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Oskarshamn site investigation

Revision of borehole deviation measurements in Oskarshamn

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Data in SKB's database can be changed for different reasons. Minor changes in SKB's database will not necessarily result in a revised report. Data revisions may also be presented as supplements, available at www.skb.se.

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Abstract

Within the scope of SKB's site investigations, accurate borehole deviation measurements are crucial for allotting data from different surveys of borehole logging correct positions in space. Because full-scale calibration of the deviation logging equipment is normally not possible, the only available measure of quality is repeatability, i.e. a comparison of several deviation loggings in the same borehole.

In connection with a major quality revision (autumn 2006 to early spring 2007) regarding orientation of geological objects (fractures, rock contacts etc) a reassessment of the reliability of deviation measurements was made. Some problems with low repeatability and some problems with correct length measurements when using the standard method for deviation measurements caused a decision to introduce a new strategy. This new strategy implies the possibility to combine several deviation measurements.

Another important result of the revision is the introduction of an uncertainty of a deviation measurement. The uncertainty is presented both as uncertainties of inclination and bearing, and in geometrical terms as an "uncertainty cone" around each borehole.

This document reports the results gained by the revision of the borehole deviation measurements in Oskarshamn.

Sammanfattning

I SKB:s platsundersökningar är noggranna krökningsmätningar av borrhål avgörande för en geometrisk korrekt placering av resultaten från olika borrhålsundersökningar. Eftersom en instrumentkontroll i full skala inte har varit möjlig, återstår en jämförelse av upprepade mätningar i samma borrhål som det enda kvalitetsmåttet.

I samband med en revision (hösten 2006 och våren 2007) kring orienteringen av geologiska objekt (sprickor, bergkontakter m m), omvärderades tillförlitligheten av krökningsmätningarna. Den hittills använda standardmetoden för krökningsmätningar visade sig ha problem med låg repeterbarhet och problem med längdmätningen. Detta föranledde introduktionen av en ny strategi, som möjliggör en kombination av flera oberoende krökningsmätningar.

Ett annat viktigt resultat av revisionen är introduktionen av ett mått på onoggrannheten av krökningsmätningar. Onoggrannheten presenteras som en individuell onoggrannhet av inklination och bäring, men också i geometriska termer som en konisk ”strut” kring borrhålsaxeln.

I denna rapport presenteras resultatet av revisionen av krökningsmätningar utförda inom Platsundersökning Oskarshamn.

Contents

1 Introduction

Within the scope of SKB's site investigations accurate borehole deviation measurements are crucial for allotting data from different surveys of borehole logging correct positions in space.

Full-scale calibration of the deviation logging equipment has not been possible, except for some minor verification tests in a short borehole located on Äspö (KAS13), extending from the ground surface to 256 m borehole length where the break through was located in the Äspö-tunnel. As a result of this fact, the only available measure of quality is repeatability, i.e. a comparison of several deviation loggings in the same borehole.

Within the site investigation project (from 2002 to 2007) two types of instrumentation for borehole deviation measurements have routinely been applied:

- Optical tool
- Magnetometer/accelerometer based tools

In most core-drilled boreholes in Oskarshamn both methods have been applied. Furthermore, repeated measurements with both types of instruments have been performed in many of the boreholes. In a few core-drilled boreholes and some percussion-drilled boreholes deviation data from other equipment (e.g. Acoustic Televiewer) has been used.

Regarding core-drilled boreholes, two boreholes were measured with one Boremac logging (executed 1988 and 1993 respectively), one borehole was measured with one Optical tool logging (Maxibor), 20 boreholes (borehole length less than 200 m) were measured with two magnetometer/accelerometer loggings and 16 boreholes were measured with one or two loggings with both methods.

Regarding percussion-drilled boreholes in Oskarshamn 13 boreholes were measured with one magnetometer/accelerometer-logging (Flexit), 15 boreholes were measured with Acoustic or Optical Televiewer. Nine percussion-drilled boreholes, which were drilled in 1987, were measured with an inclinometer/magnetometer (compass) based method (Boremac). Six boreholes were not measured at all, only the starting direction (inclination and bearing) was measured.

Initially, the deviation measurements based upon the optical tool were used for calculating the resulting deviation files for the core-drilled boreholes. In connection with a major quality revision (autumn 2006 to early spring 2007) regarding orientation of geological objects (fractures, rock contacts etc) a reassessment of the reliability of deviation measurements was made. Some problems with low repeatability and some problems with length measurements when using the optical tool, caused a decision to introduce a new strategy. This new strategy implies the possibility to combine several deviation measurements and gives a quantification of the uncertainty.

This document reports the results gained by the revision of the borehole deviation measurements in Oskarshamn.

As a result of the revision, a new strategy is applied in Sicada for handling borehole deviation data: several deviation logging activities can now be combined through a "running median algorithm" to define new deviation data. The recipe for combining different logging files is given in an "EG154-file", which describes which borehole length intervals from different deviation loggings that should be included in the calculation.

Another important result of the revision is the introduction of an uncertainty of measurement. All deviation loggings which are not ERROR-marked are used to calculate the differences from the new calculated deviation file. This implies that the uncertainty calculation may be based on more deviation loggings than those specified in the "EG154"-file. The 90th percentile value of these differences is used as a measure of the uncertainties of inclination and bearing.

The new deviation calculations, based upon this revision, are all stored in Sicada, and they are traceable by the borehole ID codes.

Original data from the reported activity are stored in the primary database Sicada, where they are traceable by the borehole ID codes. Only data in SKB's databases are accepted for further interpretation and modelling. The data presented in this report are regarded as copies of the original data. Data in the databases may be revised, if needed. Such revisions will not necessarily result in a revision of the P-report, although the normal procedure is that major data revisions entail a revision of the P-report. Minor data revisions are normally presented as supplements, available at www.skb.se.

1.1 Nomenclature

Table 1-1 describes the nomenclature used in this report and Table 1-2 presents some symbols and abbreviations.

Table 1-1. Nomenclature used in this report.

Inclination	In this context, the angle between the borehole length axis and the horizontal plane. Another term sometimes used is Dip.
Bearing	In this context, the direction of the borehole in relation to geographic north. Another term sometimes used is Azimuth.
Declination	In this context the magnetic declination, which at any point on the Earth is the angle between the local magnetic field (compass north) and geographic north.
Sicada	The database of SKB.
ERROR-marked	A term used in Sicada to indicate that data are not accessible.
In_Use-flagged	Among several activities in Sicada only one can be In_Use-flagged (e.g. one deviation logging per borehole). Only data from this particular activity can be used.

Table 1-2. Symbols, definitions and abbreviations used in this report.

I	Inclination of borehole, measured in degrees.
ΔI	Inclination uncertainty, measured in degrees.
B	Bearing of the borehole, measured in degrees.
ΔB	Bearing uncertainty, measured in degrees.
Δr	Radius uncertainty, defined as the radial uncertainty (in metres) of the borehole coordinates (perpendicular to the borehole axis) at a particular borehole length.
ΔZ	Elevation uncertainty, defined as the vertical uncertainty (in metres) of the borehole coordinates at a particular borehole length.
BHL	Borehole length. Sometimes also denoted L (e.g. equation 4-1 and 4-2)
Elev.	Elevation, measured in metres above sea level according to RHB70.
TOC	Top Of Casing.

2 Objective and scope

The objective with deviation measurements is to calculate the deviation of a borehole as a function of borehole length to achive geometrical data of the borehole, e.g. X-, Y-, and Z-coordinates for points with a predetermined interval along the borehole. As it is only possible to assign coordinates only to a limited number of points the intermediate borehole sections are interpolated between the coordinates of the points and extrapolated to the end of the borehole from the last point assigned coordinates.

Accurate deviation measurements are crucial for the interpretation of other borehole investigations. In an internal PM (SKB ID 1063373), sources of errors were identified, and it was recommended to access an estimate of uncertainties as well. As a result, a review of all borehole deviation measurements was initiated.

This report describes the outcome of the revision.

3 Equipment

3.1 Description of equipment/interpretation tools

3.1.1 Description and principles of magnetometer/accelerometer based tools

Table 3-1 lists the specifications of the magnetometer/accelerometer based deviation logging tool used together with the quantities measured. The Flexit Multi Smart equipment is manufactured by the company Flexit AB[1].

Only the two parameters Inclination and Bearing are relevant in the deviation measurements. The other quantities are used internally in the software. The magnetic field strength and the magnetic field inclination are used to identify and eliminate readings affected by magnetic disturbances.

Data handling and quality assurance for Flexit Multi Smart is performed in the software MeasureIT version 2.0, and the software DisplayIT version 2.0 is used for presentation of deviation loggings.

3.1.2 Description and principles of the optical tool

The optical tool used by SKB is denoted “Maxibor I” and is manufactured by the company Reflex Instrument AB[1]. The Maxibor tool measures the curvature of consecutive borehole segments by optical principles. In this way, the derivative of the borehole deviation is measured. It is claimed by the manufacturer that the resulting accuracy of the deviation logging is 1:1000.

Data handling, quality assurance and presentation of deviation loggings for Reflex Maxibor are performed in the software MAXIBOR MX PC, version 1.23.

Table 3-1. Specifications of the magnetometer/accelerometer based tool used.

Specification	Flexit Multi Smart*
Diameter	31.7 mm
Probe length	840 mm
Inclination	0° to –90°
Bearing	0° to 360°
Magnetic field strength	50,000 to 100,000 nT
Magnetic field inclination	0° to 90°
Gravity roll angle (rotation of probe in inclined boreholes)	0° to 360°
Magnetic toolface angle (rotation of probe in near-vertical boreholes)	0° to 360°
Inclination accuracy	± 0.2°
Bearing accuracy	± 0.3°
Magnetic field strength accuracy	± 50 nT
Tool face accuracy (grav/mag)	± 0.2° / ± 0.3°

* Specifications for Flexit are taken from SKB PIR-04-03, SKB internal document.

[1] Flexit AB and Reflex Instrument AB are both owned by the Australian company Imdex Limited.

3.1.3 Description and principles of the Acoustic Televiewer

High resolution Acoustic Televiewer (HiRAT) gives an acoustic image of traveltime and amplitude of the borehole wall and is not primarly designed for being a deviation tool. The tool is manufactured by Robertson Geologging Ltd. The specification of the tool is presented in Table 3-2. For orientation of the images the tool uses one triaxional magnetometer and one triaxional accelerometer. The magnetometer and accelerometer gives the orientation of the tool, e.g. bearing and inclination. The tool is sensible to magnetic objects, e.g. steel casings and magnetic objects in the rock disturbing the magnetic field. The borehole Optical Televiewer was used in three boreholes due to the fact that the Acoustic Televiewer was not available. The diameter of the tool is 50 mm and the length is 1,510 mm. The specification is otherwise the same as for the Acoustic Televiewer. The tool uses a digital camera to get an optical image of the borehole wall.

3.1.4 Description and principles of Boremac

Boremac is an instrument that was manufactured by ABEM based on a concept originally developed by Geological Survey of Sweden for deviation measurements in ore prospecting boreholes. The probe was operated by SGAB in Laxemar in 1987 in 9 percussion drilled boreholes and also in KLX01 in 1988 and in KLX02 in 1993. The probe was constructed with a compass to register the deviation of the earth magnetic field and an inclinometer to register the inclination of the borehole relative to gravity. The resulting accuracy of bearing and inclination is not known but the measuring resolution was ± 1.0° for bearing and ± 0.1° for inclination. The tool is sensible to magnetic objects, e.g. steel casings and magnetic objects in the rock disturbing the magnetic field.

Table 3-2. Specification of the Acoustic Televiewer used.

Specification	Acoustic Televiewer RG 25 112 000*
Diameter	45.0 mm
Probe length	1,980 mm
Inclination	0° to –90°
Bearing	0° to 360°
Magnetic field strength	N/A
Magnetic field inclination	N/A
Gravity roll angle (rotation of probe in inclined boreholes)	N/A
Magnetic toolface angle (rotation of probe in near-vertical boreholes)	N/A
Inclination accuracy	± 0.5°
Bearing accuracy	± 1.0°
Magnetic field strength accuracy	N/A
Tool face accuracy (grav/mag)	N/A

* Specifications for Acoustic Televiewer are taken from SKB PIR-04-03, SKB internal document. N/A indicates that information is not available.

4 Execution

4.1 Preparations

Before performing deviation logging, the TOC (Top Of Casing) of the borehole needs to be surveyed for the coordinates (Northing, Easting and Elevation) in RT90/RHB70. The coordinates are used in calculating the borehole deviation.

Furthermore, before performing Maxibor measurements, the inclination and bearing at TOC and at 3 m BHL need to be determined. These are used as starting values in the Maxibor survey.

4.2 Execution of field work

In general, two deviation loggings are performed with 3 m point interval, one in downward and one in upward direction. Furthermore, as a general principle in core-drilled boreholes, at least two independent measurement methods were applied to allow for quality checking.

In accordance with the method description SKB MD 224.001 version 1.0[2], the optical method (Maxibor) should be used for deviation logging of core-drilled boreholes, and a magnetic/accelerometer method (Flexit or Reflex) in percussion-drilled holes. Until December 2006, this was the procedure applied at the site investigations at Forsmark and Simpevarp/Laxemar in Oskarshamn.

4.2.1 Logging with Flexit Smart Tool

Initially, the Flexit Smart Tool is set up with the predefined borehole parameters, e.g. borehole ID, date and time, reading interval, time interval between readings etc. The equipment is hanging in a wire and is lowered into the borehole with an electrically powered winch.

The probe and the hand held computer have internal electronic clocks that synchronise with each other. When the probe is positioned at a predefined length, the operator waits for the measurement to be executed before lowering to the next length position. In general, deviation logging is performed every 3 m in both downward and upward direction.

Figure 4-1 shows a photography of the equipment.

4.2.2 Logging with Maxibor

In the boreholes KLX03, KLX04 and KLX06, the Maxibor tool was centralized and lowered inside the drill string, using a wire. Furthermore, the starting point for the loggings was 3.0 m above the TOC. Two different Maxibor measurements were performed in borehole KLX06, one was merged with partial measurements and the other was executed as a complete borehole measurement. The result from these two measurements were sent to Reflex Instrument AB, the manufacturer of the Maxibor, and the result from their analyses indicated bad rotation of the instrument, between the measurement levels in the borehole, especially for the complete borehole measurement. Figure 4-2 shows the bearing results from these two measurements compared to the two Flexit measurements. Only the merged measurement was delivered to Sicada.

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[2] Internal SKB document.

Figure 4-1. Flexit Smart Tool System.

As a first test in borehole KLX05 and from borehole KLX07A, May 2005, the Maxibor was centralized in the borehole by a barrel, mounted on lower end of the drill string, and the starting point for the Maxibor logging was at 3 m borehole length. This procedure gives more accurate length measurements and makes it possible to rotate the instrument between the measuring levels, which is believed to improve the quality of the logging.

Data communication in the Maxibor system is similar as for the Flexit Smart Tool System. Initially, the Maxibor probe is set up with the predefined borehole parameters, e.g. borehole ID, date and time, time interval between readings etc. When mounting the complete probe consisting of accumulator, camera and lenses, the measuring interval is defined, normally 3 m.

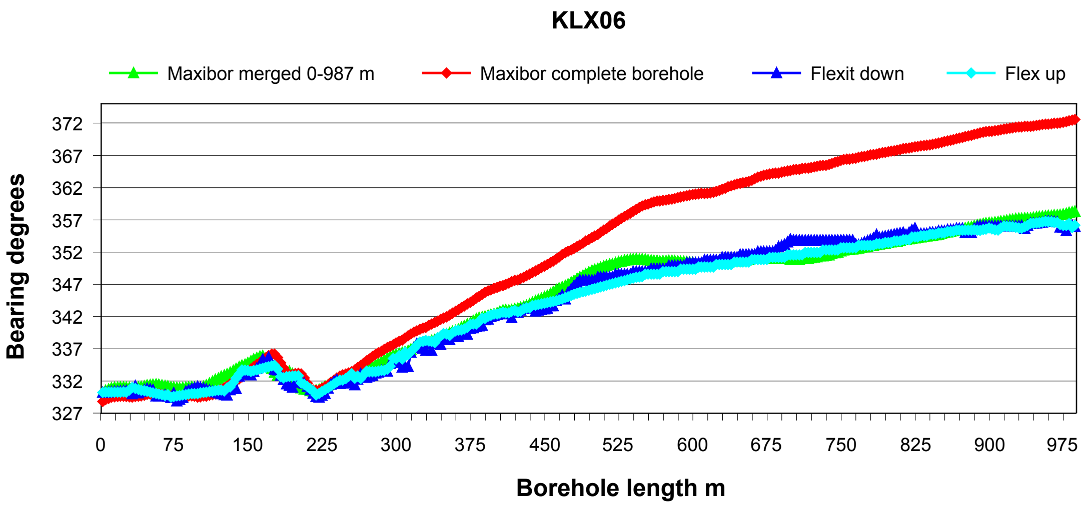


Figure 4-2. Comparison of the bearing result from different measurements in KLX06.

The Maxibor probe and the computer have internal electronic clocks that synchronise with each other, and when the probe is positioned at a predefined length, the operator is waiting for the measurement to be executed before lowering to the next 3 m station. In general, deviation logging is performed every 3 m in both downward and upward direction.

4.2.3 Logging with Acoustic Televiewer

The Acoustic Televiewer is set up with the predefined borehole parameters, e.g. borehole ID and date and time. The equipment is hanging in a wire and is lowered into the borehole with an electrically powered winch. The logging is performed continiously in upward direction. Readings are taken every 0.1 m. The logging velocity is 2 m/min for high resolution in the images but the tool has normally been operated with 10 m/min in order to locate length marks every 50 metres in the borehole mainly for length adjustment and cross-correlation of natural gamma with other tools.

4.2.4 Logging with Boremac

The logging with Boremac is similar to logging with the Flexit tool but the readings, e.g. length, deviation and inclination was manually written on a protocol. The equipment was hanging in a wire and was lowered into the borehole with an electrically powered winch. In the percussion drilled boreholes the winch was manually operated. In the 9 percussion-drilled boreholes the deviation logging was performed every 1 m from TOC down to 50 m and then every 10th m down to the bottom of the borehole. The core-drilled borehole KLX01 was logged every 10th m from TOC to 690 m and KLX02 was logged every 10th or 20th m from TOC to 1,443 m respectively.

4.3 Data handling/post processing of measured data

4.3.1 Magnetometer/accelerometer methods

For magnetometer/accelerometer deviation measurements it is crucial to eliminate anomalies, caused by e.g. magnetic disturbances.

Figure 4-3 illustrates an example of the quality checking of Flexit data from KLX12A. At locations where the magnetic field intensity deviates more than 1,000 nT from the mean value in Laxemar (49,000 nT) or if the magnetic dip deviates more than 1.5° from the mean value (72°), data are excluded and replaced by a linear interpolation.

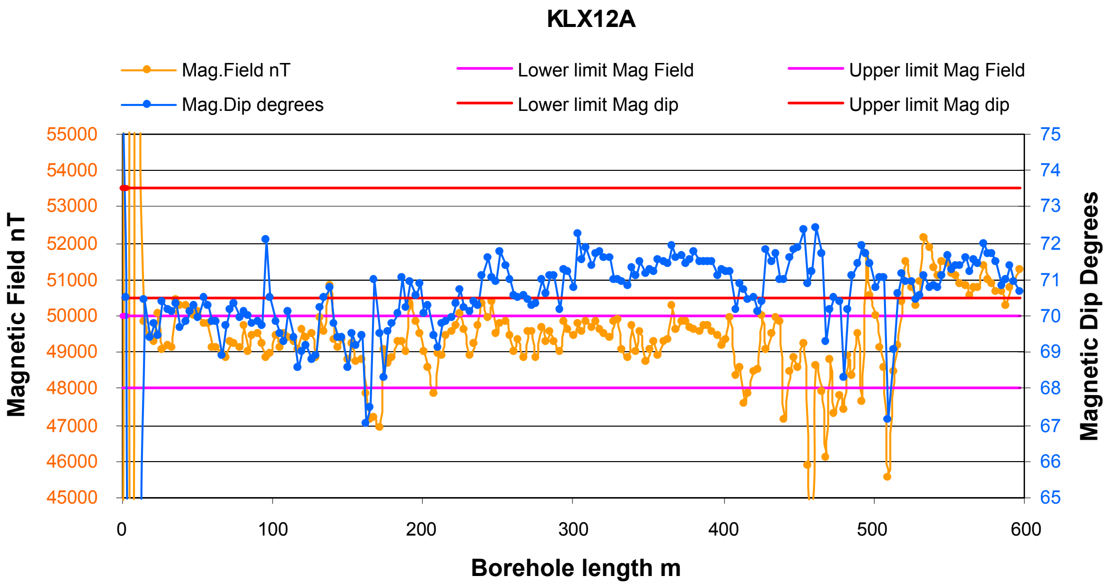


Figure 4-3. *Example of quality checking of Flexit data from KLX12A. Readings exceeding the treshold values are excluded from the calculations.*

Figures 4-4 show Flexit raw data respectively data adjusted for magnetic disturbances in borehole KLX12A.

The metallic casing in the upper part of the boreholes makes magnetic measurements unreliable. Therefore, bearing readings in the casing are always excluded from TOC to at least 12 m below the casing and replaced by a linear interpolation. Processing is performed with the software described in Section 3.1.1.

Measurements with magnetic/accelerometer tools are effected not only by magnetic anomalies in the rock surrounding the borehole, but also by external sources to varying magnetic field. The geomagnetic field is normally considered as constant over time, but in fact contains disturbances. The most common disturbance is fluctuations caused by storms of charged particles from the sun. These storms cause large current loops in the earth ionosphere, and as a consequence of that, magnetic field variations on the earth surface. These variations can cause variations of the magnetic declination of several degrees, and need to be taken into account when measuring the bearing with magnetometer based methods.

Figure 4-5 shows data from the geomagnetic observatory in Uppsala from a day with strong disturbances and from a "quiet" day with only very small disturbances.

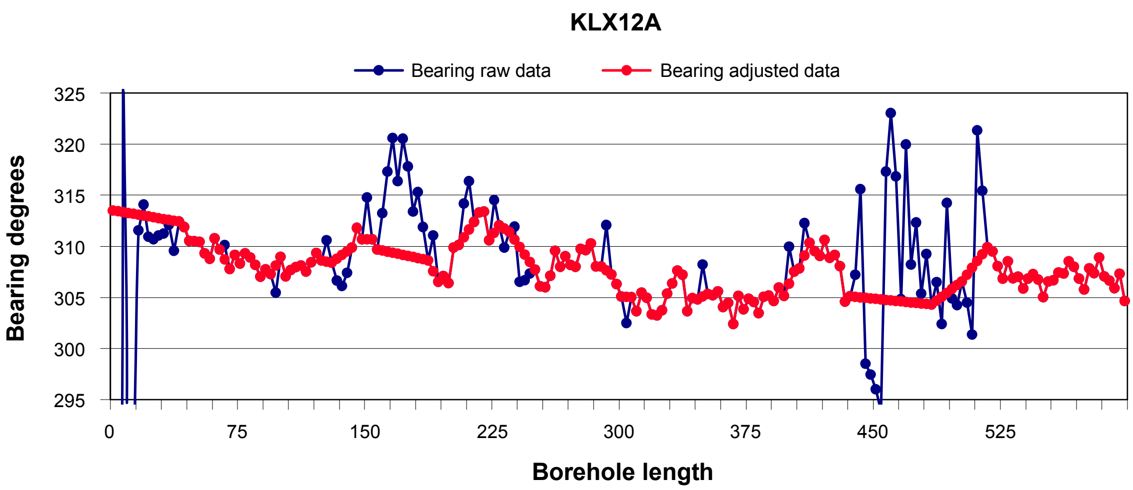


Figure 4-4. *Raw data and adjusted data (bearing) from KLX12A.*

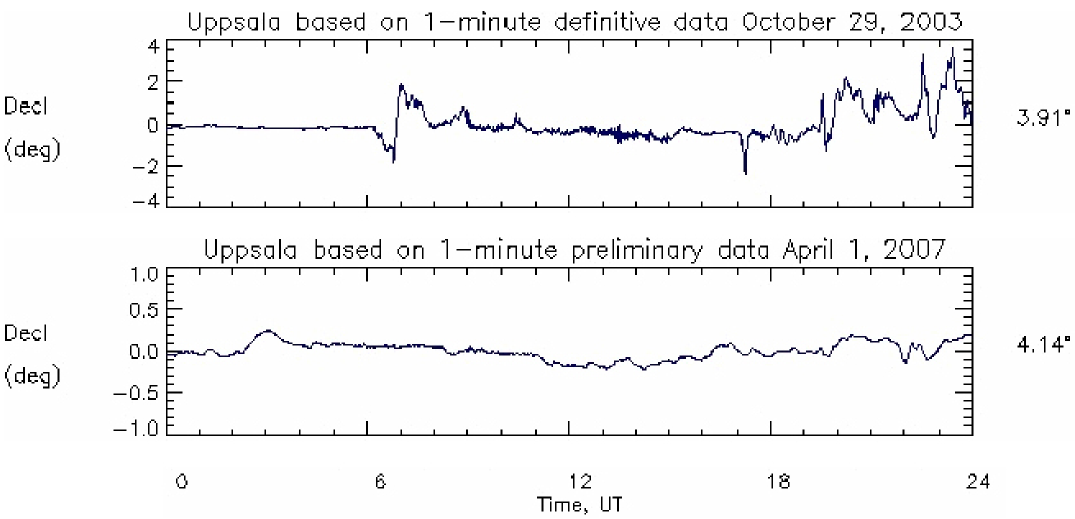


Figure 4-5. *The magnetic declination as observed at the geomagnetic observatory in Uppsala. The upper diagram shows data from a day with considerable disturbances, whereas the lower diagram displays data from a typical day with only small variations. Diagrams are taken from www.intermagnet.org.*

The geomagnetic data are available at *www.intermagnet.org* with a delay of one day. The procedure is to accept a magnetometer/accelerometer logging if the fluctuations in the declination of the geomagnetic data do not exceed 0.5 deg. If the fluctuations exceed 0.5 deg the deviation logging should be ERROR-marked, and a new logging has to be conducted. The geomagnetic data are displayed in the appendices for each magnetometer/accelerometer logging.

4.3.2 Optical method

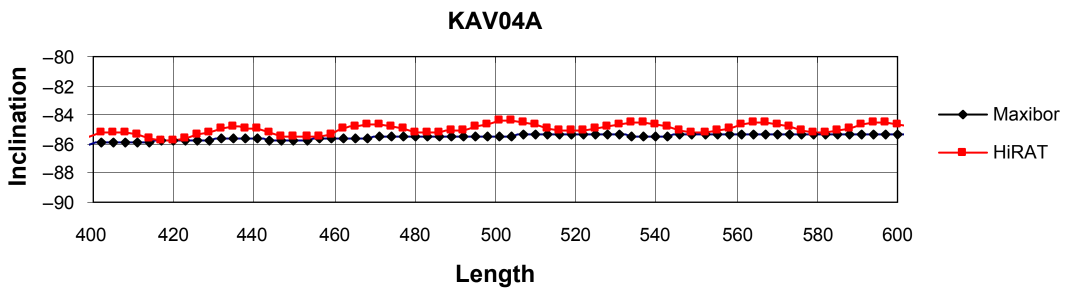
When applying the optical method, the calculation of the deviation file needs not only the TOC coordinates, but also the directions (bearing and inclination) of the instrument at TOC are needed. After implementation of the improved logging procedure in May 2005 the starting direction values for the Maxibor (at 3 m borehole length) were calculated from the TOC direction values (from the borehole direction survey), in accordance with SKB ID 1037594[3].

In some boreholes several deviation measurements have been performed during the drilling. Some of these "partial" measurements start at a certain borehole length, and become a continuation of an earlier deviation logging. The starting coordinates and directions for the new partial logging are taken from the last value of the former deviation logging for the corresponding borehole length.

4.3.3 Acoustic Televiewer

In boreholes logged with the Acoustic Televiewer a 31 point median filter was used to reduce oscillation in the bearing. Example of the oscillation of the bearing for borehole KAV04A is shown in Figure 4-6.

It can be observed that the inclination varies between 1–2° and the bearing varies up to 10° with a wavelength of 30–35 m. This is probably due to rotation of the probe while taking readings and the fact that electrical wires are positioned nearby the accelerometer and magnetometer.



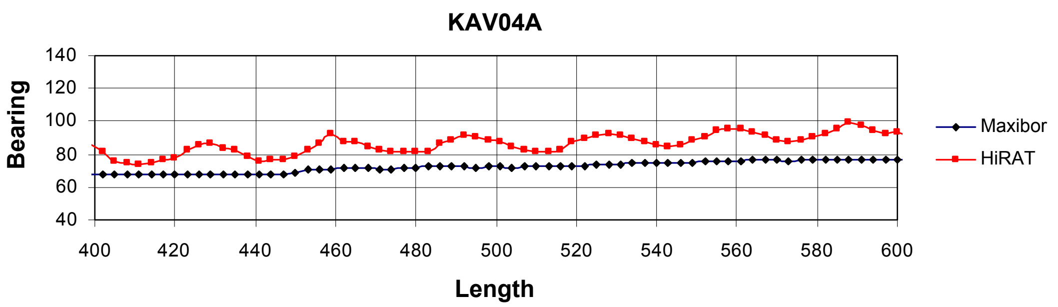


Figure 4-6. *Inclination and bearing for Acoustic Televiewer in the borehole KAV04A between 400 and 600 m compared with Maxibor.*

[3] Internal SKB document.

4.3.4 Boremac

In the 9 percussion drilled boreholes the deviation logging was performed every 1 m from TOC down to 50 m and then every 10th m down to the bottom of the borehole. The core-drilled borehole KLX01 was logged every 10th to 690 m and KLX02 was logged every 10th or 20th m from TOC to 1,443 m in KLX02 respectively. Postprocessing was performed by interpolation of data for every 1 m in the part which was logged only every 10th or 20th metre.

4.3.5 Boreholes without deviation measurements

Six boreholes were not measured by any deviation method at all. Only the starting direction (inclination and bearing) was measured. An extrapolation of a straight line, based on the starting direction, is automatically performed in Sicada.

4.4 Borehole deviations

A borehole deviation file is a list of coordinates (X, Y, Z), normally given for every 3rd metre along the borehole. The coordinates are calculated from the bearing and inclination readings along the borehole, by means of simple geometrical formulas. The basis for the calculation is the coordinates (X_0, Y_0, Z_0) at TOC.

4.4.1 "Initial" procedure (before revision) for calculation of borehole deviation

Before the revision, one of the actual deviation loggings was selected as the In_Use-flagged file. In the core-drilled boreholes normally the deviation logging measured with the optical tool was used.

As an example, Table 4-1 shows the deviation logging activities in Sicada before the revision. The activity with ID 13077619 was In_Use-flagged (Flag = I), and thereby used for calculating the borehole coordinates.

Table 4-1. Deviation logging activities in KLX05 before the revision. The deviation logging with the optical tool, activity ID 13077619, was In_Use-flagged.

Activity ID	Activity type code	Activity	Start date	Secup (m)	Seclow (m)	Flags*
13055515	EG156	Maxibor measurement	2004-10-22 00:00	0.00	294.00	F
13055519	EG156	Maxibor measurement	2004-10-29 00:00	0.00	408.00	F
13055521	EG156	Maxibor measurement	2004-11-03 00:00	0.00	489.00	F
13055601	EG156	Maxibor measurement	2004-11-10 00:00	0.00	546.00	F
13059939	EG156	Maxibor measurement	2004-11-21 08:30	0.00	630.00	F
13066203	EG156	Maxibor measurement	2005-01-23 07:23	15.00	941.00	F
13074897	EG156	Maxibor measurement	2005-03-13 00:00	15.00	981.00	F
13077619	EG156	Maxibor measurement	2005-07-07 00:00	0.00	981.00	IF
13076130	EG157	Magnetic – accelerometer measurement	2005-05-19 19:13	0.00	990.00	F

* The meaning of the flag codes in this and other Sicada tables are as follows: I (In_use), F (data in the Sicada file archive), C (a written comment is saved in Sicada).

4.4.2 New procedure (after revision) for calculation of borehole deviation

As a result of the deviation data revision, a new procedure for calculating deviation data of a borehole, based on one or several measurements performed in the borehole, has been applied. The resulting deviation file is calculated as the median value of the inclination- and bearing-values in the deviation activities specified in the EG154-file.

A general strategy for including deviation activities in the EG154-specifications has been specified by a working group[4], responsible for the implementation of the revision of the deviation measurements. This general strategy is as follows:

- Inclination values from all approved magnetic/accelerometer based loggings are included, from TOC to the bottom of the borehole.
- Bearing values from all approved magnetic/accelerometer based loggings are included from 3–12 m below the end of the casing to the bottom of the borehole.
- Bearing values from all approved optical tool measurements are included from 3 m below TOC to the bottom of the borehole.
- In boreholes where no magnetic/accelerometer based deviation logging exists, one or multiple approved loggings with the optical tool are used.

The decision of which measurements to be included is however always subject to an expert judgment and the decision is documented in the Sicada database. In the appendices the details for each borehole are specified.

As an example, Table 4-2 shows the deviation logging activities in KLX05 after the revision. The newly constructed EG154-activity is now In_Use-flagged. The content of this file is shown in Table 4-3. As seen in this example, for the bearing two loggings with the magnetic/accelerometer tool are used from 30 to 60 m (between casing and cone) and from 123 m borehole length (below cone), together with the optical logging from 3 m borehole length.

Table 4-2. Deviation logging activities in KLX05 after the revision. The constructed deviation "EG154" is In_Use-flagged.

Activity ID	Activity type code	Activity	Start date	Secup (m)	Seclow (m)	Flags
13055515	EG156	Maxibor measurement	2004-10-22 10:00	0.00	294.00	ECF
13055519	EG156	Maxibor measurement	2004-10-29 08:30	0.00	408.00	ECF
13055521	EG156	Maxibor measurement	2004-11-03 10:00	0.00	489.00	ECF
13055601	EG156	Maxibor measurement	2004-11-10 14:00	0.00	546.00	ECF
13059939	EG156	Maxibor measurement	2004-11-21 08:30	0.00	630.00	ECF
13066203	EG156	Maxibor measurement	2005-01-23 07:23	0.00	990.00	ECF
13073086	EG157	Magnetic – accelerometer measurement	2005-03-13 00:00	0.00	984.00	E
13074897	EG156	Maxibor measurement	2005-03-13 06:00	15.00	981.00	ECF
13076130	EG157	Magnetic – accelerometer measurement	2005-05-19 19:13	0.00	990.00	CF
13138349	EG157	Magnetic – accelerometer measurement	2005-05-19 21:57	0.00	990.00	CF
13077619	EG156	Maxibor measurement	2005-07-07 00:00	0.00	981.00	CF
13144262	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

[4] The group was headed by Karl-Erik Almén. The other participants were Lennart Ekman, Nils Håkansson, Göran Nilsson, Johan Nissen, Stefan Sehlstedt, Leif Stenberg and Martin Stigsson.

Table 4-3. The EG154-specification in borehole KLX05.

Deviation activity ID	Deviation angle type	Approved secup (m)	Approved seclow (m)
13076130	BEARING	30.00	60.00
13076130	BEARING	123.00	981.00
13076130	INCLINATION	3.00	981.00
13077619	BEARING	3.00	981.00
13138349	BEARING	30.00	60.00
13138349	BEARING	123.00	981.00
13138349	INCLINATION	3.00	981.00

For the inclination the two magnetic/accelerometer loggings from 3 m borehole length are used. An automatic interpolation in Sicada is performed between TOC and 3 m. The resulting bearing and inclination from this example are shown in Figure 4-7. In most of the boreholes, however, the inclination readings from the magnetometer/accelerometer tool are used in the upper part of the borehole with casing, and only the bearing readings are replaced by interpolated values.

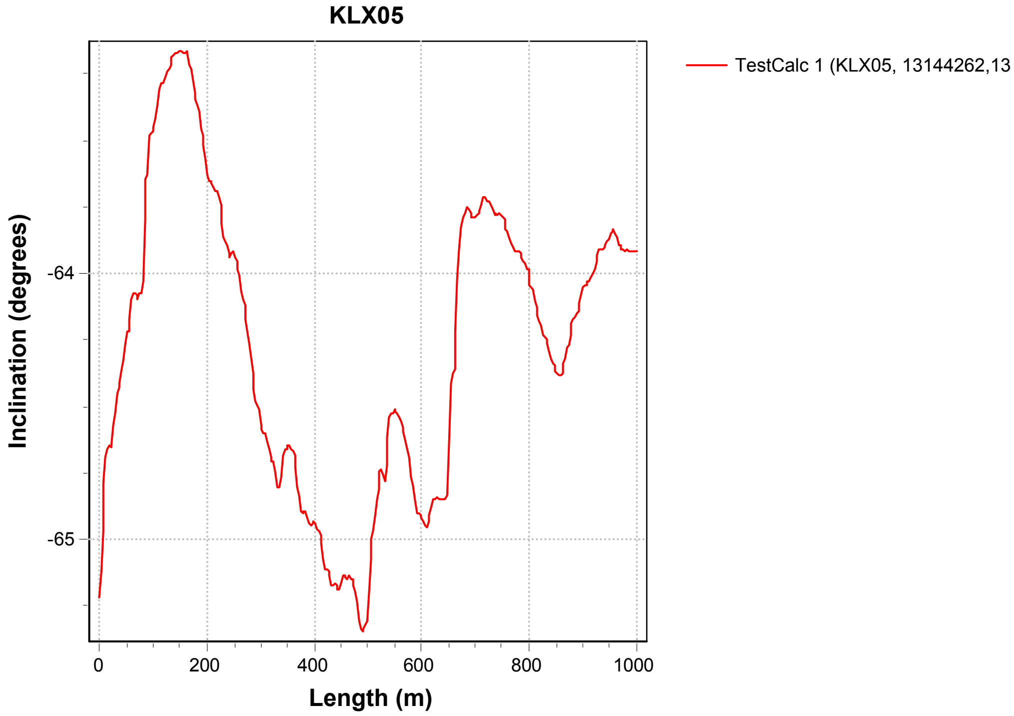
The median values for inclination and bearing are calculated as the median values from the specified activities at each 3 m borehole length, including the surrounding values within ± 4.5 m borehole length. As an example, if the EG154-file specifies three logging activities, then each new value is calculated as the median value of 9 readings of inclination and bearing respectively. This procedure is implemented in Sicada.

4.4.3 Estimation of uncertainties in borehole deviation loggings

The starting point in the calculation of deviation logging uncertainties is an estimate of the uncertainties of the measured quantities. The inclination- and bearing uncertainties are calculated as the 90th percentile of the whole population of differences between the new calculated deviation file (EG154 according to section 4.4.2) and all other deviation activities which are not ERROR-marked. This procedure is also included in Sicada. In boreholes with only one deviation activity, these uncertainties cannot be calculated. In these cases fixed values, defined as the maximum values from all core-drilled boreholes at Laxemar (except KLX15A and KLX16A which have been drilled after the revision) of the inclination uncertainty and the bearing uncertainty respectively are used. The values used are $\Delta I = 1.8°$ and $\Delta B = 4.9°$. For Boremac measurements the values used for inclination uncertainty and bearing uncertainty are $\Delta I = 3.0°$ and $\Delta B = 6.0°$. This assumption was based on expert judgement and comparison with straight line extrapolation, taking into account half the maximum values of uncertainty from the concerned boreholes.

For the boreholes which was not measured by any deviation method at all the uncertainty in inclination is calculated according to: $-0.000092 \cdot (BHL)^2 + 0.049 \cdot BHL + 1.16 + 1.8$. The uncertainty in bearing is calculated according to: $0.05 \cdot BHL + 2.5 + 4.9$ for borehole lengths ≤ 100 m and 7.5+4.9 (i.e. a constant value of 12.4) for borehole lengths between 100 and 200 m.

A useful representation of the uncertainties involved in deviation logging is the "radius uncertainty", defined as the radius (of a circle located in a plane perpendicular to the borehole axis) corresponding to the inclination- and bearing uncertainties. This quantity is a direct measure (in metres) of the uncertainty of the borehole location, and defines the shape of a cone surrounding the borehole.



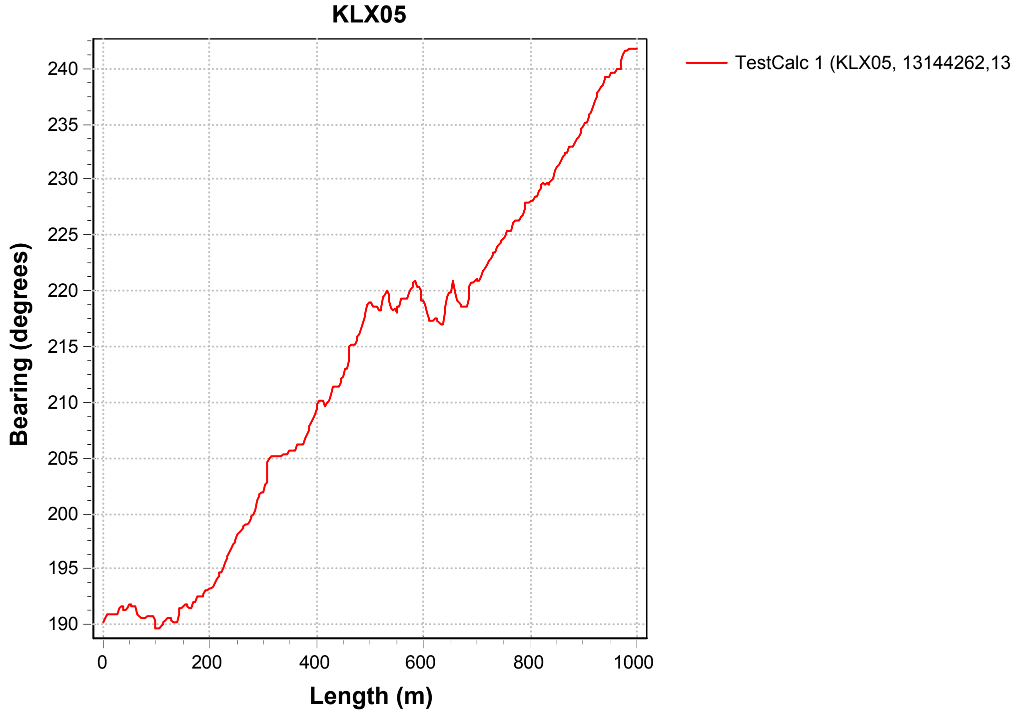


Figure 4-7. *Resulting deviation (inclination and bearing) in KLX05 after the revision.*

The radius uncertainty is estimated as stated in equation (4-1).

$$\Delta r_n = \sum_{i=1}^{n} (L_i - L_{i-1}) \cdot MAX\{\sin(\Delta I); \sin(\Delta B) \cdot \cos(I_i)\} \qquad (4\text{-}1)$$

where L_i is the borehole length at measurement position i. This quantity is calculated automatically in Sicada.

Figure 4-8 shows the resulting radius uncertainty in KLX05, as calculated by equation (4-1). Figure 4-9 illustrates the interpretation of the radius uncertainties as "uncertainty cones" around the borehole axis in four boreholes.

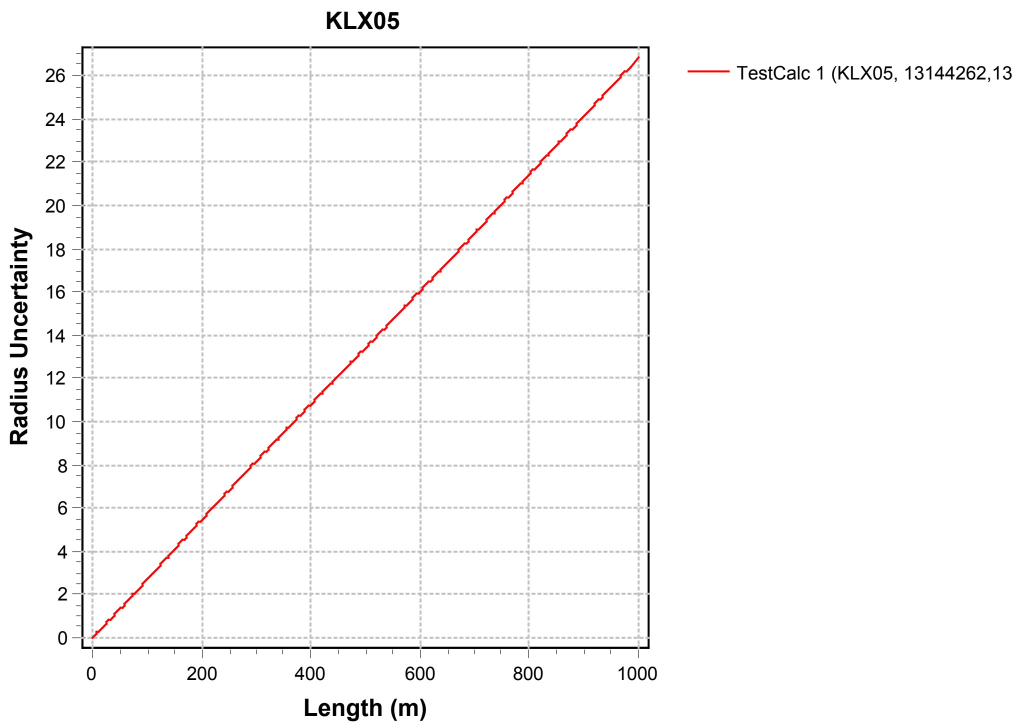


Figure 4-8. *The calculated radius uncertainty in KLX05 according to equation (4-1).*

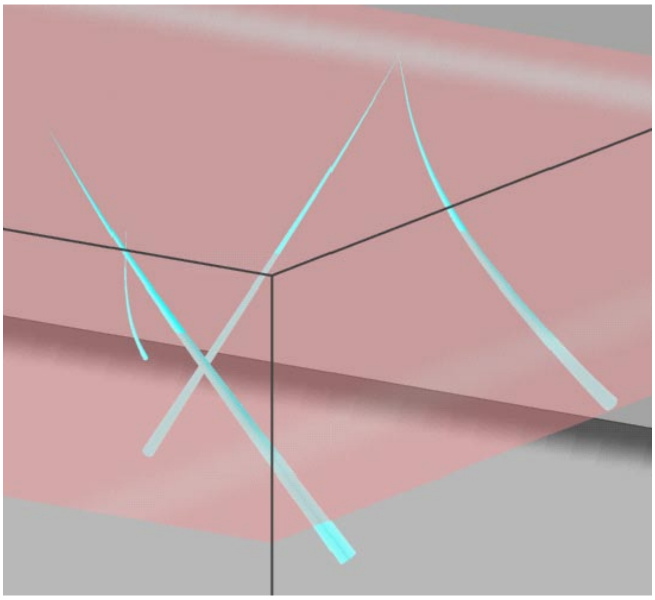


Figure 4-9. *Example showing four different boreholes. The radius uncertainties are represented as "uncertainty cones" around each borehole axis.*

Another useful quantity is the elevation uncertainty. Although it can be calculated by projecting the radius uncertainty (4-1) onto the vertical plane, this is a rather pessimistic estimate. Due to the fact that the elevation uncertainty only depends upon the inclination uncertainty, a more realistic estimate can be calculated as equation (4-2)[5].

$$\Delta Z_n = \sum_{i=1}^{n} (L_i - L_{i-1}) \cdot \sin(\Delta I) \cdot \cos(I_i) \qquad (4\text{-}2)$$

The elevation uncertainty is not calculated by Sicada, but is to be calculated by equation (4-2) when needed. In Chapter 5, Tables 5-1 and 5-2, deviation uncertainty values are listed at the bottom of each borehole, and in the appendices values are listed for every approximately 100 m or 20 m elevation for core-drilled boreholes and percussion-drilled boreholes respectively.

[5] Equation (4-2) can be proved by considering a segment of unit length of the borehole with inclination I_i (measured from horizontal) together with the two "extremes" (I_i–ΔI) and (I_i+ΔI). The corresponding extremes in elevation are $Z_1 = \sin(I_i - \Delta I)$ and $Z_2 = \sin(I_i + \Delta I)$. The contribution to elevation uncertainty from this segment is thus $\Delta Z_i = ½ |Z_1 – Z_2|$. Equation (4-2) then follows by applying the trigonometric addition formulas, $\sin(\alpha \pm \beta) = \sin(\alpha)\cos(\beta) \pm \cos(\alpha)\sin(\beta)$.

5 Results

A detailed description of the construction of the revised deviation data for each borehole is shown in Appendix A (core-drilled boreholes) and Appendix B (percussion-drilled boreholes). For each borehole a specification of the involved deviation measurements is given, and the resulting deviation file together with the estimated uncertainties are presented.

Tables 5-1 and 5-2 present an overview of the resulting uncertainties for inclination and bearing, together with the radius uncertainty at the bottom of each borehole. Also the elevation uncertainty is calculated and presented. The elevation uncertainty is not calculated in Sicada, but it can be calculated according to equation (4-2). The tables also display the change in position at the bottom of each borehole due to the revision, i.e. between the dates 2006-12-17 and 2007-05-04. As seen, the revision caused considerable changes (more than 10 metres) in four core-drilled boreholes (KLX05, KLX09, KLX10 and KLX12A). Another reason to significant changes is due to the fact that some core-drilled boreholes were calculated as a straight line on December 17, 2006. In the percussion-drilled boreholes the revision caused only marginal changes in the position. Also, some of the percussion drilled boreholes were calculated as a straight line on December 17, 2006 which resulted in significant changes in the position of the bottom of these boreholes.

In the percussion-drilled boreholes logged with Boremac and Acoustic Televiewer only one deviation logging has been performed. In these cases standard estimates of inclination uncertainty and bearing uncertainty (according to section 4.4.3) are used. For boreholes without deviation measurement a calculation of the uncertainty has been calculated as discussed in section 4.4.3. No changes in position are calculated for these boreholes.

Table 5-1. Overview of the deviation uncertainties in all core-drilled boreholes. The inclination I is given at TOC, whereas the elevation, the radius uncertainty Δr and the elevation uncertainty ΔZ are given at the bottom of each borehole. The column "Change" displays the change in position at the bottom of each borehole due to the revision. Because the boreholes KLX15A and KLX16A were drilled after the revision, no changes in position are calculated for these boreholes.

Borehole ID	BHL [m]	Elev. [m]	I [deg]	ΔI [deg]	ΔB [deg]	Δr [m]	ΔZ [m]	Change [m]
KLX01	1,077.99	–1,059.35	–85.30	3.0	6.0	56.42	3.29	2.47
KLX02	1,700.50	–1,669.83	–85.00	3.0	6.0	89.00	10.55	5.63
KLX03	1,000.42	–952.21	–74.93	1.8	4.9	31.42	7.60	87.24*
KLX04	993.49	–964.00	–84.76	1.8	4.9	31.21	3.23	0.16
KLX05	1,000.16	–883.26	–65.22	0.55	3.545	26.86	4.17	18.42
KLX06	994.94	–787.99	–65.20	1.019	1.389	17.79	10.06	214.07*
KLX07A	884.73	–631.27	–60.04	1.005	0.575	14.82	9.43	4.75
KLX07B	200.13	–180.99	–85.15	0.145	0.86	0.51	0.04	0.39
KLX08	1,000.41	–832.82	–60.51	0.645	1.67	15.03	5.81	5.69
KLX09	880.38	–850.62	–84.94	0.99	1.76	15.21	1.81	11.59
KLX09B	100.22	–76.60	–89.83	0.178	133.447	0.34	0.001	0.13
KLX09C	120.05	–78.26	–59.52	0.085	0.820	0.91	0.09	5.44*
KLX09D	121.02	–80.57	–60.25	0.035	1.374	1.50	0.04	0.26
KLX09E	120.0	–81.06	–59.96	0.075	0.777	0.83	0.08	0.07
KLX09F	152.30	–109.96	–59.74	0.030	0.650	0.91	0.04	0.02
KLX09G	100.10	–66.90	–61.08	0.020	1.169	1.03	0.02	0.06
KLX10	1,001.20	–975.79	–85.19	0.913	6.103	15.95	1.90	12.62
KLX10B	50.25	–25.05	–59.97	0.066	1.638	0.73	0.03	0.19

Borehole ID	BHL [m]	Elev. [m]	I [deg]	ΔI [deg]	ΔB [deg]	Δr [m]	ΔZ [m]	Change [m]
KLX10C	146.25	–108.25	–60.03	0.046	0.734	0.97	0.06	6.49*
KLX11A	992.29	–910.99	–76.77	0.825	1.25	14.29	4.64	93.26*
KLX11B	100.2	–79.92	–89.93	0.095	15.017	0.24	0.001	0.75
KLX11C	120.15	–77.13	–60.73	0.030	0.620	0.65	0.03	3.27
KLX11D	120.35	–75.29	–59.00	0.030	0.882	1.01	0.03	5.92*
KLX11E	121.30	–82.05	–60.92	0.090	0.609	0.65	0.10	5.14*
KLX11F	120.05	–79.39	–61.14	0.035	0.616	0.65	0.04	0.06
KLX12A	602.29	–561.39	–75.31	0.075	1.405	4.04	0.22	12.30
KLX13A	595.85	–567.07	–82.24	0.993	2.694	10.33	1.28	7.75
KLX14A	176.27	–113.36	–49.96	0.037	0.511	1.06	0.08	8.38*
KLX15A	1,000.43	–739.99	–54.42	0.160	0.591	6.77	1.83	N/A
KLX16A	433.55	–371.44	–64.98	0.265	2.113	6.96	0.87	N/A
KLX17A	701.08	–572.47	–61.34	1.8	4.9	30.92	11.37	41.69*
KLX18A	611.28	–581.60	–82.11	0.415	0.734	4.43	0.74	3.18
KLX19A	800.07	–652.63	–57.55	0.995	0.595	13.89	7.61	9.24
KLX20A	457.92	–311.34	–50.03	0.72	0.605	5.75	3.87	3.70
KLX21A	75.00	–47.54	–50.72	0.06	1.425	1.18	0.05	1.25
KLX21B	858.78	–789.36	–70.86	0.135	3.350	18.24	0.74	32.40*
KLX22A	100.45	–64.44	–60.34	0.151	0.666	0.60	0.14	0.14
KLX22B	100.25	–65.35	–61.25	0.101	1.37	1.20	0.09	0.18
KLX23A	100.15	–64.46	–61.36	0.080	0.482	0.42	0.07	0.04
KLX23B	50.27	–21.28	–60.85	0.130	0.552	0.24	0.06	0.02
KLX24A	100.17	–63.68	–59.15	0.071	0.829	0.77	0.07	0.08
KLX25A	50.24	–20.19	–59.46	0.066	0.544	0.25	0.03	0.01
KLX26A	101.14	–71.80	–60.45	0.050	0.907	0.81	0.04	0.86
KLX26B	50.37	–27.76	–60.01	0.035	0.608	0.27	0.02	0.01
KLX28A	80.23	–58.84	–60.06	0.040	1.516	1.09	0.03	0.48
KLX29A	60.25	–38.64	–60.91	0.080	0.865	0.45	0.04	1.39

* Calculated as a straight borehole with the starting values of inclination and bearing on 2006-12-17.

Table 5-2. Overview of the deviation uncertainties in all percussion-drilled boreholes. The inclination I is given at TOC, whereas the elevation, the radius uncertainty Δr and the elevation uncertainty ΔZ are given at the bottom of each borehole. The column "Change" displays the change in position at the bottom of each borehole due to the revision. Because the boreholes HLX10, HLX11, HLX12, HLX16 and HLX20 were not measured with any deviation method, no changes in position are calculated for these boreholes.

Borehole ID	BHL [m]	Elev. [m]	I [deg]	ΔI [deg]	ΔB [deg]	Δr [m]	ΔZ [m]	Change [m]
HLX01	100.63	–78.15	–59.40	3.0	6.0	5.33	2.64	1.84
HLX02	132.00	–109.08	–59.30	3.0	6.0	6.93	3.05	2.09
HLX03	100.00	–81.94	–63.10	3.0	6.0	5.23	1.98	1.45
HLX04	125.00	–107.72	–65.20	3.0	6.0	6.54	2.12	1.54
HLX05	100.00	–72.47	–59.90	3.0	6.0	5.23	2.47	1.61
HLX06	100.00	–70.71	–58.60	3.0	6.0	5.38	2.64	1.87
HLX07	100.00	–81.85	–60.80	3.0	6.0	5.23	2.20	1.52
HLX08	40.00	–26.31	–47.80	3.0	6.0	2.93	1.47	0.61
HLX09	151.00	–131.86	–61.30	3.0	6.0	7.90	3.51	1.96
HLX10	85.00	–67.45	–68.69	6.5	11.7	9.56	3.48	N/A
HLX11	70.00	–51.97	–68.49	5.9	10.9	7.24	2.66	N/A
HLX12	31.00	–18.16	–83.88	4.4	9.0	2.37	0.25	N/A
HLX13	200.20	–148.60	–58.07	1.8	4.9	9.56	3.52	7.15*
HLX14	115.90	–90.41	–68.65	3.0	6.0	6.07	2.27	2.36
HLX15	151.90	–120.97	–58.37	1.8	4.9	7.28	2.68	0.05
HLX16	202.20	–168.00	–58.10	9.1	12.4	32.00	16.91	N/A
HLX17	202.20	–176.29	–59.49	1.8	4.9	7.90	2.90	0.02
HLX18	181.20	–148.56	–57.60	1.8	4.9	8.35	3.07	0.05
HLX19	202.20	–162.89	–57.90	1.8	4.9	9.50	3.50	0.21
HLX20	202.20	–164.60	–60.38	9.1	12.4	32.00	15.82	N/A
HLX21	150.30	–108.92	–56.99	1.8	4.9	7.81	2.87	0.01
HLX22	163.20	–118.74	–59.44	1.8	4.9	8.54	3.14	0.01
HLX23	160.20	–115.78	–58.18	1.8	4.9	7.94	2.92	0.03
HLX24	175.20	–126.96	–58.39	1.8	4.9	9.01	3.31	0.02
HLX25	202.50	–160.26	–58.59	1.8	4.9	7.68	2.83	0.04
HLX26	151.20	–115.78	–60.42	1.8	4.9	7.58	2.79	0.02
HLX27	164.70	–124.59	–59.41	1.8	4.9	8.29	3.05	0.01
HLX28	154.20	–112.81	–59.49	1.8	4.9	7.56	2.78	0.10
HLX29	12.90	–0.11	–56.96	3.6	8.0	0.98	0.44	N/A
HLX30	163.40	–134.51	–61.04	0.1	0.9	1.16	0.18	2.58
HLX31	133.20	–104.44	–58.76	1.8	4.9	5.49	2.02	21.36**
HLX32	162.60	–121.19	–58.67	1.8	4.9	8.10	2.98	3.15
HLX33	202.10	–166.17	–58.81	0.1	0.8	1.36	0.21	3.49
HLX34	151.80	–112.10	–59.73	0.2	1.7	2.44	0.26	3.58
HLX35	151.80	–111.90	–60.13	1.8	4.9	7.18	2.64	2.93
HLX36	199.80	–144.81	–59.02	0.1	1.1	2.21	0.28	1.13
HLX37	199.80	–150.98	–59.25	0.1	0.7	1.35	0.22	0.75
HLX38	199.50	–149.50	–59.46	0.1	0.9	1.79	0.13	18.87*
HLX39	199.30	–144.48	–59.35	0.1	1.5	2.63	0.21	0.21
HLX40	199.50	–132.51	–59.82	0.0	1.5	3.23	0.10	24.42*
HLX41	199.50	–137.87	–59.15	0.2	1.5	3.21	0.42	0.61
HLX42	152.60	–114.86	–57.21	0.1	0.3	0.42	0.12	0.89
HLX43	170.60	–113.13	–50.51	0.1	1.8	3.23	0.15	9.60*

* Calculated as a straight borehole with the starting values of inclination and bearing on 2006-12-17.

** The length of the borehole was calculated to 154.20 m on December 17, 2006 compared to actual length of the borehole which is 133.20 m.

Appendices attached on CD

Appendix A. Details of the core-drilled boreholes

Appendix B. Details of the percussion-drilled boreholes

Reading instructions for the appendices

For each borehole the appendix starts with a technical description, followed by a description of the deviation logging activities and the used strategy for including (and excluding) deviation data in the final calculation. Parts of the text is identical to the text in the Sicada comments (in swedish language).

The key in the discussion of deviation logging activities is the Activity ID code, which is a unique number specifying an activity stored in Sicada. For each borehole Table 1 lists the involved activities. Note, that Table 1 always contains one additional activity compared to the actual number of deviation logging activities in a borehole. This is due to the fact that the activity *Borehole deviation multiple measurements (EG154)* appears in Table 1. It should also be noted, that in many cases some activities are redundant, in the sence that they are based on the same deviation logging. This is the case for most of the percussion drilled boreholes in Appendix B, for which one of the activities is ERROR-marked. This activity was initially stored using wrong corrections for magnetic declination, and was therefore at a later date substituted by a new, correct, data set. Because data cannot be deleted from Sicada, these activities still appear in Table 1, although ERROR-marked.

Table 2 shows the content of the file *EG154 Borehole deviation multiple measurements*, described in section 4.4.2.

Table 3 contains a subset of the object_location file, which is an output from Sicada. The original object_location file contains coordinate information for every three meter borehole length. In Table 3 the information is reduced to every approximately 100 m elevation (Appendix A) or 20 m elevation (Appendix B). Table 3 contains an additional column Elevation_uncert which contains the elevation uncertainty calculated by equation (4-2). This parameter is not calculated in Sicada, but added afterwards to the tables.

Borehole description – KLX01

The drilling and the deviation measurements in the borehole KLX01 was conducted before the SKB Site Investigation in Oskarshamn began. The documentations from these activities do not meet all requirements in the method descriptions involved in the Site Investigation.

Technical description of borehole KLX01 is given in Figure 1.

Drilling period: 1987-12-05 – 1988-02-05 0 – 702.11 m
1990-05-07 – 1990-08-04 702.11 – 1,077.99 m

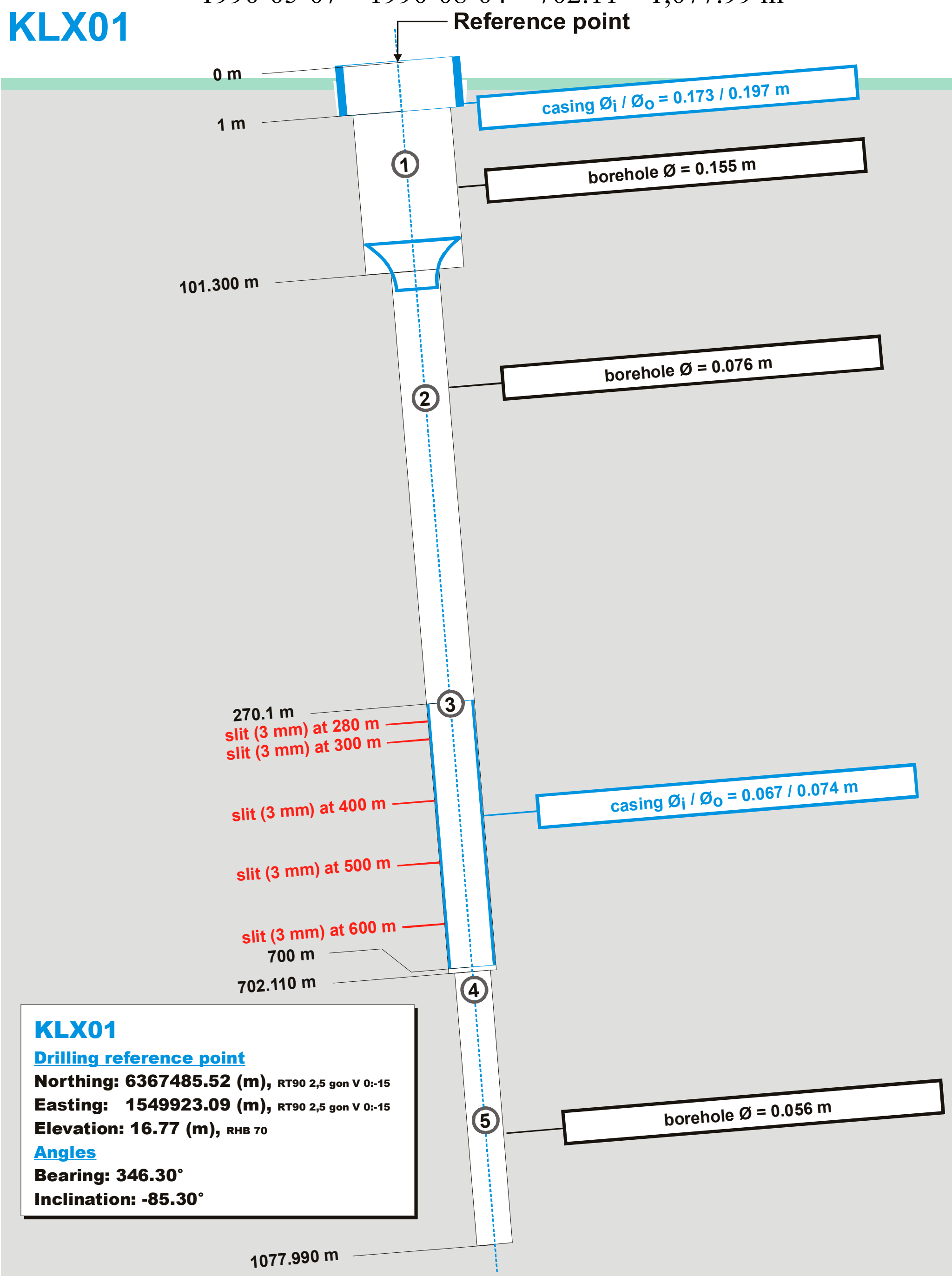


Figure 1. *Technical description of borehole KLX01.*

Deviation measurement in KLX01.

One deviation measurement was conducted in KLX01. The deviation activities are tabulated in Sicada Activity Log, see Table 1.

After the first drilling period, one deviation measurement (ID 3013109) was executed in borehole KLX01 on 1988-02-08 with Boremac instrument, between borehole lengths 0 – 690 m.

The borehole was extended to 1,077.99 m borehole length, between 1990-05-07 – 1990–08-04. No deviation measurement was executed in the extended part of the borehole. This extended part of the borehole (below 690.00 m) is calculated with the same inclination and bearing as the last measured level (690 m).

No observations of the geomagnetic disturbances are available from 1988.

Borehole deviation multiple measurements.

A first attempt (ID 13145663) to calculate the deviation measurement (ID 3013109) with SKB, Sicada *Borehole deviation multiple measurements*, could not be used because of 10 m interval between the measurement levels. The *Borehole deviation multiple measurements* are designed for maximum 4.5 m length between the measurements levels.
This first attempt (ID 13145663) is therefore ERROR- marked.

An excel trend interpolation of the deviation measurement (ID 3013109) was performed and resulted in measurement ID 13148090, with data every meter. The original log file (ID 3013109) was then ERROR-marked.

A new calculation, according to *Borehole deviation multiple measurements,* was then performed and the new deviation file (ID 13148183) was in-use flagged 2007-02-15. This file was later ERROR-marked and the inclination and bearing uncertainties for the borehole part below 690 m was replaced by uncertainty values according to boreholes without measurement (ID 13166394). This file was ERROR-marked due to the fact that EG154 can not handle different uncertainties along the borehole. A new EG154 file (ID 13166963) was constructed with uncertainties for Boremac-measured boreholes, i.e. 3° for inclination and 6° for bearing. Table 2 shows deviation data for the calculation of the *Borehole deviation multiple measurements*.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3.

Figure 2 and 3 shows the resulting deviation data together with the other, not ERROR-marked, deviation activities listed in Table 1.

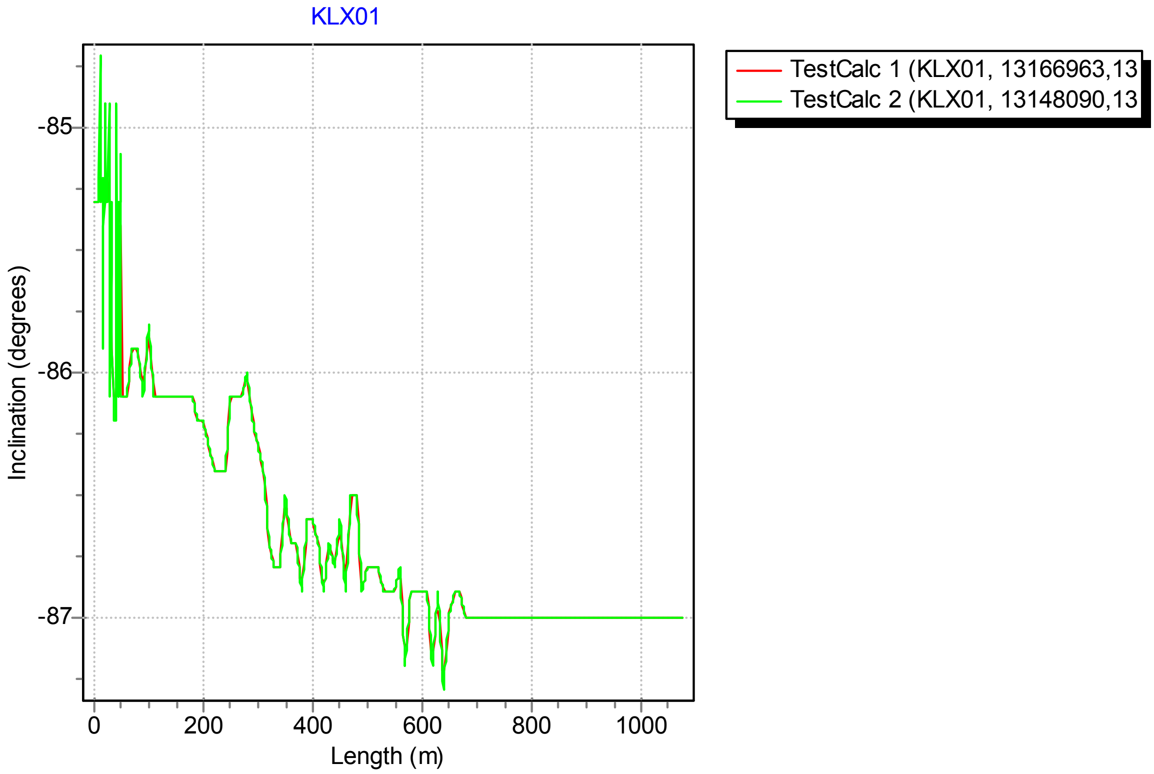
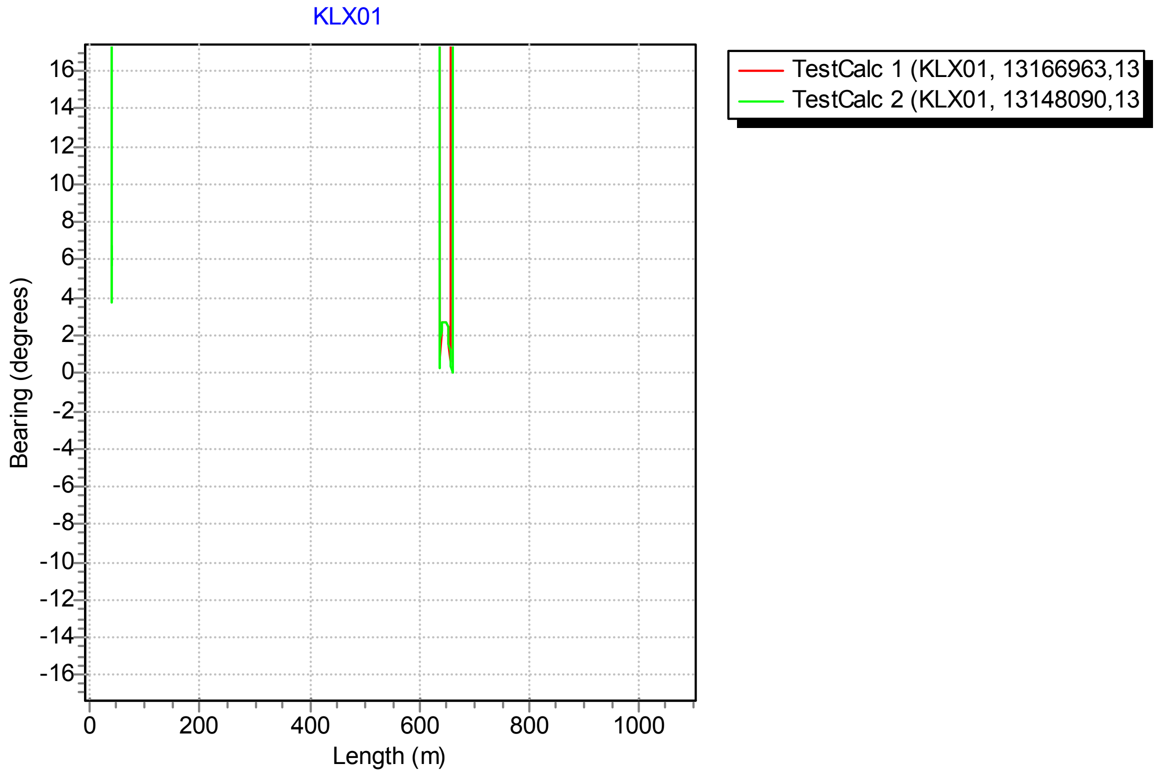


Figure 2. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The inclination is shown.*



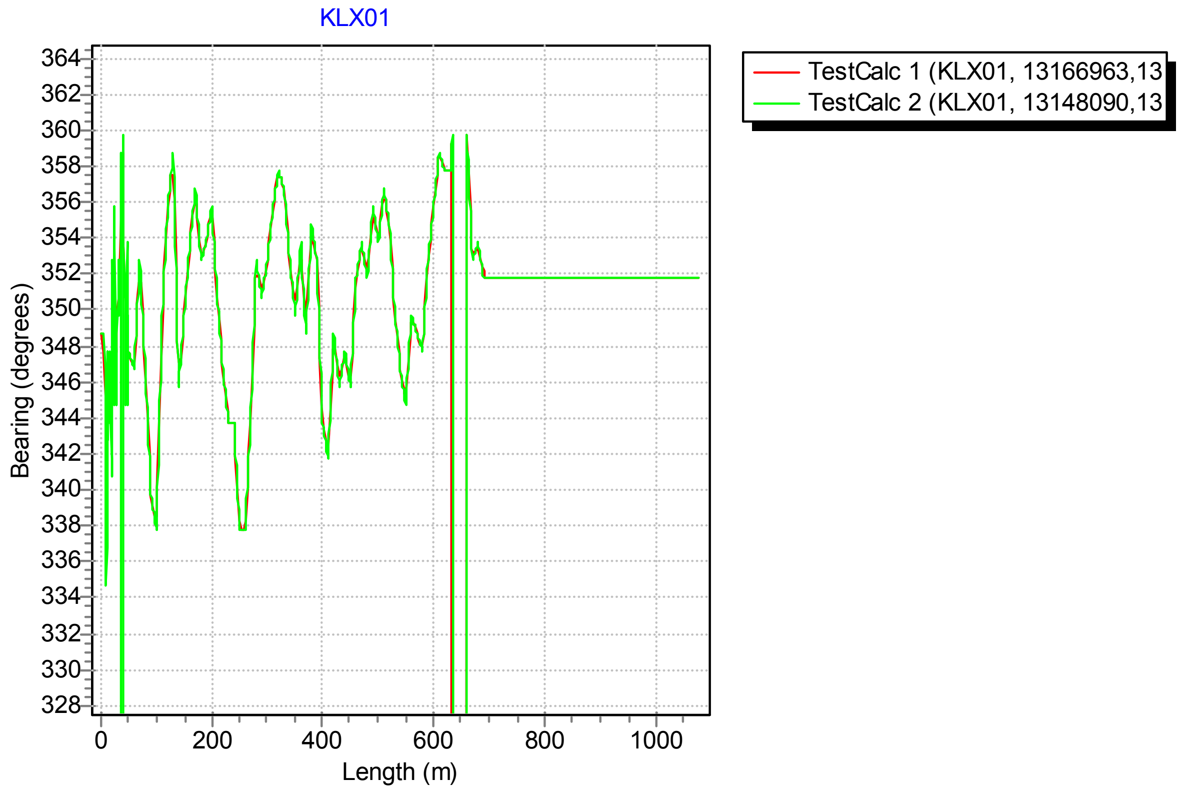


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the bearing greater than 0° and the lower diagram shows the bearing below 360°.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX01	3013109	EG155	Boremac measurement	1988-02-08 00:00	0.00	690.00	E
KLX01	13145663	EG154	Borehole deviation multiple measurements	2007-01-24 08:00			EC
KLX01	13148090	EG155	Boremac measurement	2007-02-15 11:30	0.00	690.00	C
KLX01	13148183	EG154	Borehole deviation multiple measurements	2007-02-15 16:00			EC
KLX01	13166394	EG154	Borehole deviation multiple measurements	2007-07-04 09:15			EC
KLX01	13166963	EG154	Borehole deviation multiple measurements	2007-07-10 14:30			I C

Table 2. Content of the EG154-file.

Id Code	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX01	13148090	BEARING	3.00	1077.99	6.0
KLX01	13148090	INCLINATION	3.00	1077.99	3.0

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Id Code	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX01	6367485.52	1549923.09	16.77	0	0.00	-85.30	348.73	3.0	6.0	0
KLX01	6367493.93	1549921.17	-99.91	117	0.45	-86.10	353.93	3.0	6.0	6.12
KLX01	6367500.53	1549920.37	-198.68	216	0.80	-86.36	348.33	3.0	6.0	11.15
KLX01	6367506.98	1549918.86	-300.46	318	1.15	-86.64	357.33	3.0	6.0	16.49
KLX01	6367512.59	1549917.97	-399.30	417	1.45	-86.84	346.63	3.0	6.0	21.82
KLX01	6367518.32	1549917.09	-501.14	519	1.75	-86.80	354.93	3.0	6.0	27.16
KLX01	6367523.56	1549916.26	-599.99	618	2.03	-87.14	357.93	3.0	6.0	32.34
KLX01	6367527.45	1549916.09	-674.89	693	2.23	-87.00	351.83	3.0	6.0	36.27
KLX01	6367547.39	1549913.22	-1,059.35	1,077.99	3.29	-87.00	351.83	3.0	6.0	56.42

Borehole description – KLX02

The drilling and the deviation measurements in the borehole KLX02 was conducted before the SKB Site Investigation in Oskarshamn began. The documentations from these activities do not meet all requirements in the method descriptions involved in the Site Investigation.

Technical description of borehole KLX02 is given in Figure 1.

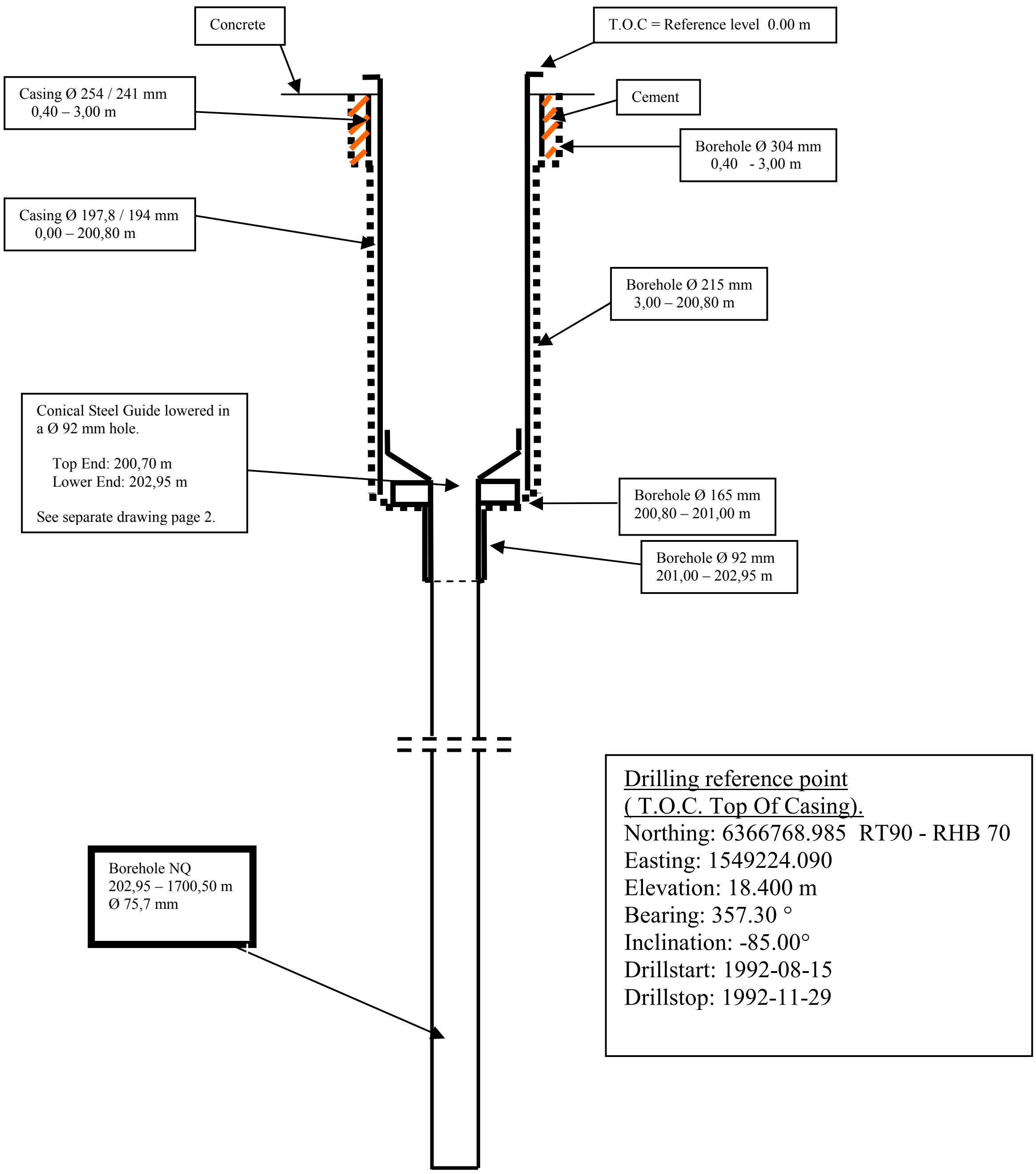


Figure 1. *Technical description of borehole KLX02.*

Deviation measurement in KLX02

One deviation measurement was conducted in KLX02. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

There is one deviation measurement (ID 10100012) executed in borehole KLX02 on 1993-07-21 with the Boremac instrument, between borehole lengths 0 – 1,440 m. The logging tool was obstructed at 1,440 m and could not be lowered to the full borehole length. The unmeasured part of the borehole (below 1,440.00 m) is calculated with the same inclination and bearing as the last measured level (1,440 m).

No observations of the geomagnetic disturbances are available from 1993.

Borehole deviation multiple measurements

A first attempt (ID 13145664) to calculate the one and only deviation measurement (ID 10100012) with SKB, Sicada *Borehole deviation multiple measurements*, could not be used because of the 10 m interval between the measurement levels. The *Borehole deviation multiple measurements* are designed for maximum 4.5 m length between the measurements levels. This first attempt (ID 13145664) is therefore ERROR- marked.

An excel trend interpolation of the only deviation measurement (ID 10100012) was performed and resulted in measurement ID 13148091, with data every meter. The original log file (ID 10100012) was then ERROR- marked.

A new calculation, according to *Borehole deviation multiple measurements,* was then performed and the new deviation file (ID 13148184) was in-use flagged 2007-02-15. This file was later ERROR-marked and the inclination and bearing uncertainties for the borehole part below 1,440 m was replaced by uncertainty values according to boreholes without measurement (ID 13166395). This file was ERROR-marked due to the fact that EG154 can not handle different uncertainties along the borehole. A new EG154 file (ID 13166964) was constructed with uncertainties as for Boremac- measured boreholes, i.e. 3° for inclination and 6° for bearing. Table 2 shows deviation data for the calculation of the *Borehole deviation multiple measurements*.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3.

Figure 2 and 3 shows the resulting deviation data together with the other, not ERROR-marked, deviation activities listed in Table 1.

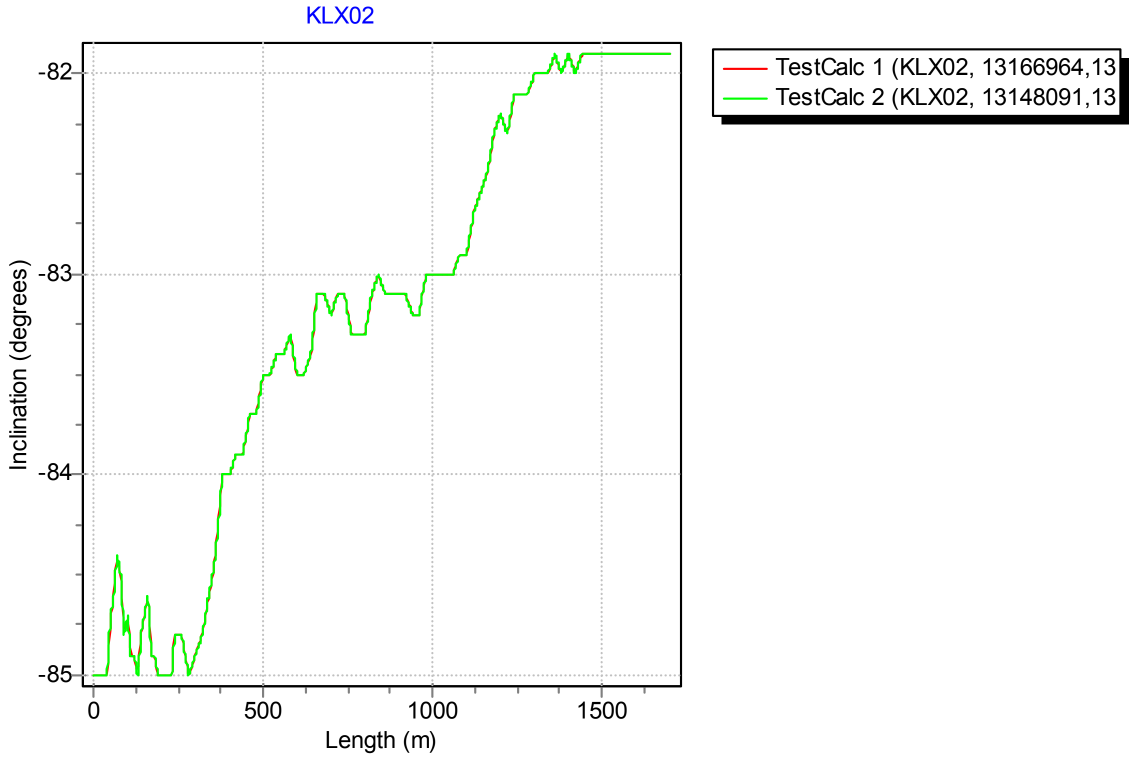
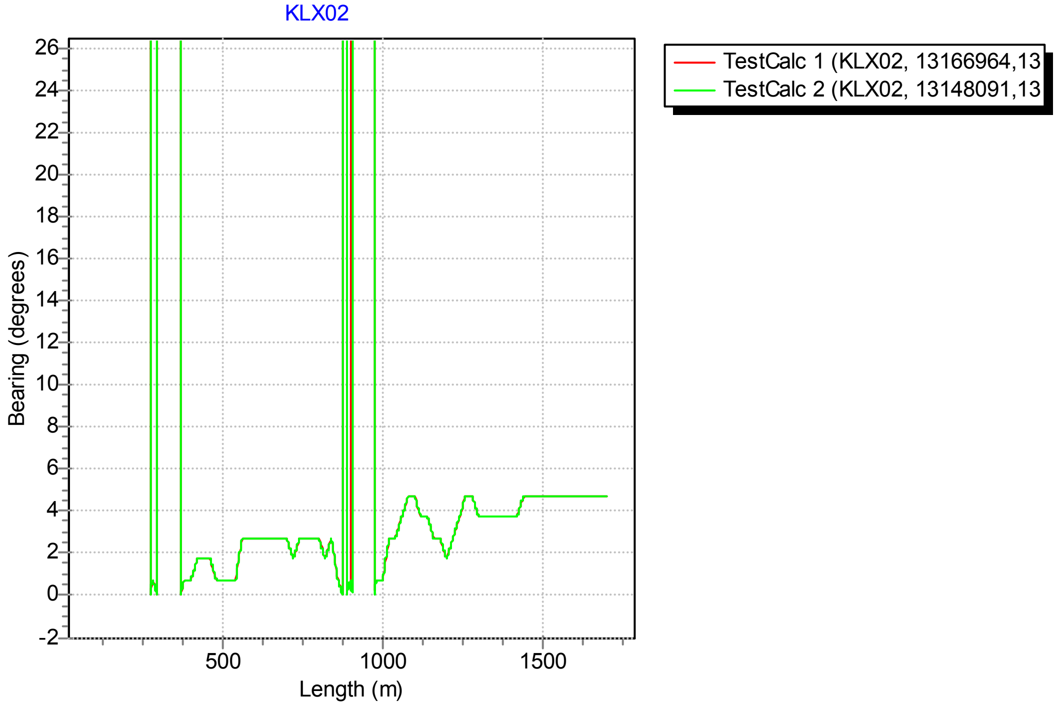


Figure 2. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The inclination is shown.*



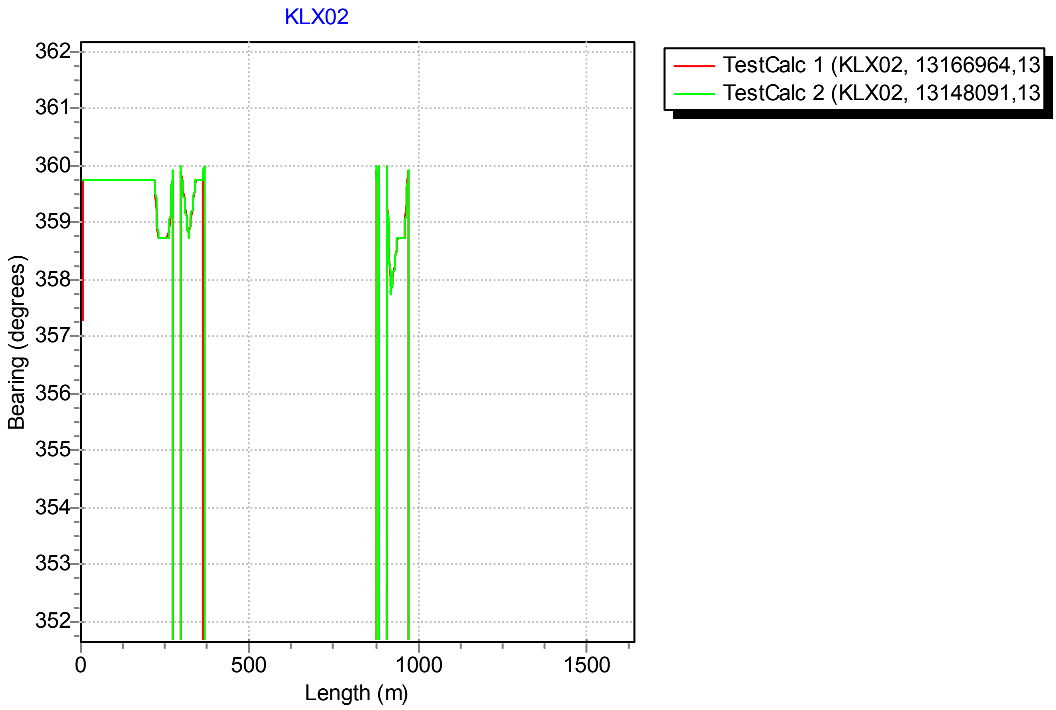


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the bearing greater than 0° and the lower diagram shows the bearing below 360°.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	ActivityTypeCode	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX02	10100012	EG155	Boremac measurement	1993-07-21 00:00	0.00	1440.00	E
KLX02	13145664	EG154	Borehole deviation multiple measurements	2007-01-24 08:00			EC
KLX02	13148091	EG155	Boremac measurement	2007-02-15 08:00	0.00	1440.00	C
KLX02	13148184	EG154	Borehole deviation multiple measurements	2007-02-15 16:00			EC
KLX02	13166395	EG154	Borehole deviation multiple measurements	2007-07-04 09:30			EC
KLX02	13166964	EG154	Borehole deviation multiple measurements	2007-07-10 15:00			I C

Table 2. Content of the EG154-file.

Id Code	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX02	13148091	BEARING	10.00	1700.50	6.0
KLX02	13148091	INCLINATION	10.00	1700.50	3.0

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

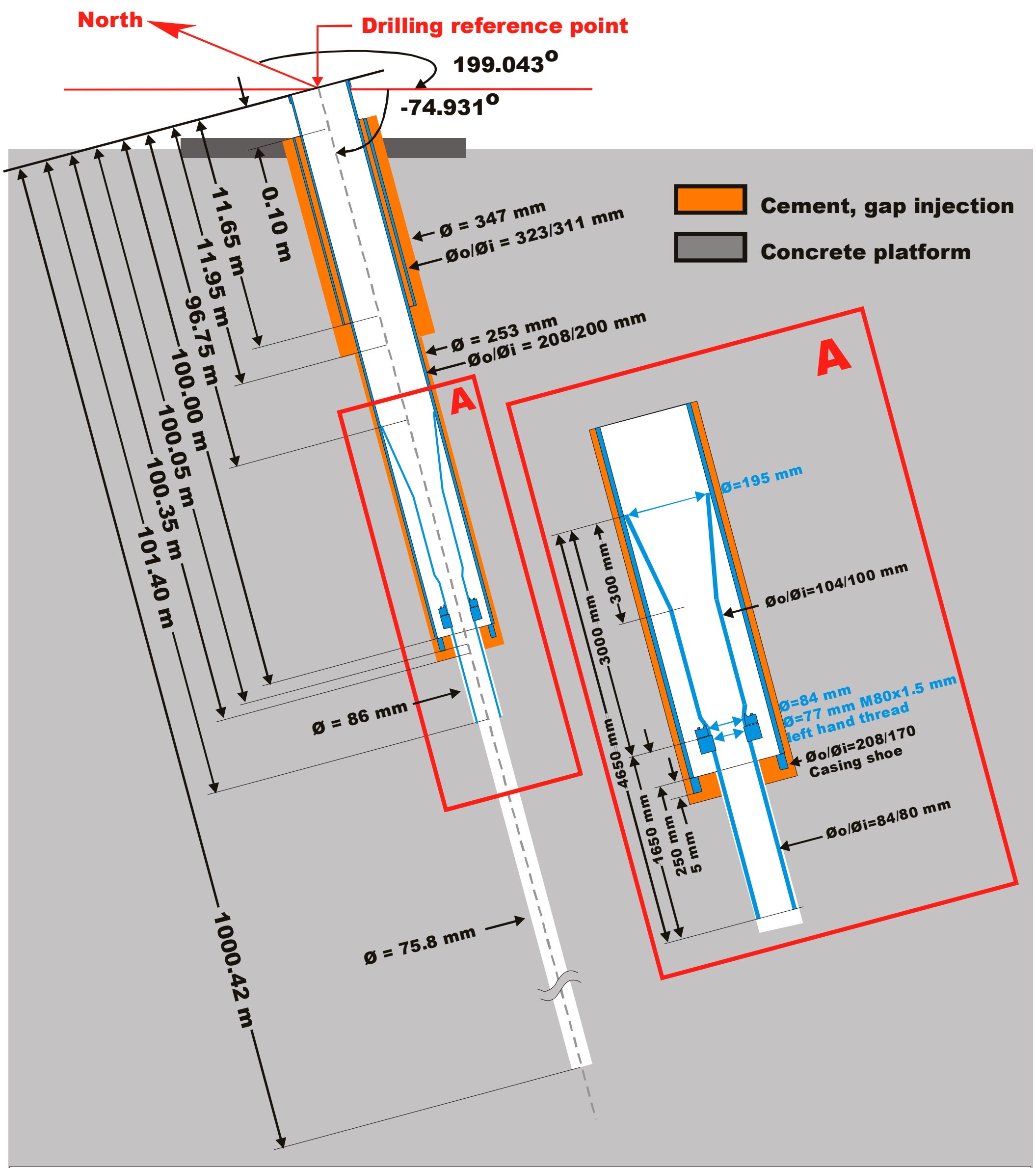
Id Code	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX02	6366768.99	1549224.09	18.40	0	0.00	-85.0	357.3	3.0	6.0	0
KLX02	6366779.87	1549224.02	-101.10	120	0.57	-84.9	359.73	3.0	6.0	6.28
KLX02	6366788.70	1549223.98	-199.71	219	1.03	-85.0	359.73	3.0	6.0	11.46
KLX02	6366797.78	1549223.88	-301.30	321	1.51	-84.79	358.83	3.0	6.0	16.80
KLX02	6366807.67	1549223.93	-399.81	420	2.03	-83.9	1.73	3.0	6.0	21.98
KLX02	6366818.87	1549224.17	-501.19	522	2.61	-83.49	0.73	3.0	6.0	27.32
KLX02	6366830.21	1549224.59	-599.54	621	3.21	-83.5	2.73	3.0	6.0	32.50
KLX02	6366842.25	1549225.14	-700.82	723	3.84	-83.1	1.88	3.0	6.0	37.84
KLX02	6366853.92	1549225.66	-799.13	822	4.45	-83.09	1.83	3.0	6.0	43.02
KLX02	6366866.20	1549225.79	-900.39	924	5.09	-83.12	357.93	3.0	6.0	48.36
KLX02	6366878.12	1549225.79	-998.67	1,023	5.72	-83.0	2.73	3.0	6.0	53.54
KLX02	6366890.67	1549226.64	-1,099.89	1,125	6.38	-82.67	3.73	3.0	6.0	58.88
KLX02	6366904.15	1549227.29	-1,200.99	1,227	7.08	-82.23	3.08	3.0	6.0	64.22
KLX02	6366917.77	1549228.27	-1,299.05	1,326	7.80	-82.0	3.73	3.0	6.0	69.40
KLX02	6366932.00	1549229.20	-1,400.04	1,428	8.54	-81.96	4.13	3.0	6.0	74.74
KLX02	6366933.68	1549229.33	-1,411.92	1,440.00	8.63	-81.91	4.63	3.0	6.0	75.36
KLX02	6366934.10	1549229.36	-1,414.89	1,443.00	8.65	-81.9	4.7	3.0	6.0	75.52
KLX02	6366970.25	1549232.34	-1,669.83	1,700.50	10.55	-81.9	4.7	3.0	6.0	89.00

Borehole description - KLX03

Technical description of borehole KLX03 is given in Figure 1.

Technical data

Borehole KLX03



Drilling reference point

Northing: 6366112.59 (m), RT90 2,5 gon V 0:-15

Easting: 1547718.93 (m), RT90 2,5 gon V 0:-15

Elevation: 18.49 (m), RHB 70

Drilling period

Drilling start date: 2004-05-03

Drilling stop date: 2004-09-07

Figure 1. *Technical description of borehole KLX03.*

<u>Deviation measurement in KLX03</u>

In total six deviation measurements were conducted in KLX03. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

Three of those measurements were conducted when the borehole drilling was completed and three Maxibor part measurements were conducted to different depths, while the borehole drilling was in progress.

The values surveyed at TOC (Borehole direction surveying) were used as the starting values for the Maxibor measurements in KLX03.

The first Maxibor part measurement (ID 13025384) was executed between borehole lengths 0 – 465 m. The second part measurement was executed between borehole lengths 411 – 594 m and then merged by Maxibor software with the first part measurement (at borehole length 411 m) to create the measurement 0 – 594 m (ID 13030095). The third part measurement was executed between borehole lengths 549 – 729 m and then merged by Maxibor software with the second part measurement (at borehole length 549 m) to create the measurement 0 – 729 m (ID 13030862).

The complete borehole Maxibor measurement (ID 13032424) was not merged with any part measurement, i.e. it was conducted between borehole lengths 0 – 993 m.

A comparison of different measurements in borehole KLX03 showed an inaccuracy, see Figure 2. Significant differences in borehole length (> 10 m) in the bearing occurred between the Mag/acc measurements and the Maxibor measurements. The Mag/acc measurements used a calibrated wheel on which the length of the logging cable was measured, with small differences between the measurement occations. The Maxibor measurements used spray marks every three metre, on the drill rig-wire, when hoisting the measuring tool up to the next level. A decision was taken to ERROR- mark all Maxibor measurements in KLX03.

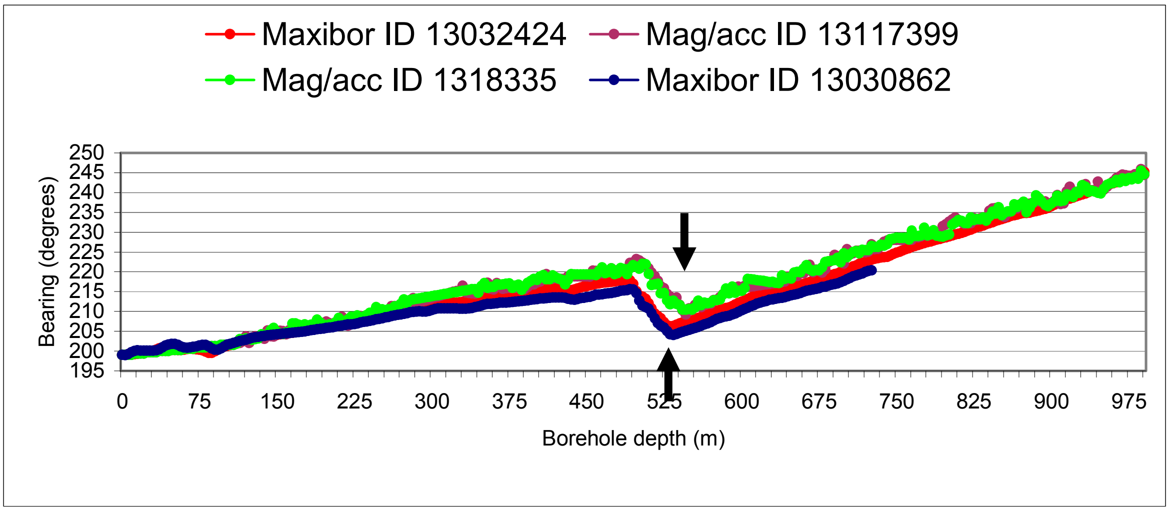


Figure 2. *The diagram shows the inaccuracy in borehole length between Mag/acc measurements and Maxibor measurements, at a position where a significant change of the bearing angle occur. Deviation drilling in order to change the borehole direction more towards left (eastwards) was performed between 500.00 m and 531.01 m.*

Mag/acc measurement (ID 13073341) was bug reported and ERROR- marked, due to wrongly correction for magnetic declination and meridian convergence. But the raw data from that measurement was re-used, without correction for magnetic declination and meridian convergence, to calculate the correct measurement (ID 13117399).

The two Mac/acc measurements (ID 13117399, 13138335) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measuring, see Figure 3.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144260) the two Mag/acc measurements (ID 13117399, ID 13138335) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level. Because the two deviation activities in EG154 (Table 2) were very similar the “Radius uncertainty” was unrealistically low and it was decided to set the inclination and bearing uncertainties manually to 1.8º and 4.9º respectively (see section 4.4.2), and based on these values the “Radius uncertainty” was calculated for every measuring level. This file (ID 13144260) was therefore ERROR- marked and replaced by a new EG154 file (ID 13166496) based on manually set uncertainties.

Figure 4 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

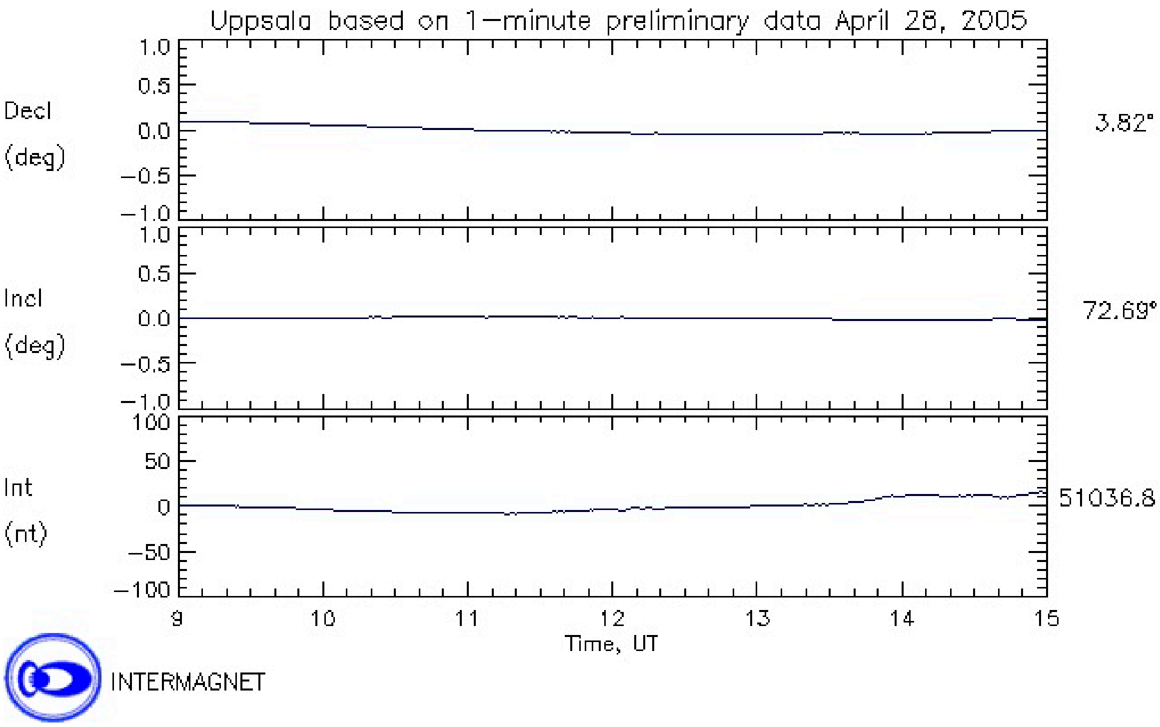
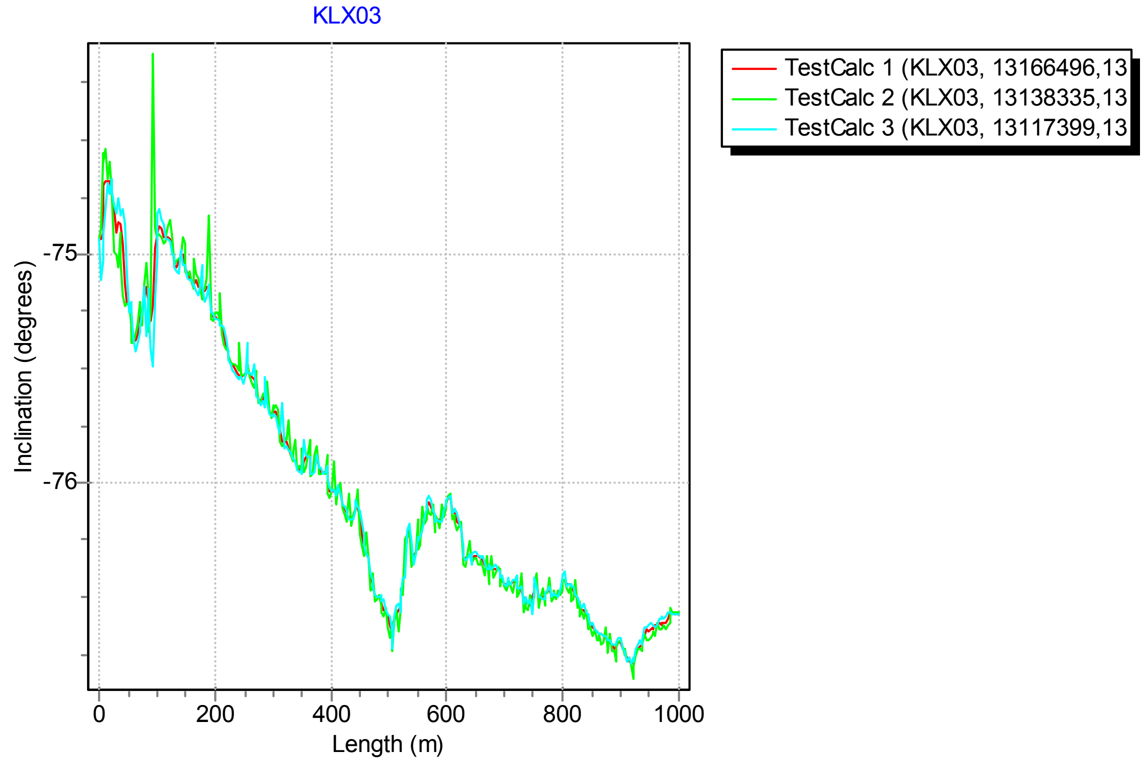


Figure 3. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-04-28.*



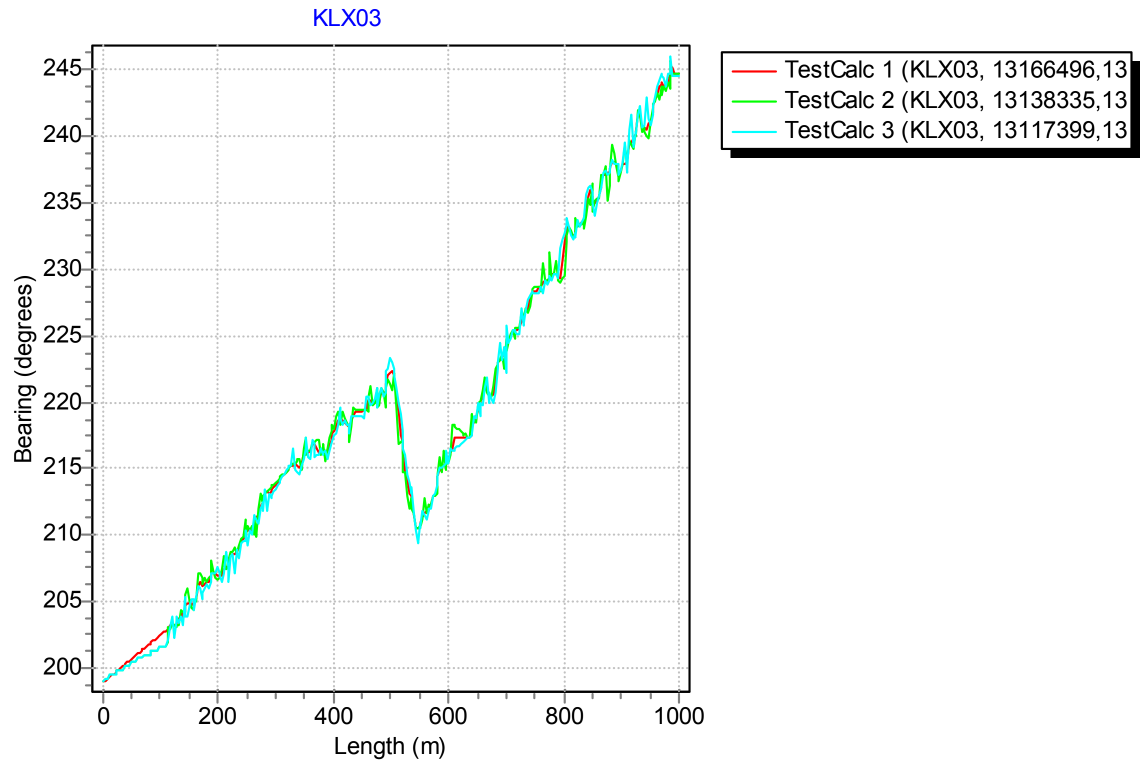


Figure 4. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX03	13025384	EG156	Maxibor measurement	2004-06-28 16:30	0.00	465.00	ECF
KLX03	13030095	EG156	Maxibor measurement	2004-08-18 12:30	0.00	594.00	ECF
KLX03	13030862	EG156	Maxibor measurement	2004-08-21 09:40	0.00	729.00	ECF
KLX03	13032424	EG156	Maxibor measurement	2004-09-09 08:30	0.00	993.00	ECF
KLX03	13073341	EG157	Magnetic - accelerometer measurement	2005-04-28 09:04	0.00	990.00	EF
KLX03	13117399	EG157	Magnetic - accelerometer measurement	2005-04-28 09:15	0.00	990.00	CF
KLX03	13138335	EG157	Magnetic - accelerometer measurement	2005-04-28 11:45	0.00	990.00	CF
KLX03	13144260	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			EC
KLX03	13166496	EG154	Borehole deviation multiple measurements	2007-07-06 09:30			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX03	13117399	BEARING	117.00	1000.42	4.9
KLX03	13117399	INCLINATION	3.00	1000.42	1.8
KLX03	13138335	BEARING	117.00	1000.42	4.9
KLX03	13138335	INCLINATION	3.00	1000.42	1.8

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX03	6366112.59	1547718.93	18.49	0	0.00	-74.93	199.04	1.8	4.9	0
KLX03	6366082.95	1547707.47	-100.33	123.	1.00	-74.93	203.27	1.8	4.9	3.86
KLX03	6366059.47	1547696.05	-198.93	225	1.82	-75.45	208.63	1.8	4.9	7.07
KLX03	6366037.41	1547682.19	-300.65	330	2.64	-75.88	215.32	1.8	4.9	10.37
KLX03	6366017.66	1547667.34	-399.61	432	3.41	-76.16	218.58	1.8	4.9	13.57
KLX03	6365999.12	1547652.15	-498.75	534	4.17	-76.20	213.00	1.8	4.9	16.77
KLX03	6365978.46	1547637.99	-600.71	639	4.95	-76.32	217.59	1.8	4.9	20.07
KLX03	6365960.92	1547621.69	-699.85	741	5.71	-76.52	227.88	1.8	4.9	23.28
KLX03	6365945.88	1547603.23	-799.03	843	6.46	-76.58	235.43	1.8	4.9	26.48
KLX03	6365933.11	1547582.74	-901.21	948	7.21	-76.66	240.99	1.8	4.9	29.78
KLX03	6365927.72	1547571.86	-952.21	1,000.42	7.60	-76.57	244.69	1.8	4.9	31.42

Borehole description-KLX04

Technical description of borehole KLX04 is given in Figure 1.

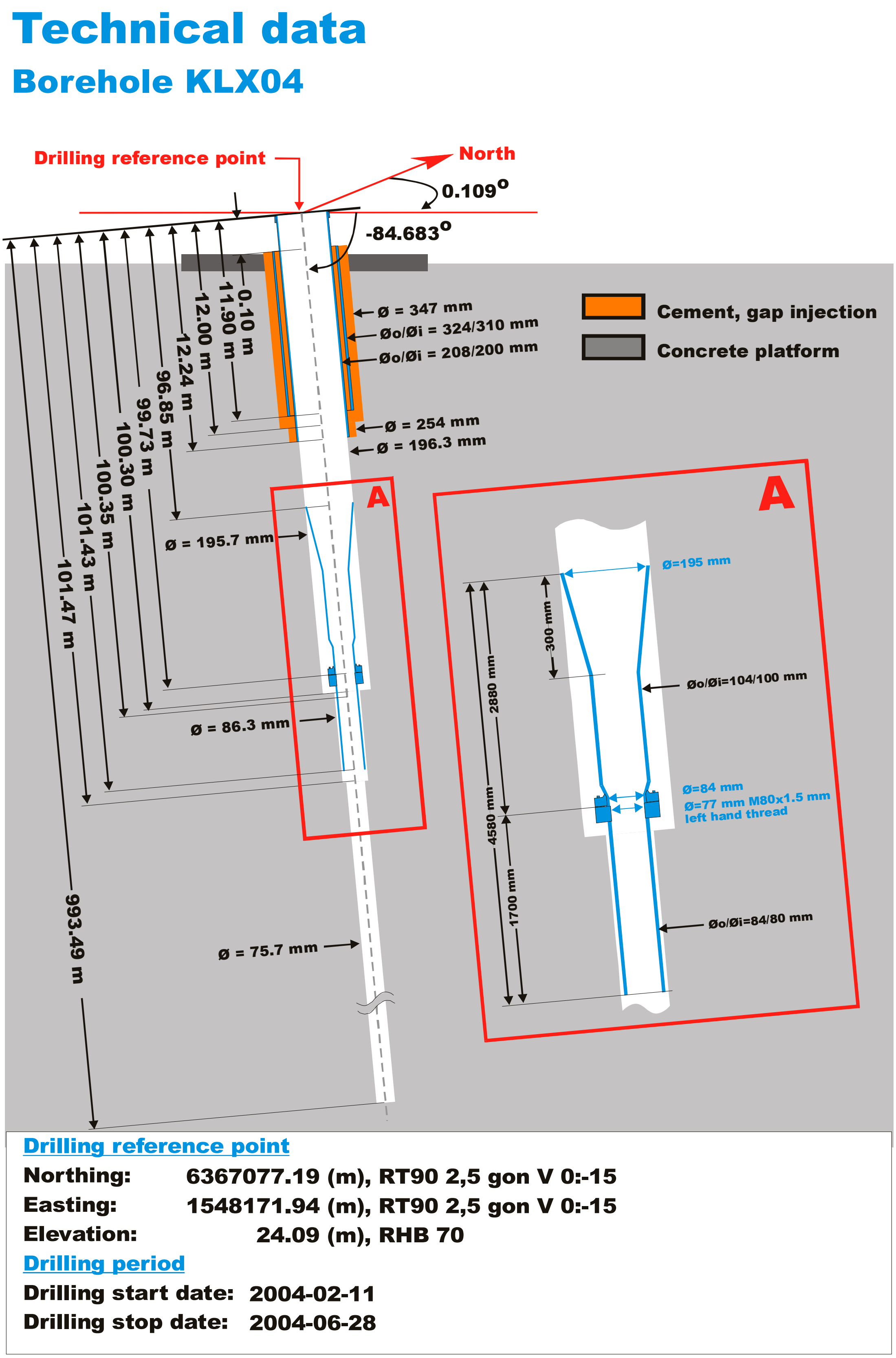


Figure 1. *Technical description of borehole KLX04.*

Deviation measurement in KLX04

In total three deviation measurements were conducted in KLX04. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

One part Maxibor measurement (ID 13020491) was conducted between borehole lengths 0 – 774 m, while the borehole drilling was in progress and the other Maxibor measurement (ID 13025254) was conducted when the borehole drilling was completed. These measurements were merged by Maxibor software at borehole length 684 m.

The part Maxibor measurement (ID 13020491) was later ERROR-marked, because the same data between borehole lengths 0 - 684 m is used in the complete borehole Maxibor measurement (ID 13025254), and would therefore confuse the calculation of the inclination and bearing uncertainties.

A measurement, Maxibor 0 – 177 m (ID 13011061) was ERROR-marked due to wrong start values.

The measurements were executed with the instrument centralized and hoisted by wire, inside the drill string.

The starting values (bearing and inclination) for the first Maxibor part measurement (ID 13020491) were obtained from surveying with a Total station on the Maxibor (Borehole direction surveying for Maxibor ID 13046229). The Maxibor was hanging on a wire inside the drill string, 3 m above the TOC.

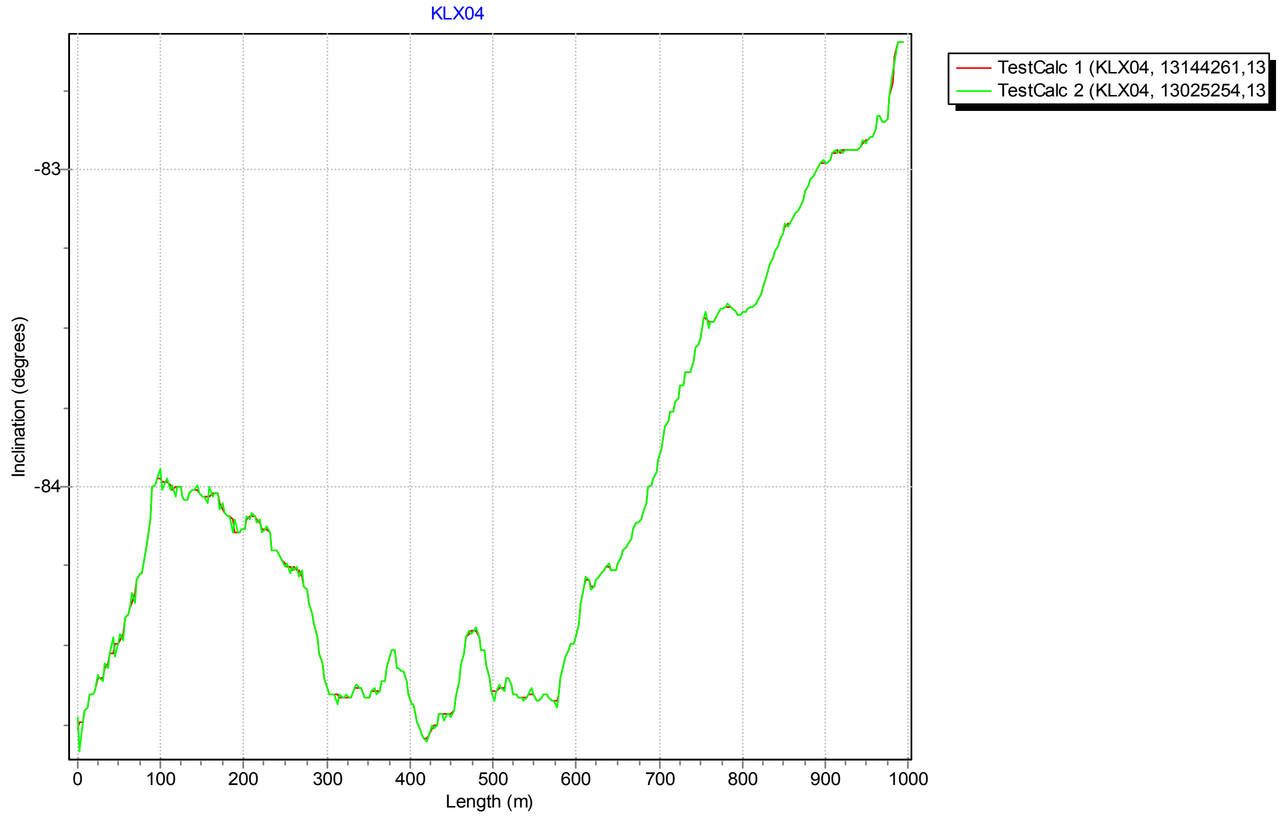
- These values shall not be mixed up with the values surveyed at TOC (Borehole direction surveying).

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144261) the Maxibor measurement (ID 13025254) was used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. Because only one deviation activity is included in the EG154-file (Table 2) the inclination and bearing uncertainties are set manually to 1.8º and 4.9º respectively, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 2 shows the resulting deviation data together with the other, not ERROR-marked, deviation activities listed in Table 1.



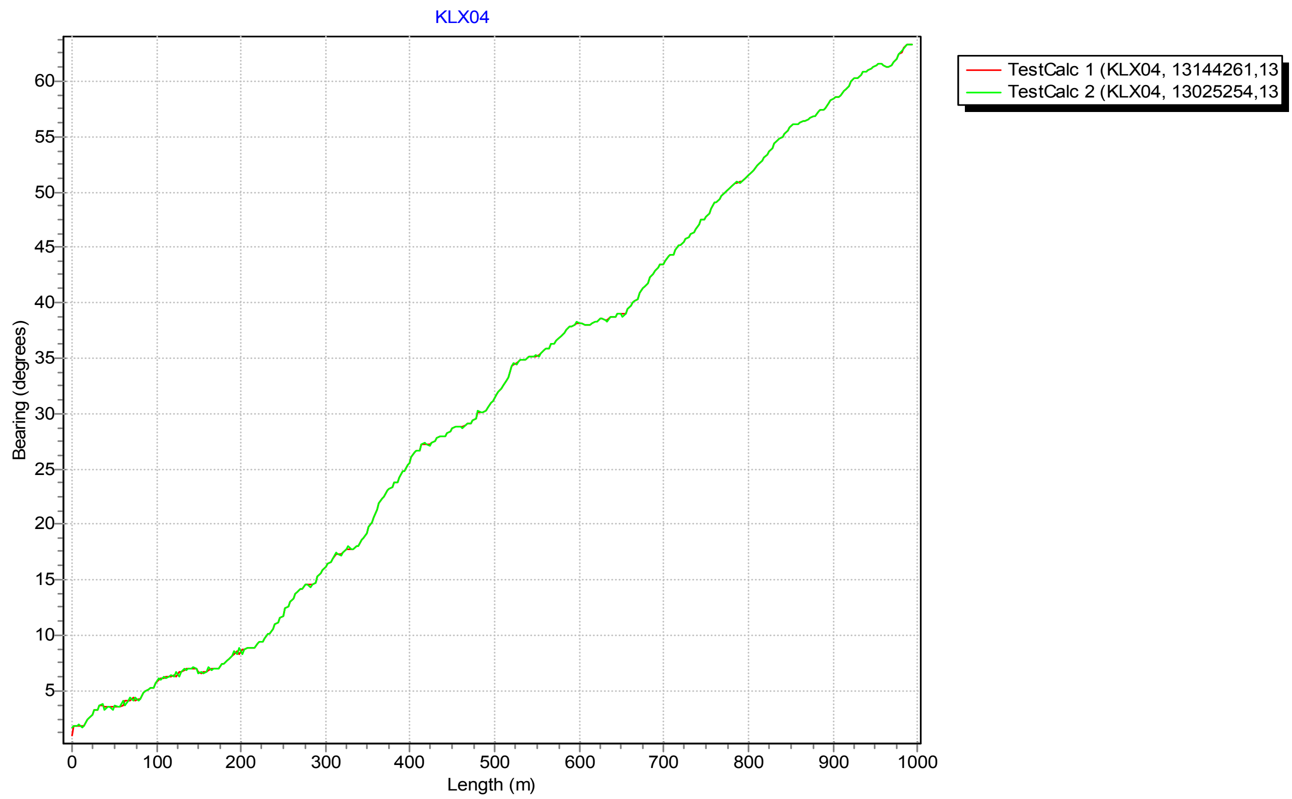


Figure 2. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR-marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX04	13011061	EG156	Maxibor measurement	2004-03-22 10:30	0.00	177.00	EC
KLX04	13020491	EG156	Maxibor measurement	2004-06-15 09:30	0.00	774.00	ECF
KLX04	13025254	EG156	Maxibor measurement	2004-06-28 13:30	0.00	987.00	CF
KLX04	13144261	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

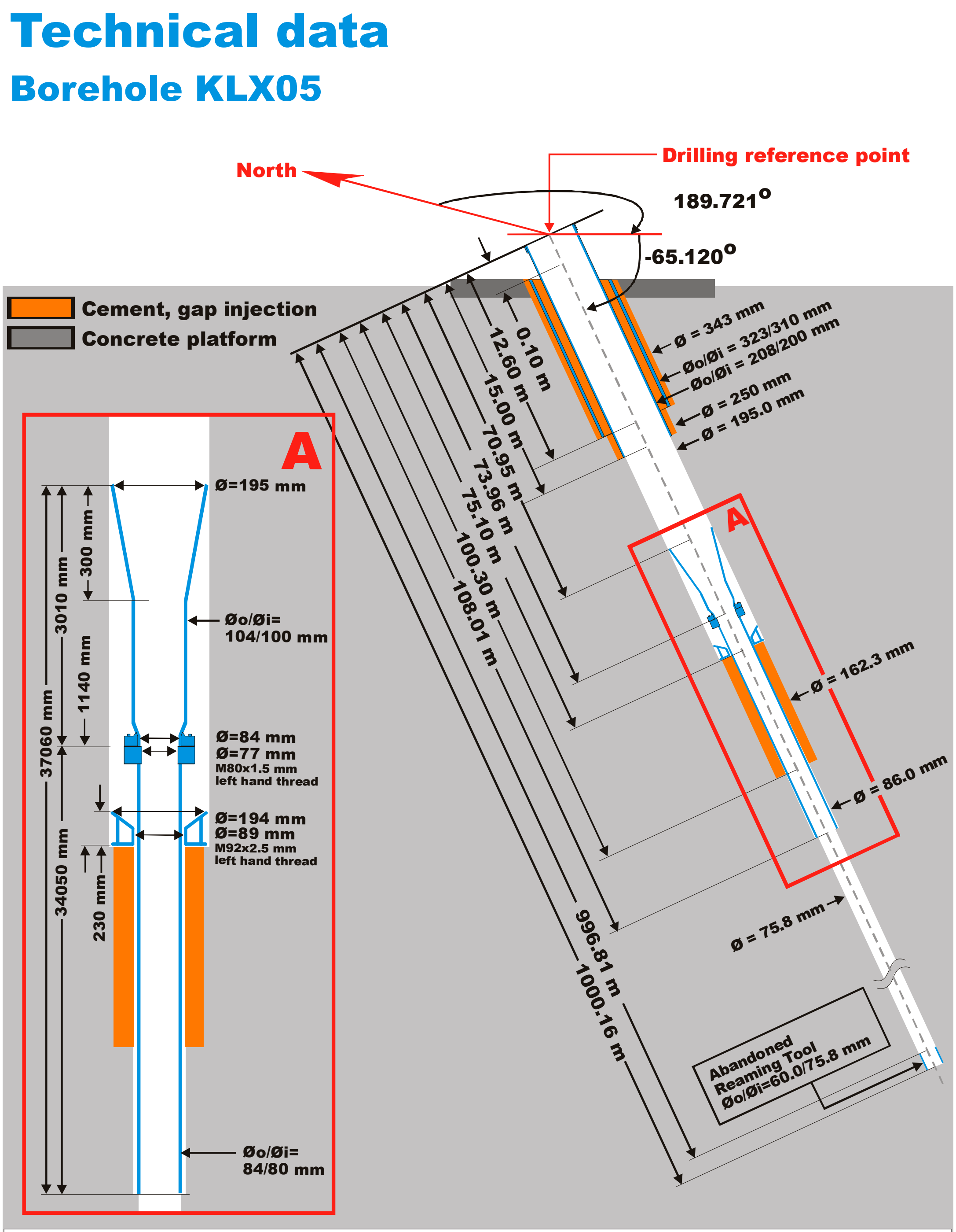
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX04	13025254	BEARING	3.00	993.49	4.900
KLX04	13025254	INCLINATION	3.00	993.49	1.800

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX04	6367077.19	1548171.94	24.09	0	0.00	-84.76	0.93	1.8	4.9	0
KLX04	6367089.58	1548172.84	-101.29	126	0.39	-84.03	6.69	1.8	4.9	3.96
KLX04	6367099.72	1548174.2	-199.76	225	0.71	-84.13	9.43	1.8	4.9	7.07
KLX04	6367109.37	1548176.62	-301.28	327	1.02	-84.66	17.7	1.8	4.9	10.27
KLX04	6367117.86	1548180.21	-399.85	426	1.31	-84.76	27.36	1.8	4.9	13.38
KLX04	6367126.14	1548185.03	-501.39	528	1.62	-84.65	34.66	1.8	4.9	16.58
KLX04	6367133.67	1548190.67	-599.95	627	1.91	-84.28	38.55	1.8	4.9	19.69
KLX04	6367141.57	1548197.72	-701.39	729	2.24	-83.68	45.93	1.8	4.9	22.9
KLX04	6367148.77	1548206.34	-799.75	828	2.60	-83.34	53.93	1.8	4.9	26.01
KLX04	6367155.41	1548216.67	-901.01	930	2.98	-82.94	60.29	1.8	4.9	29.21
KLX04	6367159.16	1548223.65	-964	993.49	3.23	-82.6	63.33	1.8	4.9	31.21

Borehole description – KLX05

Technical description of borehole KLX05 is given in Figure 1.



Drilling reference point

Northing:	**6365633.34 (m), RT90 2,5 gon V**
Easting:	**1548909.41 (m), RT90 2,5 gon V**
Elevation:	**17.63 (m), RHB 70**

Drilling period

Drilling start date:	**2004-08-11**
Drilling stop date:	**2005-01-22**

Figure 1. Technical description of borehole KLX05

<u>Deviation measurement in KLX05</u>

In total ten deviation measurements were conducted in KLX05. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

There were five Maxibor part measurements executed in borehole KLX05 (ID 13055515, 13055519, 13055521, 13055601, 13059939) conducted to different borehole lengths, while the borehole drilling was in progress. All were executed with the instrument centralized and hoisted by wire, inside the drill string.

One of the complete borehole Maxibor measurements (ID 13066203) was executed with the instrument centralized and hoisted by wire, inside the drill string. The other Maxibor measurement (ID 13074897) was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values (bearing and inclination, see Borehole direction surveying for Maxibor, Sicada ID 13046229) for the first Maxibor part measurement (ID 13055515) were obtained from surveying with a Total station on the drill string. Inside the drill string the Maxibor instrument was hanging on a wire, 3 m above the TOC.

- These values shall not be mixed up with the values surveyed at TOC (Borehole direction surveying).

The five Maxibor part measurements together with the Maxibor measurement ID 13066203 was later ERROR- marked due to changed borehole geometry between borehole lengths approximately 75 - 108 m. Hence, this borehole section must be reamed, when the SKB-dummy did not pass through. See Figure 2. This reaming did not affect geometry at the initial 0.00 – 15.00 m.

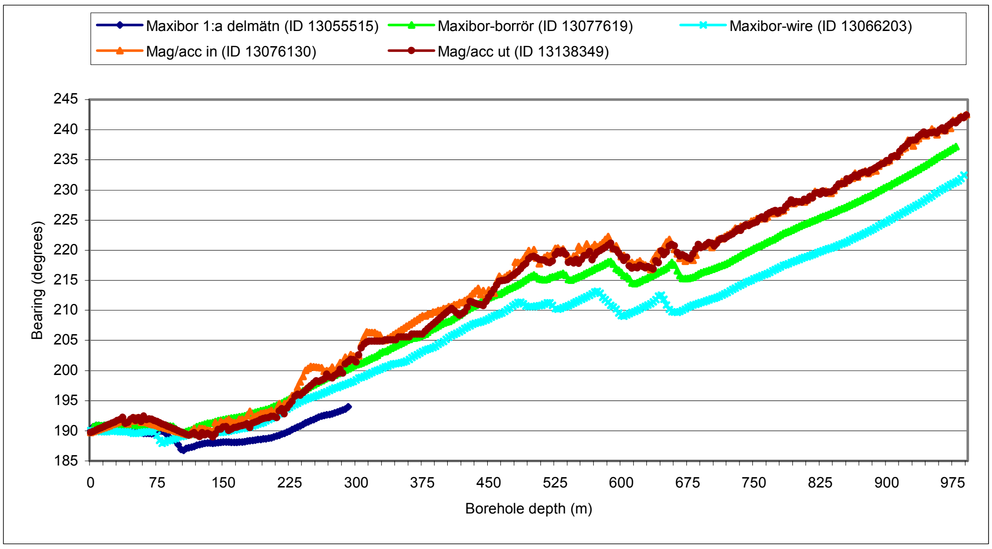


Figure 2. *The diagram shows the bearing data from the different deviation measurements in borehole KLX05. Deviation drilling in order to change the borehole direction more towards left (eastwards) was performed between 495.00 m and 630.00 m.*

The Maxibor measurement + drill string (ID 13074897) was executed between the borehole levels 15.00 – 981.00 m due to great concern how to get the correct start values for this surveying method, i.e. when the instrument no longer could be measured with the Total station, above and lined up with the TOC. This measurement was later, by Maxibor software, merged with the first part Maxibor measurement (ID 13055515) 0 – 15 m, for complete borehole deviation data (ID13077619).

Maxibor measurement ID 13074897 was later ERROR- marked, because the same data between borehole depths 15 – 981 m is used in Maxibor measurement ID 13077619, and would therefore confuse the calculation of the inclination and bearing uncertainties, see Table 3.

The two Mac/acc measurements (ID 13076130, 13138349) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measuring, see Figures 3 and 4.

There is one Mag/acc measurement (ID 13073086) ERROR- marked in Table 1, due to wrongly correction for magnetic declination and meridian convergence.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144262) the Maxibor measurement (ID 13077619) and the two Mag/acc measurements (ID 13076130 and 13138349) was used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 5 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

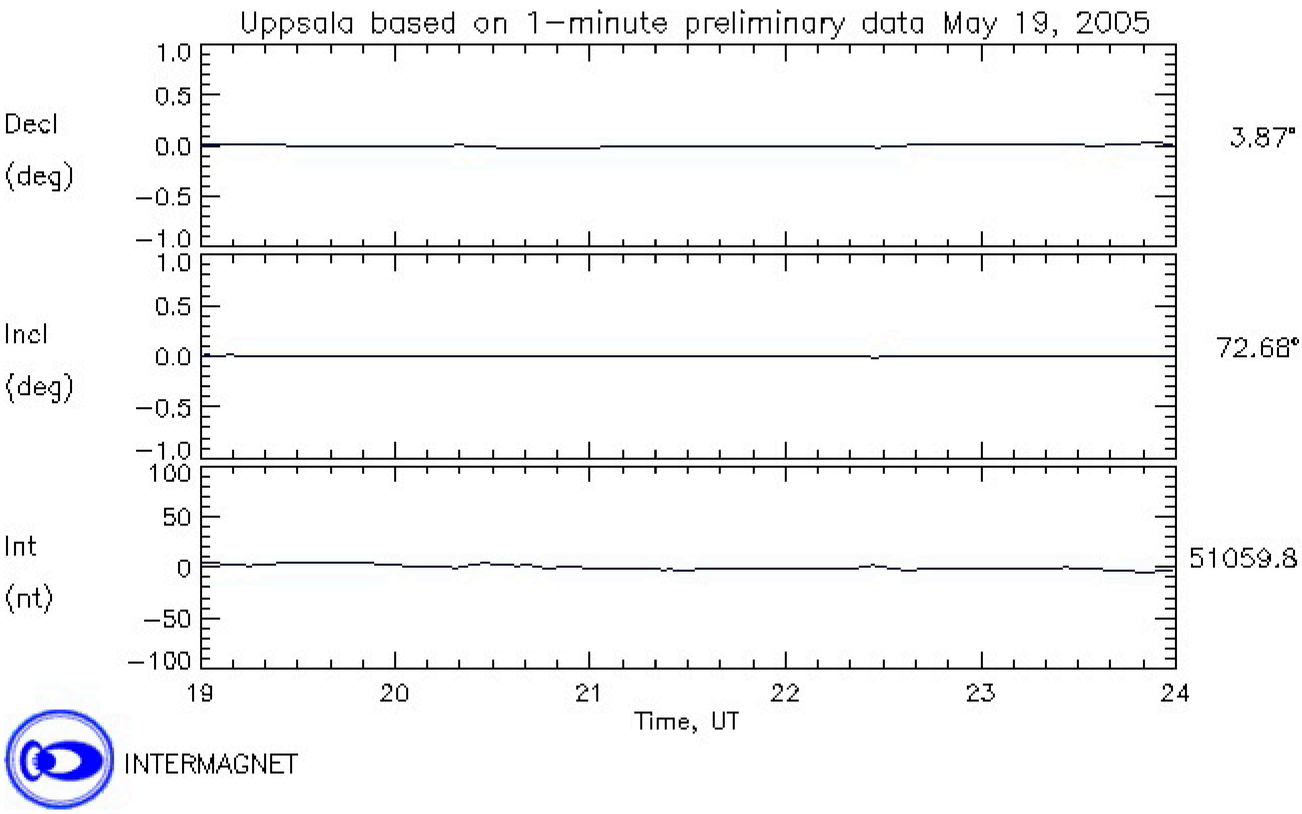


Figure 3. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-05-19.*

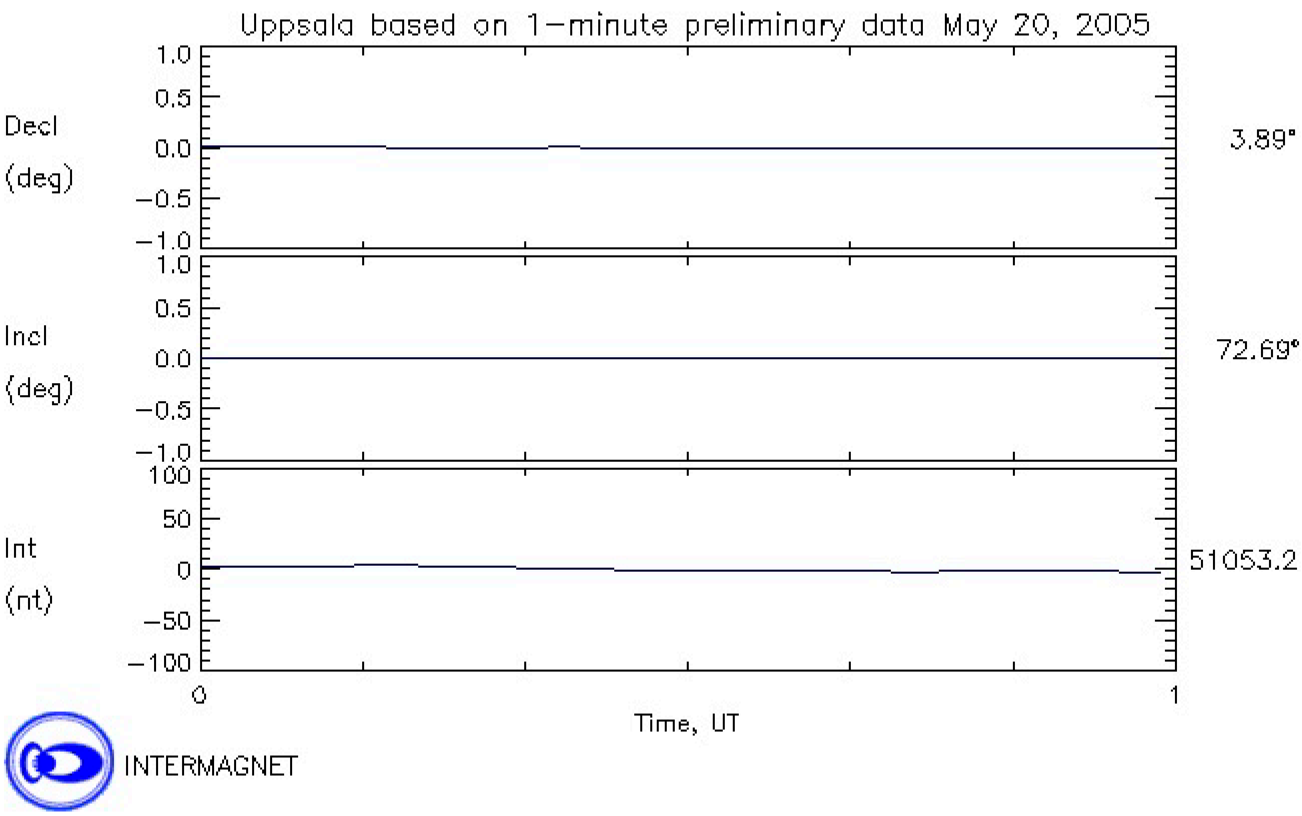
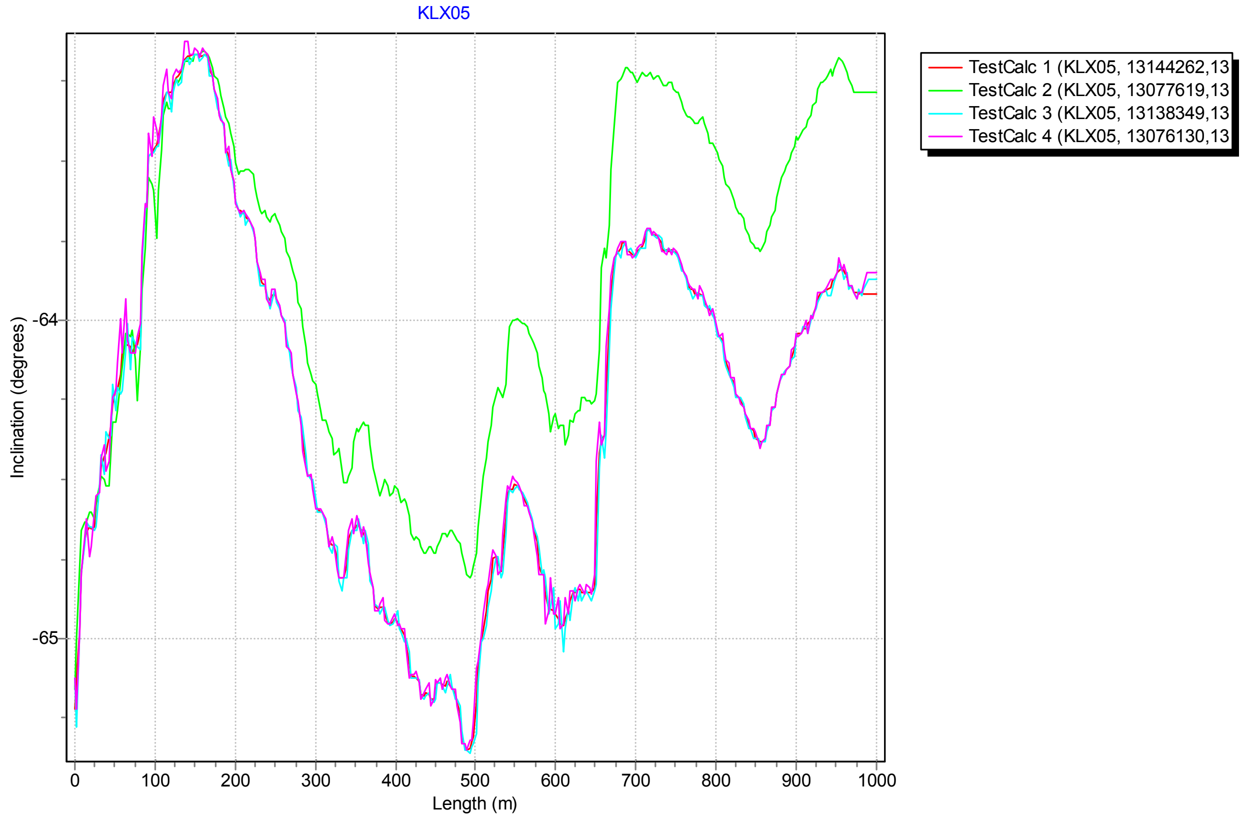


Figure 4. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-05-20.*



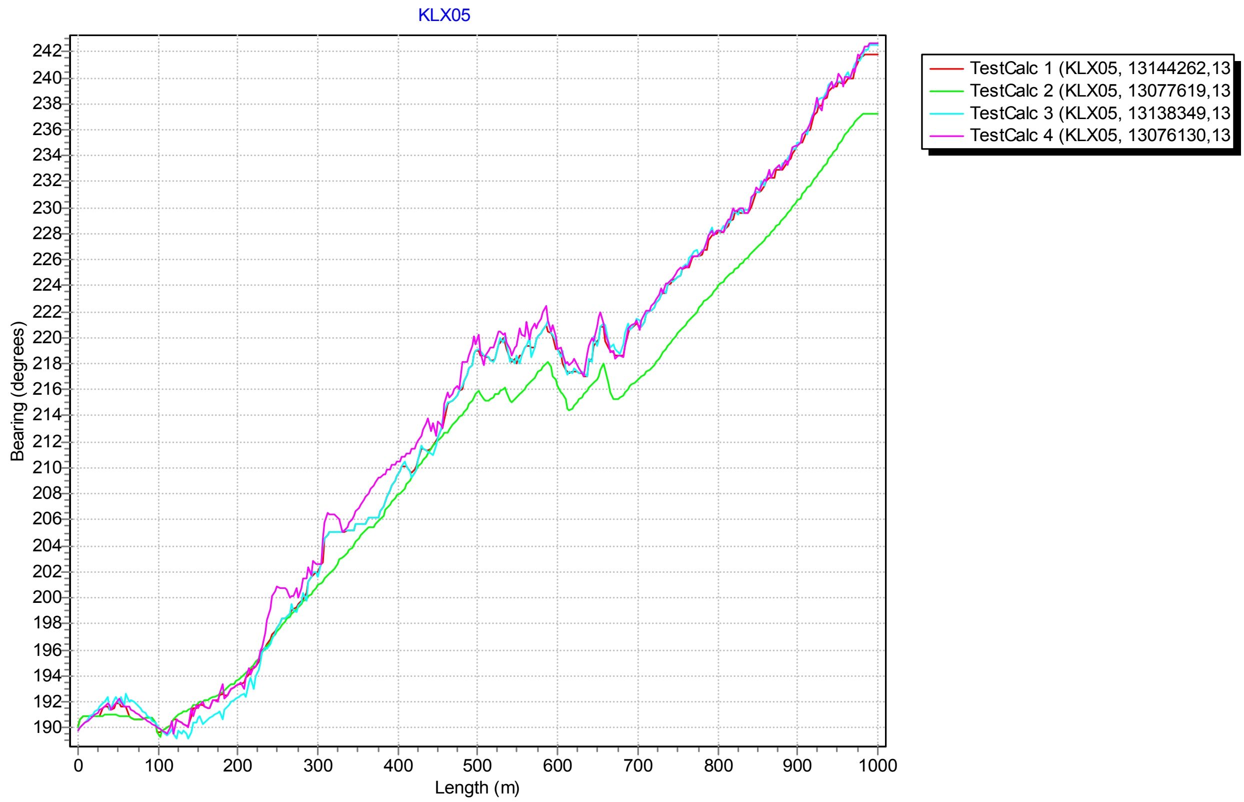


Figure 5. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX05	13055515	EG156	Maxibor measurement	2004-10-22 10:00	0.00	294.00	ECF
KLX05	13055519	EG156	Maxibor measurement	2004-10-29 08:30	0.00	408.00	ECF
KLX05	13055521	EG156	Maxibor measurement	2004-11-03 10:00	0.00	489.00	ECF
KLX05	13055601	EG156	Maxibor measurement	2004-11-10 14:00	0.00	546.00	ECF
KLX05	13059939	EG156	Maxibor measurement	2004-11-21 08:30	0.00	630.00	ECF
KLX05	13066203	EG156	Maxibor measurement	2005-01-23 07:23	0.00	990.00	ECF
KLX05	13073086	EG157	Magnetic - accelerometer measurement	2005-03-13 00:00	0.00	984.00	E
KLX05	13074897	EG156	Maxibor measurement	2005-03-13 06:00	15.00	981.00	ECF
KLX05	13076130	EG157	Magnetic - accelerometer measurement	2005-05-19 19:13	0.00	990.00	CF
KLX05	13138349	EG157	Magnetic - accelerometer measurement	2005-05-19 21:57	0.00	990.00	CF
KLX05	13077619	EG156	Maxibor measurement	2005-07-07 00:00	0.00	981.00	CF
KLX05	13144262	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX05	13076130	BEARING	30.00	60.00	
KLX05	13076130	BEARING	123.00	981.00	
KLX05	13076130	INCLINATION	3.00	981.00	
KLX05	13077619	BEARING	3.00	981.00	
KLX05	13138349	BEARING	30.00	60.00	
KLX05	13138349	BEARING	123.00	981.00	
KLX05	13138349	INCLINATION	3.00	981.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

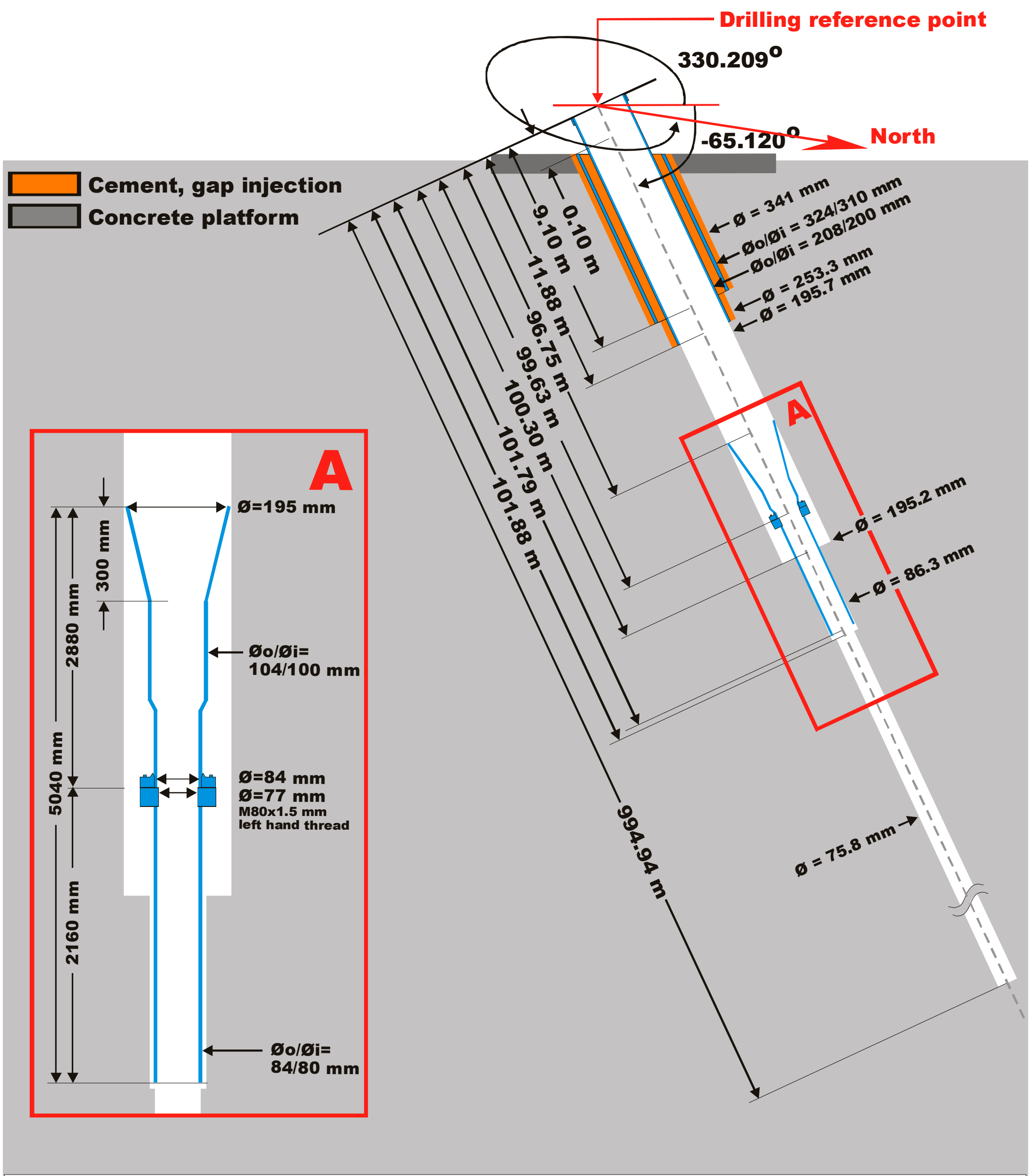
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX05	6365633.34	1548909.41	17.63	0	0.00	-65.22	190.19	0.55	3.545	0
KLX05	6365576.58	1548898.58	-101.04	132	0.56	-63.22	190.26	0.55	3.545	3.58
KLX05	6365528.29	1548887.36	-200.34	243	1.03	-63.94	197.17	0.55	3.545	6.64
KLX05	6365483.94	1548869.41	-300.47	354	1.49	-64.64	205.72	0.55	3.545	9.6
KLX05	6365443.18	1548846.27	-401.07	465	1.94	-65.14	215.09	0.55	3.545	12.5
KLX05	6365407.17	1548817.94	-498.86	573	2.38	-64.66	219.83	0.55	3.545	15.34
KLX05	6365370.15	1548788.08	-599.15	684	2.84	-63.75	219.33	0.55	3.545	18.28
KLX05	6365334.85	1548754.17	-698.75	795	3.31	-63.98	227.95	0.55	3.545	21.31
KLX05	6365304.58	1548716.58	-798.69	906	3.77	-64.04	235.02	0.55	3.545	24.3
KLX05	6365283.47	1548680.99	-883.26	1,000.16	4.17	-63.91	241.73	0.55	3.545	26.86

Borehole description – KLX06

Technical description of borehole KLX06 is given in Figure 1.

Technical data

Borehole KLX06



Drilling reference point

Northing: 6367806.64 (m), RT90 2,5 gon V

Easting: 1548566.88 (m), RT90 2,5 gon V

Elevation: 17.68 (m), RHB 70

Drilling period

Drilling start date: 2004-08-03

Drilling stop date: 2004-11-25

Figure 1. Technical description of borehole KLX06

Deviation measurement in KLX06

In total six deviation measurements are conducted in KLX06. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

There are four Maxibor part measurements executed and merged in borehole KLX06 to create a complete borehole deviation measurement. All measurements were executed with the instrument centralized and hoisted by wire, inside the drill string.

The starting values (bearing and inclination, see Borehole direction surveying for Maxibor, Sicada ID 13030829) for the first Maxibor part measurement (ID 13032423) were obtained from surveying with a Total station on the drill string. Inside the drill string was the Maxibor instrument hanging on a wire, 3 m above the TOC.

- These values shall not be mixed up with the values surveyed at TOC (Borehole direction surveying).

The first Maxibor part measurement is (ID13032423) between borehole lengths 0 – 222 m.

The second part measurement is measured between borehole lengths 204 – 390 m and then merged by Maxibor software (at borehole lengths 204 m) with the first part measurement to create measurement (ID 13034800) 0 – 390 m.

The third part measurement is measured between borehole lengths 372 – 735 m and then merged by Maxibor software (at borehole lengths 372 m) with the second part measurement to create measurement (ID 13055618) 0 – 735 m.

The fourth part measurement is measured between borehole lengths 702 – 987 m and then merged by Maxibor software (at borehole lengths 702 m) with the third part measurement to create the complete borehole measurement (ID 13062810) 0 – 987 m.

This complete borehole Maxibor measurement (ID 13062810) was wrongly bug reported and ERROR- marked, when it was noticed that the values at borehole length 0.00 m did not match the values at TOC from Borehole direction surveying (ID 13030518). These initial values was then wrongly changed and the following calculation created the Maxibor measurement (ID 13131495) which also had to be ERROR- marked when the mistake was discovered. The correct complete borehole Maxibor measurement in KLX06 has ID 1318717.

The first, second and third part measurements was later ERROR- marked because those data is involved in the fourth measurement and would therefore interfere the calculation of the inclination and bearing uncertainties.

The two Mac/acc measurements (ID 13117554, 13138707) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measuring, see Figure 2.

There is two ERROR- marked Mag/acc measurements (ID 13073342 and 13114637) in Table 1, due to wrongly correction for magnetic declination and meridian convergence.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144263) the Maxibor measurement (ID 13138717) and the two Mag/acc measurements (ID 13138707, 13117554) were used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

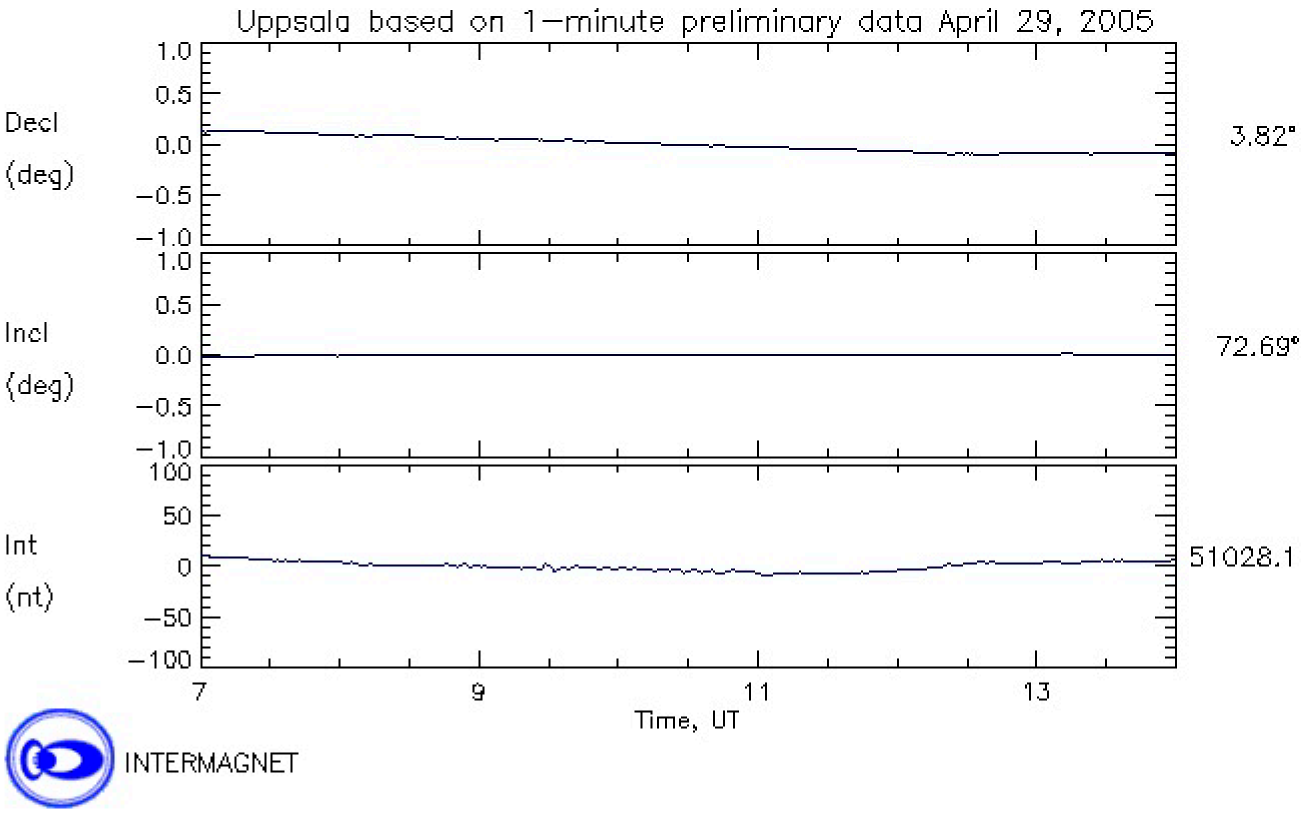
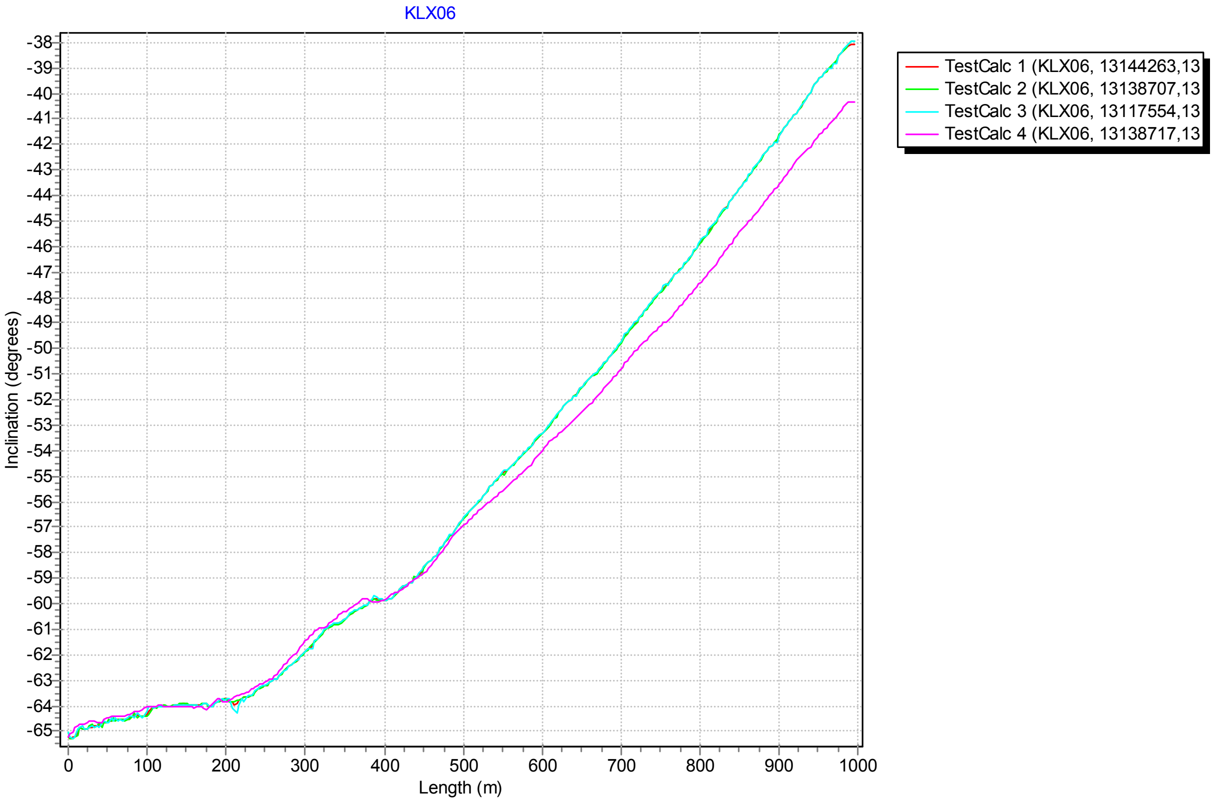


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-04-29.*



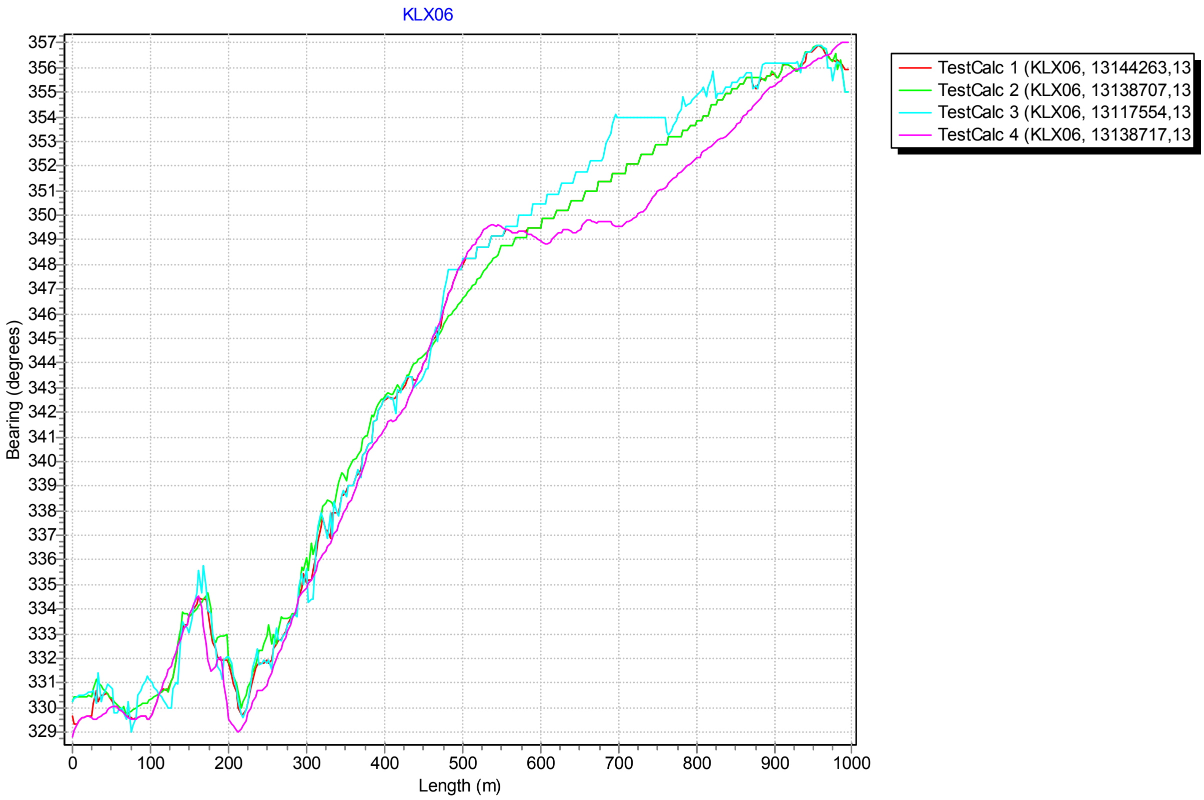


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX06	13032423	EG156	Maxibor measurement	2004-09-06 15:30	0.00	222.00	ECF
KLX06	13034800	EG156	Maxibor measurement	2004-09-21 14:30	0.00	390.00	EC
KLX06	13055618	EG156	Maxibor measurement	2004-10-24 14:00	0.00	735.00	ECF
KLX06	13062810	EG156	Maxibor measurement	2004-11-27 08:20	0.00	987.00	ECF
KLX06	13138717	EG156	Maxibor measurement	2004-11-27 08:20	0.00	987.00	C
KLX06	13131495	EG156	Maxibor measurement	2004-11-28 08:20	0.00	987.00	ECF
KLX06	13117554	EG157	Magnetic - accelerometer measurement	2005-04-29 07:26	0.00	990.00	CF
KLX06	13073342	EG157	Magnetic - accelerometer measurement	2005-04-29 07:26	0.00	990.00	EF
KLX06	13114637	EG157	Magnetic - accelerometer measurement	2005-04-29 07:26	0.00	990.00	EF
KLX06	13138707	EG157	Magnetic - accelerometer measurement	2005-04-29 10:33	0.00	990.00	CF
KLX06	13144263	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX06	13117554	BEARING	27.00	81.00	
KLX06	13117554	BEARING	117.00	987.00	
KLX06	13117554	INCLINATION	3.00	987.00	
KLX06	13138707	BEARING	27.00	81.00	
KLX06	13138707	BEARING	117.00	987.00	
KLX06	13138707	INCLINATION	3.00	987.00	
KLX06	13138717	BEARING	3.00	987.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX06	6367806.64	1548566.88	17.68	0	0.00	-65.2	329.65	1.019	1.389	0
KLX06	6367854.66	1548539.17	-98.79	129	0.99	-64.02	331.24	1.019	1.389	2.3
KLX06	6367899.13	1548515.76	-201.11	243	1.88	-63.31	331.8	1.019	1.389	4.32
KLX06	6367946.55	1548493.87	-299.02	354	2.81	-60.49	339.02	1.019	1.389	6.3
KLX06	6368003.24	1548475.89	-399.74	471	3.87	-57.85	345.45	1.019	1.389	8.38
KLX06	6368071.38	1548462.06	-501.17	594	5.11	-53.48	349.49	1.019	1.389	10.57
KLX06	6368149.19	1548449.53	-599.43	720	6.51	-48.94	352.09	1.019	1.389	12.81
KLX06	6368244.03	1548439	-699.03	858	8.21	-43.39	355.36	1.019	1.389	15.27
KLX06	6368347.82	1548431.79	-787.99	994.94	10.06	-38.09	355.91	1.019	1.389	17.79

Borehole description – KLX07A

Technical description of borehole KLX07A is given in Figure 1.

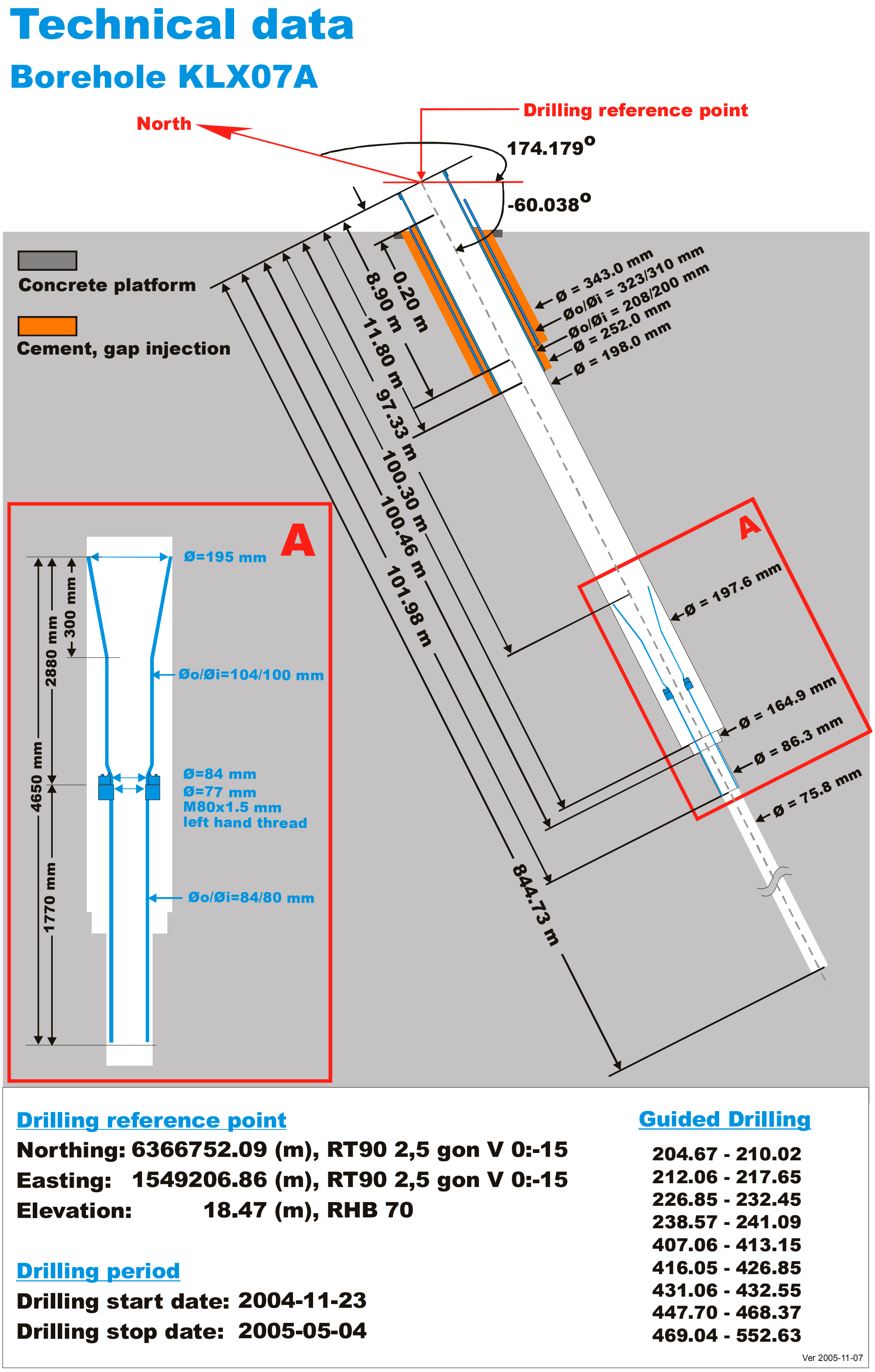


Figure 1. Technical description of borehole KLX07A.

Deviation measurement in KLX07A

In total seven deviation measurements were conducted in KLX07A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

All Maxibor measurements were executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX07A was measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values were added for borehole length 0.00 m. See document (ID 1037594 Documentum).

There are two Maxibor part measurements executed in borehole KLX07A. Measurment (ID 13062912) between borehole lengths 0 – 402 m was ERROR- marked due to wrong values at 0.00 m. Measurement (ID 13064857) between borehole lengths 390 – 429 m was ERROR- marked due to problem with the instrument.

One of the two complete borehole Maxibor measurements (ID 13073321) was ERROR- marked due to missing data at borehole length 0.00 m. These data (from Borehole surveying at TOC) were added to the Maxibor raw data for a complete borehole measurement (ID 13078348)

The two correct Maxibor measurements (ID 13078348, 13138798) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13120699, 13138780) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked Mag/acc measurements (ID 13073418) due to wrong calculation of the deviation.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144264) the two Maxibor measurements (ID 13078348 and 13138798) and the two Mag/acc measurements (ID 13120699 and 13138780) were used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

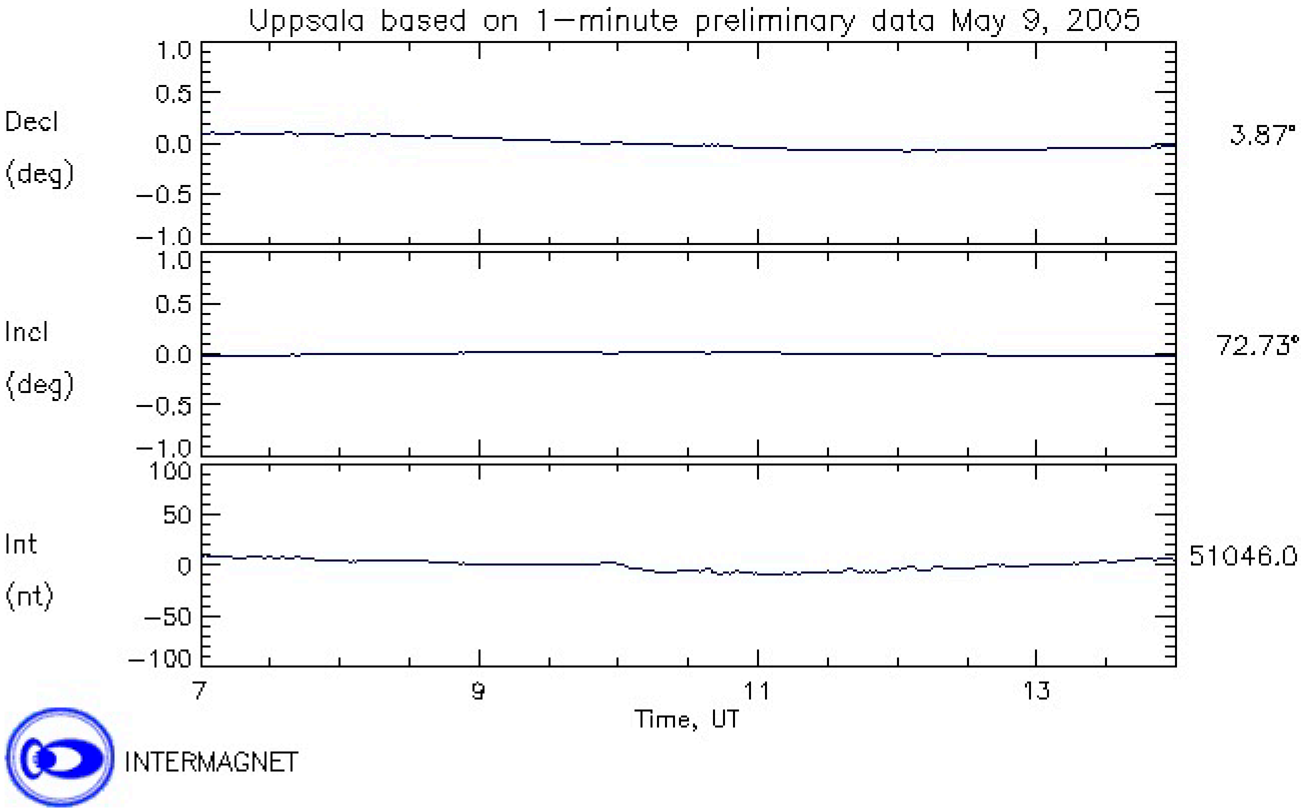
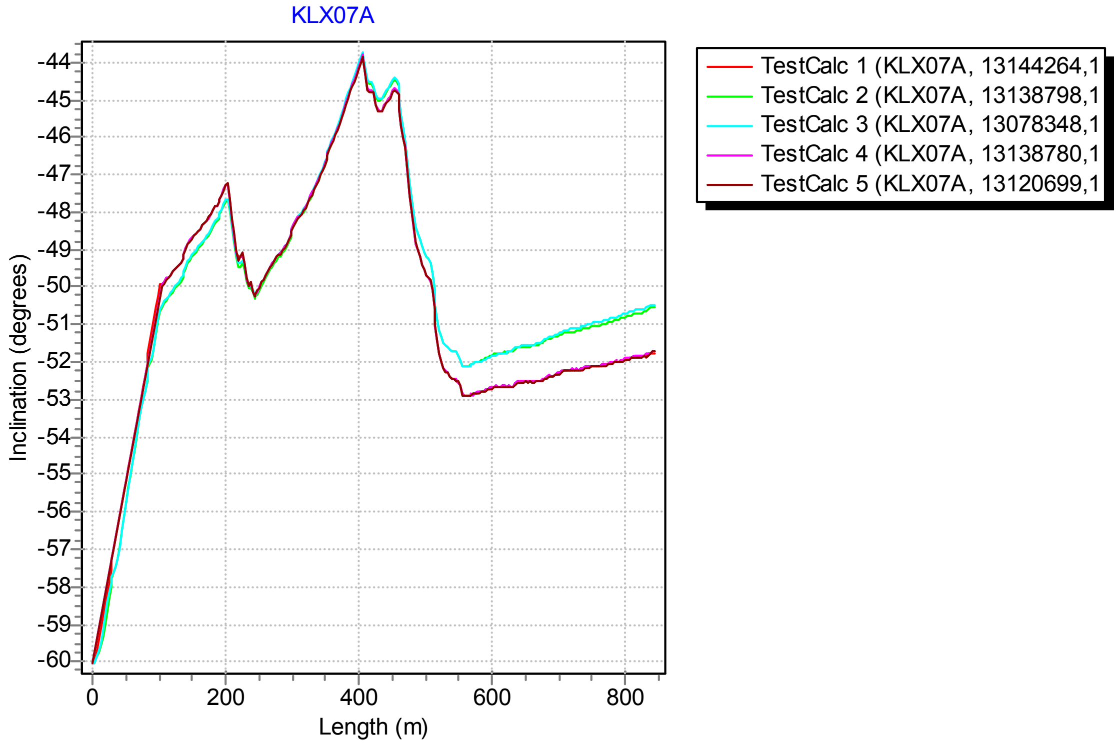


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-05-09.*



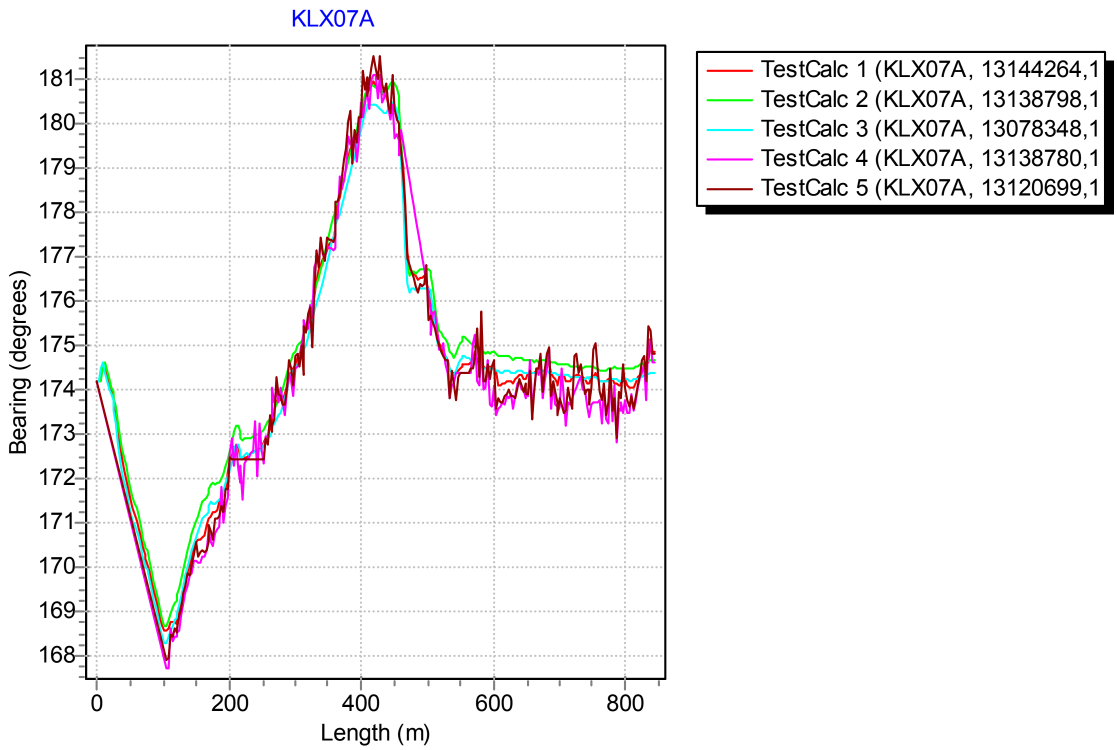


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities) specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX07A	13062912	EG156	Maxibor measurement	2005-02-10 07:00	0.00	402.00	EC
KLX07A	13064857	EG156	Maxibor measurement	2005-02-27 07:00	390.00	429.00	E
KLX07A	13073418	EG157	Magnetic - accelerometer measurement	2005-04-29 07:26	105.00	840.00	EF
KLX07A	13120699	EG157	Magnetic - accelerometer measurement	2005-05-09 07:40	105.00	840.00	CF
KLX07A	13138780	EG157	Magnetic - accelerometer measurement	2005-05-09 11:00	105.00	840.00	CF
KLX07A	13073321	EG156	Maxibor measurement	2005-05-20 00:00	3.00	837.00	ECF
KLX07A	13078348	EG156	Maxibor measurement	2005-05-20 07:00	0.00	837.00	CF
KLX07A	13138798	EG156	Maxibor measurement	2005-05-20 13:00	0.00	837.00	CF
KLX07A	13144264	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX07A	13078348	BEARING	3.00	837.00	
KLX07A	13120699	BEARING	117.00	837.00	
KLX07A	13120699	INCLINATION	105.00	837.00	
KLX07A	13138780	BEARING	117.00	837.00	
KLX07A	13138780	INCLINATION	105.00	837.00	
KLX07A	13138798	BEARING	3.00	837.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX07A	6366752.09	1549206.86	18.47	0	0.00	-60.04	174.18	1.005	0.575	0
KLX07A	6366665.79	1549220.84	-99.3	147	1.54	-48.77	170.47	1.005	0.575	2.58
KLX07A	6366577.77	1549232.91	-200.92	282	3.10	-49.11	173.78	1.005	0.575	4.95
KLX07A	6366482.98	1549237.18	-300.98	420	4.76	-44.78	180.91	1.005	0.575	7.37
KLX07A	6366395.6	1549241.08	-399.54	552	6.30	-52.64	174.53	1.005	0.575	9.68
KLX07A	6366319.56	1549248.54	-499.73	678	7.64	-52.46	174.41	1.005	0.575	11.89
KLX07A	6366242.67	1549256.3	-599.24	804	8.99	-51.91	174.11	1.005	0.575	14.1
KLX07A	6366217.62	1549258.74	-631.27	844.73	9.43	-51.78	174.87	1.005	0.575	14.82

Borehole description – KLX07B

Technical description of borehole KLX07B is given in Figure 1.

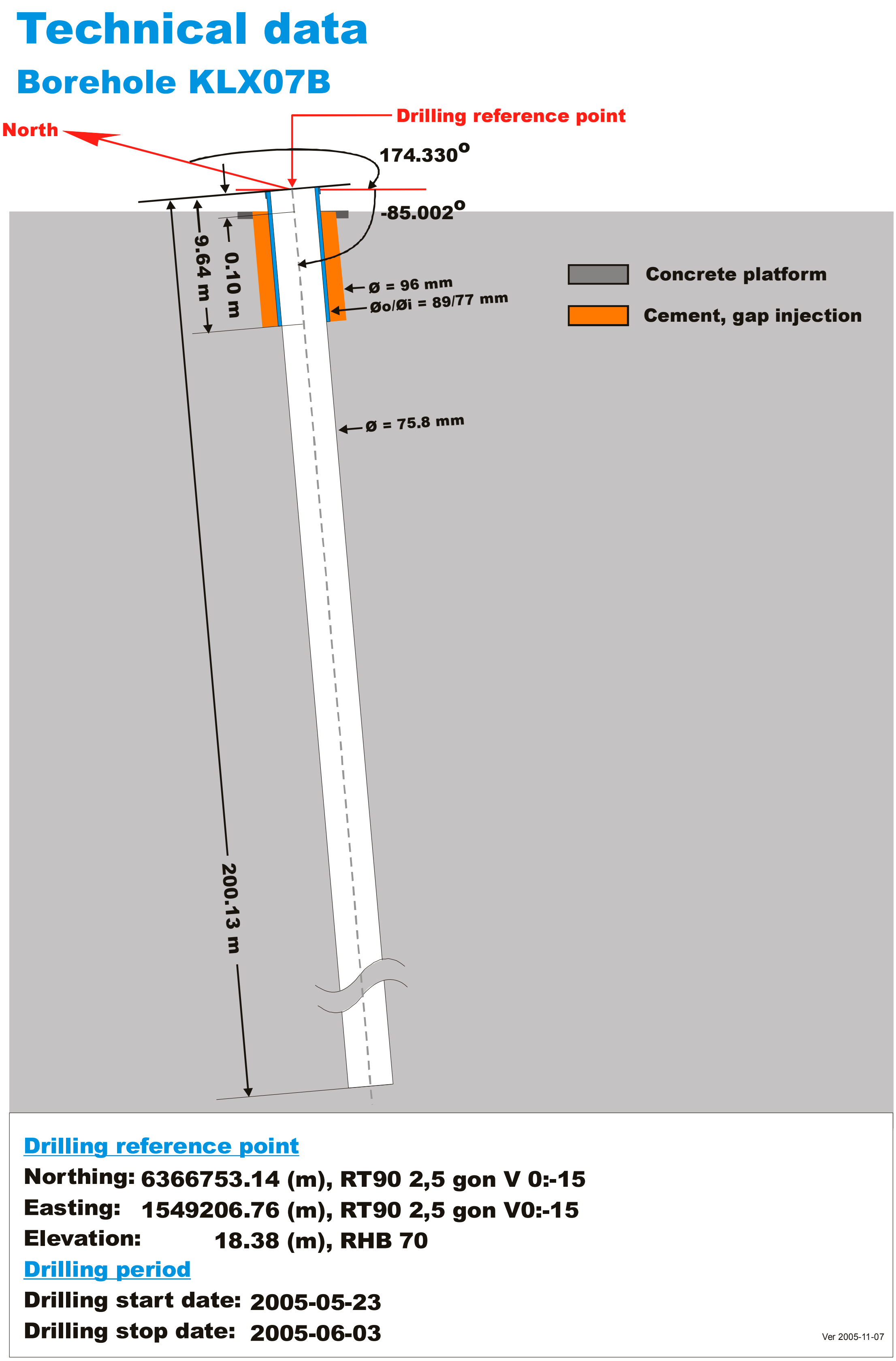


Figure 1. Technical description of borehole KLX07B.

Deviation measurement in KLX07B

In total three deviation measurements were conducted in KLX07B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX07B were measured with the Total station aiming on a prism, above and lined up with the TOC. The values at borehole length 0.00 m were used as start values for the Maxibor measurements, when no support casing was mounted in the borehole.

One Maxibor measurement (ID 13110931) was executed down in the borehole.

The two Mac/acc measurements (ID 13117545, 13138807) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked Mag/acc measurements (ID 13078118) due to wrongly correction for magnetic declination and meridian convergence.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144265) the Maxibor measurement (ID 13110931) and the two Mag/acc measurements (ID 13117545 and 13138807) were used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

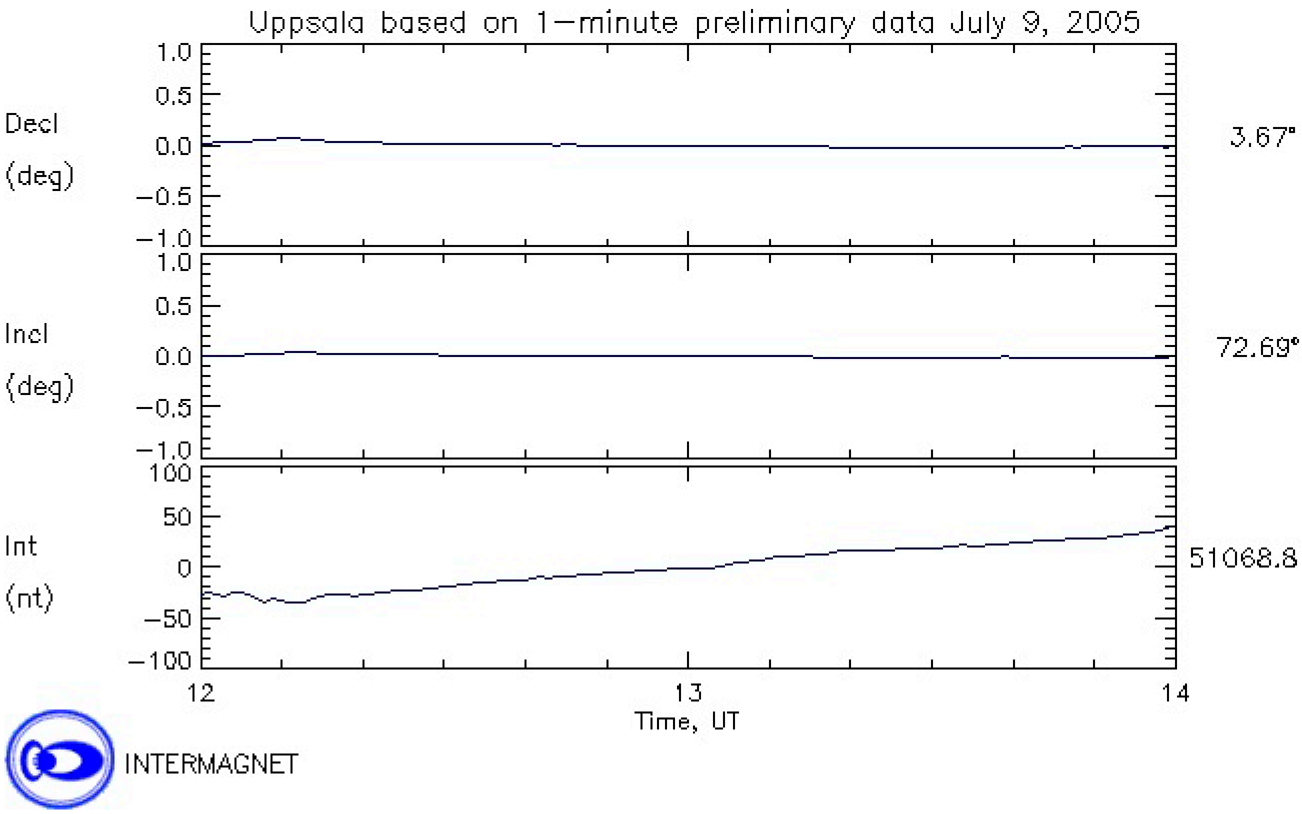
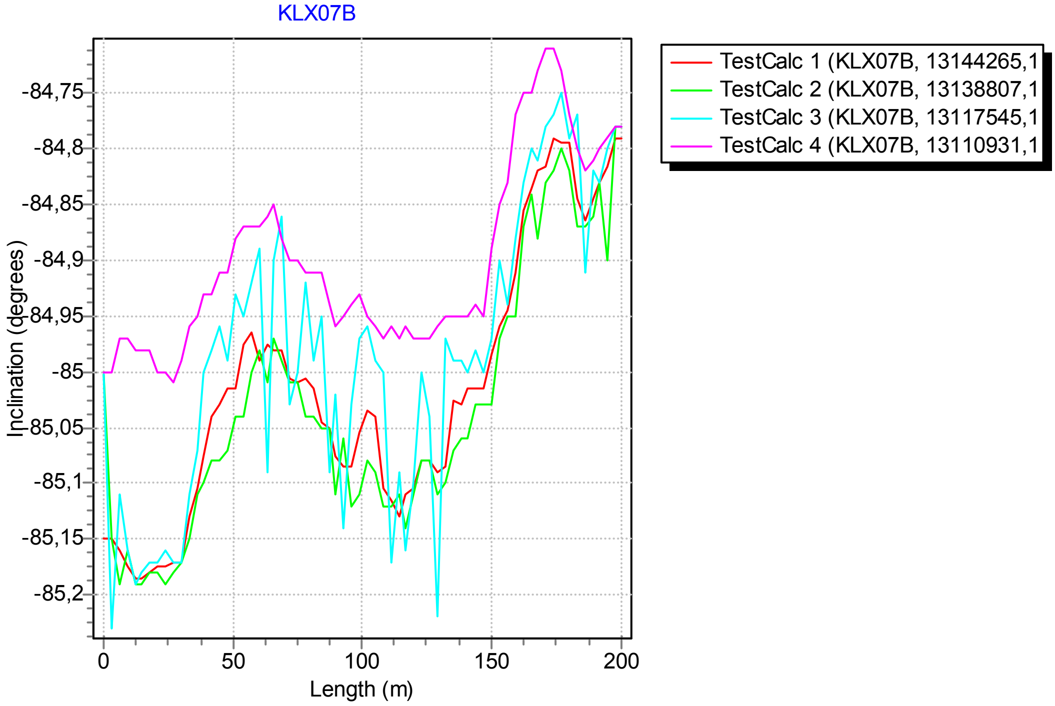


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-07-09.*



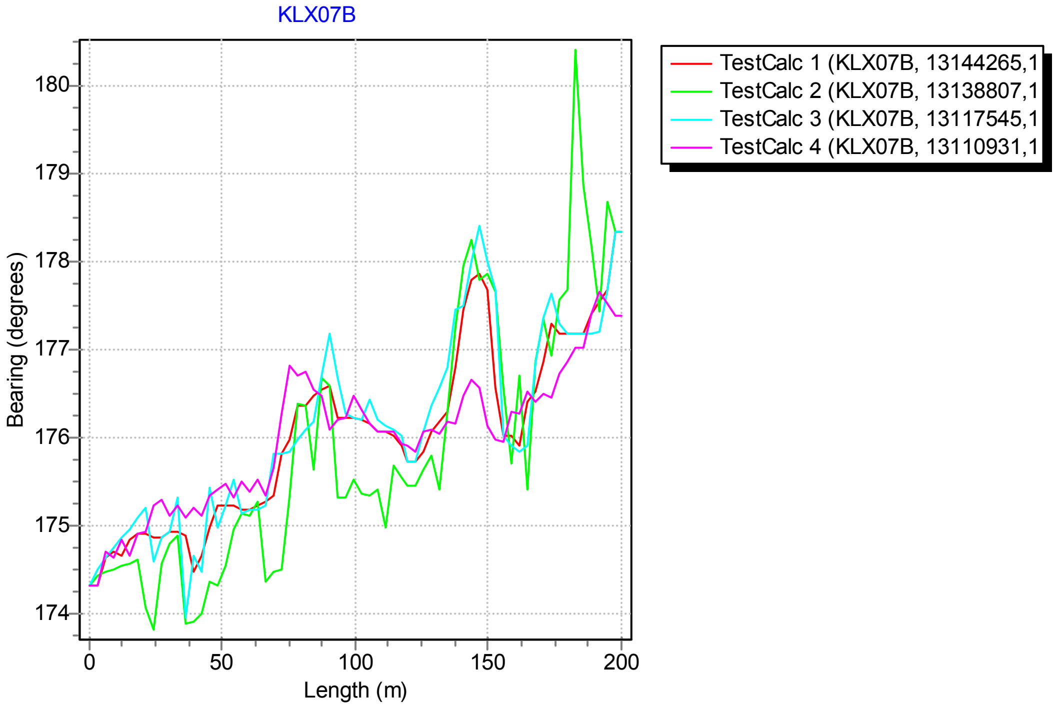


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX07B	13110931	EG156	Maxibor measurement	2005-06-03 12:00	0.00	198.00	CF
KLX07B	13078118	EG157	Magnetic - accelerometer measurement	2005-07-09 12:30	0.00	198.00	EF
KLX07B	13117545	EG157	Magnetic - accelerometer measurement	2005-07-09 12:38	0.00	198.00	CF
KLX07B	13138807	EG157	Magnetic - accelerometer measurement	2005-07-09 13:04	0.00	198.00	CF
KLX07B	13144265	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX07B	13110931	BEARING	3.00	200.13	
KLX07B	13117545	BEARING	17.00	200.13	
KLX07B	13117545	INCLINATION	3.00	200.13	
KLX07B	13138807	BEARING	17.00	200.13	
KLX07B	13138807	INCLINATION	3.00	200.13	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX07B	6366753.13	1549206.76	18.38	0	0.00	-85.15	174.33	0.145	0.86	0
KLX07B	6366742.87	1549207.57	-101.18	120	0.03	-85.1	175.72	0.145	0.86	0.3
KLX07B	6366735.79	1549207.96	-180.99	200.13	0.04	-84.79	178.34	0.145	0.86	0.51

Borehole description – KLX08

Technical description of borehole KLX08 is given in Figure 1.

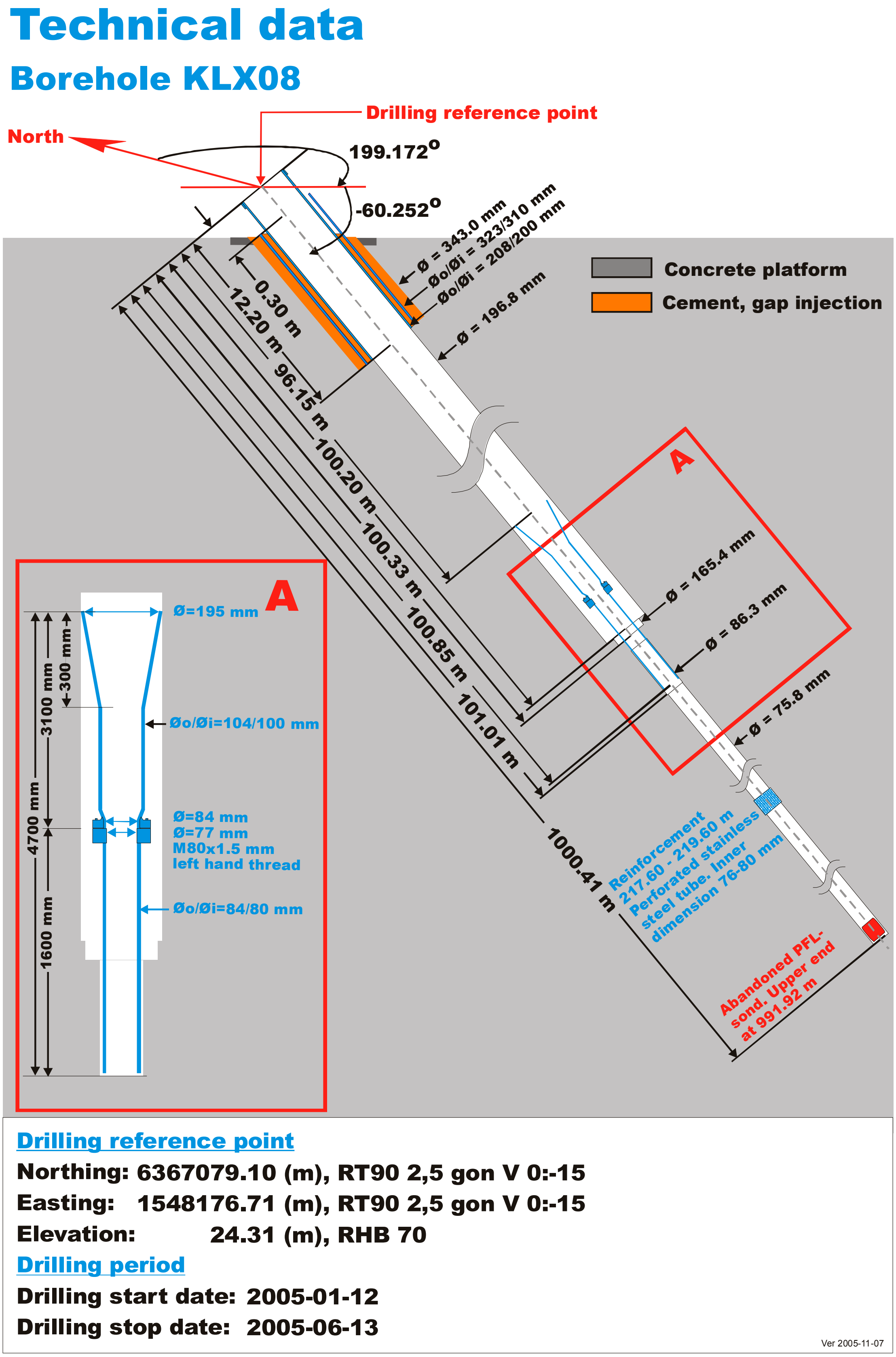


Figure 1. Technical description of borehole KLX08.

Deviation measurement in KLX08

In total four deviation measurements were conducted in KLX08. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurements were executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX08 were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which were used as start values (bearing and inclination) for the Maxibor measurement. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m was added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13078304, 13138836) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13117472, 13138841) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There are two ERROR- marked measurements. Mag/acc (ID 13080864) was bug reported (Bug 1819) due to wrongly correction for magnetic declination and meridian convergence. But the raw data from that measurement was re-used, without correction for magnetic declination and meridian convergence, to calculate the correct measurement (ID 13117472).

Maxibor (ID 13075969) was ERROR- marked due to missing data at borehole length 0.00 m. These data (from Borehole surveying at TOC) were added to the Maxibor raw data for a complete borehole measurement (ID 13078304).

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144266) the two Maxibor measurements (ID 13078304, 13138836) and the two Mag/acc measurements (ID 13117472 and 13138841) were used. The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

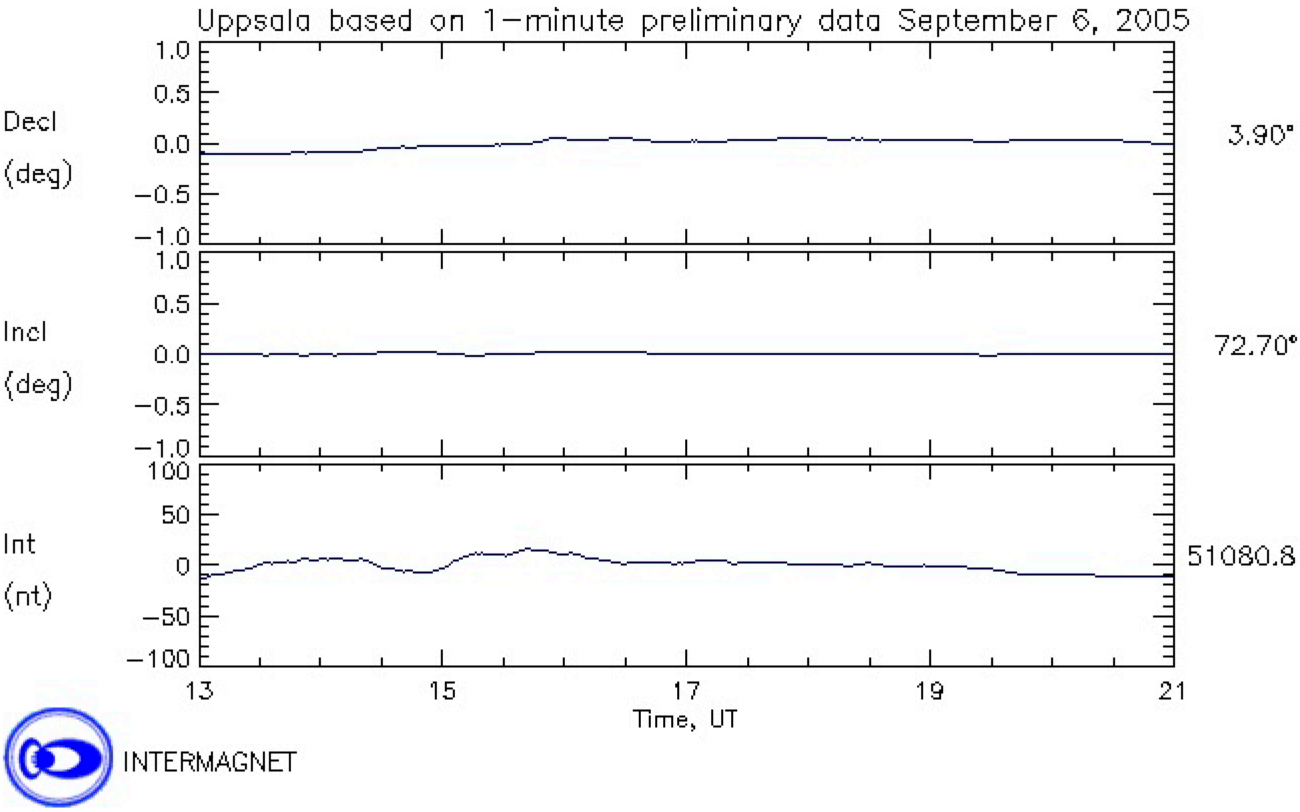
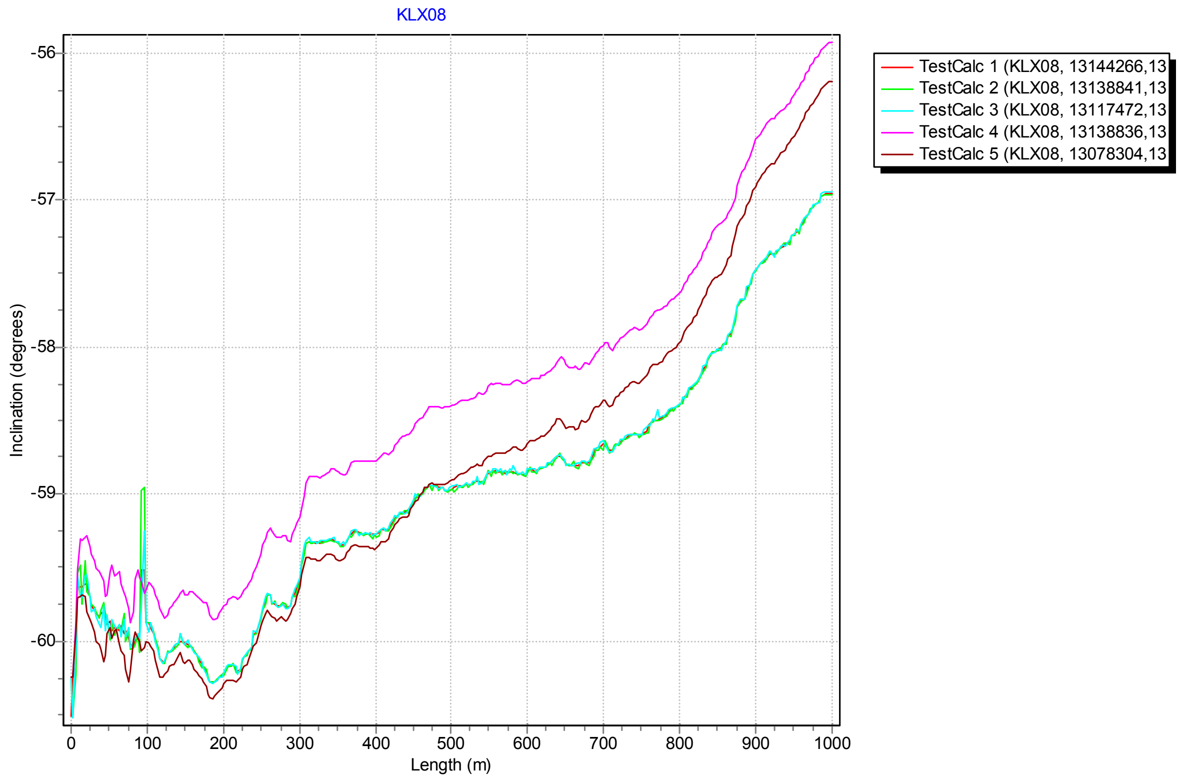


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-09-06.*



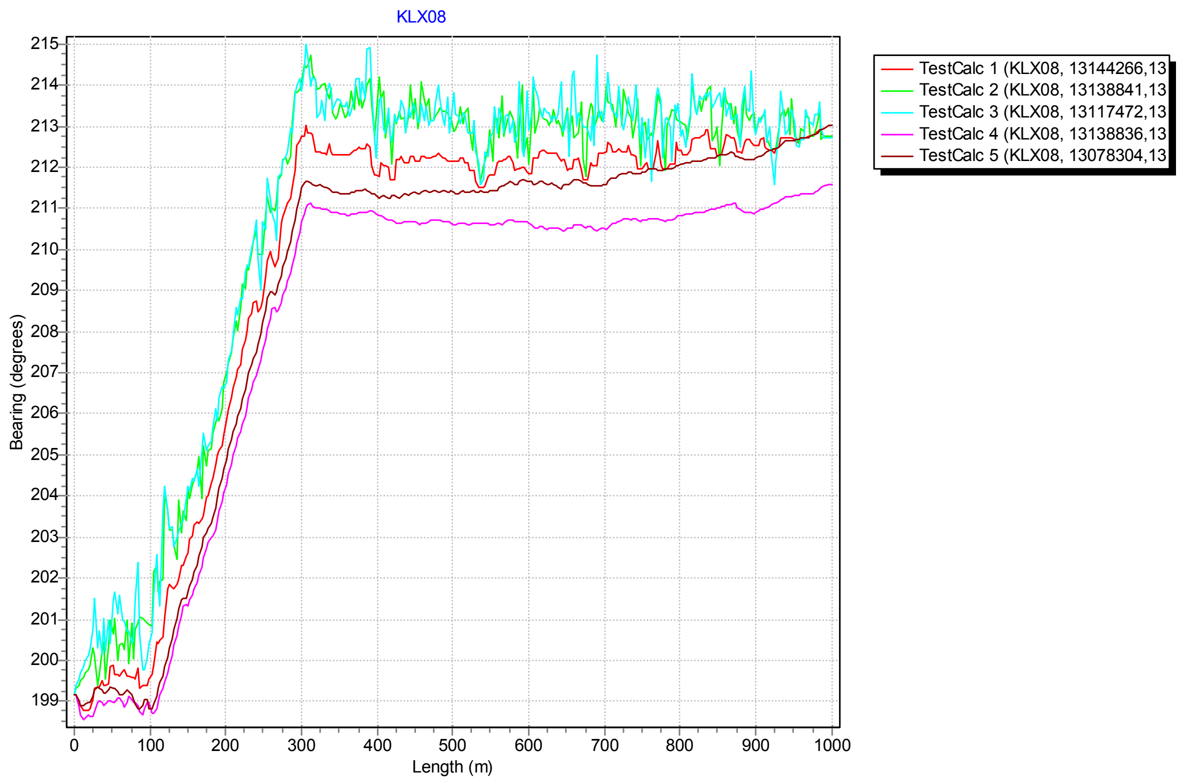


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX08	13075969	EG156	Maxibor measurement	2005-06-21 00:00	3.00	996.00	ECF
KLX08	13078304	EG156	Maxibor measurement	2005-06-21 06:00	0.00	996.00	CF
KLX08	13138836	EG156	Maxibor measurement	2005-06-21 13:00	0.00	996.00	CF
KLX08	13117472	EG157	Magnetic - accelerometer measurement	2005-09-06 13:49	0.00	990.00	CF
KLX08	13080864	EG157	Magnetic - accelerometer measurement	2005-09-06 14:00	0.00	990.00	EF
KLX08	13138841	EG157	Magnetic - accelerometer measurement	2005-09-06 17:08	0.00	990.00	CF
KLX08	13144266	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

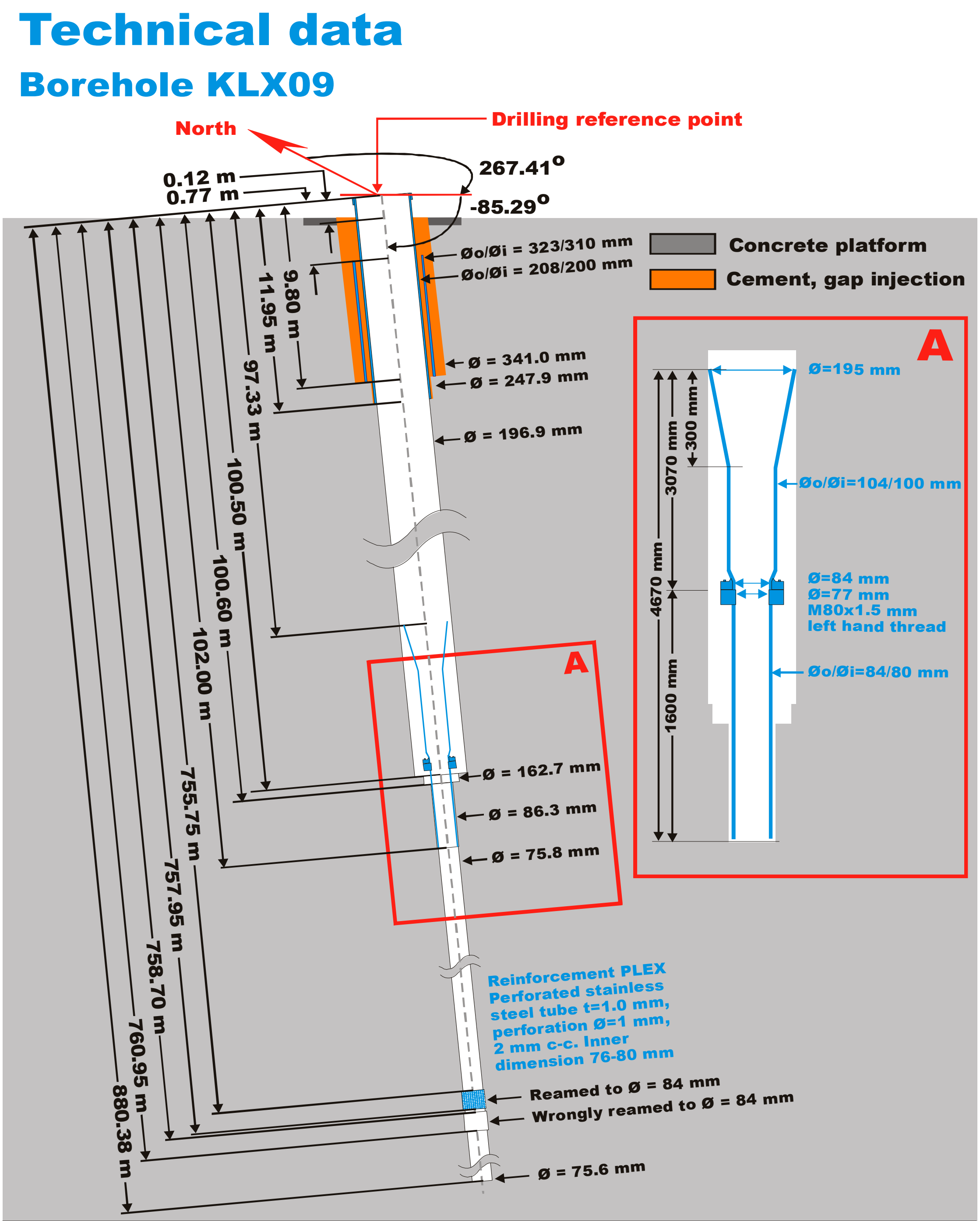
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX08	13078304	BEARING	3.00	990.00	
KLX08	13117472	BEARING	27.00	990.00	
KLX08	13117472	INCLINATION	3.00	990.00	
KLX08	13138836	BEARING	3.00	990.00	
KLX08	13138841	BEARING	27.00	990.00	
KLX08	13138841	INCLINATION	3.00	990.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX08	6367079.1	1548176.71	24.31	0	0.00	-60.51	199.17	0.645	1.67	0
KLX08	6367011.24	1548152.11	-100.28	144	0.81	-60	202.32	0.645	1.67	2.1
KLX08	6366960.16	1548127.28	-199.1	258	1.45	-59.68	209.95	0.645	1.67	3.76
KLX08	6366909.73	1548095.85	-299.88	375	2.12	-59.25	212.49	0.645	1.67	5.49
KLX08	6366858.9	1548063.89	-400.3	492	2.80	-58.98	212.14	0.645	1.67	7.24
KLX08	6366807.63	1548031.87	-500.47	609	3.48	-58.85	212.22	0.645	1.67	9
KLX08	6366756.28	1547999.52	-600.5	726	4.16	-58.63	212.38	0.645	1.67	10.77
KLX08	6366704.5	1547966.75	-700.17	843	4.85	-58.03	212.44	0.645	1.67	12.56
KLX08	6366651.61	1547932.97	-798.91	960	5.56	-57.17	212.69	0.645	1.67	14.39
KLX08	6366633.12	1547921.07	-832.82	1,000.41	5.81	-56.96	212.75	0.645	1.67	15.03

Borehole description – KLX09

Technical description of borehole KLX09 is given in Figure 1.



Drilling reference point

Northing: 6367323.45 (m), RT90 2,5 gon V 0:-15
Easting: 1548863.18 (m), RT90 2,5 gon V 0:-15
Elevation: 23.45 (m), RHB 70

Drilling period

Drilling start date: 2005-06-02
Drilling stop date: 2005-10-15

Ver 2006-03-21

Figure 1. Technical description of borehole KLX09.

Deviation measurement in KLX09

In total four deviation measurements were conducted in KLX09. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX09 were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13094370, 13139118) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13139120, 13116290) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement, mag/acc (ID 13099956) which was bug reported (Bug 1819) due to wrongly correction for magnetic declination and meridian convergence. But the raw data from that measurement was re-used, without correction for magnetic declination and meridian convergence, to calculate the correct measurement (ID 13139120). Also was the values between 0 – 108 m included, the bearing values was interpolated due to magnetic disturbances caused by the support casing.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144267) the two Maxibor measurements (ID 13094370, 13139118) and the two Mag/acc measurements (ID 13139120, 13116290) were used. Due to the fact that bearing values from the Maxibor measurement seems to be unrealistic and the bearing values from the Mag/acc measurement were magnetic disturbed between 0 – 117 metres, none of these values were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

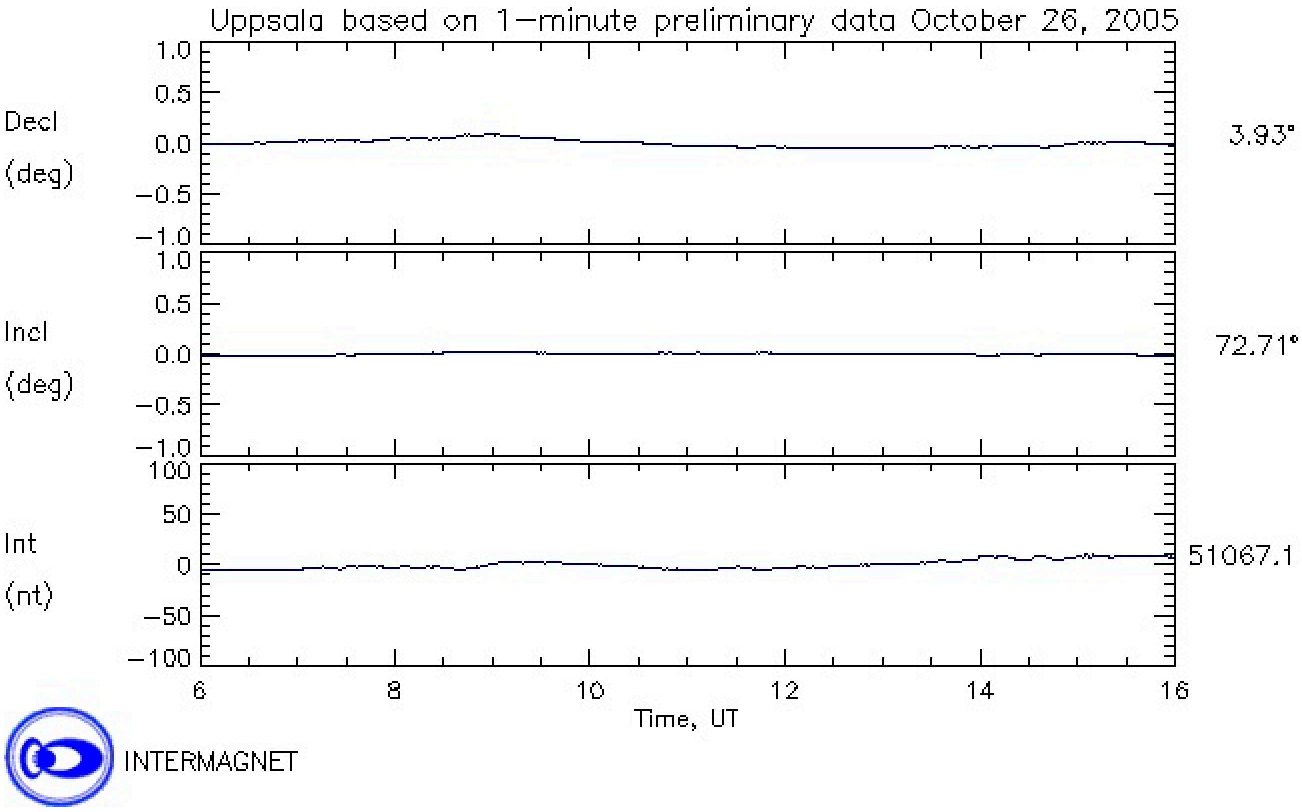
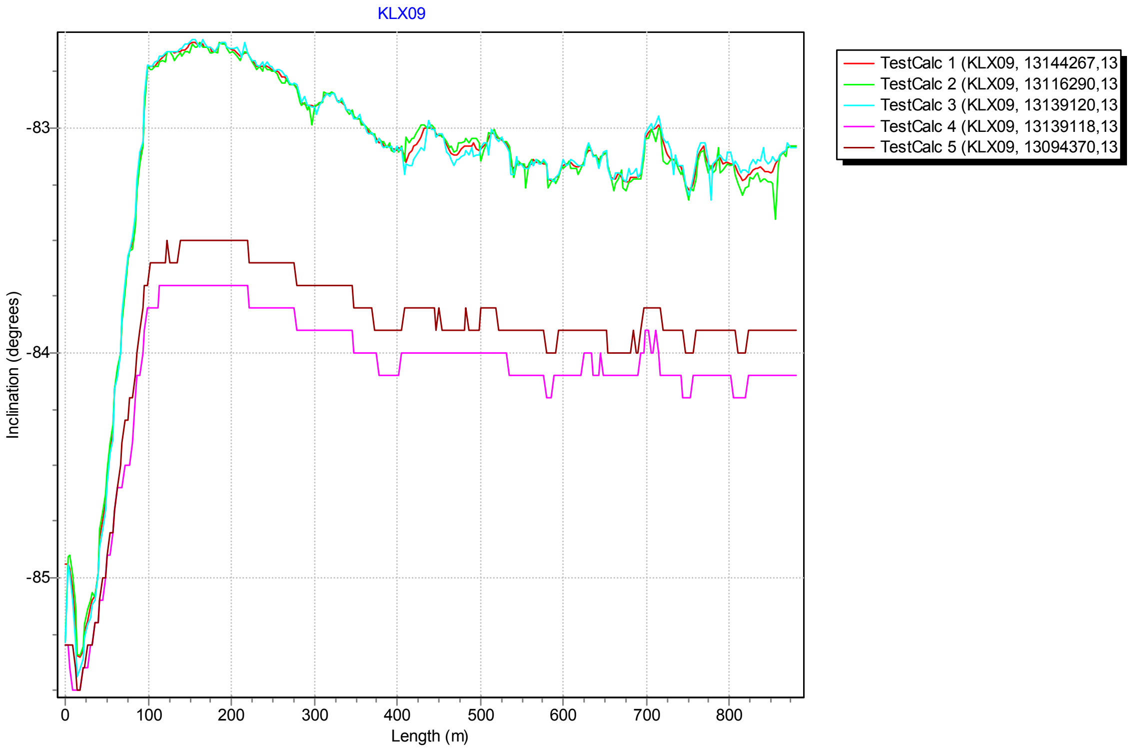


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-10-26.*



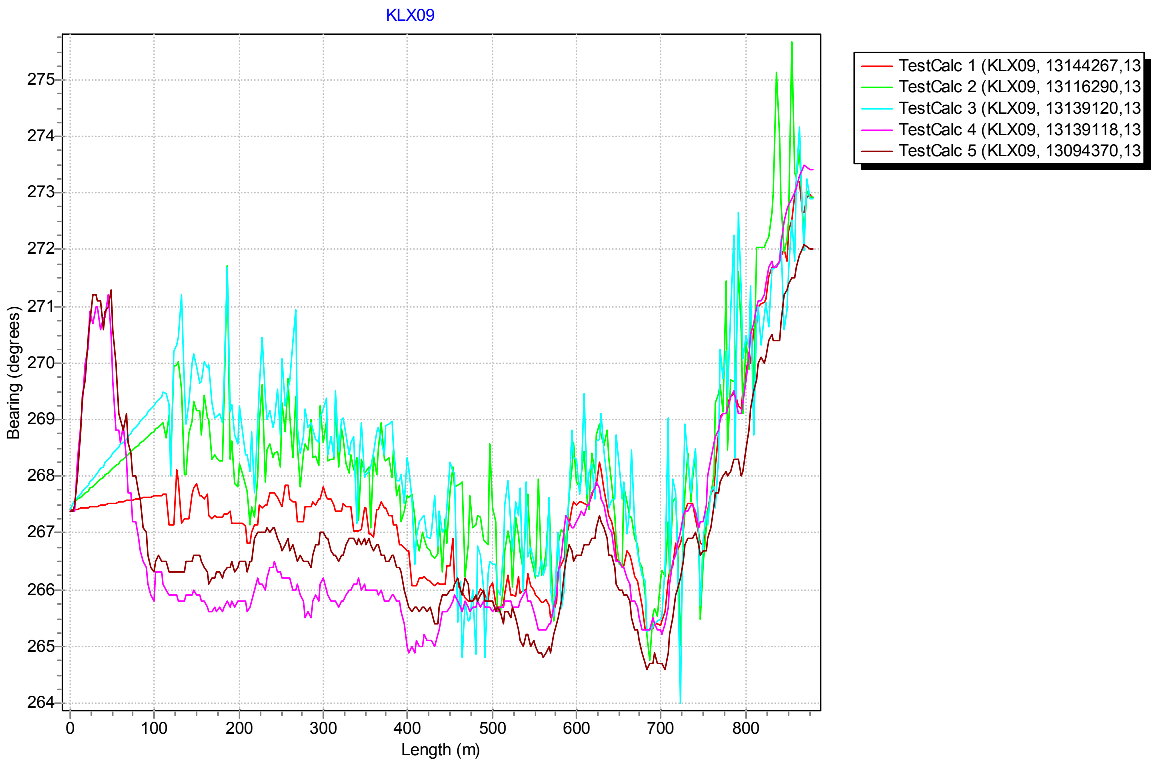


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09	13094370	EG156	Maxibor measurement	2005-10-24 06:00	0.00	876.00	CF
KLX09	13139118	EG156	Maxibor measurement	2005-10-24 12:00	0.00	876.00	CF
KLX09	13139120	EG157	Magnetic - accelerometer measurement	2005-10-26 06:21	0.00	876.00	CF
KLX09	13099956	EG157	Magnetic - accelerometer measurement	2005-10-26 06:21	108.00	876.00	EF
KLX09	13116290	EG157	Magnetic - accelerometer measurement	2005-10-26 10:43	0.00	876.00	CF
KLX09	13144267	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

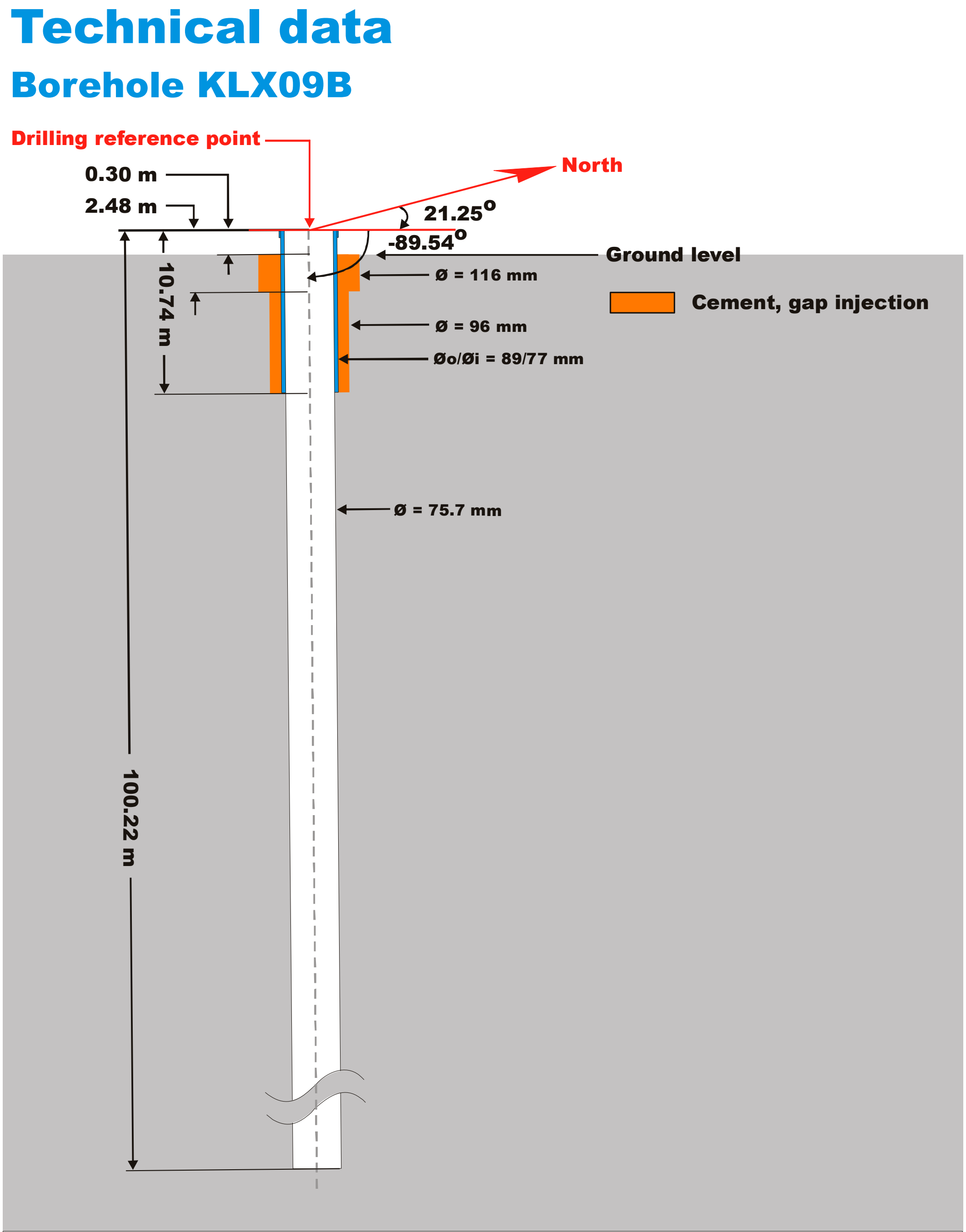
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09	13094370	BEARING	117.00	876.00	
KLX09	13116290	BEARING	117.00	876.00	
KLX09	13116290	INCLINATION	3.00	876.00	
KLX09	13139118	BEARING	117.00	876.00	
KLX09	13139120	BEARING	117.00	876.00	
KLX09	13139120	INCLINATION	3.00	876.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09	6367323.45	1548863.18	23.45	0	0.00	-84.94	267.41	0.99	1.76	0
KLX09	6367322.9	1548850.45	-98.87	123	0.22	-82.66	267.15	0.99	1.76	2.13
KLX09	6367322.3	1548837.42	-200.03	225	0.45	-82.7	267.49	0.99	1.76	3.89
KLX09	6367321.75	1548824.67	-301.23	327	0.67	-82.88	267.48	0.99	1.76	5.65
KLX09	6367321.1	1548812.67	-399.5	426	0.87	-83.06	266.15	0.99	1.76	7.36
KLX09	6367320.25	1548800.38	-500.75	528	1.09	-83.06	265.87	0.99	1.76	9.12
KLX09	6367319.55	1548788.62	-599.05	627	1.29	-83.12	268.26	0.99	1.76	10.83
KLX09	6367318.78	1548776.46	-700.32	729	1.50	-83.14	267.4	0.99	1.76	12.6
KLX09	6367318.57	1548764.71	-798.62	828	1.70	-83.19	271.53	0.99	1.76	14.31
KLX09	6367318.83	1548758.47	-850.62	880.38	1.81	-83.09	272.93	0.99	1.76	15.21

Borehole description – KLX09B

Technical description of borehole KLX09B is given in Figure 1.



Drilling reference point
Northing: 6367329.07 (m), RT90 2,5 gon V 0:-15
Easting: 1548859.01 (m), RT90 2,5 gon V0:-15
Elevation: 23.62 (m), RHB 70
Drilling period
Drilling start date: 2006-01-16
Drilling stop date: 2006-01-26

Ver 2006-11-23

Figure 1. Technical description of borehole KLX09B.

Deviation measurement in KLX09B

In total two deviation measurements were conducted in KLX09B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101430, 13139123) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144268) the two Mag/acc measurements (ID 13101430, 13139123) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

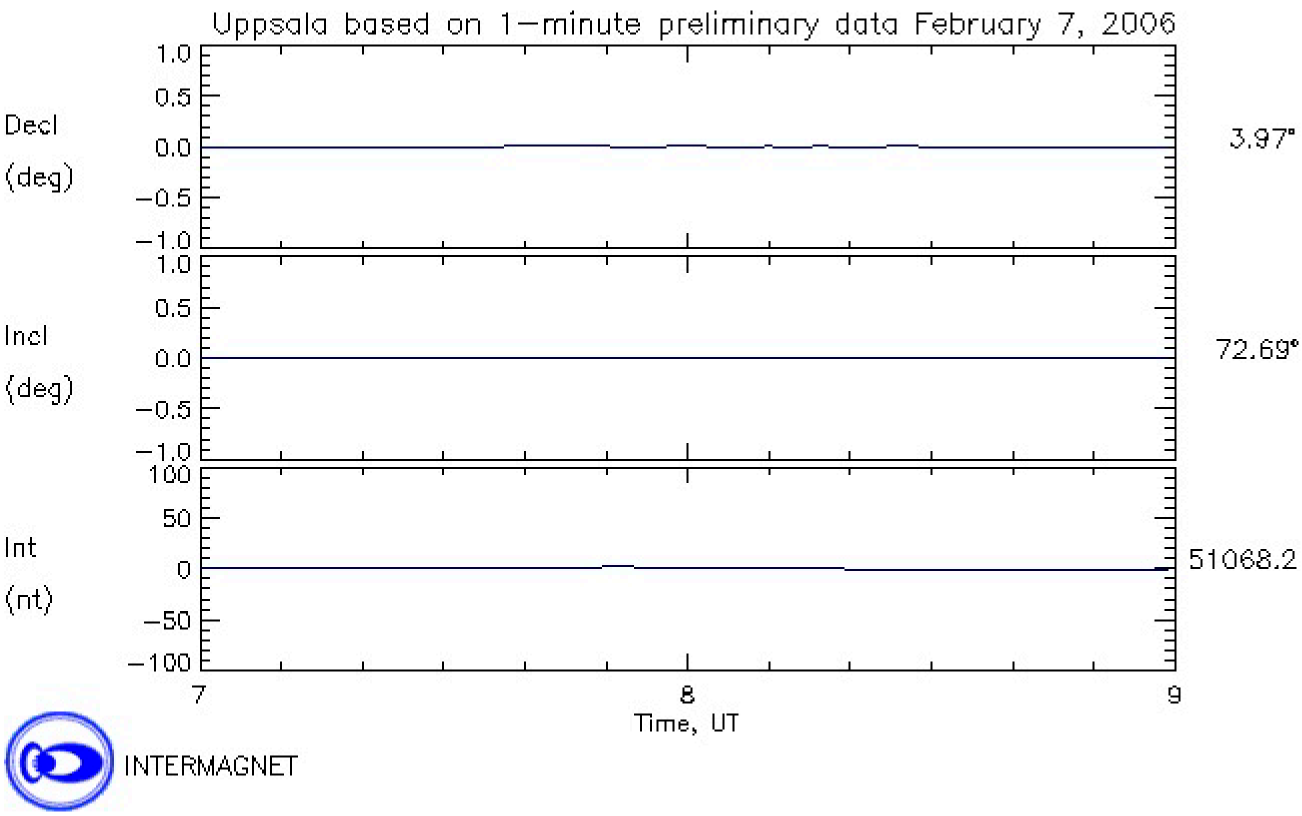
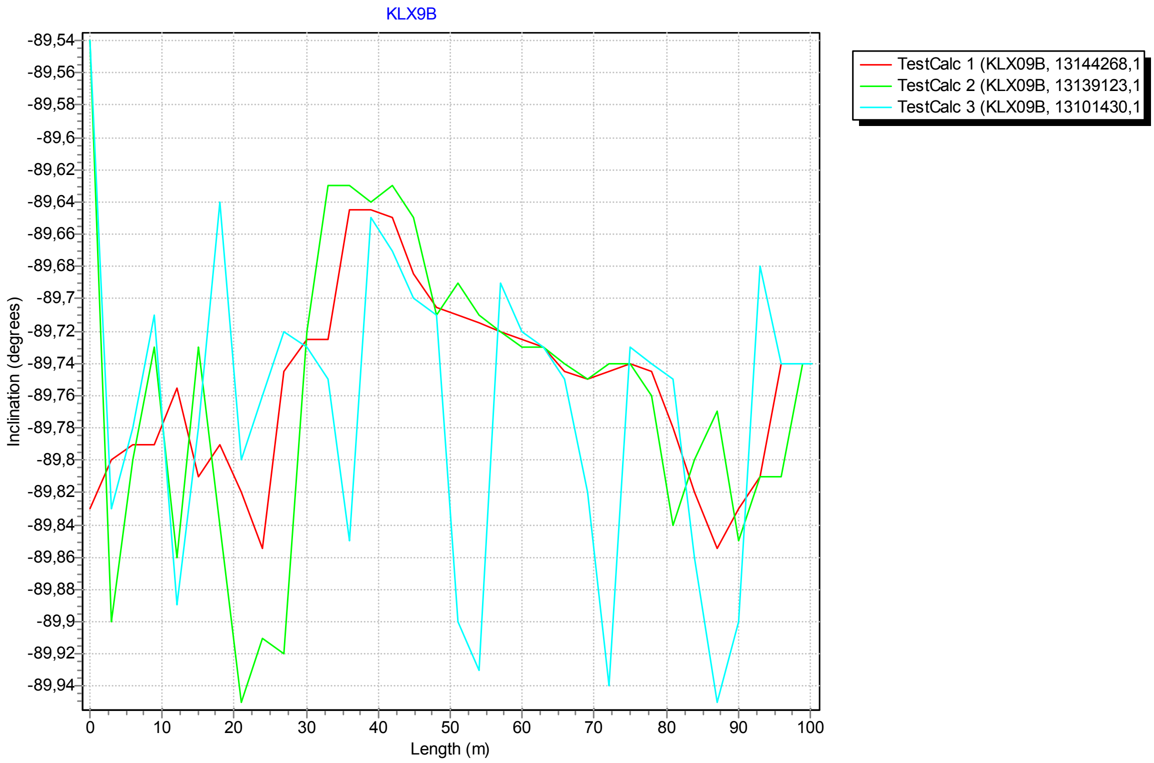


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-07.*



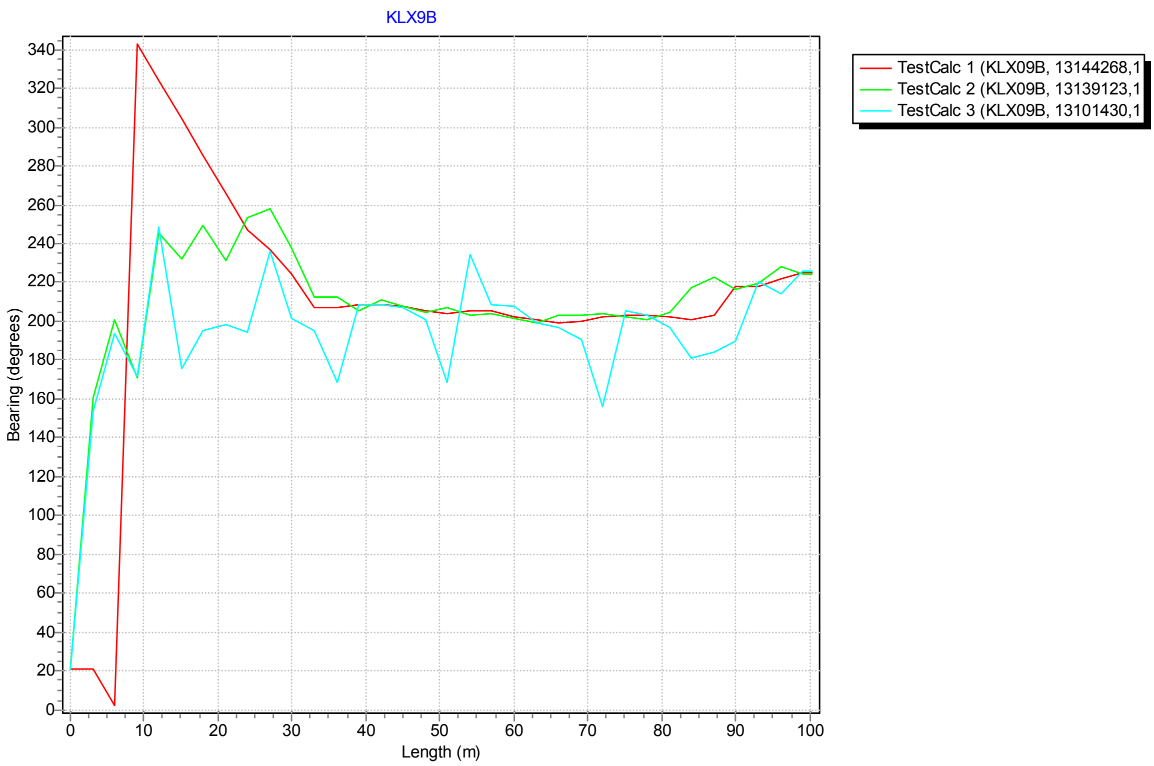


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09B	13101430	EG157	Magnetic - accelerometer measurement	2006-02-07 07:38	0.00	99.00	CF
KLX09B	13139123	EG157	Magnetic - accelerometer measurement	2006-02-07 08:14	0.00	99.00	CF
KLX09B	13144268	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09B	13101430	BEARING	27.00	100.22	
KLX09B	13101430	INCLINATION	3.00	100.22	
KLX09B	13139123	BEARING	27.00	100.22	
KLX09B	13139123	INCLINATION	3.00	100.22	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09B	6367329.07	1548859.01	23.61	0	0.00	-89.83	21.25	0.178	133.447	0
KLX09B	6367328.82	1548858.81	-76.6	100.22	0.00	-89.74	224.99	0.178	133.447	0.34

Borehole description – KLX09C

Technical description of borehole KLX09C is given in Figure 1.

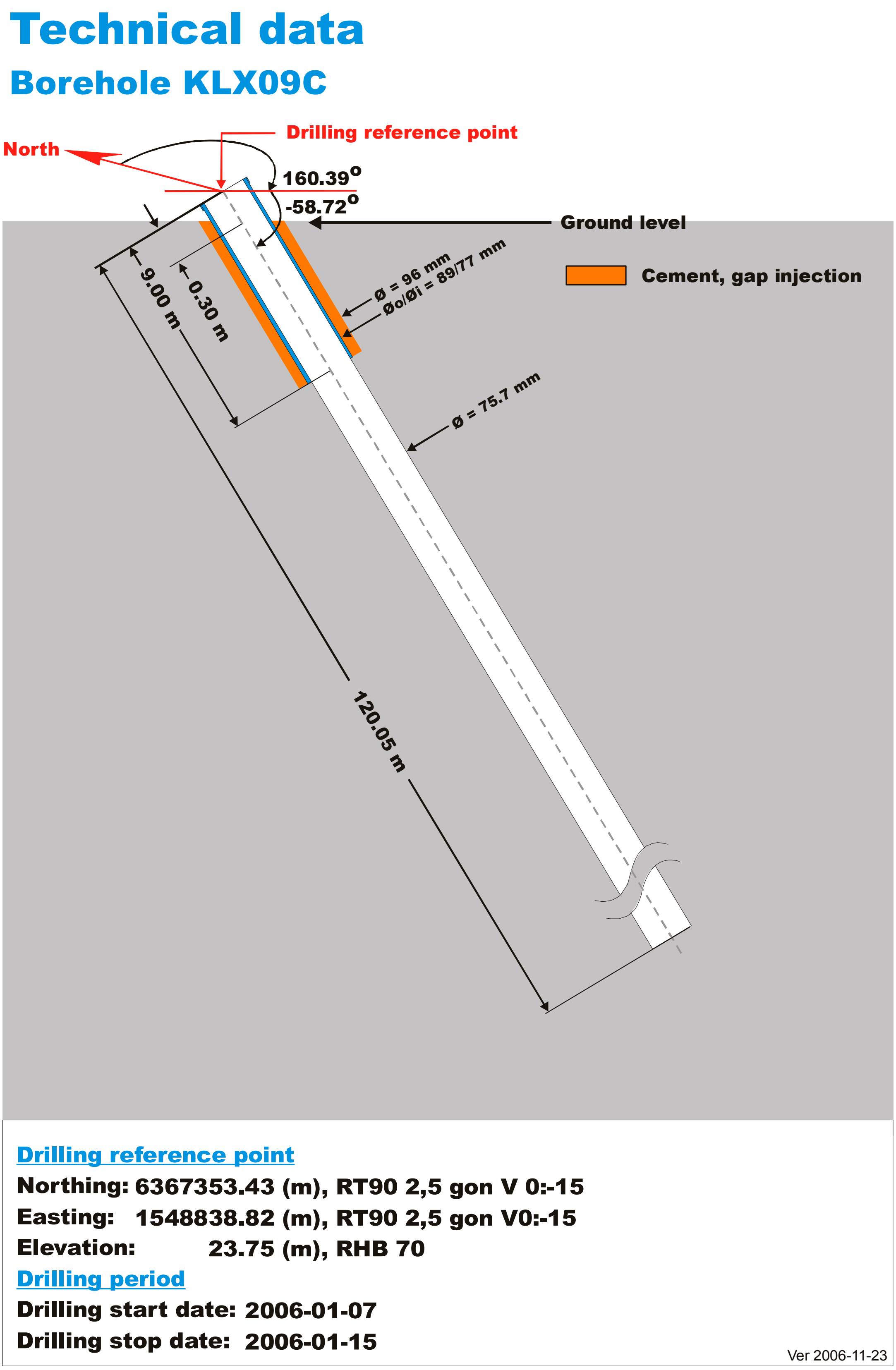


Figure 1. *Technical description of borehole KLX09C.*

Deviation measurement in KLX09C

In total two deviation measurements were conducted in KLX09C. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101433, 13139125) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144269) the two Mag/acc measurements (ID 13101433, 13139125) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

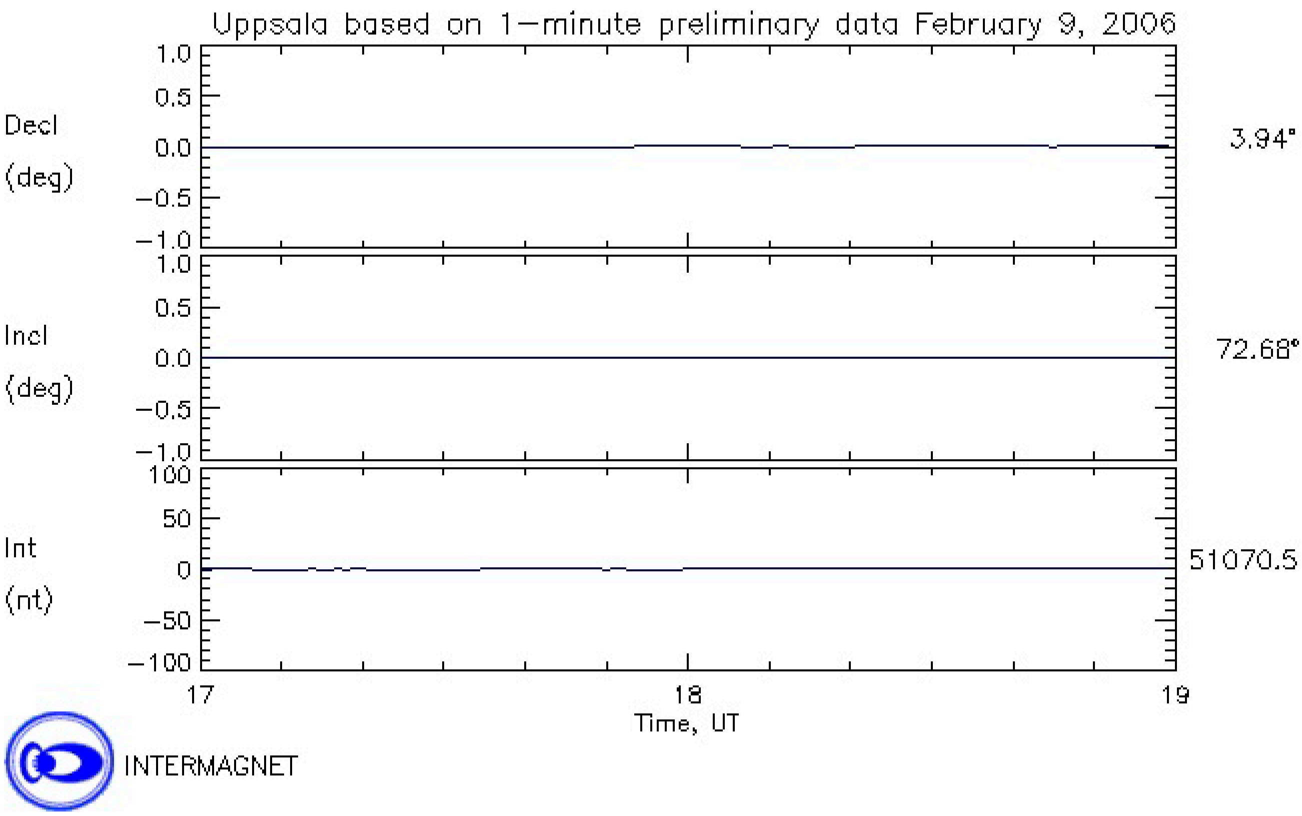
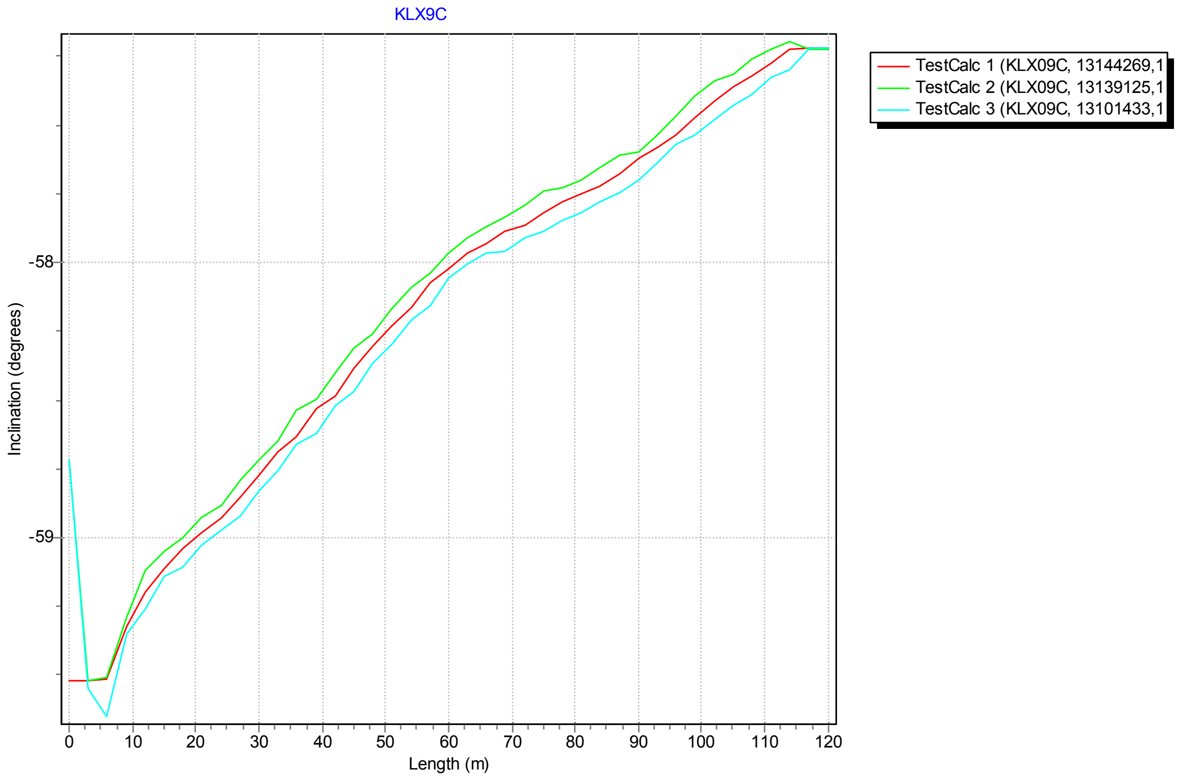


***Figure 2.** The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-09.*



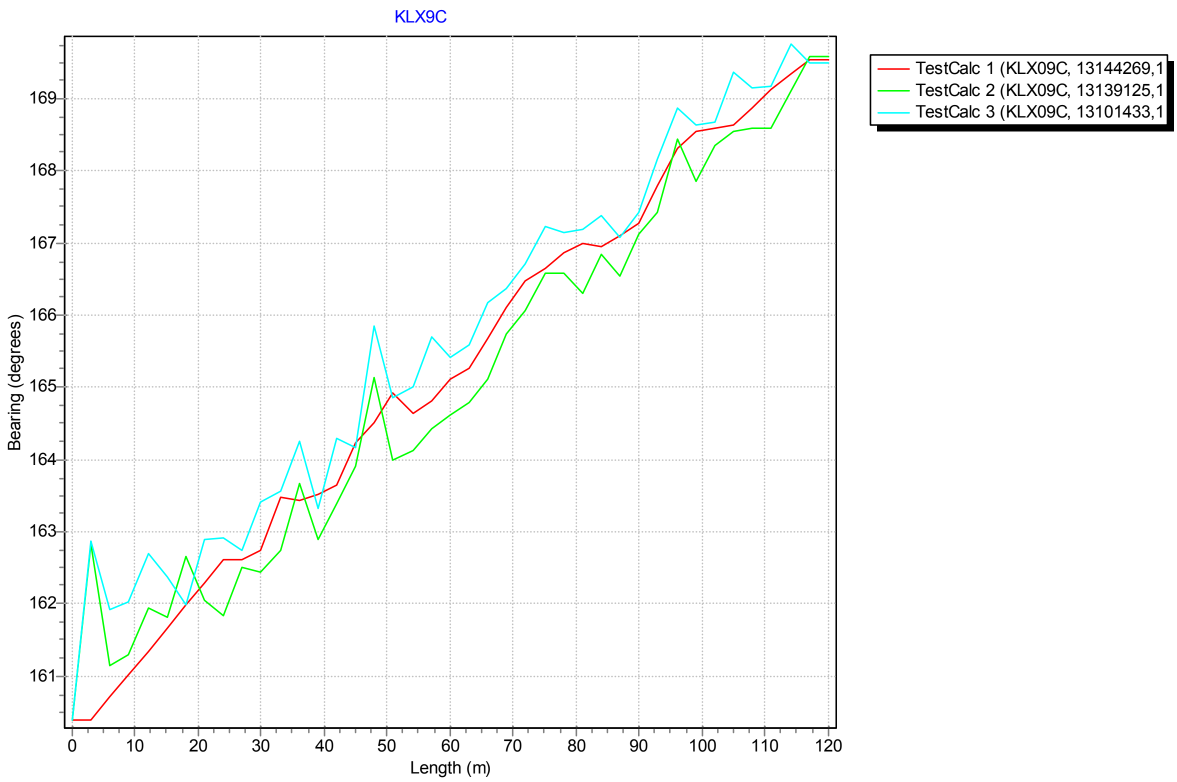


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09C	13101433	EG157	Magnetic - accelerometer measurement	2006-02-09 17:20	0.00	117.00	CF
KLX09C	13139125	EG157	Magnetic - accelerometer measurement	2006-02-09 17:53	0.00	117.00	CF
KLX09C	13144269	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09C	13101433	BEARING	27.00	120.05	
KLX09C	13101433	INCLINATION	3.00	120.05	
KLX09C	13139125	BEARING	27.00	120.05	
KLX09C	13139125	INCLINATION	3.00	120.05	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

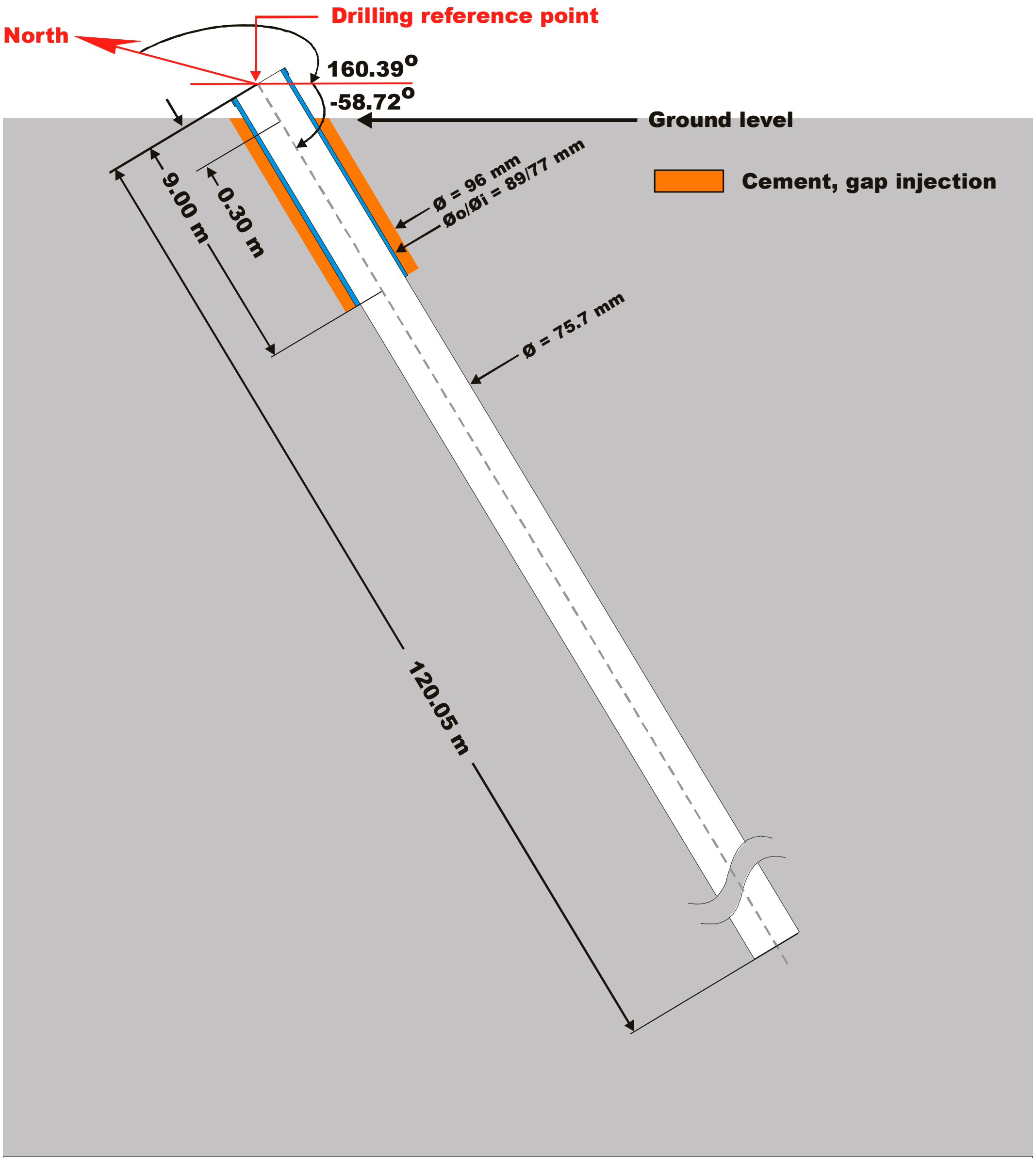
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09C	6367353.43	1548838.82	23.75	0	0.00	-59.52	160.39	0.085	0.82	0
KLX09C	6367292.31	1548854.89	-78.26	120.05	0.09	-57.22	169.55	0.085	0.82	0.91

Borehole description – KLX09C

Technical description of borehole KLX09C is given in Figure 1.

Technical data

Borehole KLX09C



Drilling reference point

Northing: 6367353.43 (m), RT90 2,5 gon V 0:-15
Easting: 1548838.82 (m), RT90 2,5 gon V0:-15
Elevation: 23.75 (m), RHB 70

Drilling period

Drilling start date: 2006-01-07
Drilling stop date: 2006-01-15

Ver 2006-11-23

Figure 1. *Technical description of borehole KLX09C.*

Deviation measurement in KLX09C

In total two deviation measurements were conducted in KLX09C. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101433, 13139125) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144269) the two Mag/acc measurements (ID 13101433, 13139125) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

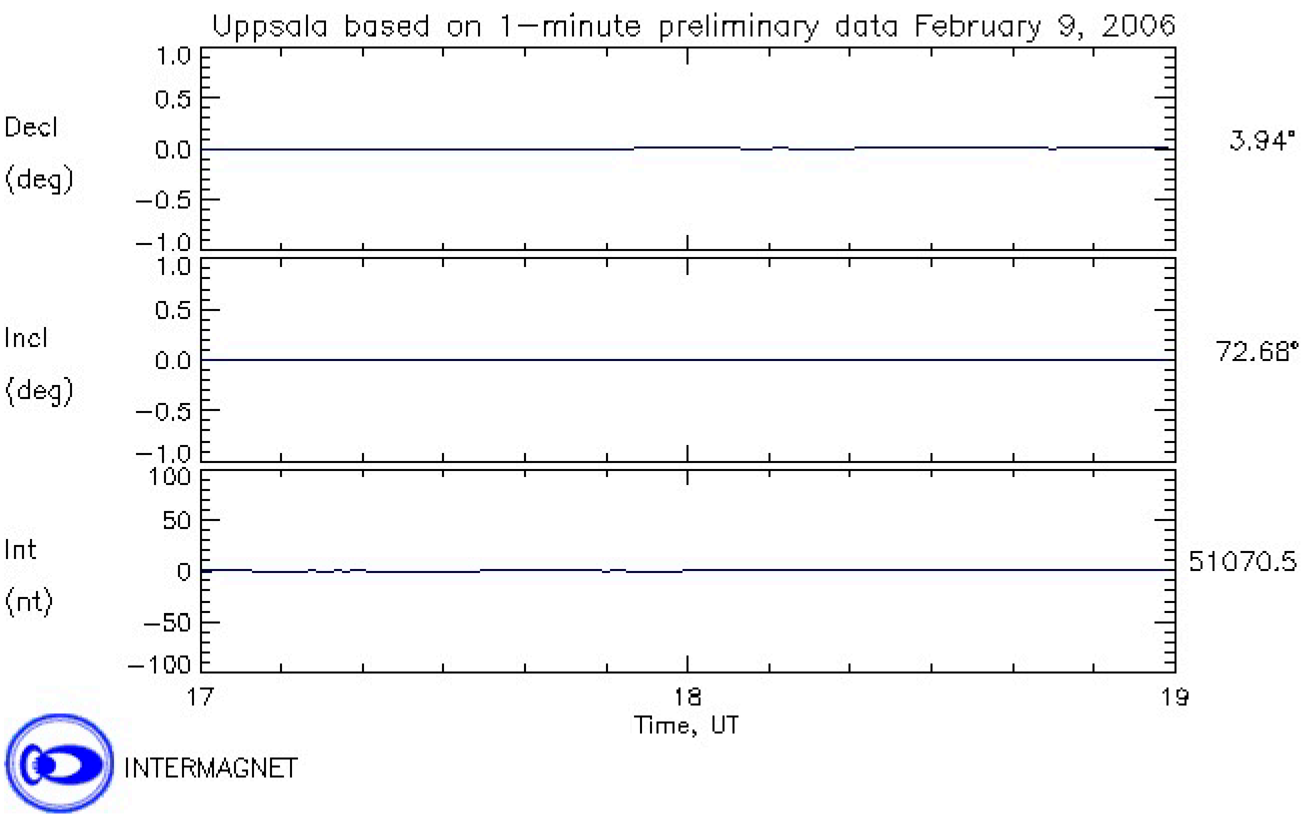
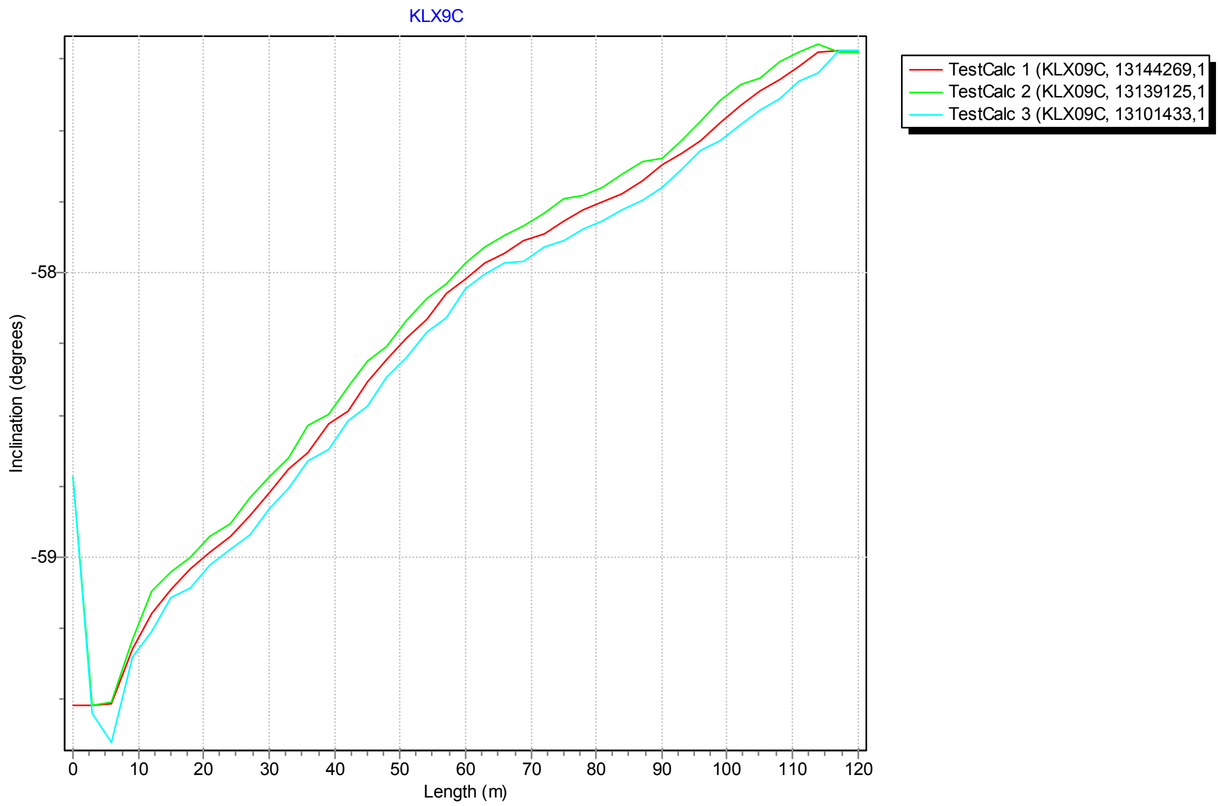


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-09.*



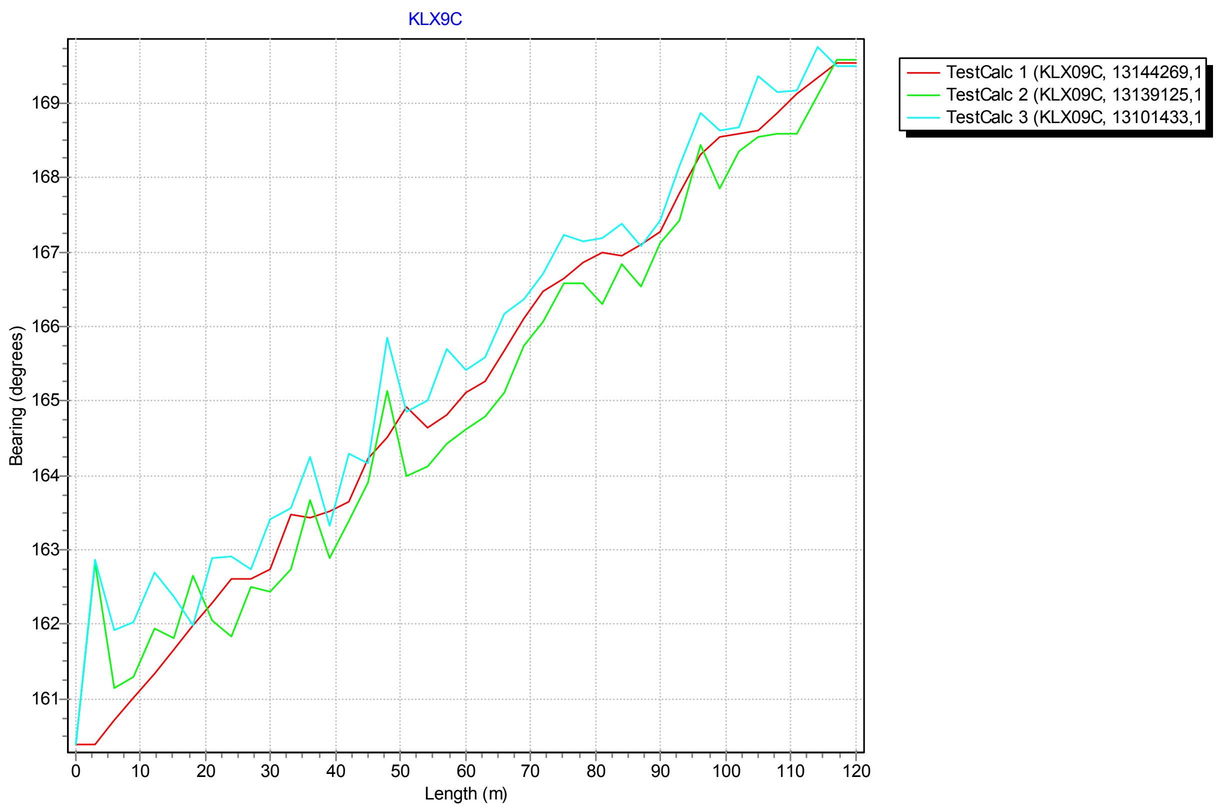


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09C	13101433	EG157	Magnetic - accelerometer measurement	2006-02-09 17:20	0.00	117.00	CF
KLX09C	13139125	EG157	Magnetic - accelerometer measurement	2006-02-09 17:53	0.00	117.00	CF
KLX09C	13144269	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09C	13101433	BEARING	27.00	120.05	
KLX09C	13101433	INCLINATION	3.00	120.05	
KLX09C	13139125	BEARING	27.00	120.05	
KLX09C	13139125	INCLINATION	3.00	120.05	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

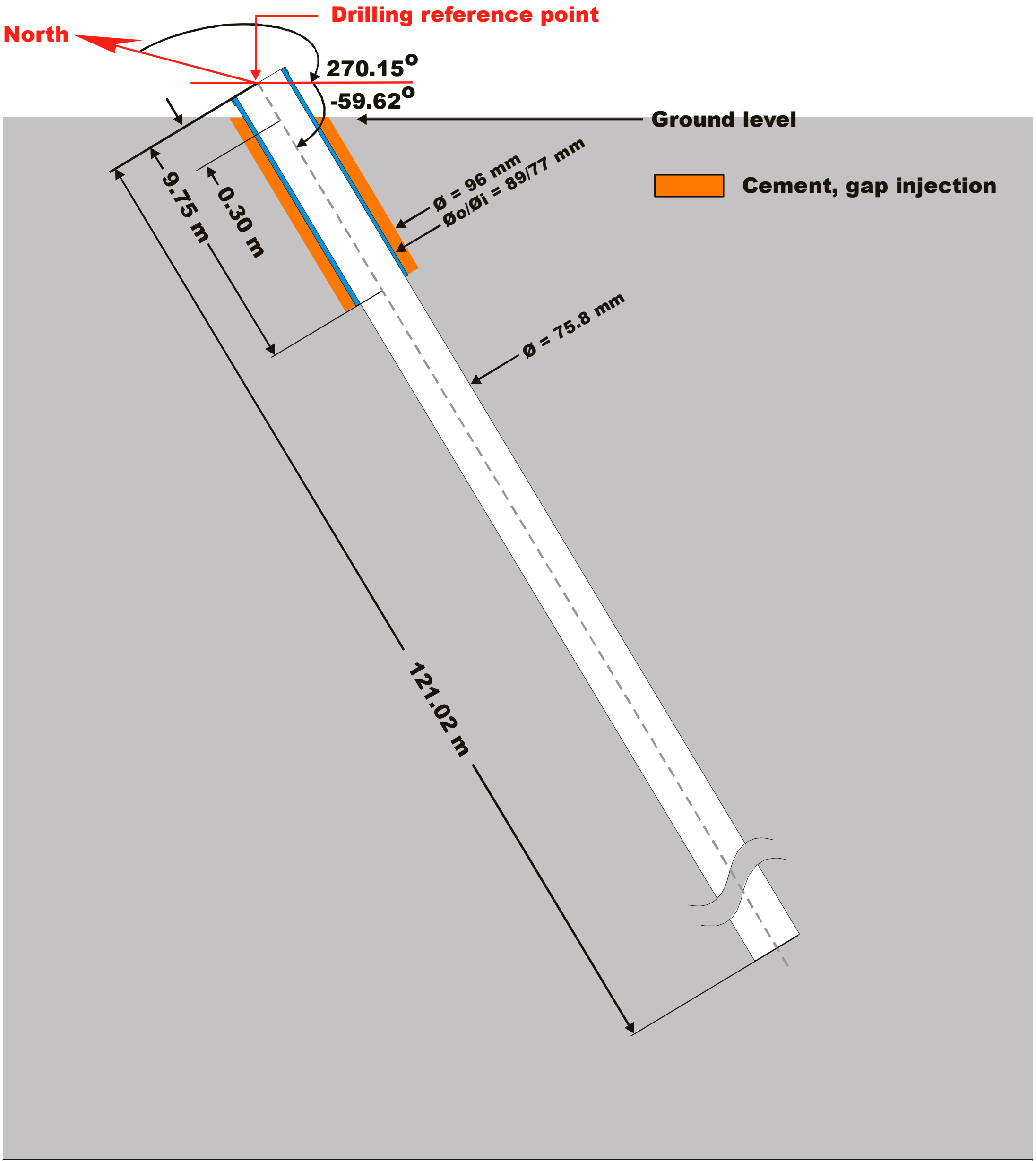
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09C	6367353.43	1548838.82	23.75	0	0.00	-59.52	160.39	0.085	0.82	0
KLX09C	6367292.31	1548854.89	-78.26	120.05	0.09	-57.22	169.55	0.085	0.82	0.91

Borehole description – KLX09D

Technical description of borehole KLX09D is given in Figure 1.

Technical data

Borehole KLX09D



Drilling reference point

Northing: 6367336.99 (m), RT90 2,5 gon V 0:-15

Easting: 1548878.22 (m), RT90 2,5 gon V0:-15

Elevation: 23.10 (m), RHB 70

Drilling period

Drilling start date: 2005-11-05

Drilling stop date: 2005-11-17

Ver 2006-11-23

Figure 1. Technical description of borehole KLX09D.

Deviation measurement in KLX09D

In total two deviation measurements were conducted in KLX09D. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101432, 13139126) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144270) the two Mag/acc measurements (ID 13101432, 13139126) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

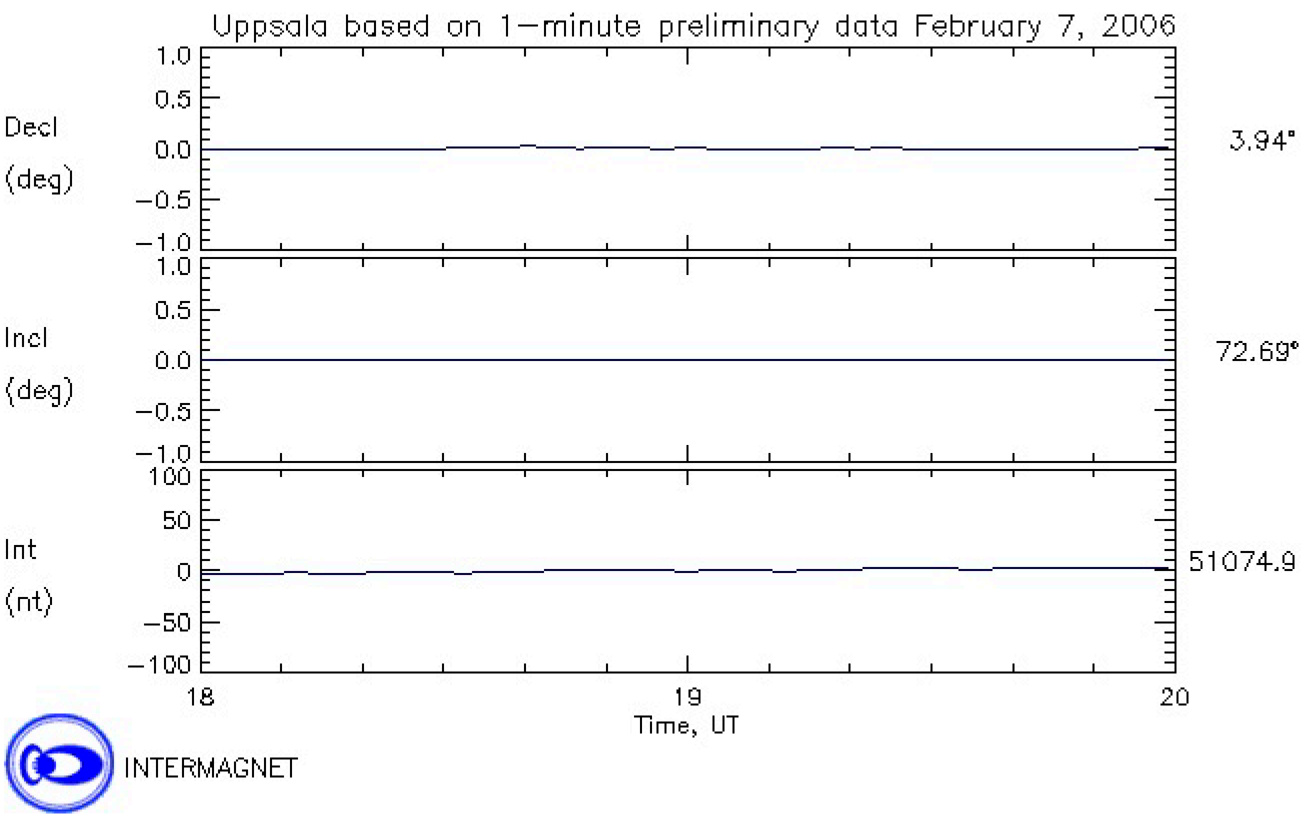
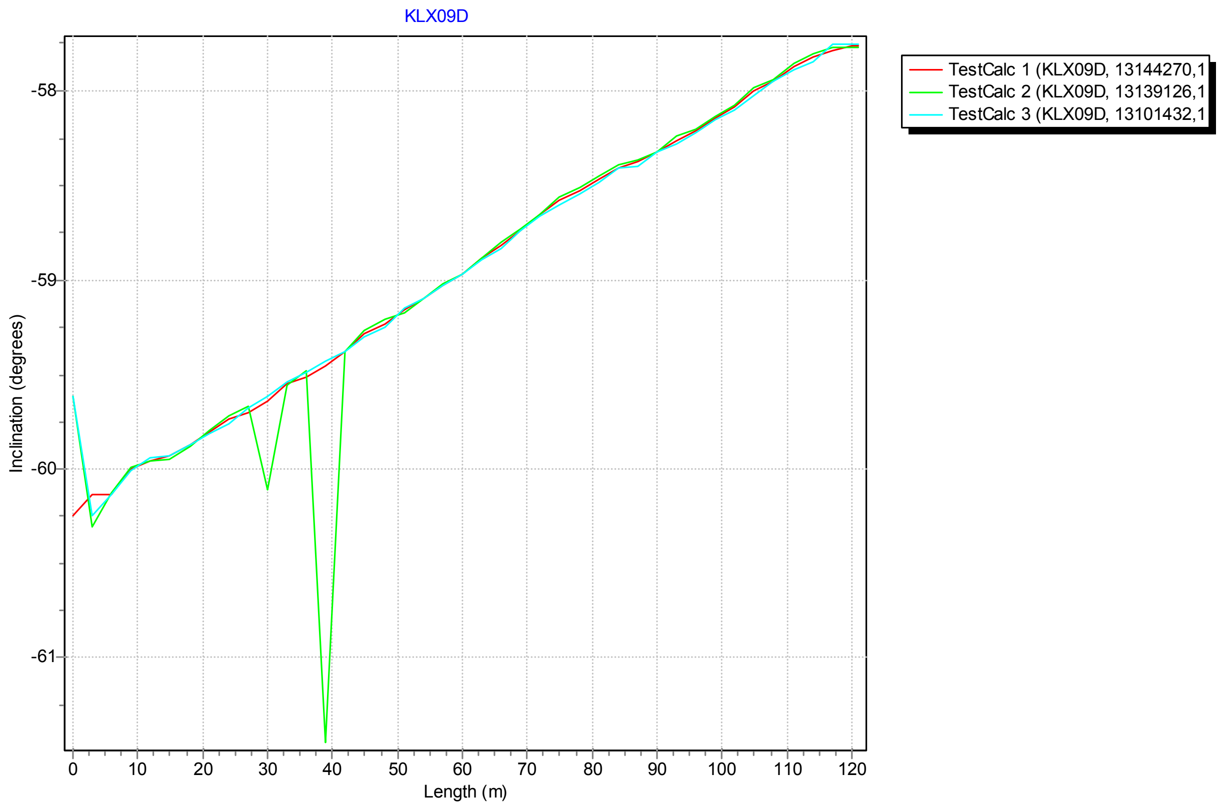


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-07.*



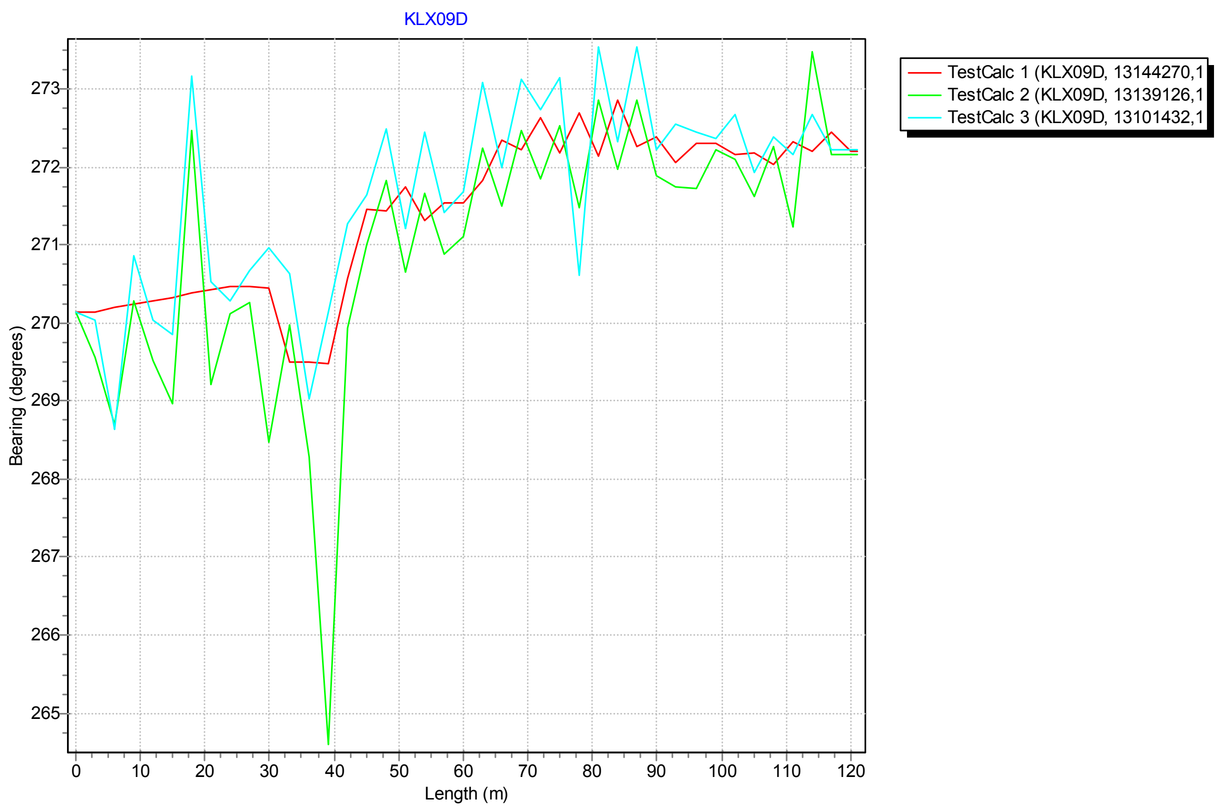


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09D	13101432	EG157	Magnetic - accelerometer measurement	2006-02-07 18:32	0.00	117.00	CF
KLX09D	13139126	EG157	Magnetic - accelerometer measurement	2006-02-07 18:52	0.00	117.00	CF
KLX09D	13144270	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09D	13101432	BEARING	27.00	121.02	
KLX09D	13101432	INCLINATION	3.00	121.02	
KLX09D	13139126	BEARING	27.00	121.02	
KLX09D	13139126	INCLINATION	3.00	121.02	

Table 3. Subset (for every approx. 100 m elevation) of the resulting “Object_location” in Sicada.

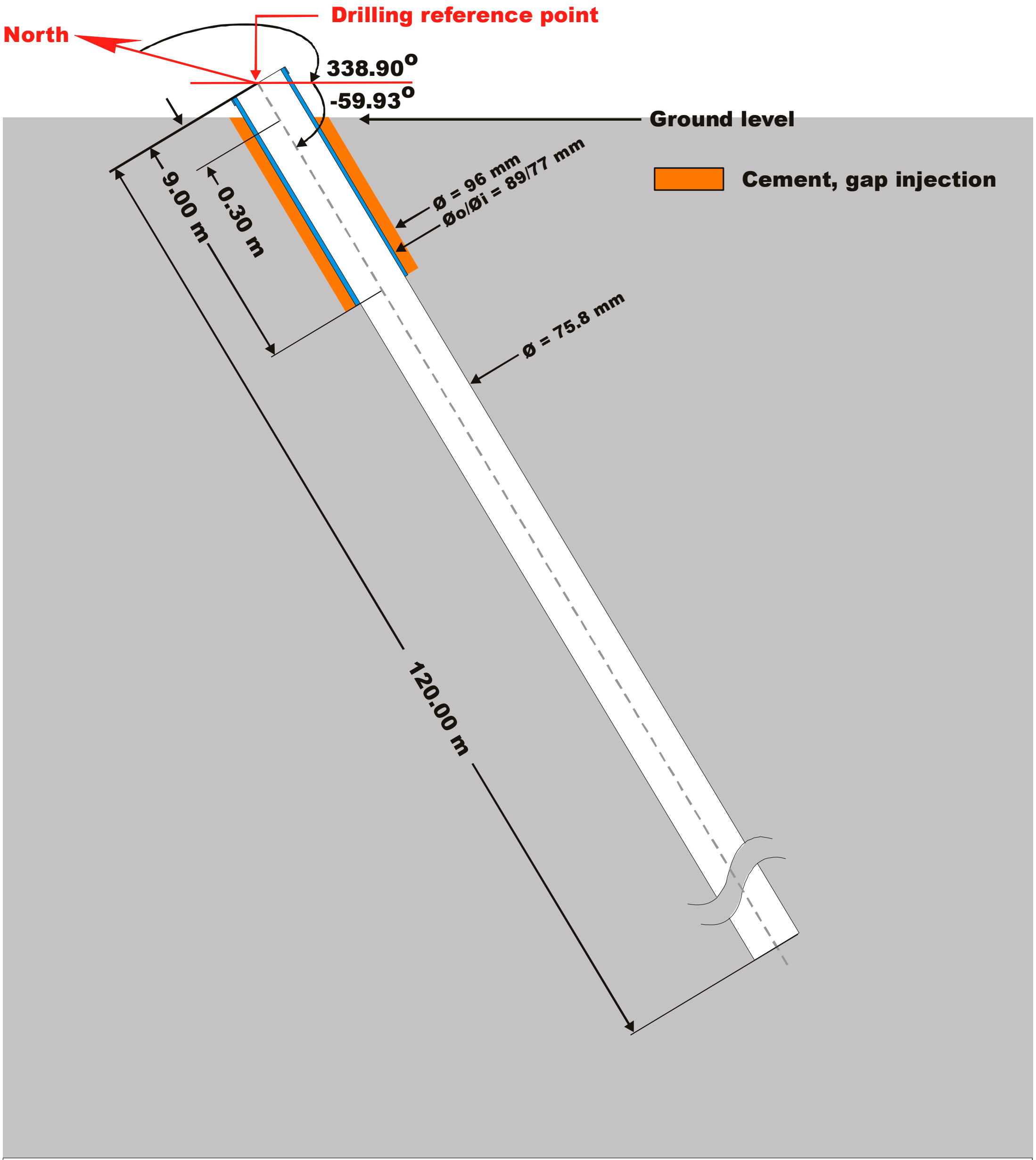
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09D	6367336.99	1548878.22	23.1	0	0.00	-60.25	270.15	0.035	1.374	0
KLX09D	6367338.55	1548815.84	-80.57	121.02	0.04	-57.76	272.2	0.035	1.374	1.5

Borehole description – KLX09E

Technical description of borehole KLX09E is given in Figure 1.

Technical data

Borehole KLX09E



Drilling reference point

Northing: 6367304.45 (m), RT90 2,5 gon V 0:-15

Easting: 1548880.37 (m), RT90 2,5 gon V0:-15

Elevation: 22.16 (m), RHB 70

Drilling period

Drilling start date: 2005-11-23

Drilling stop date: 2005-12-05

Ver 2006-11-23

Figure 1. *Technical description of borehole KLX09E.*

Deviation measurement in KLX09E

In total two deviation measurements were conducted in KLX09E. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13117512, 13139146) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement (ID 13101428) due to wrongly stated time for start and stop, of the activity. The raw data from that measurement is re-used for measurement ID 13117512.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144271) the two Mag/acc measurements (ID 13117512, 13139146) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

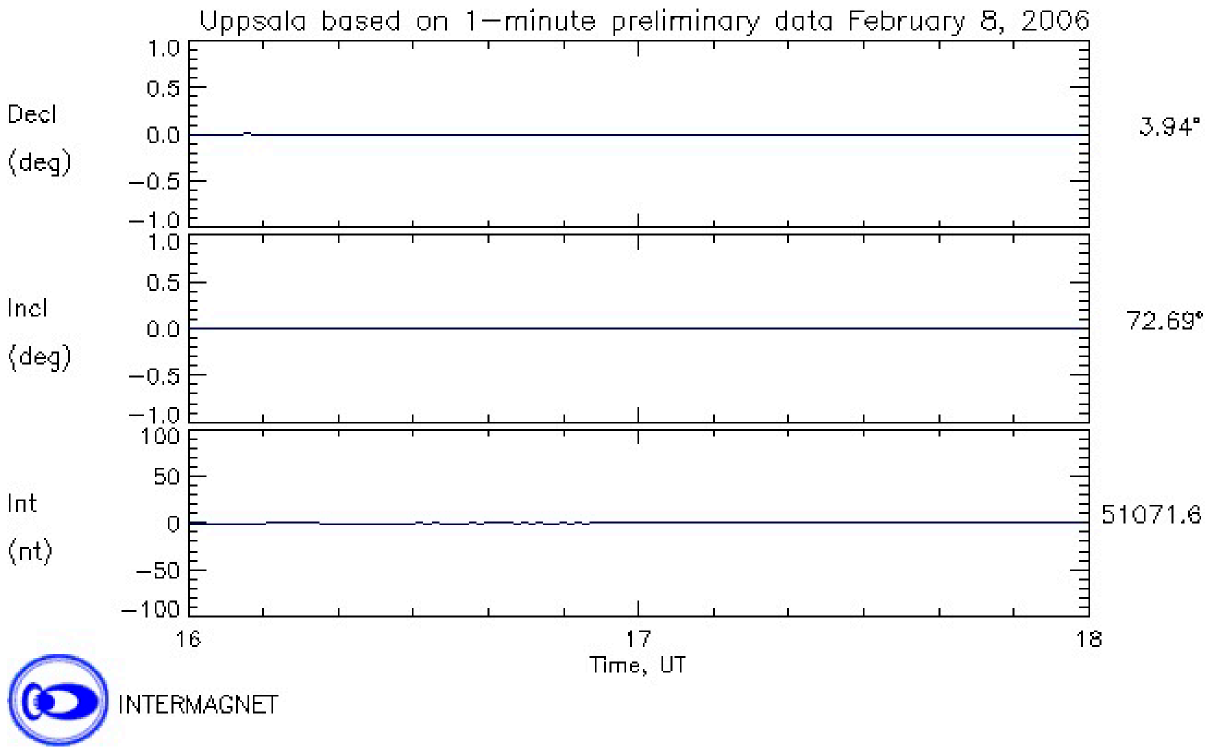
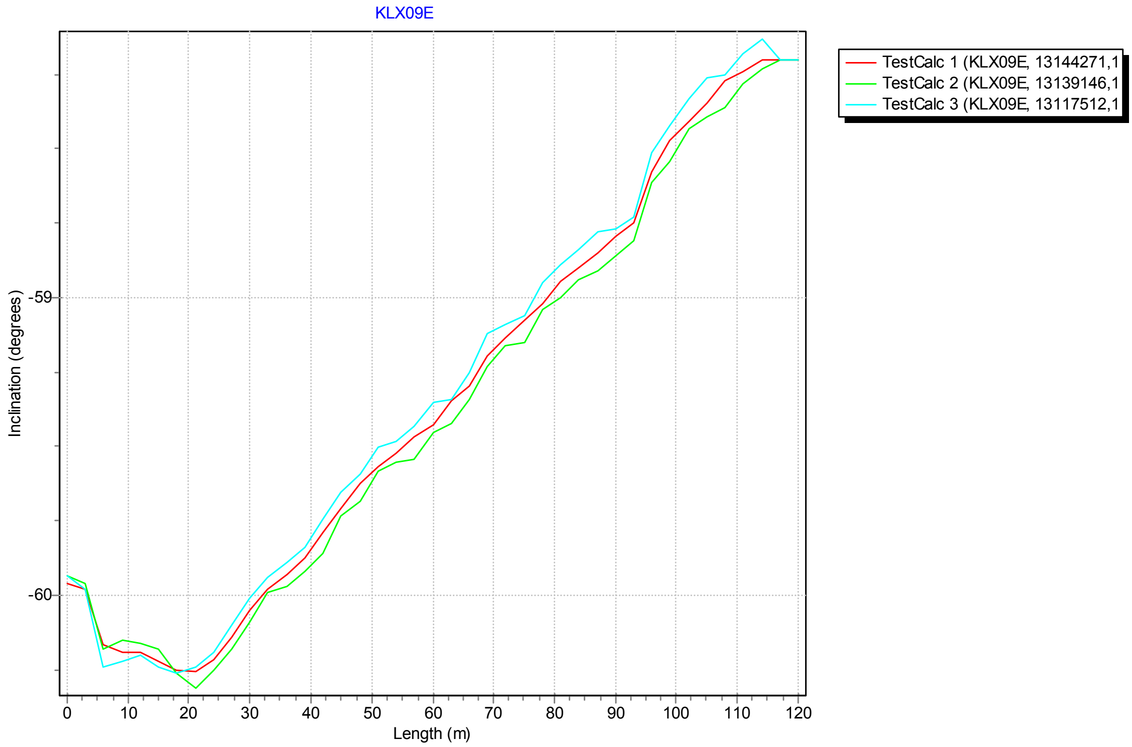


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-08.*



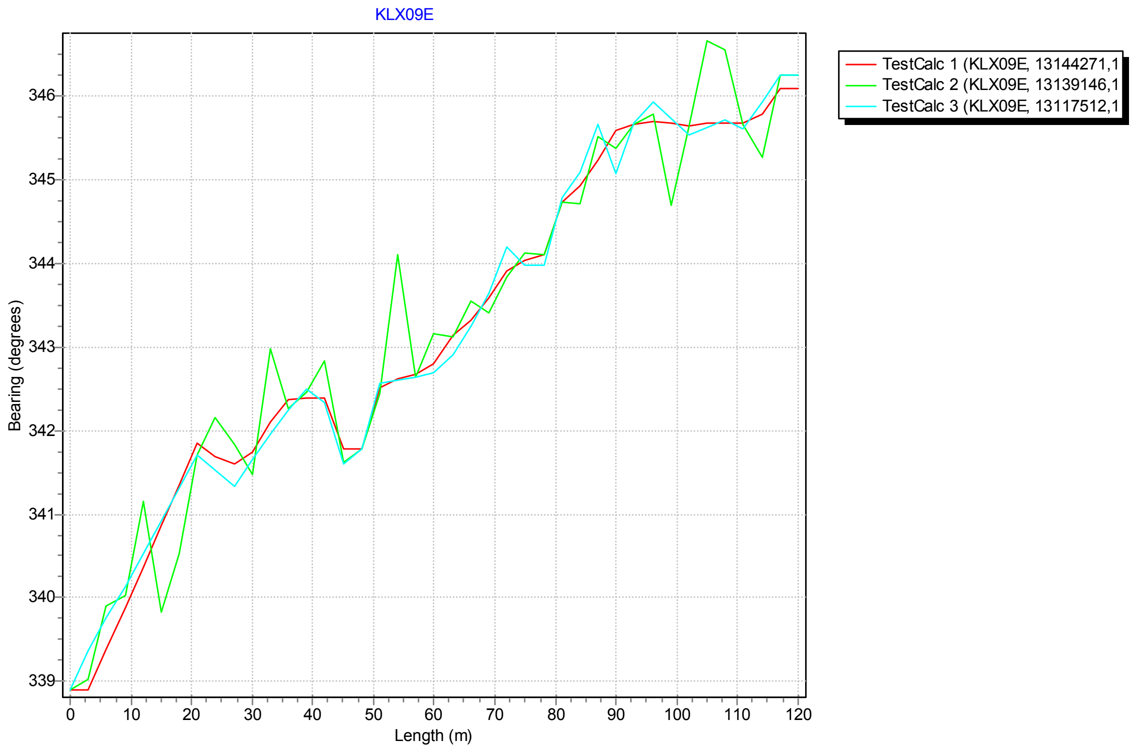


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09E	13117512	EG157	Magnetic - accelerometer measurement	2006-02-08 16:20	0.00	117.00	CF
KLX09E	13101428	EG157	Magnetic - accelerometer measurement	2006-02-08 16:50	0.00	117.00	EF
KLX09E	13139146	EG157	Magnetic - accelerometer measurement	2006-02-08 17:06	0.00	117.00	CF
KLX09E	13144271	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09E	13117512	BEARING	24.00	120.00	
KLX09E	13117512	INCLINATION	3.00	120.00	
KLX09E	13139146	BEARING	24.00	120.00	
KLX09E	13139146	INCLINATION	3.00	120.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09E	6367304.45	1548880.37	22.16	0	0.00	-59.96	338.9	0.075	0.777	0
KLX09E	6367363	1548862.73	-81.06	120	0.08	-58.2	346.08	0.075	0.777	0.83

Borehole description – KLX09F

Technical description of borehole KLX09F is given in Figure 1.

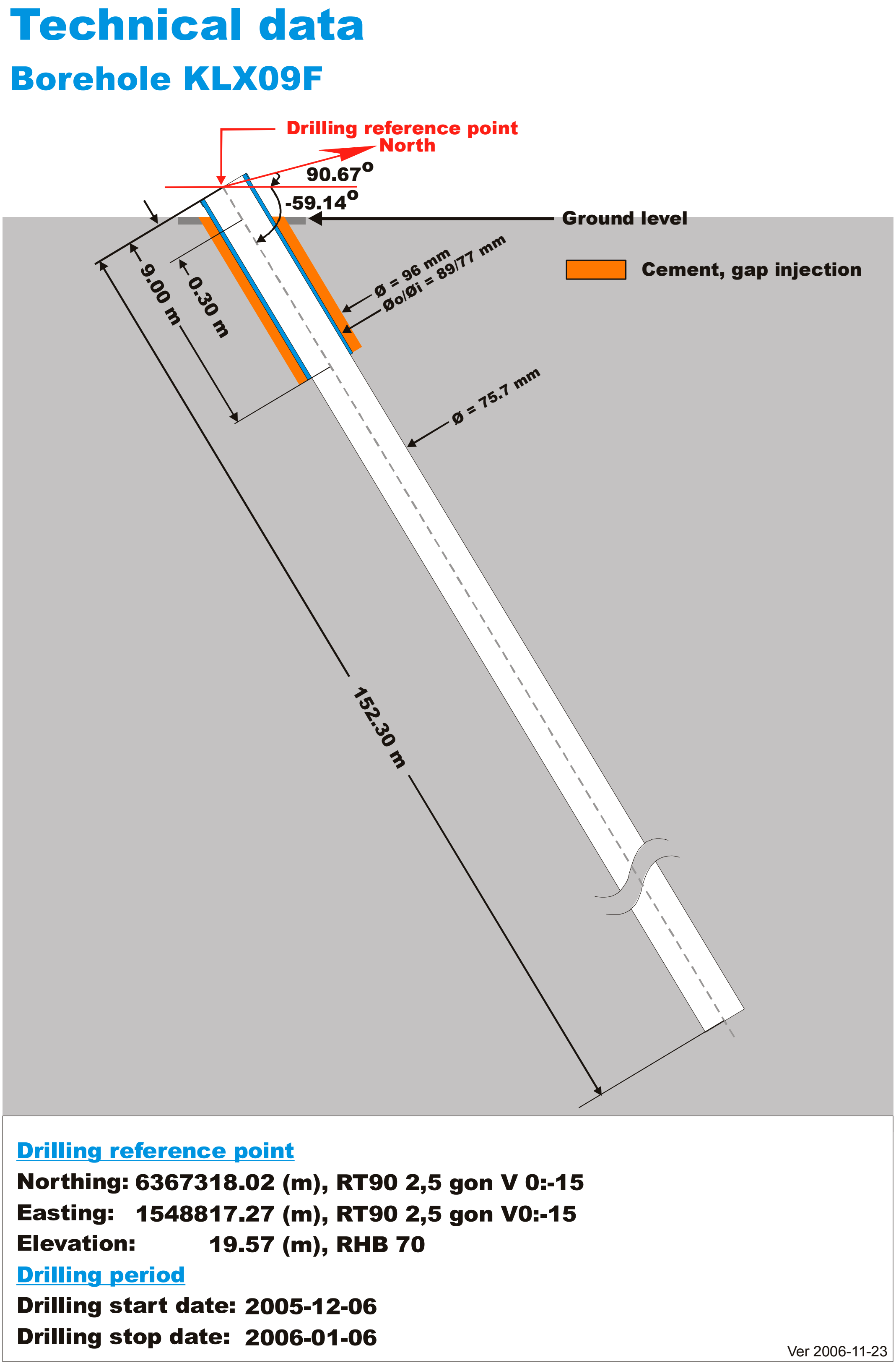


Figure 1. *Technical description of borehole KLX09F.*

Deviation measurement in KLX09F

In total two deviation measurements were conducted in KLX09F. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101429, 13139147) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144272) the two Mag/acc measurements (ID 13101429, 13139147) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

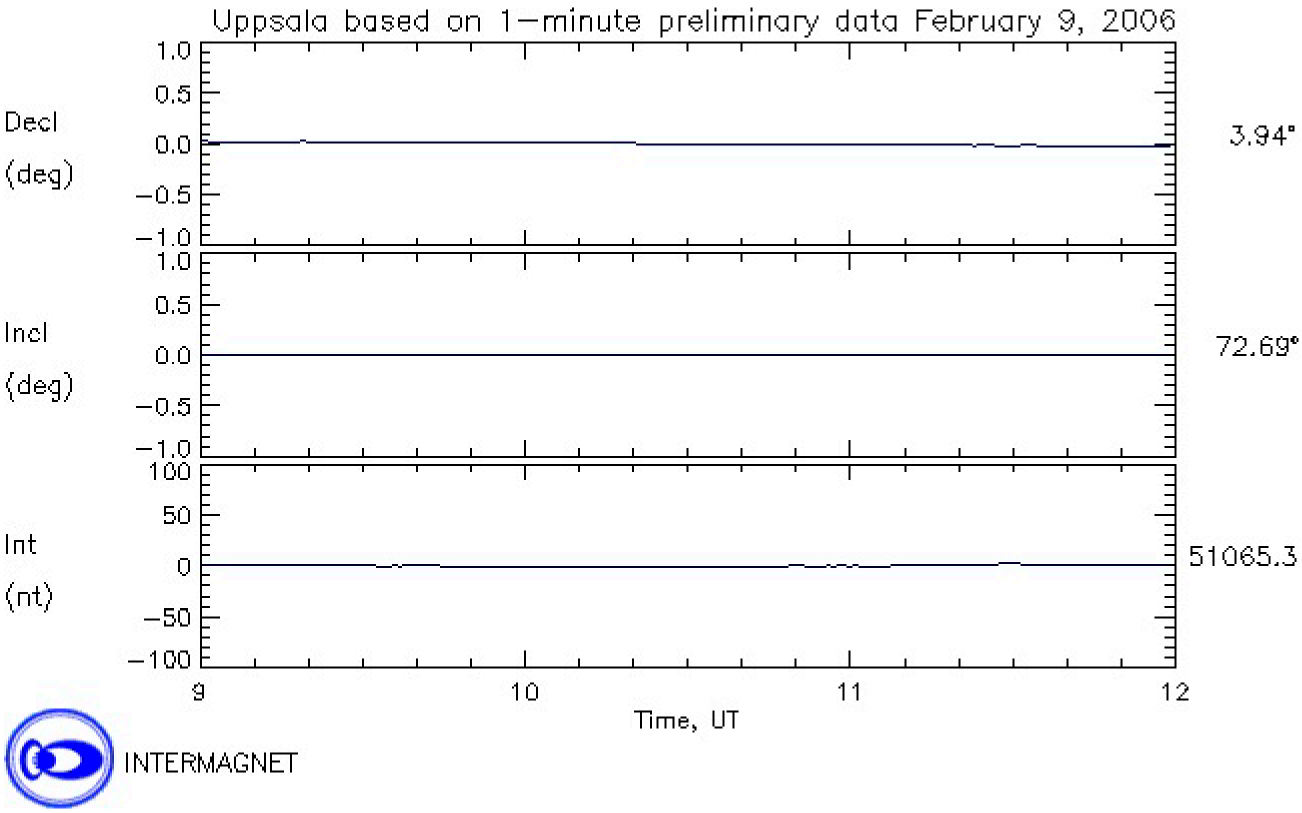
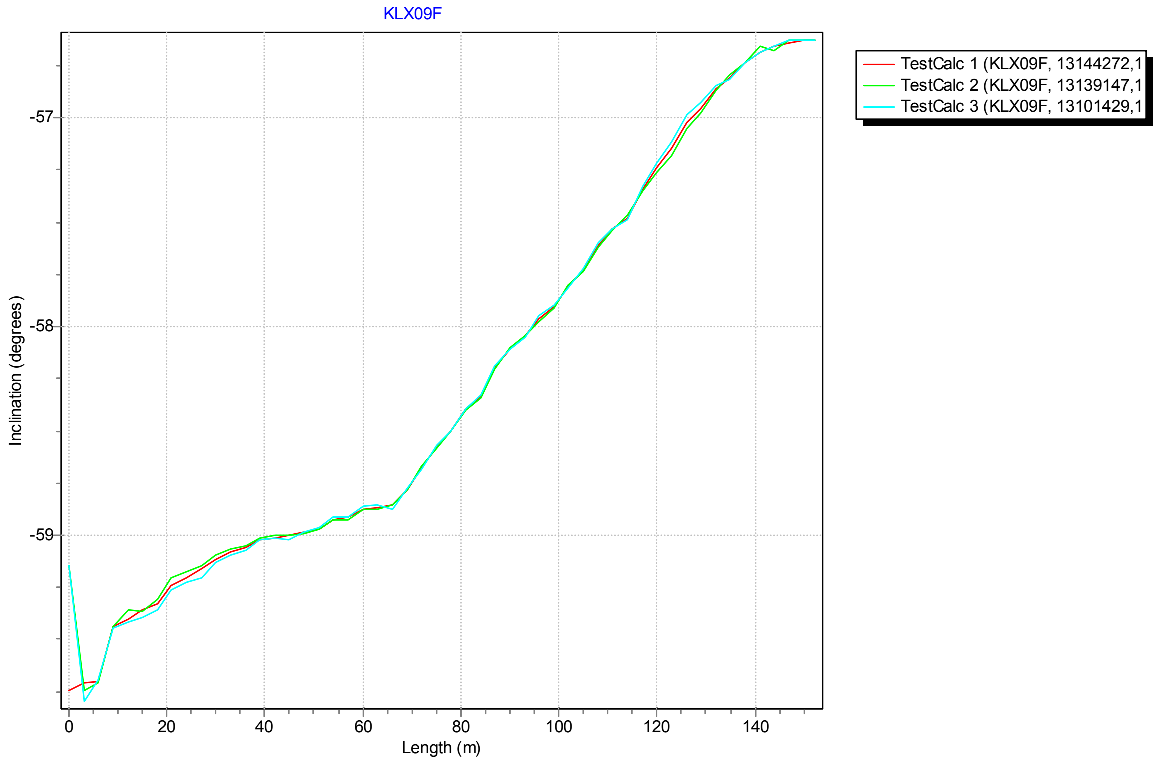


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-09.*



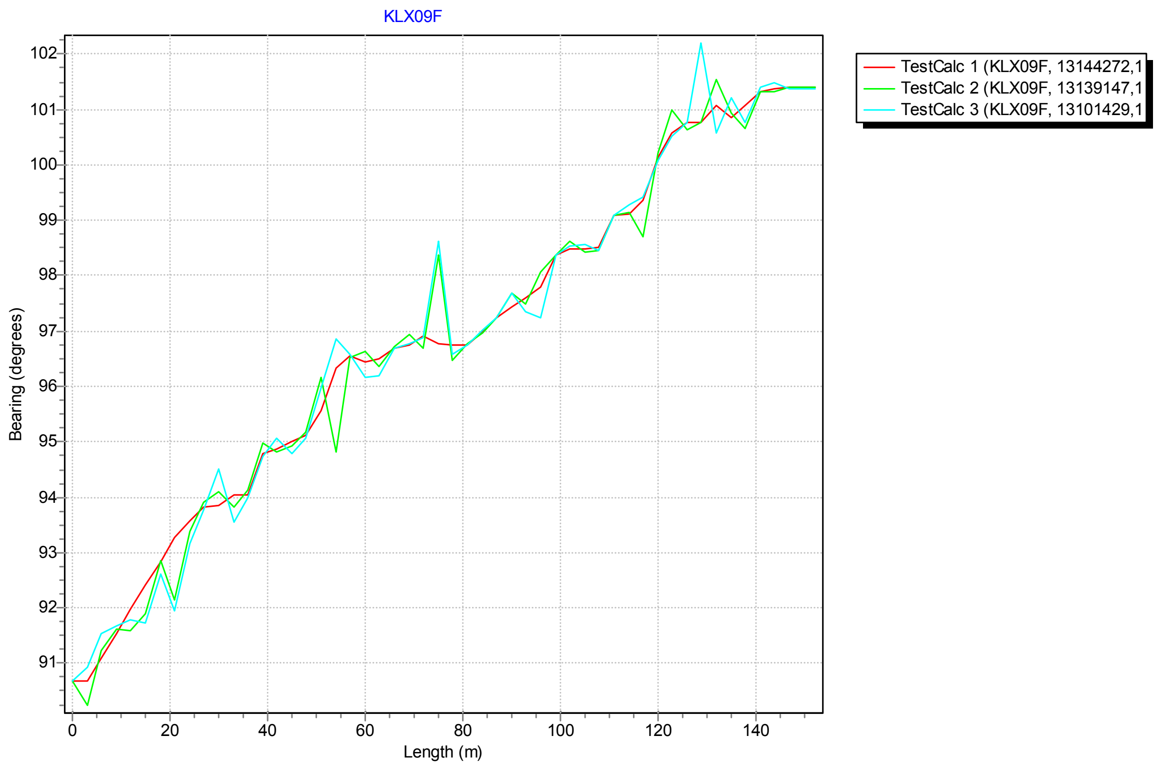


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09F	13101429	EG157	Magnetic - accelerometer measurement	2006-02-09 09:45	0.00	147.00	CF
KLX09F	13139147	EG157	Magnetic - accelerometer measurement	2006-02-09 10:45	0.00	147.00	CF
KLX09F	13144272	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09F	13101429	BEARING	24.00	152.30	
KLX09F	13101429	INCLINATION	3.00	152.30	
KLX09F	13139147	BEARING	24.00	152.30	
KLX09F	13139147	INCLINATION	3.00	152.30	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

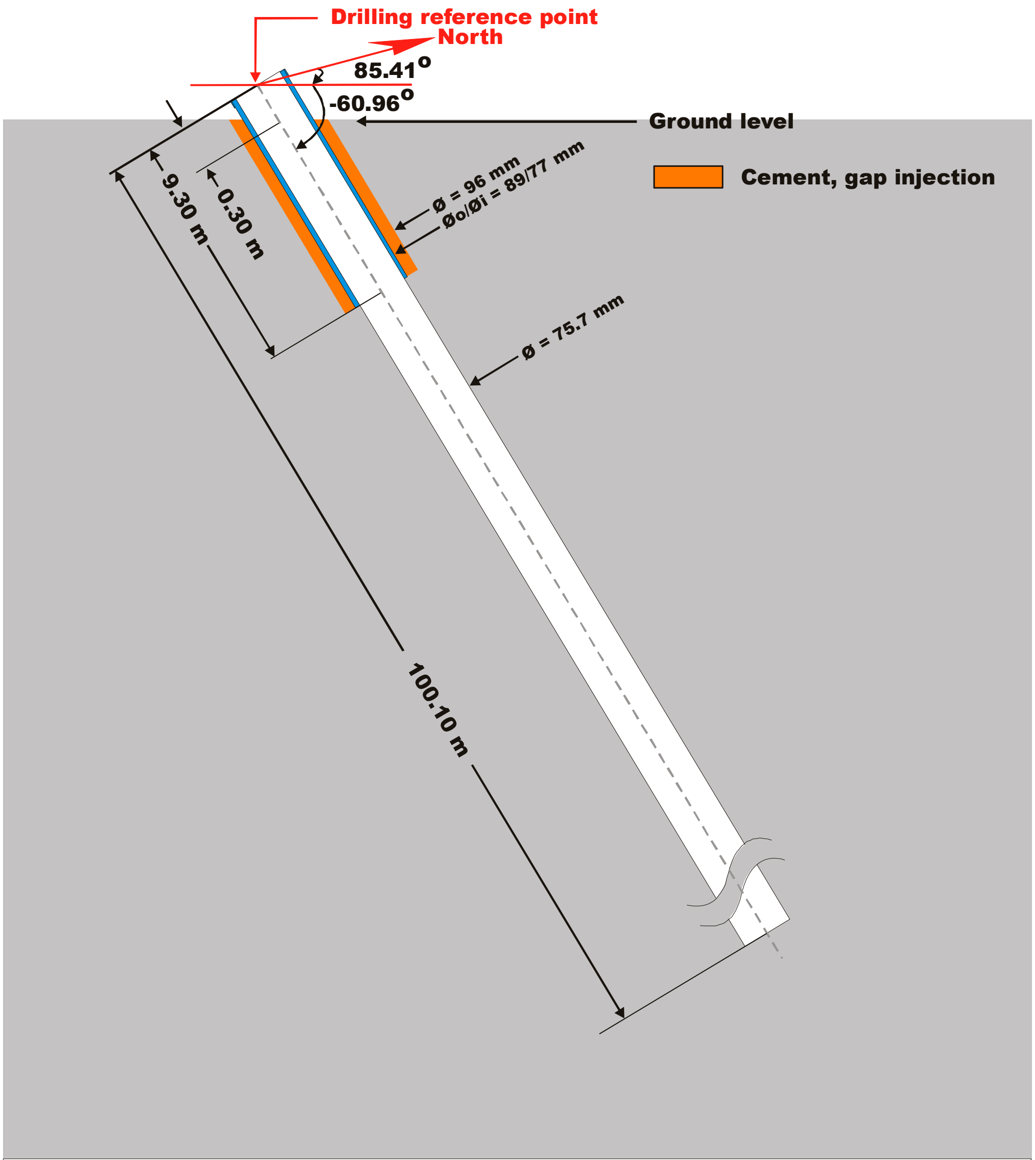
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09F	6367318.02	1548817.26	19.57	0	0.00	-59.74	90.67	0.03	0.65	0
KLX09F	6367308.38	1548896.64	-109.96	152.3	0.04	-56.63	101.39	0.03	0.65	0.91

Borehole description – KLX09G

Technical description of borehole KLX09G is given in Figure 1.

Technical data

Borehole KLX09G



Drilling reference point

Northing: 6367330.09 (m), RT90 2,5 gon V 0:-15

Easting: 1548905.77 (m), RT90 2,5 gon V0:-15

Elevation: 19.63 (m), RHB 70

Drilling period

Drilling start date: 2006-01-27

Drilling stop date: 2006-02-03

Ver 2006-11-23

Figure 1. *Technical description of borehole KLX09G.*

<u>Deviation measurement in KLX09G</u>

In total two deviation measurements were conducted in KLX09G. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13101431, 13139174) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measuring, see Figure 2.

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13144273) the two Mag/acc measurements (ID 13101431, 13139174) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

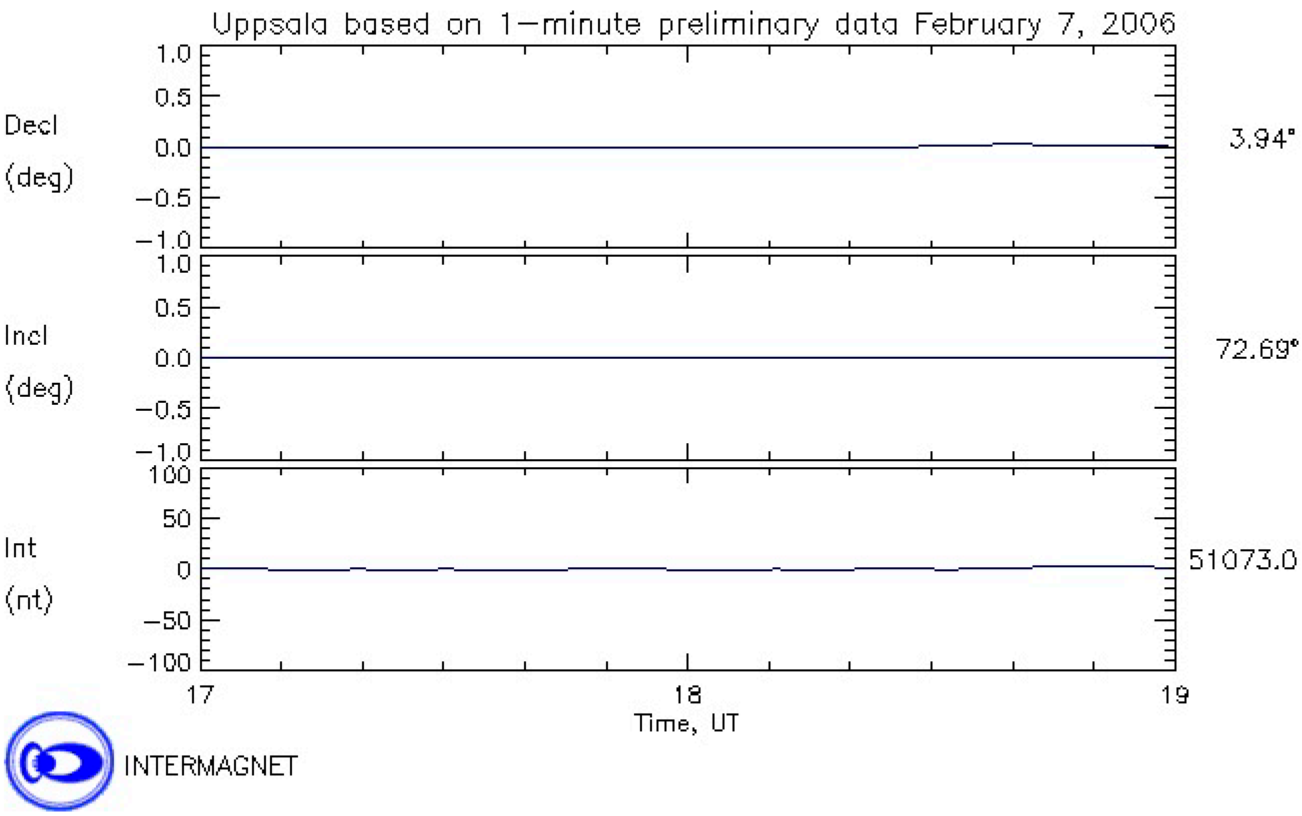


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-02-07.*

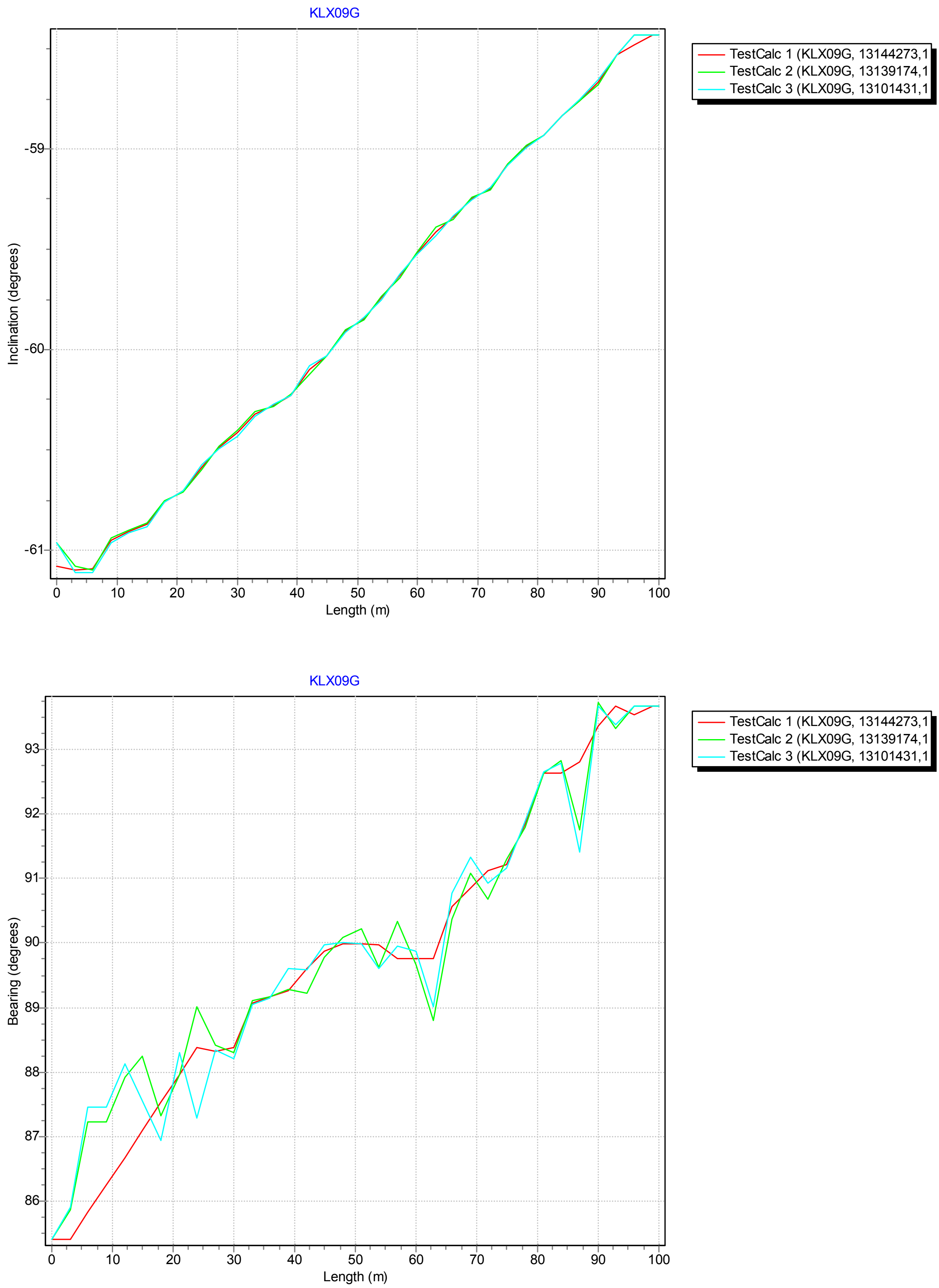


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX09G	13101431	EG157	Magnetic - accelerometer measurement	2006-02-07 17:07	0.00	96.00	CF
KLX09G	13139174	EG157	Magnetic - accelerometer measurement	2006-02-07 18:08	0.00	96.00	CF
KLX09G	13144273	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX09G	13101431	BEARING	27.00	100.10	
KLX09G	13101431	INCLINATION	3.00	100.10	
KLX09G	13139174	BEARING	27.00	100.10	
KLX09G	13139174	INCLINATION	3.00	100.10	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX09G	6367330.09	1548905.77	19.63	0	0.00	-61.08	85.41	0.02	1.169	0
KLX09G	6367330.22	1548956.04	-66.9	100.1	0.02	-58.43	93.67	0.02	1.169	1.03

Borehole description – KLX10

Technical description of borehole KLX10 is given in Figure 1.

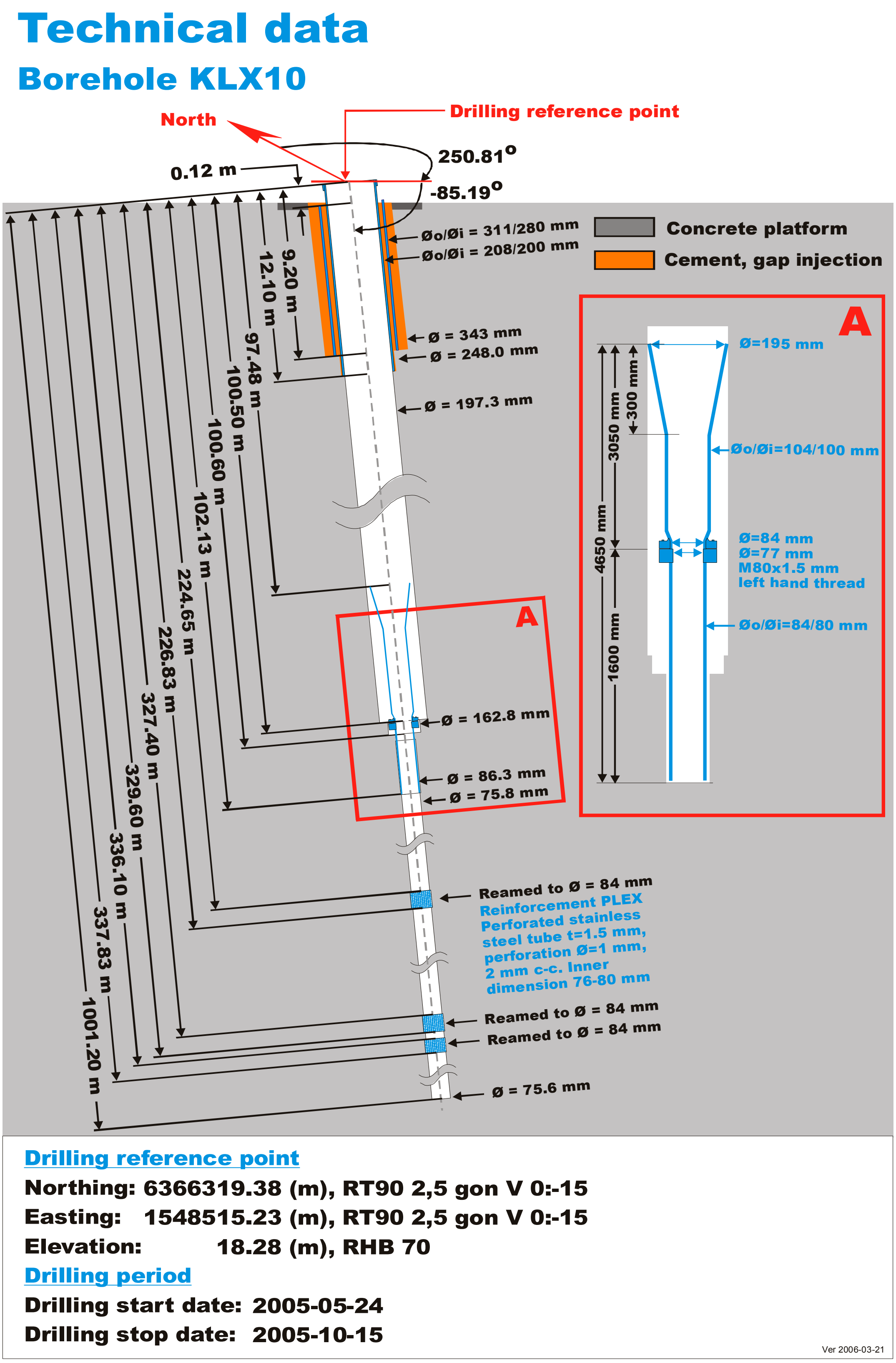


***Figure 1.** Technical description of borehole KLX10.*

Deviation measurement in KLX10

In total three deviation measurements were conducted in KLX10. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX10 were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13094371, 13139221) were executed down and up the borehole.

The Mac/acc measurement (ID 13119847) was executed down in the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement, mag/acc (ID 13099955) which was bug reported (Bug 1819) due to wrongly correction for magnetic declination and meridian convergence. But the raw data from that measurement was re-used, without correction for magnetic declination and meridian convergence, to calculate the correct measurement (ID 13119847).

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144298) the two Maxibor measurements (ID 13094371, 13139221) and the Mag/acc measurement (ID 13119847) were used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

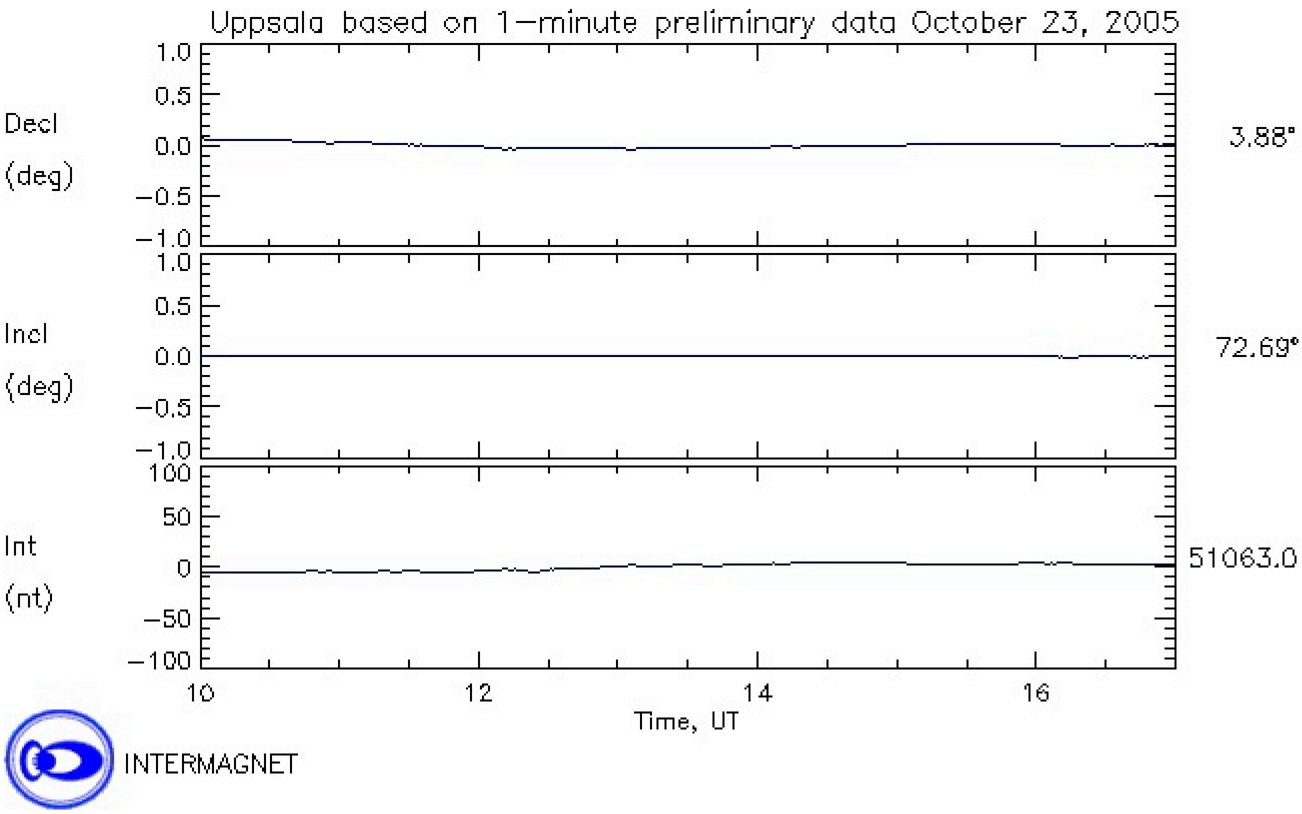
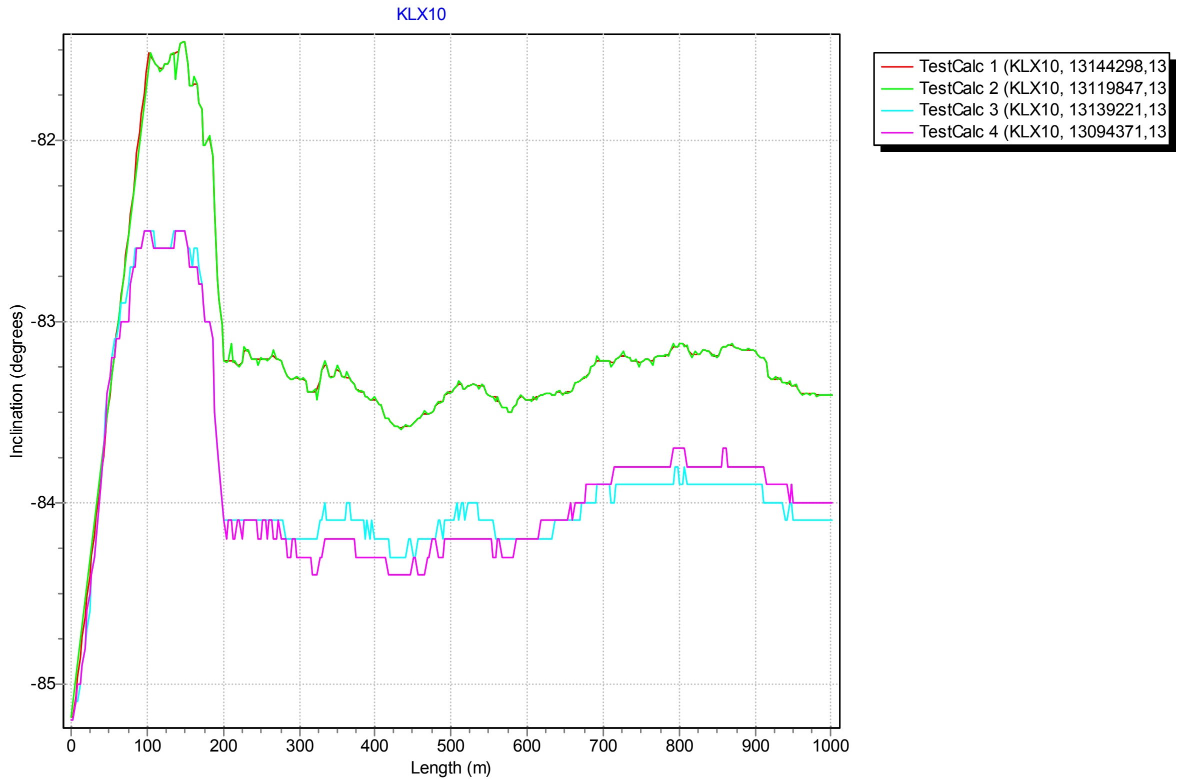


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-10-23.*



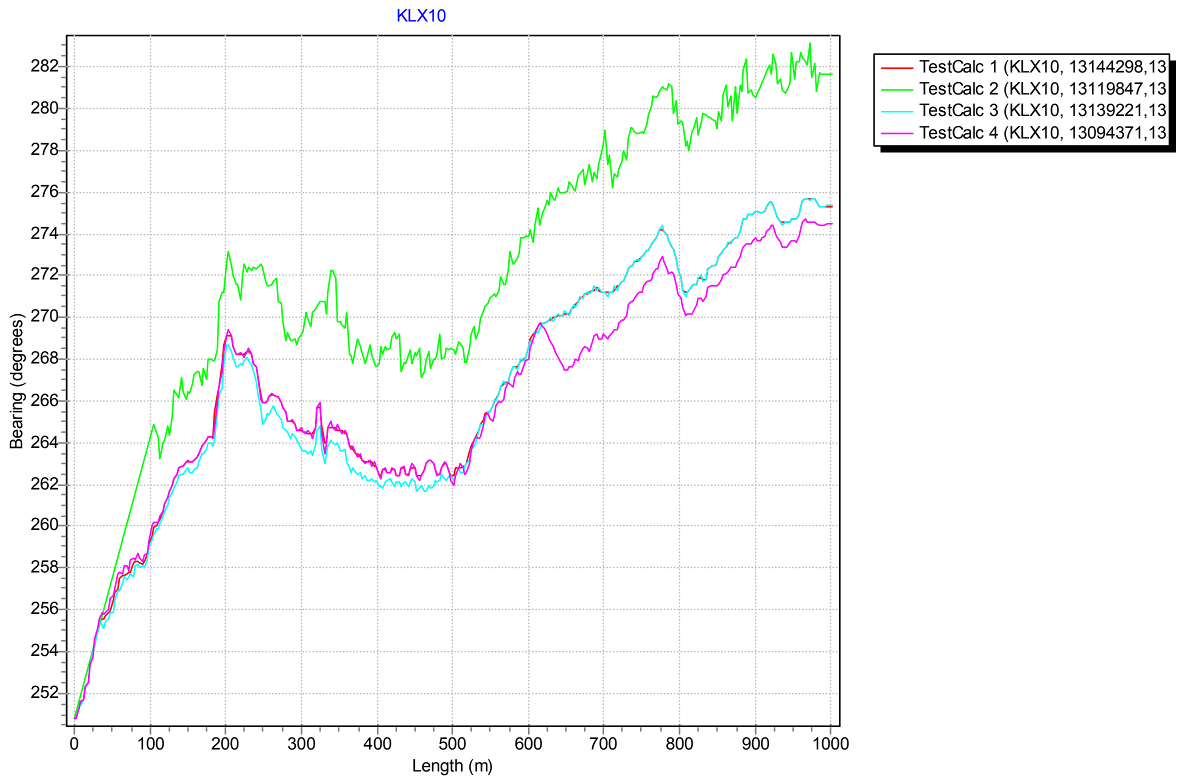


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX10	13094371	EG156	Maxibor measurement	2005-10-22 06:00	0.00	996.00	CF
KLX10	13139221	EG156	Maxibor measurement	2005-10-22 13:00	0.00	996.00	CF
KLX10	13119847	EG157	Magnetic - accelerometer measurement	2005-10-23 10:58	105.00	987.00	CF
KLX10	13099955	EG157	Magnetic - accelerometer measurement	2005-10-23 10:58	108.00	996.00	EF
KLX10	13144298	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

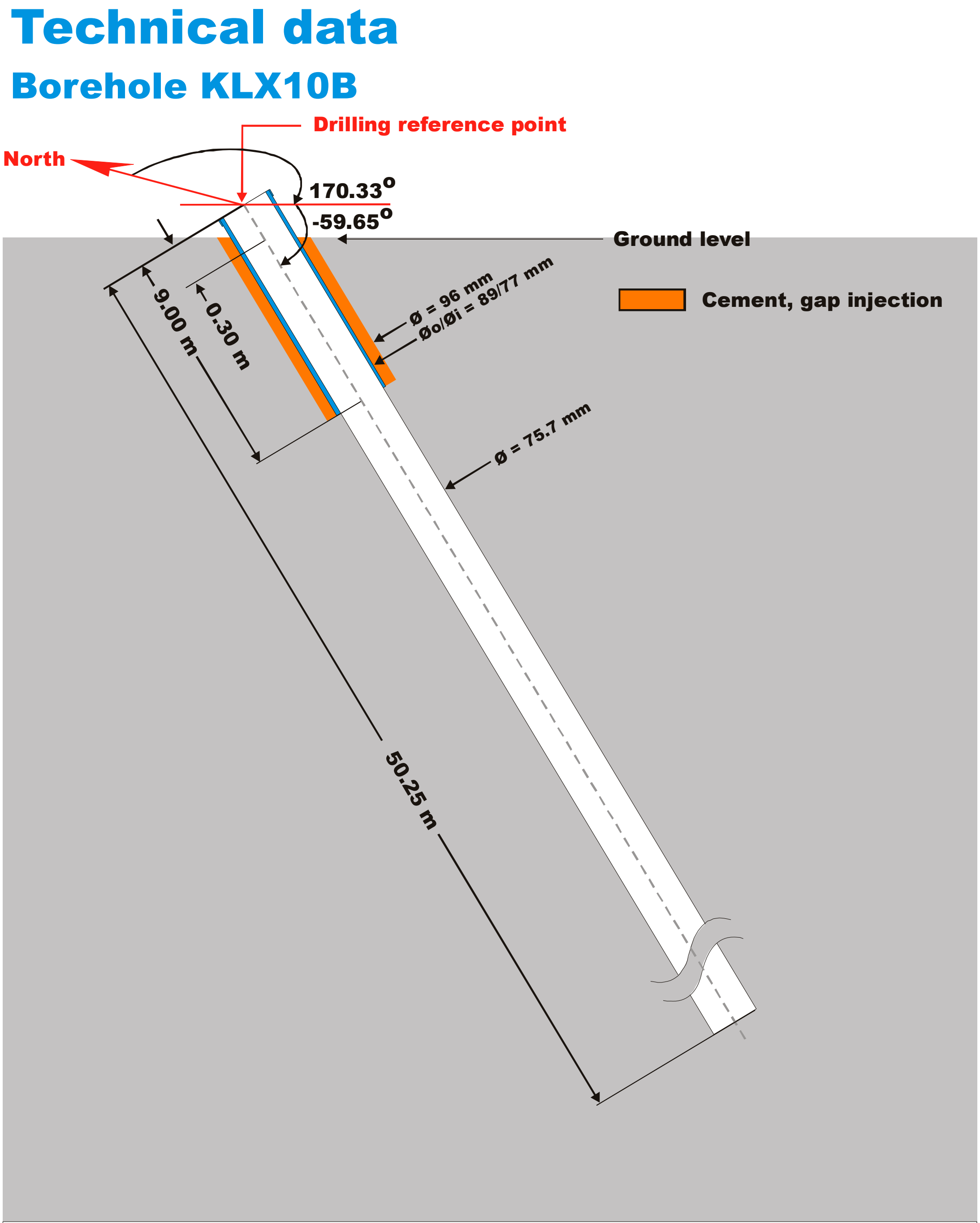
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX10	13094371	BEARING	3.00	987.00	
KLX10	13119847	BEARING	120.00	987.00	
KLX10	13119847	INCLINATION	105.00	987.00	
KLX10	13139221	BEARING	3.00	987.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX10	6366319.38	1548515.23	18.28	0	0.00	-85.19	250.8	0.913	6.103	0
KLX10	6366316.16	1548501.27	-100.84	120	0.23	-81.61	261.05	0.913	6.103	1.91
KLX10	6366314.88	1548487.77	-198.9	219	0.45	-83.24	268.2	0.913	6.103	3.49
KLX10	6366314.04	1548475.83	-300.19	321	0.64	-83.39	265.7	0.913	6.103	5.11
KLX10	6366312.79	1548464.47	-398.53	420	0.82	-83.55	262.7	0.913	6.103	6.69
KLX10	6366311.33	1548452.98	-499.87	522	1.00	-83.36	263.6	0.913	6.103	8.32
KLX10	6366310.72	1548441.32	-601.2	624	1.19	-83.4	269.8	0.913	6.103	9.94
KLX10	6366310.88	1548429.79	-699.52	723	1.37	-83.19	271.7	0.913	6.103	11.52
KLX10	6366311.45	1548417.7	-800.8	825	1.57	-83.18	271.9	0.913	6.103	13.15
KLX10	6366312.24	1548405.97	-899.1	924	1.75	-83.32	275.4	0.913	6.103	14.72
KLX10	6366313.03	1548397.1	-975.79	1,001.2	1.90	-83.41	275.3	0.913	6.103	15.95

Borehole description – KLX10B

Technical description of borehole KLX10B is given in Figure 1.



Drilling reference point
Northing: 6366316.49 (m), RT90 2,5 gon V 0:-15
Easting: 1548525.15 (m), RT90 2,5 gon V0:-15
Elevation: 18.15 (m), RHB 70
Drilling period
Drilling start date: 2006-02-08
Drilling stop date: 2006-02-14
Rev 2006-12-21

Figure 1. Technical description of borehole KLX10B.

Deviation measurement in KLX10B

In total two deviation measurements were conducted in KLX10B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13110506, 13139262) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144274) the two Mag/acc measurements (ID 13110506, 13139262) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

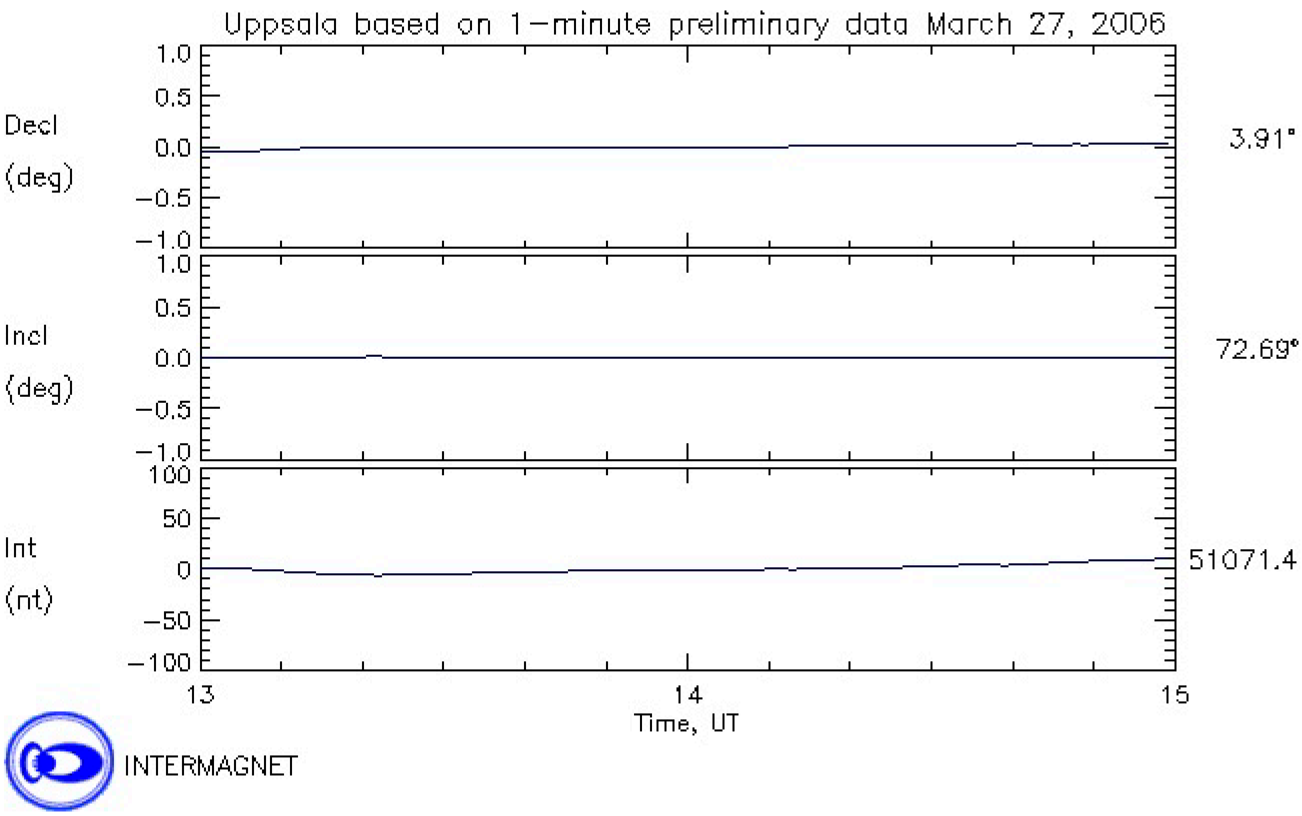
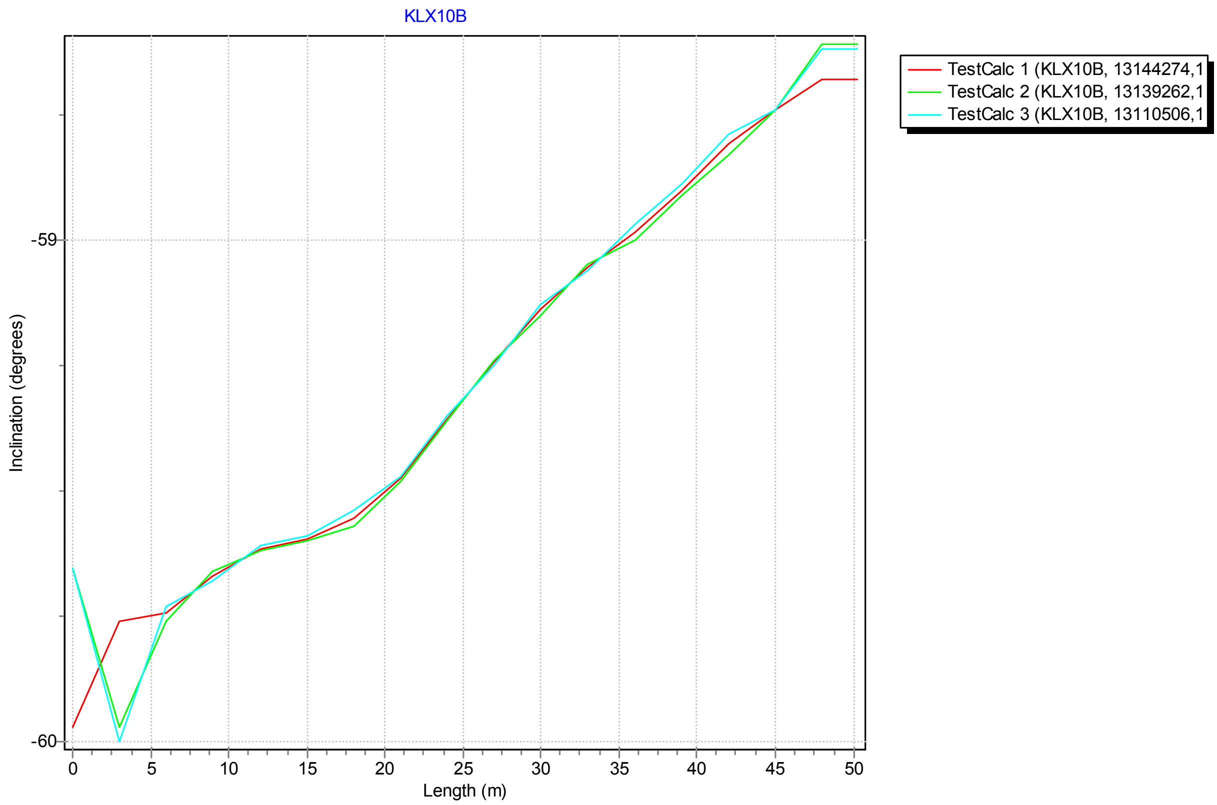


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-03-27.*



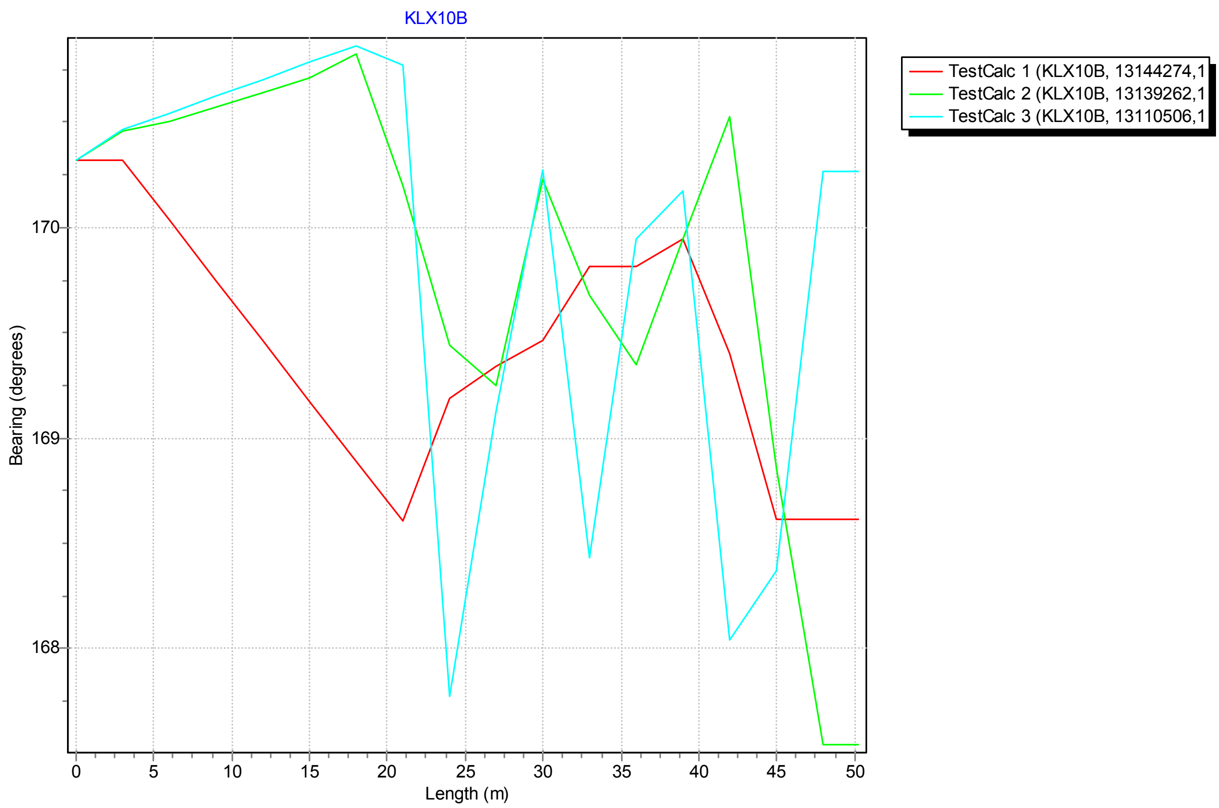


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX10B	13110506	EG157	Magnetic - accelerometer measurement	2006-03-27 13:34	0.00	48.00	CF
KLX10B	13139262	EG157	Magnetic - accelerometer measurement	2006-03-27 14:02	0.00	48.00	CF
KLX10B	13144274	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX10B	13110506	BEARING	24.00	50.25	
KLX10B	13110506	INCLINATION	3.00	50.25	
KLX10B	13139262	BEARING	24.00	50.25	
KLX10B	13139262	INCLINATION	3.00	50.25	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX10B	6366316.49	1548525.15	18.15	0	0.00	-59.97	170.32	0.066	1.638	0
KLX10B	6366291.26	1548529.87	-25.05	50.25	0.03	-58.68	168.62	0.066	1.638	0.73

Borehole description – KLX10C

Technical description of borehole KLX10C is given in Figure 1.

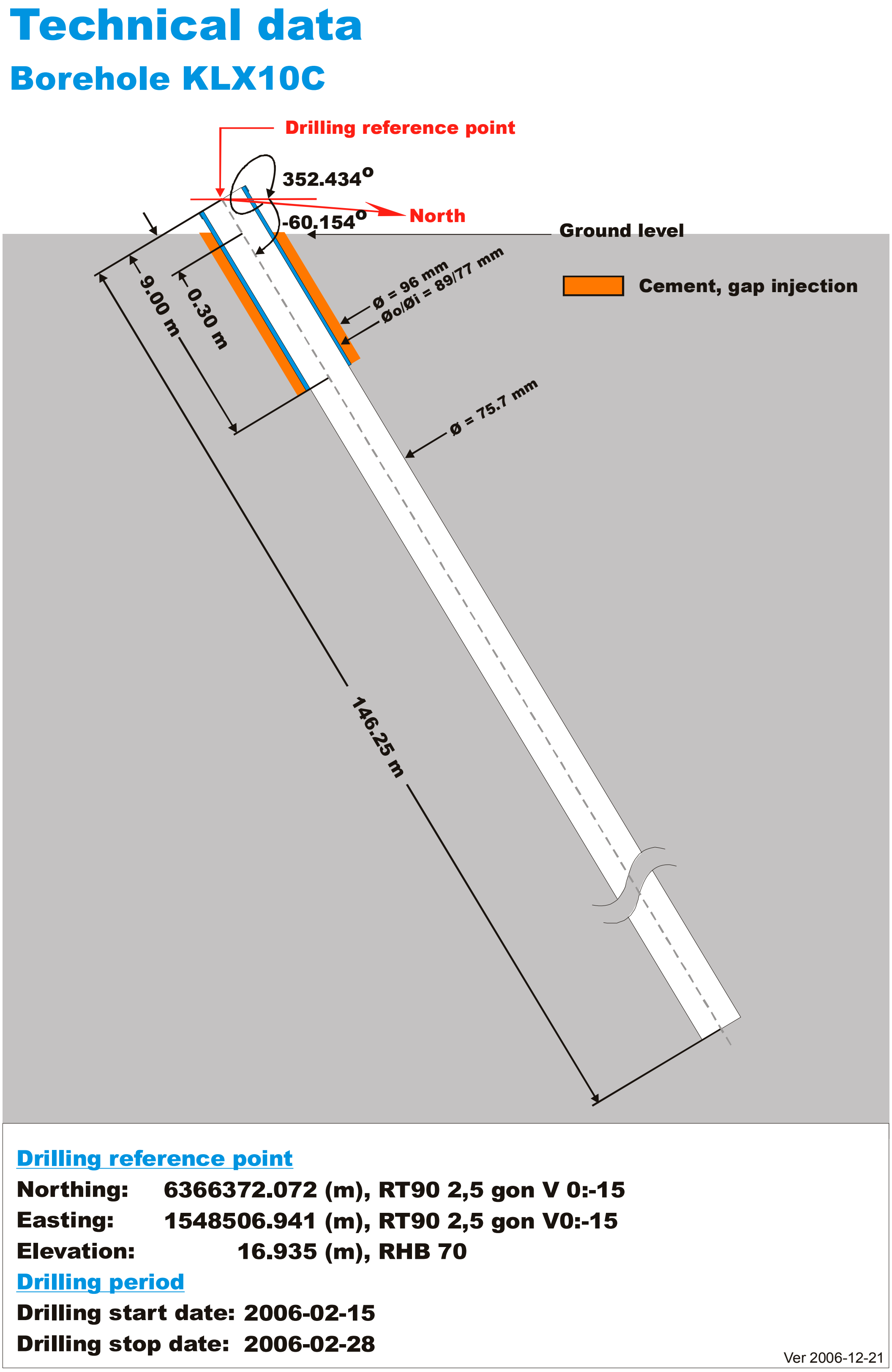


Figure 1. *Technical description of borehole KLX10C.*

Deviation measurement in KLX10C

In total two deviation measurements were conducted in KLX10C. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13139322, 13139324) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement (ID 13110562) because the measurement was executed deeper than the borehole bottom. The raw data from that measurement, excluding the last measured level, is re-used for measurement ID 13139322.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144275) the two Mag/acc measurements (ID 13139322, 13139324) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figures 3 and 4 shows the resulting deviation data together with the other, not ERROR-marked, deviation activities listed in Table 1.

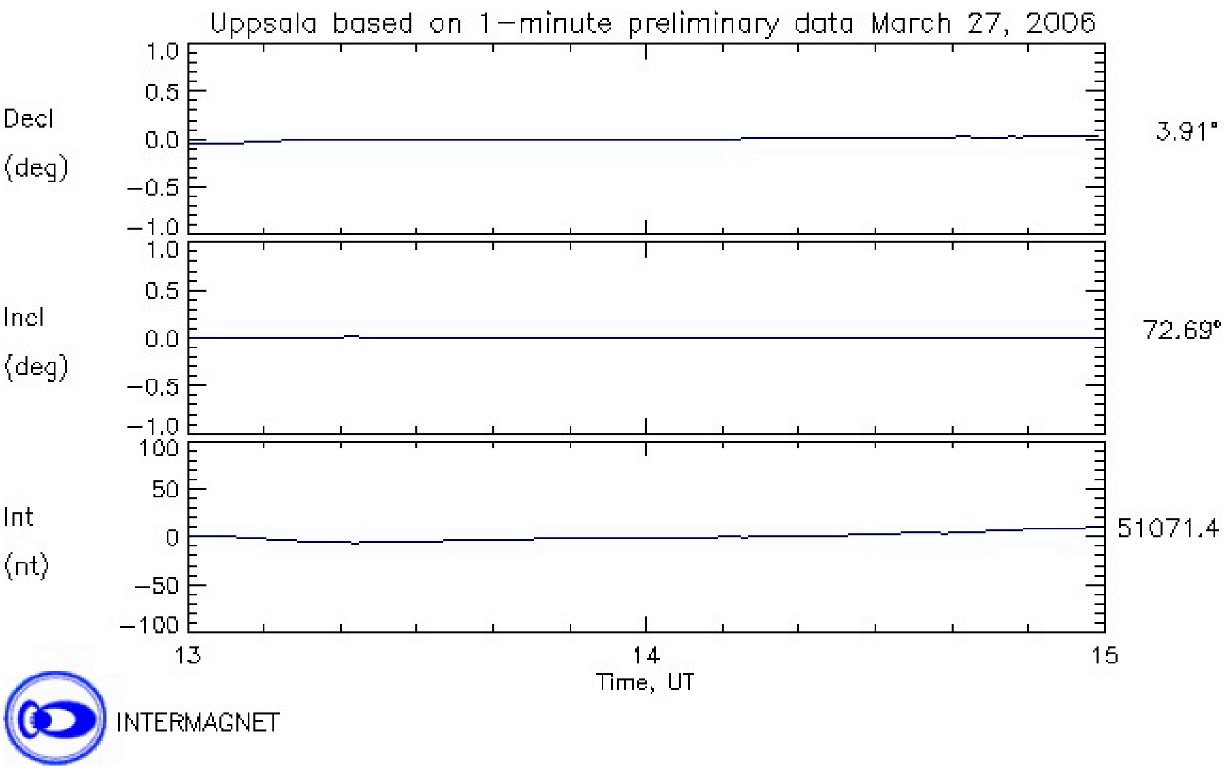


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-03-27.*

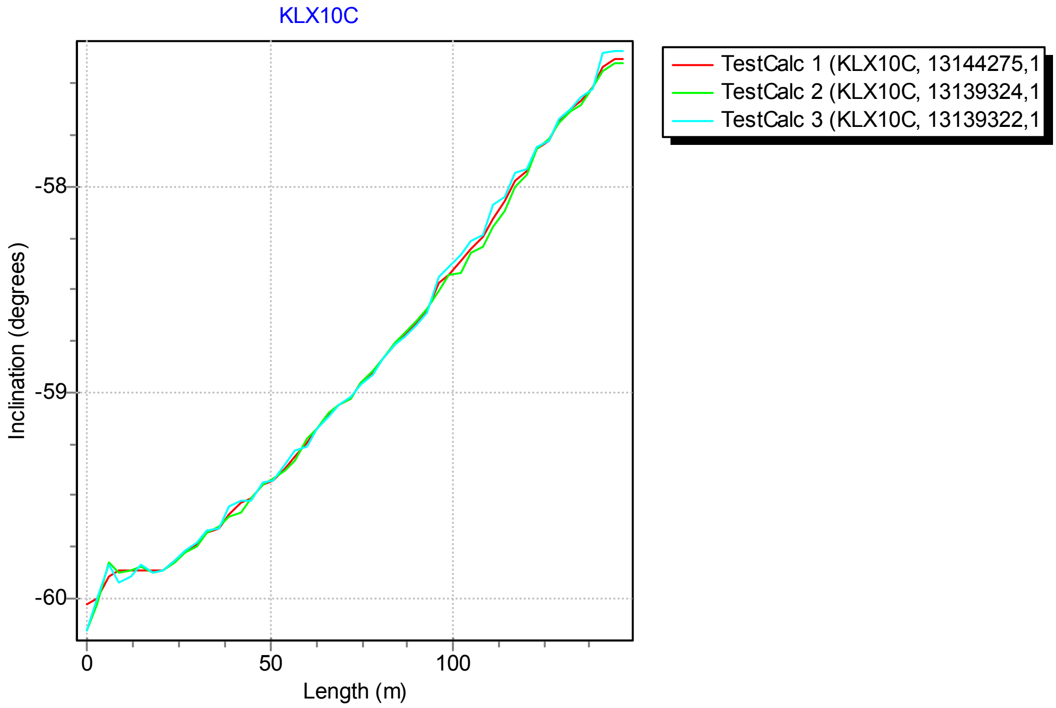
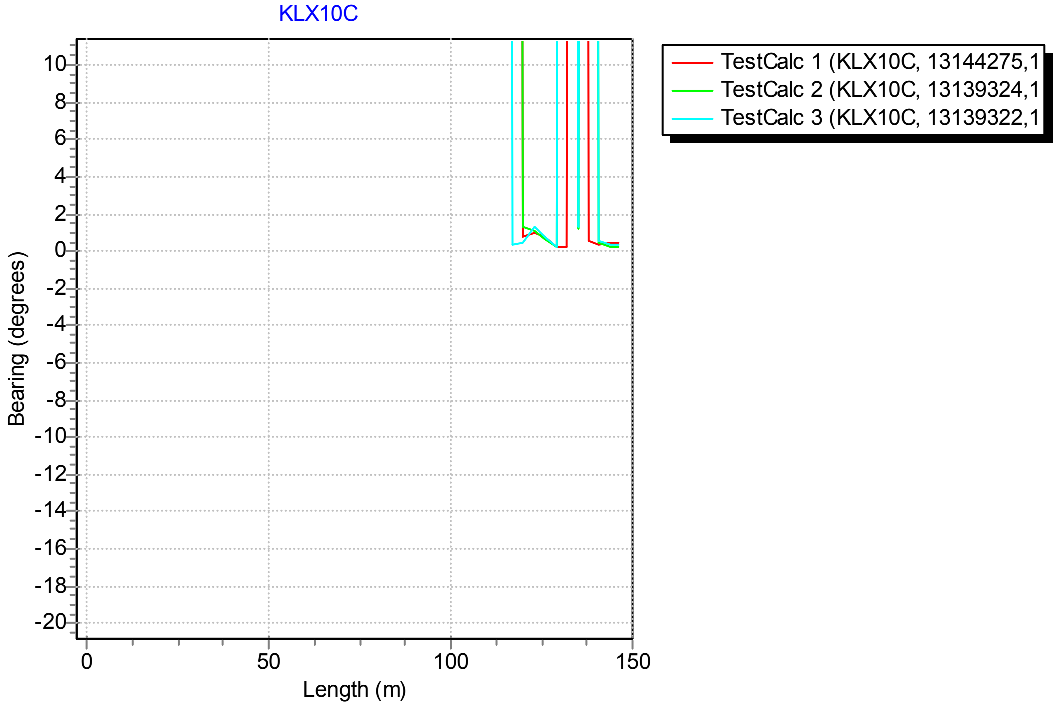


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The inclination is shown*



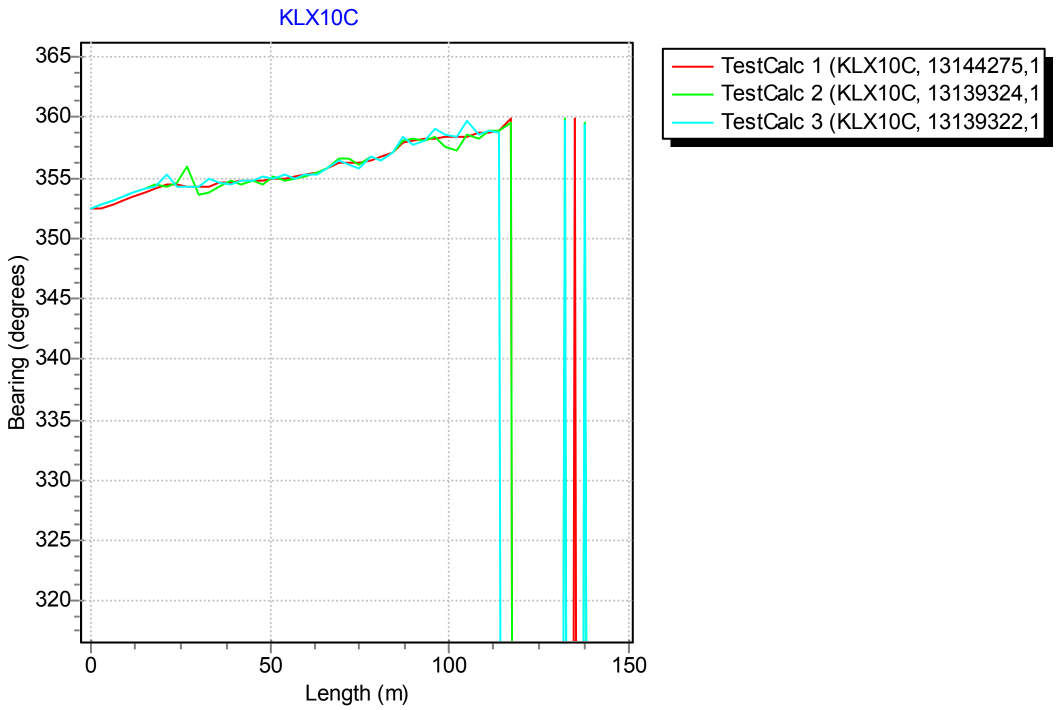


Figure 4. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the bearing greater than 0° and the lower diagram shows the bearing below 360°.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX10C	13110562	EG157	Magnetic - accelerometer measurement	2006-03-27 14:19	0.00	150.00	EF
KLX10C	13139322	EG157	Magnetic - accelerometer measurement	2006-03-27 14:19	0.00	144.00	CF
KLX10C	13139324	EG157	Magnetic - accelerometer measurement	2006-03-27 14:38	0.00	144.00	CF
KLX10C	13144275	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

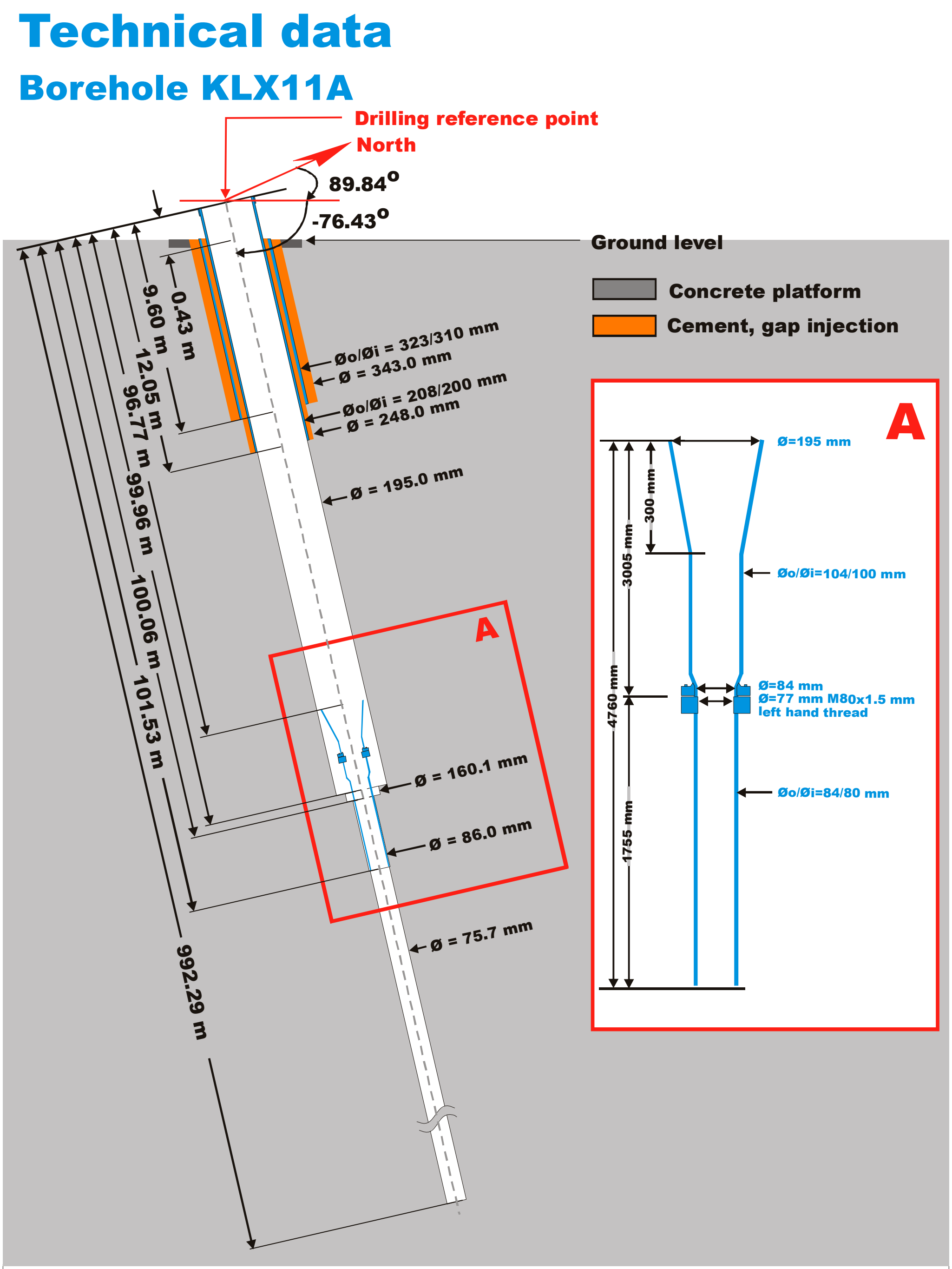
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX10C	13139322	BEARING	24.00	144.00	
KLX10C	13139322	INCLINATION	3.00	144.00	
KLX10C	13139324	BEARING	24.00	144.00	
KLX10C	13139324	INCLINATION	3.00	144.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX10C	6366372.07	1548506.94	16.93	0	0.00	-60.03	352.43	0.046	0.734	0
KLX10C	6366447.47	1548502.7	-108.25	146.25	0.06	-57.38	0.42	0.046	0.734	0.97

Borehole description – KLX11A

Technical description of borehole KLX11A is given in Figure 1.



Drilling reference point

Northing: 6366339.72 (m), RT90 2,5 gon V 0:-15

Easting: 1546608.49 (m), RT90 2,5 gon V 0:-15

Elevation: 27.14 (m), RHB 70

Drilling period

Drilling start date: 2005-11-24

Drilling stop date: 2006-03-02

Ver 2007-06-07

Figure 1. *Technical description of borehole KLX11A.*

Deviation measurement in KLX11A

In total four deviation measurements were conducted in KLX11A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX11A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m was added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13134828, 13140779) were executed down and up the borehole.

The two Mac/acc measurements (ID 13120652, 13140780) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is two ERROR- marked measurements. One Maxibor measurement (ID 13105833) was ERROR- marked due to missing data at borehole length 0.00 m, the raw data from that measurement is re-used and the data at borehole length 0.00 m was added. One Mag/acc measurement (ID 13105829) was ERROR- marked due to recalculation, the raw data from that measurement was re-used and the values between borehole length 0 – 108 m were included, to calculate the correct measurement (ID13120652. Note, the bearing values were interpolated due to magnetic disturbances caused by the support casing

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144276) the two Maxibor measurements (ID 13134828, 13140779) and the two Mag/acc measurements (ID 13120652, 13140780) were used. The strategy used in selecting the activities deviates from the general strategy (Section 4.4.2) due to the fact that the bearing data between borehole lengths 0 – 117 m diverge.Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

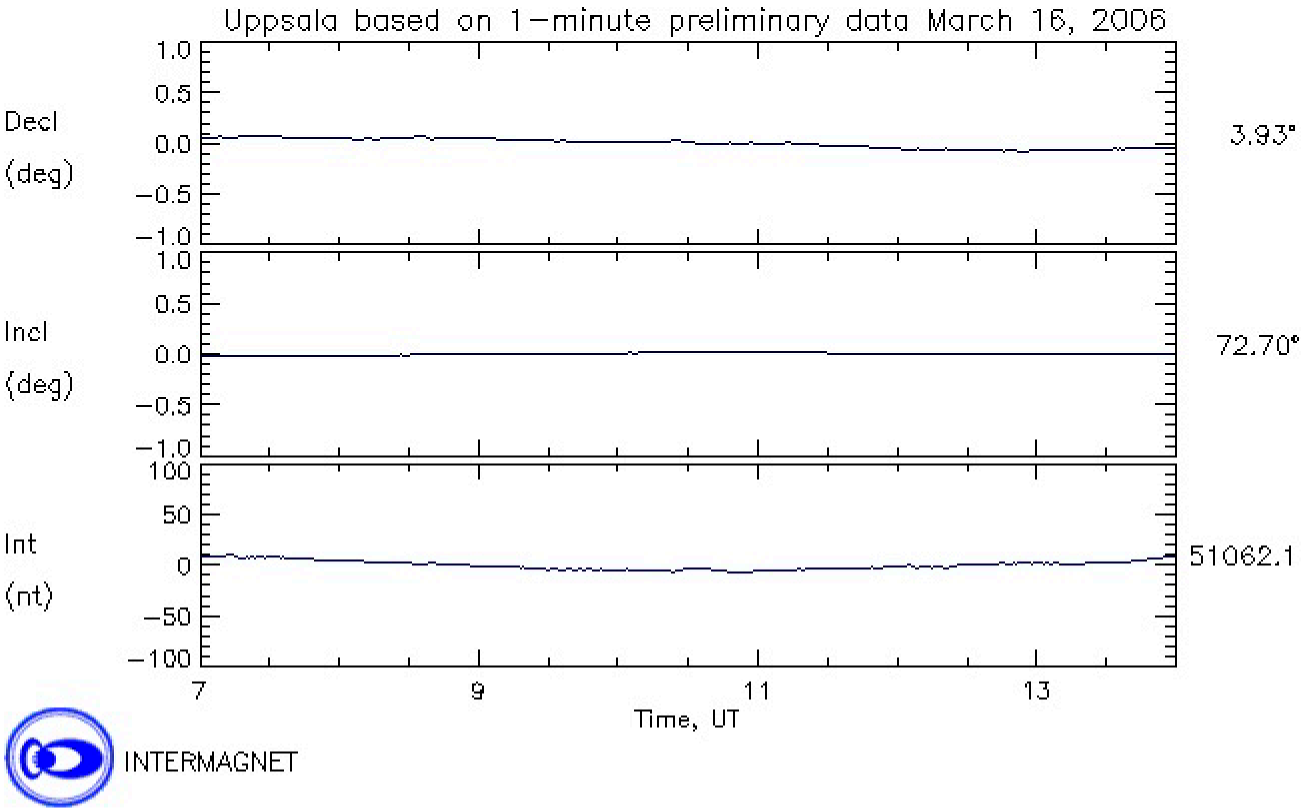
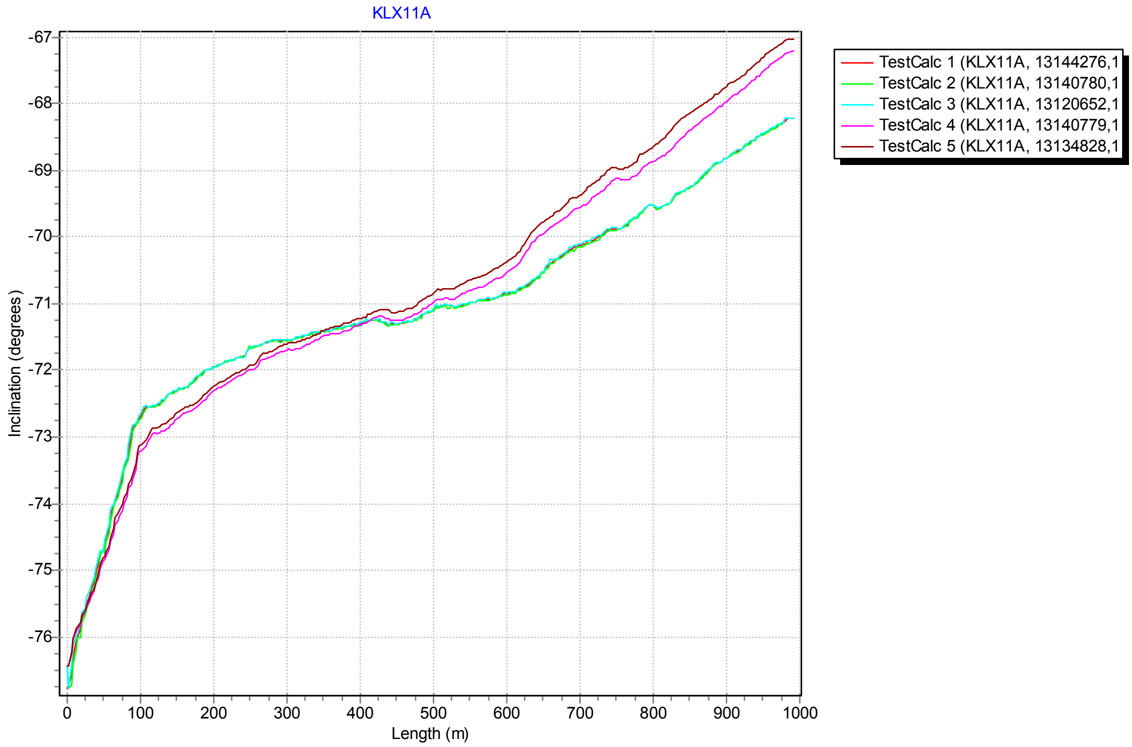


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-03-16.*



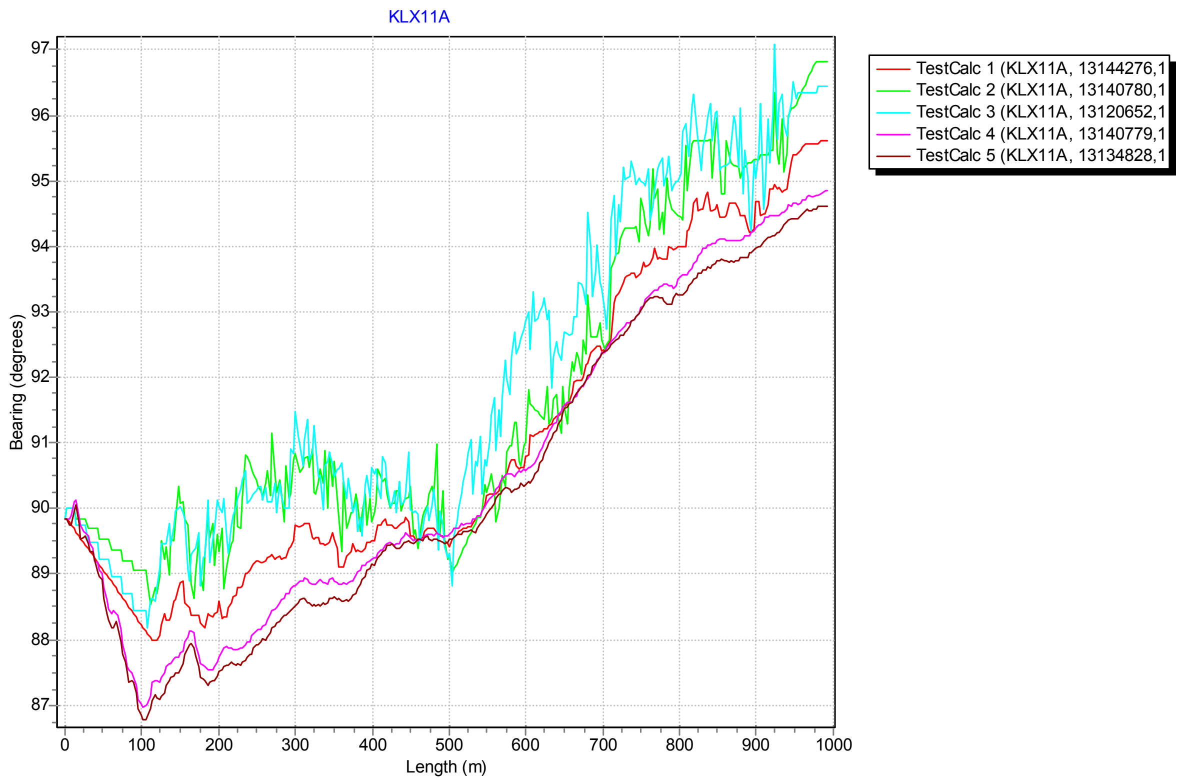


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11A	13105833	EG156	Maxibor measurement	2006-03-15 06:00	3.00	990.00	EF
KLX11A	13134828	EG156	Maxibor measurement	2006-03-15 06:00	0.00	990.00	CF
KLX11A	13140779	EG156	Maxibor measurement	2006-03-15 12:00	0.00	990.00	CF
KLX11A	13120652	EG157	Magnetic - accelerometer measurement	2006-03-16 07:00	0.00	981.00	CF
KLX11A	13105829	EG157	Magnetic - accelerometer measurement	2006-03-16 07:00	108.00	981.00	EF
KLX11A	13140780	EG157	Magnetic - accelerometer measurement	2006-03-16 10:57	0.00	981.00	CF
KLX11A	13144276	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11A	13120652	BEARING	117.00	981.00	
KLX11A	13120652	INCLINATION	3.00	981.00	
KLX11A	13134828	BEARING	117.00	981.00	
KLX11A	13140779	BEARING	117.00	981.00	
KLX11A	13140780	BEARING	117.00	981.00	
KLX11A	13140780	INCLINATION	3.00	981.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11A	6366339.72	1546608.49	27.14	0	0.00	-76.77	89.84	0.825	1.25	0
KLX11A	6366340.49	1546644.62	-99.78	132	0.52	-72.44	88.31	0.825	1.25	1.9
KLX11A	6366341.32	1546676.91	-199.68	237	0.99	-71.81	89.02	0.825	1.25	3.41
KLX11A	6366341.67	1546710.11	-299.29	342	1.47	-71.43	89.46	0.825	1.25	4.92
KLX11A	6366341.95	1546743.73	-398.76	447	1.95	-71.31	89.8	0.825	1.25	6.44
KLX11A	6366342.13	1546778.67	-500.96	555	2.45	-70.97	90.23	0.825	1.25	7.99
KLX11A	6366341.54	1546813.22	-600.11	660	2.95	-70.39	91.75	0.825	1.25	9.5
KLX11A	6366339.73	1546848.96	-698.82	765	3.47	-69.81	93.82	0.825	1.25	11.01
KLX11A	6366336.89	1546886.78	-799.94	873	4.01	-69.03	94.66	0.825	1.25	12.57
KLX11A	6366333.5	1546926	-900.51	981	4.58	-68.25	95.56	0.825	1.25	14.12
KLX11A	6366333.09	1546930.16	-910.99	992.29	4.64	-68.22	95.61	0.825	1.25	14.29

Borehole description – KLX11B

Technical description of borehole KLX11B is given in Figure 1.

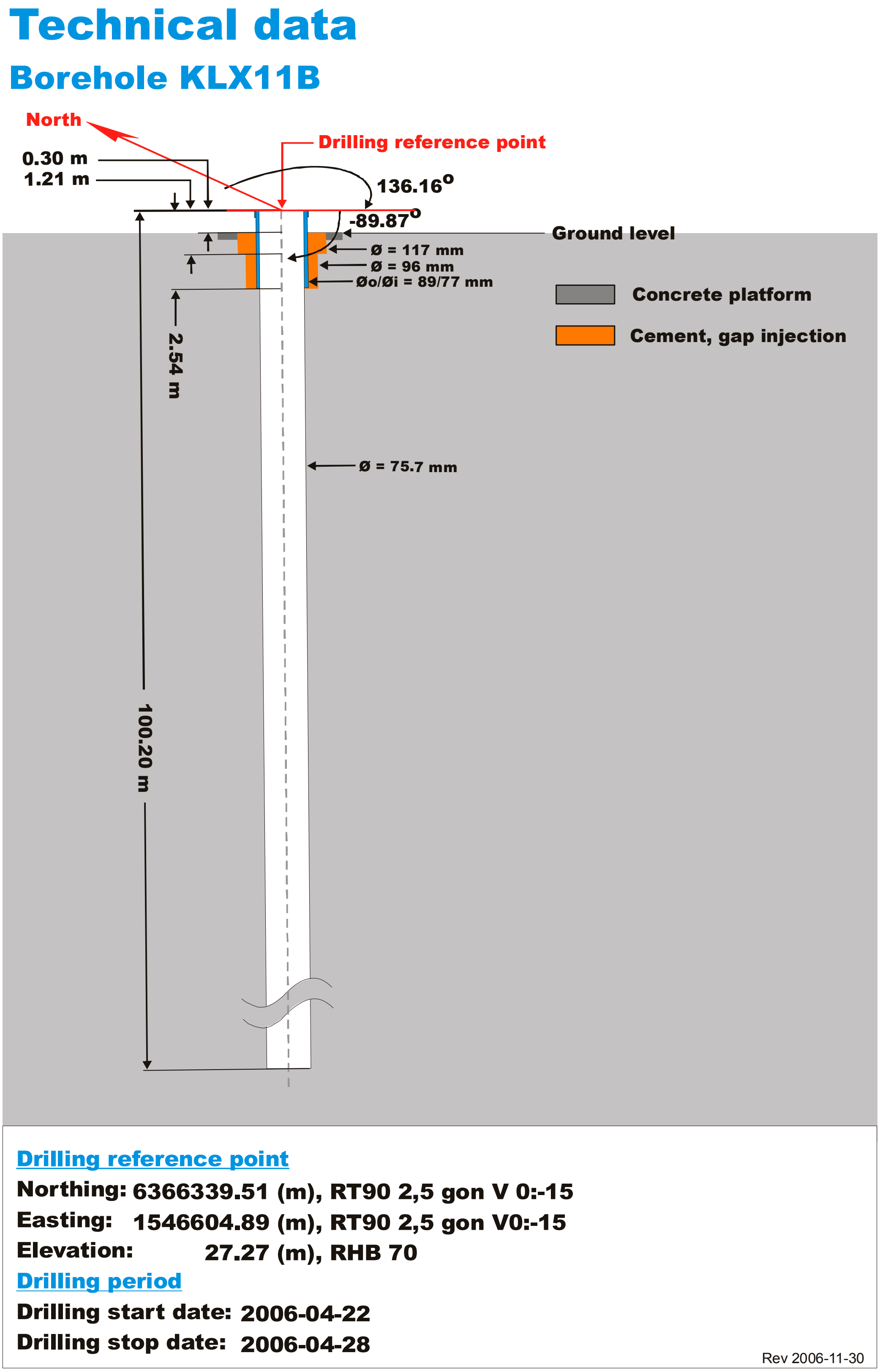


Figure 1. Technical description of borehole KLX11B.

Deviation measurement in KLX11B

In total two deviation measurements were conducted in KLX11B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13140785, 13115947) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144277) the two Mag/acc measurements (ID 13140785, 13115947) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

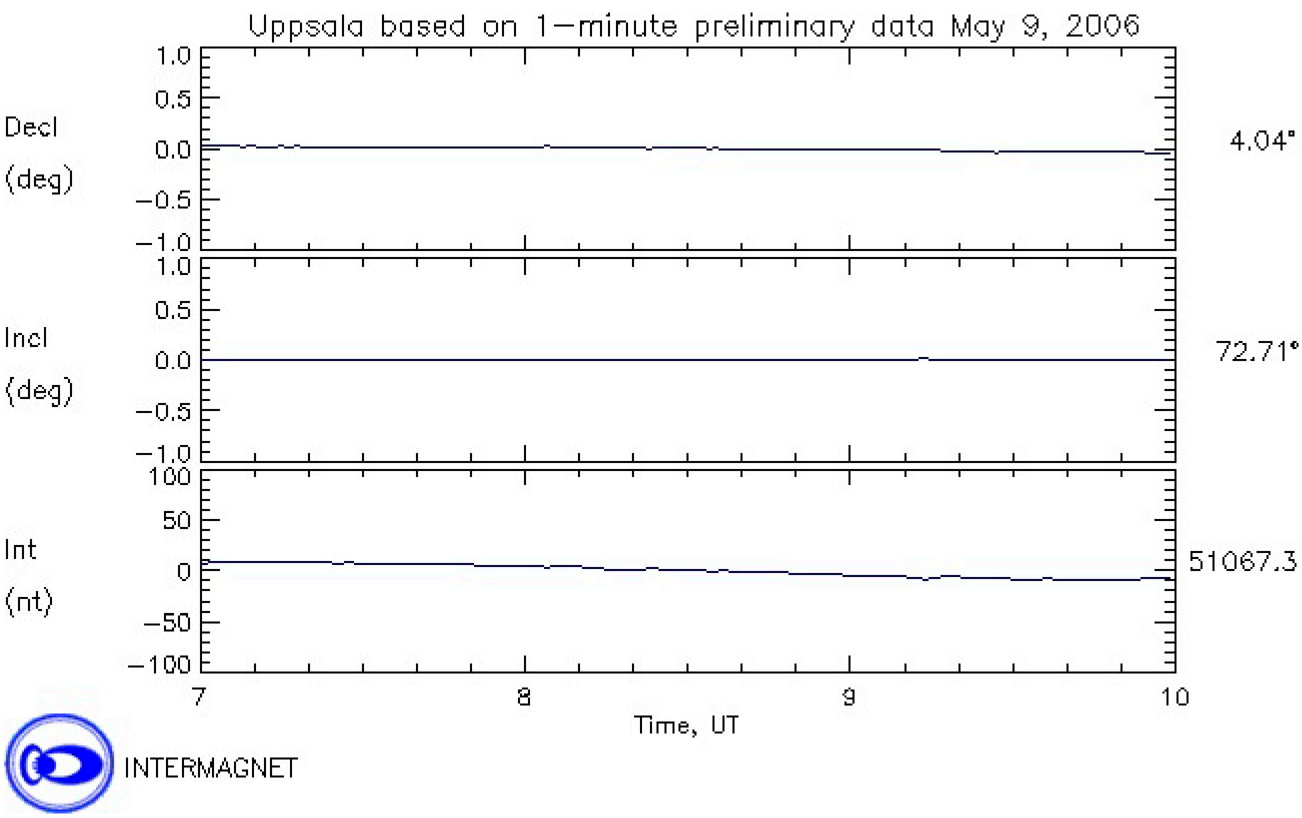
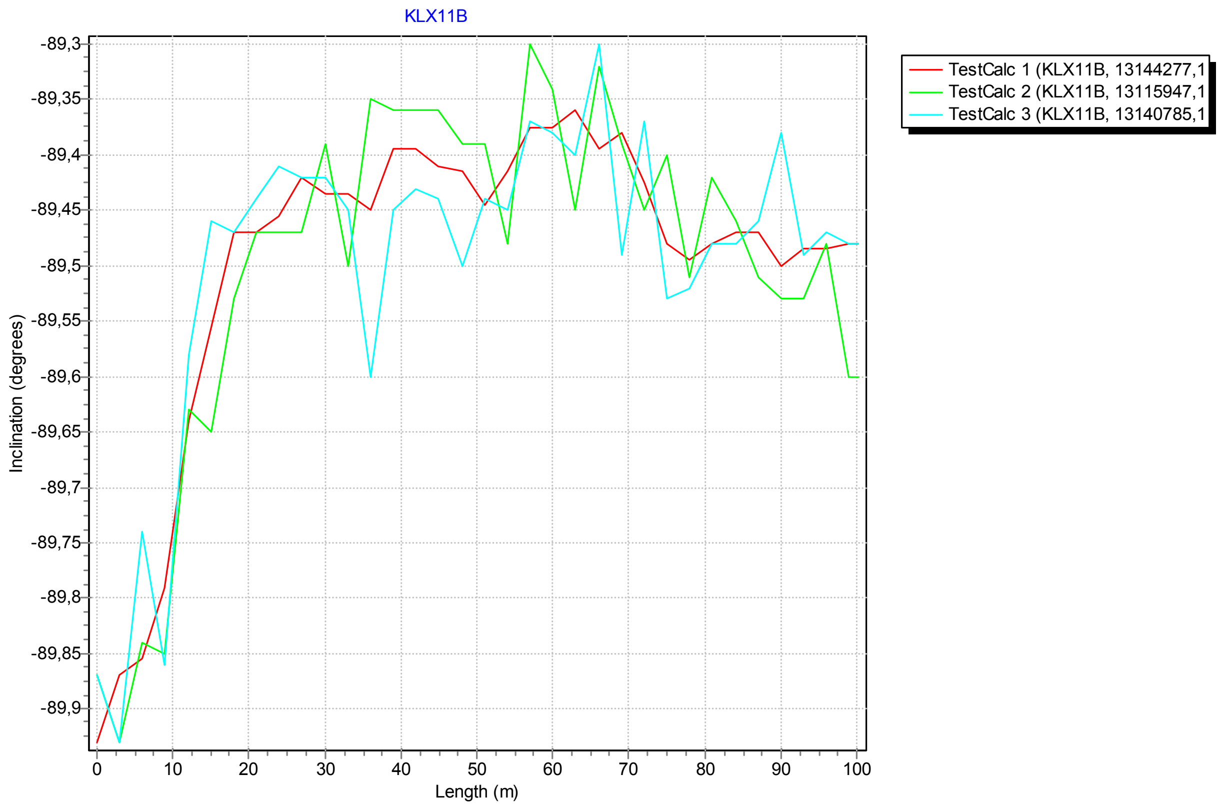


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-09.*



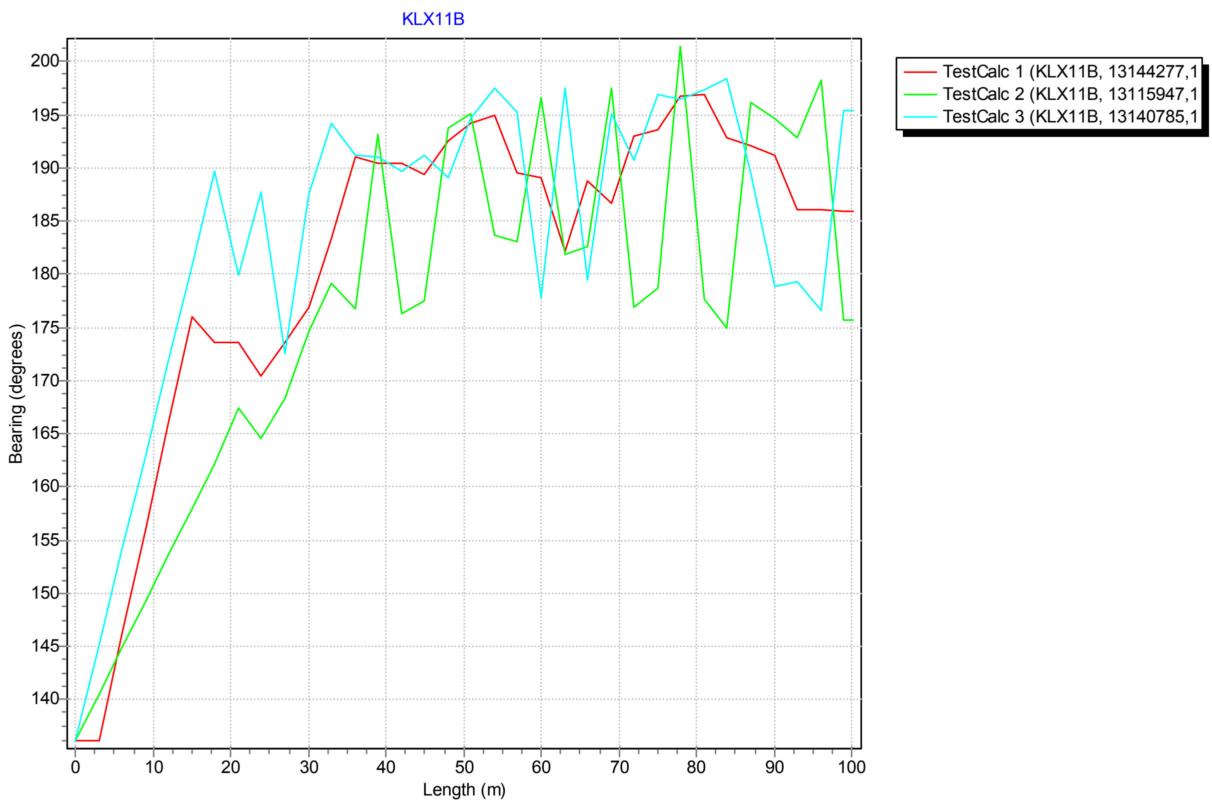


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11B	13140785	EG157	Magnetic - accelerometer measurement	2006-05-09 08:43	0.00	99.00	CF
KLX11B	13115947	EG157	Magnetic - accelerometer measurement	2006-05-09 08:57	0.00	99.00	CF
KLX11B	13144277	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11B	13115947	BEARING	18.00	100.20	
KLX11B	13115947	INCLINATION	3.00	100.20	
KLX11B	13140785	BEARING	18.00	100.20	
KLX11B	13140785	INCLINATION	3.00	100.20	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

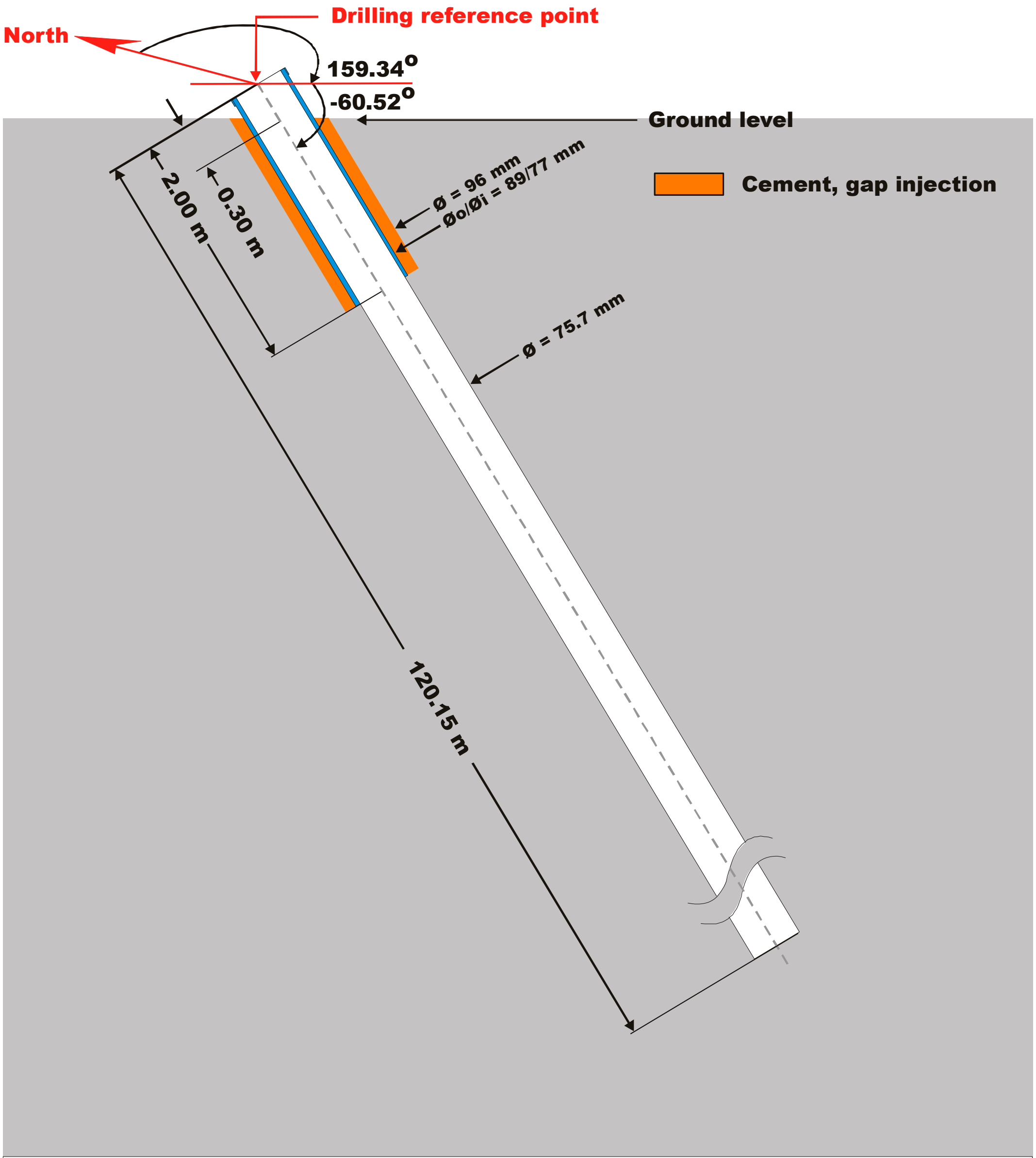
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11B	6366339.51	1546604.89	27.27	0	0.00	-89.93	136.16	0.095	15.017	0
KLX11B	6366338.63	1546604.81	-72.92	100.2	0.00	-89.48	185.99	0.095	15.017	0.24

Borehole description – KLX11C

Technical description of borehole KLX11C is given in Figure 1.

Technical data

Borehole KLX11C



Drilling reference point

Northing: 6366350.26 (m), RT90 2,5 gon V 0:-15

Easting: 1546586.89 (m), RT90 2,5 gon V0:-15

Elevation: 27.19 (m), RHB 70

Drilling period

Drilling start date: 2006-03-30

Drilling stop date: 2006-04-05

Rev 2006-11-30

Figure 1. *Technical description of borehole KLX11C.*

Deviation measurement in KLX11C

In total two deviation measurements were conducted in KLX11C. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13140841, 13115951) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144278) the two Mag/acc measurements (ID 13140841, 13115951) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

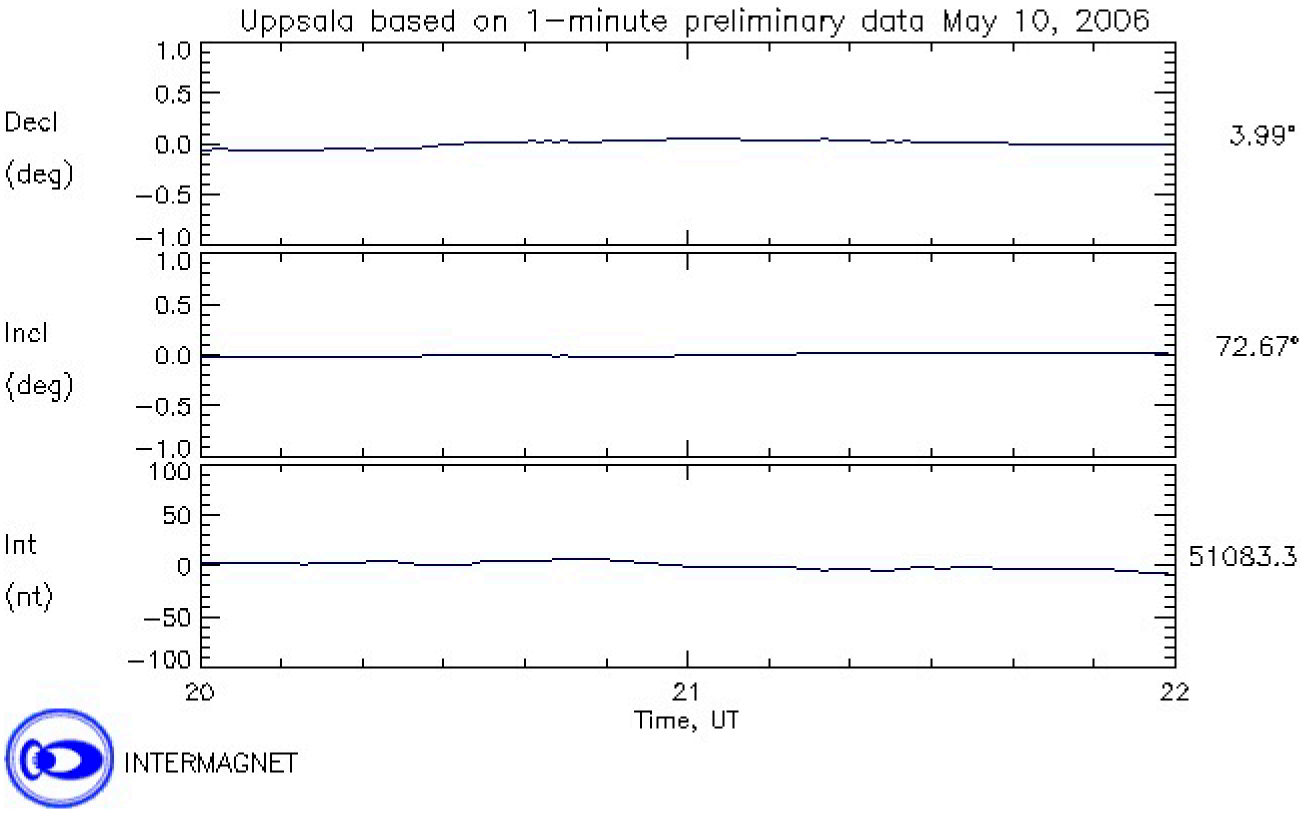
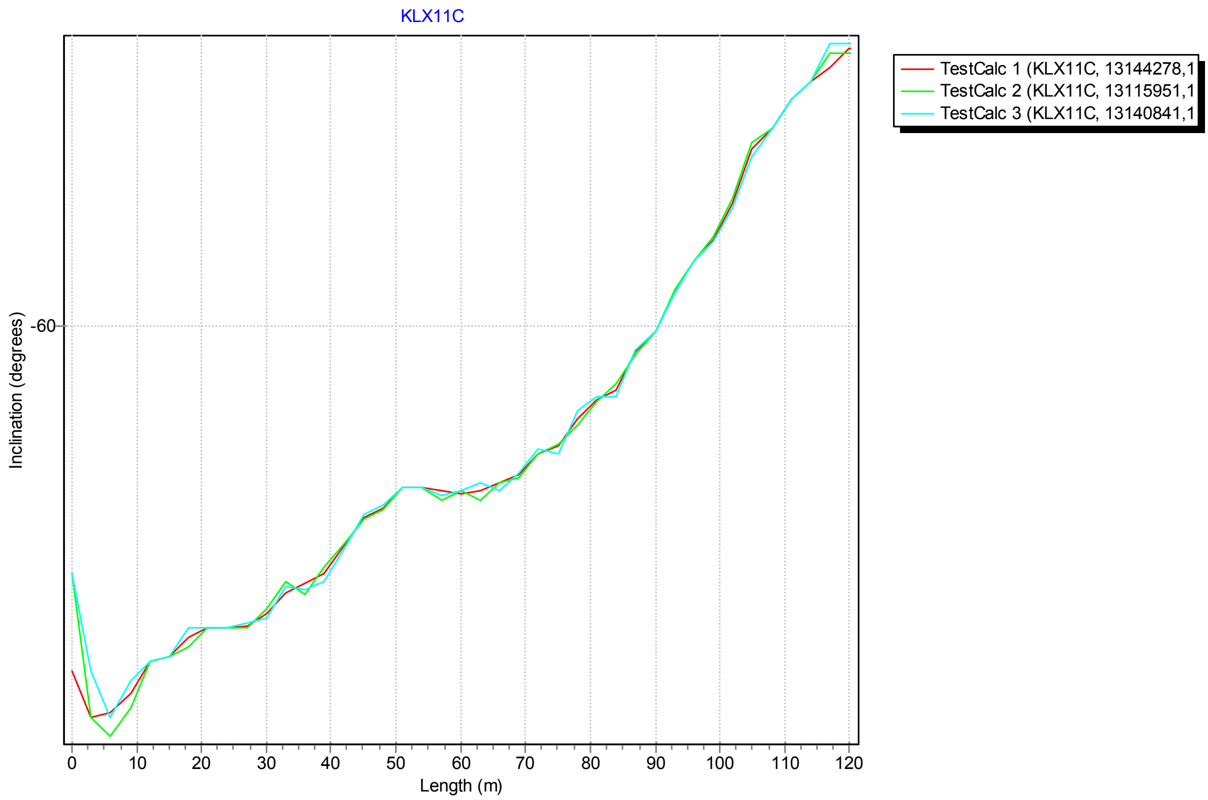


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-10.*



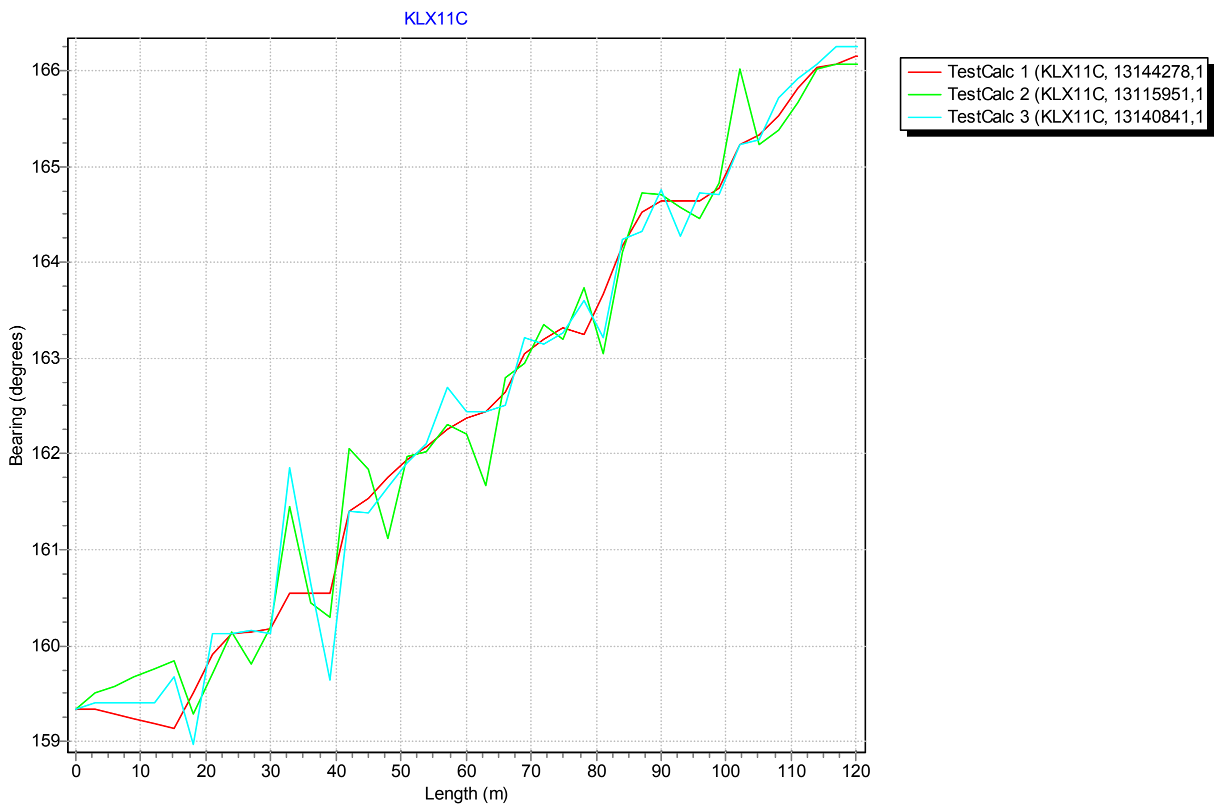


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11C	13140841	EG157	Magnetic - accelerometer measurement	2006-05-10 20:24	0.00	117.00	CF
KLX11C	13115951	EG157	Magnetic - accelerometer measurement	2006-05-10 20:53	0.00	117.00	CF
KLX11C	13144278	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11C	13115951	BEARING	18.00	120.15	
KLX11C	13115951	INCLINATION	3.00	120.15	
KLX11C	13140841	BEARING	18.00	120.15	
KLX11C	13140841	INCLINATION	3.00	120.15	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11C	6366350.26	1546586.89	27.19	0	0.00	-60.73	159.34	0.03	0.62	0
KLX11C	6366293.47	1546604.85	-77.13	120.15	0.03	-59.41	166.16	0.03	0.62	0.65

Borehole description – KLX11D

Technical description of borehole KLX11D is given in Figure 1.

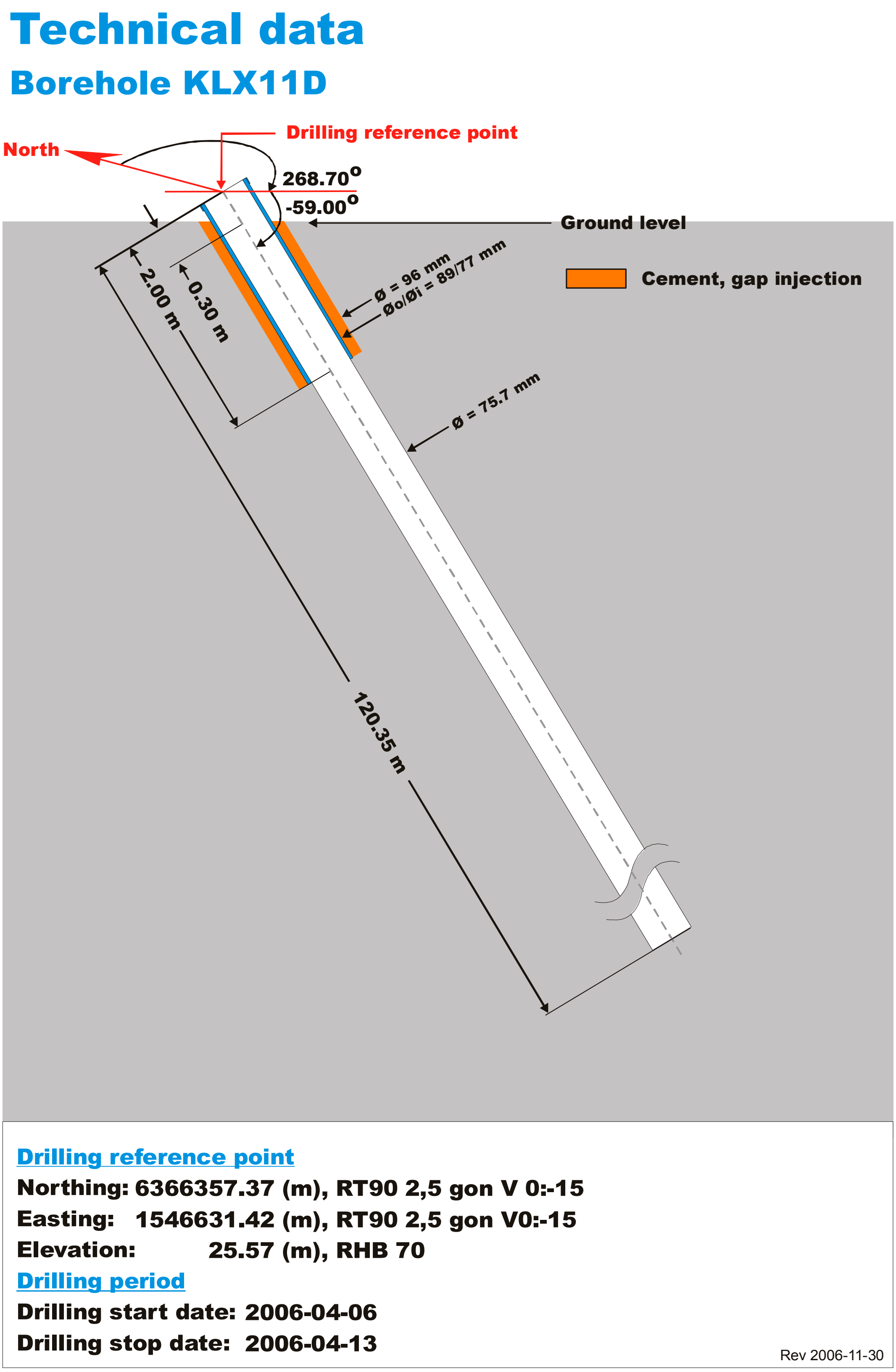


Figure 1. *Technical description of borehole KLX11D.*

Deviation measurement in KLX11D

In total two deviation measurements were conducted in KLX11D. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141077, 13115961) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144279) the two Mag/acc measurements (ID 13141077, 13115961) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

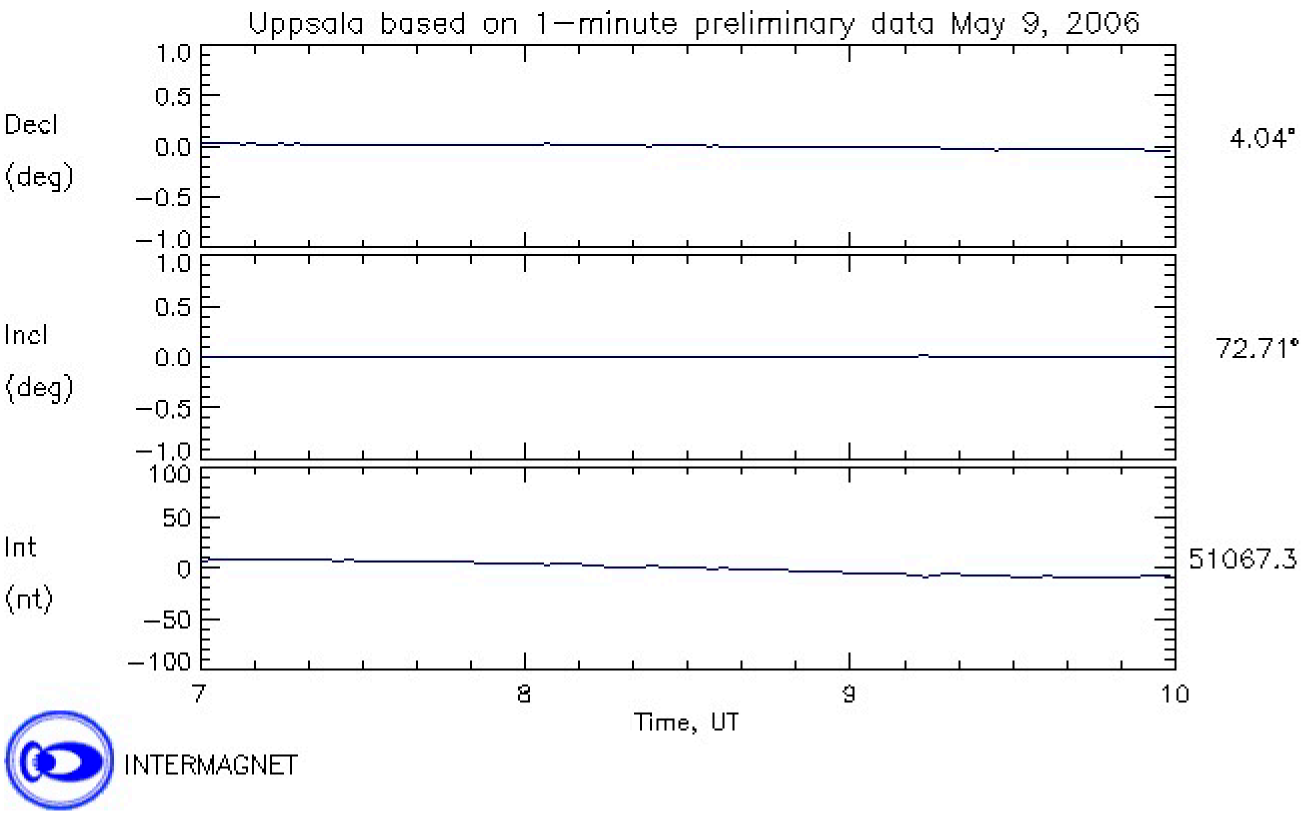
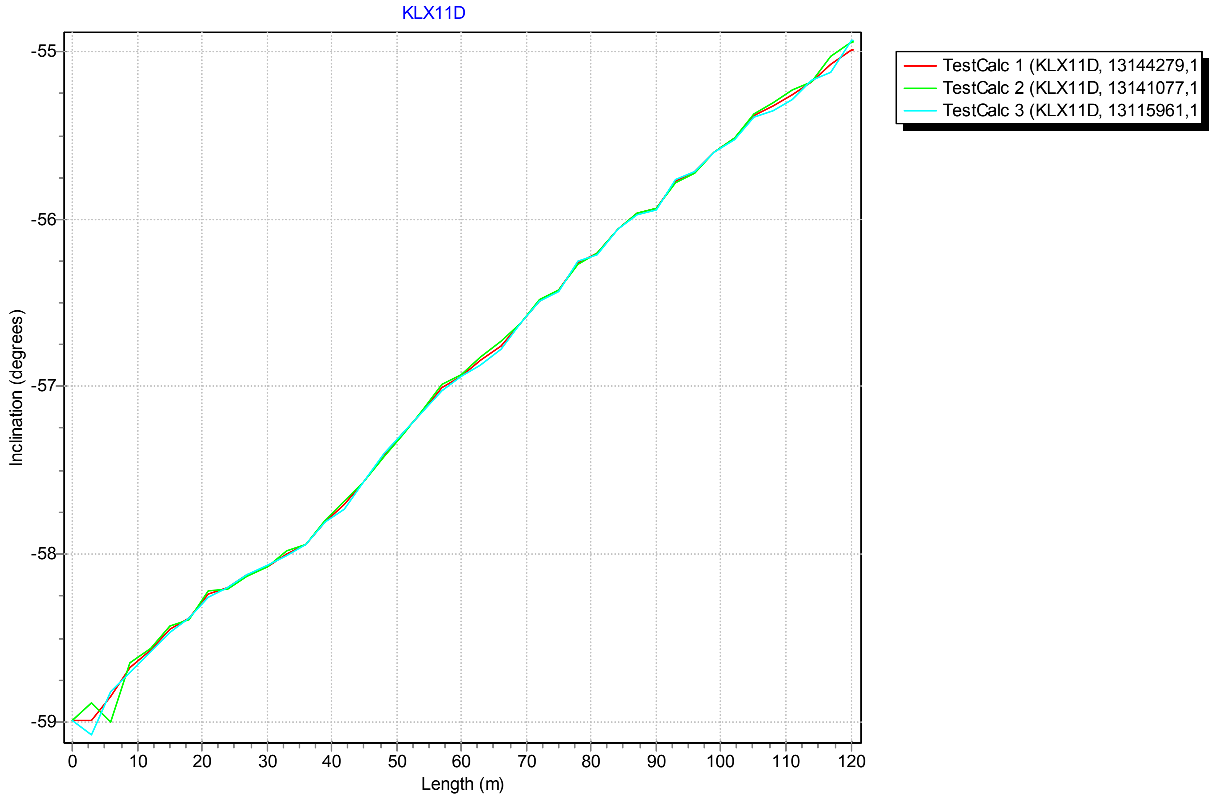


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-09.*



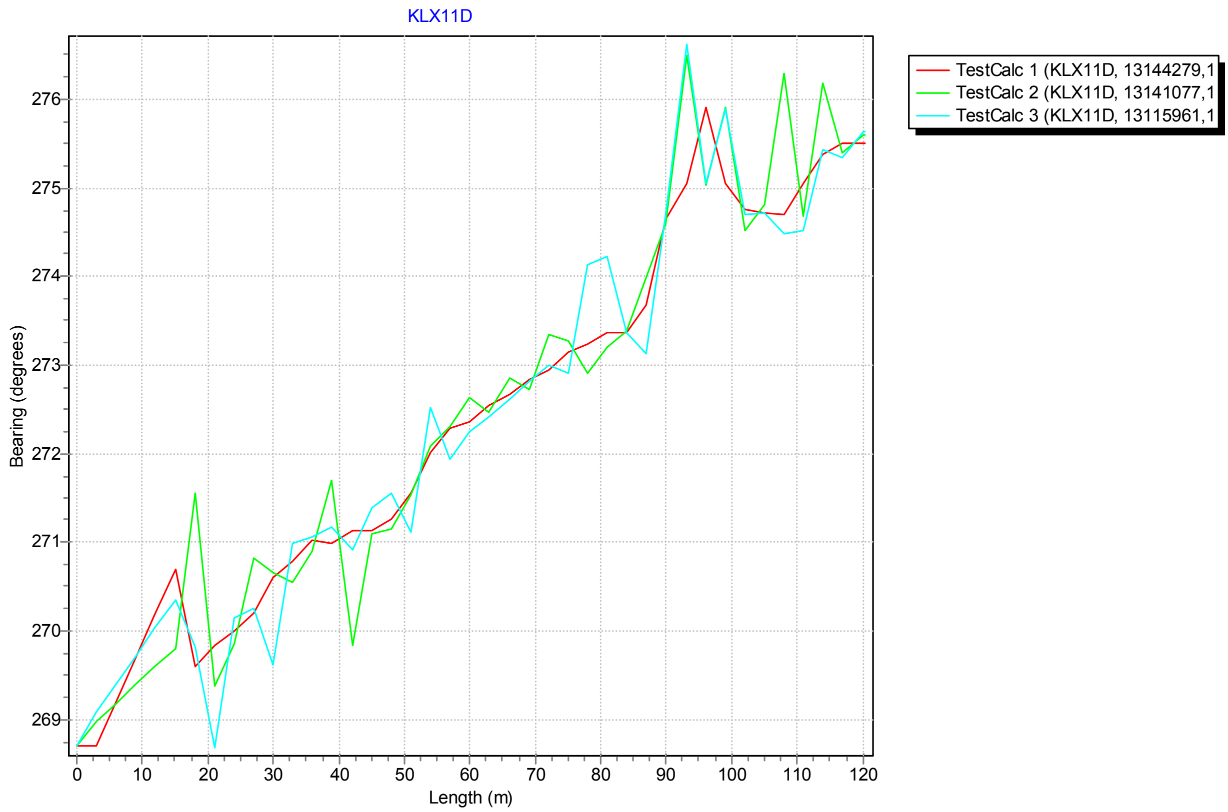


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11D	13115961	EG157	Magnetic - accelerometer measurement	2006-05-09 07:36	0.00	120.00	CF
KLX11D	13141077	EG157	Magnetic - accelerometer measurement	2006-05-09 08:21	0.00	120.00	CF
KLX11D	13144279	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11D	13115961	BEARING	18.00	120.35	
KLX11D	13115961	INCLINATION	3.00	120.35	
KLX11D	13141077	BEARING	18.00	120.35	
KLX11D	13141077	INCLINATION	3.00	120.35	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

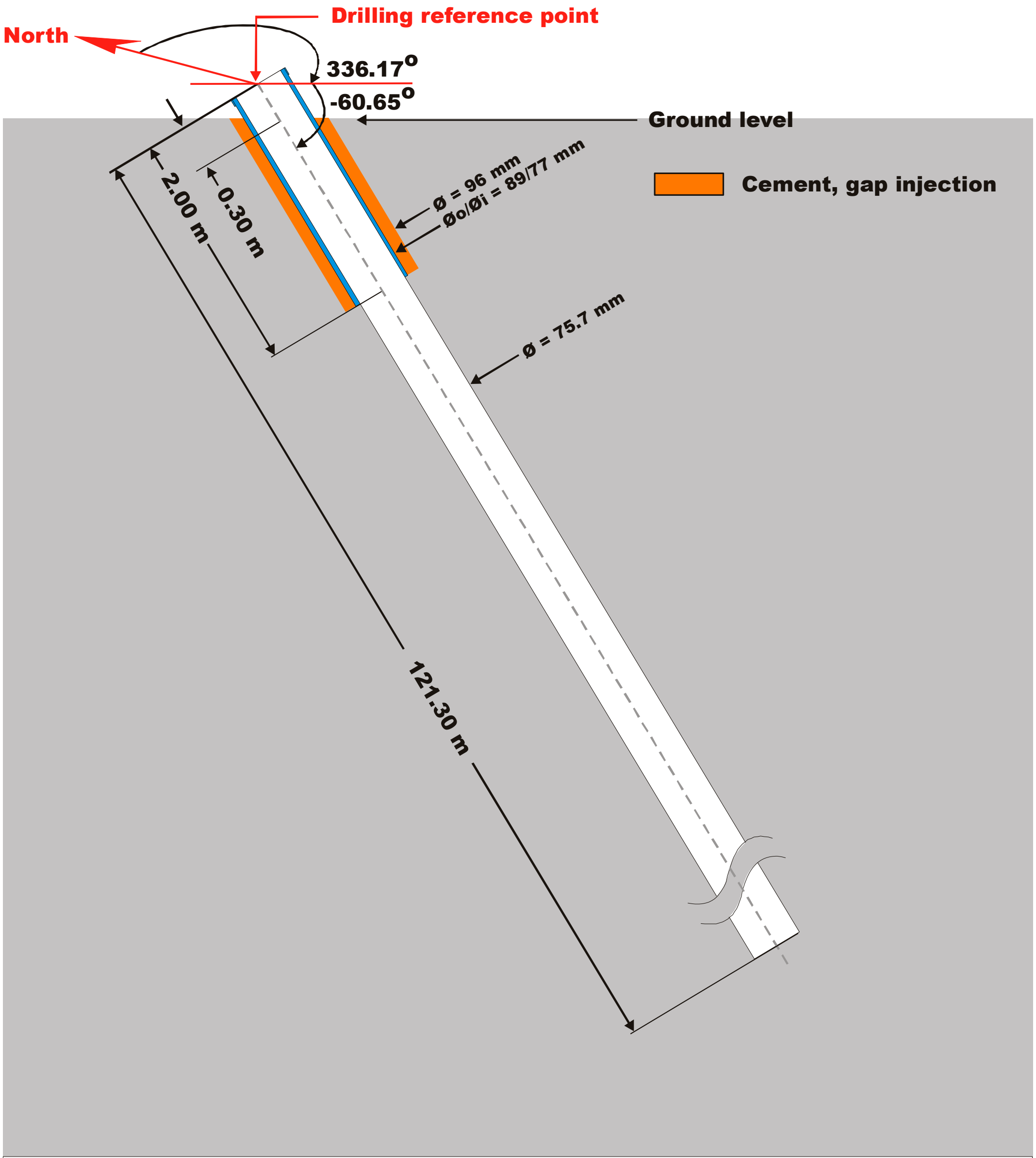
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11D	6366357.37	1546631.42	25.57	0	0.00	-59	268.7	0.03	0.882	0
KLX11D	6366360.14	1546565.92	-75.29	120.35	0.03	-54.98	275.5	0.03	0.882	1.01

Borehole description – KLX11E

Technical description of borehole KLX11E is given in Figure 1.

Technical data

Borehole KLX11E



Drilling reference point

Northing: 6366300.39 (m), RT90 2,5 gon V 0:-15

Easting: 1546627.23 (m), RT90 2,5 gon V0:-15

Elevation: 22.65 (m), RHB 70

Drilling period

Drilling start date: 2006-04-13

Drilling stop date: 2006-04-21

Rev 2006-11-30

Figure 1. *Technical description of borehole KLX11E.*

Deviation measurement in KLX11E

In total two deviation measurements were conducted in KLX11E. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13140973, 13115964) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144280) the two Mag/acc measurements (ID 13140973, 13115964) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

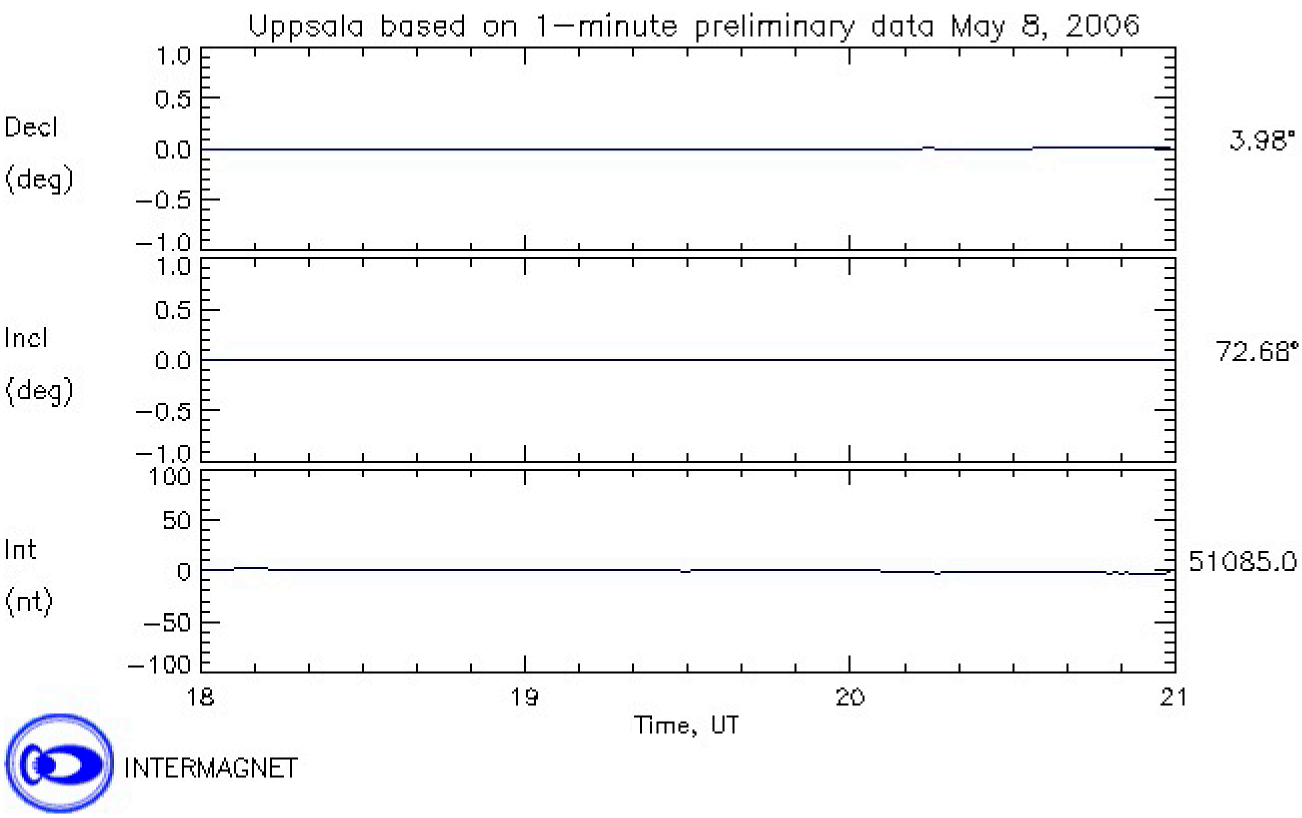
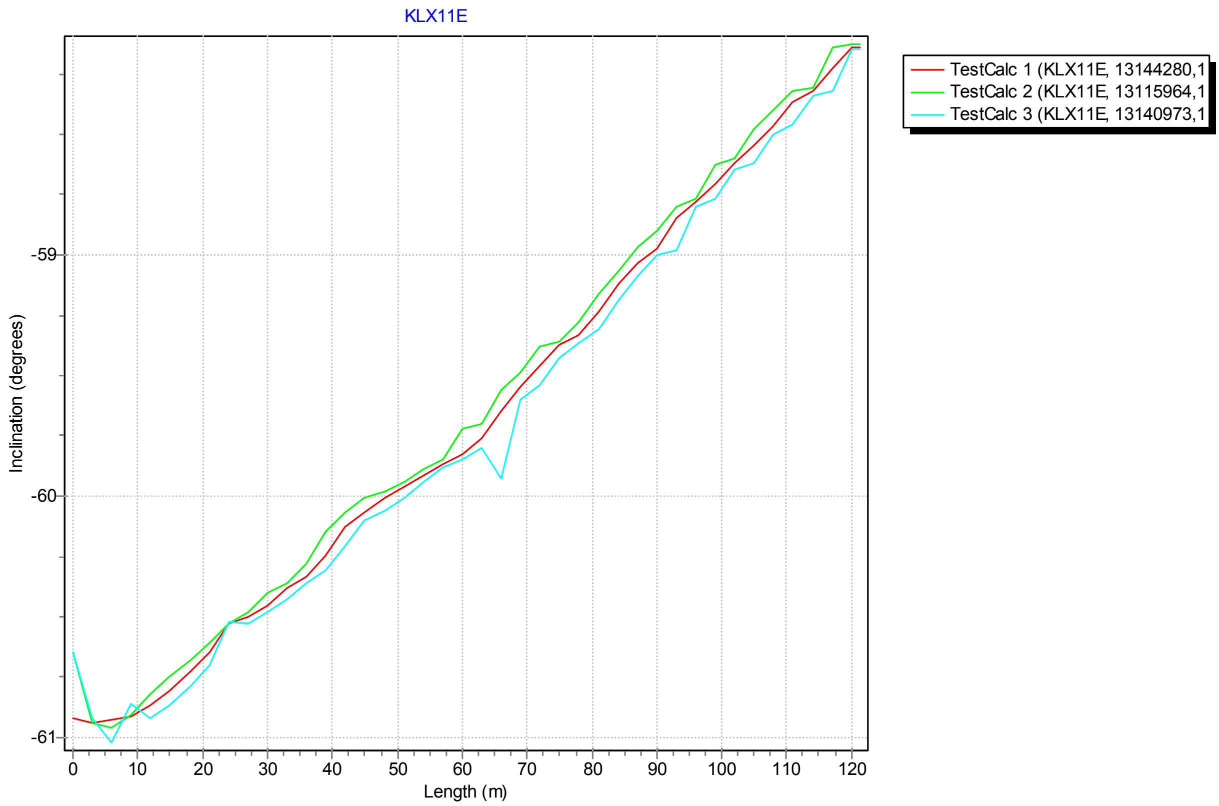


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-08.*



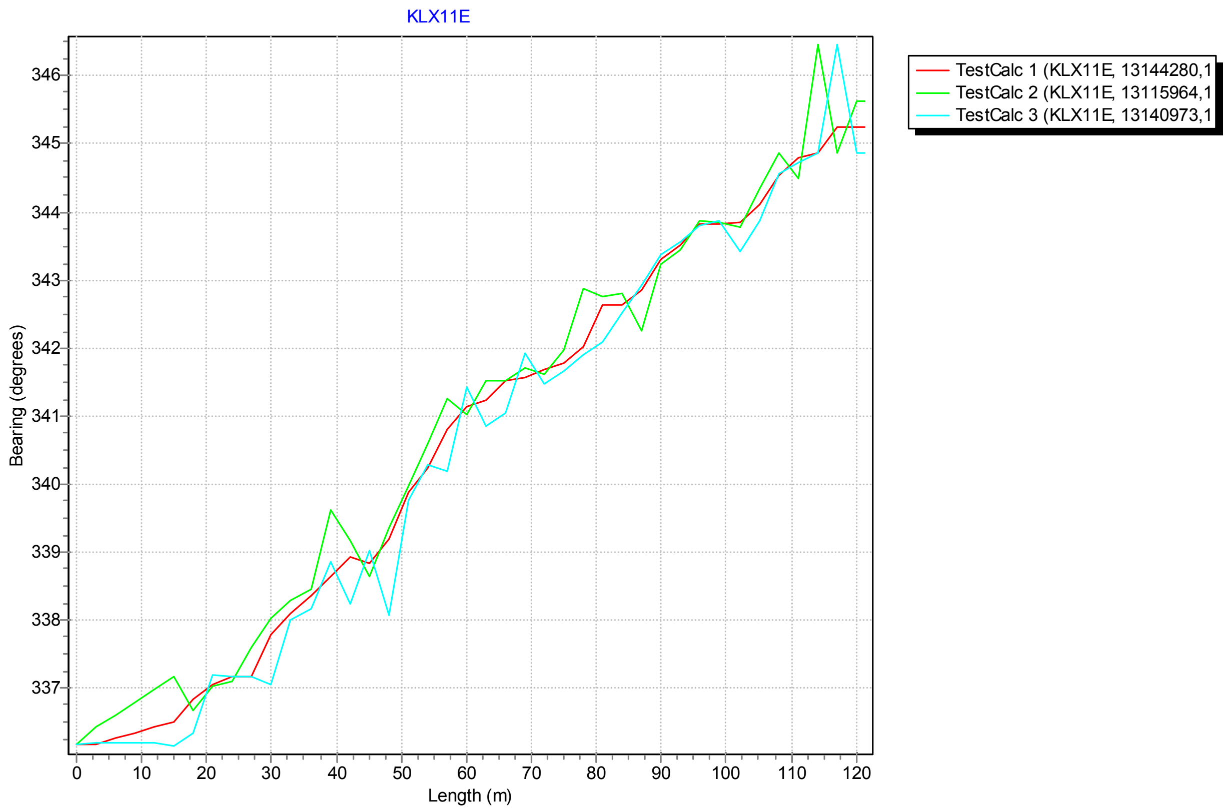


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11E	13140973	EG157	Magnetic - accelerometer measurement	2006-05-08 19:35	0.00	120.00	CF
KLX11E	13115964	EG157	Magnetic - accelerometer measurement	2006-05-08 19:51	0.00	120.00	CF
KLX11E	13144280	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

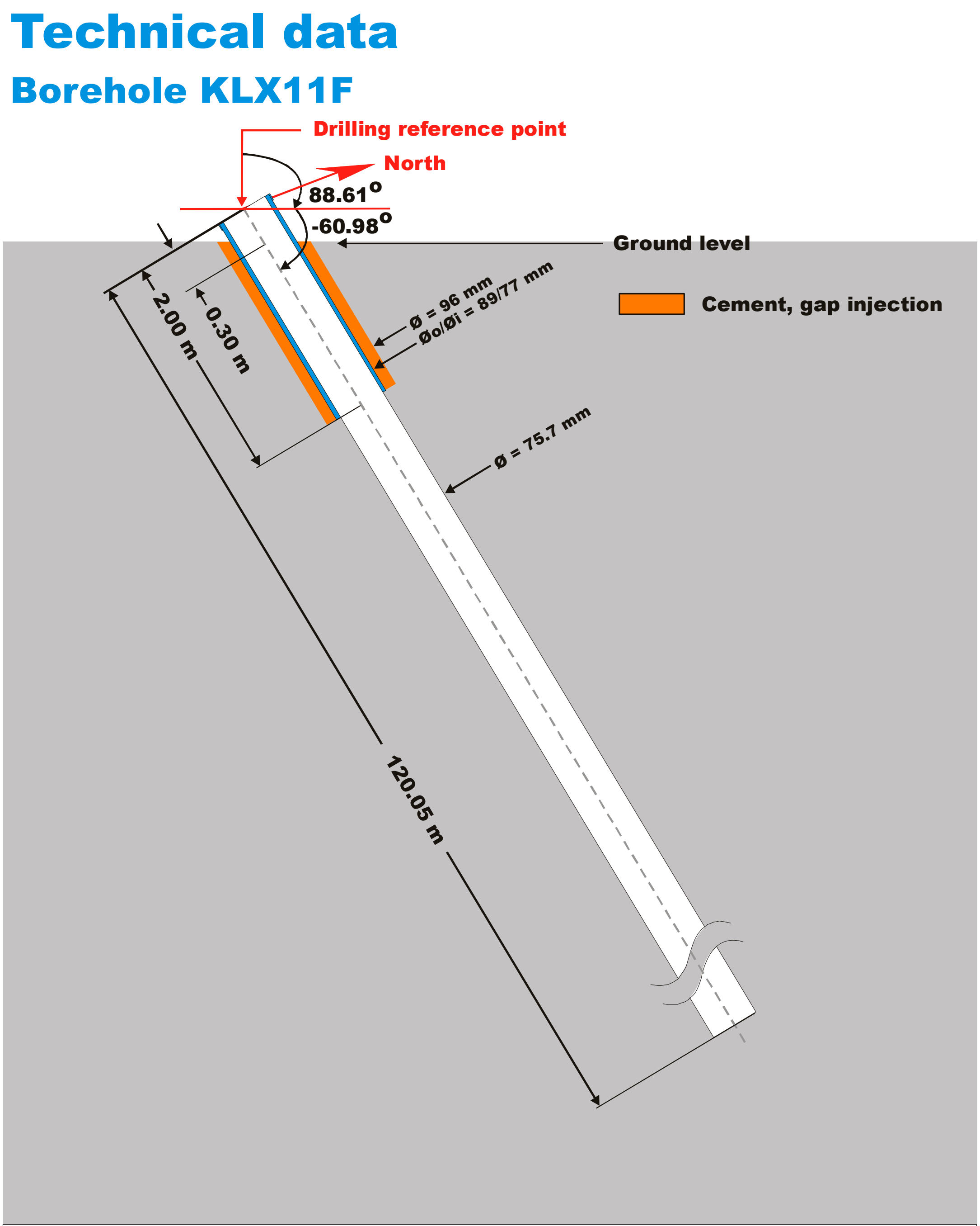
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11E	13115964	BEARING	18.00	121.30	
KLX11E	13115964	INCLINATION	3.00	121.30	
KLX11E	13140973	BEARING	18.00	121.30	
KLX11E	13140973	INCLINATION	3.00	121.30	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11E	6366300.39	1546627.23	22.65	0	0.00	-60.92	336.17	0.09	0.609	0
KLX11E	6366358.09	1546607	-82.05	121.3	0.10	-58.14	345.25	0.09	0.609	0.65

Borehole description – KLX11F

Technical description of borehole KLX11F is given in Figure 1.



Drilling reference point
Northing: 6366314.09 (m), RT90 2,5 gon V 0:-15
Easting: 1546577.96 (m), RT90 2,5 gon V0:-15
Elevation: 24.47 (m), RHB 70
Drilling period
Drilling start date: 2006-03-14
Drilling stop date: 2006-03-17
Rev 2006-11-30

Figure 1. Technical description of borehole KLX11F.

Deviation measurement in KLX11F

In total two deviation measurements were conducted in KLX11F. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13140975, 13115943) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144281) the two Mag/acc measurements (ID 13140975, 13115943) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

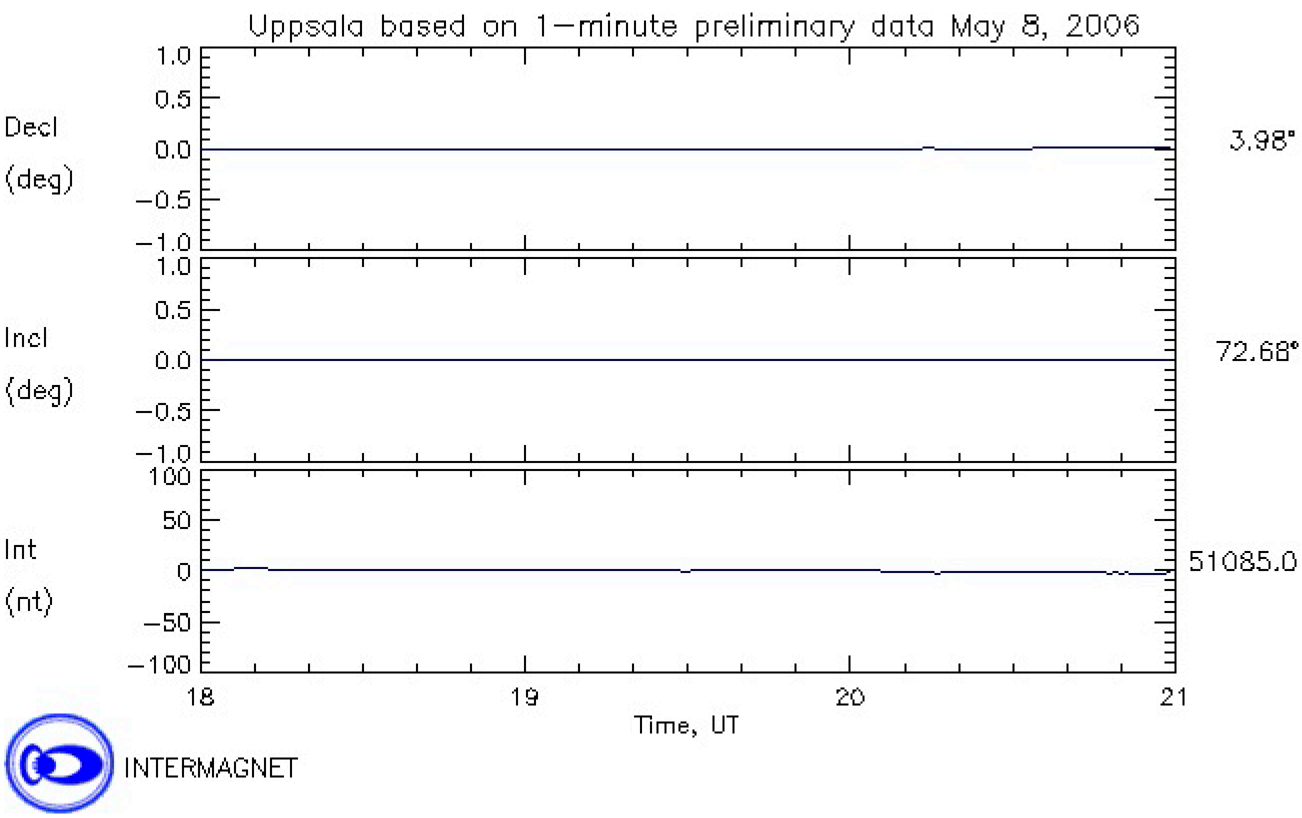
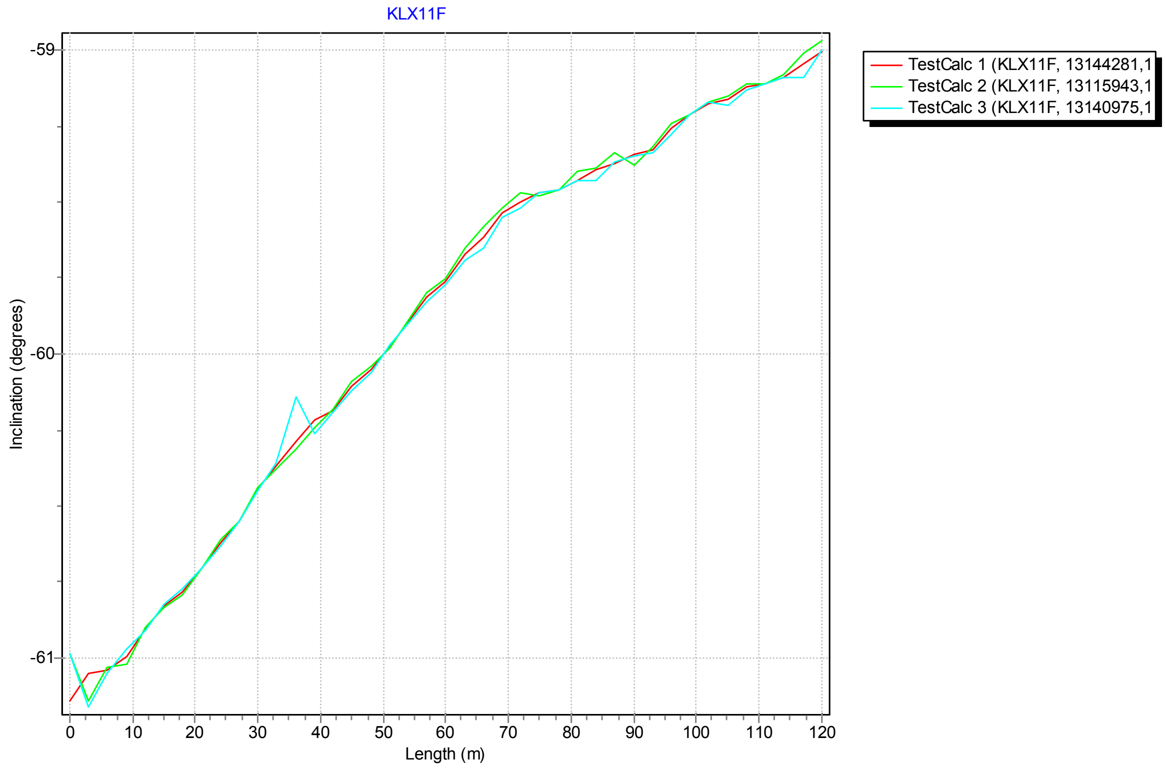


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-08.*



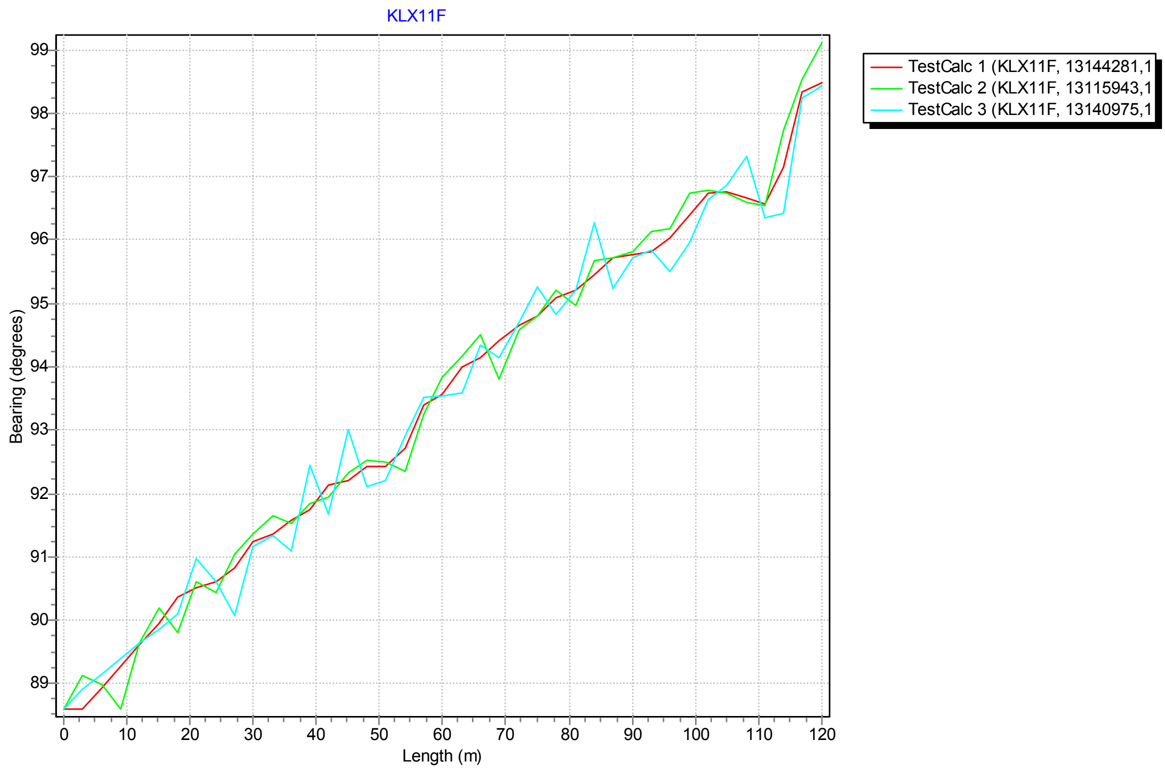


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX11F	13140975	EG157	Magnetic - accelerometer measurement	2006-05-08 18:38	0.00	120.00	CF
KLX11F	13115943	EG157	Magnetic - accelerometer measurement	2006-05-08 19:05	0.00	120.00	CF
KLX11F	13144281	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX11F	13115943	BEARING	18.00	120.05	
KLX11F	13115943	INCLINATION	3.00	120.05	
KLX11F	13140975	BEARING	18.00	120.05	
KLX11F	13140975	INCLINATION	3.00	120.05	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

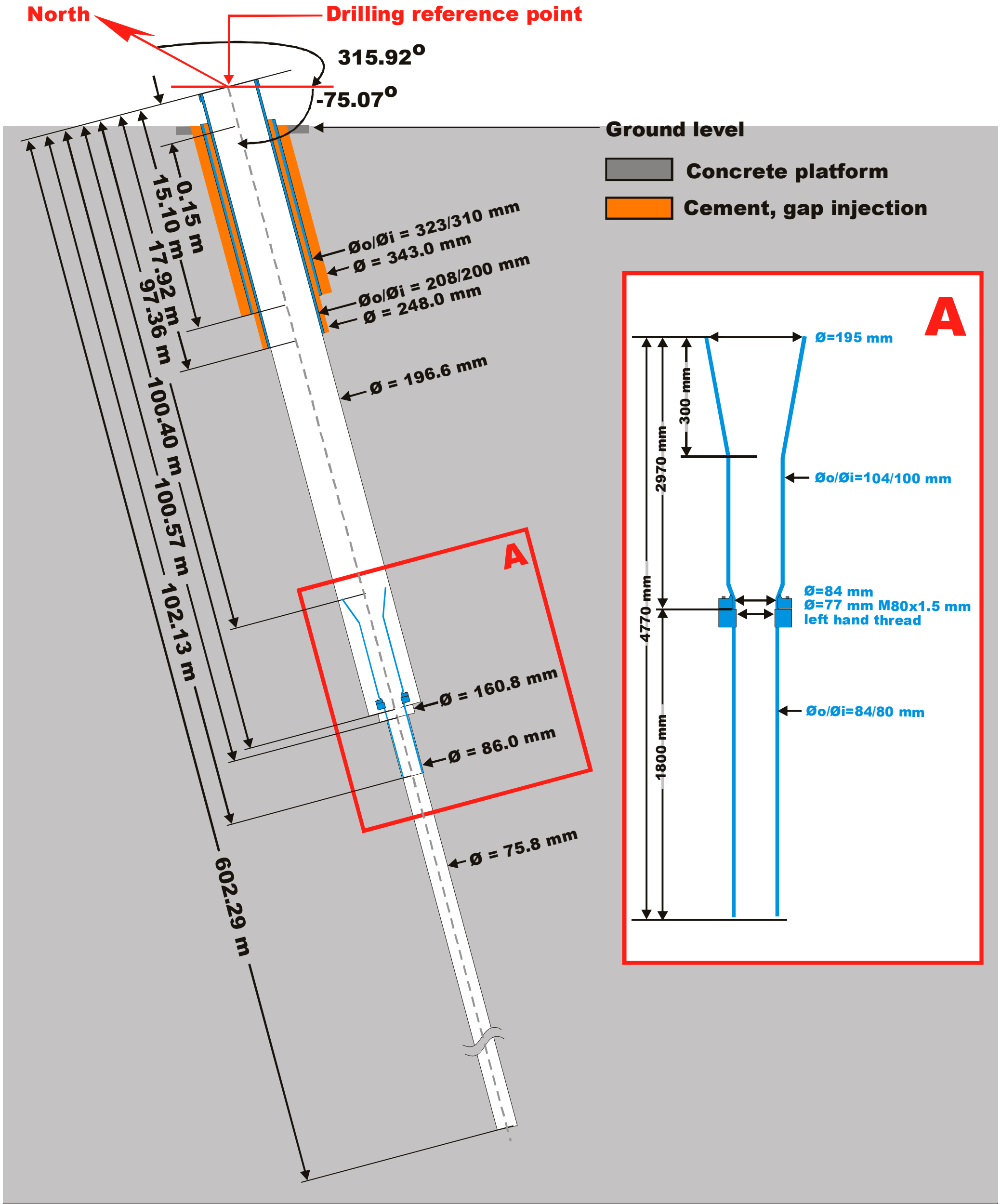
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX11F	6366314.09	1546577.96	24.47	0	0.00	-61.14	88.61	0.035	0.616	0
KLX11F	6366310.45	1546637.98	-79.39	120.05	0.04	-59	98.48	0.035	0.616	0.65

Borehole description – KLX12A

Technical description of borehole KLX12A is given in Figure 1.

Technical data

Borehole KLX12A



Drilling reference point

Northing: 6365630.78 (m), RT90 2,5 gon V 0:-15

Easting: 1548904.44 (m), RT90 2,5 gon V 0:-15

Elevation: 17.74 (m), RHB 70

Drilling period

Drilling start date: 2005-10-19

Drilling stop date: 2006-03-04

Ver 2007-02-15

Figure 1. Technical description of borehole KLX12A.

Deviation measurement in KLX12A

In total three deviation measurements were conducted in KLX12A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX12A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m was added. See document (ID 1037594 Documentum).

The Maxibor measurement (ID 13115107) was ERROR- marked, when a comparison with the Mag/acc measurements showed differences on the inclination data between borehole lengths 302 – 335 m, where a deviation drilling and reaming was performed. See Figure 2.

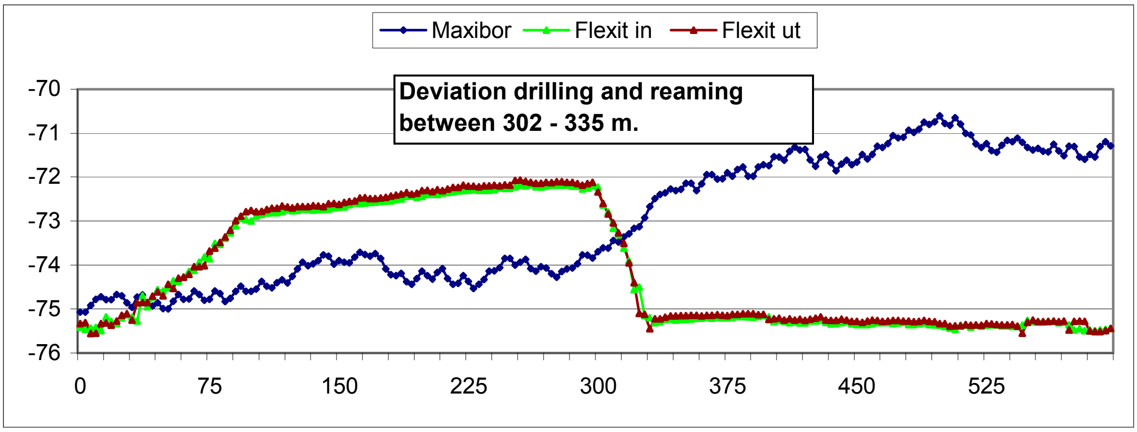


Figure 2. *Inclination data from Maxibor and Flexit (mag/acc) shows differences between borehole lengths 302 – 335 m.*

The two Mac/acc measurements (ID 13141778, 13141808) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the dates of the Mag/acc measurement, see Figure 3 and 4.

There is two ERROR- marked mag/acc measurements, (ID 13108191) due to wrongly correction for magnetic declination and meridian convergence. But the raw data from that measurement was re-used, without correction for magnetic declination and meridian convergence, to calculate measurement (ID 13118513). This measurement was later ERROR-marked because of strong magnetic anomalies in the rock surrounding the borehole
Again the raw data was re-used to calculate measurement (ID 13141778).

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144282) the two Mag/acc measurements (ID 13141778, 13141808) were used. The strategy used in selecting the activities is in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 5 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

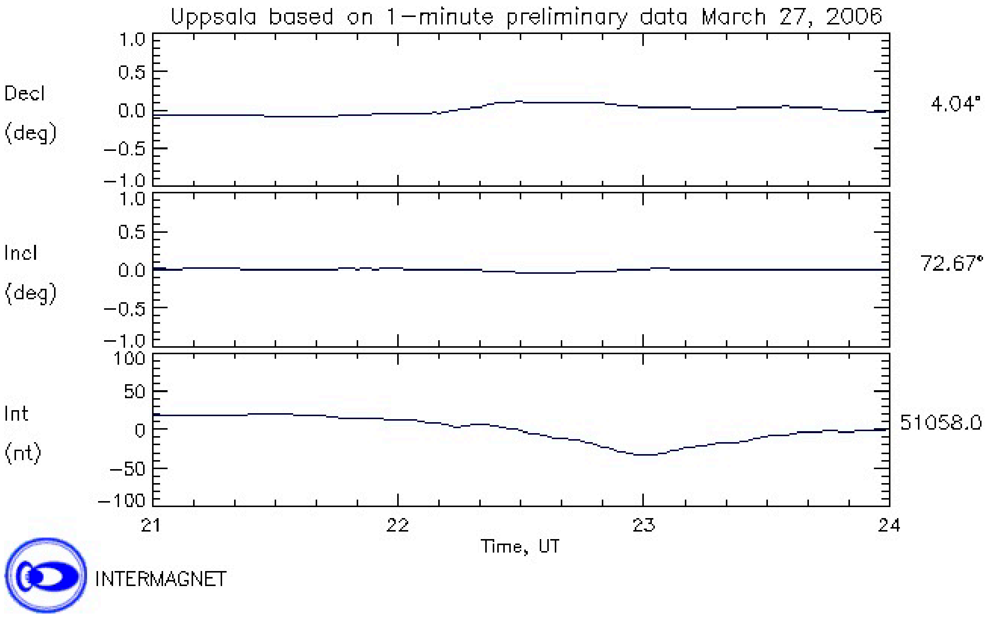


Figure 3. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-03-27.*

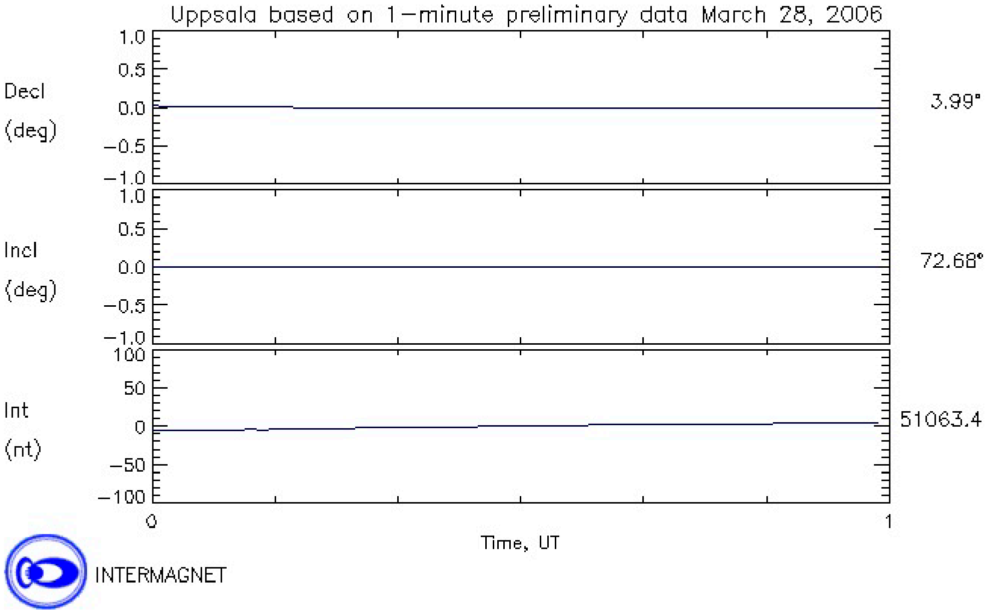
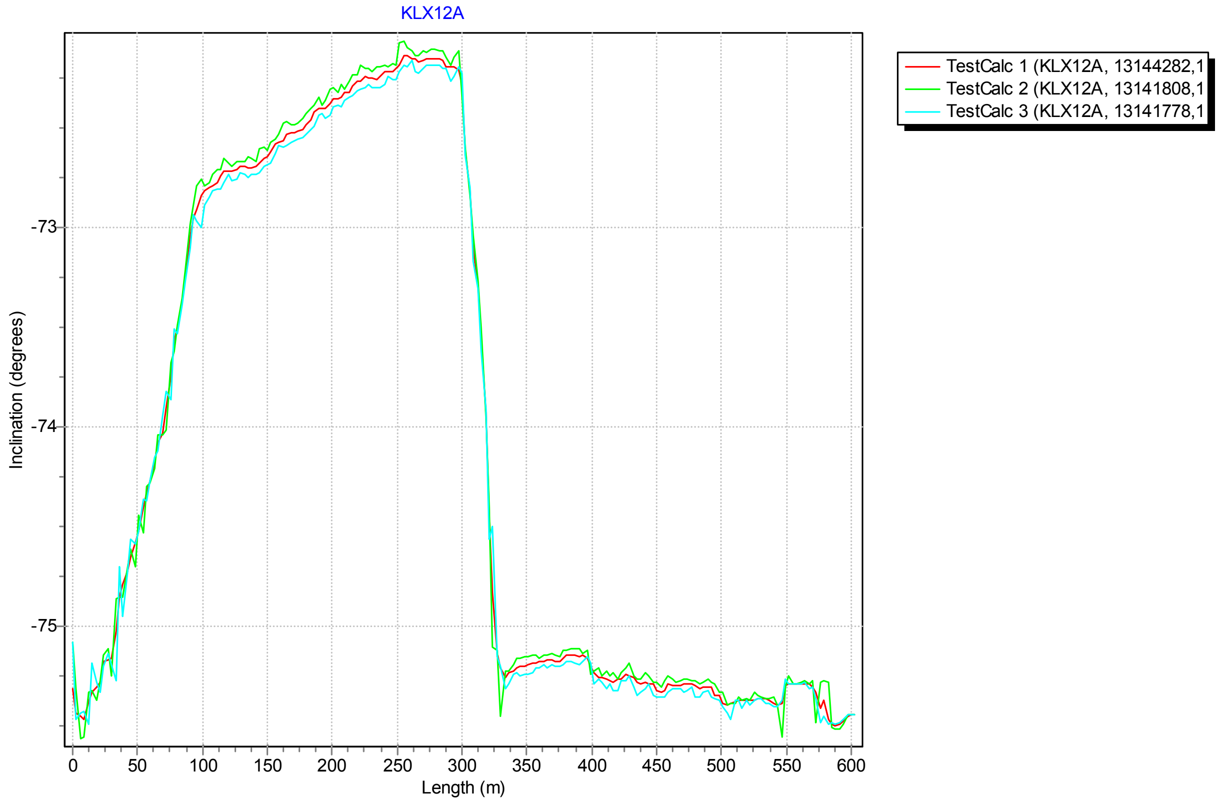


Figure 4. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-03-28.*



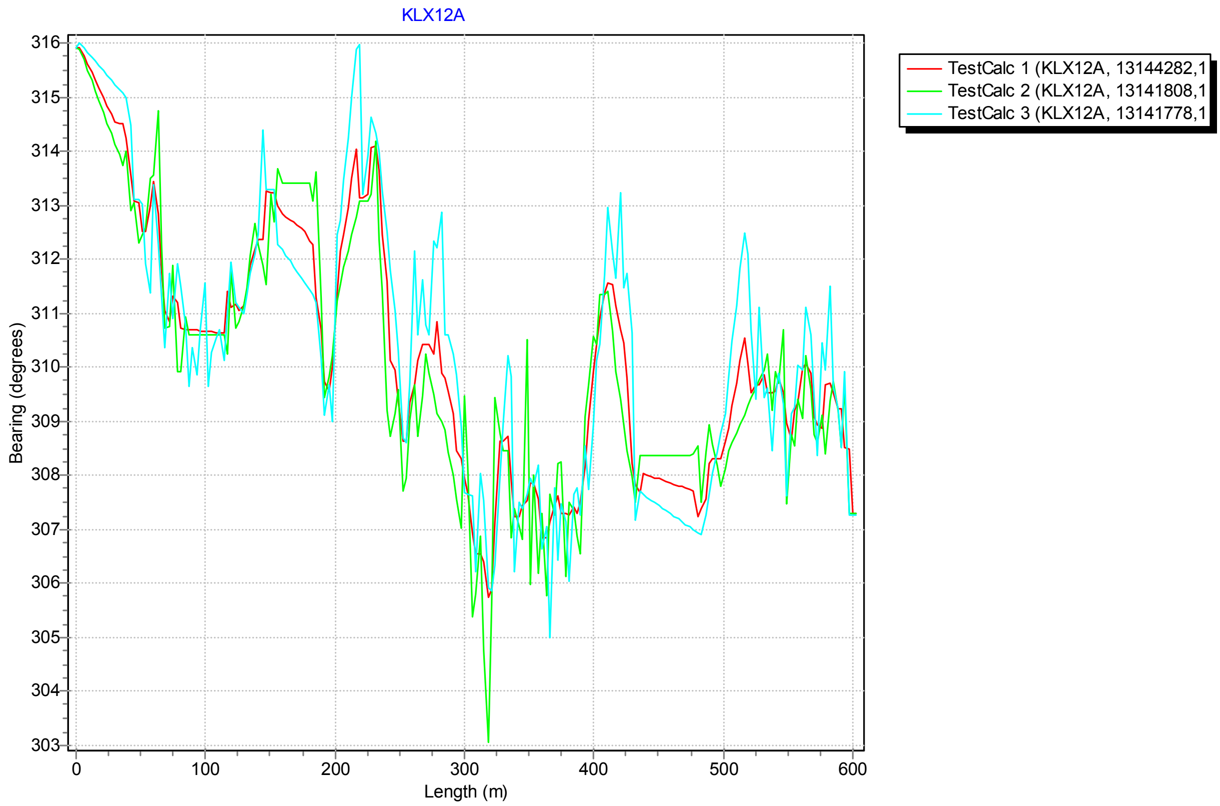


Figure 5. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX12A	13115107	EG156	Maxibor measurement	2006-03-14 06:00	0.00	600.00	ECF
KLX12A	13118513	EG157	Magnetic - accelerometer measurement	2006-03-27 21:36	0.00	597.00	ECF
KLX12A	13141778	EG157	Magnetic - accelerometer measurement	2006-03-27 21:36	0.00	597.00	CF
KLX12A	13108191	EG157	Magnetic - accelerometer measurement	2006-03-27 21:36	0.00	597.00	EF
KLX12A	13141808	EG157	Magnetic - accelerometer measurement	2006-03-27 23:09	0.00	597.00	CF
KLX12A	13144282	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX12A	13141778	BEARING	33.00	81.00	
KLX12A	13141778	BEARING	117.00	597.00	
KLX12A	13141778	INCLINATION	3.00	597.00	
KLX12A	13141808	BEARING	33.00	81.00	
KLX12A	13141808	BEARING	117.00	597.00	
KLX12A	13141808	INCLINATION	3.00	597.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX12A	6365630.78	1548904.44	17.74	0	0.00	-75.31	315.92	0.075	1.405	0
KLX12A	6365653.57	1548879.64	-100.54	123	0.04	-72.72	311.17	0.075	1.405	0.83
KLX12A	6365674.79	1548856.27	-200.68	228	0.09	-72.25	314.06	0.075	1.405	1.6
KLX12A	6365694.54	1548832.17	-300.93	333	0.13	-75.25	308.73	0.075	1.405	2.36
KLX12A	6365710.76	1548811.8	-399.54	435	0.16	-75.28	307.68	0.075	1.405	3
KLX12A	6365727.33	1548791.01	-501.12	540	0.20	-75.38	309.58	0.075	1.405	3.66
KLX12A	6365737.27	1548778.82	-561.39	602.29	0.22	-75.44	307.29	0.075	1.405	4.04

Borehole description – KLX13A

Technical description of borehole KLX13A is given in Figure 1.

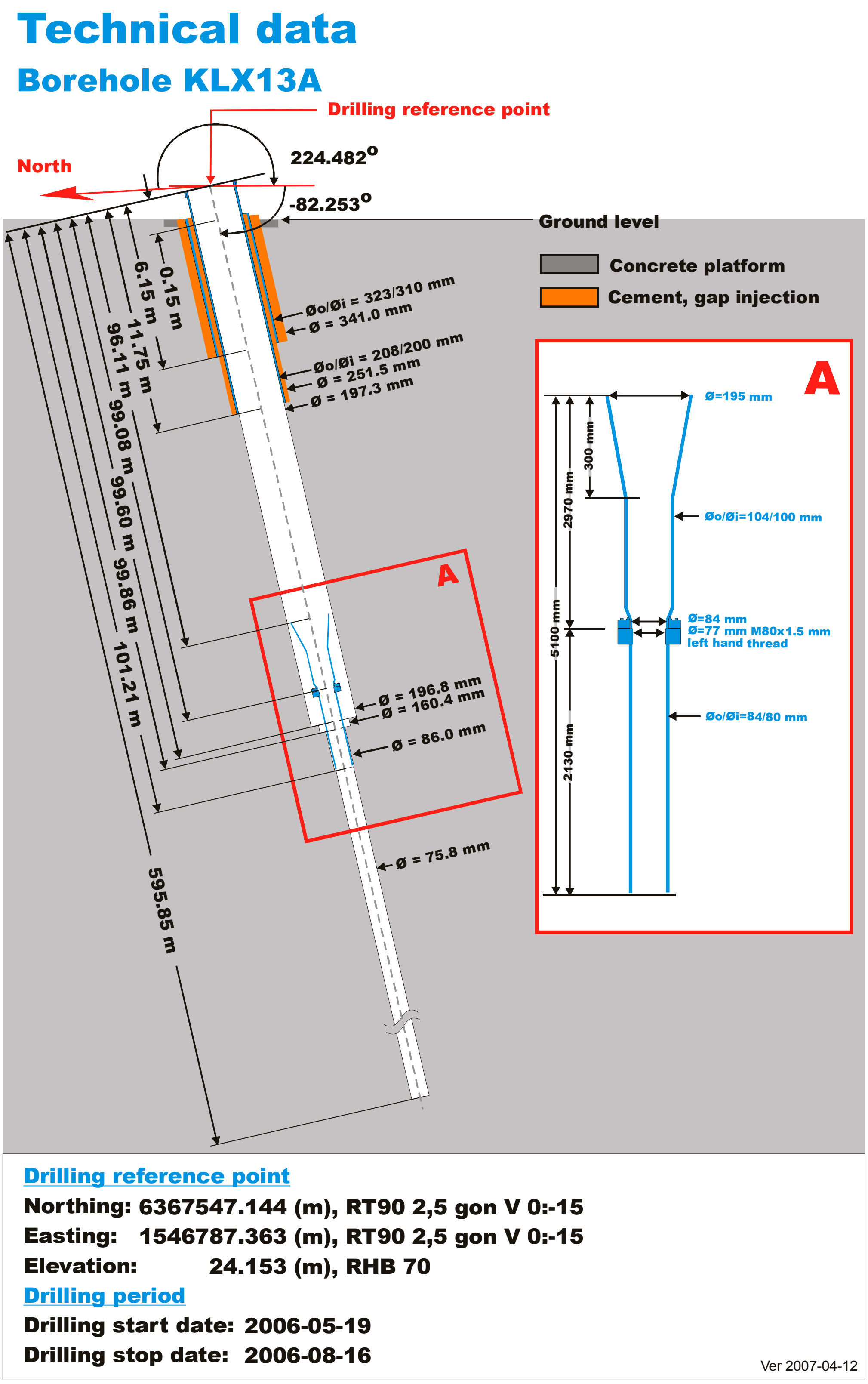


Figure 1. *Technical description of borehole KLX13A.*

Deviation measurement in KLX13A

In total four deviation measurements were conducted in KLX13A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Maxibor measurements were executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX13A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m was added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13120921, 13142365) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13142373, 13142385) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the dates of the Mag/acc measurement, see Figure 2 and 3.

There is two ERROR- marked mag/acc measurements, (ID 13121776) due to editing. But the raw data from that measurement was re-used to calculate measurement (ID 13121310). This measurement was later ERROR- marked because of wrong coordinates. Again the raw data was re-used to calculate measurement (ID 13142373).

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144283) the two Maxibor measurements (ID 13120921, 13142365) and the two Mag/acc measurements (ID 13142373,13142385) were used. The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 4 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

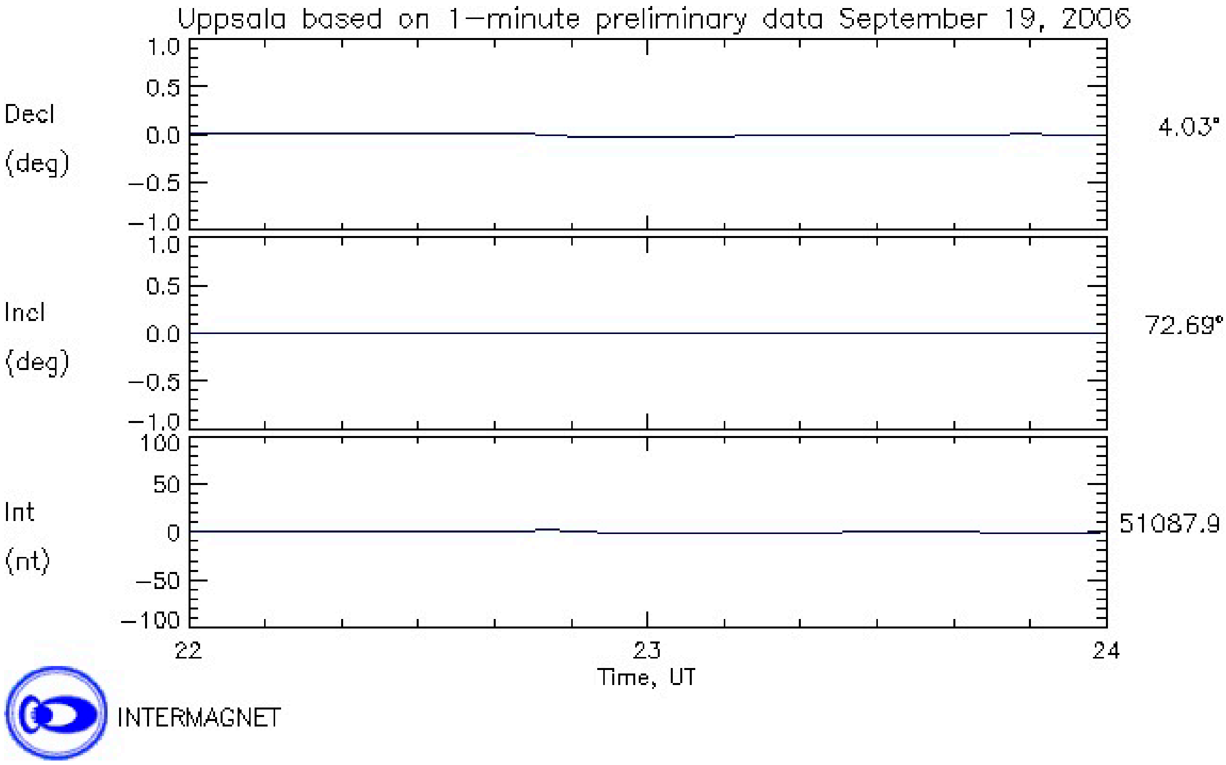


__Figure 2.__ The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-19.

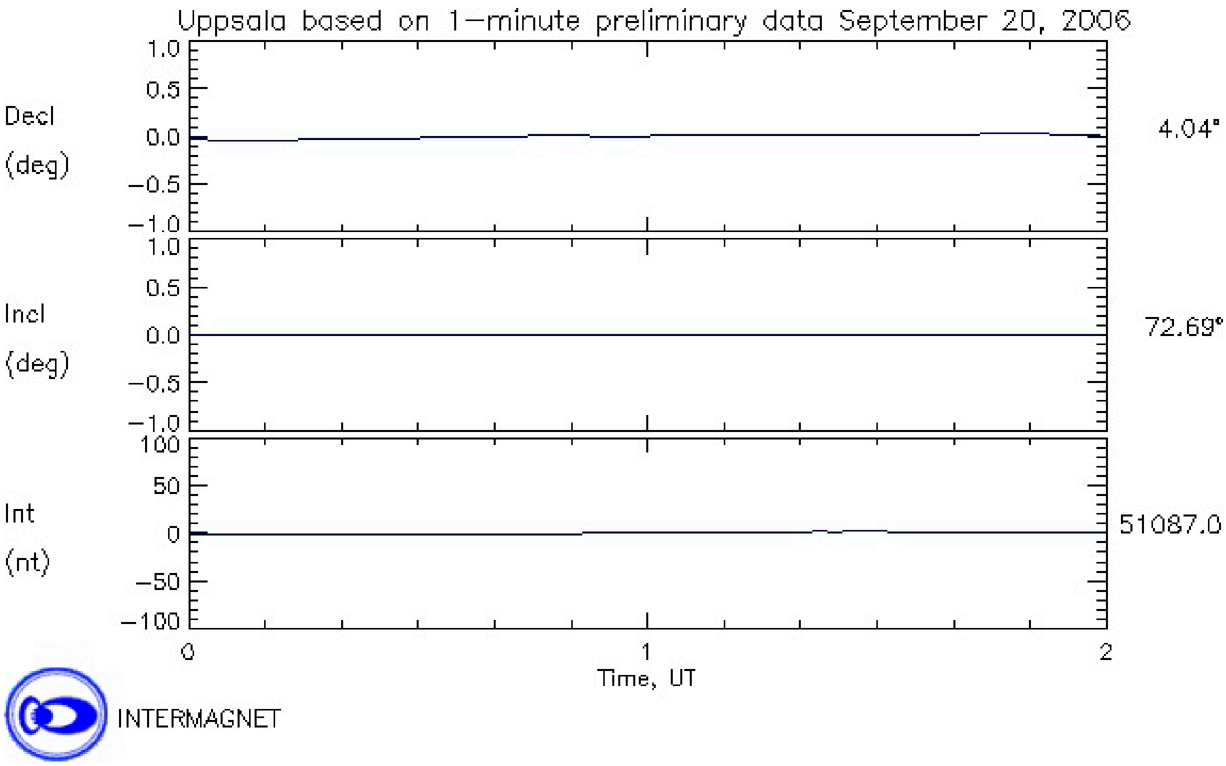
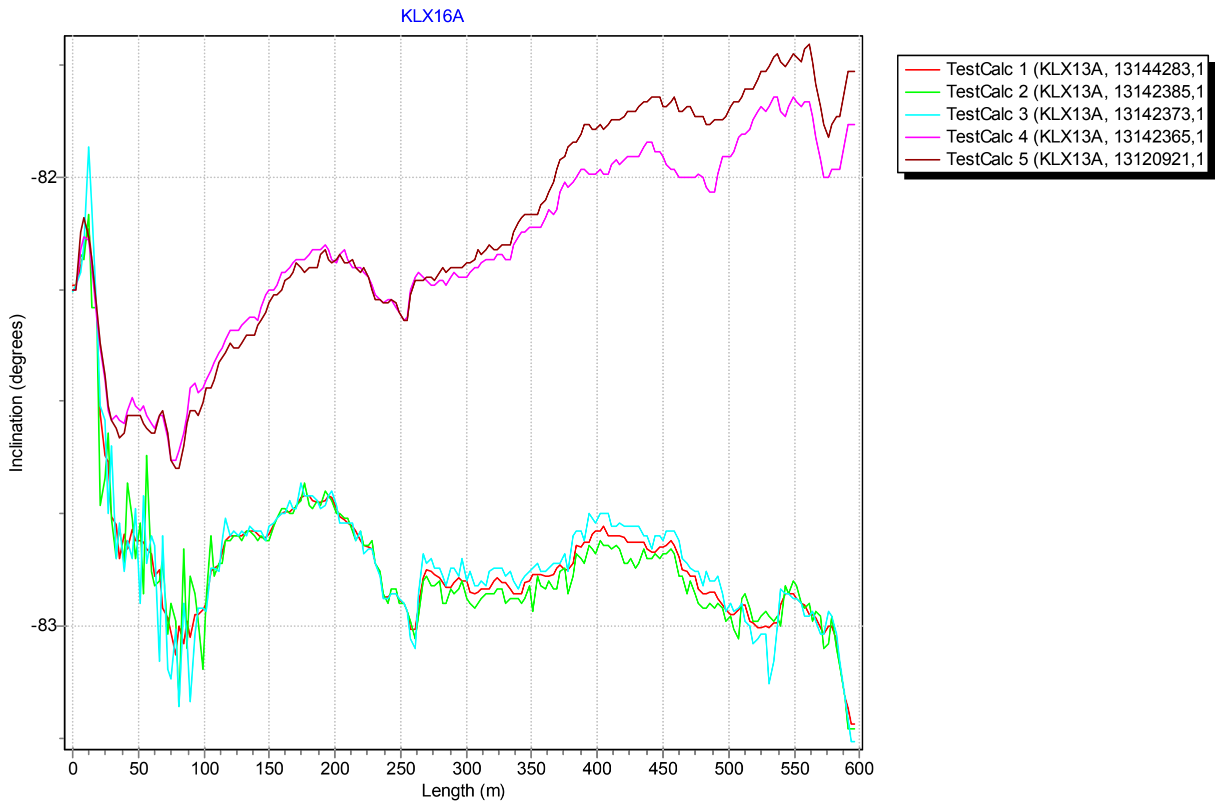


__Figure 3.__ The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-20.



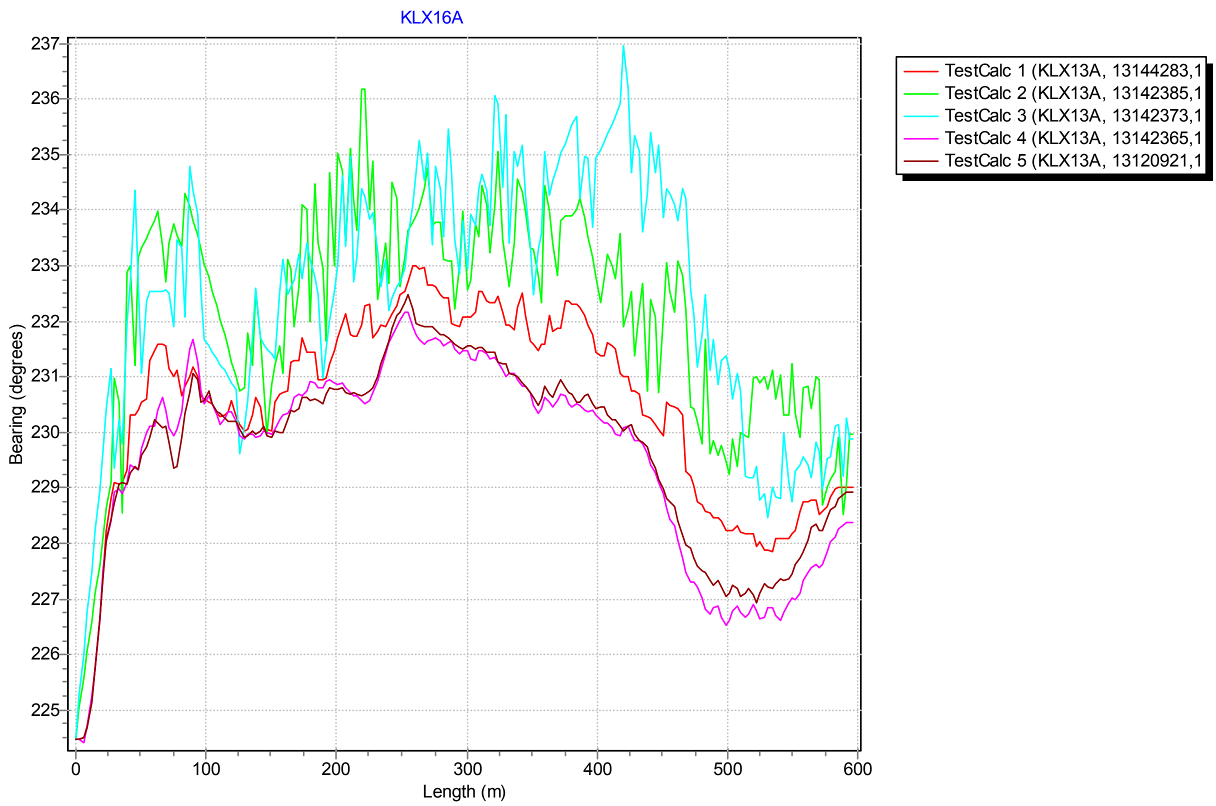


Figure 4. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX13A	13120921	EG156	Maxibor measurement	2006-08-31 12:00	0.00	591.00	CF
KLX13A	13142365	EG156	Maxibor measurement	2006-08-31 15:00	0.00	591.00	CF
KLX13A	13142373	EG157	Magnetic - accelerometer measurement	2006-09-19 22:53	0.00	594.00	CF
KLX13A	13121310	EG157	Magnetic - accelerometer measurement	2006-09-19 22:53	0.00	594.00	EF
KLX13A	13121776	EG157	Magnetic - accelerometer measurement	2006-09-19 22:55	0.00	594.00	EF
KLX13A	13142385	EG157	Magnetic - accelerometer measurement	2006-09-20 00:14	0.00	594.00	CF
KLX13A	13144283	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX13A	13120921	BEARING	3.00	591.00	
KLX13A	13142365	BEARING	3.00	591.00	
KLX13A	13142373	BEARING	27.00	81.00	
KLX13A	13142373	BEARING	117.00	591.00	
KLX13A	13142373	INCLINATION	3.00	591.00	
KLX13A	13142385	BEARING	27.00	81.00	
KLX13A	13142385	BEARING	117.00	591.00	
KLX13A	13142385	INCLINATION	3.00	591.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX13A	6367547.14	1546787.36	24.15	0	0.00	-82.24	224.48	0.993	2.694	0
KLX13A	6367536.84	1546775.3	-100.84	126	0.27	-82.8	230.14	0.993	2.694	2.18
KLX13A	6367529.01	1546765.59	-199.05	225	0.49	-82.82	232.32	0.993	2.694	3.9
KLX13A	6367521.32	1546755.63	-300.27	327	0.71	-82.91	232.16	0.993	2.694	5.67
KLX13A	6367513.46	1546745.67	-401.48	429	0.93	-82.81	230.76	0.993	2.694	7.43
KLX13A	6367505.47	1546736.41	-499.72	528	1.14	-83	227.88	0.993	2.694	9.15
KLX13A	6367500	1546730.23	-567.07	595.85	1.28	-83.22	229.01	0.993	2.694	10.33

Borehole description – KLX14A

Technical description of borehole KLX14A is given in Figure 1.

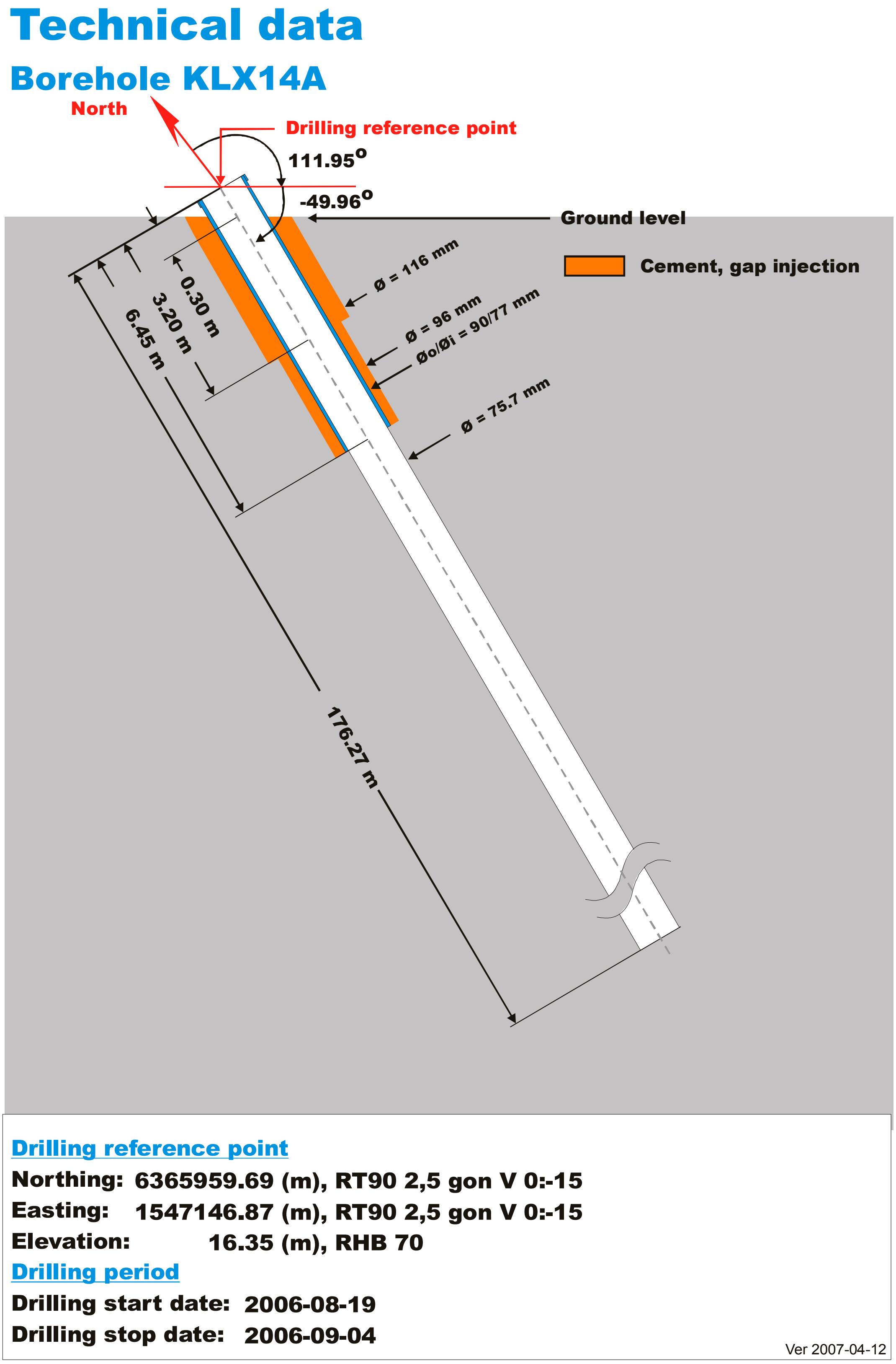


Figure 1. *Technical description of borehole KLX14A.*

<u>Deviation measurement in KLX14A</u>

In total two deviation measurements were conducted in KLX14A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13140187, 13140188) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data are documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked mag/acc measurement, (ID 13121779) due to editing. But the raw data from that measurement was re-used to calculate measurement (ID 13140187).

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13144284) the two Mag/acc measurements (ID 13140187, 13140188) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

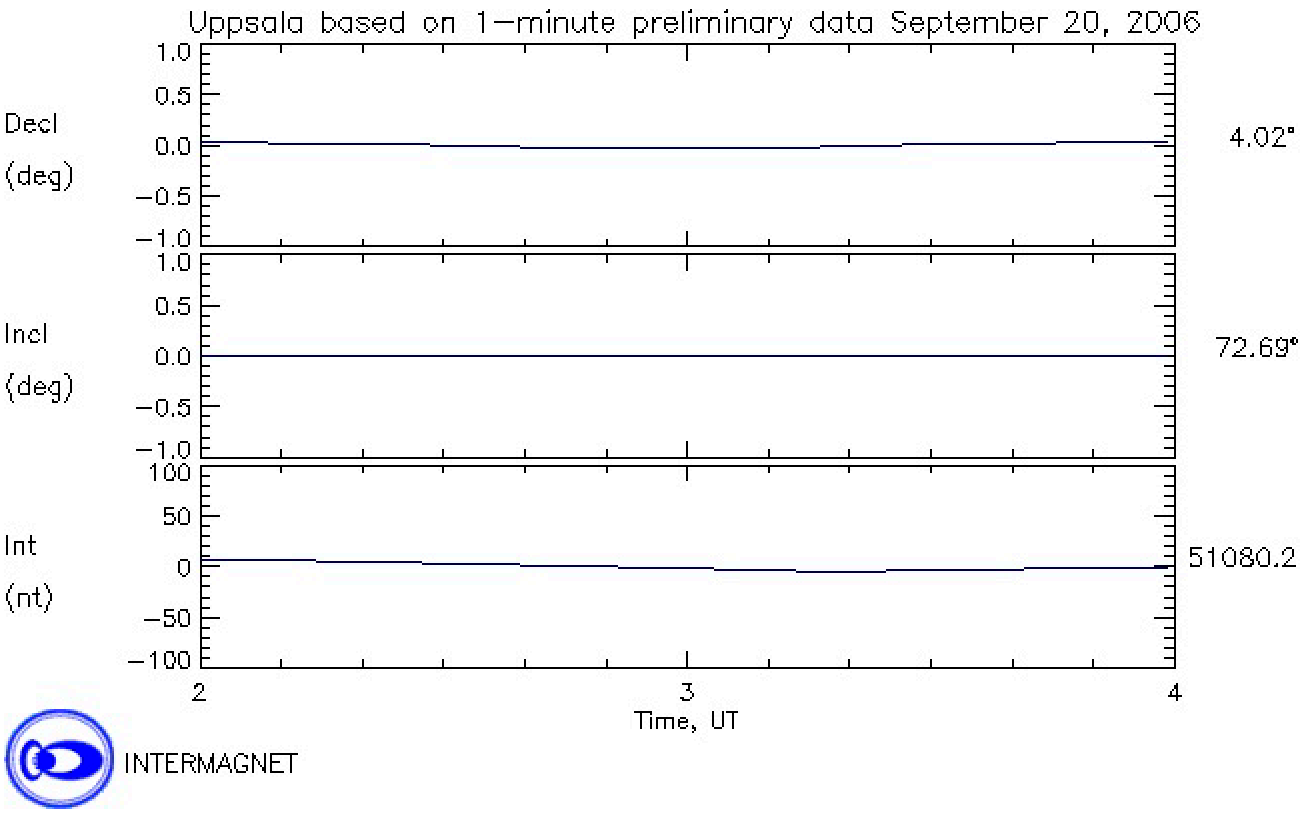
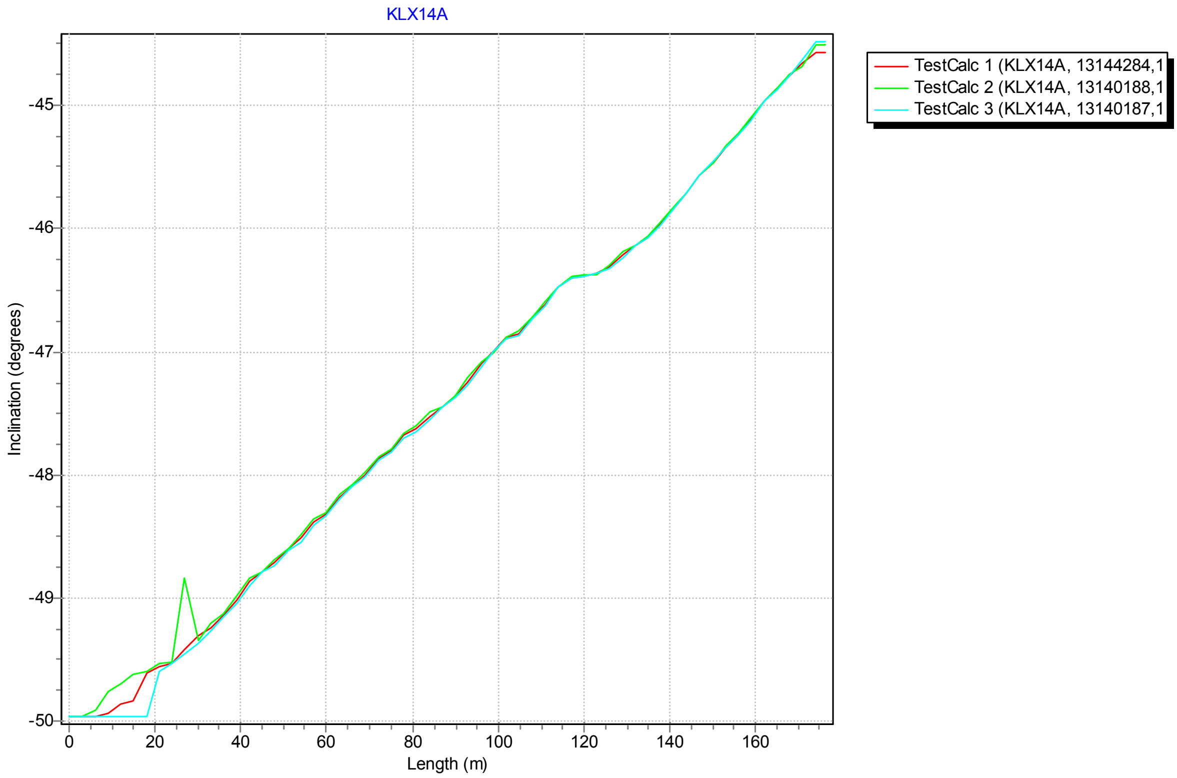


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-20.*



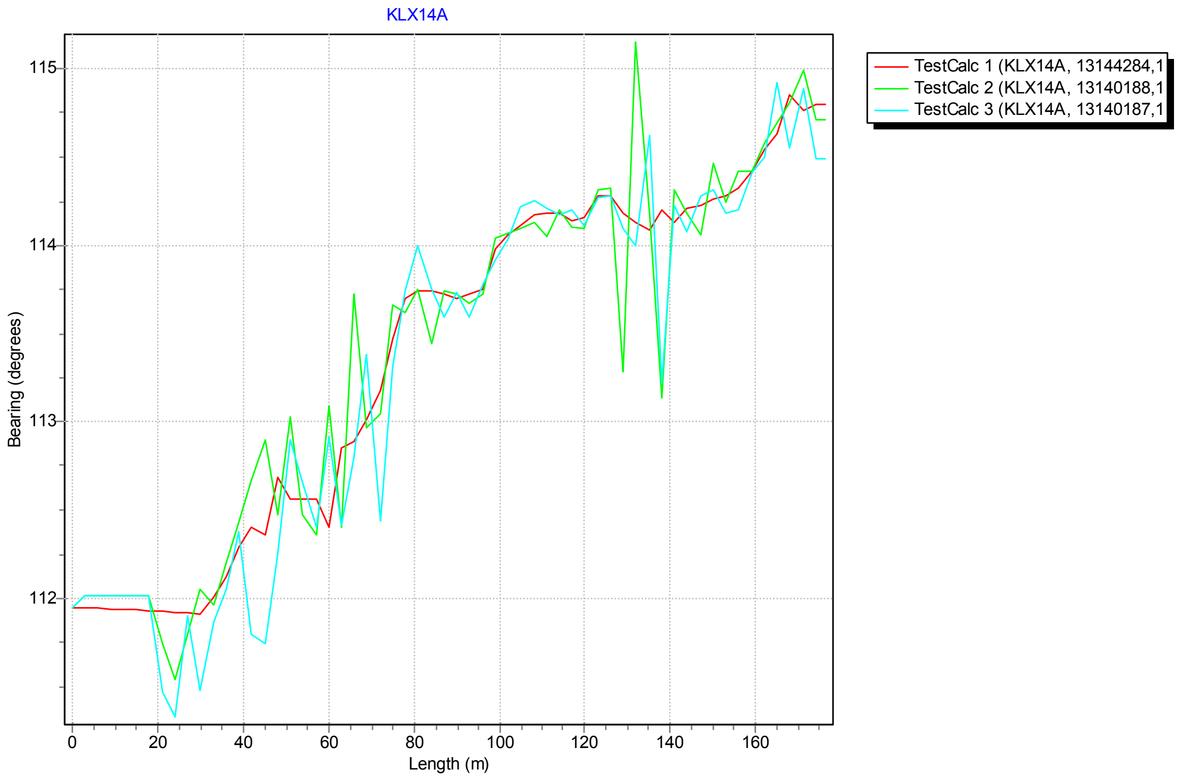


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX14A	13140187	EG157	Magnetic - accelerometer measurement	2006-09-20 02:57	0.00	174.00	CF
KLX14A	13121779	EG157	Magnetic - accelerometer measurement	2006-09-20 02:57	0.00	177.00	EF
KLX14A	13140188	EG157	Magnetic - accelerometer measurement	2006-09-20 03:20	0.00	174.00	CF
KLX14A	13144284	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

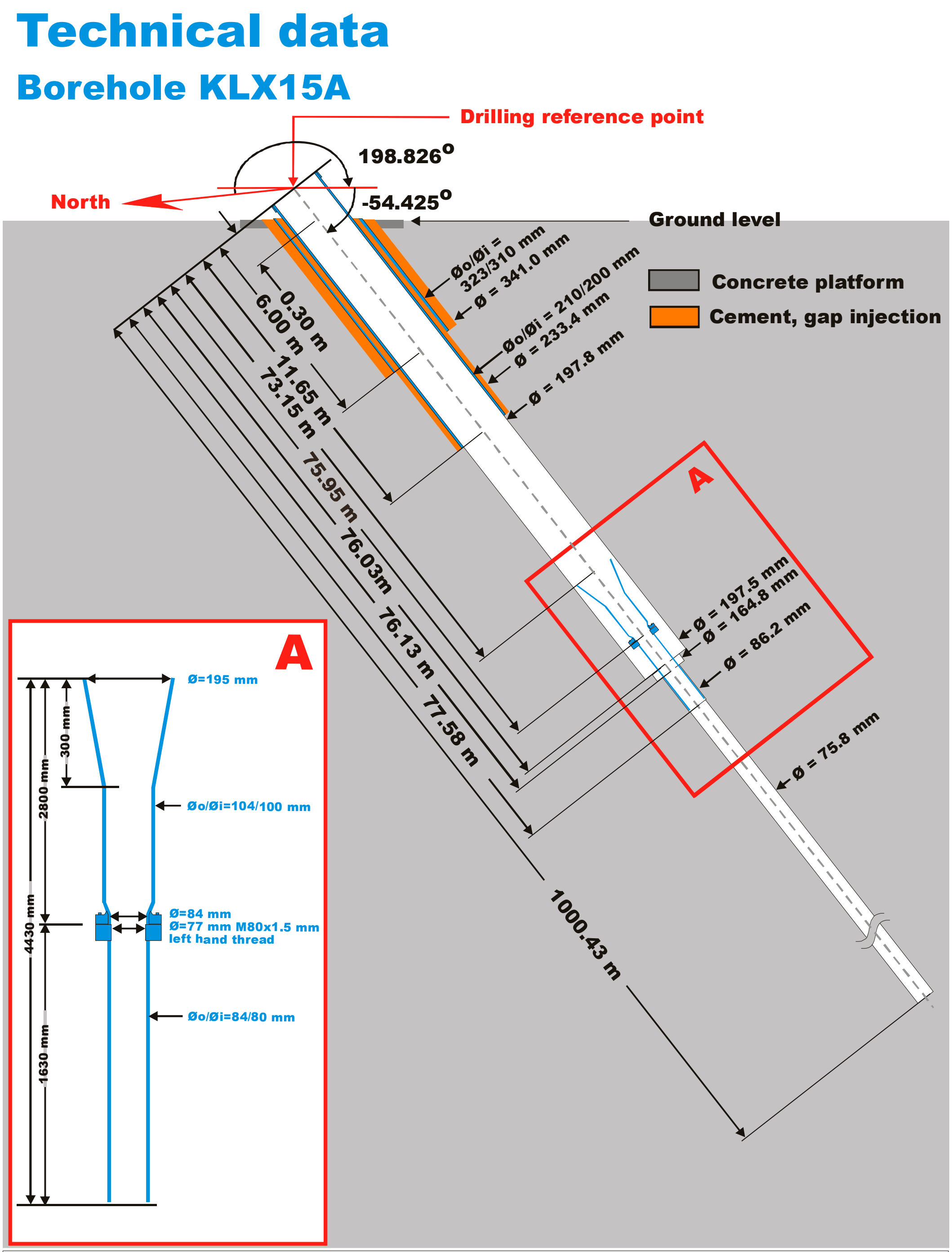
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX14A	13140187	BEARING	33.00	176.27	
KLX14A	13140187	INCLINATION	3.00	176.27	
KLX14A	13140188	BEARING	33.00	176.27	
KLX14A	13140188	INCLINATION	3.00	176.27	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX14A	6365959.69	1547146.87	16.35	0	0.00	-49.96	111.95	0.037	0.511	0
KLX14A	6365918.31	1547243.24	-99.06	156	0.07	-45.23	114.32	0.037	0.511	0.94
KLX14A	6365912.32	1547256.3	-113.36	176.27	0.08	-44.57	114.8	0.037	0.511	1.06

Borehole description – KLX15A

Technical description of borehole KLX15A is given in Figure 1.



Drilling reference point

Northing: 6365614.168 (m), RT90 2,5 gon V 0:-15

Easting: 1547987.466 (m), RT90 2,5 gon V 0:-15

Elevation: 14.590 (m), RHB 70

Drilling period

Drilling start date: 2006-12-21

Drilling stop date: 2007-02-25

Ver 2007-04-24

Figure 1. *Technical description of borehole KLX15A.*

<u>Deviation measurement in KLX15A</u>

In total four deviation measurements were conducted in KLX15A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX15A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m was added. See document (ID 1037594 Documentum)..

The two Maxibor measurements (ID 13151041, 13151042) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13155770, 13155771) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13155937) the two Maxibor measurements (ID 13151041, 13151042) and the two Mag/acc measurements (ID 13155770, 13155771) was used. The strategy used in selecting the activities deviates from the general strategy (Section 4.4.2) due to the fact that the measurements from both methods show similarity. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

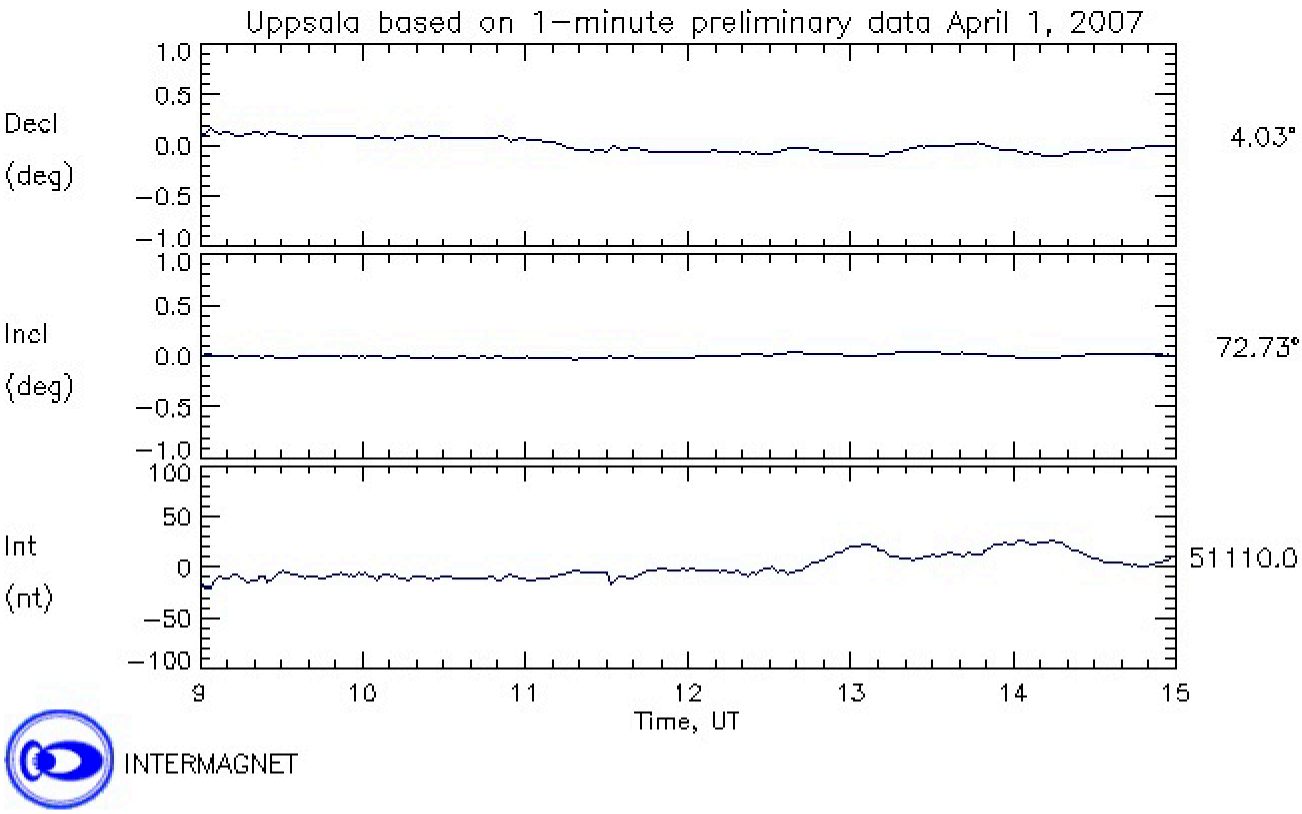
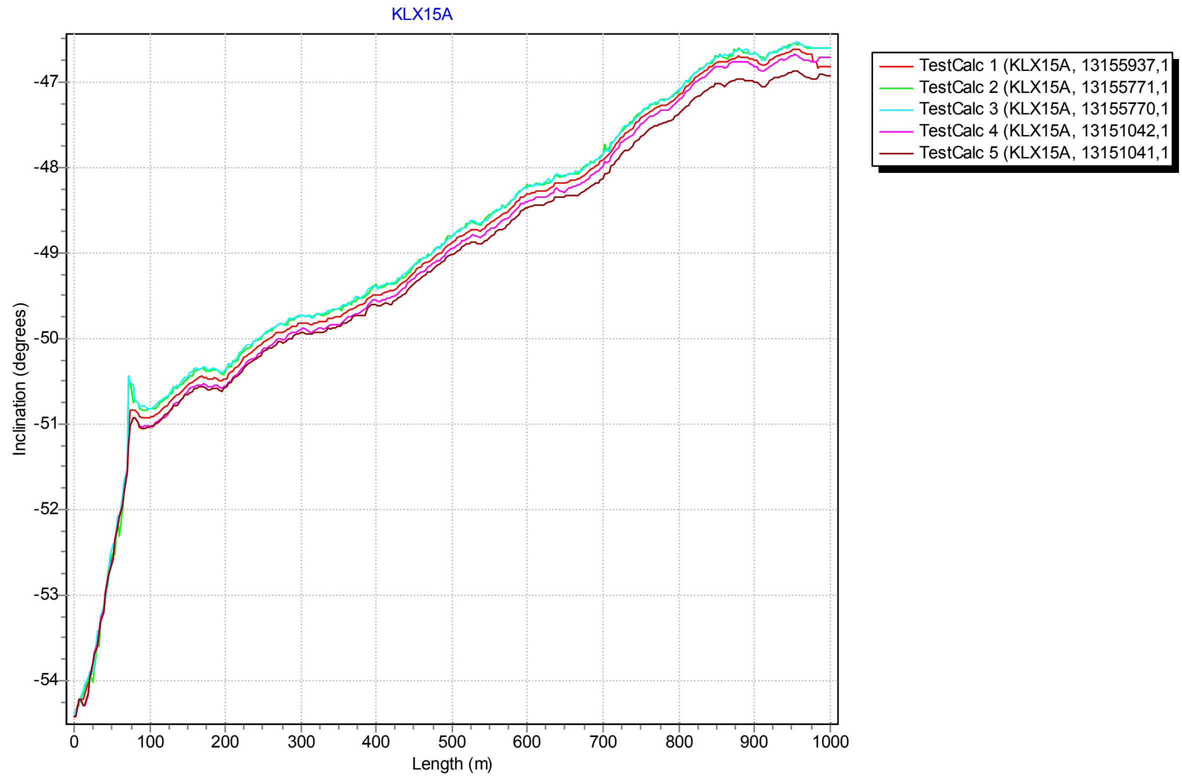


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2007-04-01.*



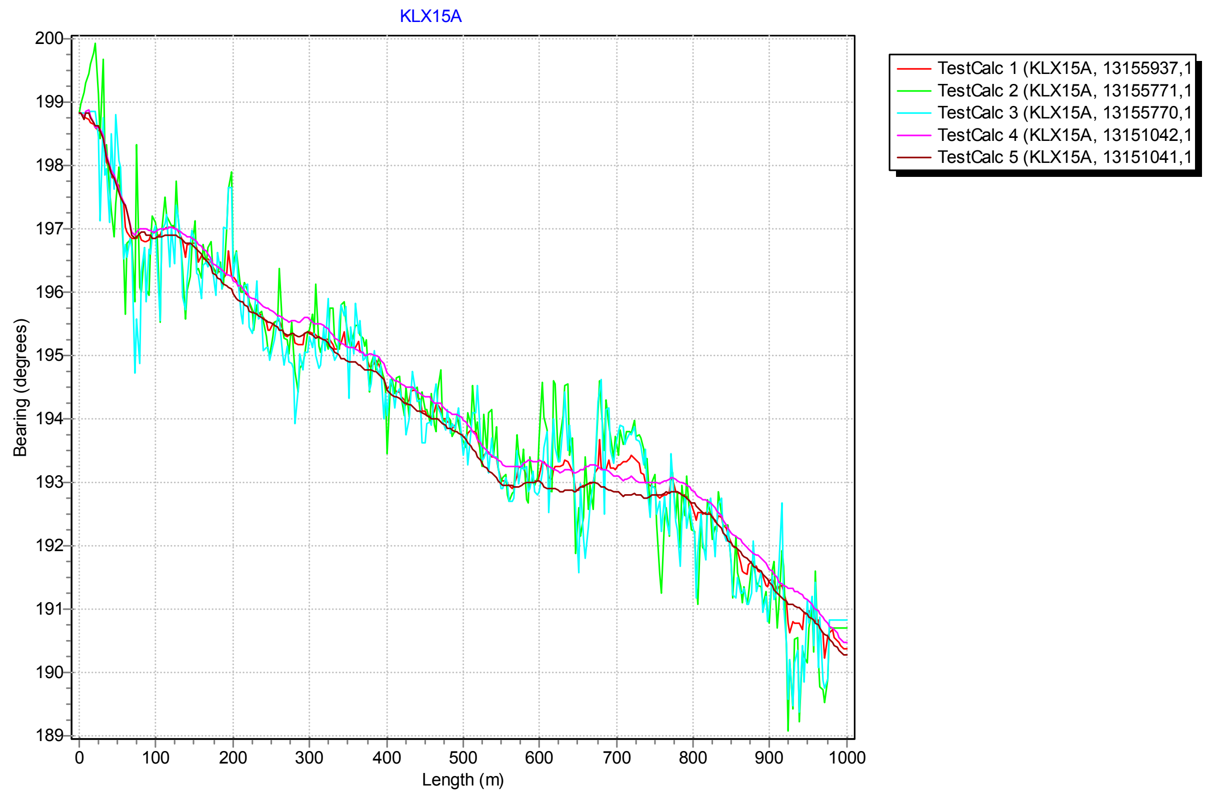


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX15A	13151041	EG156	Maxibor measurement	2007-03-03 06:00	0.00	996.00	CF
KLX15A	13151042	EG156	Maxibor measurement	2007-03-03 11:00	0.00	996.00	CF
KLX15A	13155770	EG157	Magnetic - accelerometer measurement	2007-04-01 09:00	0.00	978.00	CF
KLX15A	13155771	EG157	Magnetic - accelerometer measurement	2007-04-01 12:00	0.00	978.00	CF
KLX15A	13155937	EG154	Borehole deviation multiple measurements	2007-04-11 13:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX15A	13151041	BEARING	24.00	1000.33	
KLX15A	13151041	INCLINATION	3.00	1000.33	
KLX15A	13151042	BEARING	24.00	1000.33	
KLX15A	13151042	INCLINATION	3.00	1000.33	
KLX15A	13155770	BEARING	24.00	1000.33	
KLX15A	13155770	INCLINATION	3.00	1000.33	
KLX15A	13155771	BEARING	24.00	1000.33	
KLX15A	13155771	INCLINATION	3.00	1000.33	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

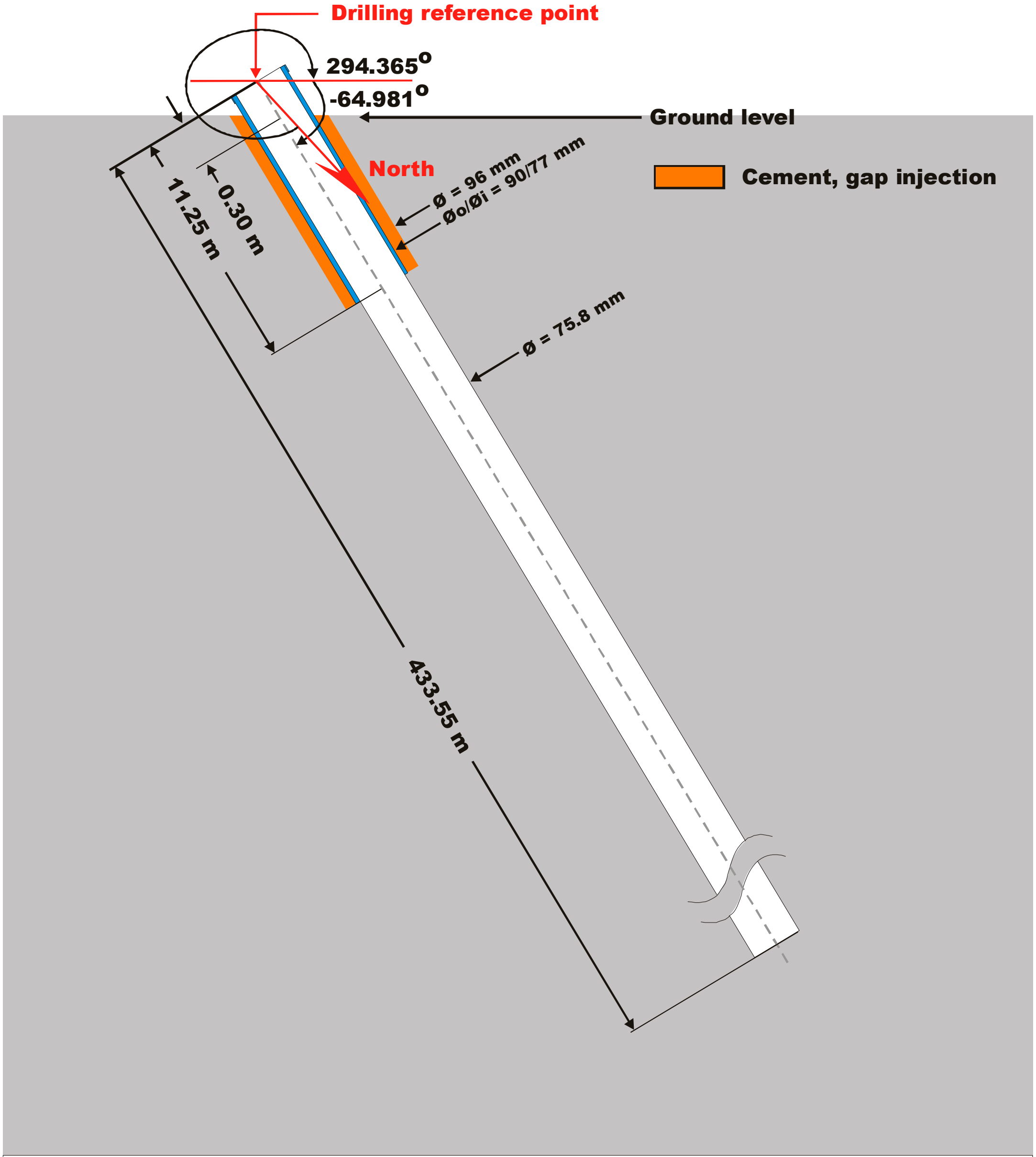
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX15A	6365614.17	1547987.47	14.59	0	0.00	-54.42	198.83	0.16	0.591	0
KLX15A	6365527.78	1547960.36	-101.16	147	0.25	-50.58	196.79	0.16	0.591	0.93
KLX15A	6365448.55	1547937.65	-200.39	276	0.48	-49.92	195.33	0.16	0.591	1.79
KLX15A	6365366.15	1547915.44	-301.09	408	0.72	-49.47	194.54	0.16	0.591	2.67
KLX15A	6365282.24	1547894.52	-400.82	540	0.96	-48.73	193.4	0.16	0.591	3.56
KLX15A	6365196.79	1547874.63	-499.44	672	1.21	-48.1	193.14	0.16	0.591	4.46
KLX15A	6365108.04	1547854.07	-599.07	807	1.46	-47.08	192.53	0.16	0.591	5.4
KLX15A	6365015.51	1547834.93	-699.64	945	1.73	-46.64	190.94	0.16	0.591	6.38
KLX15A	6364978.16	1547827.91	-739.99	1,000.43	1.83	-46.81	190.38	0.16	0.591	6.77

Borehole description – KLX16A

Technical description of borehole KLX16A is given in Figure 1.

Technical data

Borehole KLX16A



Drilling reference point

Northing: 6364797.693 (m), RT90 2,5 gon V 0:-15

Easting: 1547584.058 (m), RT90 2,5 gon V0:-15

Elevation: 18.853 (m), RHB 70

Drilling period

Drilling start date: 2006-11-28

Drilling stop date: 2007-01-09

Ver 2007-04-11

Figure 1. *Technical description of borehole KLX16A.*

Deviation measurement in KLX16A

In total four deviation measurements were conducted in KLX16A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX16A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13145711, 13145708) were executed down and up the borehole length.

The two Mac/acc measurements (ID 13147170, 13147171) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13147675) the two Maxibor measurements (ID 13145711, 13145708) and the two Mag/acc measurements (ID 13147170, 13147171) were used. The file ID 13147675 was later ERROR- marked and replaced with the file ID 13166848. Here the inclination of both Maxibor files was included. The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

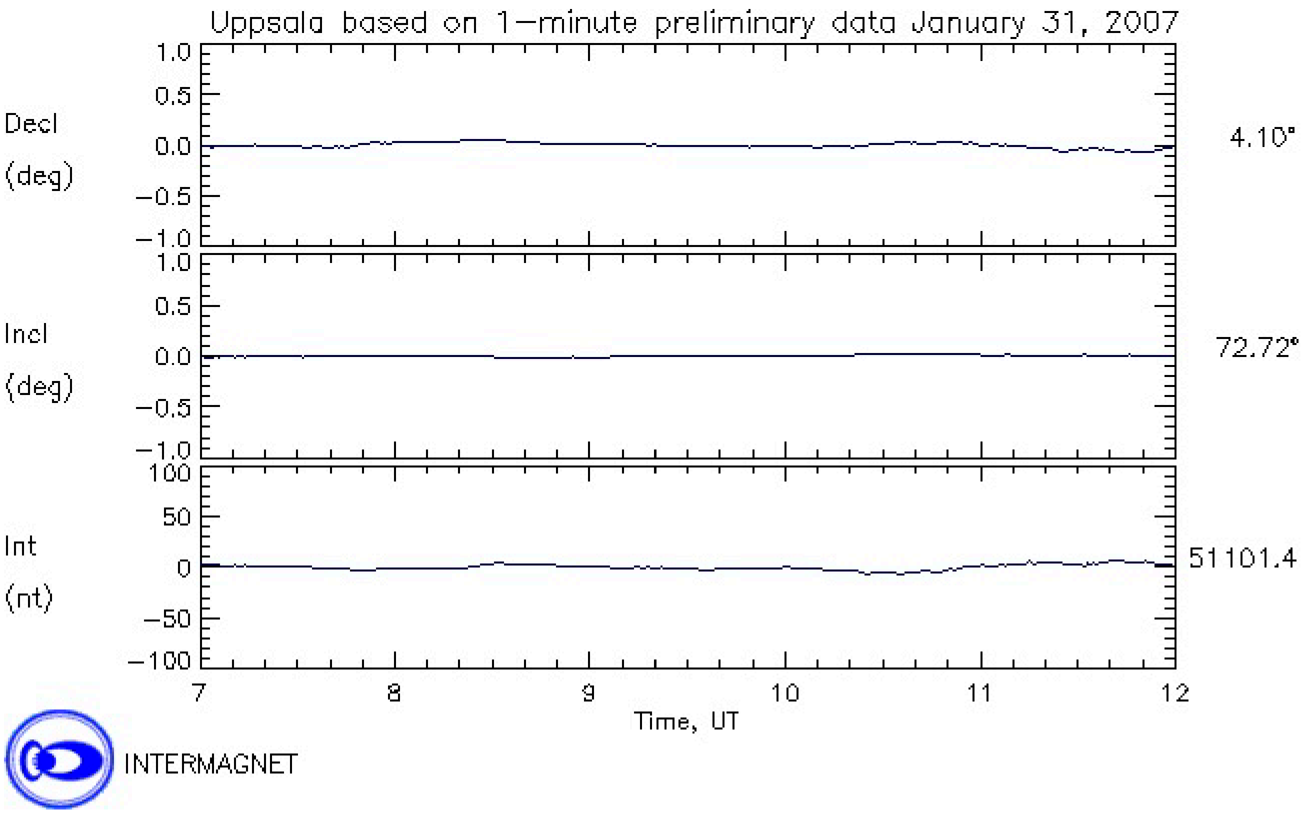
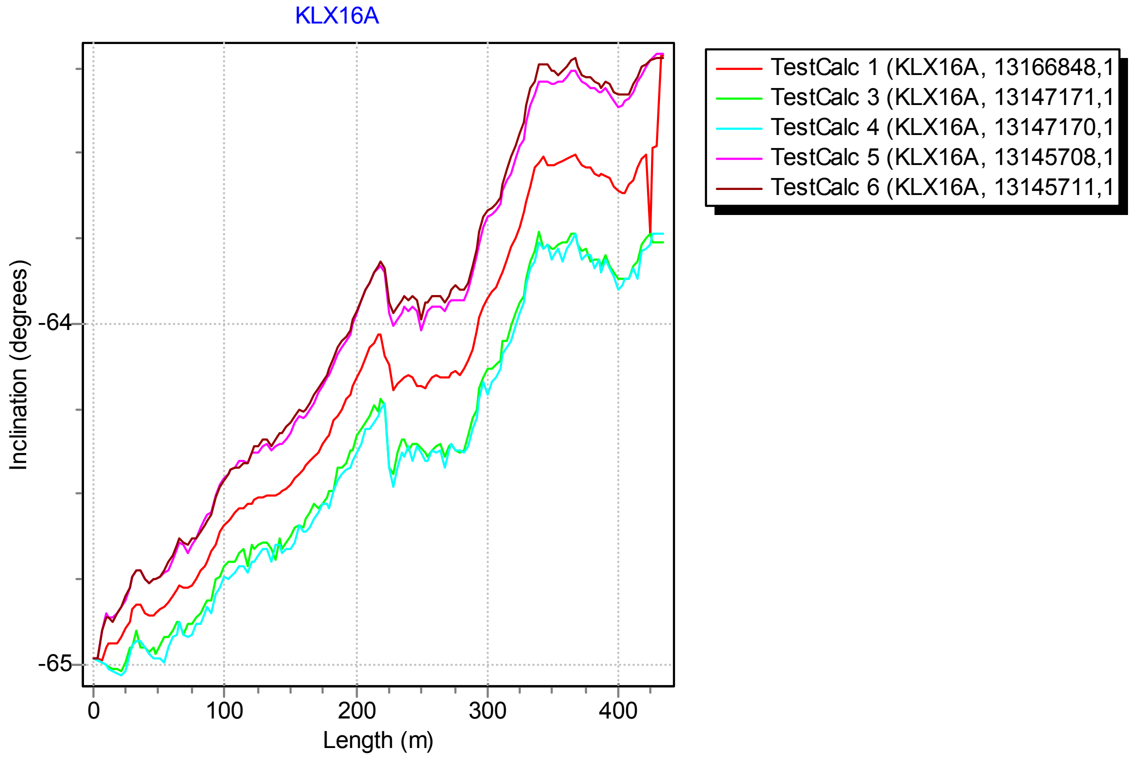


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2007-01-31.*



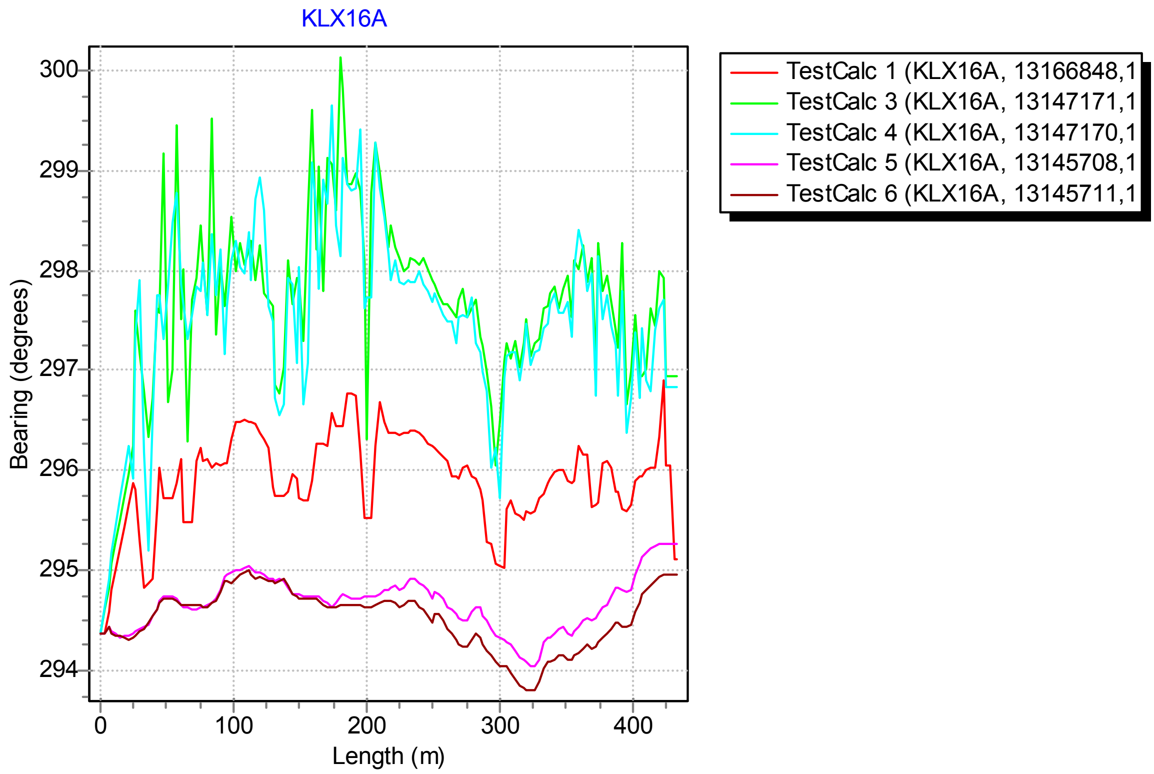


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX16A	13145711	EG156	Maxibor measurement	2007-01-13 06:00	0.00	429.00	CF
KLX16A	13145708	EG156	Maxibor measurement	2007-01-13 10:00	0.00	429.00	CF
KLX16A	13147170	EG157	Magnetic - accelerometer measurement	2007-01-31 08:00	0.00	426.00	CF
KLX16A	13147171	EG157	Magnetic - accelerometer measurement	2007-01-31 10:00	0.00	426.00	CF
KLX16A	13147675	EG154	Borehole deviation multiple measurements	2007-02-12 15:00			EC
KLX16A	13166848	EG154	Borehole deviation multiple measurements	2007-07-09 15:30			I C

Table 2. Content of the EG154-file.

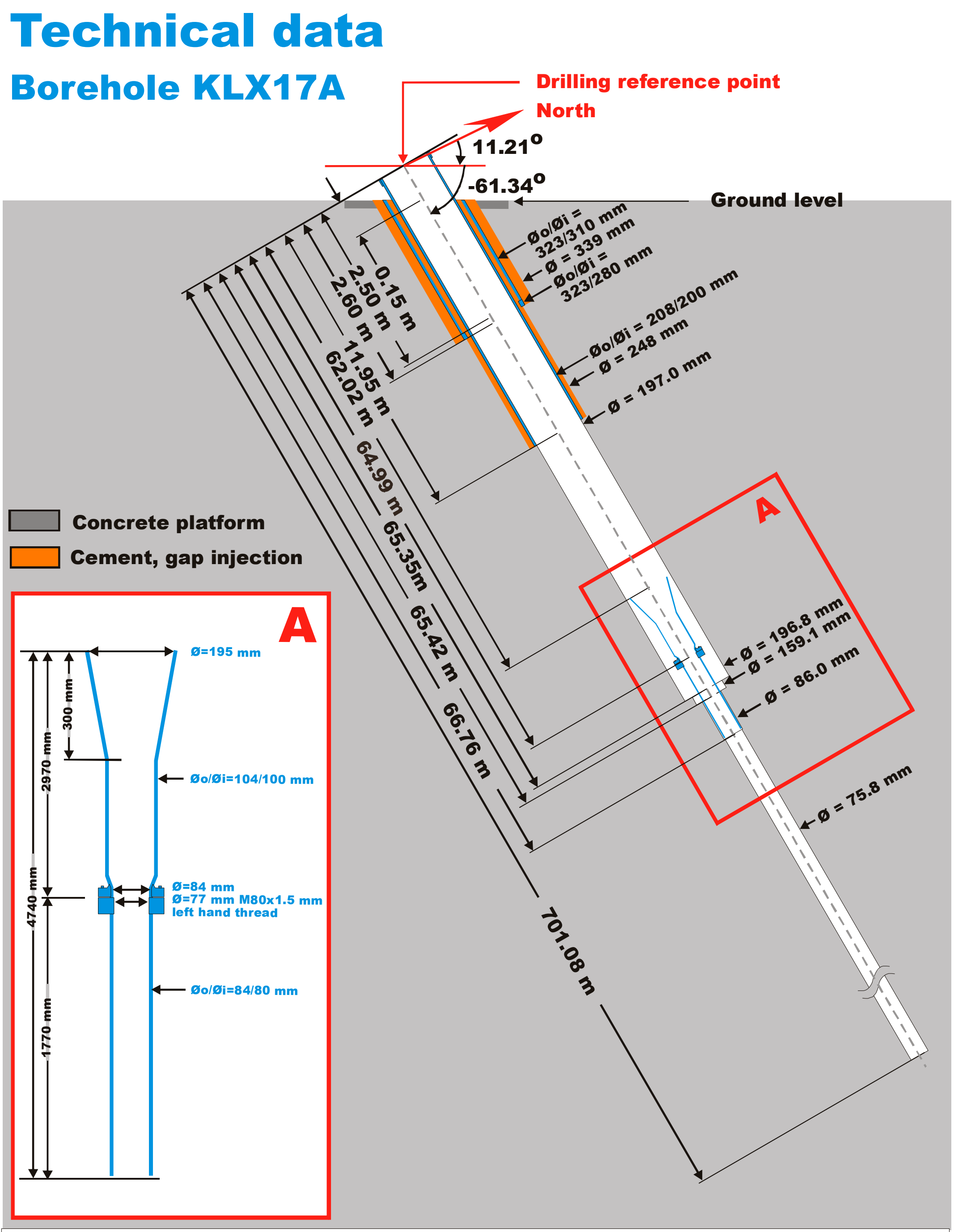
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX16A	13145708	BEARING	27.00	433.55	
KLX16A	13145708	INCLINATION	3.00	433.55	
KLX16A	13145711	BEARING	27.00	433.55	
KLX16A	13145711	INCLINATION	3.00	433.55	
KLX16A	13147170	BEARING	27.00	433.55	
KLX16A	13147170	INCLINATION	3.00	433.55	
KLX16A	13147171	BEARING	27.00	433.55	
KLX16A	13147171	INCLINATION	3.00	433.55	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX16A	6364797.69	1547584.06	18.85	0.00	0.00	-64.98	294.37	0.265	2.113	0
KLX16A	6364822.17	1547533.35	-100.53	132	0.26	-64.50	295.74	0.265	2.113	2.08
KLX16A	6364843.43	1547490.12	-200.53	243	0.48	-64.16	296.33	0.265	2.113	3.85
KLX16A	6364864.67	1547446.16	-300.22	354	0.71	-63.53	295.87	0.265	2.113	5.65
KLX16A	6364880.17	1547414.29	-371.44	433.55	0.87	-63.22	295.11	0.265	2.113	6.96

Borehole description – KLX17A

Technical description of borehole KLX17A is given in Figure 1.



Drilling reference point

Northing: 6366848.75 (m), RT90 2,5 gon V 0:-15

Easting: 1546862.09 (m), RT90 2,5 gon V 0:-15

Elevation: 27.63 (m), RHB 70

Drilling period

Drilling start date: 2006-08-07

Drilling stop date: 2006-10-23

Ver 2007-04-16

Figure 1. *Technical description of borehole KLX17A.*

Deviation measurement in KLX17A

In total five deviation measurements were conducted in KLX17A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX17A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

Maxibor measurement (ID 13131113) was conducted to check the bearing of the borehole between borehole lengths 0 – 237 m due to indications of deviation.

The two Maxibor measurements (ID 13134857, 13134858) were executed down and up the borehole.

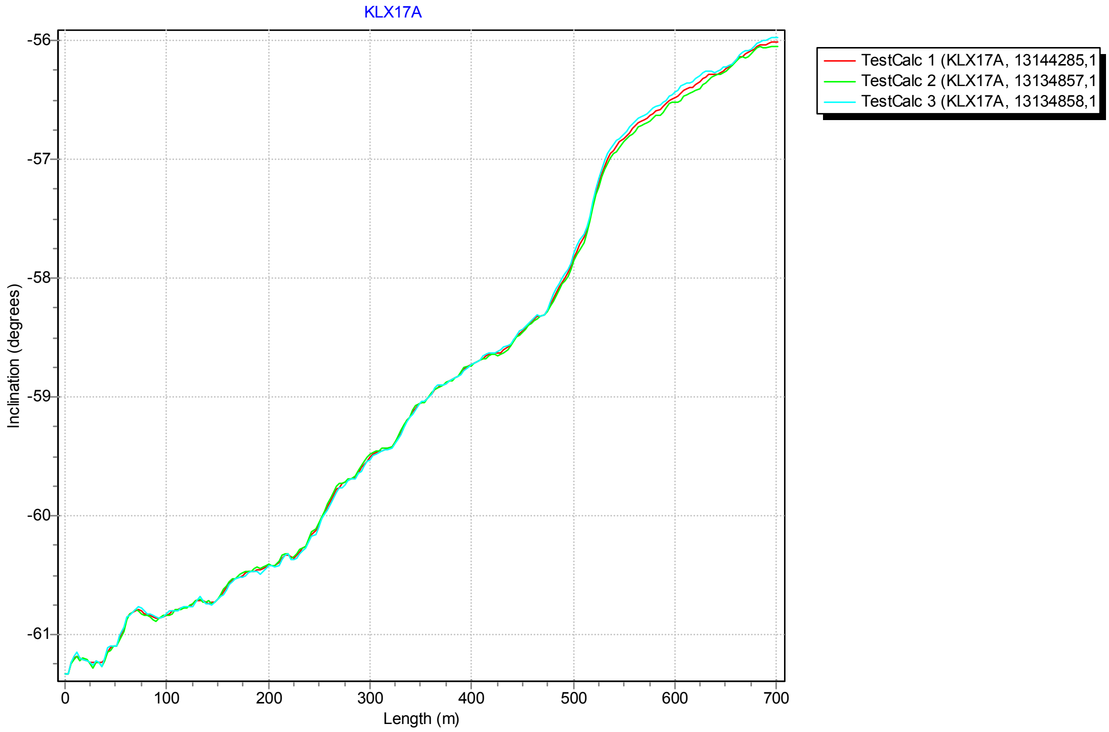
The two Mac/acc measurements (ID 13138552, 13138553) were executed down and up the borehole, with the Flexit instrument. These measurements were ERROR- marked due to magnetic anomalies in the surrounding rock of the borehole.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144285) the two Maxibor measurements (ID13134857,13134858) were used. The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. Because the two deviation activities in EG154 (Table 2) were very similar the “Radius uncertainty” would be unrealistically low, and it was decided to set the inclination and bearing uncertainties manually to 1.8º and 4.9º respectively (see section 4.4.2), and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 2 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.



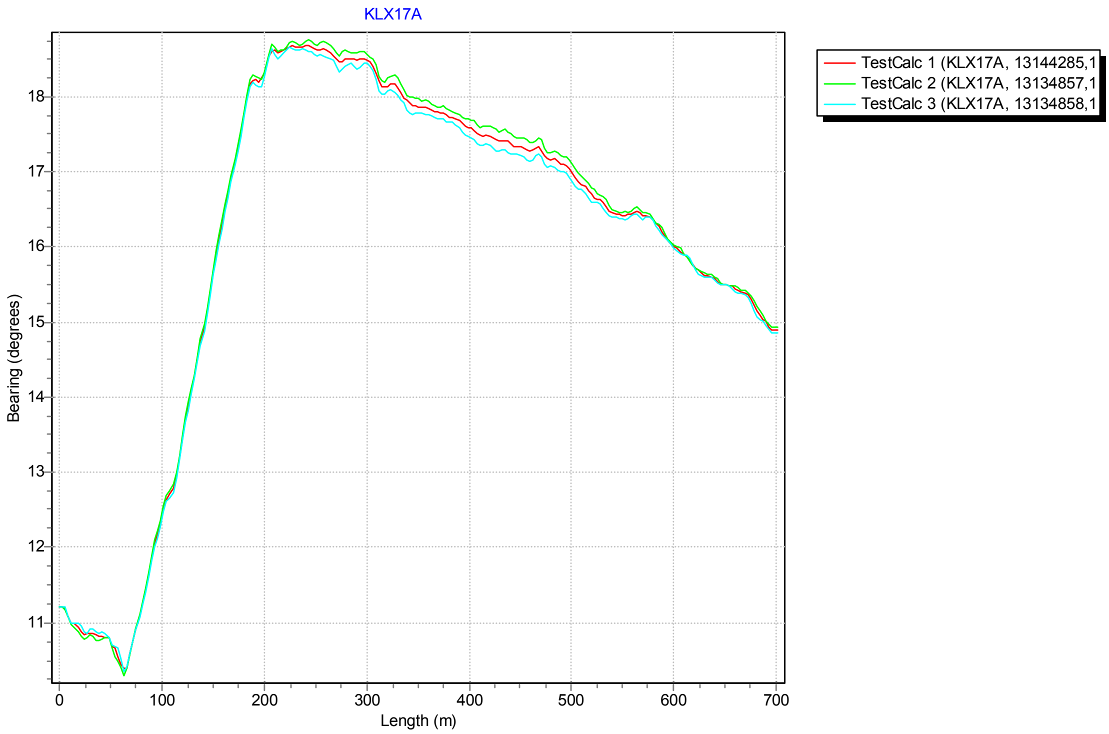


Figure 2. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing. The borehole was percussion drilled down to 65.42 m. The borehole was also reamed down to 172.98 m due to small rock pieces falling into the borehole.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX17A	13131113	EG156	Maxibor measurement	2006-09-23 00:00	0.00	237.00	F
KLX17A	13134858	EG156	Maxibor measurement	2006-10-31 13:00	0.00	696.00	CF
KLX17A	13134857	EG156	Maxibor measurement	2006-10-31 15:30	0.00	696.00	CF
KLX17A	13138552	EG157	Magnetic - accelerometer measurement	2006-11-30 10:00	0.00	696.00	ECF
KLX17A	13138553	EG157	Magnetic - accelerometer measurement	2006-11-30 12:25	0.00	696.00	ECF
KLX17A	13144285	EG154	Borehole deviation multiple measurements	2007-01-17 14:00			I C

Table 2. Content of the EG154-file.

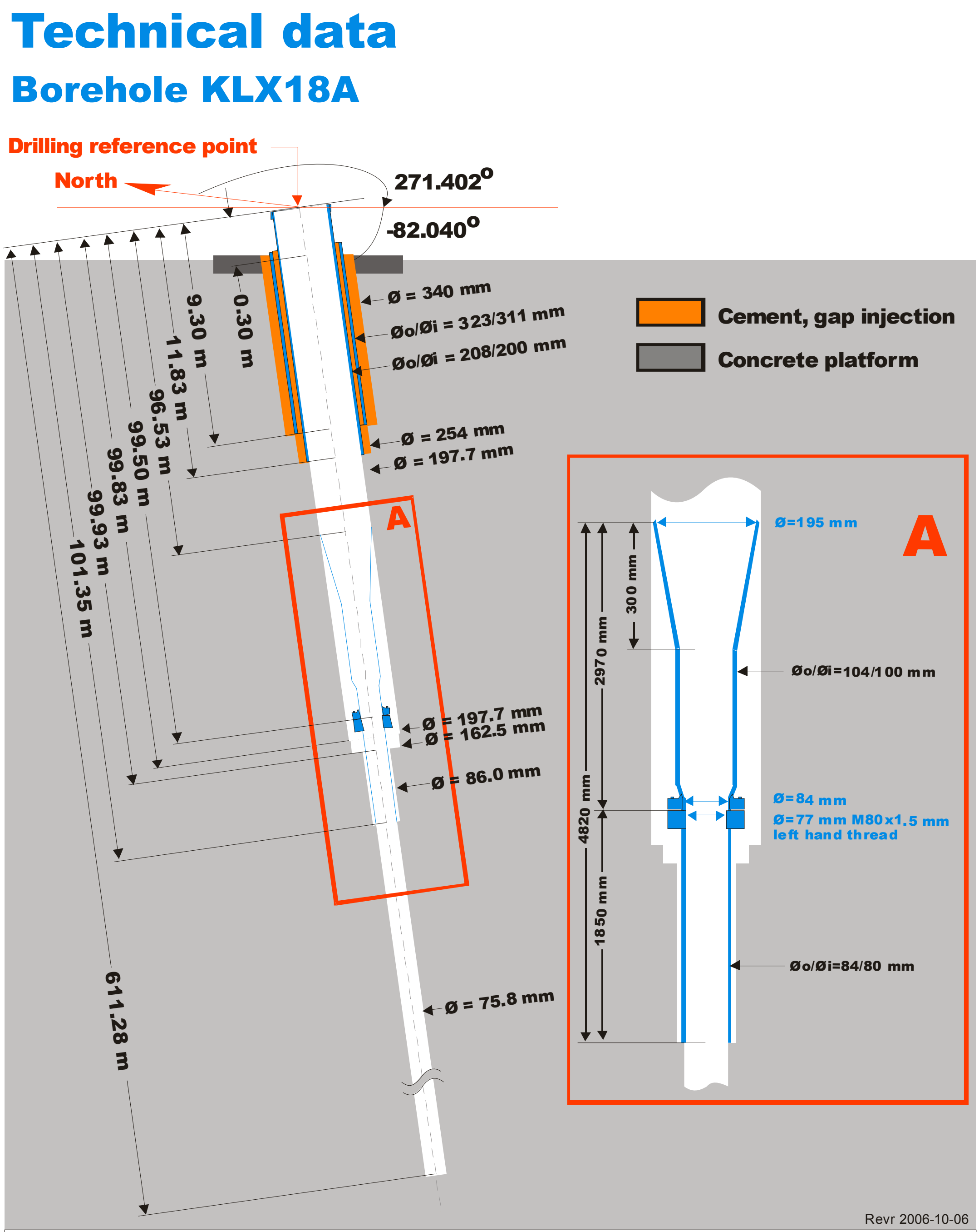
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX17A	13134857	BEARING	3.00	696.00	4.900
KLX17A	13134857	INCLINATION	3.00	696.00	1.800
KLX17A	13134858	BEARING	3.00	696.00	4.900
KLX17A	13134858	INCLINATION	3.00	696.00	1.800

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX17A	6366848.75	1546862.09	27.63	0	0.00	-61.34	11.21	1.8	4.9	0
KLX17A	6366918.56	1546876.8	-100.88	147	2.24	-60.73	15.4	1.8	4.9	6.1
KLX17A	6366972.15	1546894.17	-199.99	261	4.01	-59.88	18.62	1.8	4.9	10.91
KLX17A	6367028.81	1546912.78	-300.65	378	5.89	-58.87	17.77	1.8	4.9	16.01
KLX17A	6367087.13	1546931.06	-400.41	495	7.81	-57.95	17.08	1.8	4.9	21.23
KLX17A	6367149.94	1546949.59	-500.96	615	9.87	-56.39	15.84	1.8	4.9	26.83
KLX17A	6367196.14	1546962.31	-572.47	701.08	11.37	-56	14.9	1.8	4.9	30.92

Borehole description – KLX18A

Technical description of borehole KLX18A is given in Figure 1.



Drilling reference point

Northing: 6366413.39 (m), RT90 2,5 gon V 0:-15
Easting: 1547966.35 (m), RT90 2,5 gon V 0:-15
Elevation: 21.01 (m), RHB 70

Drilling period

Drilling start date: 2006-02-15
Drilling stop date: 2006-05-02

Figure 1. *Technical description of borehole KLX18A.*

<u>Deviation measurement in KLX18A</u>

In total four deviation measurements were conducted in KLX18A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX18A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13112106, 13141039) were executed down and up the borehole.

The two Mac/acc measurements (ID 13120581, 13141042) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement (ID 13116205), due to recalculation, the raw data from that measurement was re-used to calculate the correct measurement (ID 13120581).

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13144286) the two Maxibor measurements (ID 13112106, 13141039) and the two Mag/acc measurements (ID 13120581, 13141042) were used. The strategy used in selecting the activities deviates from the general strategy (Section 4.4.2) due to the fact that the bearing data between borehole lengths 0 – 117 m diverge. The bearing data was interpolated between TOC and 117 m. Table Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

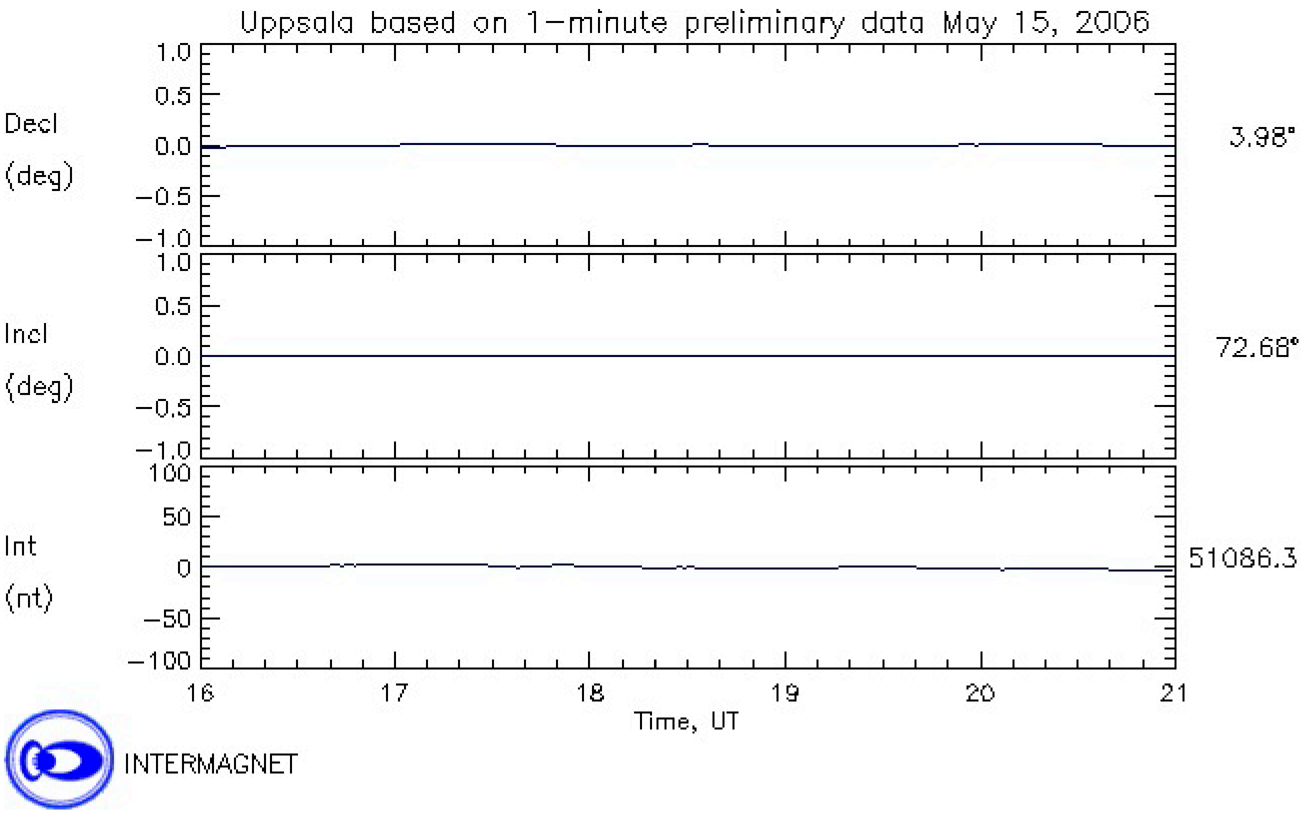
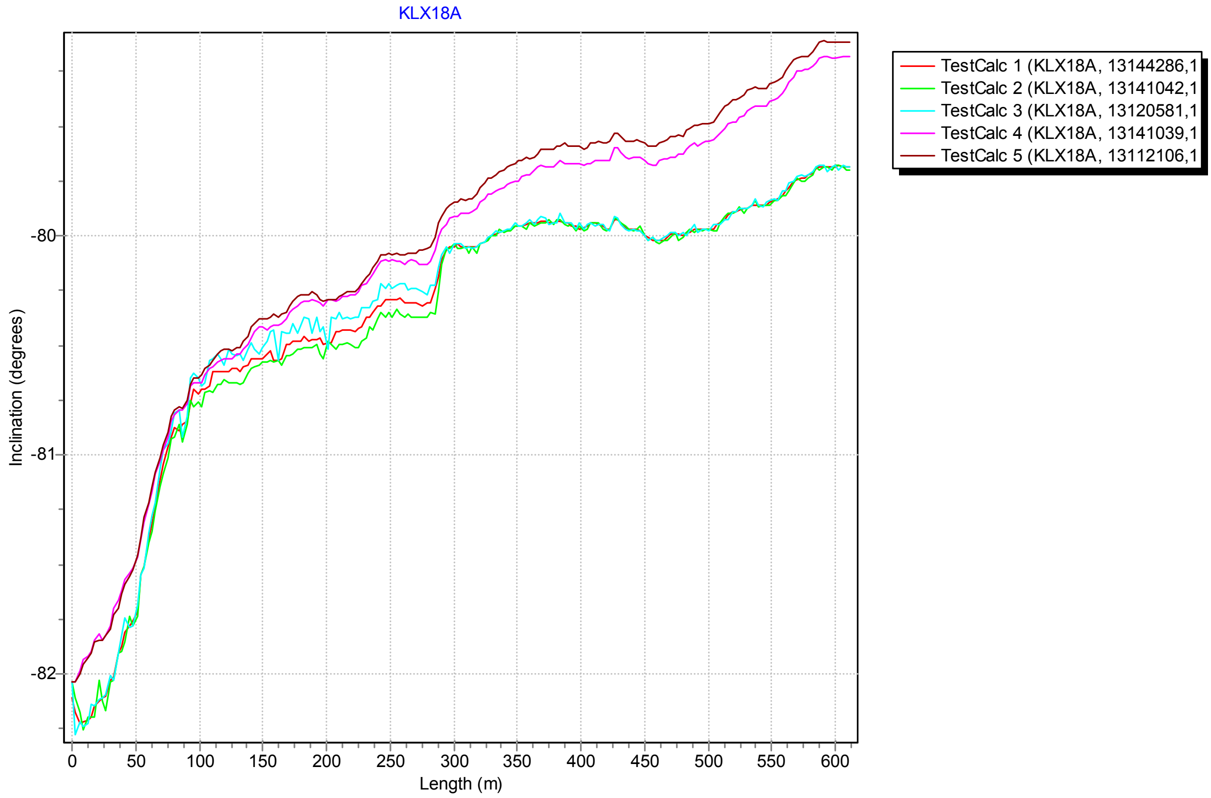


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-15.*



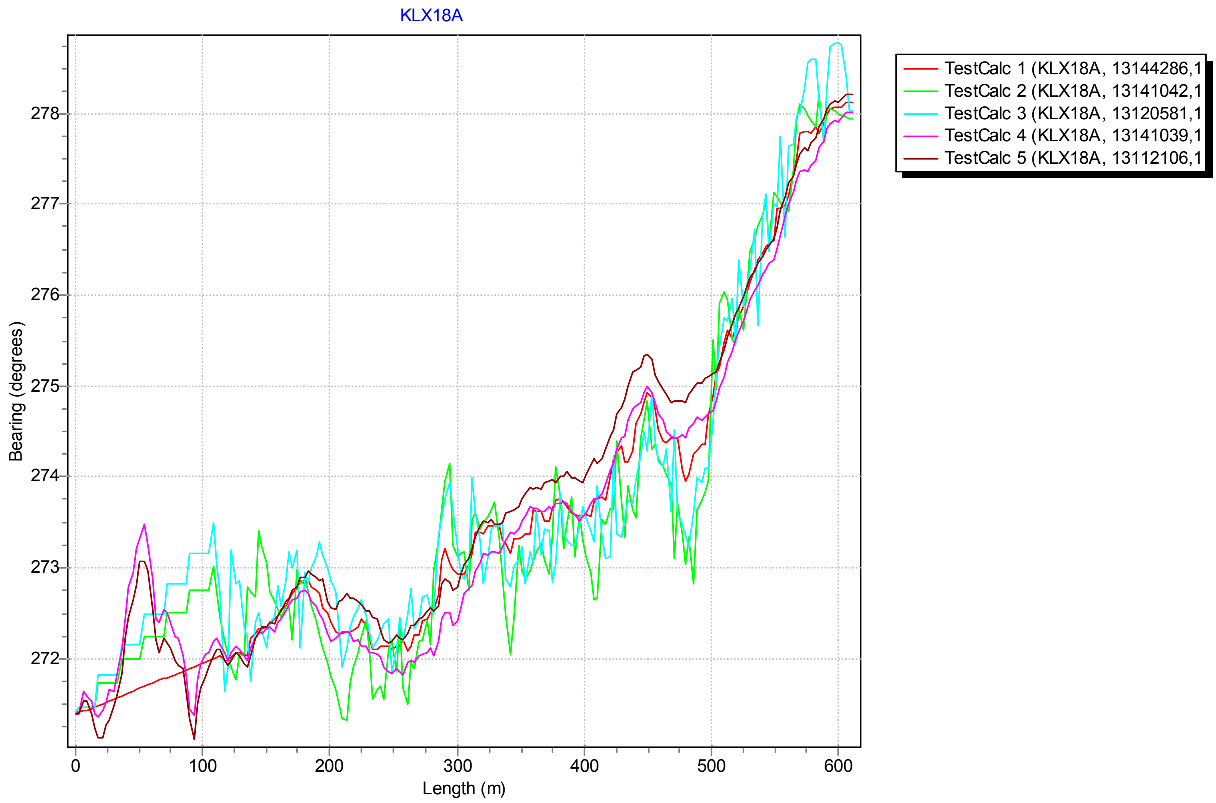


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX18A	13112106	EG156	Maxibor measurement	2006-05-04 06:00	0.00	606.00	CF
KLX18A	13141039	EG156	Maxibor measurement	2006-05-04 09:30	0.00	606.00	CF
KLX18A	13116205	EG157	Magnetic - accelerometer measurement	2006-05-15 00:00	0.00	609.00	EF
KLX18A	13120581	EG157	Magnetic - accelerometer measurement	2006-05-15 16:44	0.00	609.00	CF
KLX18A	13141042	EG157	Magnetic - accelerometer measurement	2006-05-15 19:01	0.00	609.00	CF
KLX18A	13144286	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

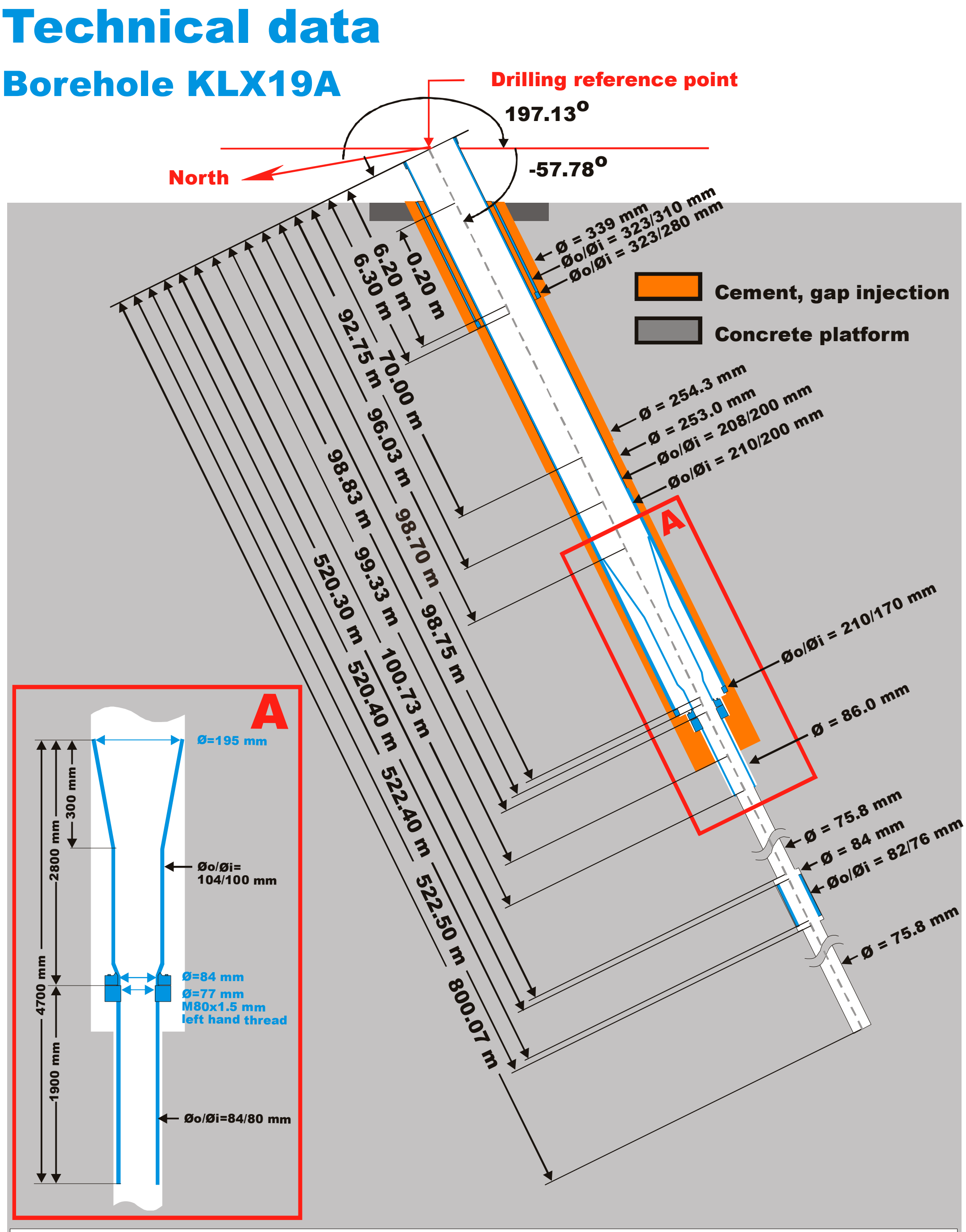
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX18A	13112106	BEARING	117.00	606.00	
KLX18A	13120581	BEARING	117.00	606.00	
KLX18A	13120581	INCLINATION	3.00	606.00	
KLX18A	13141039	BEARING	117.00	606.00	
KLX18A	13141042	BEARING	117.00	606.00	
KLX18A	13141042	INCLINATION	3.00	606.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX18A	6366413.39	1547966.35	21.01	0	0.00	-82.11	271.4	0.415	0.734	0
KLX18A	6366413.95	1547947.95	-100.6	123	0.13	-80.63	272.01	0.415	0.734	0.89
KLX18A	6366414.66	1547931.15	-201.2	225	0.26	-80.43	272.44	0.415	0.734	1.63
KLX18A	6366415.42	1547914.36	-298.77	324	0.38	-80.03	273.47	0.415	0.734	2.35
KLX18A	6366416.53	1547896.61	-399.2	426	0.51	-79.93	274.26	0.415	0.734	3.09
KLX18A	6366418	1547878.91	-499.64	528	0.63	-79.88	276.01	0.415	0.734	3.82
KLX18A	6366419.89	1547864.24	-581.6	611.28	0.74	-79.69	278.11	0.415	0.734	4.43

Borehole description – KLX19A

Technical description of borehole KLX19A is given in Figure 1.



Drilling reference point

Northing: 6365901.42 (m), RT90 2,5 gon V 0:-15

Easting: 1547004.62 (m), RT90 2,5 gon V 0:-15

Elevation: 16.87 (m), RHB 70

Drilling period

Drilling start date: 2006-05-10

Drilling stop date: 2006-09-20

Ver 2007-04-24

Figure 1. *Technical description of borehole KLX19A.*

Deviation measurement in KLX19A

In total six deviation measurements were conducted in KLX19A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX19A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13131114, 131411325) were executed down and up the borehole.

The two Mag/acc measurements (ID 13143746, 13143747) were executed down and up the borehole, with the Flexit instrument, in the telescopic part of the borehole 0 – 99 m. The two Mac/acc measurements (ID 13132082, 13136111) were executed down and up the borehole length, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the dates of the Mag/acc measurement, see Figure 2 and 3.

There is two ERROR- marked measurements (ID 13141515, 13116207), due to recalculation, the raw data from that measurement were re-used to calculate the correct measurements (ID 13143746, 13143747).

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144287) the two Maxibor measurements (ID 13131114, 13141325) and the two Mag/acc measurements (ID 13132082, 13136111) were used. The strategy used in selecting the activities deviates from the general strategy (Section 4.4.2) due to the fact that the bearing data between borehole lengths 0 – 117 m diverge. The bearing data was interpolated between TOC and 117 m. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 4 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

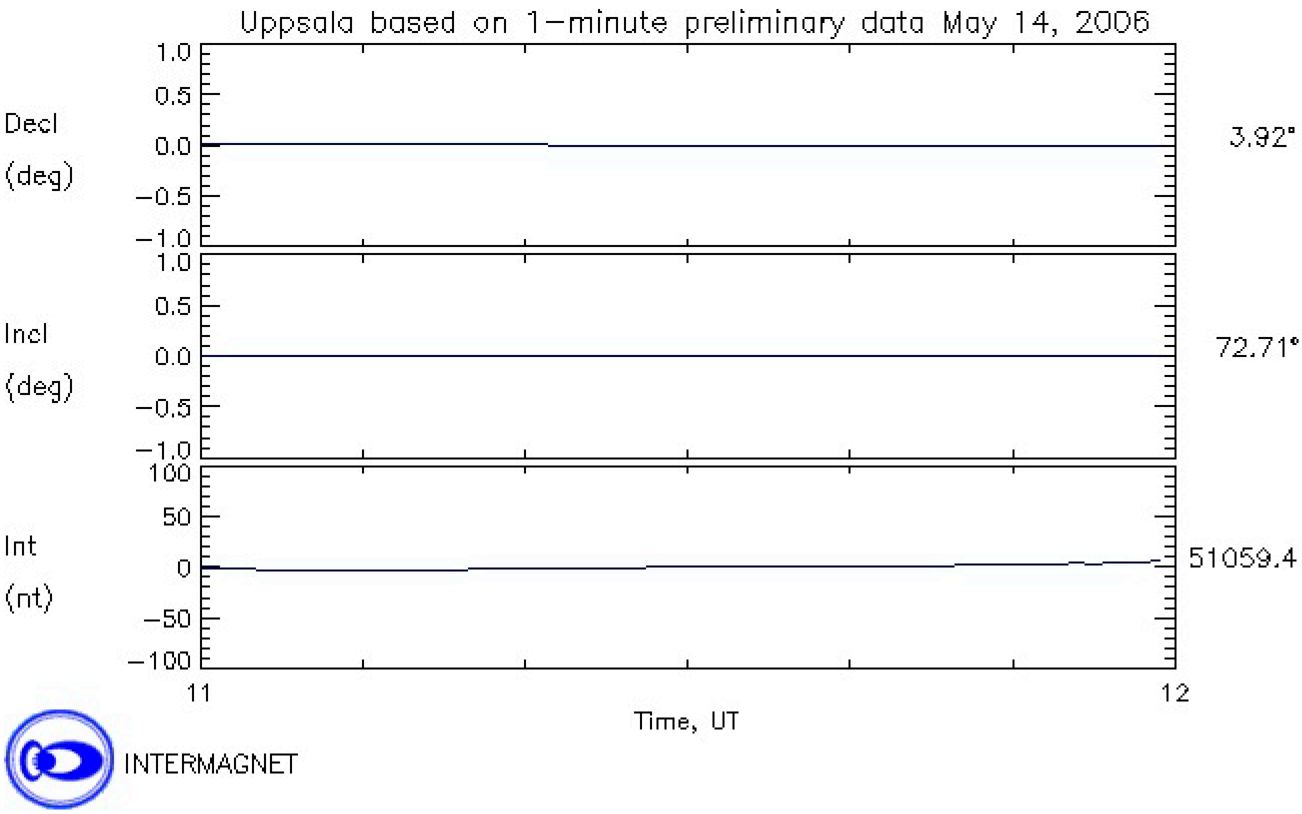


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-14.*

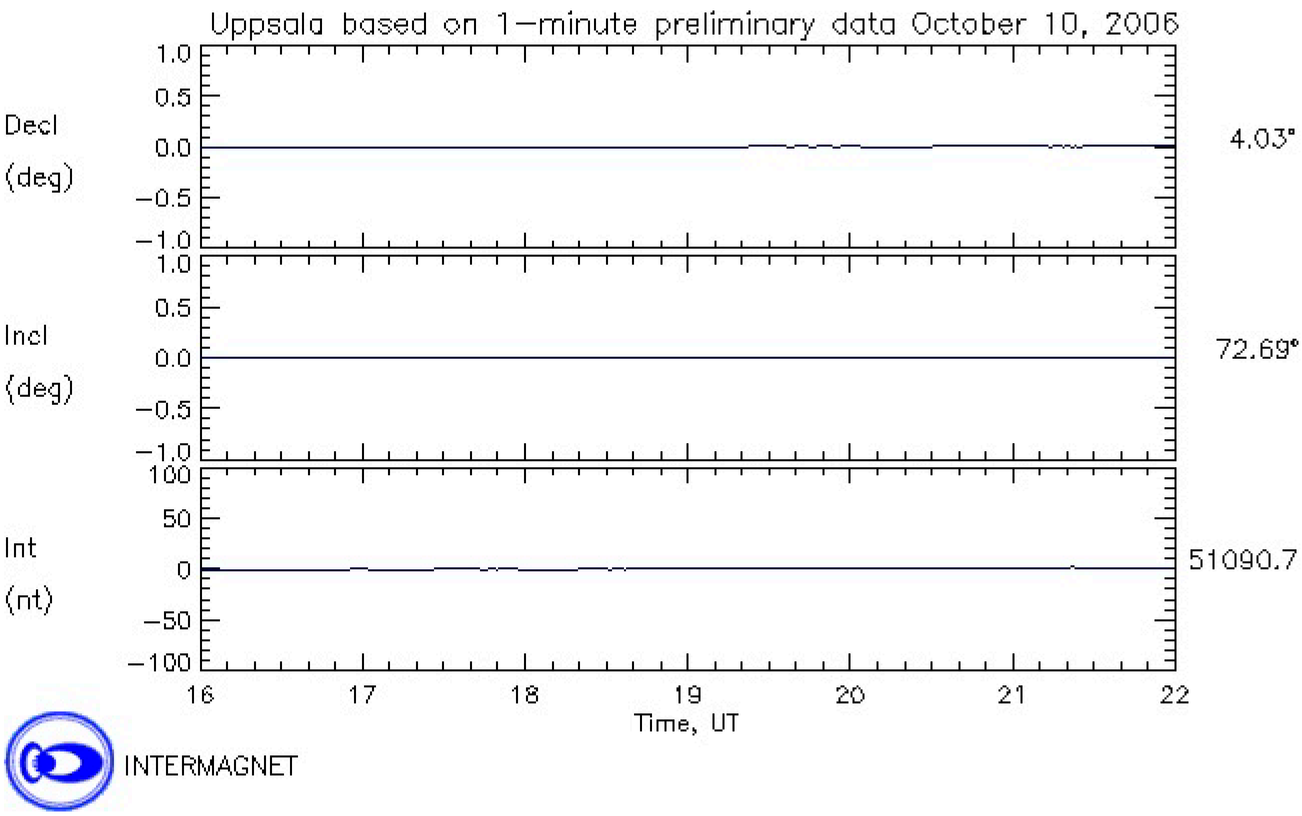
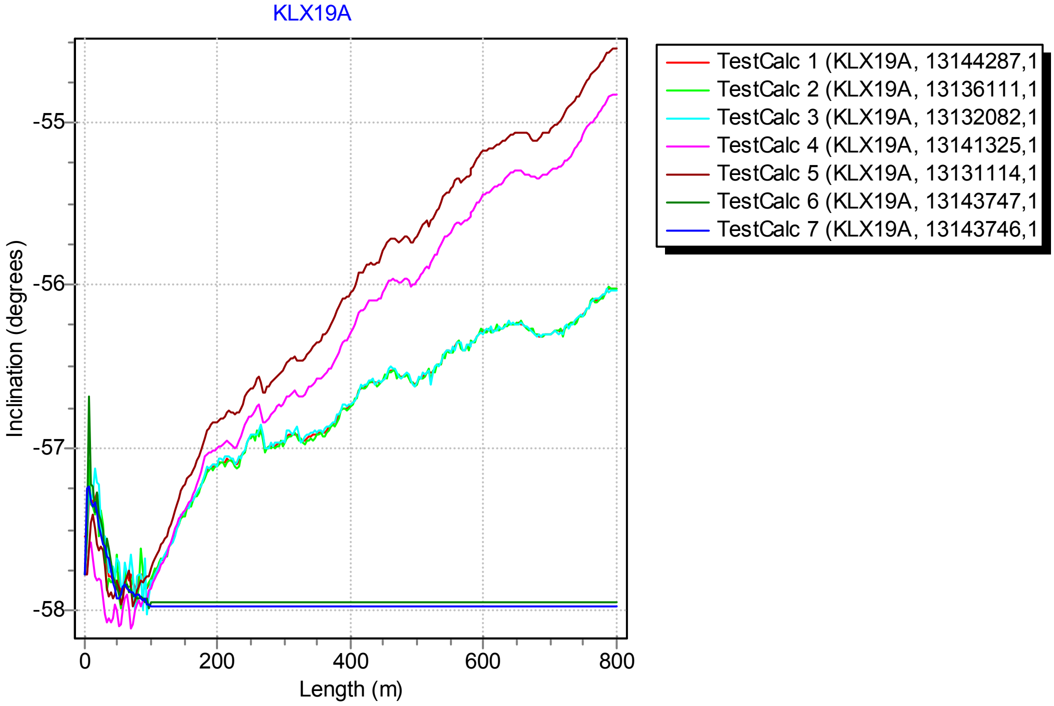


Figure 3. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-10-10.*



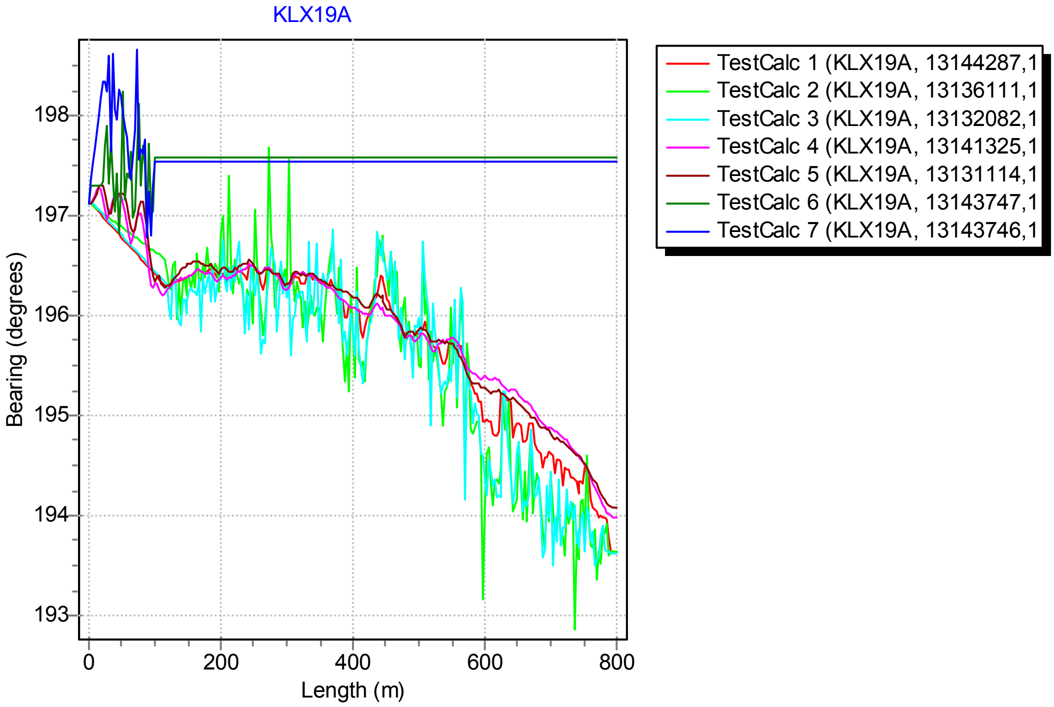


Figure 4. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX19A	13143746	EG157	Magnetic - accelerometer measurement	2006-05-14 11:10	0.00	99.00	CF
KLX19A	13143747	EG157	Magnetic - accelerometer measurement	2006-05-14 11:29	0.00	99.00	CF
KLX19A	13141515	EG157	Magnetic - accelerometer measurement	2006-05-14 11:29	0.00	99.00	ECF
KLX19A	13116207	EG157	Magnetic - accelerometer measurement	2006-05-14 11:29	0.00	99.00	ECF
KLX19A	13131114	EG156	Maxibor measurement	2006-09-25 06:00	0.00	795.00	CF
KLX19A	13141325	EG156	Maxibor measurement	2006-09-25 10:30	0.00	795.00	CF
KLX19A	13132082	EG157	Magnetic - accelerometer measurement	2006-10-10 16:00	0.00	792.00	CF
KLX19A	13136111	EG157	Magnetic - accelerometer measurement	2006-10-10 19:00	0.00	792.00	CF
KLX19A	13144287	EG154	Borehole deviation multiple measurements	2007-01-12 16:00			I C

Table 2. Content of the EG154-file.

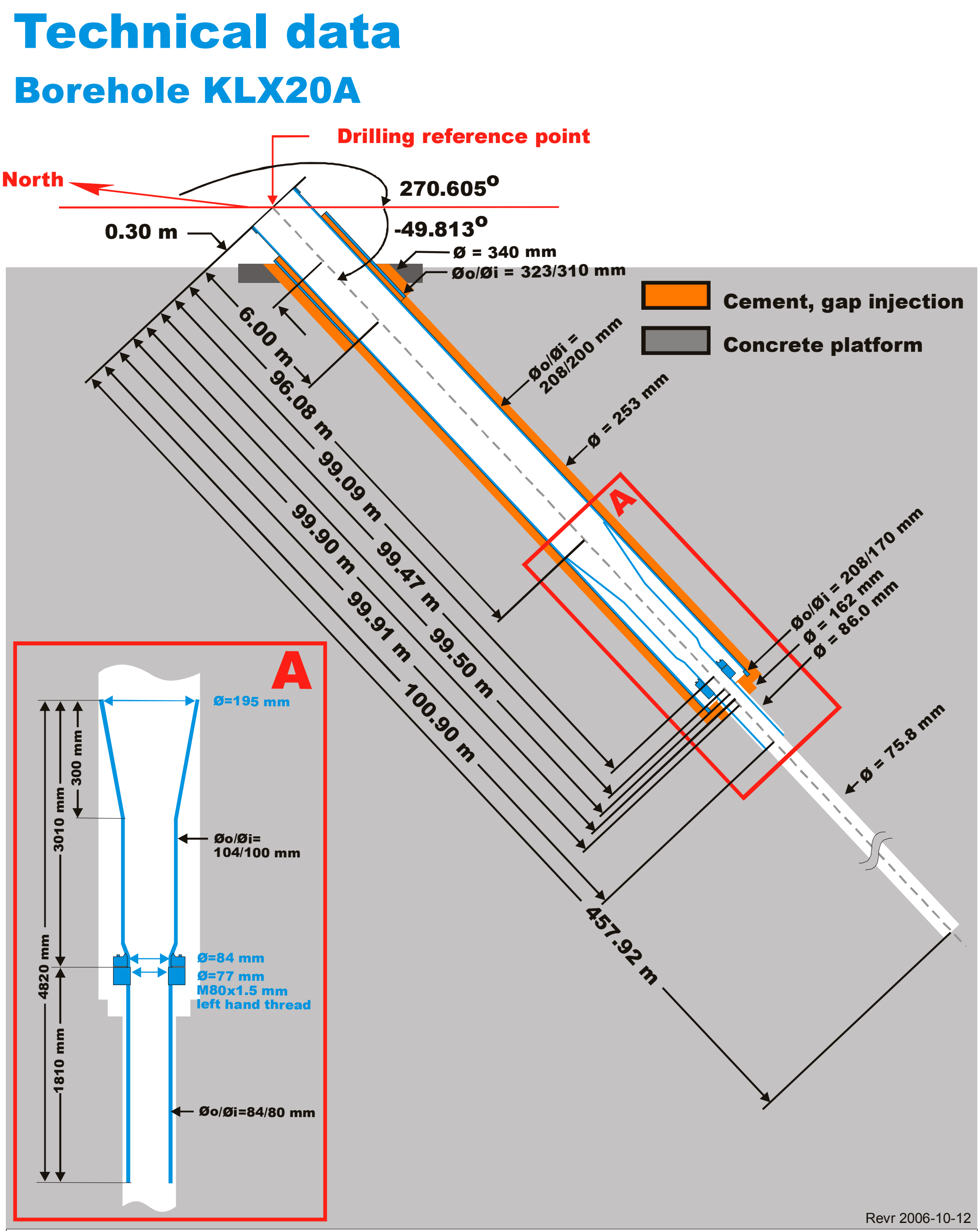
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX19A	13131114	BEARING	117.00	792.00	
KLX19A	13132082	BEARING	117.00	792.00	
KLX19A	13132082	INCLINATION	3.00	792.00	
KLX19A	13136111	BEARING	117.00	792.00	
KLX19A	13136111	INCLINATION	3.00	792.00	
KLX19A	13141325	BEARING	117.00	792.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX19A	6365901.42	1547004.62	16.87	0	0.00	-57.55	197.13	0.995	0.595	0
KLX19A	6365830.73	1546983.47	-99.75	138	1.28	-57.5	196.37	0.995	0.595	2.4
KLX19A	6365768.31	1546965.06	-200.57	258	2.41	-56.92	196.43	0.995	0.595	4.48
KLX19A	6365705.48	1546946.63	-301.13	378	3.55	-56.83	196.22	0.995	0.595	6.56
KLX19A	6365643.62	1546928.84	-398.84	495	4.67	-56.61	195.81	0.995	0.595	8.6
KLX19A	6365579.66	1546911.11	-498.81	615	5.82	-56.28	194.79	0.995	0.595	10.68
KLX19A	6365513.61	1546893.75	-601.1	738	7.01	-56.23	194.34	0.995	0.595	12.82
KLX19A	6365480.03	1546885.34	-652.63	800.07	7.61	-56.03	193.63	0.995	0.595	13.89

Borehole description – KLX20A

Technical description of borehole KLX20A is given in Figure 1.



Drilling reference point

Northing: 6366334.57 (m), RT90 2,5 gon V 0:-15

Easting: 1546604.89 (m), RT90 2,5 gon V 0:-15

Elevation: 27.24 (m), RHB 70

Drilling period

Drilling start date: 2006-02-22

Drilling stop date: 2006-04-24

Figure 1. *Technical description of borehole KLX20A.*

<u>Deviation measurement in KLX20A</u>

In total four deviation measurements were conducted in KLX20A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX20A were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13114898, 13141381) were executed down and up the borehole.

The two Mac/acc measurements (ID 13120027, 13141380) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

There is one ERROR- marked measurement (ID 13116206), due to recalculation, the raw data from that measurement were re-used to calculate the correct measurements (ID 13120027)

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13144288) the two Maxibor measurements (ID 13114898, 13141381) and the two Mag/acc measurements (ID 13120027, 13141380) were used. The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

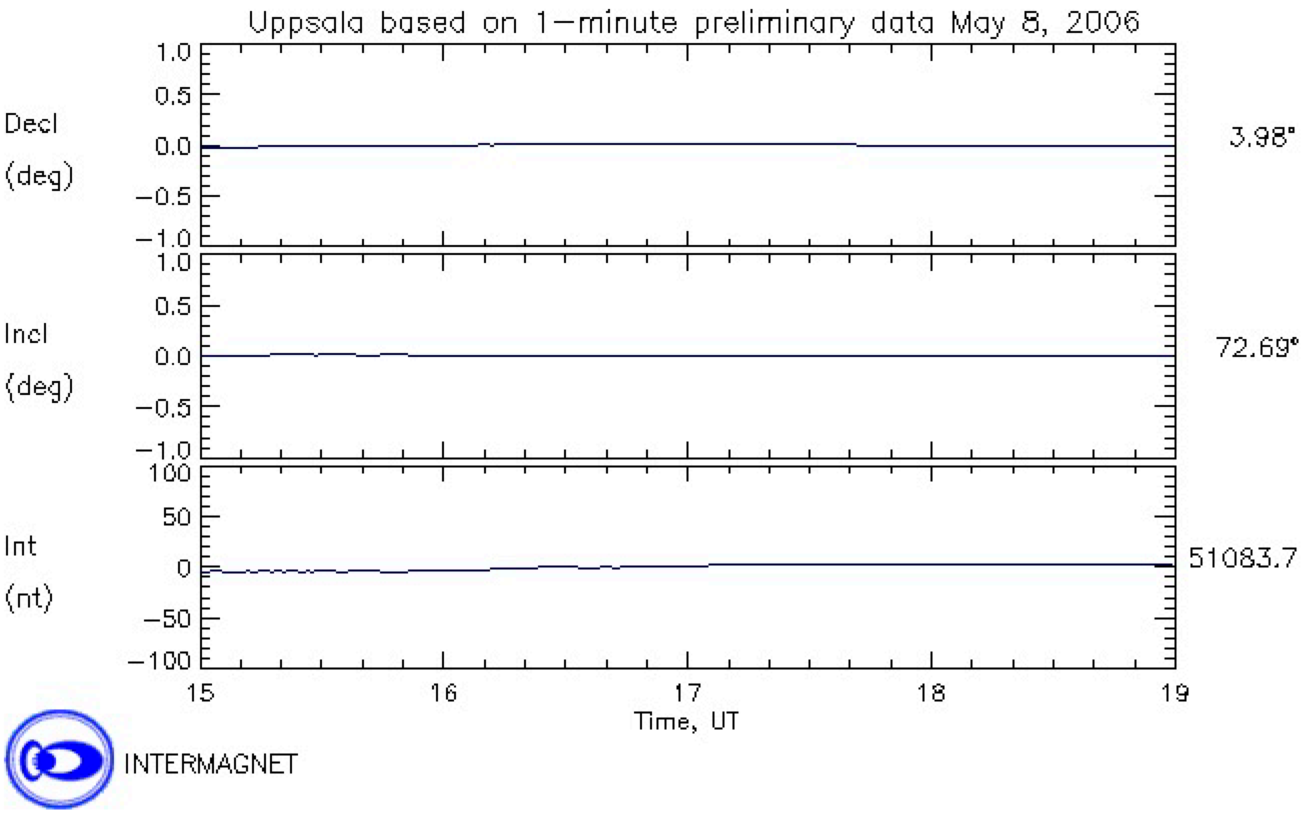
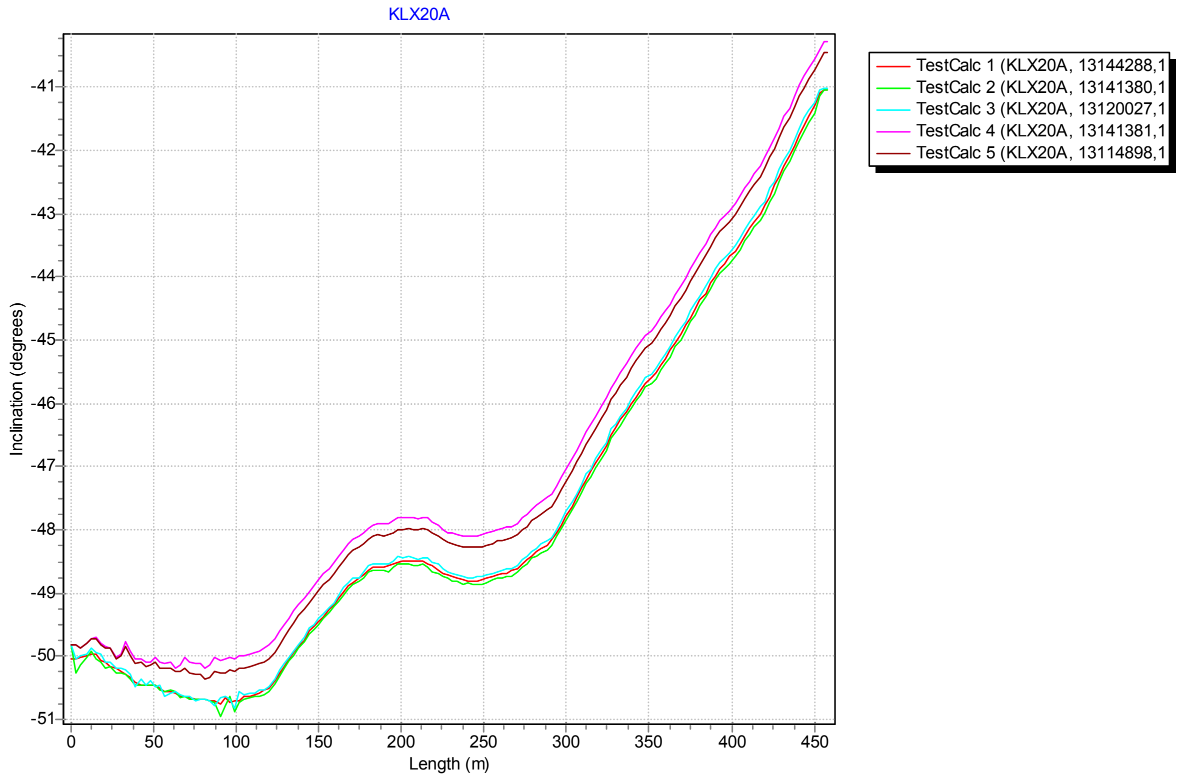


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-08.*



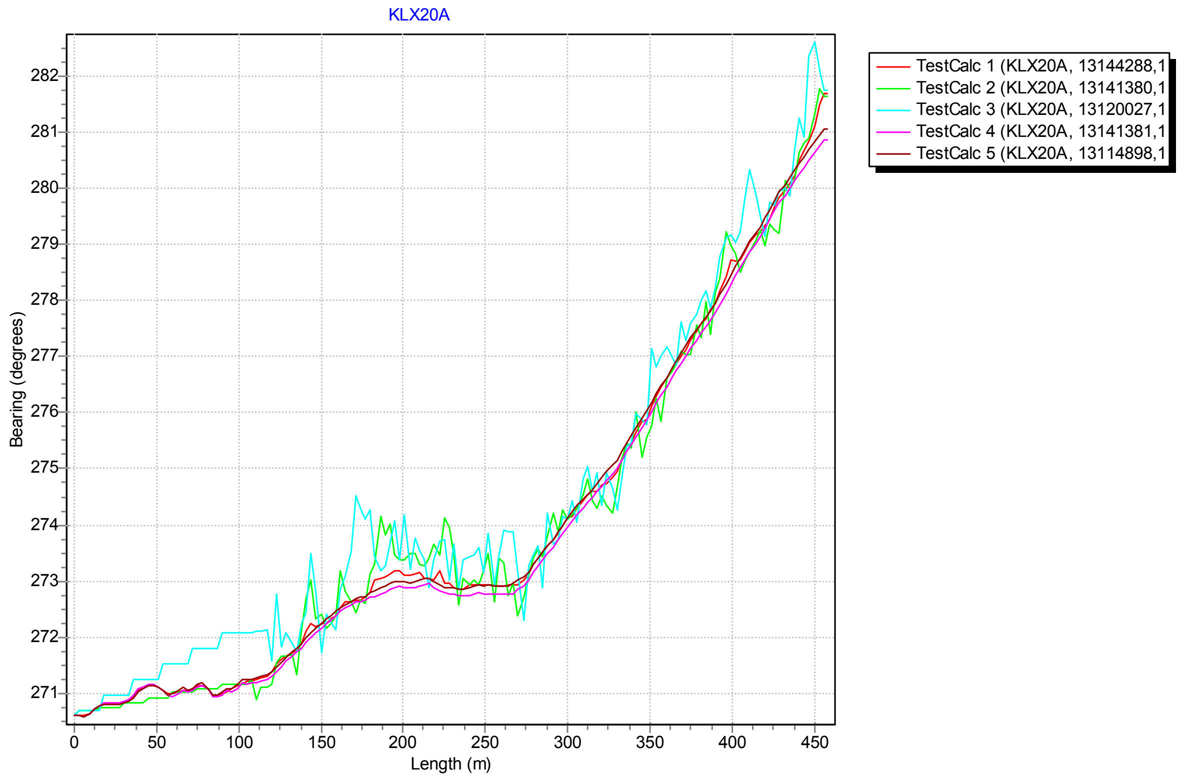


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX20A	13114898	EG156	Maxibor measurement	2006-04-29 07:00	0.00	456.00	CF
KLX20A	13141381	EG156	Maxibor measurement	2006-04-29 10:30	0.00	456.00	CF
KLX20A	13116206	EG157	Magnetic - accelerometer measurement	2006-05-08 00:00	0.00	456.00	EF
KLX20A	13120027	EG157	Magnetic - accelerometer measurement	2006-05-08 15:08	0.00	456.00	CF
KLX20A	13141380	EG157	Magnetic - accelerometer measurement	2006-05-08 16:54	0.00	456.00	CF
KLX20A	13144288	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX20A	13114898	BEARING	3.00	465.00	
KLX20A	13120027	BEARING	117.00	465.00	
KLX20A	13120027	INCLINATION	3.00	465.00	
KLX20A	13141380	BEARING	117.00	465.00	
KLX20A	13141380	INCLINATION	3.00	465.00	
KLX20A	13141381	BEARING	3.00	465.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

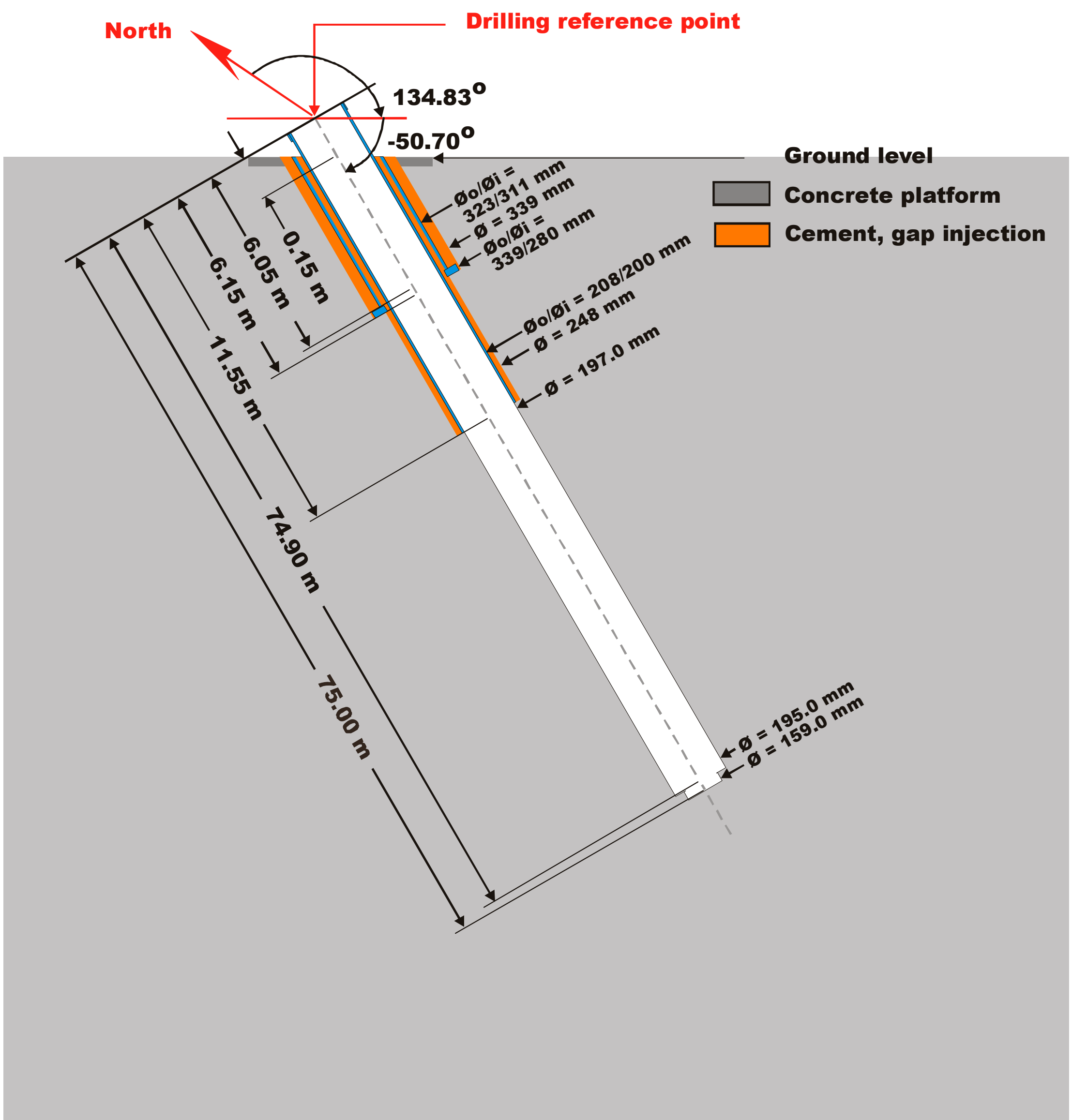
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX20A	6366334.57	1546604.89	27.24	0	0.00	-50.03	270.6	0.72	0.605	0
KLX20A	6366336.93	1546499.41	-99.6	165	1.33	-48.98	272.63	0.72	0.605	2.07
KLX20A	6366341.73	1546410.22	-200.83	300	2.45	-47.78	274.12	0.72	0.605	3.77
KLX20A	6366354.16	1546311.06	-300.16	441	3.71	-41.76	280.5	0.72	0.605	5.54
KLX20A	6366356.6	1546298.59	-311.34	457.92	3.87	-41.04	281.69	0.72	0.605	5.75

Borehole description – KLX21A

Technical description of borehole KLX21A is given in Figure 1.

Technical data

Borehole KLX21A



Drilling reference point

Northing: 6366158.1 (m), RT90 2,5 gon V 0:-15
Easting: 1549706.23 (m), RT90 2,5 gon V 0:-15
Elevation: 10.69 (m), RT90-RHB 70

Drilling period

Drilling start date: 2006-08-21
Drilling stop date: 2006-08-29

Ver 2007-06-01

Figure 1. *Technical description of borehole KLX21A.*

Deviation measurement in KLX21A

In total two deviation measurements were conducted in KLX21A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13147165, 13147166) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measuring, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13150523) the two Mag/acc measurements (ID 13147165, 13147166) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

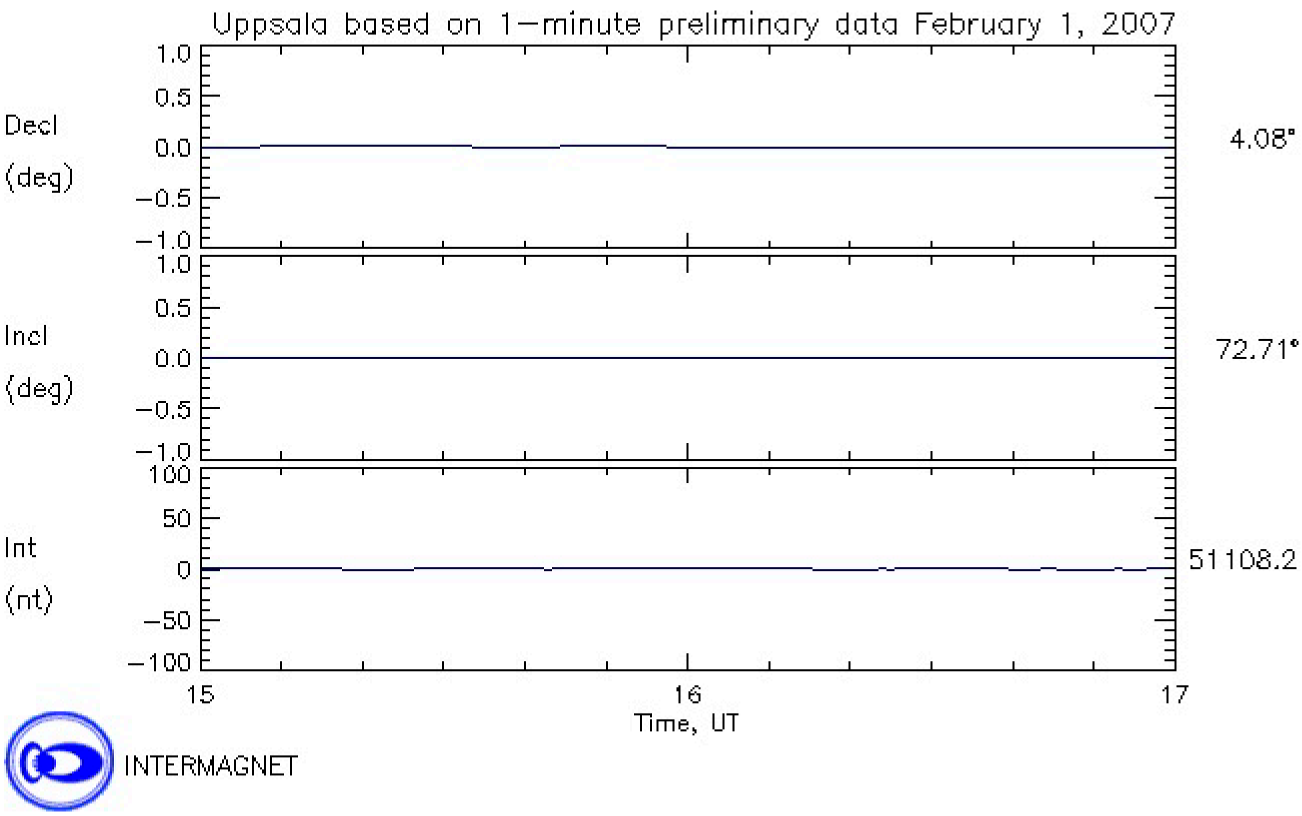
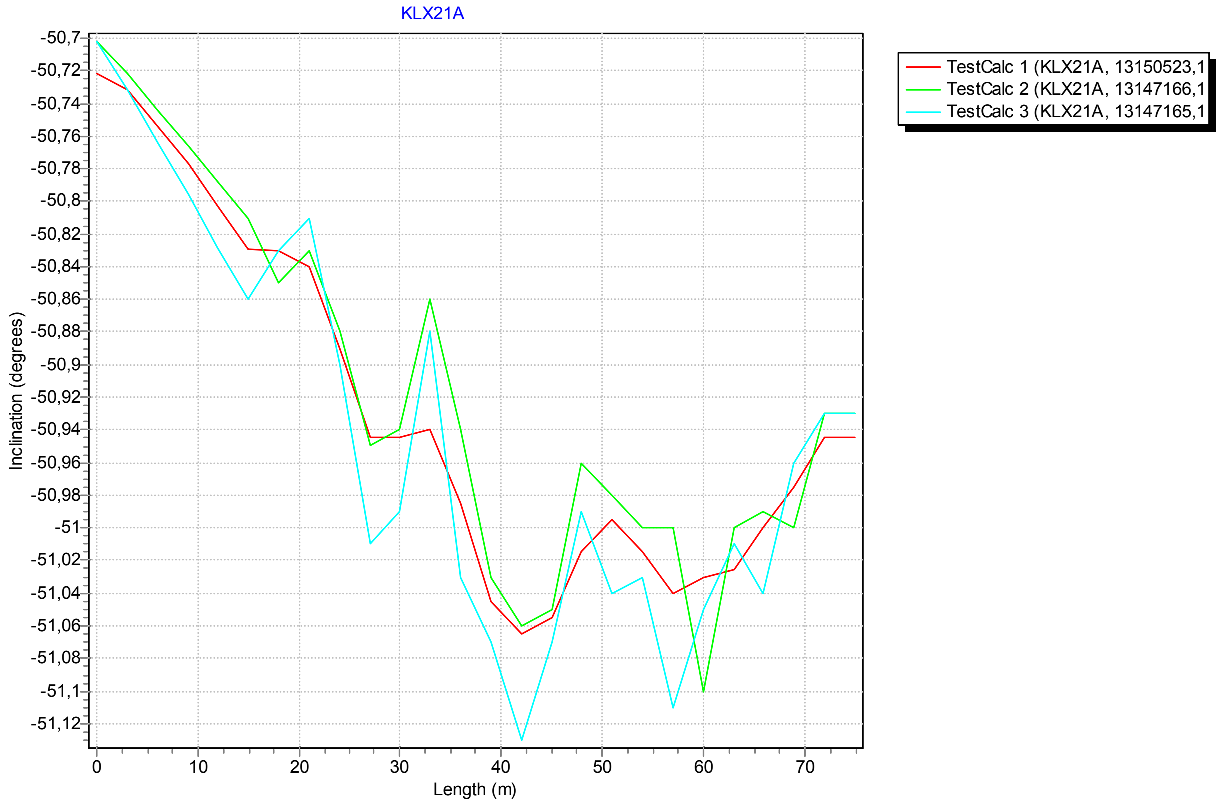


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2007-02-01.*



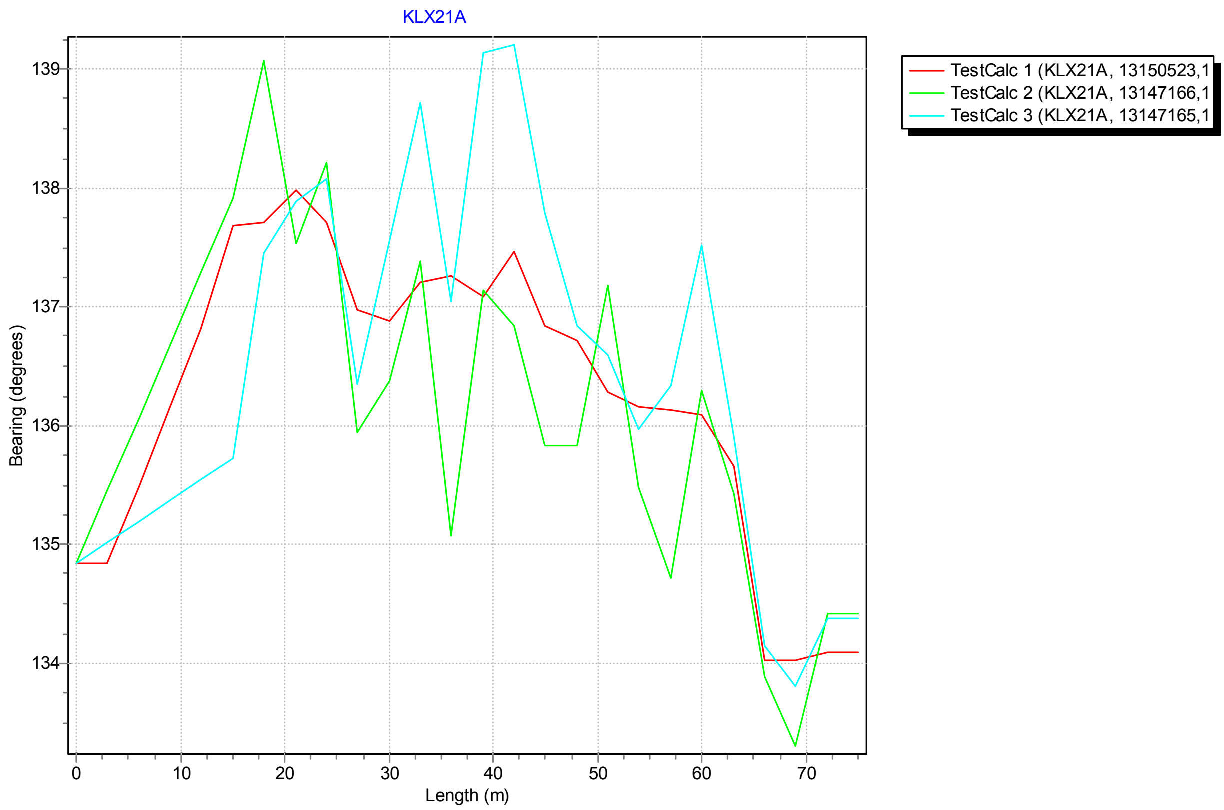


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX21A	13147165	EG157	Magnetic - accelerometer measurement	2007-02-01 15:30	0.00	72.00	C
KLX21A	13147166	EG157	Magnetic - accelerometer measurement	2007-02-01 15:45	0.00	72.00	C
KLX21A	13150523	EG154	Borehole deviation multiple measurements	2007-02-27 10:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX21A	13147165	BEARING	15.00	72.00	
KLX21A	13147165	INCLINATION	3.00	73.00	
KLX21A	13147166	BEARING	15.00	74.00	
KLX21A	13147166	INCLINATION	3.00	75.00	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX21A	6366158.18	1549706.23	10.69	0	0.00	-50.72	134.83	0.06	1.425	0
KLX21A	6366124.01	1549738.87	-47.54	75	0.05	-50.95	134.09	0.06	1.425	1.18

Borehole description – KLX21B

Technical description of borehole KLX21B is given in Figure 1.

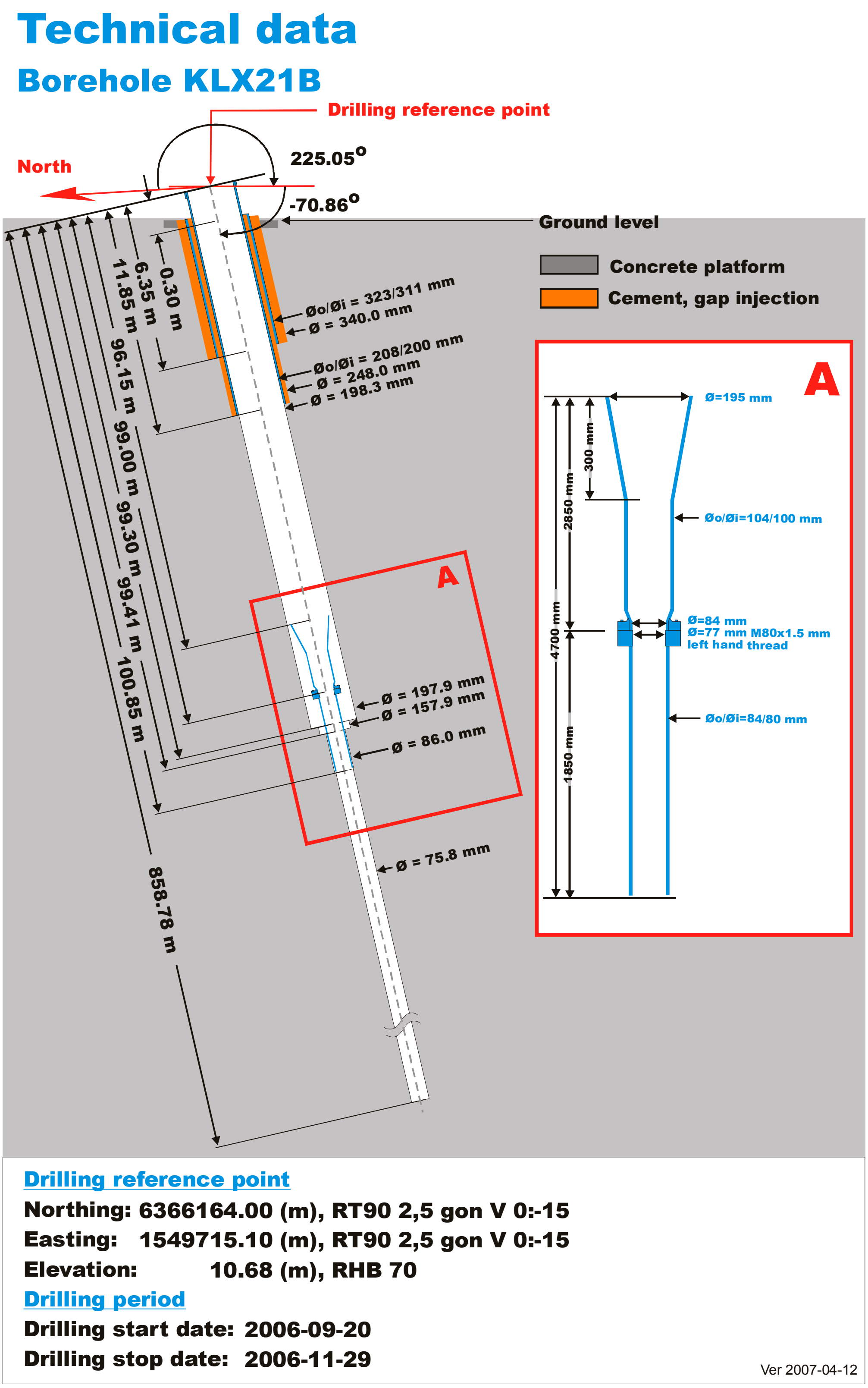


Figure 1. Technical description of borehole KLX21B.

Deviation measurement in KLX21B

In total four deviation measurements were conducted in KLX21B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The Maxibor measurement was executed with the instrument mounted inside a barrel which was joined to the lower end of the drill string.

The starting values for the Maxibor measurements in KLX21B were measured with the Total station aiming on a prism, above and lined up with the TOC. A later calculation gave the values at borehole length 3.00 m which was used as start values (bearing and inclination) for the Maxibor measurements. When the calculation of the Maxibor measurement was done, the values for borehole length 0.00 m were added. See document (ID 1037594 Documentum).

The two Maxibor measurements (ID 13138801, 13138803) were executed down and up the borehole.

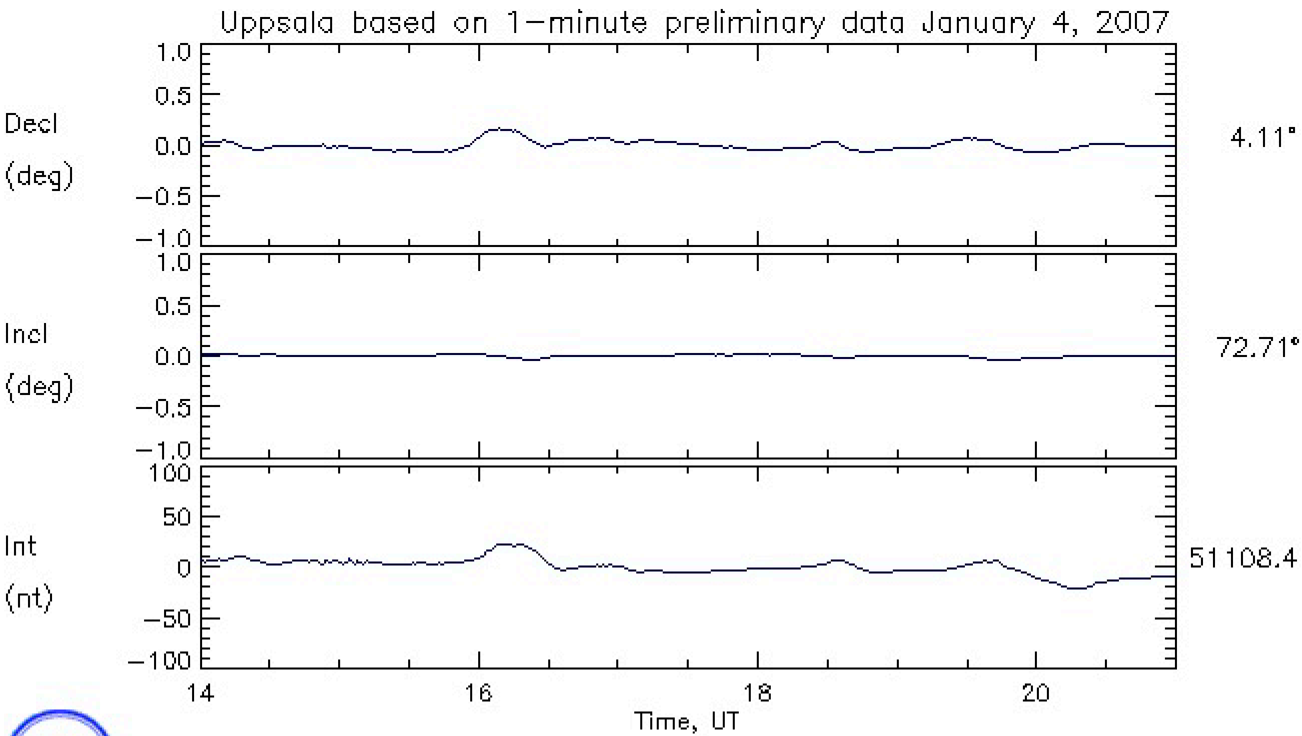
The two Mac/acc measurements (ID 13144889, 13144890) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13145644) the two Maxibor measurements (ID 13138801, 13138803) and the two Mag/acc measurements (ID 13144889, 13144890) were used. The file (ID 13145644) was ERROR-marked due to the fact that the bearing for both Mag/acc measurements were calculated from 3 m. This file was replaced with a new EG154- file (ID 13169280). The strategy used in selecting the activities was in agreement with the general strategy (Section 4.4.2). Table 2 shows all deviation data for the calculation.

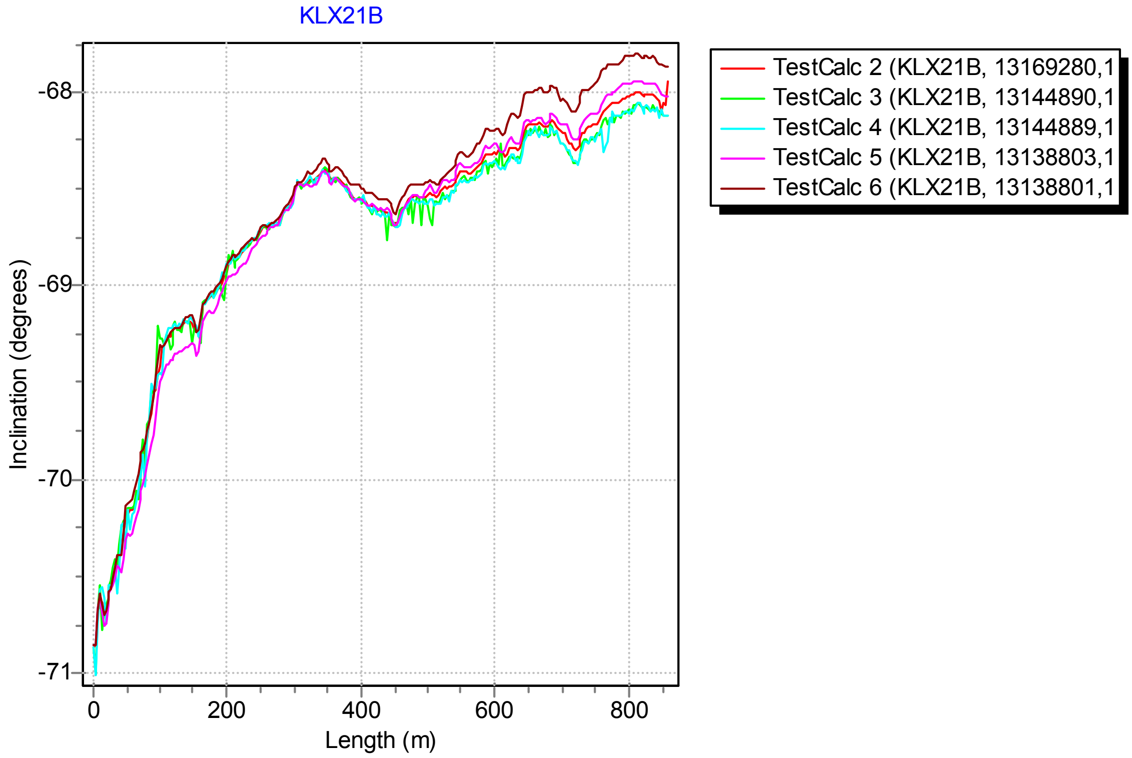
A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR-marked, deviation activities listed in Table 1.



INTERMAGNET

Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2007-01-04.*



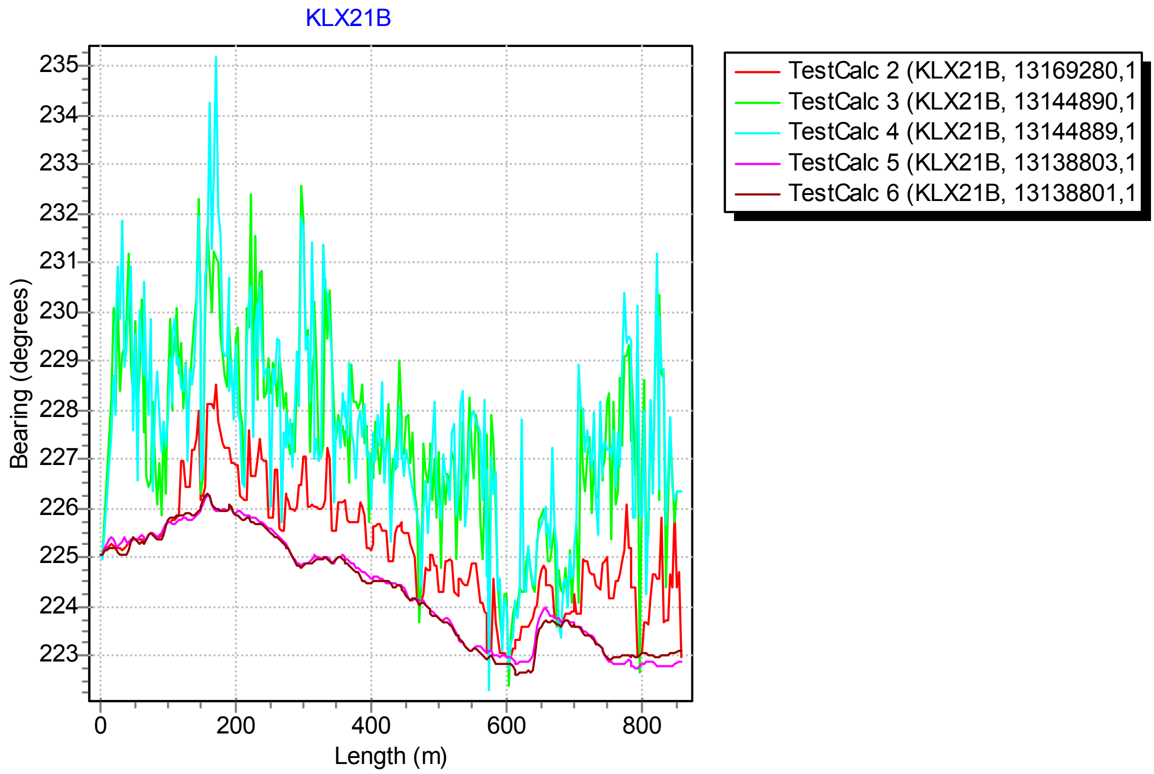


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX21B	13138801	EG156	Maxibor measurement	2006-12-01 06:00	0.00	855.00	CF
KLX21B	13138803	EG156	Maxibor measurement	2006-12-01 12:00	0.00	855.00	CF
KLX21B	13144889	EG157	Magnetic - accelerometer measurement	2007-01-04 15:00	0.00	852.00	CF
KLX21B	13144890	EG157	Magnetic - accelerometer measurement	2007-01-04 18:00	0.00	852.00	CF
KLX21B	13145644	EG154	Borehole deviation multiple measurements	2007-01-23 13:00			EC
KLX21B	13169280	EG154	Borehole deviation multiple measurements	2007-08-20 14:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX21B	13138801	BEARING	3.00	858.78	
KLX21B	13138801	INCLINATION	3.00	858.78	
KLX21B	13138803	BEARING	3.00	858.78	
KLX21B	13138803	INCLINATION	3.00	858.78	
KLX21B	13144889	BEARING	117.00	858.78	
KLX21B	13144889	INCLINATION	3.00	858.78	
KLX21B	13144890	BEARING	117.00	858.78	
KLX21B	13144890	INCLINATION	3.00	858.78	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

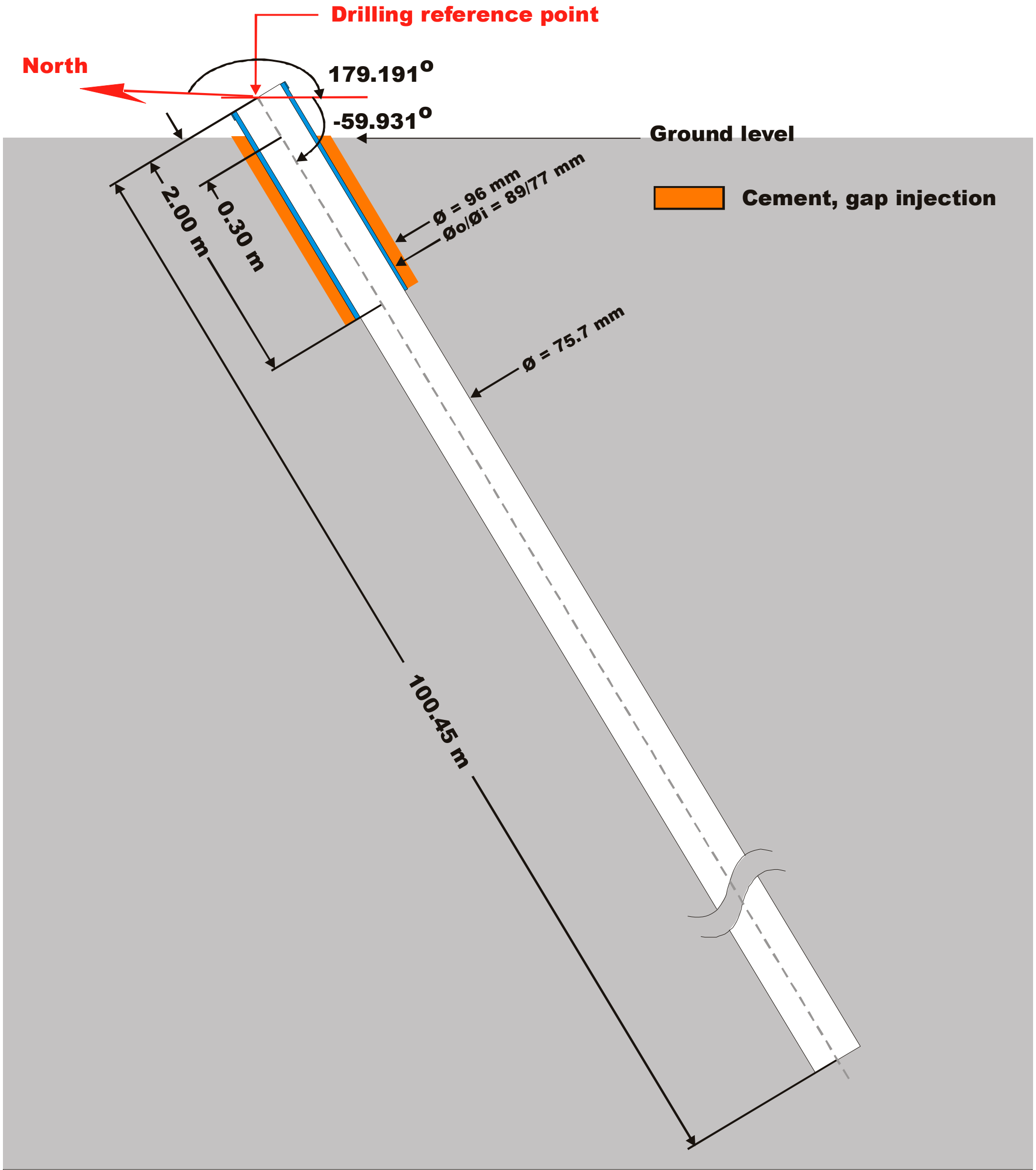
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX21B	6366164.00	1549715.10	10.68	0	0.00	-70.86	225.05	0.135	3.35	0.00
KLX21B	6366136.00	1549686.71	-99.31	117	0.09	-69.23	225.85	0.135	3.35	2.33
KLX21B	6366109.70	1549658.46	-200.18	225	0.19	-68.81	226.64	0.135	3.35	4.59
KLX21B	6366082.51	1549629.99	-300.75	333	0.28	-68.44	226.16	0.135	3.35	6.89
KLX21B	6366054.90	1549601.68	-401.24	441	0.37	-68.63	225.63	0.135	3.35	9.2
KLX21B	6366027.64	1549574.63	-498.97	546	0.46	-68.43	224.63	0.135	3.35	11.44
KLX21B	6365998.81	1549547.06	-599.33	654	0.56	-68.17	224.83	0.135	3.35	13.78
KLX21B	6365970.10	1549519.04	-699.61	762	0.65	-68.1	224.51	0.135	3.35	16.12
KLX21B	6365944.24	1549493.71	-789.36	858.78	0.74	-67.94	222.97	0.135	3.35	18.24

Borehole description – KLX22A

Technical description of borehole KLX22A is given in Figure 1.

Technical data

Borehole KLX22A



Drilling reference point
Northing: 6366548.348 (m), RT90 2,5 gon V 0:-15
Easting: 1546688.595 (m), RT90 2,5 gon V 0:-15
Elevation: 21.976 (m), RHB 70
Drilling period
Drilling start date: 2006-05-05
Drilling stop date: 2006-05-12

Ver 2006-12-21

Figure 1. *Technical description of borehole KLX22A.*

Deviation measurement in KLX22A

In total two deviation measurements were conducted in KLX22A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141470, 13118123) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144299) the two Mag/acc measurements (ID 13141470, 13118123) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

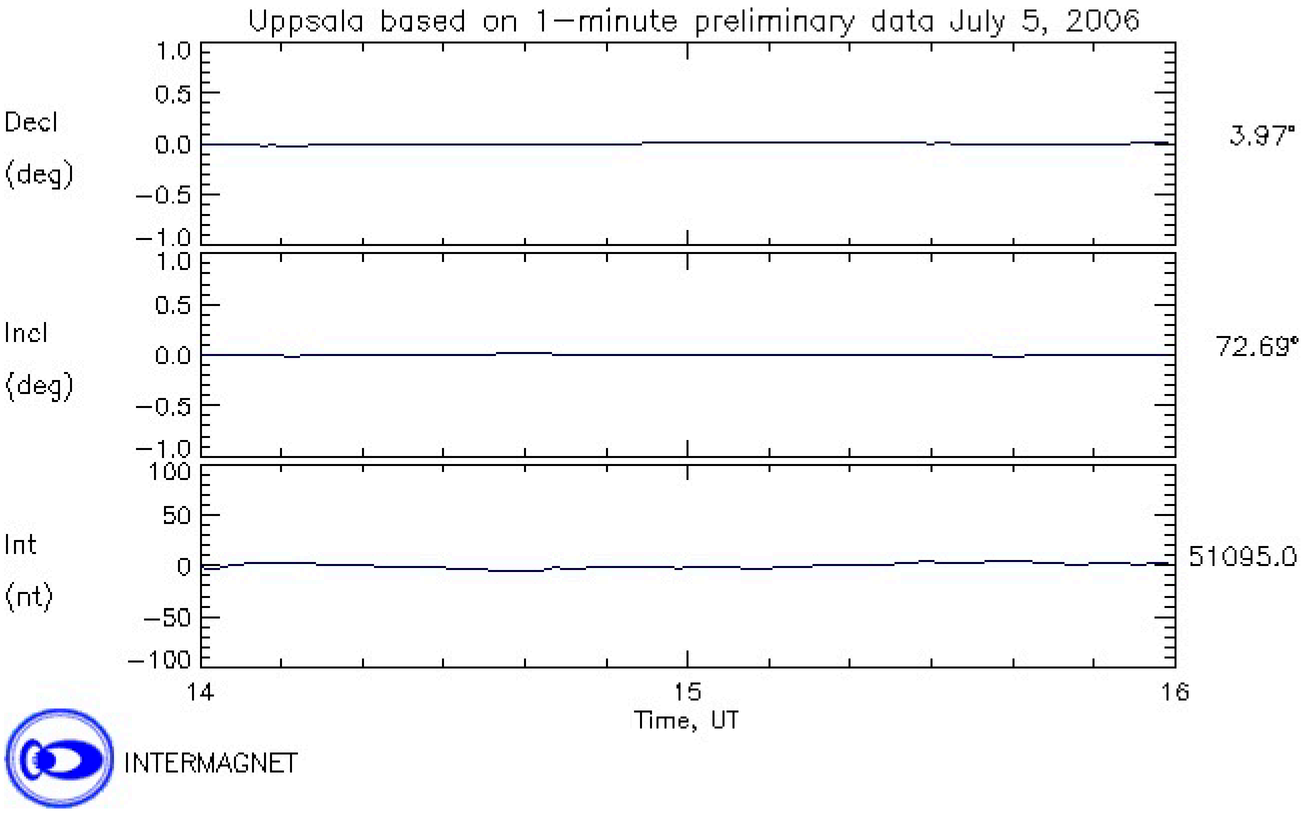
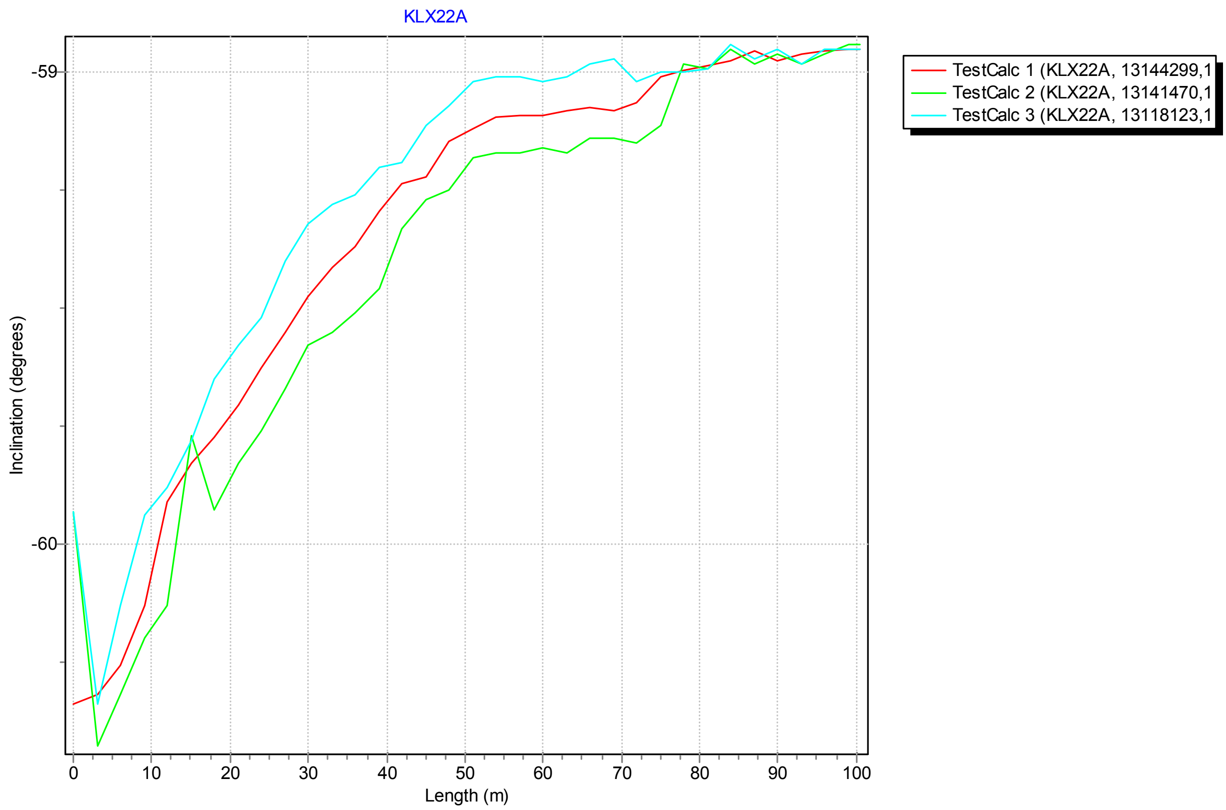


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-07-05.*



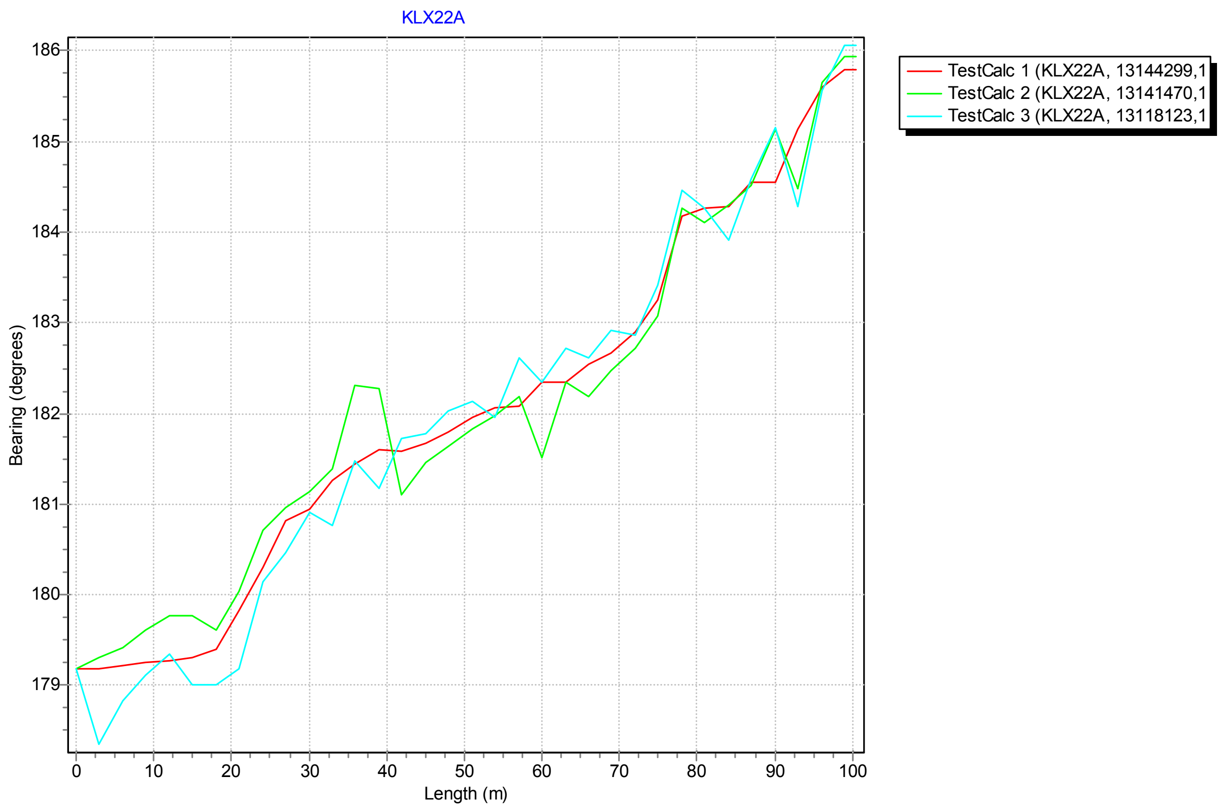


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX22A	13118123	EG157	Magnetic - accelerometer measurement	2006-07-05 14:32	0.00	99.00	CF
KLX22A	13141470	EG157	Magnetic - accelerometer measurement	2006-07-05 14:46	0.00	99.00	CF
KLX22A	13144299	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX22A	13118123	BEARING	18.00	100.45	
KLX22A	13118123	INCLINATION	3.00	100.45	
KLX22A	13141470	BEARING	18.00	100.45	
KLX22A	13141470	INCLINATION	3.00	100.45	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

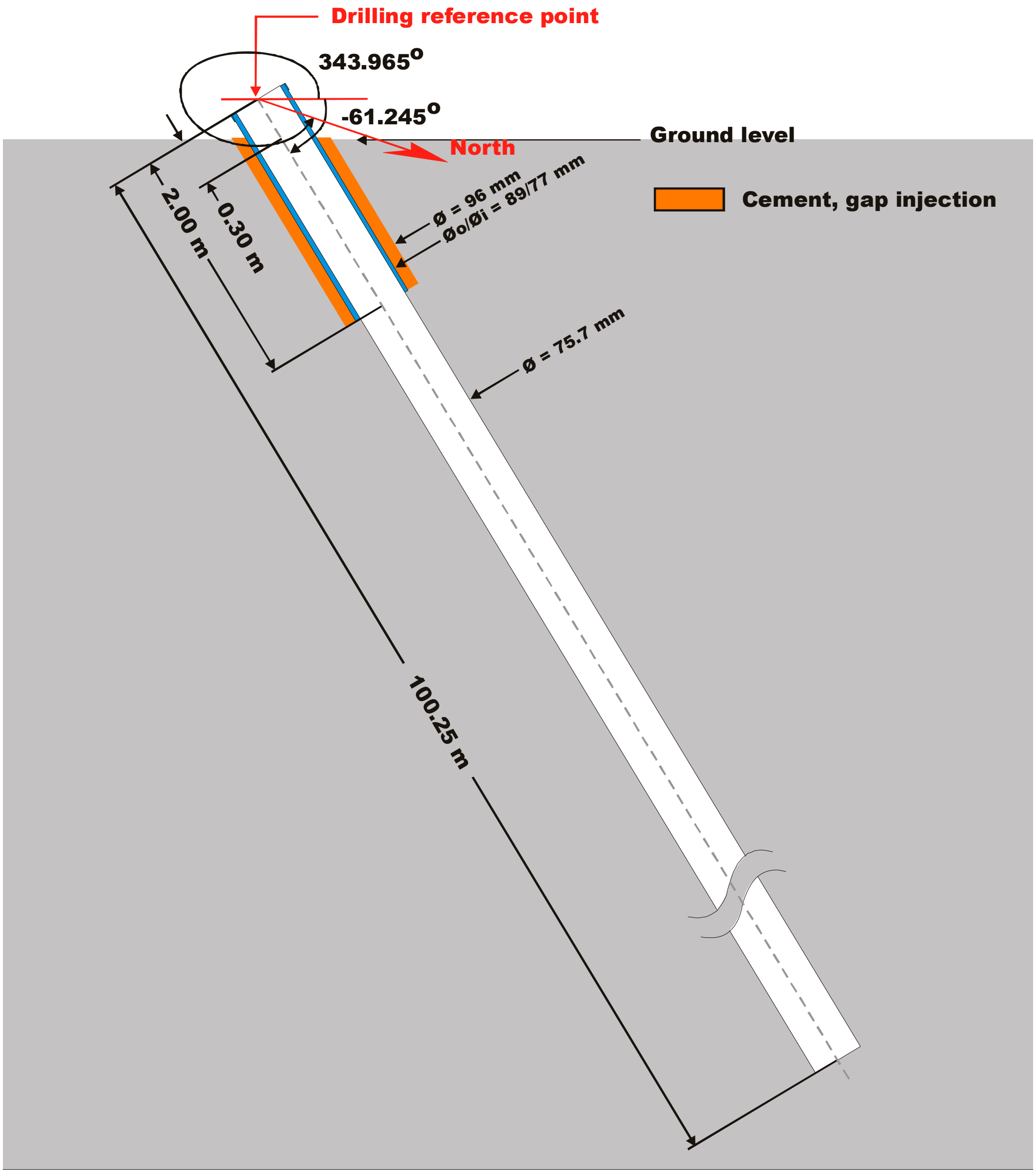
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX22A	6366548.35	1546688.6	21.97	0	0.00	-60.34	179.19	0.151	0.666	0
KLX22A	6366497.19	1546686.79	-64.44	100.45	0.14	-58.95	185.8	0.151	0.666	0.6

Borehole description – KLX22B

Technical description of borehole KLX22B is given in Figure 1.

Technical data

Borehole KLX22B



Drilling reference point

Northing: 6366553.127 (m), RT90 2,5 gon V 0:-15

Easting: 1546685.405 (m), RT90 2,5 gon V 0:-15

Elevation: 21.575 (m), RHB 70

Drilling period

Drilling start date: 2006-05-13

Drilling stop date: 2006-05-18

Ver 2006-12-21

Figure 1. Technical description of borehole KLX22B.

Deviation measurement in KLX22B

In total two deviation measurements were conducted in KLX22B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141479, 13118124) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144289) the two Mag/acc measurements (ID 13141479, 13118124) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

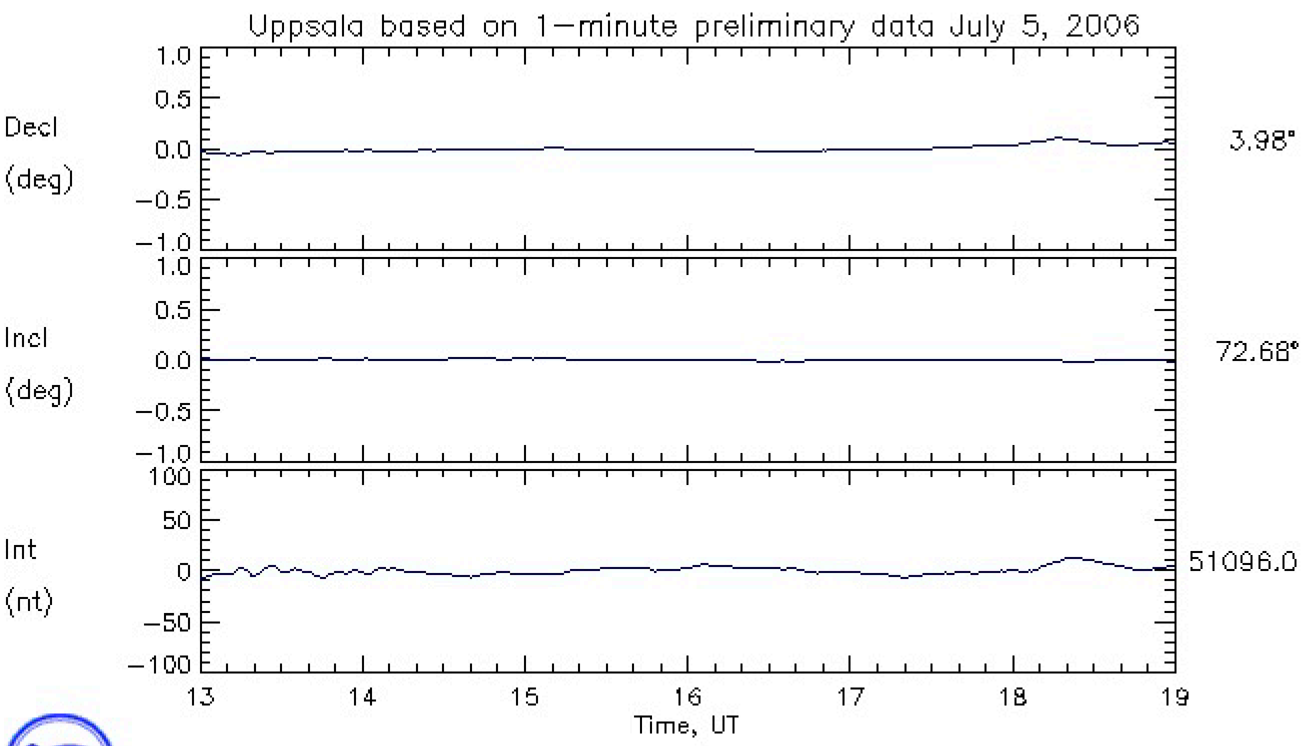
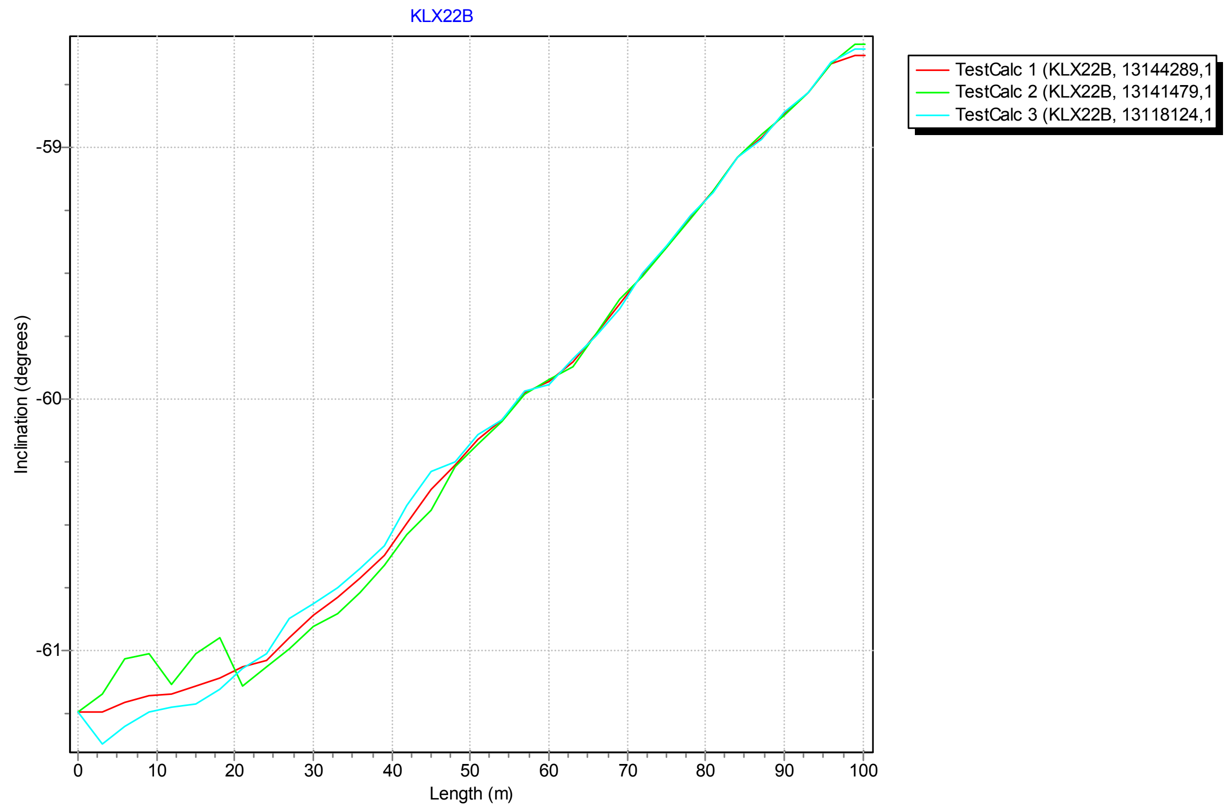


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-07-05.*



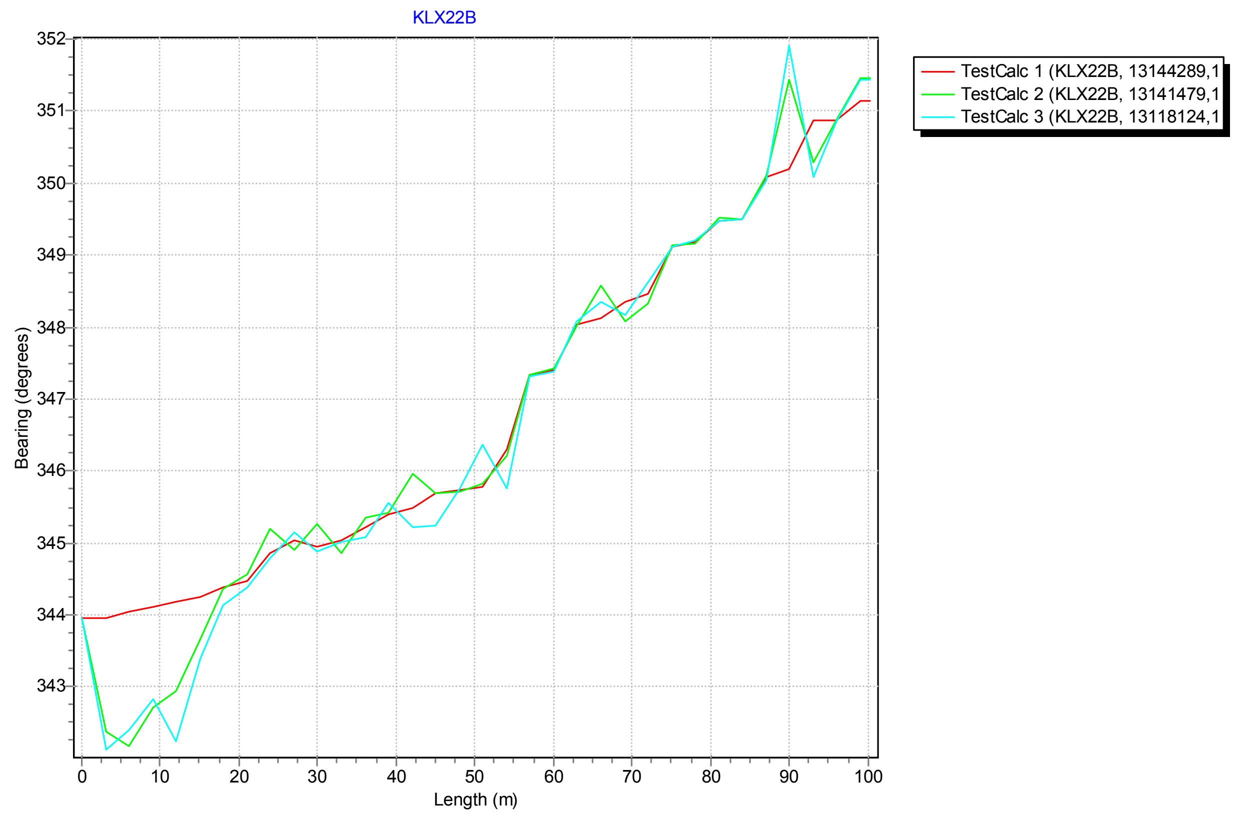


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX22B	13118124	EG157	Magnetic - accelerometer measurement	2006-07-05 13:35	0.00	99.00	CF
KLX22B	13141479	EG157	Magnetic - accelerometer measurement	2006-07-05 14:15	0.00	99.00	CF
KLX22B	13144289	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX22B	13118124	BEARING	18.00	100.25	
KLX22B	13118124	INCLINATION	3.00	100.25	
KLX22B	13141479	BEARING	18.00	100.25	
KLX22B	13141479	INCLINATION	3.00	100.25	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

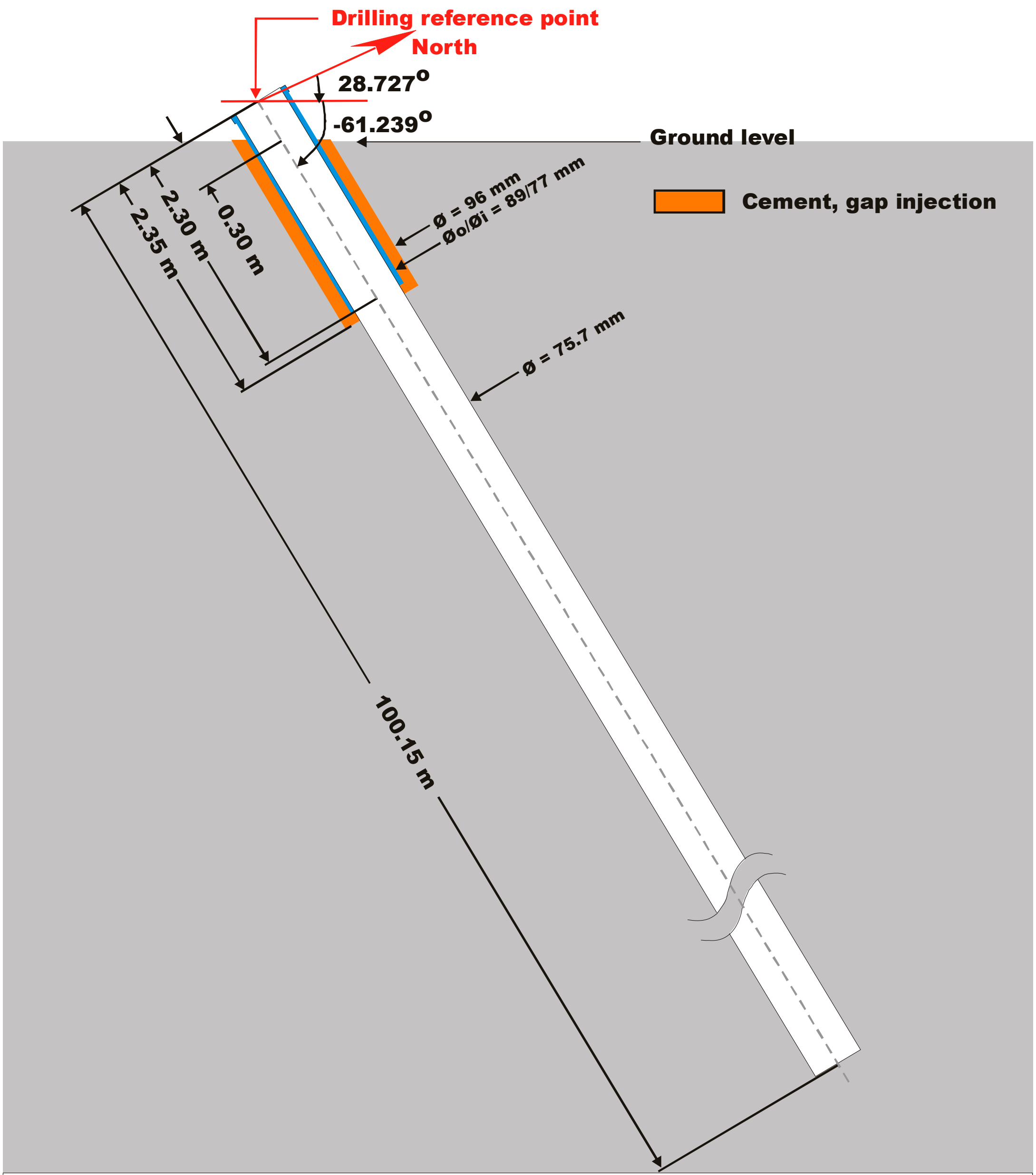
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX22B	6366553.13	1546685.41	21.57	0	0.00	-61.25	343.97	0.101	1.37	0
KLX22B	6366601.7	1546674.09	-65.35	100.25	0.09	-58.63	351.15	0.101	1.37	1.2

Borehole description – KLX23A

Technical description of borehole KLX23A is given in Figure 1.

Technical data

Borehole KLX23A



Drilling reference point

Northing: 6366106.892 (m), RT90 2,5 gon V 0:-15
Easting: 1546715.743 (m), RT90 2,5 gon V 0:-15
Elevation: 22.263 (m), RHB 70

Drilling period

Drilling start date: 2006-05-21
Drilling stop date: 2006-05-27

Ver 2006-12-21

Figure 1. Technical description of borehole KLX23A.

Deviation measurement in KLX23A

In total two deviation measurements were conducted in KLX23A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141481, 13118125) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144290) the two Mag/acc measurements (ID 13141481, 13118125) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

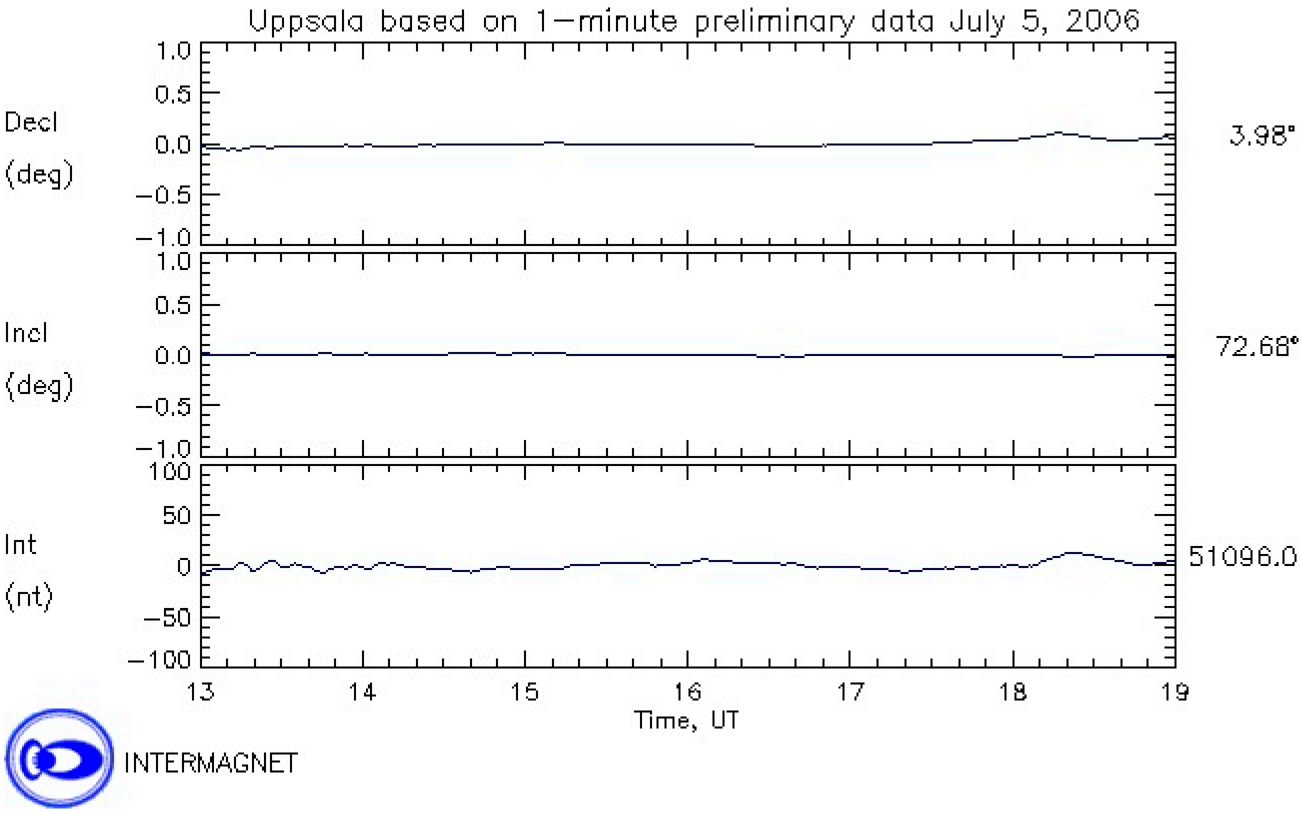
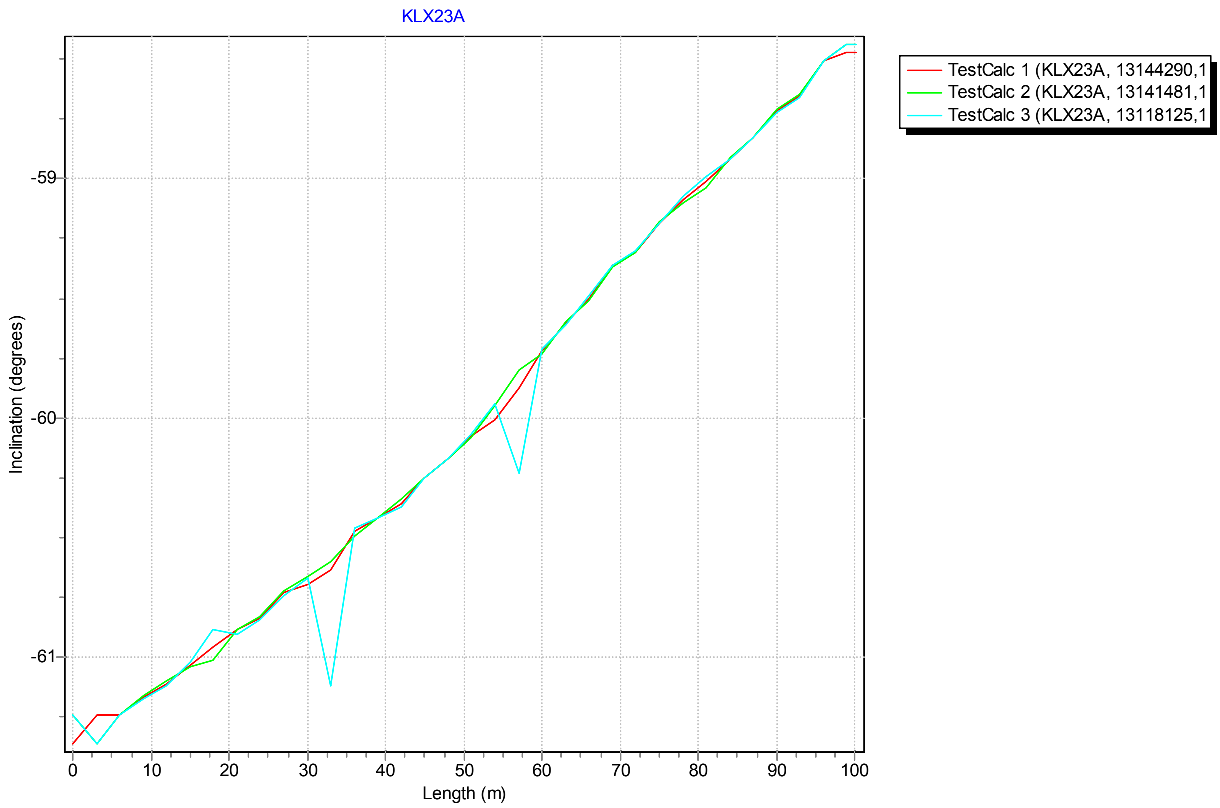


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-07-05.*



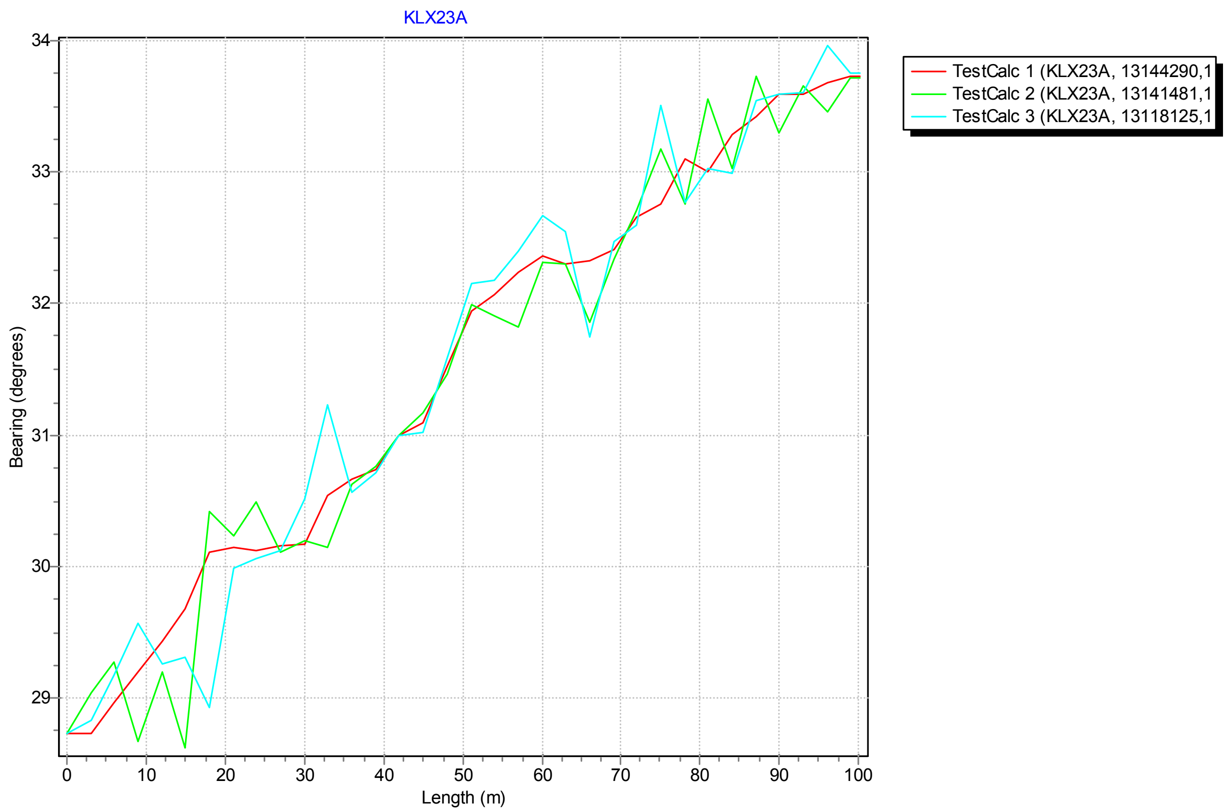


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX23A	13118125	EG157	Magnetic - accelerometer measurement	2006-07-05 17:56	0.00	99.00	CF
KLX23A	13141481	EG157	Magnetic - accelerometer measurement	2006-07-05 18:15	0.00	99.00	CF
KLX23A	13144290	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

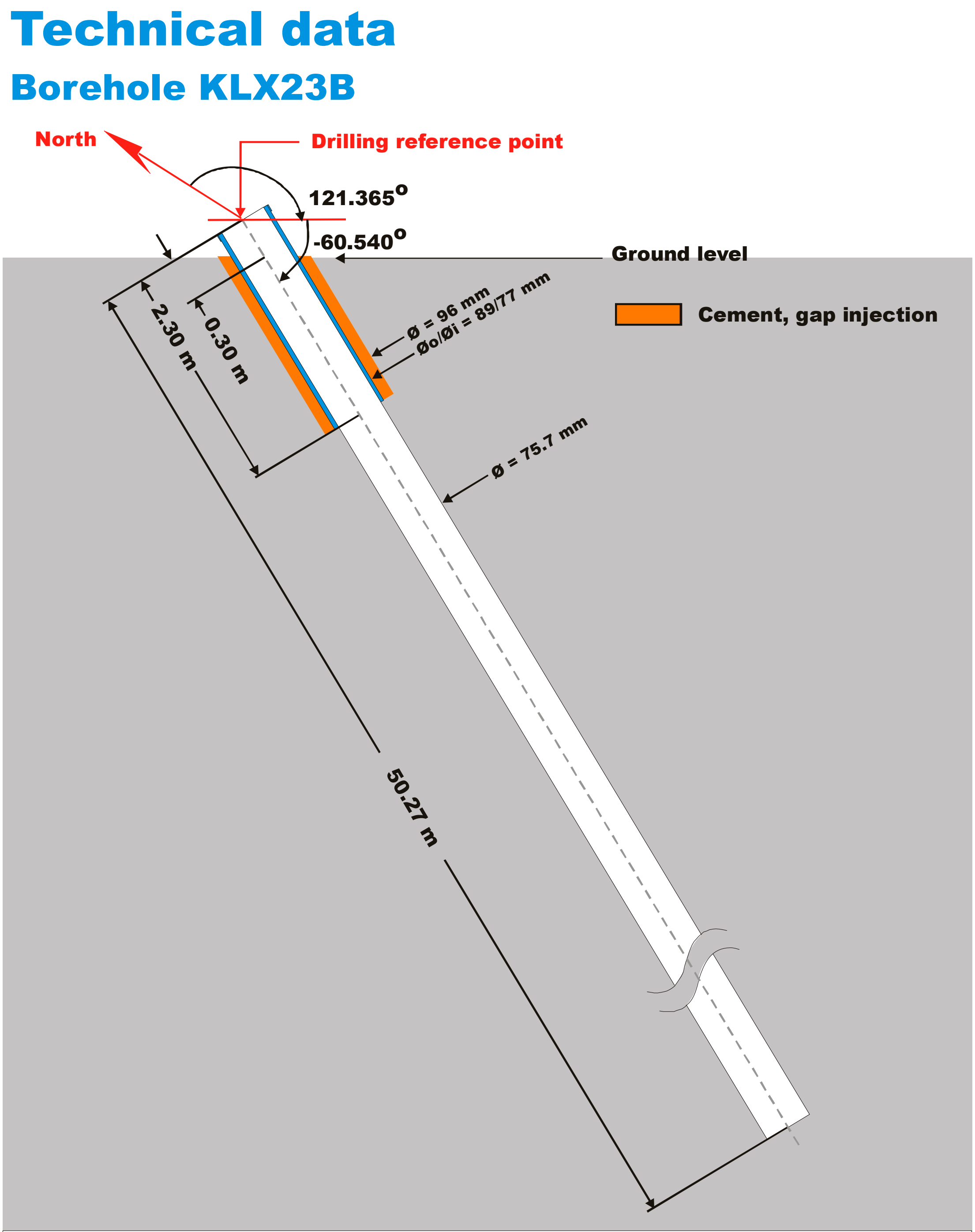
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX23A	13118125	BEARING	18.00	100.15	
KLX23A	13118125	INCLINATION	3.00	100.15	
KLX23A	13141481	BEARING	18.00	100.15	
KLX23A	13141481	INCLINATION	3.00	100.15	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX23A	6366106.89	1546715.74	22.26	0	0.00	-61.36	28.73	0.08	0.482	0
KLX23A	6366149.56	1546741.92	-64.46	100.15	0.07	-58.47	33.73	0.08	0.482	0.42

Borehole description – KLX23B

Technical description of borehole KLX23B is given in Figure 1.



Drilling reference point

Northing: 6366101.900 (m), RT90 2,5 gon V 0:-15

Easting: 1546717.332 (m), RT90 2,5 gon V 0:-15

Elevation: 22.317 (m), RHB 70

Drilling period

Drilling start date: 2006-05-28

Drilling stop date: 2006-05-31

Ver 2006-12-21

Figure 1. *Technical description of borehole KLX23B.*

Deviation measurement in KLX23B

In total two deviation measurements were conducted in KLX23B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141483, 13118122) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144291) the two Mag/acc measurements (ID 13141483, 13118122) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

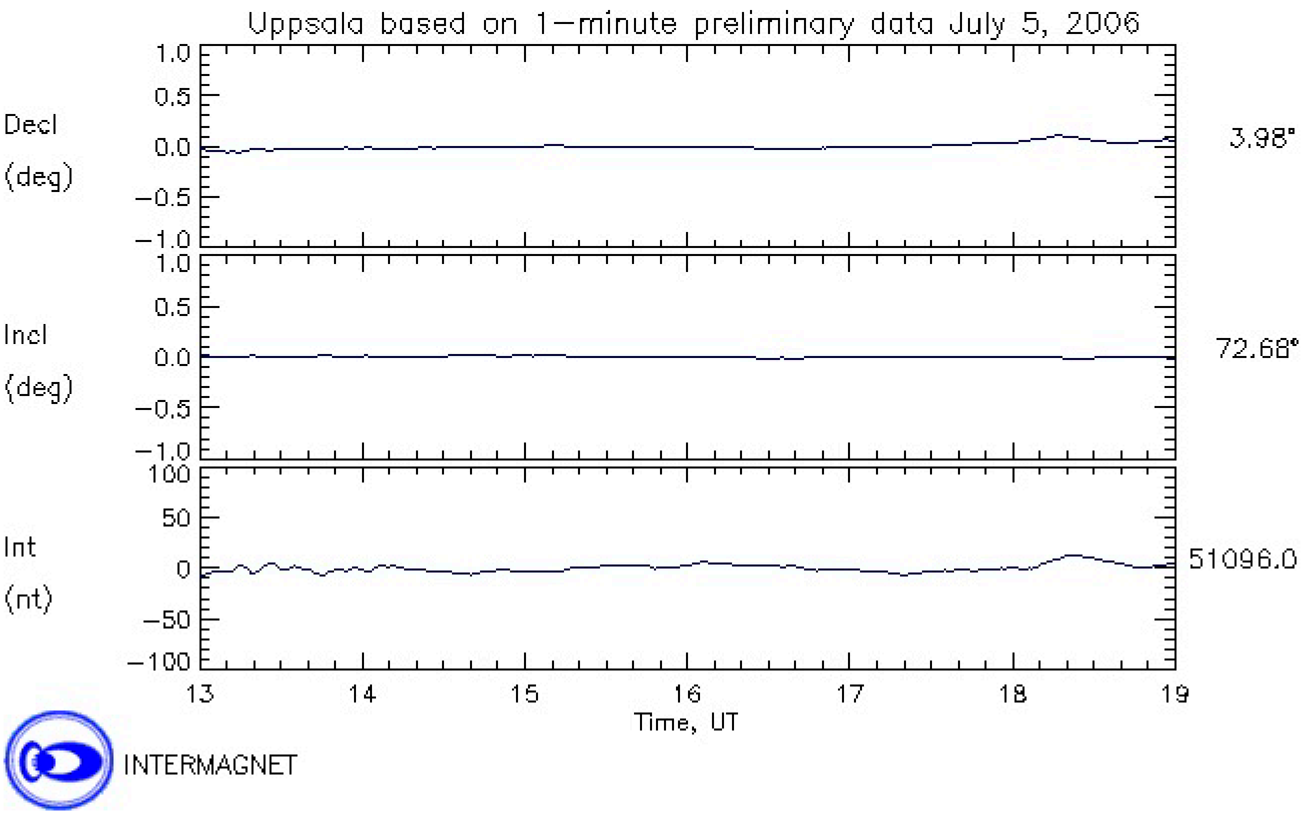
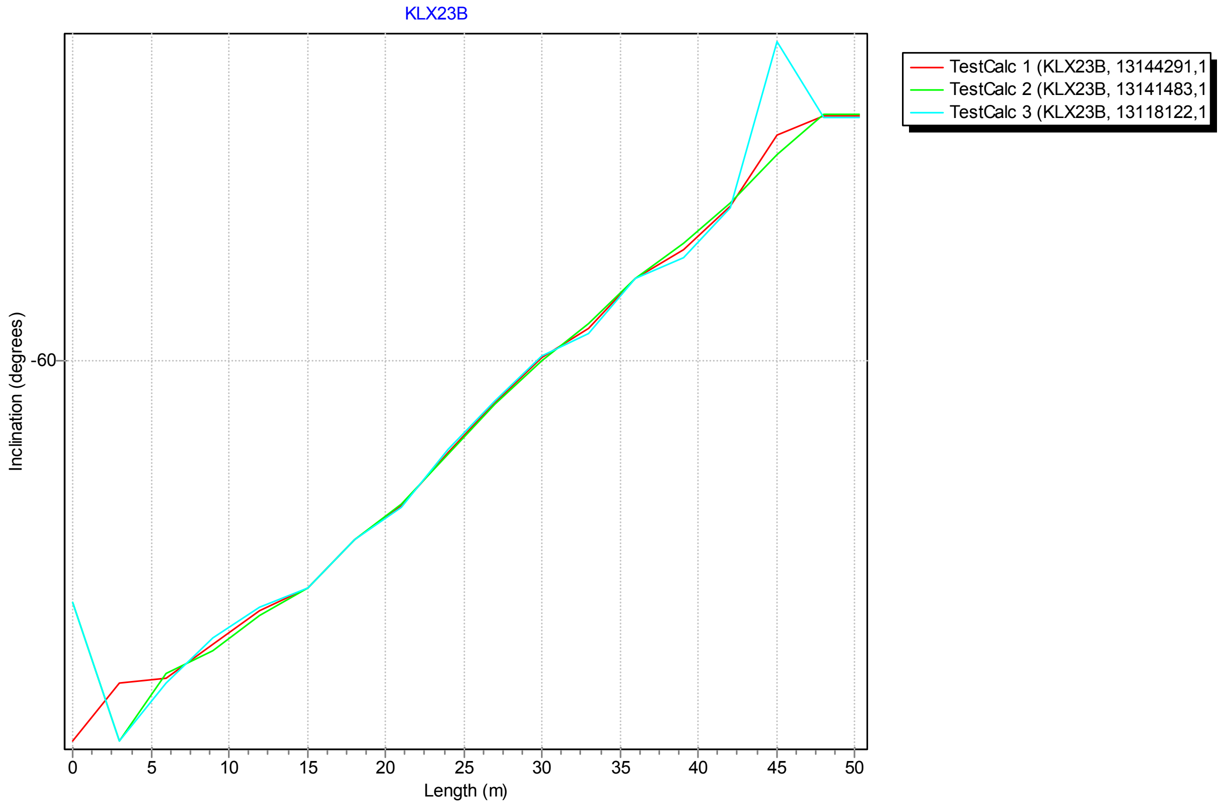


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-07-05.*



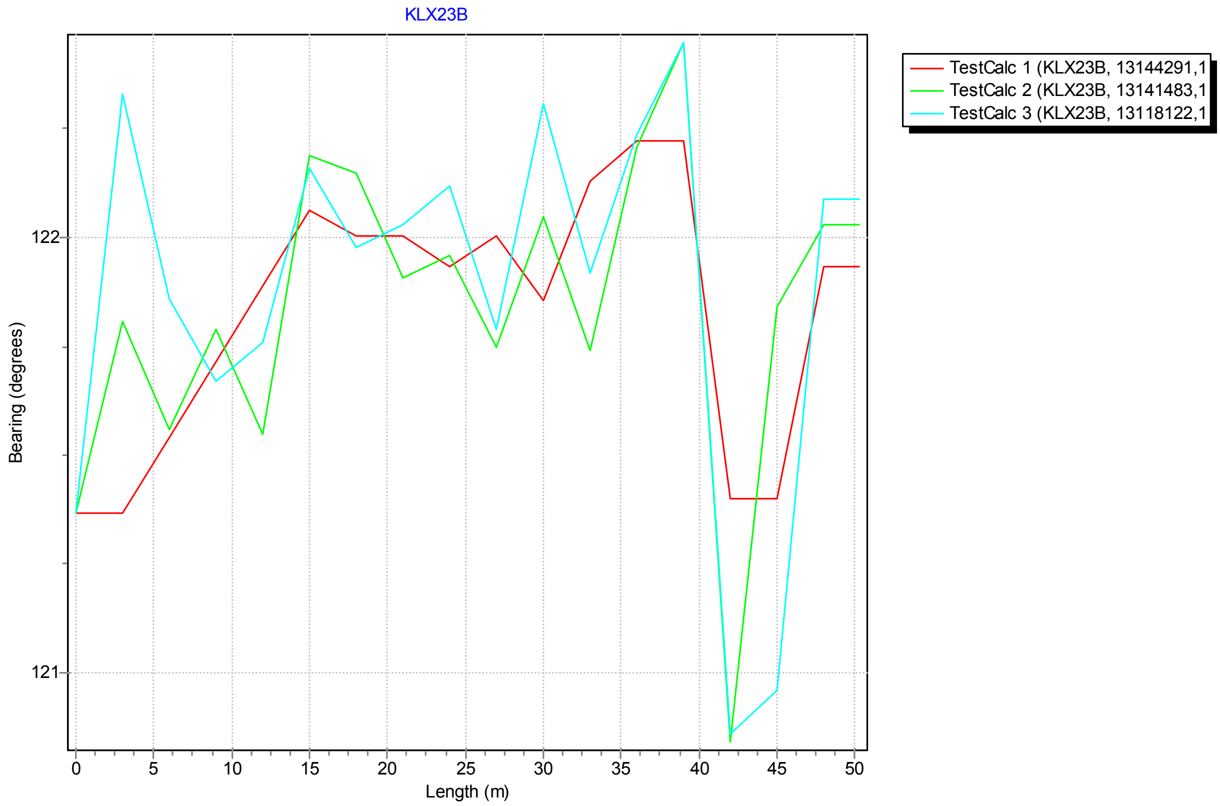


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX23B	13118122	EG157	Magnetic - accelerometer measurement	2006-07-05 18:35	0.00	48.00	CF
KLX23B	13141483	EG157	Magnetic - accelerometer measurement	2006-07-05 18:49	0.00	48.00	CF
KLX23B	13144291	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

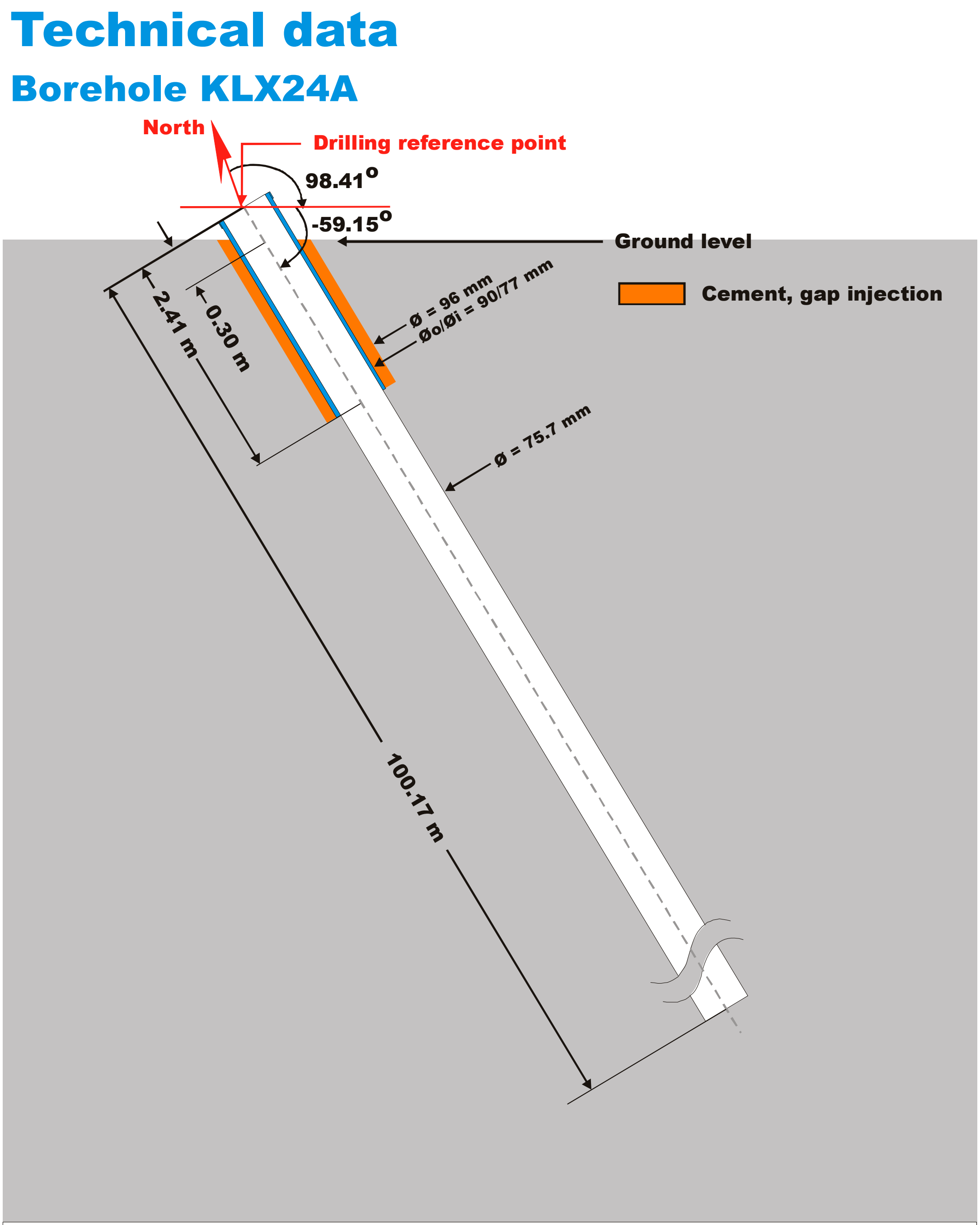
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX23B	13118122	BEARING	18.00	50.27	
KLX23B	13118122	INCLINATION	3.00	50.27	
KLX23B	13141483	BEARING	18.00	50.27	
KLX23B	13141483	INCLINATION	3.00	50.27	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Id Code	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX23B	6366101.9	1546717.33	22.32	0	0.00	-60.85	121.36	0.13	0.552	0
KLX23B	6366088.7	1546738.58	-21.28	50.27	0.06	-59.45	121.94	0.13	0.552	0.24

Borehole description – KLX24A

Technical description of borehole KLX24A is given in Figure 1.



Drilling reference point

Northing: 6366423.35 (m), RT90 2,5 gon V 0:-15

Easting: 1546853.80 (m), RT90 2,5 gon V 0:-15

Elevation: 21.29 (m), RHB 70

Drilling period

Drilling start date: 2006-06-14

Drilling stop date: 2006-06-29

Ver 2006-12-19

Figure 1. *Technical description of borehole KLX24A.*

Deviation measurement in KLX24A

In total two deviation measurements were conducted in KLX24A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141485, 13119008) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144292) the two Mag/acc measurements (ID 13141485, 13119008) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

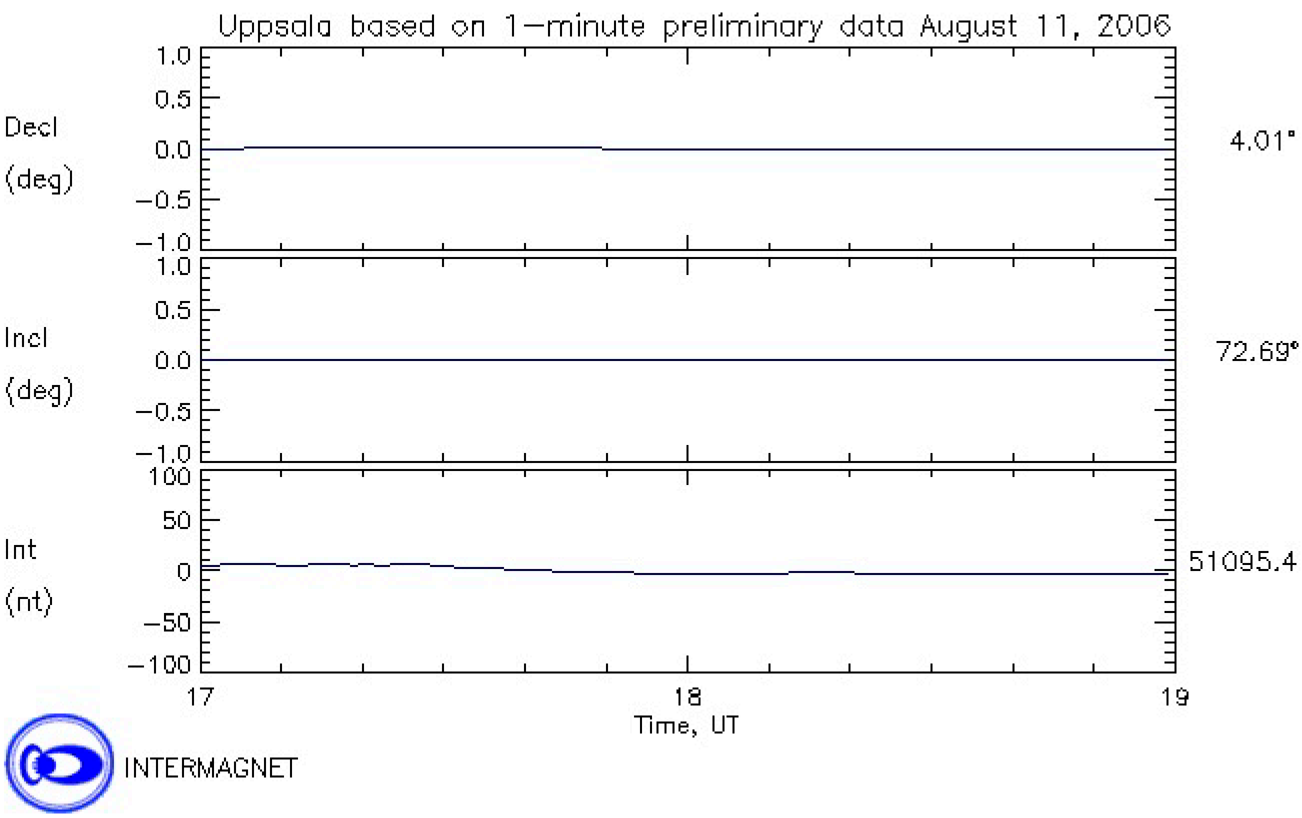
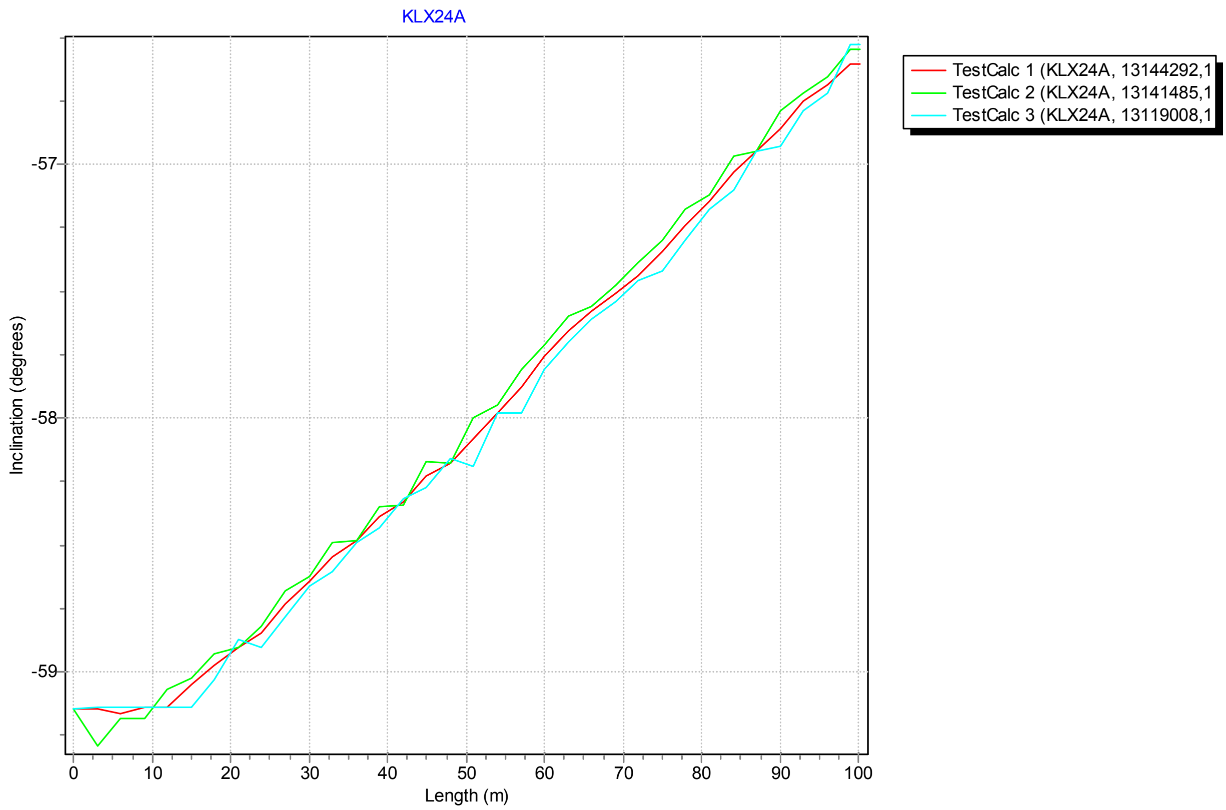


***Figure 2.** The geomagnetic field was observed at the Observatory in Uppsala on 2006-08-11.*



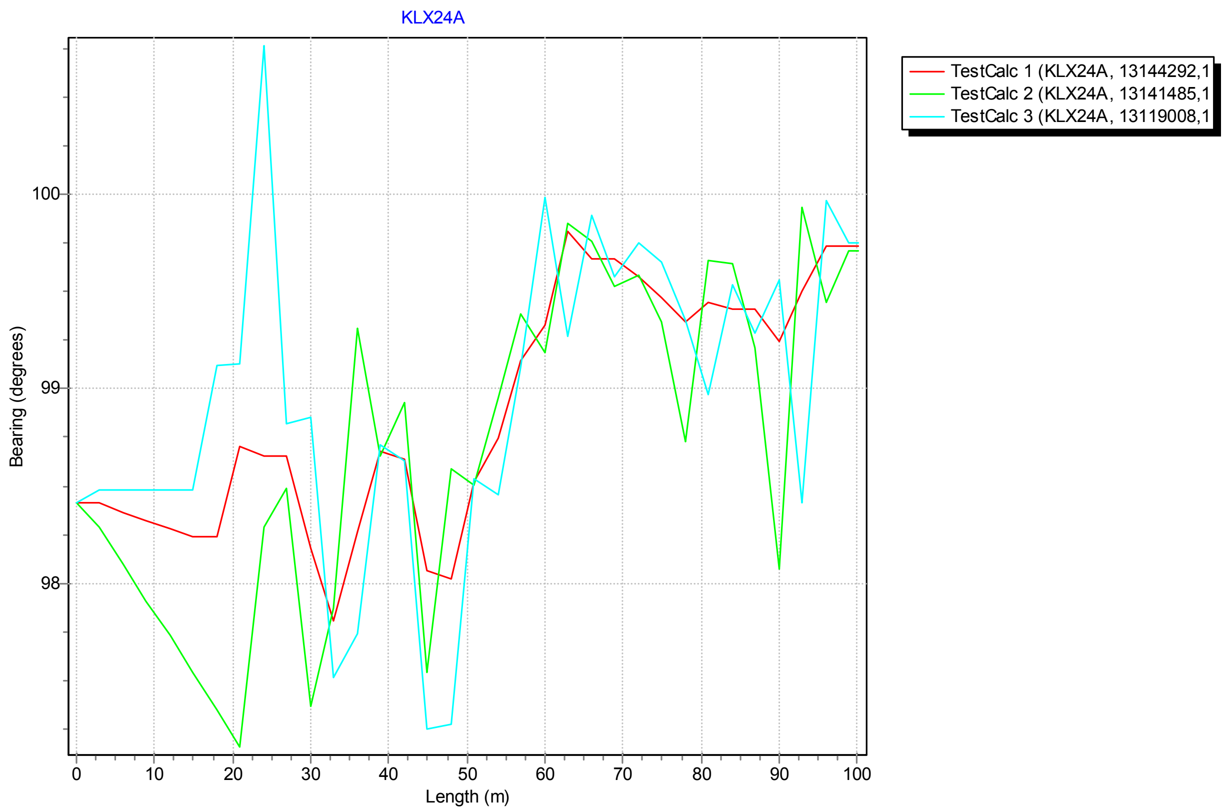


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX24A	13119008	EG157	Magnetic - accelerometer measurement	2006-08-11 17:52	0.00	99.00	CF
KLX24A	13141485	EG157	Magnetic - accelerometer measurement	2006-08-11 18:08	0.00	99.00	CF
KLX24A	13144292	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX24A	13119008	BEARING	18.00	100.17	
KLX24A	13119008	INCLINATION	3.00	100.17	
KLX24A	13141485	BEARING	18.00	100.17	
KLX24A	13141485	INCLINATION	3.00	100.17	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

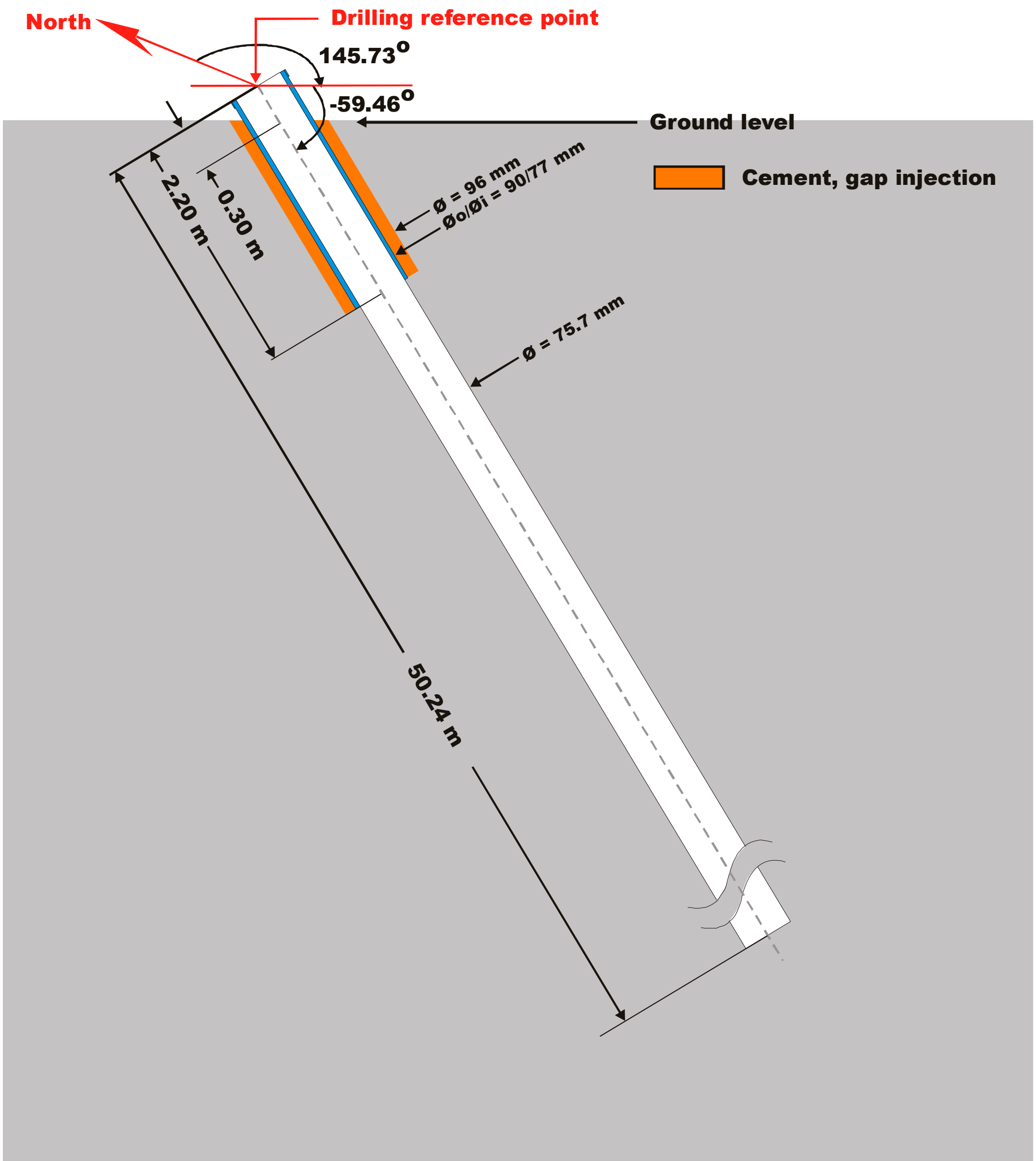
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX24A	6366423.35	1546853.8	21.29	0	0.00	-59.15	98.41	0.071	0.829	0
KLX24A	6366415.16	1546906.19	-63.68	100.17	0.07	-56.6	99.73	0.071	0.829	0.77

Borehole description – KLX25A

Technical description of borehole KLX25A is given in Figure 1.

Technical data

Borehole KLX25A



Drilling reference point

Northing: 6366274.74 (m), RT90 2,5 gon V 0:-15
Easting: 1546769.66 (m), RT90 2,5 gon V 0:-15
Elevation: 22.84 (m), RHB 70

Drilling period

Drilling start date: 2006-07-01
Drilling stop date: 2006-07-04

Ver 2006-12-19

Figure 1. *Technical description of borehole KLX25A.*

<u>Deviation measurement in KLX25A</u>

In total two deviation measurements were conducted in KLX25A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13141490, 13118994) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurument, see Figure 2.

<u>Borehole deviation multiple measurements</u>

For the calculation of *Borehole deviation multiple measurements* (ID 13144293) the two Mag/acc measurements (ID 13141490, 13118994) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the “Radius uncertainty” was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

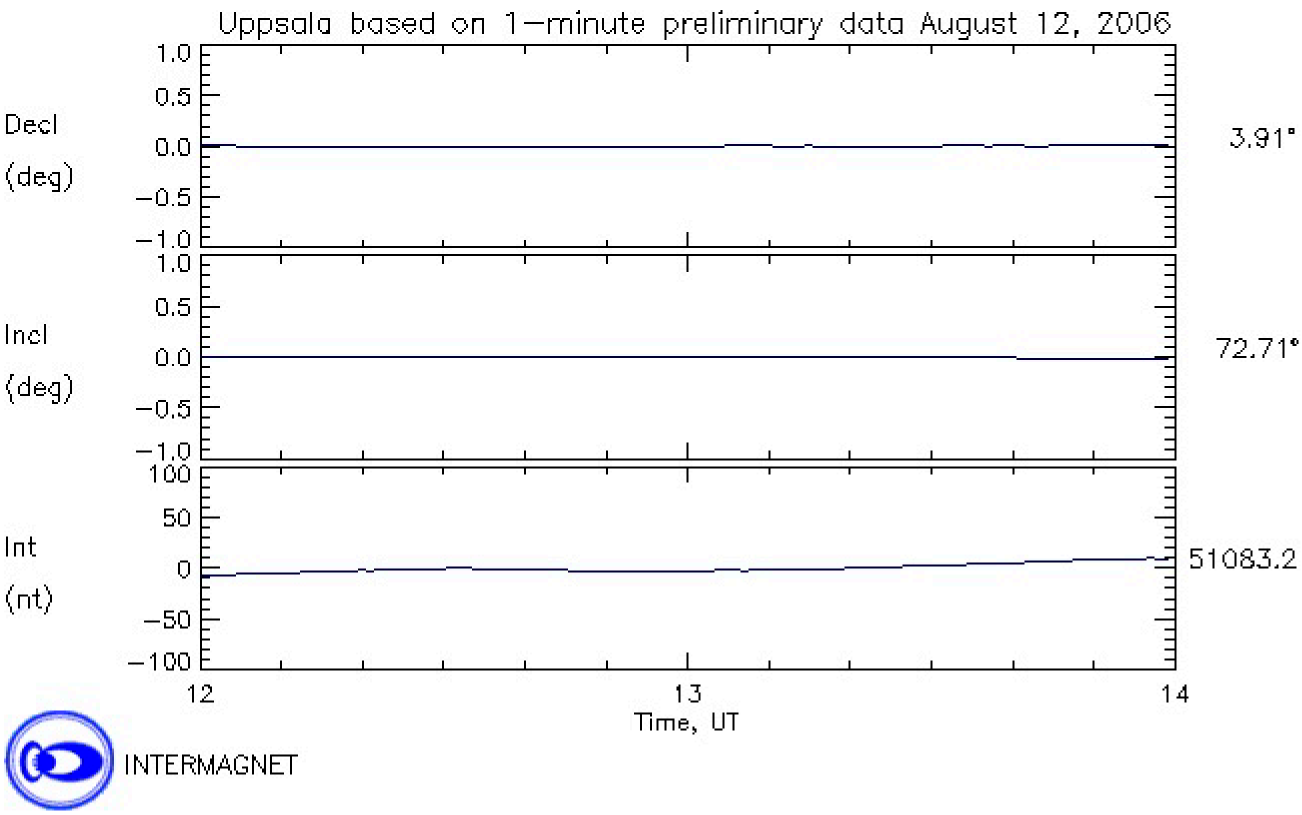
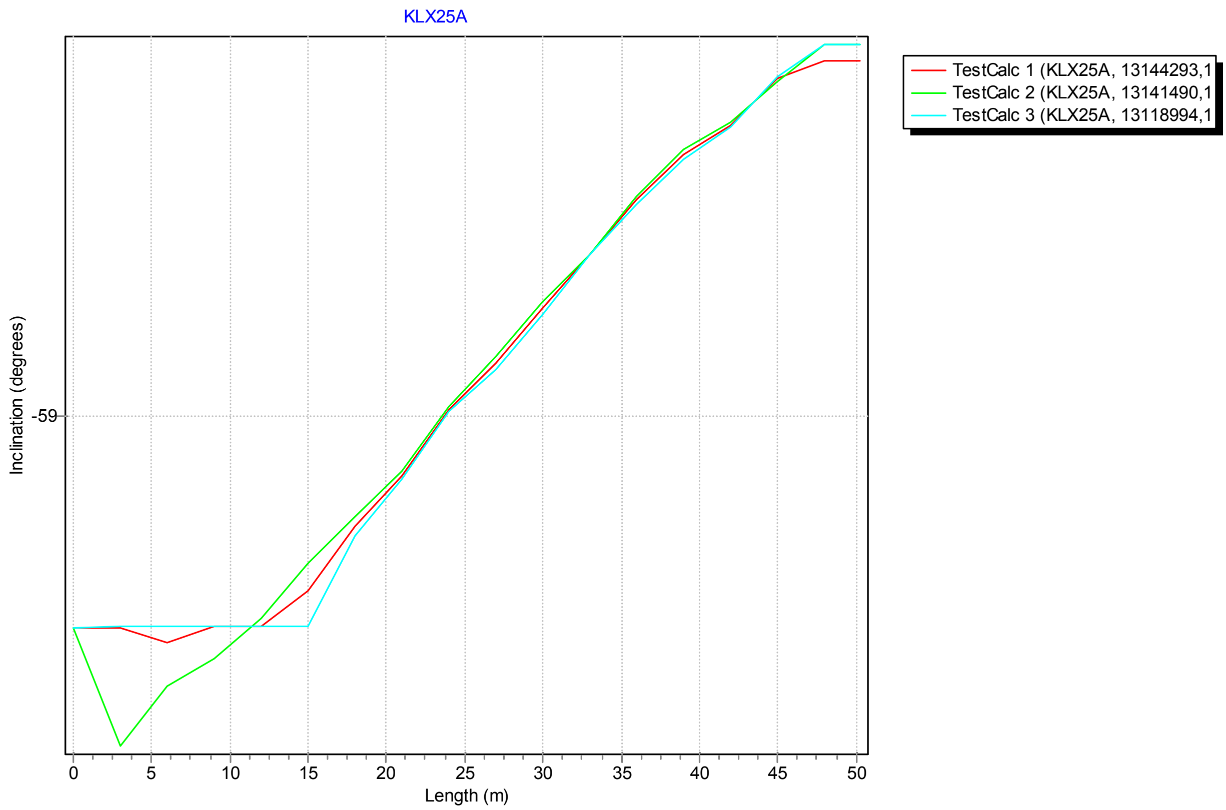


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-08-12.*



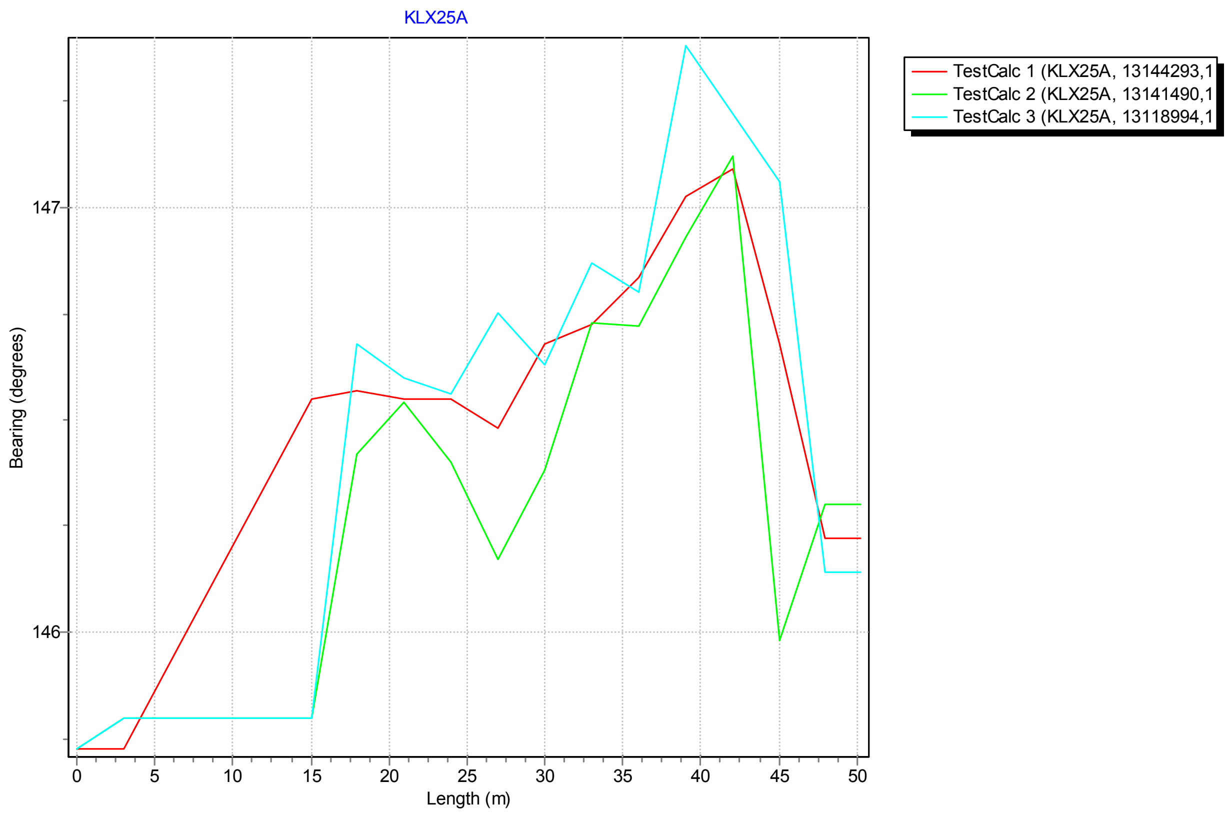


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX25A	13118994	EG157	Magnetic - accelerometer measurement	2006-08-12 12:57	0.00	48.00	CF
KLX25A	13141490	EG157	Magnetic - accelerometer measurement	2006-08-12 13:08	0.00	48.00	CF
KLX25A	13144293	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX25A	13118994	BEARING	18.00	50.24	
KLX25A	13118994	INCLINATION	3.00	50.24	
KLX25A	13141490	BEARING	18.00	50.24	
KLX25A	13141490	INCLINATION	3.00	50.24	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

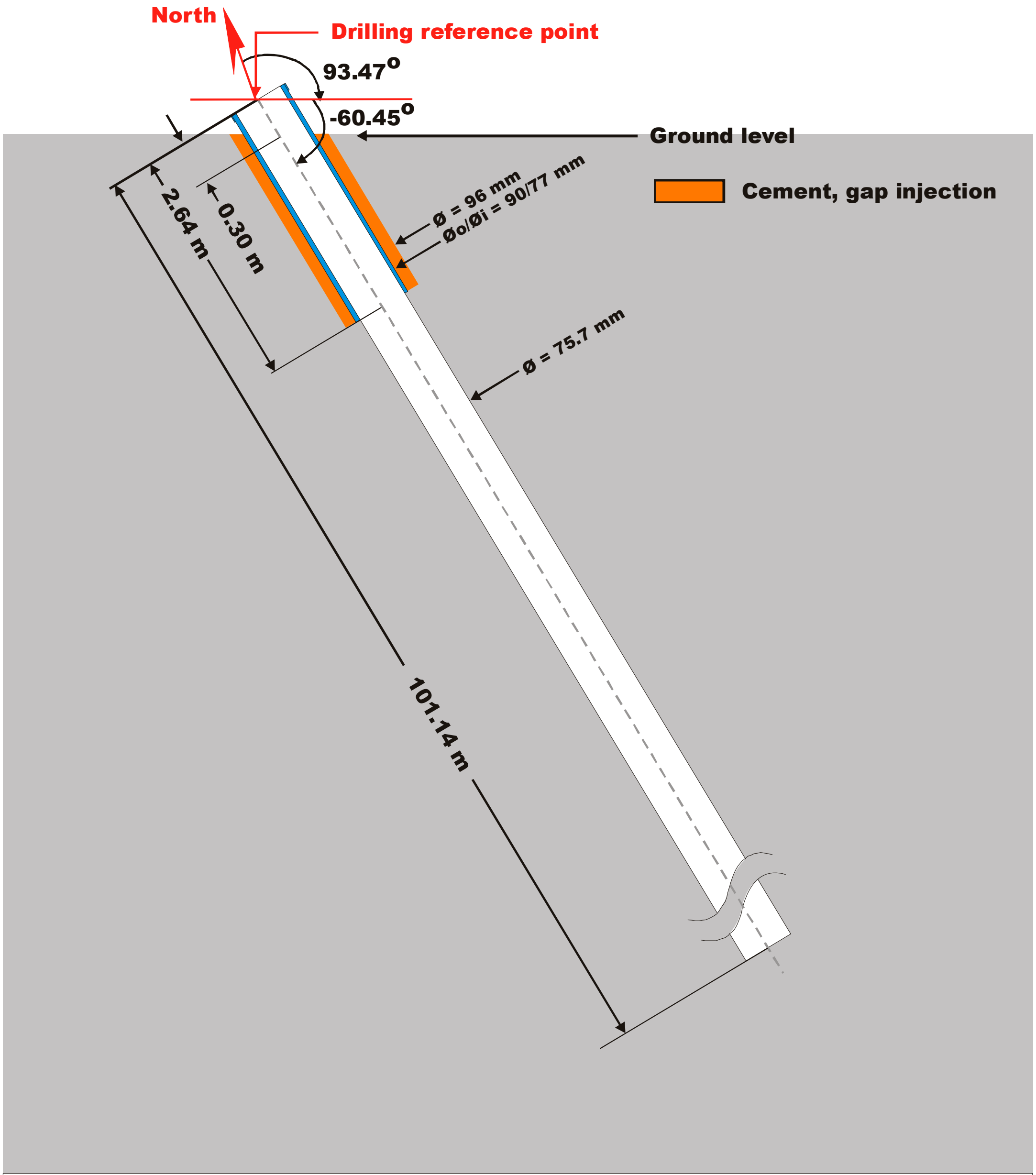
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX25A	6366274.74	1546769.66	22.84	0	0.00	-59.46	145.73	0.066	0.544	0
KLX25A	6366253.12	1546783.98	-20.19	50.24	0.03	-58.22	146.22	0.066	0.544	0.25

Borehole description – KLX26A

Technical description of borehole KLX26A is given in Figure 1.

Technical data

Borehole KLX26A



Drilling reference point

Northing: 6365546.49 (m), RT90 2,5 gon V 0:-15

Easting: 1549029.90 (m), RT90 2,5 gon V 0:-15

Elevation: 15.63 (m), RHB 70

Drilling period

Drilling start date: 2006-08-03

Drilling stop date: 2006-08-11

Ver 2006-12-21

Figure 1. *Technical description of borehole KLX26A.*

Deviation measurement in KLX26A

In total two deviation measurements were conducted in KLX26A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13142397, 13121777) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144294) the two Mag/acc measurements (ID 13142397, 13121777) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

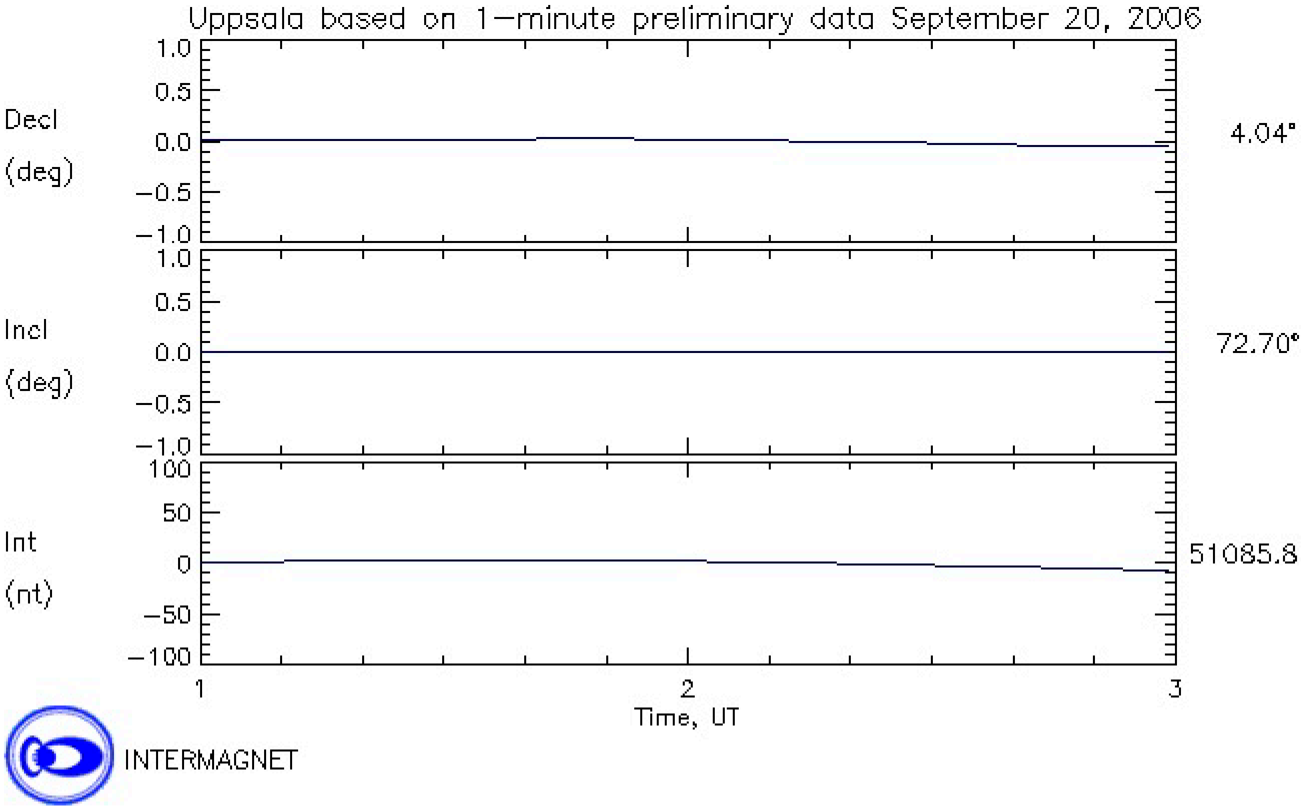
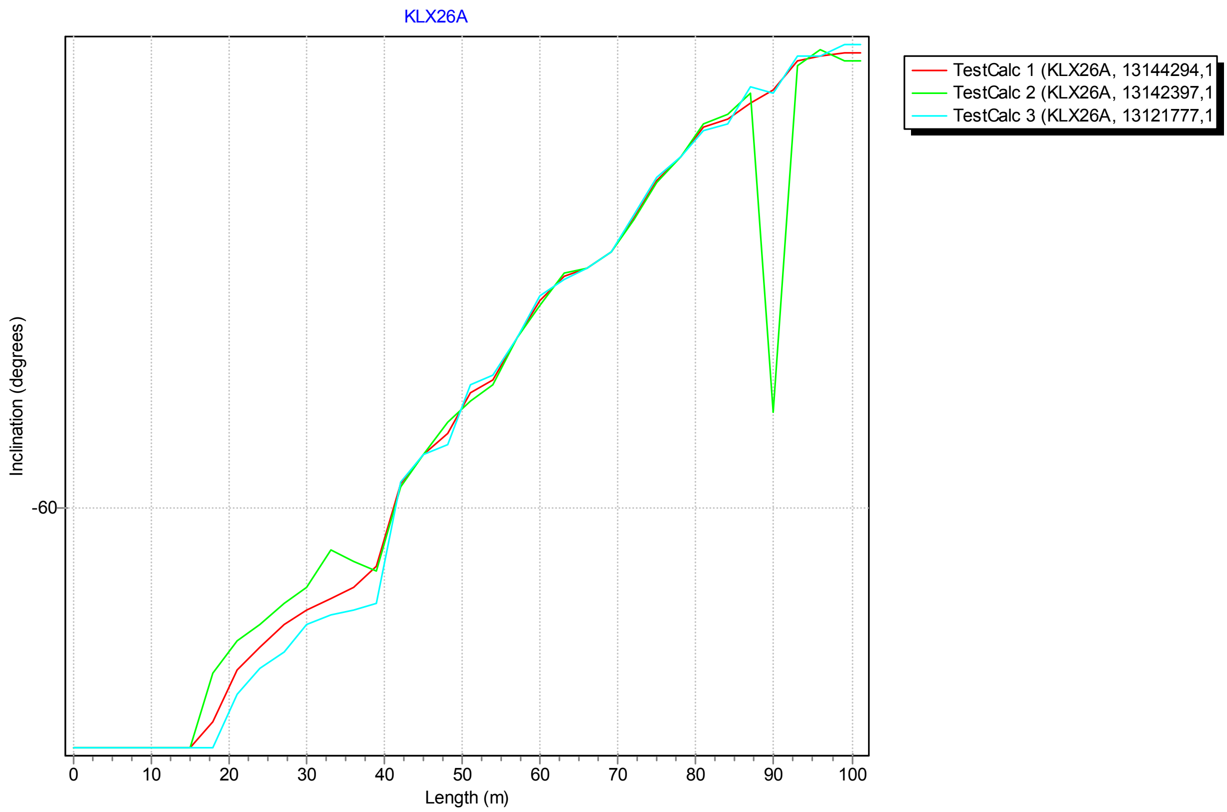


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-20.*



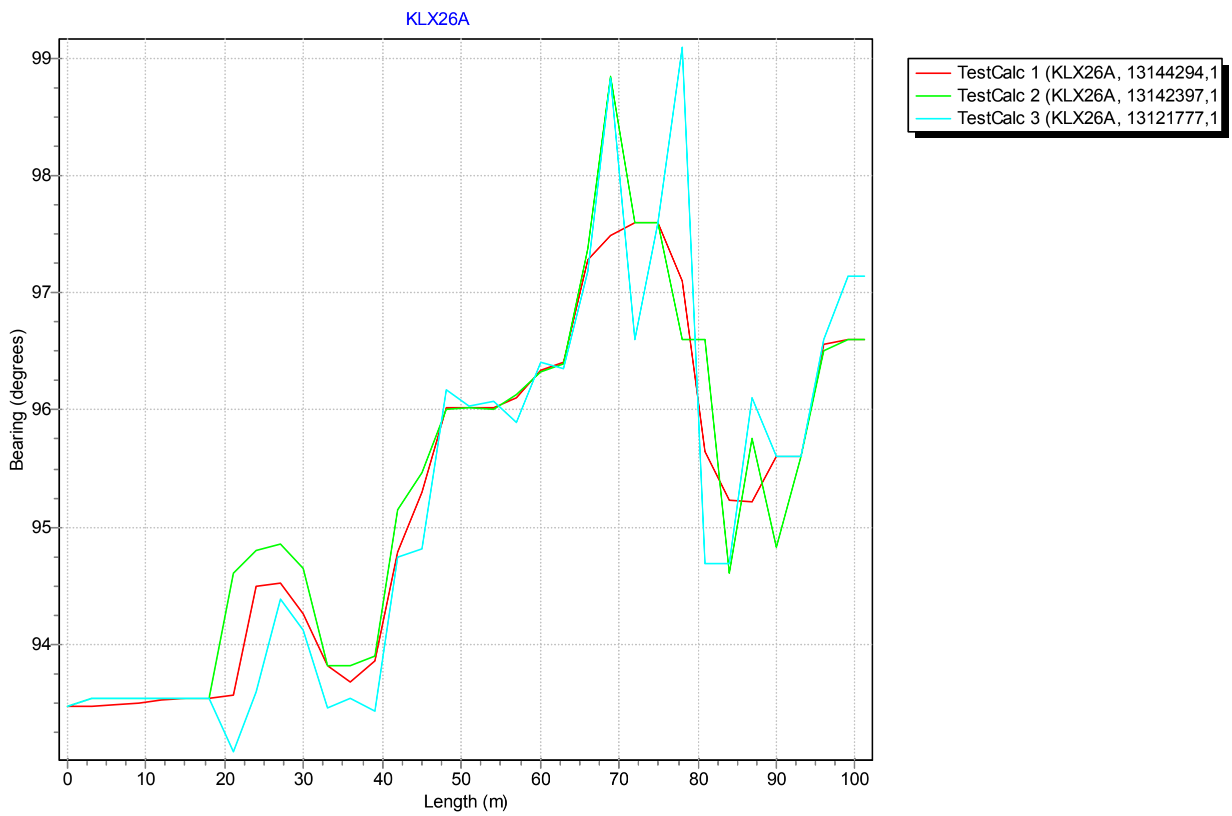


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX26A	13121777	EG157	Magnetic - accelerometer measurement	2006-09-20 01:49	0.00	99.00	CF
KLX26A	13142397	EG157	Magnetic - accelerometer measurement	2006-09-20 02:05	0.00	99.00	CF
KLX26A	13144294	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

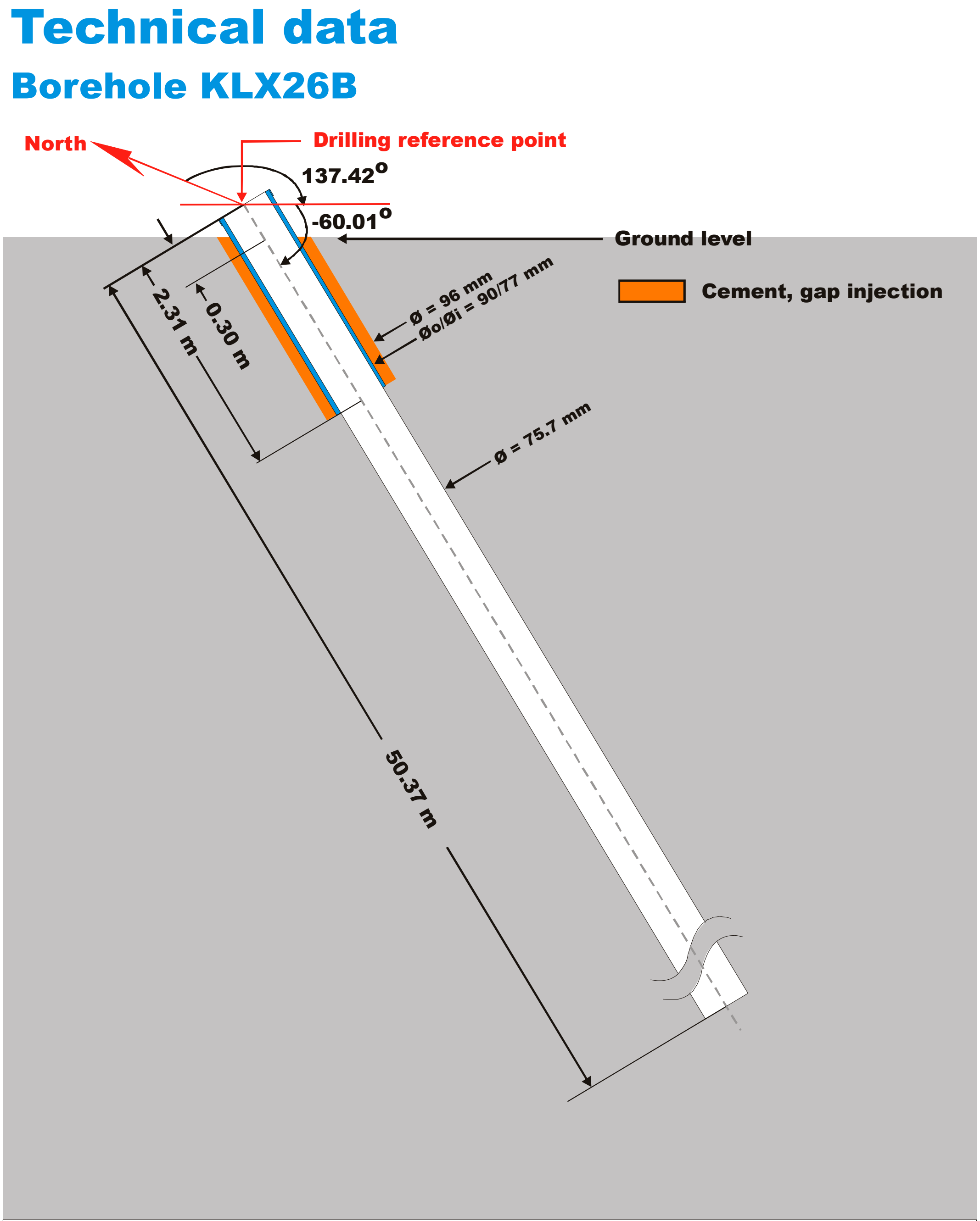
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX26A	13121777	BEARING	18.00	101.14	
KLX26A	13121777	INCLINATION	3.00	101.14	
KLX26A	13142397	BEARING	18.00	101.14	
KLX26A	13142397	INCLINATION	3.00	101.14	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX26A	6365546.49	1549029.9	15.63	0	0.00	-60.45	93.47	0.05	0.907	0
KLX26A	6365541.83	1549080.51	-71.8	101.14	0.04	-59.14	96.6	0.05	0.907	0.81

Borehole description – KLX26B

Technical description of borehole KLX26B is given in Figure 1.



Drilling reference point

Northing: 6365550.66 (m), RT90 2,5 gon V 0:-15

Easting: 1549025.61 (m), RT90 2,5 gon V 0:-15

Elevation: 15.82 (m), RHB 70

Drilling period

Drilling start date: 2006-08-12

Drilling stop date: 2006-08-17

Ver 2006-12-19

Figure 1. *Technical description of borehole KLX26B.*

Deviation measurement in KLX26B

In total two deviation measurements were conducted in KLX26B. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13143748, 13121778) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144295) the two Mag/acc measurements (ID 13143748, 13121778) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

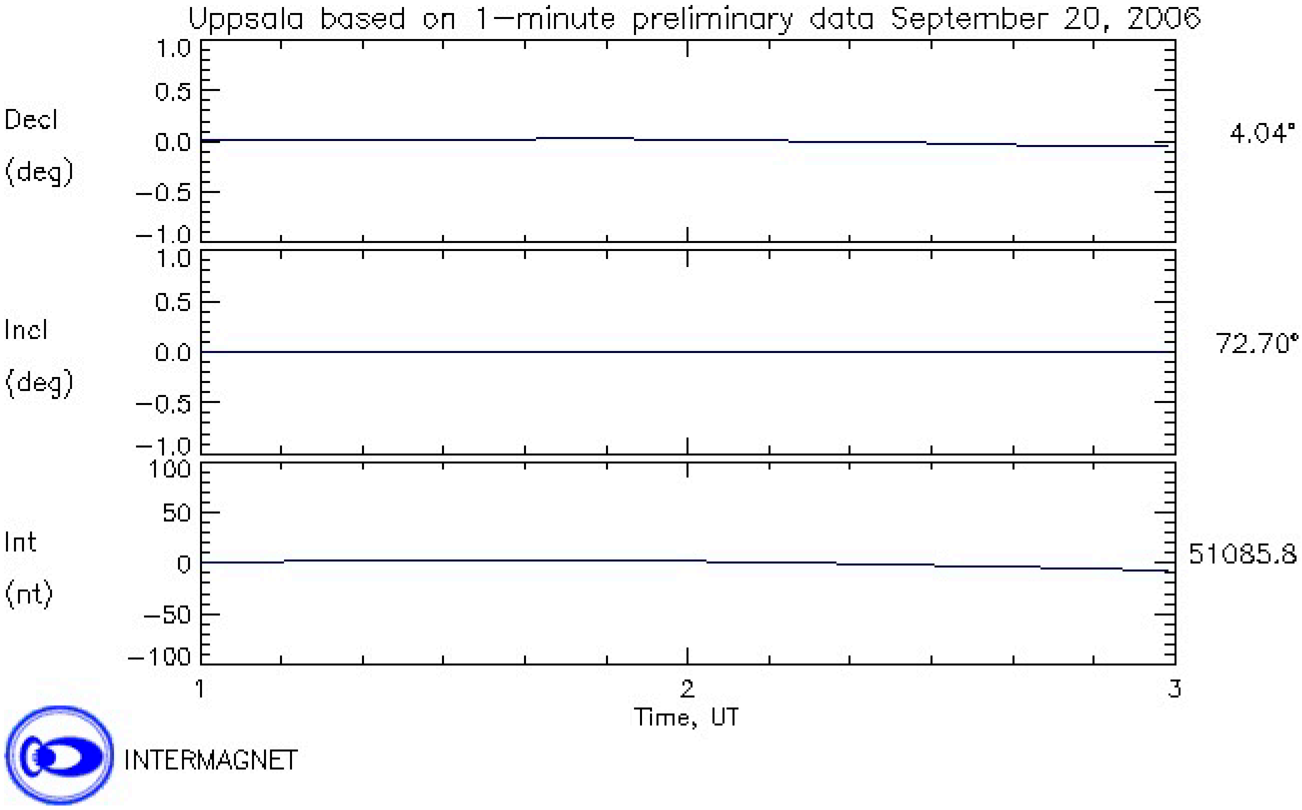
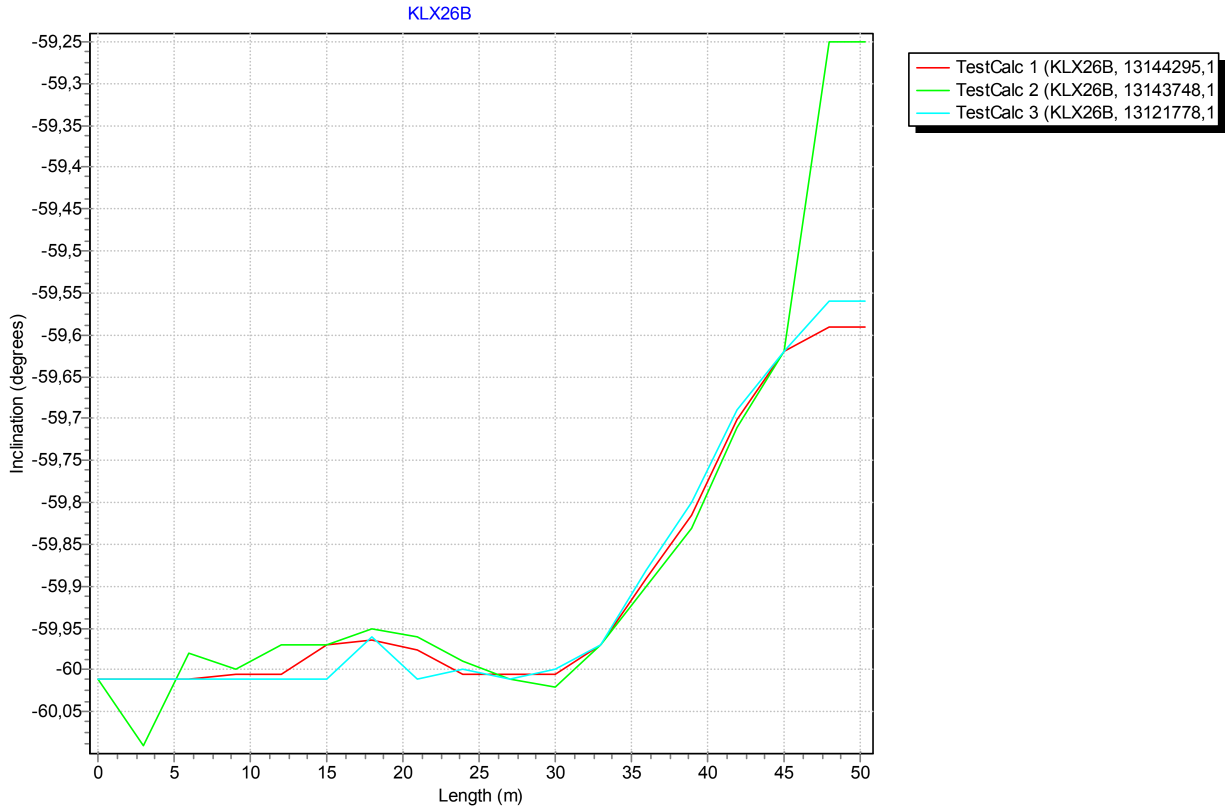


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-20.*



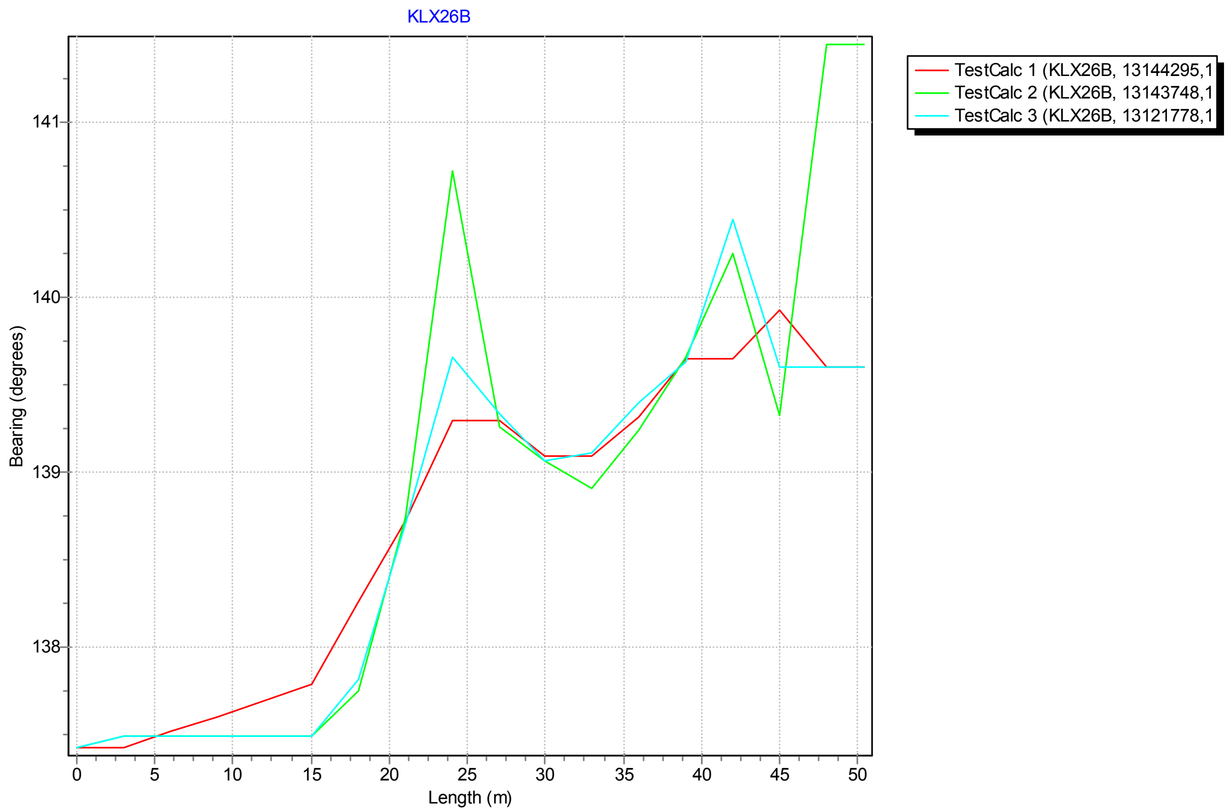


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX26B	13121778	EG157	Magnetic - accelerometer measurement	2006-09-20 02:23	0.00	48.00	CF
KLX26B	13143748	EG157	Magnetic - accelerometer measurement	2006-09-20 02:29	0.00	48.00	CF
KLX26B	13144295	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX26B	13121778	BEARING	18.00	50.37	
KLX26B	13121778	INCLINATION	3.00	50.37	
KLX26B	13143748	BEARING	18.00	50.37	
KLX26B	13143748	INCLINATION	3.00	50.37	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

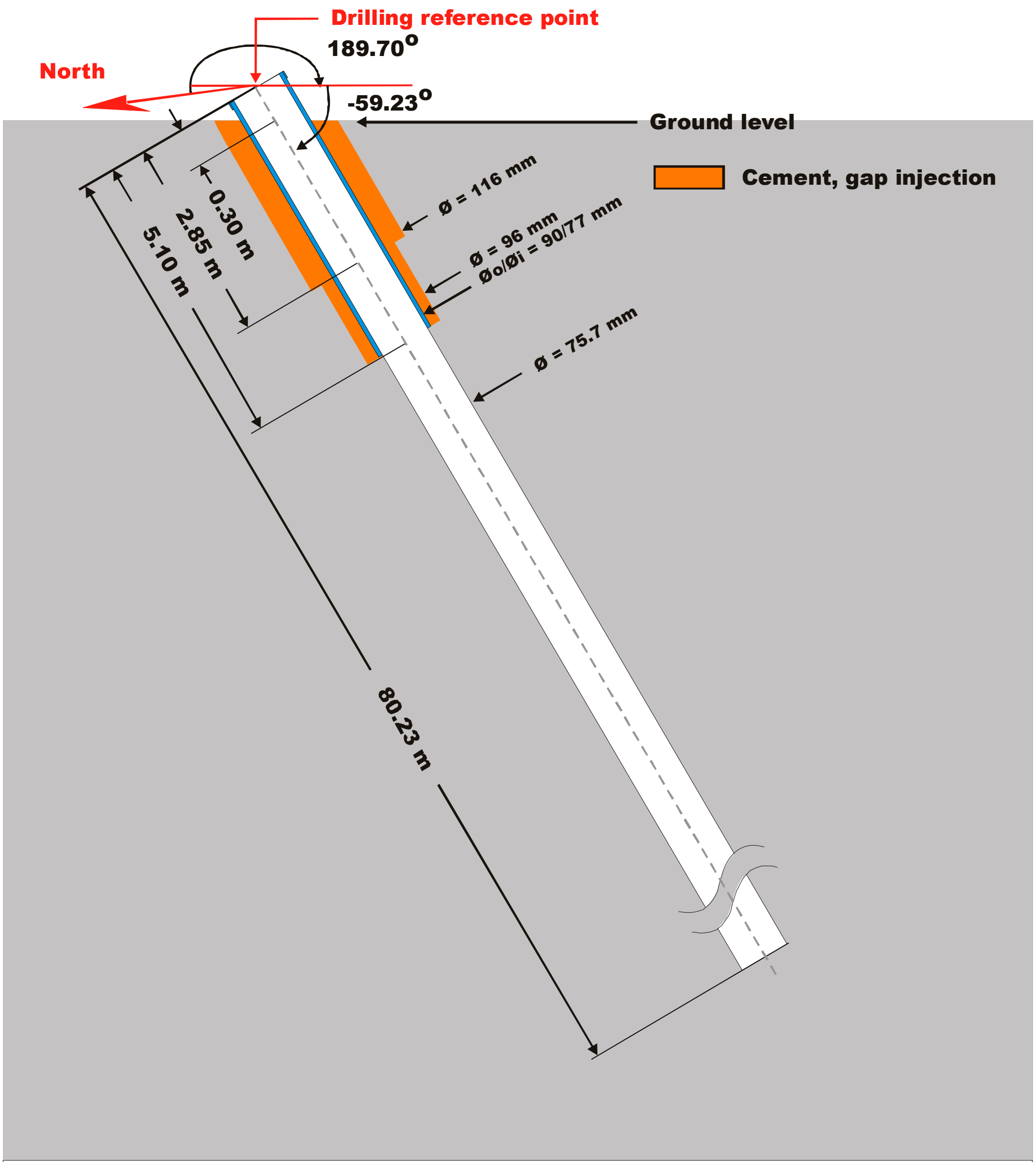
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX26B	6365550.66	1549025.61	15.82	0	0.00	-60.01	137.42	0.035	0.608	0
KLX26B	6365531.68	1549042.27	-27.76	50.37	0.02	-59.59	139.6	0.035	0.608	0.27

Borehole description – KLX28A

Technical description of borehole KLX28A is given in Figure 1.

Technical data

Borehole KLX28A



Drilling reference point

Northing: 6365682.22 (m), RT90 2,5 gon V 0:-15

Easting: 1549333.71 (m), RT90 2,5 gon V 0:-15

Elevation: 15.82 (m), RHB 70

Drilling period

Drilling start date: 2006-09-14

Drilling stop date: 2006-09-20

Ver 2006-12-19

Figure 1. Technical description of borehole KLX28A.

Deviation measurement in KLX28A

In total two deviation measurements were conducted in KLX28A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13136098, 13136099) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144296) the two Mag/acc measurements (ID 13136098, 13136099) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

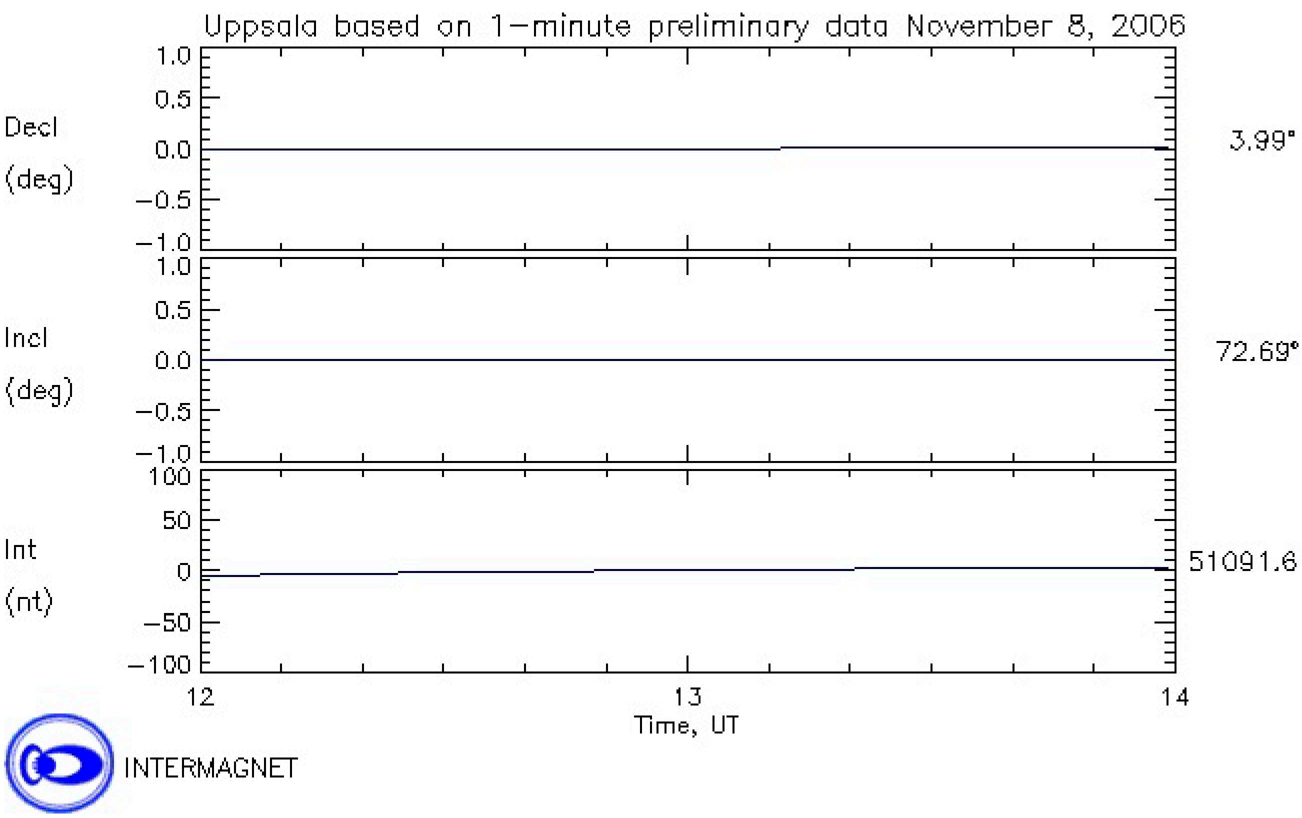
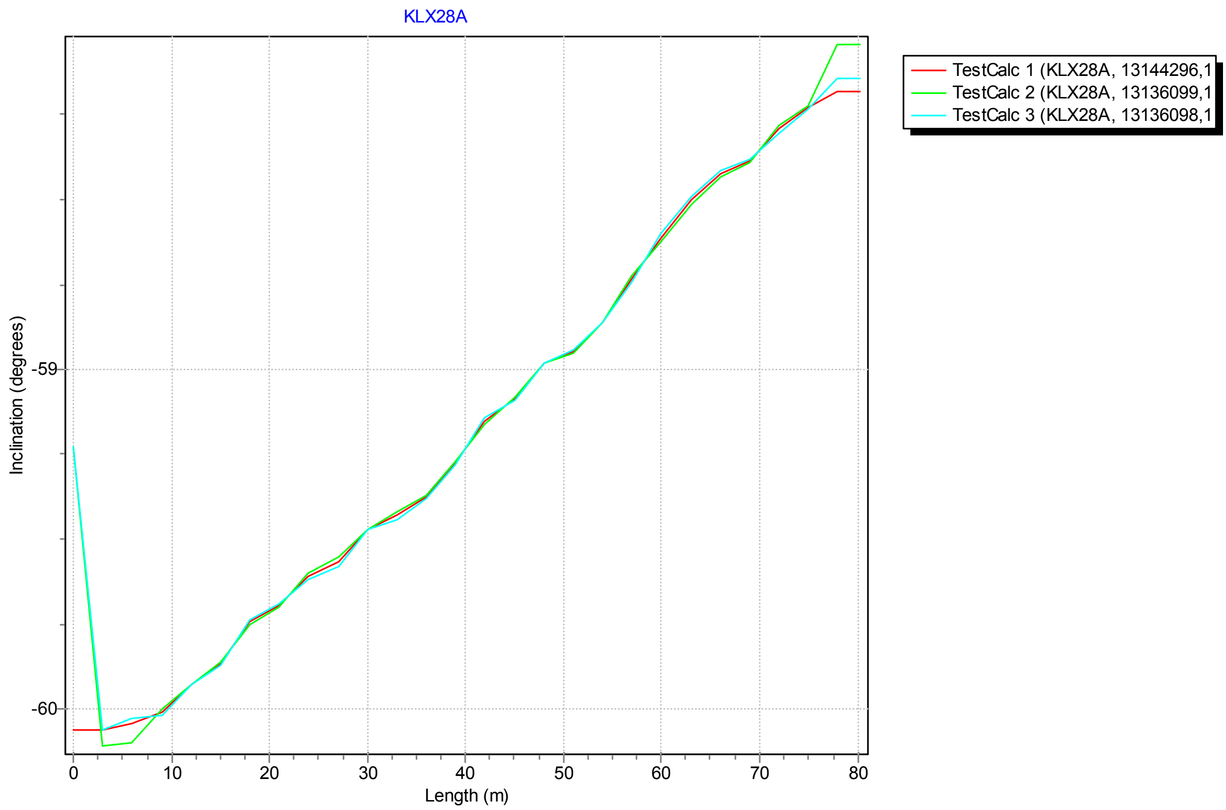


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-11-08.*



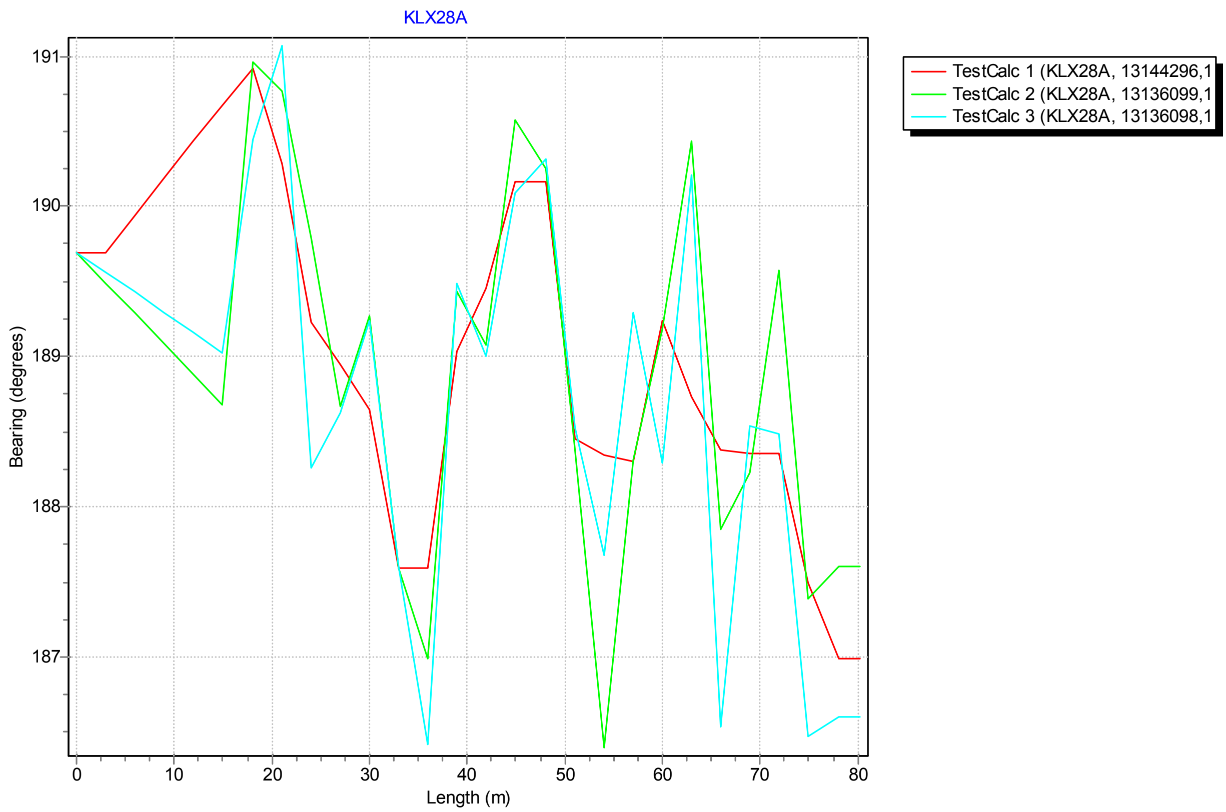


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX28A	13136098	EG157	Magnetic - accelerometer measurement	2006-11-08 12:50	0.00	78.00	CF
KLX28A	13136099	EG157	Magnetic - accelerometer measurement	2006-11-08 13:15	0.00	78.00	CF
KLX28A	13144296	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX28A	13136098	BEARING	21.00	80.23	
KLX28A	13136098	INCLINATION	3.00	80.23	
KLX28A	13136099	BEARING	21.00	80.23	
KLX28A	13136099	INCLINATION	3.00	80.23	

Table 3. Subset (for every approx. 100 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX28A	6365682.22	1549333.71	10.05	0	0.00	-60.06	189.7	0.04	1.516	0
KLX28A	6365641.63	1549327.25	-58.84	80.23	0.03	-58.18	187	0.04	1.516	1.09

Borehole description – KLX29A

Technical description of borehole KLX29A is given in Figure 1.

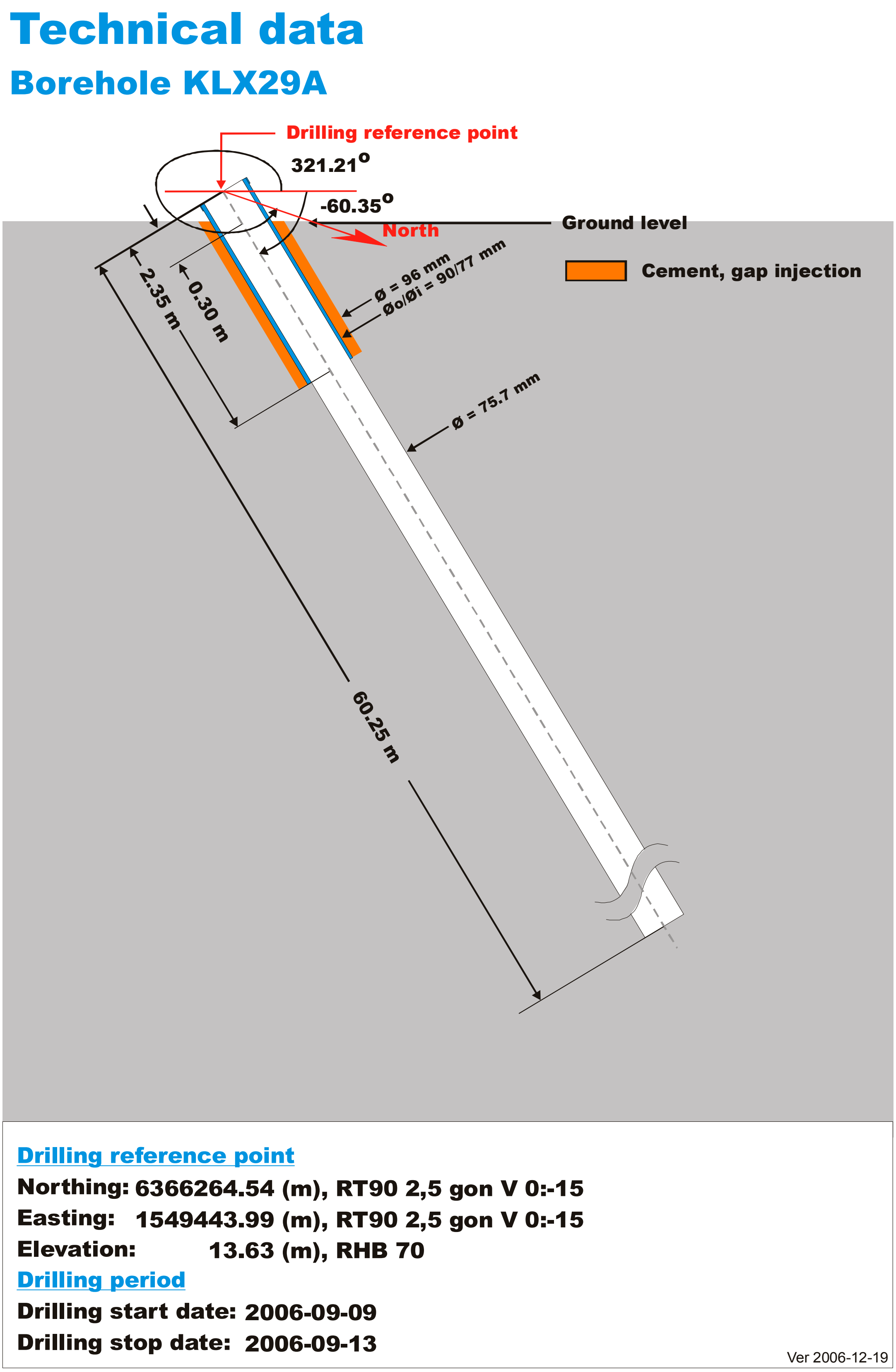


Figure 1. *Technical description of borehole KLX29A.*

Deviation measurement in KLX29A

In total two deviation measurements were conducted in KLX29A. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The two Mac/acc measurements (ID 13136109, 13136110) were executed down and up the borehole, with the Flexit instrument. Corrections of measured data were documented in the File References (Sicada) for the measurements. No geomagnetic disturbances exceeding 0.5 degrees were observed on the date of the Mag/acc measurement, see Figure 2.

Borehole deviation multiple measurements

For the calculation of *Borehole deviation multiple measurements* (ID 13144297) the two Mag/acc measurements (ID 13136109, 13136110) were used. Table 2 shows all deviation data for the calculation.

A subset of the resulting deviation file for every approximately 100 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties were calculated automatically, and based on these values the "Radius uncertainty" was calculated for every measuring level.

Figure 3 shows the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.

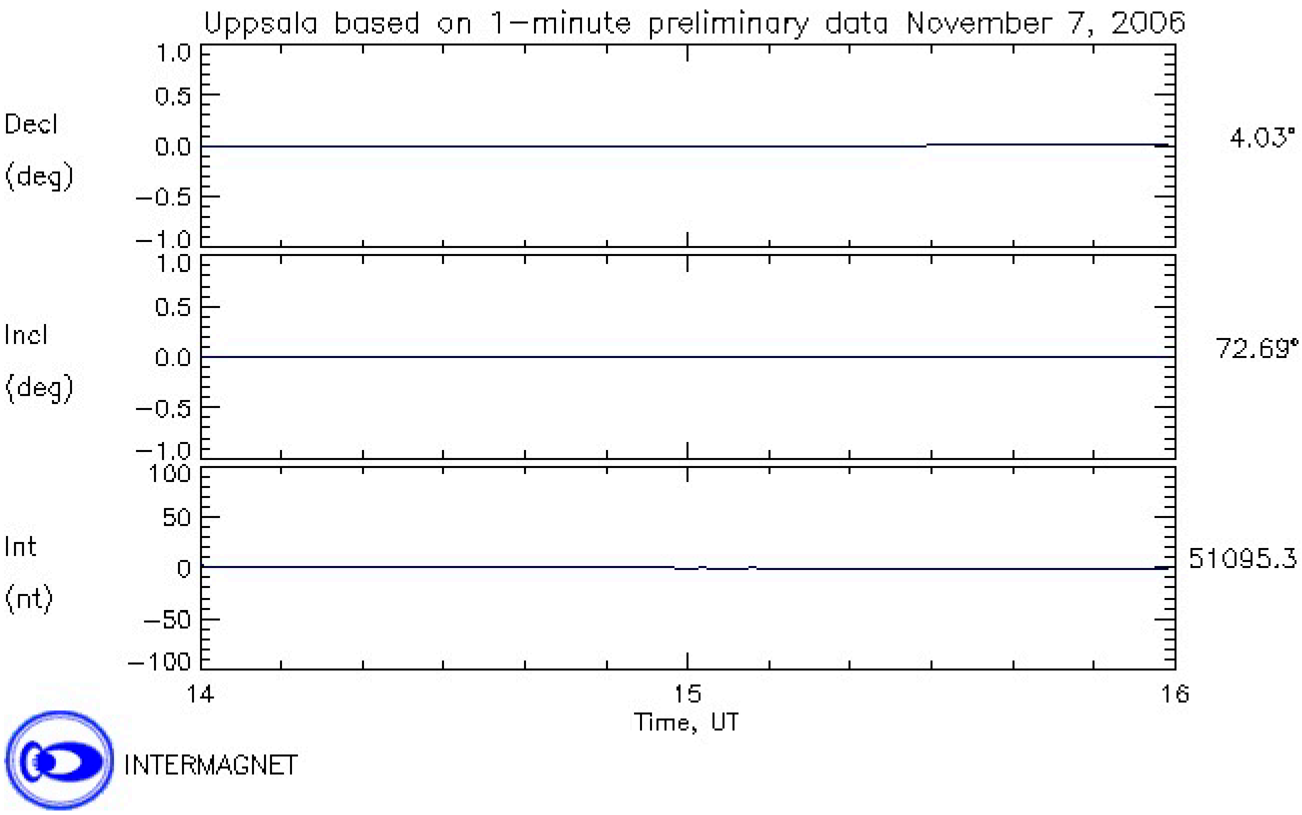
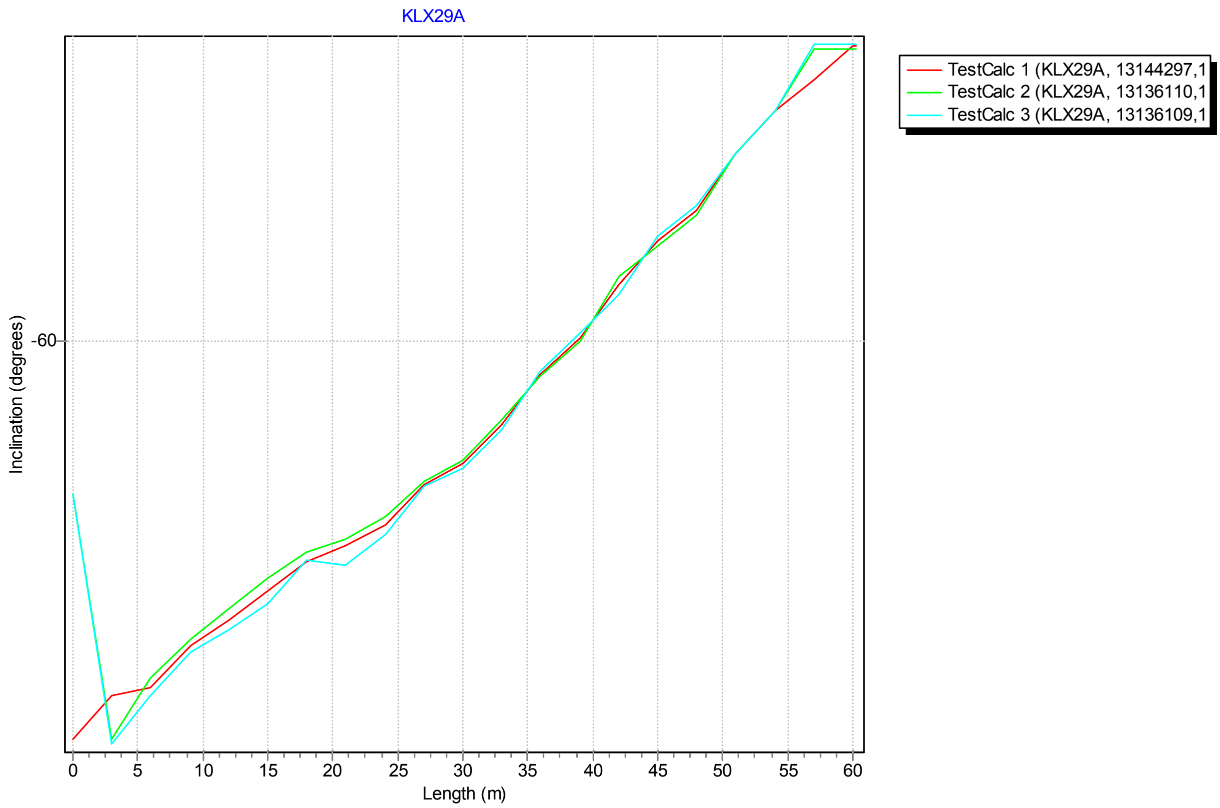


Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-11-07.*



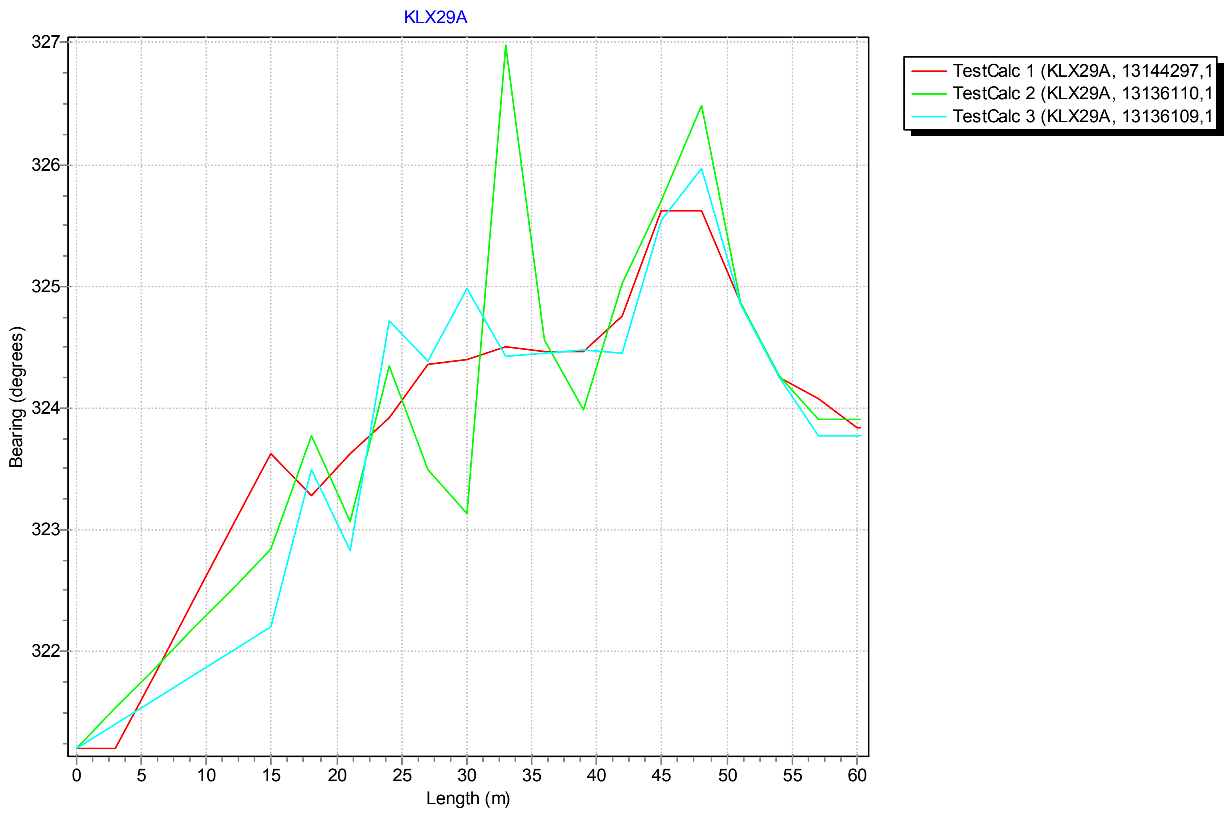


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags
KLX29A	13136109	EG157	Magnetic - accelerometer measurement	2006-11-07 14:30	0.00	57.00	CF
KLX29A	13136110	EG157	Magnetic - accelerometer measurement	2006-11-07 15:00	0.00	57.00	CF
KLX29A	13144297	EG154	Borehole deviation multiple measurements	2007-01-09 08:00			I C

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
KLX29A	13136109	BEARING	18.00	60.25	
KLX29A	13136109	INCLINATION	3.00	60.25	
KLX29A	13136110	BEARING	18.00	60.25	
KLX29A	13136110	INCLINATION	3.00	60.25	

Table 3. Subset (for every approx. 100 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation_uncert (m)	Inclination (degrees)	Bearing (degrees)	Inclination_uncert (degrees)	Bearing_uncert (degrees)	Radius_uncert (m)
KLX29A	6366264.54	1549443.99	13.63	0	0.00	-60.91	321.21	0.08	0.865	0
KLX29A	6366288.73	1549426.32	-38.64	60.25	0.04	-59.33	323.84	0.08	0.865	0.45

Borehole description – HLX01

Technical description of borehole HLX01 is given in Table 1.

Table 1. Technical description of borehole HLX01.

Title	**Value**				
	Information about percussion borehole HLX01 (2007-02-05).				
Comment:	No comment exists.				
BOREHOLE LENGTH:					
Signed/Approved By	Length(m)	Reference Level			
Johan Svensson	100.63	Unknown			
DRILLING PERIODS:					
Signed/Approved By	From Date	To Date	Secup(m)	Seclow(m)	Drilling Type
Johan Svensson	1987-10-20	1987-10-21	0.00	100.63	Percussion
	drilling				
STARTING POINT COORDINATE:					
Signed/Approved By	Length(m)	Northing(m)	Easting(m)	Elevation	Coord System
Johan Svensson	0.00	6367354.49	1549569.77	8.90	RT90-RHB70
STARTING POINT ANGLES:					
Signed/Approved By	Length(m)	Bearing	Inclination (- = down)		Coord System
Gerry Johansson	0.00	175.30	-59.40		RT38-RH00
BOREHOLE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Hole Diam(m)		
Johan Svensson	0.00	100.00	0.115		
CORE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Core Diam(m)		
CASING DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Case In(m)	Case Out(m)	Comment
Johan Svensson	0.00	3.00	0.130	0.140	
INSTALLED SECTIONS:					
Signed/Approved By	Section No	Start Date	Secup(m)	Seclow(m)	
Lars Andersson	1	2005-09-23	16.00	100.00	
Lars Andersson	2	2005-09-23	0.00	15.00	
SECTION INFORMATION:					
Signed/Approved By	Status				
N/A	Packers are expanded.				
VALVE INFORMATION:					
Signed/Approved By	Status				
	(No valve installation/removal.)				
	End of additional information.				

<u>Deviation measurement in HLX01</u>

The only deviation measurement performed in HLX01 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

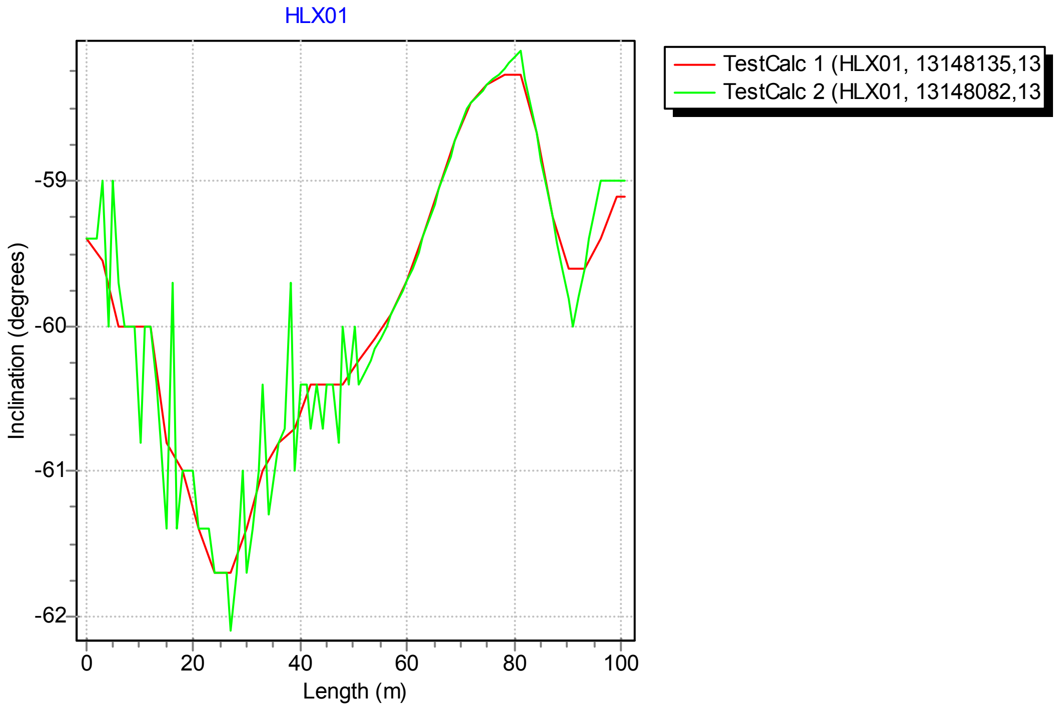
The Boremac measurement (ID 3013007) was executed down the borehole between the length 0 – 96.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148082). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-10-25.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148135) the Boremac measurement (ID 13148082) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



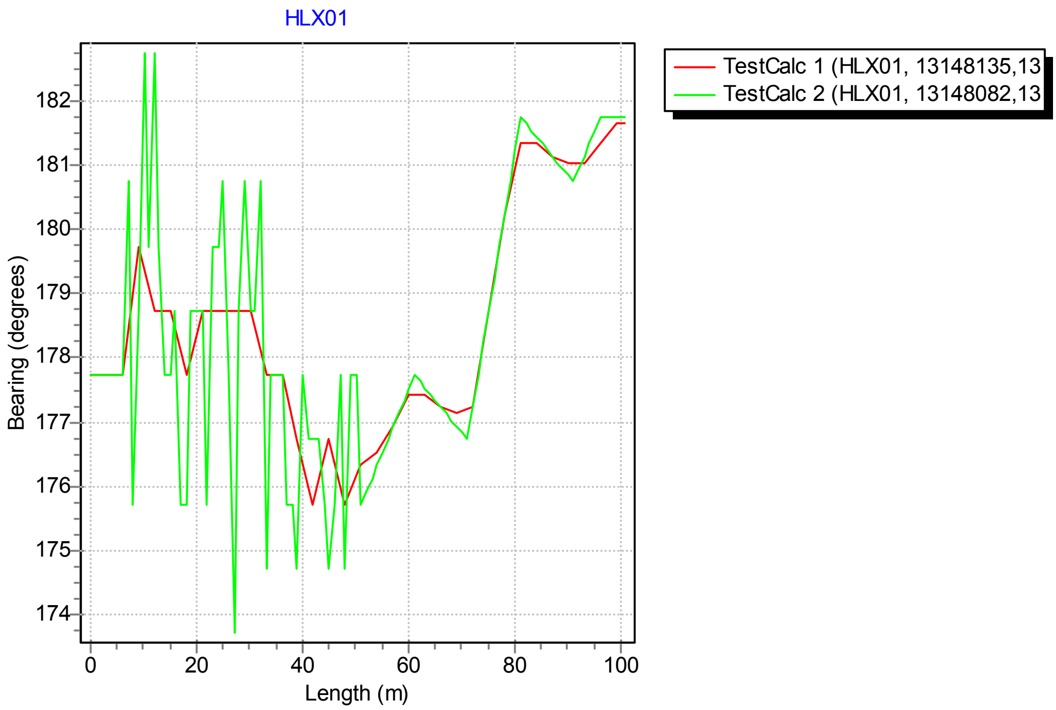


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX01.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX01	3013007	EG155	Boremac measurement	1987-10-25 00:00	0.00	96.00	E	070215 11:56
HLX01	13147117	EG154	Borehole deviation multiple measurements	2007-02-05 12:30			EC	070215 16:17
HLX01	13148082	EG155	Boremac measurement	2007-02-14 00:00	0.00	96.00		070215 11:53
HLX01	13148135	EG154	Borehole deviation multiple measurements	2007-02-15 12:00			I C	070215 16:07

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX01	13148082	BEARING	3.00	96.00	6.0
HLX01	13148082	INCLINATION	3.00	96.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX01	6367354.49	1549569.77	8.90	0.00	0.00	-59.40	177.73	3.0	6.0	0.00
HLX01	6367338.35	1549570.20	-19.88	33.00	0.84	-61.00	177.73	3.0	6.0	1.73
HLX01	6367326.53	1549570.91	-40.75	57.00	1.46	-59.92	176.93	3.0	6.0	2.99
HLX01	6367315.71	1549571.34	-58.74	78.00	2.03	-58.26	180.23	3.0	6.0	4.12
HLX01	6367304.08	1549571.10	-78.15	100.63	2.64	-59.10	181.63	3.0	6.0	5.33

Borehole description – HLX02

Technical description of borehole HLX02 is given in Table 1.

Table 1. Technical description of borehole HLX02.

```
Title                          Value
                               Information about percussion borehole HLX02 (2007-02-05).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Initial sign by sic_dba        132.00      Top of casing (center)

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Initial sign by sic_dba        1987-10-27   1987-10-27   0.00        132.00       Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Johan Svensson                 0.00        6368094.29   1549941.36  9.04        RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        327.30       -57.40                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Initial sign by sic_dba        0.00        132.00       0.115

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Initial sign by sic_dba        0.00        0.60         0.130       0.140

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)
Data NOT Signed/Approved!      1           2005-09-23   0.00        132.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are expanded.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

<u>Deviation measurement in HLX02</u>

The only deviation measurement performed in HLX02 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

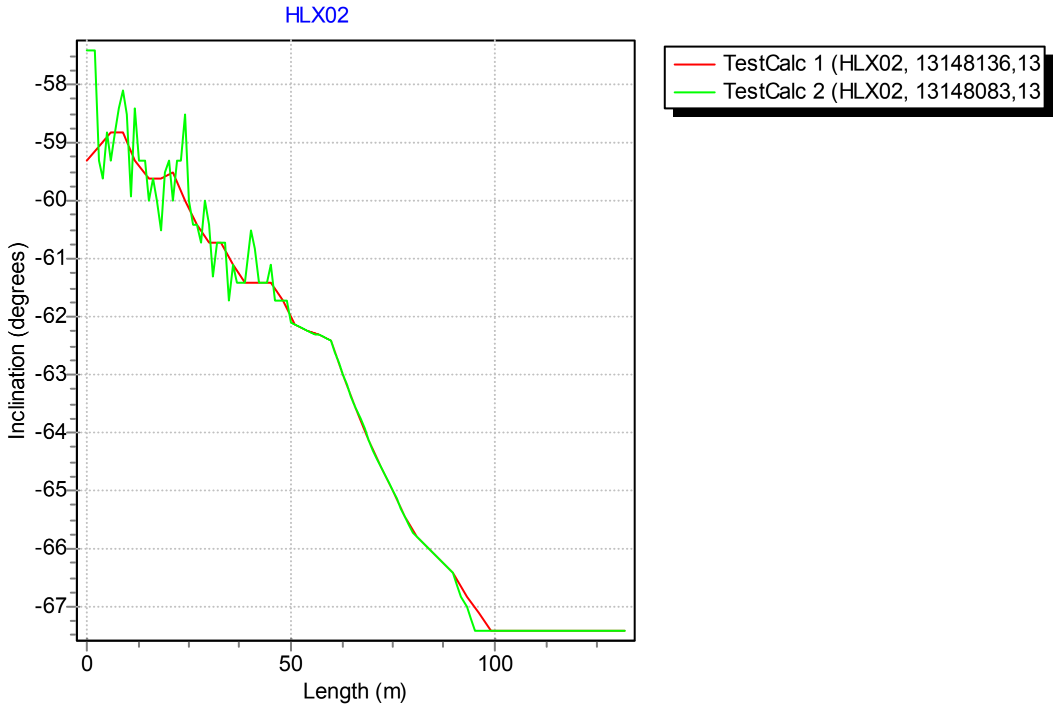
The Boremac measurement (ID 3013008) was executed down the borehole between the length 0 – 95.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148083). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-10-29.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148136) the Boremac measurement (ID 13148083) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



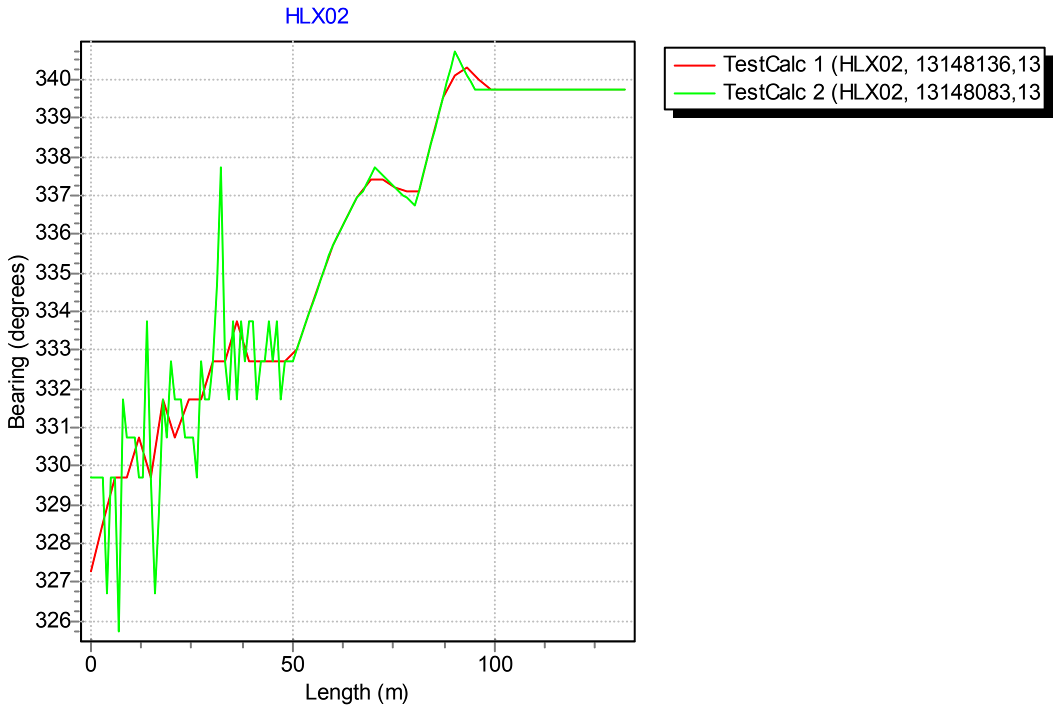


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX02.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX02	3013008	EG155	Boremac measurement	1987-10-29 00:00	0.00	95.00	E	070215 11:56
HLX02	13147118	EG154	Borehole deviation multiple measurements	2007-02-05 11:45			EC	070215 16:17
HLX02	13148083	EG155	Boremac measurement	2007-02-14 00:00	0.00	95.00		070215 11:53
HLX02	13148136	EG154	Borehole deviation multiple measurements	2007-02-15 12:15			I C	070215 16:09

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX02	13148083	BEARING	3.00	95.00	6.0
HLX02	13148083	INCLINATION	3.00	95.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX02	6368094.29	1549941.36	9.04	0.00	0.00	-59.30	327.30	3.0	6.0	0.00
HLX02	6368108.83	1549933.17	-19.43	33.00	0.87	-60.70	332.73	3.0	6.0	1.75
HLX02	6368119.02	1549928.02	-40.54	57.00	1.47	-62.31	334.83	3.0	6.0	3.01
HLX02	6368127.53	1549924.35	-59.38	78.00	1.95	-65.42	337.13	3.0	6.0	4.11
HLX02	6368147.29	1549916.96	-109.08	132.00	3.05	-67.40	339.73	3.0	6.0	6.93

Borehole description – HLX03

Technical description of borehole HLX03 is given in Table 1.

Table 1. Technical description of borehole HLX03.

Title	**Value**				
	Information about percussion borehole HLX03 (2007-02-05).				
Comment:	No comment exists.				
BOREHOLE LENGTH:					
Signed/Approved By	Length(m)	Reference Level			
Initial sign by sic_dba	100.00	Top of casing (center)			
DRILLING PERIODS:					
Signed/Approved By	From Date	To Date	Secup(m)	Seclow(m)	Drilling Type
Initial sign by sic_dba	1987-11-03	1987-11-04	0.00	100.00	Percussion
	drilling				
STARTING POINT COORDINATE:					
Signed/Approved By	Length(m)	Northing(m)	Easting(m)	Elevation	Coord System
Johan Svensson	0.00	6367820.77	1549921.18	10.45	RT90-RHB70
STARTING POINT ANGLES:					
Signed/Approved By	Length(m)	Bearing	Inclination (- = down)		Coord System
Gerry Johansson	0.00	185.30	-62.40		RT90-RHB70
BOREHOLE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Hole Diam(m)		
Initial sign by sic_dba	0.00	100.00	0.115		
CORE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Core Diam(m)		
CASING DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Case In(m)	Case Out(m)	Comment
Initial sign by sic_dba	0.00	1.40	0.130	0.140	
INSTALLED SECTIONS:					
Signed/Approved By	Section No	Start Date	Secup(m)	Seclow(m)	
Initial sign by sic_dba	1	1996-01-10	0.00	100.00	
SECTION INFORMATION:					
Signed/Approved By	Status				
N/A	Packers are released.				
VALVE INFORMATION:					
Signed/Approved By	Status				
	(No valve installation/removal.)				
	End of additional information.				

<u>Deviation measurement in HLX03</u>

The only deviation measurement performed in HLX03 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

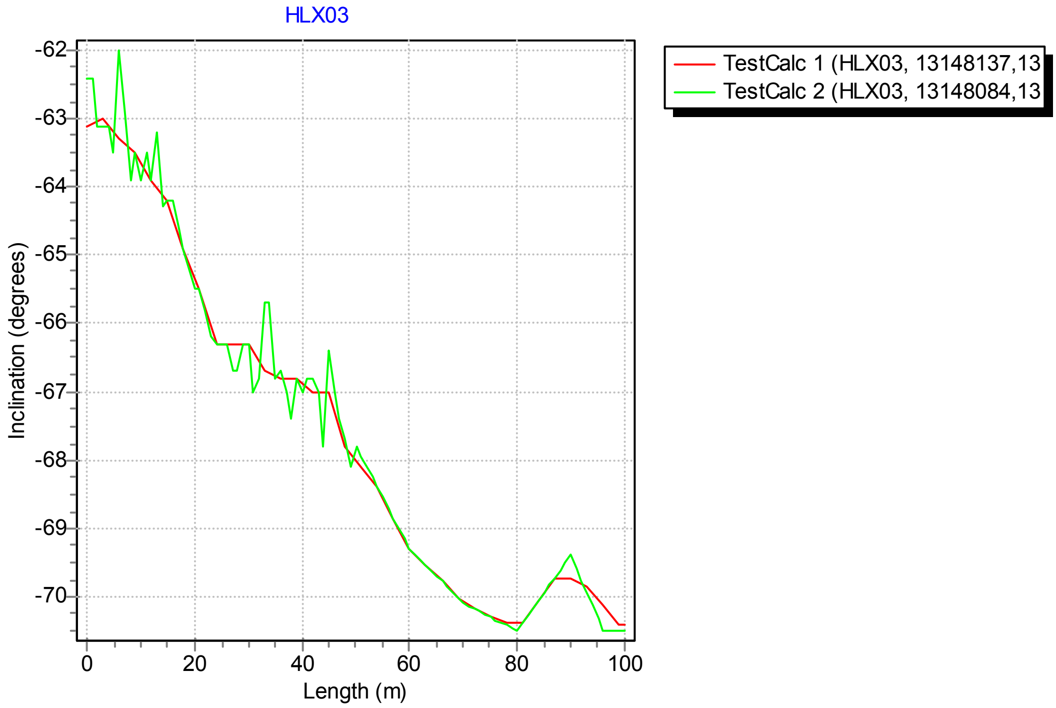
The Boremac measurement (ID 3013009) was executed down the borehole between the length 0 – 96.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148084). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-11-05.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148137) the Boremac measurement (ID 13148084) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



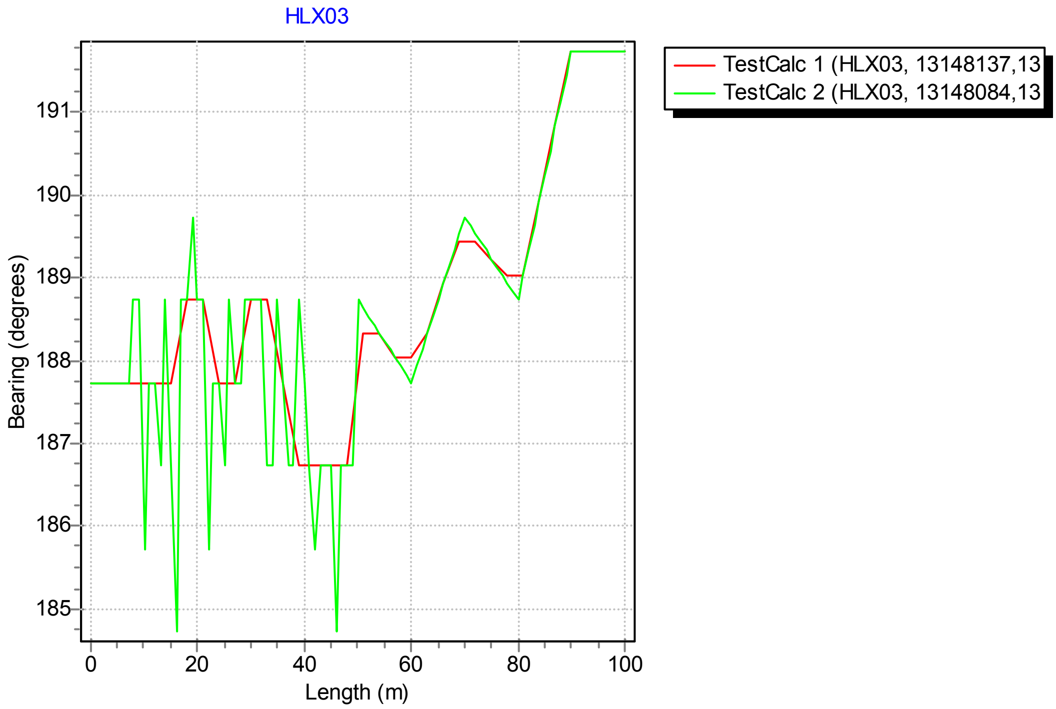


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX03.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX03	3013009	EG155	Boremac measurement	1987-11-05 00:00	0.00	96.00	E	070215 11:56
HLX03	13147119	EG154	Borehole deviation multiple measurements	2007-02-05 11:30			EC	070215 16:17
HLX03	13148084	EG155	Boremac measurement	2007-02-14 00:00	0.00	96.00		070215 11:53
HLX03	13148137	EG154	Borehole deviation multiple measurements	2007-02-15 12:30			I C	070215 16:10

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX03	13148084	BEARING	3.00	96.00	6.0
HLX03	13148084	INCLINATION	3.00	96.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX03	6367820.77	1549921.18	10.45	0.00	0.00	-63.10	187.73	3.0	6.0	0.00
HLX03	6367815.43	1549920.46	-0.27	12.00	0.28	-63.90	187.73	3.0	6.0	0.63
HLX03	6367806.83	1549919.21	-19.38	33.00	0.73	-66.70	188.73	3.0	6.0	1.73
HLX03	6367797.70	1549918.02	-41.55	57.00	1.21	-68.85	188.03	3.0	6.0	2.98
HLX03	6367790.55	1549916.91	-61.26	78.00	1.59	-70.38	189.03	3.0	6.0	4.08
HLX03	6367783.18	1549915.50	-81.94	100.00	1.98	-70.41	191.73	3.0	6.0	5.23

Borehole description – HLX04

Technical description of borehole HLX04 is given in Table 1.

Table 1. Technical description of borehole HLX04.

```
Title                          Value
                               Information about percussion borehole HLX04 (2007-02-05).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Initial sign by sic_dba        125.00      Top of casing (center)

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Initial sign by sic_dba        1987-11-05   1987-11-06   0.00        125.00       Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Johan Svensson                 0.00        6367679.68   1549795.18  10.36       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        301.30       -63.60                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Initial sign by sic_dba        0.00        125.00       0.115

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Initial sign by sic_dba        0.00        1.20         0.130       0.140

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)
Initial sign by sic_dba        1           1997-01-29   0.00        125.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are released.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

<u>Deviation measurement in HLX04</u>

The only deviation measurement performed in HLX04 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

The Boremac measurement (ID 3013010) was executed down the borehole between the length 0 – 120.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148071). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-11-07.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148139) the Boremac measurement (ID 13148071) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.

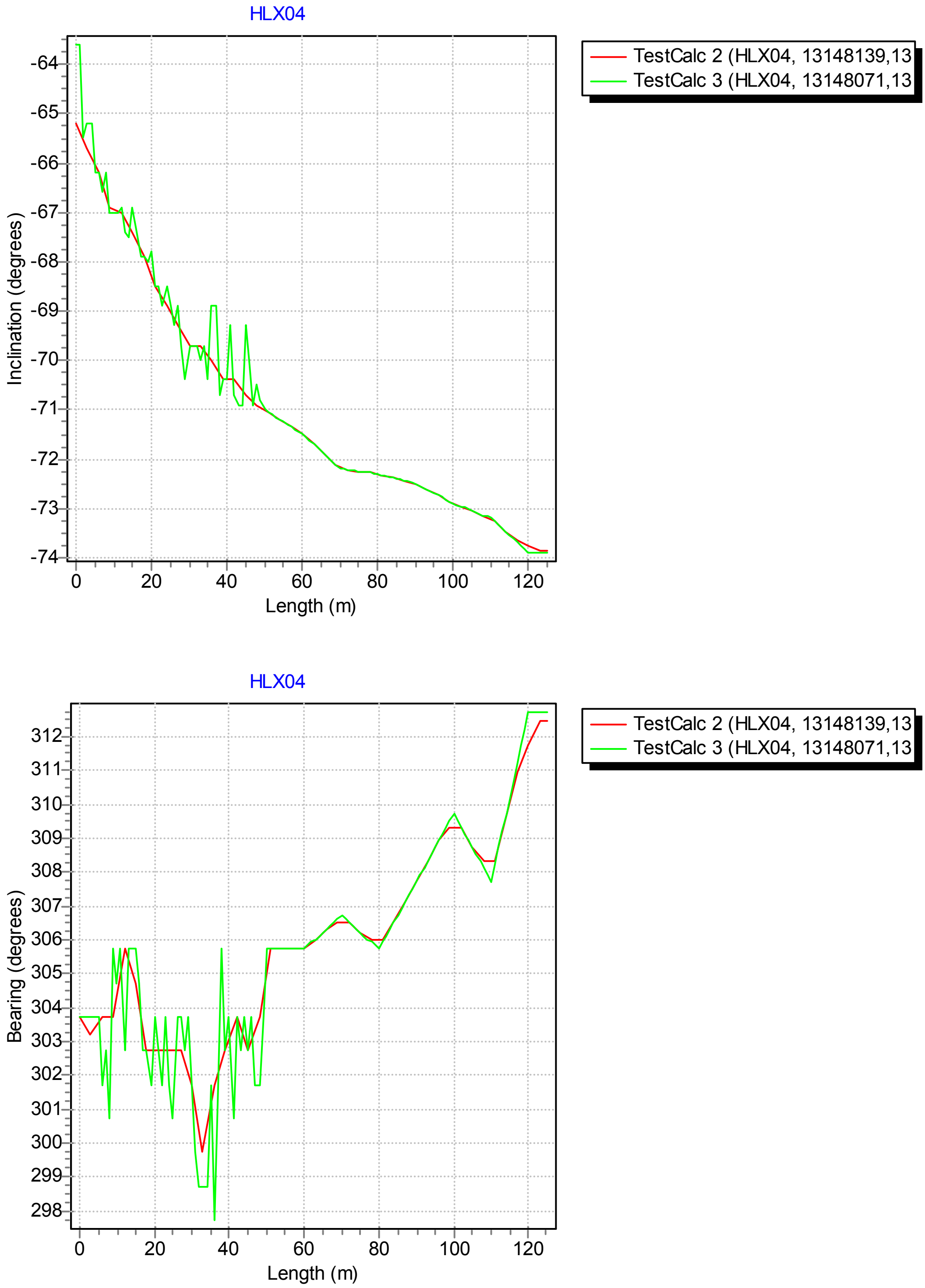


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX04.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX04	3013010	EG155	Boremac measurement	1987-11-07 00:00	0.00	120.00	E	070215 11:56
HLX04	13147120	EG154	Borehole deviation multiple measurements	2007-02-05 11:00			EC	070215 16:17
HLX04	13148071	EG155	Boremac measurement	2007-02-14 00:00	0.00	120.00		070215 11:53
HLX04	13148139	EG154	Borehole deviation multiple measurements	2007-02-15 12:35			I C	070215 16:11

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX04	13148071	BEARING	3.00	120.00	6.0
HLX04	13148071	INCLINATION	3.00	120.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX04	6367679.68	1549795.18	10.36	0.00	0.00	-65.20	303.73	3.0	6.0	0.00
HLX04	6367682.37	1549791.16	-0.62	12.00	0.25	-67.00	305.73	3.0	6.0	0.63
HLX04	6367686.54	1549784.72	-20.17	33.00	0.65	-69.70	299.73	3.0	6.0	1.73
HLX04	6367690.37	1549778.88	-39.97	54.00	1.01	-71.20	305.73	3.0	6.0	2.83
HLX04	6367694.24	1549773.58	-59.92	75.00	1.35	-72.25	306.23	3.0	6.0	3.93
HLX04	6367698.06	1549768.52	-79.94	96.00	1.69	-72.74	308.93	3.0	6.0	5.02
HLX04	6367701.90	1549763.80	-100.03	117.00	2.00	-73.66	310.98	3.0	6.0	6.12
HLX04	6367703.39	1549762.13	-107.72	125.00	2.12	-73.87	312.48	3.0	6.0	6.54

Borehole description – HLX05

Technical description of borehole HLX05 is given in Table 1.

Table 1. Technical description of borehole HLX05.

```
Title                          Value
                               Information about percussion borehole HLX05 (2007-02-05).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Initial sign by sic_dba        100.00      Top of casing (center)

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Initial sign by sic_dba        1987-11-04   1987-11-05   0.00        100.00       Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Johan Svensson                 0.00        6367558.31   1549968.58  15.71       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        175.30       -57.70                  RT38-RH00

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Initial sign by sic_dba        0.00        100.00       0.115

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Initial sign by sic_dba        0.00        0.60         0.130       0.140

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)
Initial sign by sic_dba        1           1997-01-29   0.00        100.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are released.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

<u>Deviation measurement in HLX05</u>

The only deviation measurement performed in HLX05 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

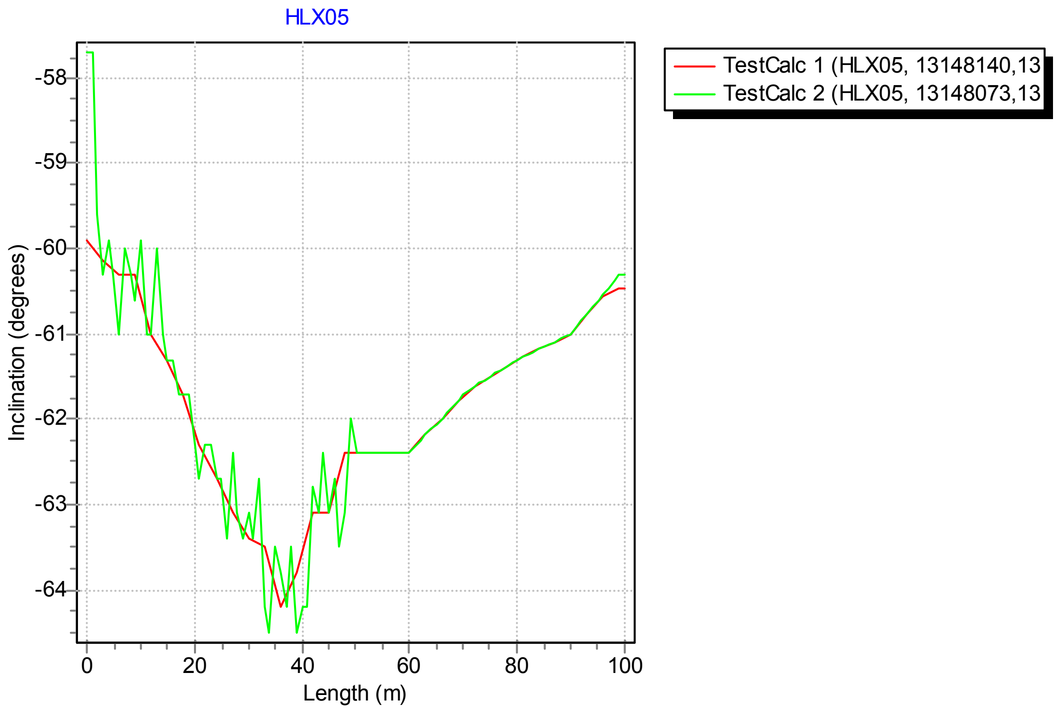
The Boremac measurement (ID 3013011) was executed down the borehole between the length 0 – 99.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148073). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-11-06.

<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13148140) the Boremac measurement (ID 13148073) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



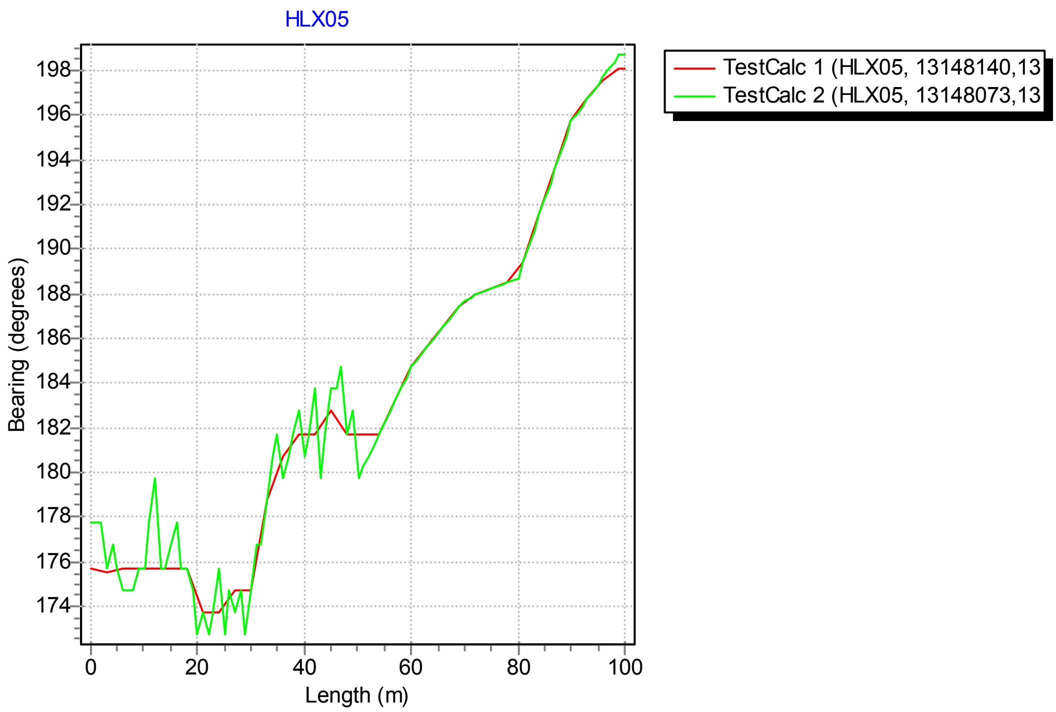


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX05.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX05	3013011	EG155	Boremac measurement	1987-11-06 00:00	0.00	99.00	E	070215 11:56
HLX05	13147121	EG154	Borehole deviation multiple measurements	2007-02-05 10:30			EC	070215 16:12
HLX05	13148073	EG155	Boremac measurement	2007-02-14 00:00	0.00	99.00		070215 11:53
HLX05	13148140	EG154	Borehole deviation multiple measurements	2007-02-15 12:40			I C	070215 16:12

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX05	13148073	BEARING	3.00	99.00	6.0
HLX05	13148073	INCLINATION	3.00	99.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX05	6367558.31	1549968.58	15.71	0.00	0.00	-59.90	175.73	3.0	6.0	0.00
HLX05	6367549.51	1549969.24	0.02	18.00	0.46	-61.70	175.73	3.0	6.0	0.94
HLX05	6367540.05	1549969.83	-18.71	39.00	0.95	-63.80	181.73	3.0	6.0	2.04
HLX05	6367529.04	1549969.32	-40.03	63.00	1.53	-62.19	185.63	3.0	6.0	3.30
HLX05	6367519.16	1549967.91	-58.50	84.00	2.06	-61.18	191.53	3.0	6.0	4.40
HLX05	6367511.66	1549965.78	-72.47	100.00	2.47	-60.46	198.06	3.0	6.0	5.23

Borehole description – HLX06

Technical description of borehole HLX06 is given in Table 1.

Table 1. Technical description of borehole HLX06.

```
Title                          Value
                               Information about percussion borehole HLX06 (2007-02-05).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Initial sign by sic_dba        100.00      Top of casing (center)

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Initial sign by sic_dba        1987-10-28   1987-10-30   0.00        100.00       Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Johan Svensson                 0.00        6367166.11   1549784.52  15.48       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        178.30       -59.90                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Initial sign by sic_dba        0.00        100.00       0.115

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Initial sign by sic_dba        0.00        1.00         0.130       0.140

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)
Lars Andersson                 1           2005-09-23   0.00        100.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are expanded.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

<u>Deviation measurement in HLX06</u>

The only deviation measurement performed in HLX06 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

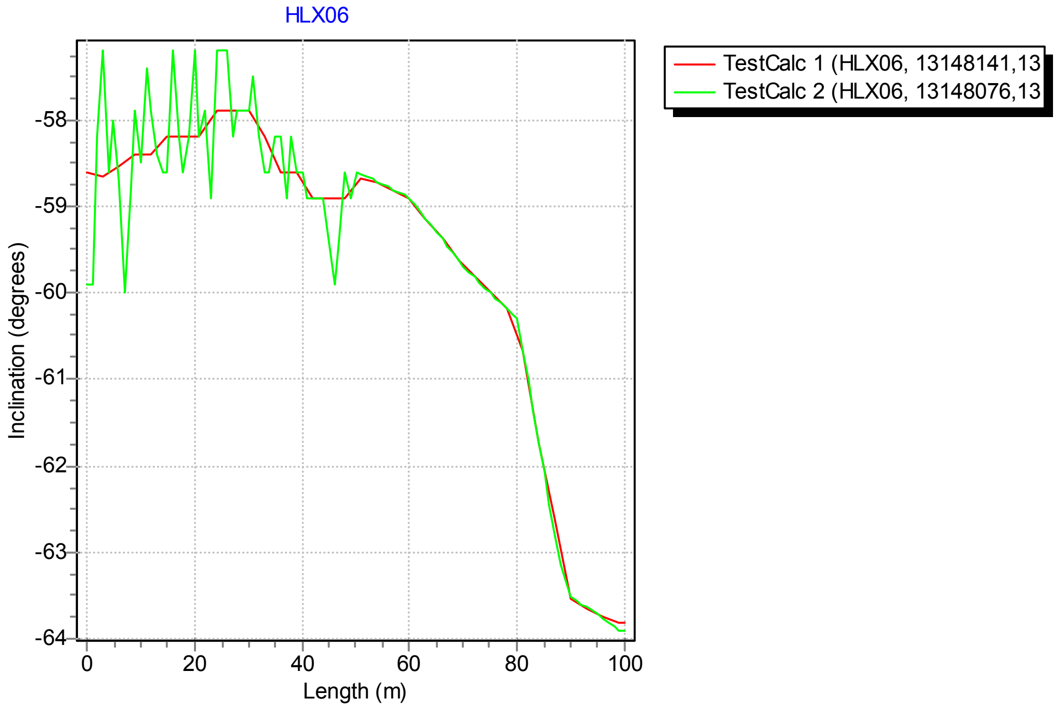
The Boremac measurement (ID 3013012) was executed down the borehole between the length 0 – 99.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID 13148076). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-10-31.

<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13148141) the Boremac measurement (ID 13148076) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



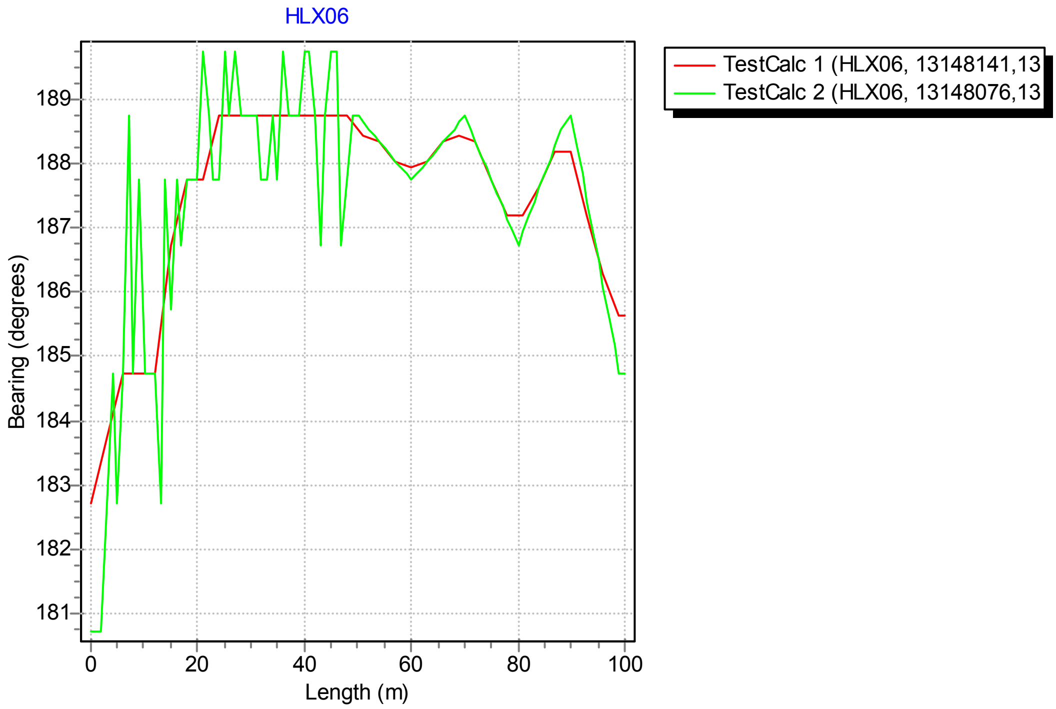


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX06.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX06	3013012	EG155	Boremac measurement	1987-10-31 00:00	0.00	99.00	E	070215 11:56
HLX06	13147122	EG154	Borehole deviation multiple measurements	2007-02-05 10:00			EC	070215 16:17
HLX06	13148076	EG155	Boremac measurement	2007-02-14 00:00	0.00	99.00		070215 11:53
HLX06	13148141	EG154	Borehole deviation multiple measurements	2007-02-15 12:40			I C	070215 16:13

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX06	13148076	BEARING	3.00	99.00	6.0
HLX06	13148076	INCLINATION	3.00	99.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX06	6367166.11	1549784.52	15.48	0.00	0.00	-58.60	182.73	3.0	6.0	0.00
HLX06	6367156.72	1549783.71	0.14	18.00	0.49	-58.20	187.73	3.0	6.0	0.99
HLX06	6367144.22	1549781.83	-20.26	42.00	1.15	-58.90	188.73	3.0	6.0	2.31
HLX06	6367131.96	1549780.03	-40.81	66.00	1.80	-59.38	188.33	3.0	6.0	3.60
HLX06	6367121.69	1549778.62	-59.07	87.00	2.34	-62.61	188.17	3.0	6.0	4.70
HLX06	6367115.95	1549777.91	-70.71	100.00	2.64	-63.81	185.62	3.0	6.0	5.38

Borehole description – HLX07

Technical description of borehole HLX07 is given in Table 1.

Table 1. Technical description of borehole HLX07.

```
Title                          Value
                               Information about percussion borehole HLX07 (2007-02-05).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)    Reference Level
Initial sign by sic_dba        100.00       Top of casing (center)

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)     Seclow(m)     Drilling Type
Initial sign by sic_dba        1987-11-02   1987-11-03   0.00         100.00        Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)    Northing(m)  Easting(m)   Elevation     Coord System
Johan Svensson                 0.00         6367151.90   1550013.88   8.61          RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)    Bearing      Inclination (- = down)     Coord System
Gerry Johansson                0.00         47.30        -59.40                     RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)     Seclow(m)    Hole Diam(m)
Initial sign by sic_dba        0.00         100.00       0.115

CORE DIAMETERS:
Signed/Approved By             Secup(m)     Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)     Seclow(m)    Case In(m)   Case Out(m)  Comment
Initial sign by sic_dba        0.00         1.00         0.130        0.140

INSTALLED SECTIONS:
Signed/Approved By             Section No   Start Date   Secup(m)     Seclow(m)
Data NOT Signed/Approved!      1            2005-09-23   16.00        100.00
Data NOT Signed/Approved!      2            2005-09-23   0.00         15.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are expanded.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

Deviation measurement in HLX07

The only deviation measurement performed in HLX07 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

The Boremac measurement (ID 3013013) was executed down the borehole between the length 0 – 97.00 m, with 1 m separation between the measuring points down to 50 m and then 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed in that part and resulted in a new Boremac file (ID

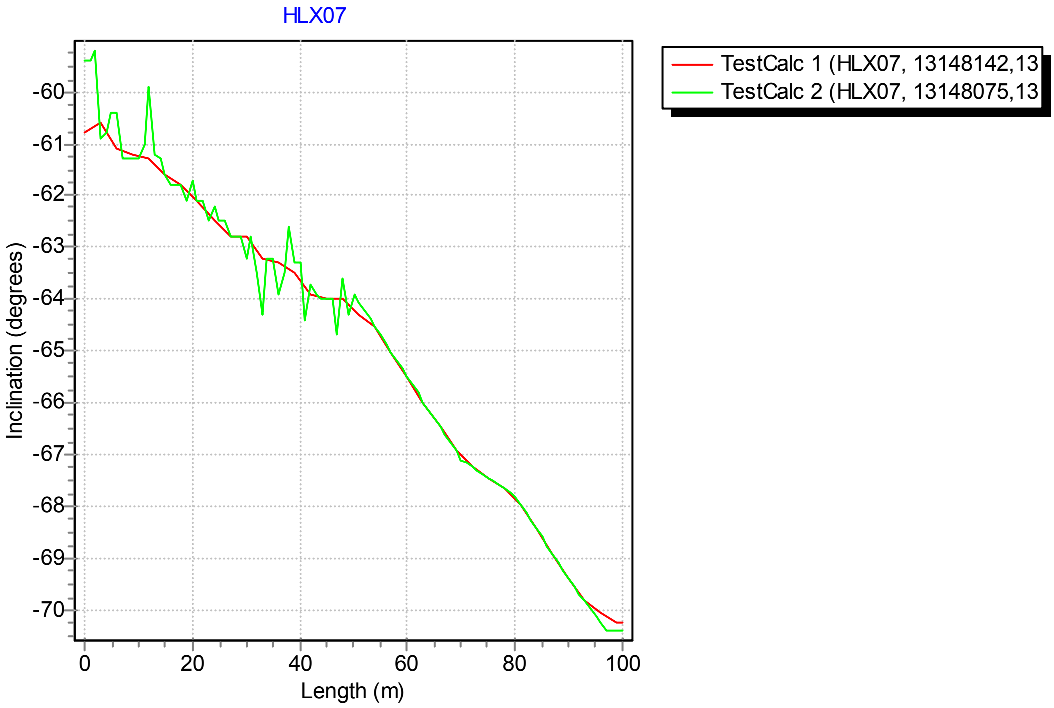
13148075). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1987-11-04.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148142) the Boremac measurement (ID 13148075) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed from 50 m with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



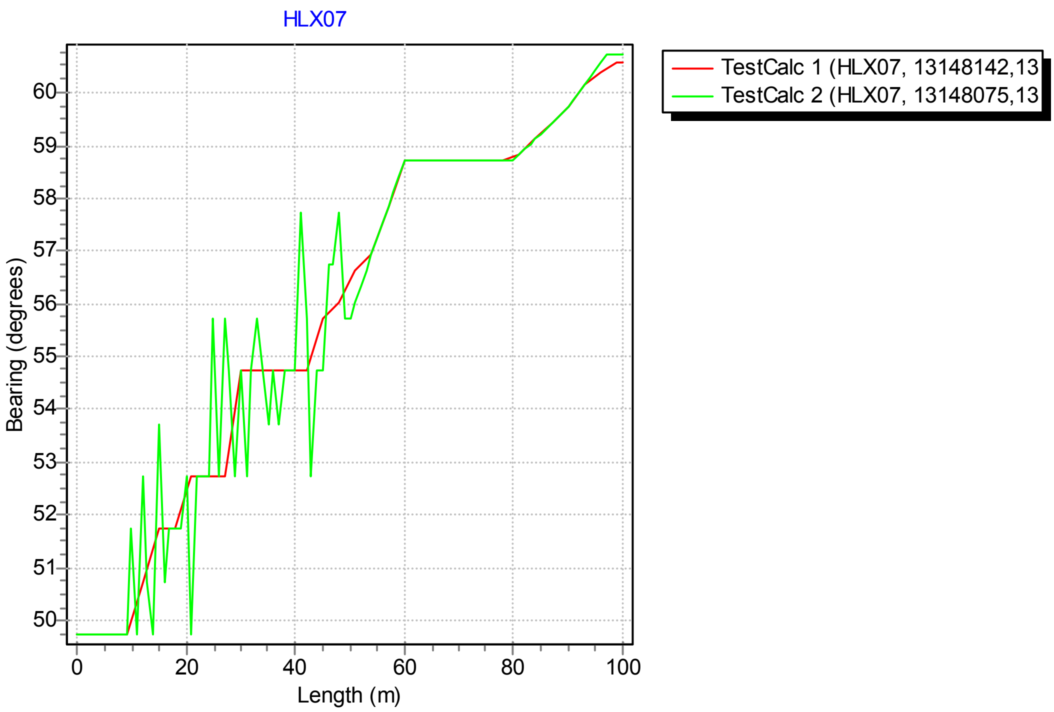


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX07.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX07	3013013	EG155	Boremac measurement	1987-11-04 00:00	0.00	97.00	E	070215 11:56
HLX07	13147123	EG154	Borehole deviation multiple measurements	2007-02-05 09:30			EC	070215 16:17
HLX07	13148075	EG155	Boremac measurement	2007-02-14 00:00	0.00	97.00		070215 11:53
HLX07	13148142	EG154	Borehole deviation multiple measurements	2007-02-15 12:45			I C	070215 16:13

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX07	13148075	BEARING	3.00	97.00	6.0
HLX07	13148075	INCLINATION	3.00	97.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX07	6367151.90	1550013.88	8.61	0.00	0.00	-60.80	49.73	3.0	6.0	0.00
HLX07	6367161.57	1550026.10	-20.47	33.00	0.81	-63.20	54.73	3.0	6.0	1.73
HLX07	6367166.82	1550033.73	-39.32	54.00	1.30	-64.54	56.93	3.0	6.0	2.83
HLX07	6367171.85	1550041.94	-61.30	78.00	1.80	-67.66	58.73	3.0	6.0	4.08
HLX07	6367175.81	1550048.70	-81.85	100.00	2.20	-70.26	60.59	3.0	6.0	5.23

Borehole description – HLX08

Technical description of borehole HLX08 is given in Table 1.

Table 1. Technical description of borehole HLX08.

Title	**Value**				
	Information about percussion borehole HLX08 (2007-02-05).				
Comment:	No comment exists.				
BOREHOLE LENGTH:					
Signed/Approved By	Length(m)	Reference Level			
Initial sign by sic_dba	40.00	Top of casing (center)			
DRILLING PERIODS:					
Signed/Approved By	From Date	To Date	Secup(m)	Seclow(m)	Drilling Type
Initial sign by sic_dba	1991-11-14	1991-11-14	0.00	40.00	Percussion drilling
STARTING POINT COORDINATE:					
Signed/Approved By	Length(m)	Northing(m)	Easting(m)	Elevation	Coord System
Johan Svensson	0.00	6366588.49	1550587.57	2.22	RT90-RHB70
STARTING POINT ANGLES:					
Signed/Approved By	Length(m)	Bearing	Inclination (- = down)		Coord System
Gerry Johansson	0.00	122.30	-47.80		RT90-RHB70
BOREHOLE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Hole Diam(m)		
Initial sign by sic_dba	0.00	40.00	0.115		
CORE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Core Diam(m)		
CASING DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Case In(m)	Case Out(m)	Comment
Initial sign by sic_dba	0.00	6.00	0.128	0.140	
INSTALLED SECTIONS:					
Signed/Approved By	Section No	Start Date	Secup(m)	Seclow(m)	
Initial sign by sic_dba	1	2004-06-21	0.00	40.00	
SECTION INFORMATION:					
Signed/Approved By	Status				
N/A	Packers are expanded.				
VALVE INFORMATION:					
Signed/Approved By	Status				
	(No valve installation/removal.)				
	End of additional information.				

<u>Deviation measurement in HLX08</u>

The only deviation measurement performed in HLX08 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

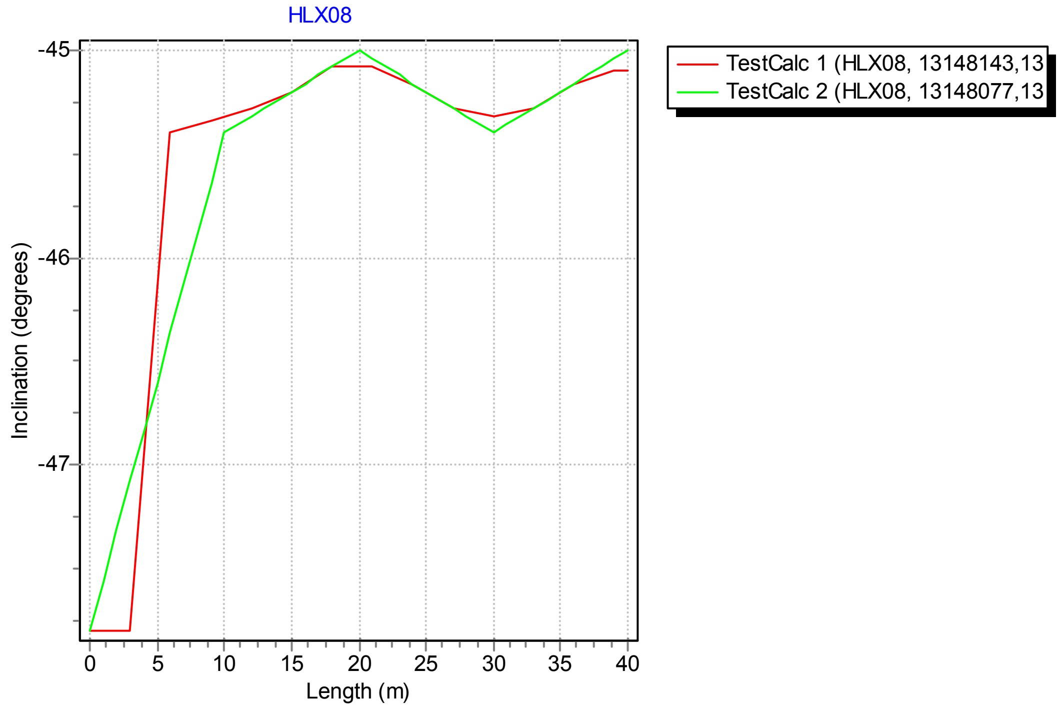
The Boremac measurement (ID 3013014) was executed down the borehole between the length 0 – 40.00 m, with 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed and resulted in a new Boremac file (ID 13148077). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1991-11-27.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148143) the Boremac measurement (ID 13148077) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



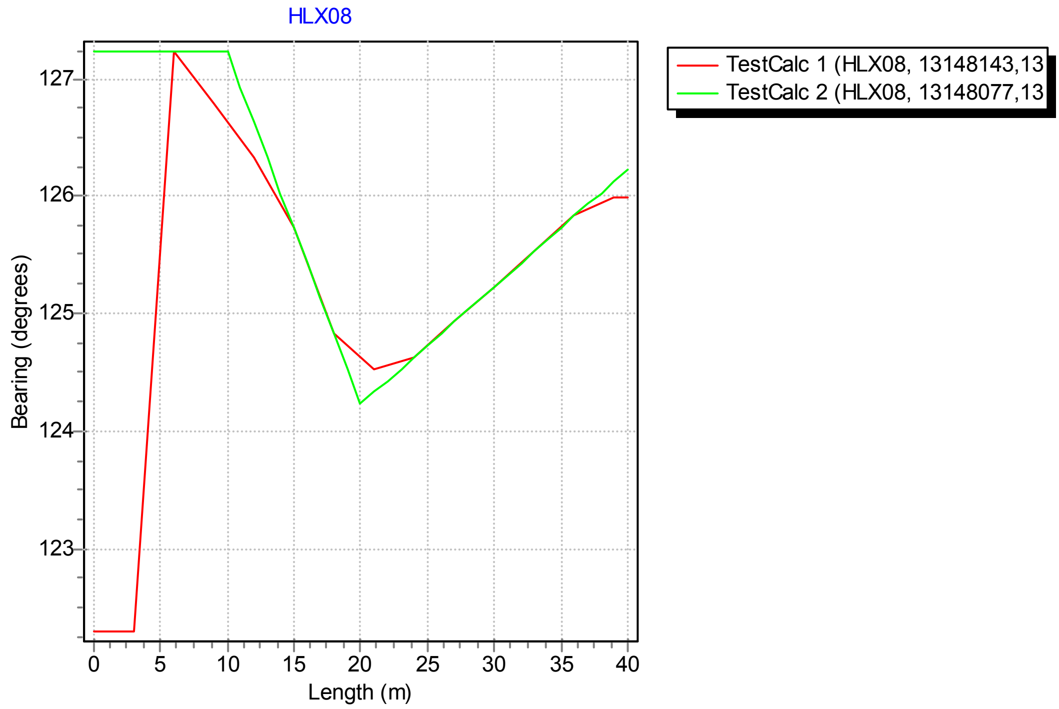


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX08.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX08	3013014	EG155	Boremac measurement	1991-11-27 00:00	0.00	40.00	E	070215 11:56
HLX08	13147124	EG154	Borehole deviation multiple measurements	2007-02-05 09:00			EC	070215 16:17
HLX08	13148077	EG155	Boremac measurement	2007-02-14 00:00	0.00	40.00		070215 11:53
HLX08	13148143	EG154	Borehole deviation multiple measurements	2007-02-15 12:50			I C	070215 16:14

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX08	13148077	BEARING	10.00	40.00	6.0
HLX08	13148077	INCLINATION	10.00	40.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX08	6366588.49	1550587.57	2.22	0.00	0.00	-47.80	122.30	3.0	6.0	0.00
HLX08	6366576.43	1550604.72	-19.22	30.00	1.10	-45.32	125.23	3.0	6.0	2.20
HLX08	6366572.31	1550610.45	-26.31	40.00	1.47	-45.10	125.98	3.0	6.0	2.93

Borehole description – HLX09

Technical description of borehole HLX09 is given in Table 1.

Table 1. Technical description of borehole HLX09.

Title	**Value**				
	Information about percussion borehole HLX09 (2007-02-02).				
Comment:	No comment exists.				
BOREHOLE LENGTH:					
Signed/Approved By	Length(m)	Reference Level			
Initial sign by sic_dba	151.00	Ground surface			
DRILLING PERIODS:					
Signed/Approved By	From Date	To Date	Secup(m)	Seclow(m)	Drilling Type
Initial sign by sic_dba	1991-11-19	1991-11-21	0.00	151.00	Percussion drilling
STARTING POINT COORDINATE:					
Signed/Approved By	Length(m)	Northing(m)	Easting(m)	Elevation	Coord System
Johan Svensson	0.00	6367230.60	1550807.37	3.31	RT90-RHB70
STARTING POINT ANGLES:					
Signed/Approved By	Length(m)	Bearing	Inclination (- = down)		Coord System
Gerry Johansson	0.00	166.30	-61.30		RT90-RHB70
BOREHOLE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Hole Diam(m)		
Initial sign by sic_dba	0.00	151.00	0.115		
CORE DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Core Diam(m)		
CASING DIAMETERS:					
Signed/Approved By	Secup(m)	Seclow(m)	Case In(m)	Case Out(m)	Comment
Initial sign by sic_dba	0.00	3.00	0.128	0.140	
INSTALLED SECTIONS:					
Signed/Approved By	Section No	Start Date	Secup(m)	Seclow(m)	
Initial sign by sic_dba	1	2004-05-05	17.00	151.00	
Initial sign by sic_dba	2	2004-05-05	0.00	16.00	
SECTION INFORMATION:					
Signed/Approved By	Status				
N/A	Packers are expanded.				
VALVE INFORMATION:					
Signed/Approved By	Status				
	(No valve installation/removal.)				
	End of additional information.				

<u>Deviation measurement in HLX09</u>

The only deviation measurement performed in HLX09 was with Boremac, an instrument with a compass and an inclinometer. The deviation logging activity is tabulated in Sicada Activity Log, see Table 2.

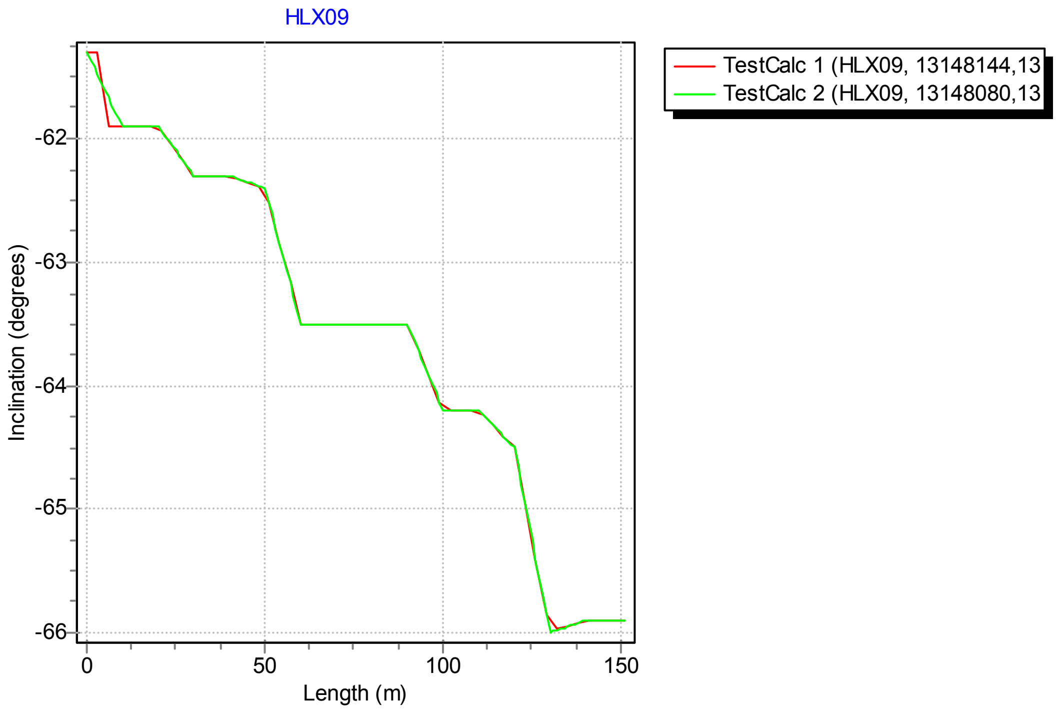
The Boremac measurement (ID 3013015) was executed down the borehole between the length 0 – 150.00 m, with 10 m separation between the measuring points to the bottom of the borehole. Interpolation with 1 m increment was performed and resulted in a new Boremac file (ID 13148080). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic data is available for the measuring date, 1991-11-28.

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148144) the Boremac measurement (ID 13148080) was used. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 4. When only one measurement was executed with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 1 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 2.



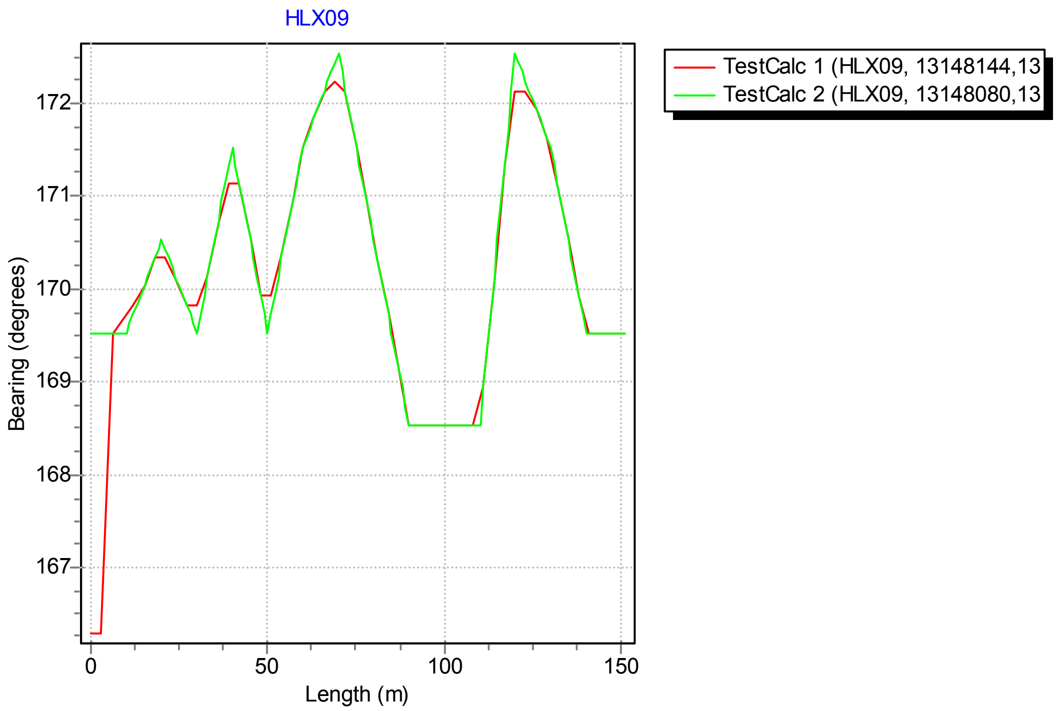


Figure 1. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 2. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. The deviation logging activities in Sicada for HLX09.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX09	3013015	EG155	Boremac measurement	1991-11-28 00:00	0.00	150.00	E	070215 11:56
HLX09	13147125	EG154	Borehole deviation multiple measurements	2007-02-02 15:45			EC	070215 16:17
HLX09	13148080	EG155	Boremac measurement	2007-02-14 00:00	0.00	150.00		070215 11:53
HLX09	13148144	EG154	Borehole deviation multiple measurements	2007-02-15 12:55			I C	070215 16:15

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX09	13148080	BEARING	10.00	150.00	6.0
HLX09	13148080	INCLINATION	10.00	150.00	3.0

Table 4. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX09	6367230.60	1550807.37	3.31	0.00	0.00	-61.30	166.30	3.0	6.0	0.00
HLX09	6367218.08	1550809.72	-20.49	27.00	0.67	-62.18	169.83	3.0	6.0	1.41
HLX09	6367208.46	1550811.34	-39.09	48.00	1.18	-62.38	169.93	3.0	6.0	2.51
HLX09	6367197.76	1550812.99	-60.51	72.00	1.74	-63.50	172.13	3.0	6.0	3.77
HLX09	6367188.54	1550814.60	-79.30	93.00	2.23	-63.71	168.53	3.0	6.0	4.87
HLX09	6367178.27	1550816.61	-100.90	117.00	2.78	-64.41	171.33	3.0	6.0	6.12
HLX09	6367169.62	1550817.90	-119.99	138.00	3.23	-65.92	169.93	3.0	6.0	7.22
HLX09	6367164.40	1550818.87	-131.86	151.00	3.51	-65.90	169.53	3.0	6.0	7.90

Borehole description – HLX10

Technical description of borehole HLX10 is given in Table 1.

Table 1. Technical description of borehole HLX10.

```
Title                          Value
                               Information about percussion borehole HLX10 (2007-05-16).

Comment:                       Drill water well used for drilling KLX02

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Stefan Sehlstedt               85.00       Unknown

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Stefan Sehlstedt               1992-09-30   1992-09-30   0.00        85.00        Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Gerry Johansson                0.00        6366635.80   1549140.14  11.74       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        176.67       -68.69                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Stefan Sehlstedt               0.00        85.00        0.137

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Stefan Sehlstedt               0.00        3.00

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are released.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

<u>Borehole direction surveying in HLX10</u>

There is no deviation measurement performed in HLX10. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Table 1.

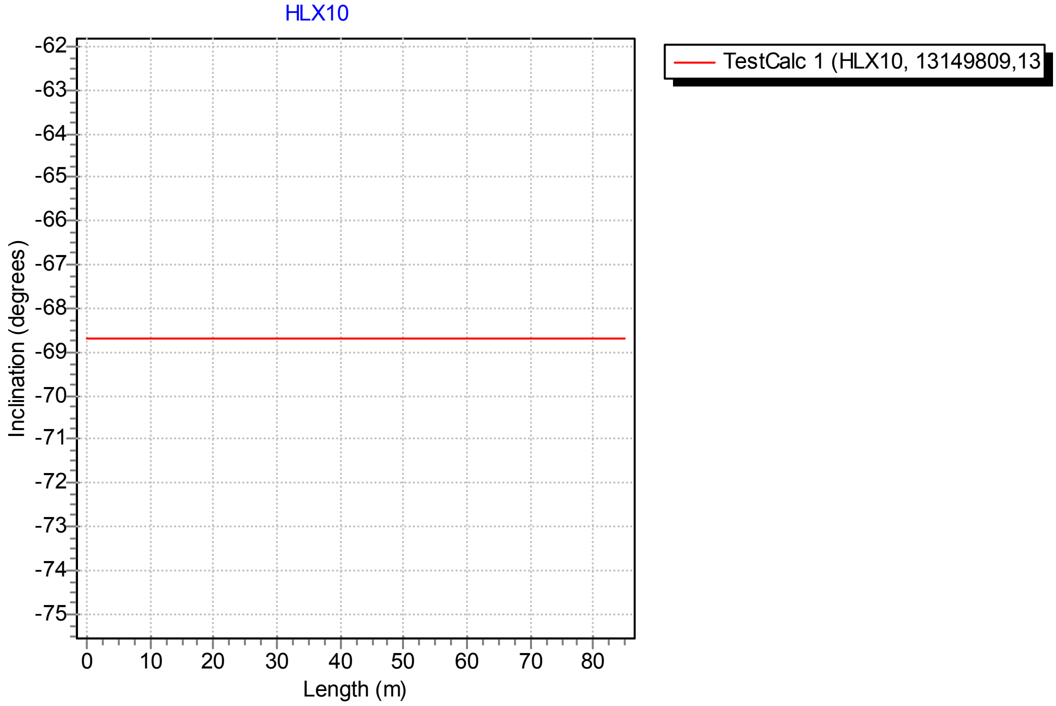
<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13149809) the borehole direction surveying (ID 13052169) from start of the borehole was used, Table 2. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 4. The uncertainty in inclination is calculated according to: –0.000092*(borehole_length)^2 + 0.049*borehole length + 1.16 + 1.8. The uncertainty in bearing is calculated according to: 0.05*borehole_length + 2.5 + 4.9.

The borehole deviation multiple measurement (ID 13146882) was error marked and replaced with (ID 13149809) which was based on the uncertainty calculation above.

Figure 1 show the inclination and bearing of the borehole plotted as a straight line.



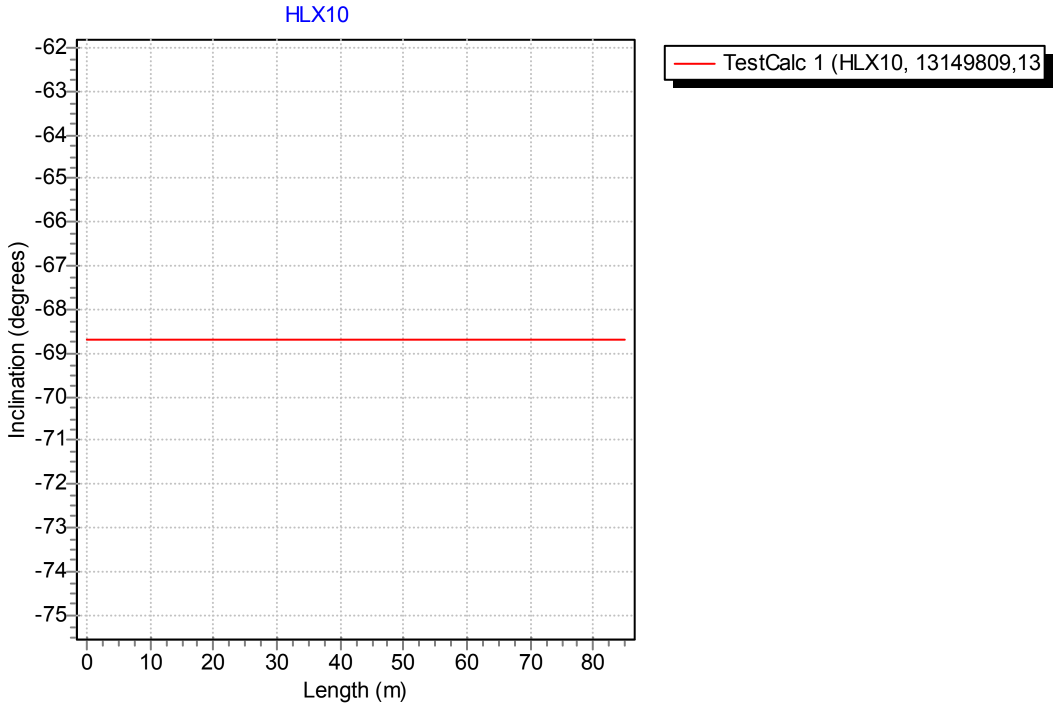


Figure 1. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. Borehole deviation multiple measurements in Sicada for HLX10.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX10	13146882	EG154	Borehole deviation multiple measurements	2007-02-02 15:20			EC	070220 11:09
HLX10	13149809	EG154	Borehole deviation multiple measurements	2007-02-19 11:45			I C	070220 13:07

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX10	13052169	BEARING	0.00	0.00	11.65
HLX10	13052169	INCLINATION	0.00	0.00	6.46

Table 4. Subset of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX10	6366635.80	1549140.14	11.74	0.00	0.00	-68.69	176.67	6.5	11.7	0.00
HLX10	6366634.71	1549140.20	8.94	3.00	0.12	-68.69	176.67	6.5	11.7	0.34
HLX10	6366604.96	1549141.93	-67.45	85.00	3.48	-68.69	176.67	6.5	11.7	9.56

Borehole description – HLX11

Technical description of borehole HLX11 is given in Table 1.

Table 1. Technical description of borehole HLX11.

```
Title                        Value
                             Information about percussion borehole HLX11 (2007-02-02).

Comment:                     No comment exists.

BOREHOLE LENGTH:
Signed/Approved By           Length(m)   Reference Level
Stefan Sehlstedt             70.00       Unknown

DRILLING PERIODS:
Signed/Approved By           From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Stefan Sehlstedt             1992-10-01   1992-10-01   0.00        70.00        Percussion
                             drilling

STARTING POINT COORDINATE:
Signed/Approved By           Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Gerry Johansson              0.00        6366595.82   1549091.99  13.15       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By           Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson              0.00        23.16        -68.49                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By           Secup(m)    Seclow(m)    Hole Diam(m)
Stefan Sehlstedt             0.00        70.00        0.139

CORE DIAMETERS:
Signed/Approved By           Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By           Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Stefan Sehlstedt             0.00        6.00

INSTALLED SECTIONS:
Signed/Approved By           Section No  Start Date   Secup(m)    Seclow(m)
Maria Eriksson               1           2005-10-25   14.00       70.00
Maria Eriksson               2           2005-10-25   0.00        13.00

SECTION INFORMATION:
Signed/Approved By           Status
N/A                          Packers are expanded.

VALVE INFORMATION:
Signed/Approved By           Status
                             (No valve installation/removal.)

                             End of additional information.
```

<u>Borehole direction surveying in HLX11</u>

There is no deviation measurement performed in HLX11. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Table 1.

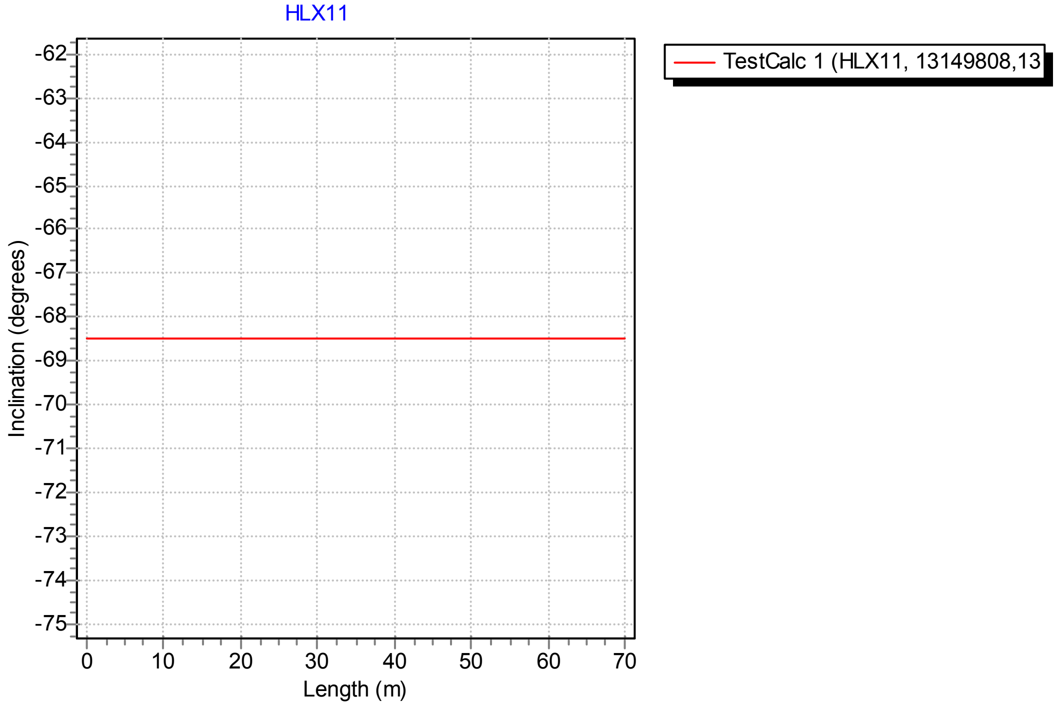
<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13149808) the borehole direction surveying (ID 13052170) from start of the borehole was used, Table 2. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 4. The uncertainty in inclination is calculated according to: $-0.000092*(\text{borehole\_length})^2 + 0.049*\text{borehole length} + 1.16 + 1.8$. The uncertainty in bearing is calculated according to: $0.05*\text{borehole\_length} + 2.5 + 4.9$.

The borehole deviation multiple measurement (ID 13146883) was error marked and replaced with (ID 13149808) which was based on the uncertainty calculation above.

Figure 1 show the inclination and bearing of the borehole plotted as a straight line.



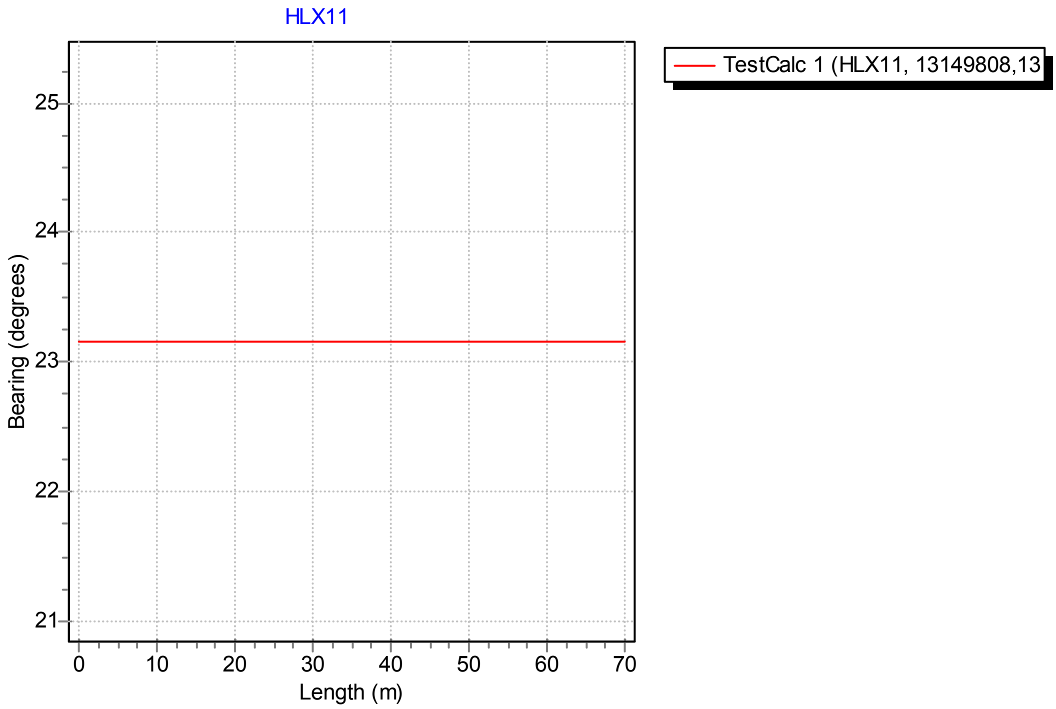


Figure 1. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. Borehole deviation multiple measurements in Sicada for HLX11.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX11	13146883	EG154	Borehole deviation multiple measurements	2007-02-02 15:10			EC	070220 11:09
HLX11	13149808	EG154	Borehole deviation multiple measurements	2007-02-19 12:45			I C	070220 13:07

Table 3. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX11	13052170	BEARING	0.00	0.00	10.9
HLX11	13052170	INCLINATION	0.00	0.00	5.939

Table 4. Subset of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX11	6366595.82	1549091.99	13.15	0.00	0.00	-68.49	23.16	5.9	10.9	0.00
HLX11	6366596.83	1549092.42	10.36	3.00	0.11	-68.49	23.16	5.9	10.9	0.31
HLX11	6366619.41	1549102.08	-51.97	70.00	2.66	-68.49	23.16	5.9	10.9	7.24

Borehole description – HLX12

Technical description of borehole HLX12 is given in Table 1.

Table 1. Technical description of borehole HLX12.

```
Title                          Value
                               Information about percussion borehole HLX12 (2007-02-02).

Comment:                       No comment exists.

BOREHOLE LENGTH:
Signed/Approved By             Length(m)   Reference Level
Stefan Sehlstedt               31.00       Unknown

DRILLING PERIODS:
Signed/Approved By             From Date    To Date      Secup(m)    Seclow(m)    Drilling Type
Stefan Sehlstedt               1992-10-02   1992-10-02   0.00        31.00        Percussion
                               drilling

STARTING POINT COORDINATE:
Signed/Approved By             Length(m)   Northing(m)  Easting(m)  Elevation   Coord System
Gerry Johansson                0.00        6366590.63   1549091.26  12.67       RT90-RHB70

STARTING POINT ANGLES:
Signed/Approved By             Length(m)   Bearing      Inclination (- = down)  Coord System
Gerry Johansson                0.00        167.15       -83.88                  RT90-RHB70

BOREHOLE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Hole Diam(m)
Stefan Sehlstedt               0.00        31.00        0.136

CORE DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Core Diam(m)

CASING DIAMETERS:
Signed/Approved By             Secup(m)    Seclow(m)    Case In(m)  Case Out(m) Comment
Stefan Sehlstedt               0.00        6.00

INSTALLED SECTIONS:
Signed/Approved By             Section No  Start Date   Secup(m)    Seclow(m)
Initial sign by sic_dba        1           2004-05-06   14.00       31.00
Initial sign by sic_dba        2           2004-05-06   0.00        13.00

SECTION INFORMATION:
Signed/Approved By             Status
N/A                            Packers are expanded.

VALVE INFORMATION:
Signed/Approved By             Status
                               (No valve installation/removal.)

                               End of additional information.
```

Borehole direction surveying in HLX12

There is no deviation measurement performed in HLX12. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Table 1.

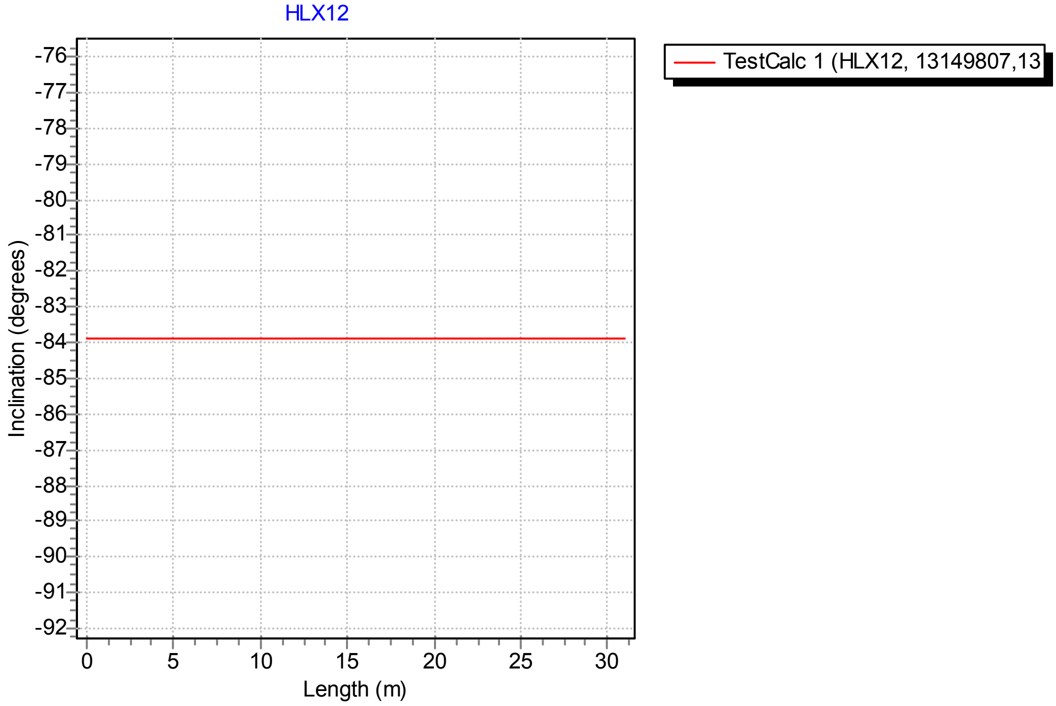
Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13149807) the borehole direction surveying (ID 13052171) from start of the borehole was used, Table 2. Table 3 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 4. The uncertainty in inclination is calculated according to: $-0.000092*(\text{borehole\_length})^2 + 0.049*\text{borehole length} + 1.16 + 1.8$. The uncertainty in bearing is calculated according to: $0.05*\text{borehole\_length} + 2.5 + 4.9$.

The borehole deviation multiple measurement (ID 13146884) was error marked and replaced with (ID 13149807) which was based on the uncertainty calculation above.

Figure 1 show the inclination and bearing of the borehole plotted as a straight line.



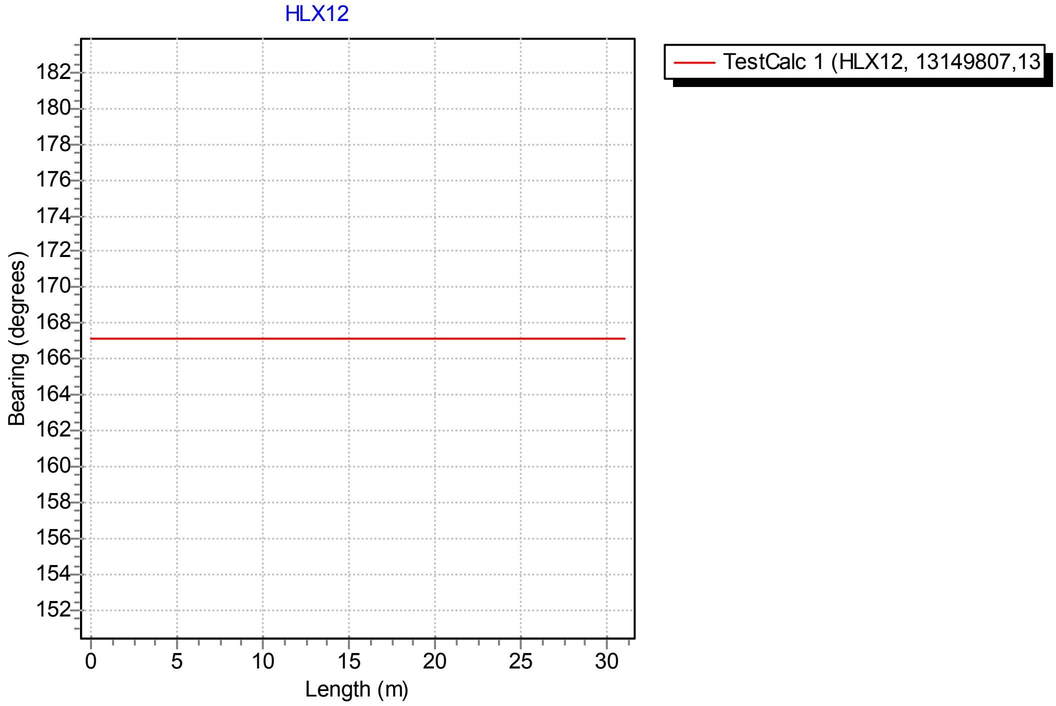


Figure 1. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 2. Borehole deviation multiple measurements in Sicada for HLX12.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX12	13146884	EG154	Borehole deviation multiple measurements	2007-02-02 15:00			EC	070220 11:09
HLX12	13149807	EG154	Borehole deviation multiple measurements	2007-02-19 13:00			I C	070220 13:07

Table 3. Content of the EG154-file.

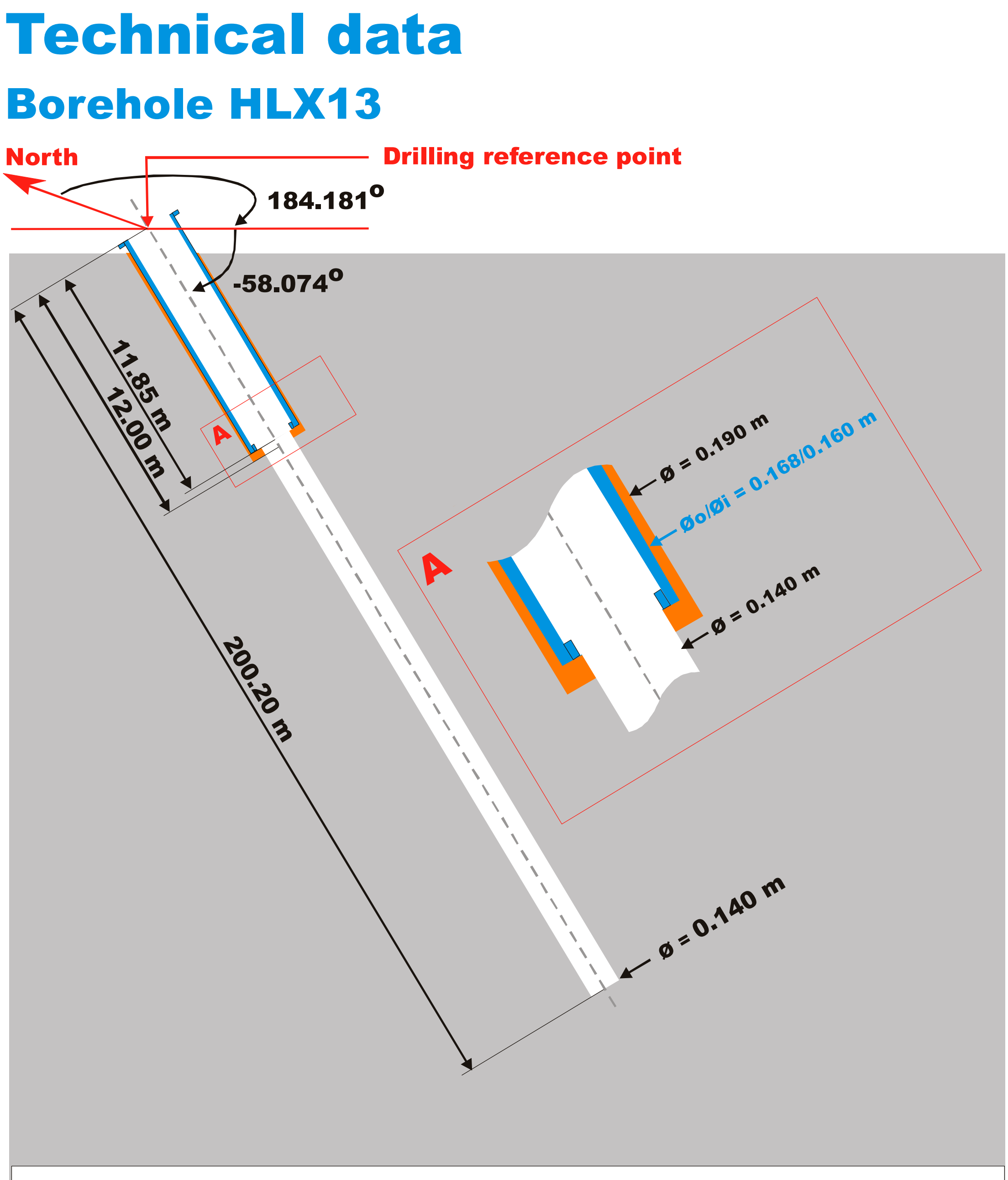
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX12	13052171	BEARING	0.00	0.00	8.950
HLX12	13052171	INCLINATION	0.00	0.00	4.391

Table 4. Subset of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX12	6366590.63	1549091.26	12.67	0.00	0.00	-83.88	167.15	4.4	9.0	0.00
HLX12	6366590.31	1549091.33	9.68	3.00	0.02	-83.88	167.15	4.4	9.0	0.23
HLX12	6366587.41	1549092.00	-18.16	31.00	0.25	-83.88	167.15	4.4	9.0	2.37

Borehole description – HLX13

Technical description of borehole HLX13 is given in Figure 1.



Drilling reference point

Northing: 6366953.000 (m), RT90 2,5 gon V 0:-15
Easting: 1547690.420 (m), RT90 2,5 gon V 0:-15
Elevation: 17.391 (m), RHB 70

Drilling period

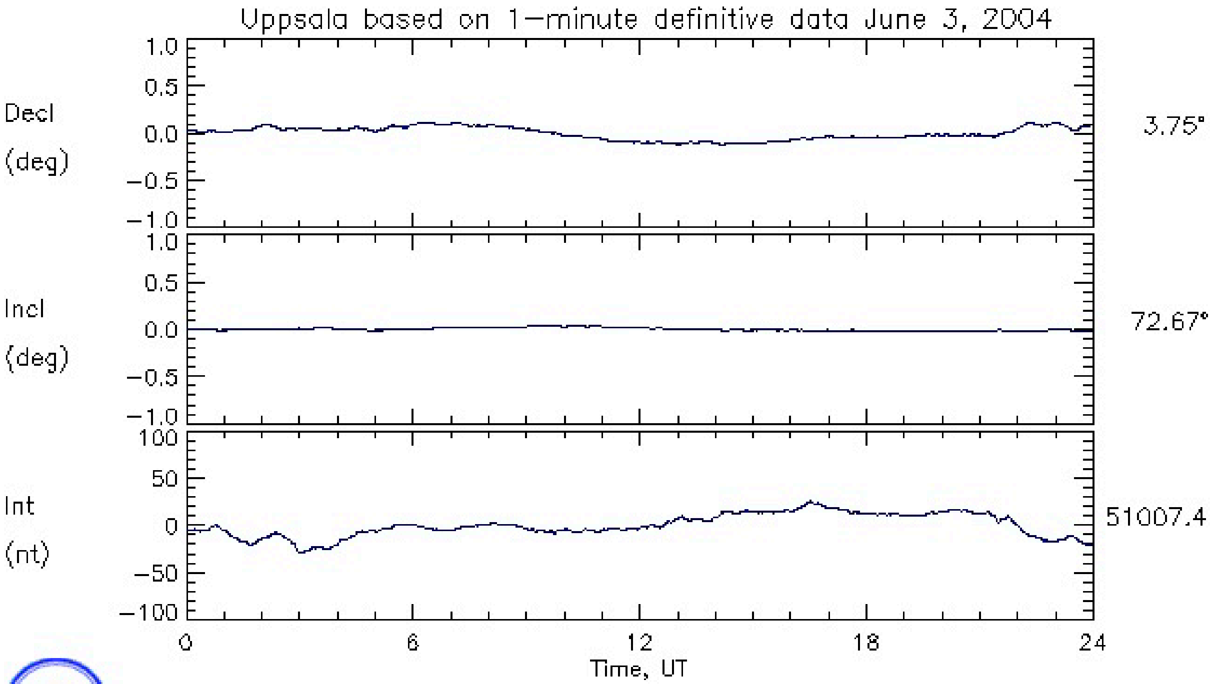
Drilling start date: 2004-02-24
Drilling stop date: 2004-02-26

Figure 1. *Technical description of the borehole HLX13.*

Deviation measurement in HLX13

The only deviation measurement performed in HLX13 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145264) is executed between borehole lengths 0 – 197.20 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.



INTERMAGNET

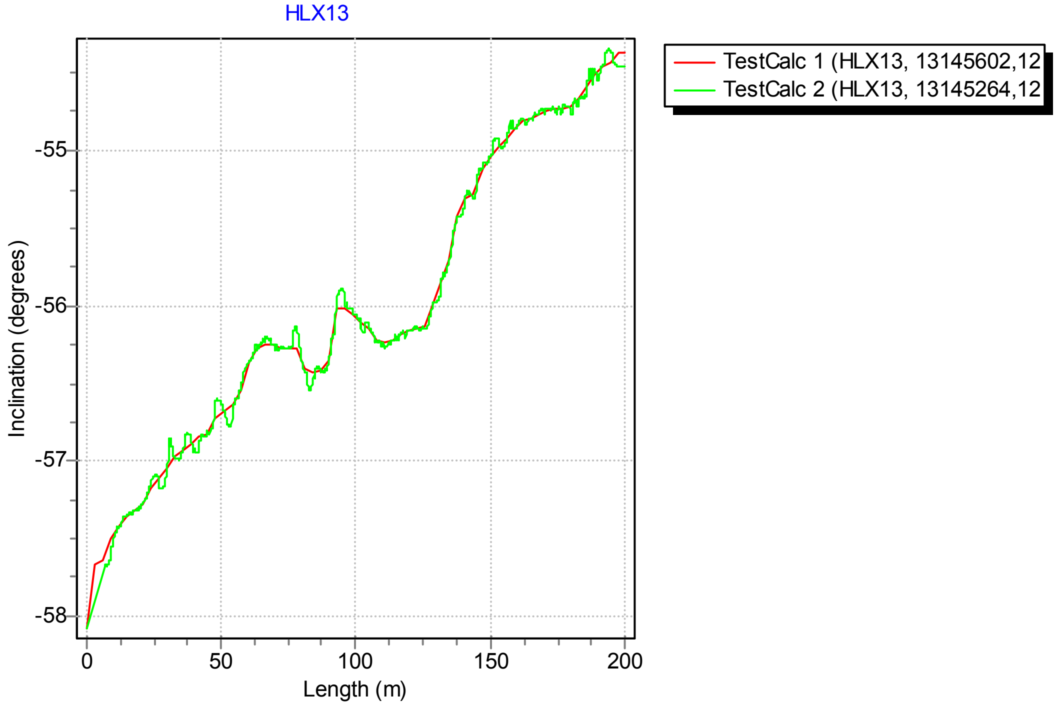
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-06-03.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145602) the acoustic televiewer measurement (ID 13145264) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 are used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



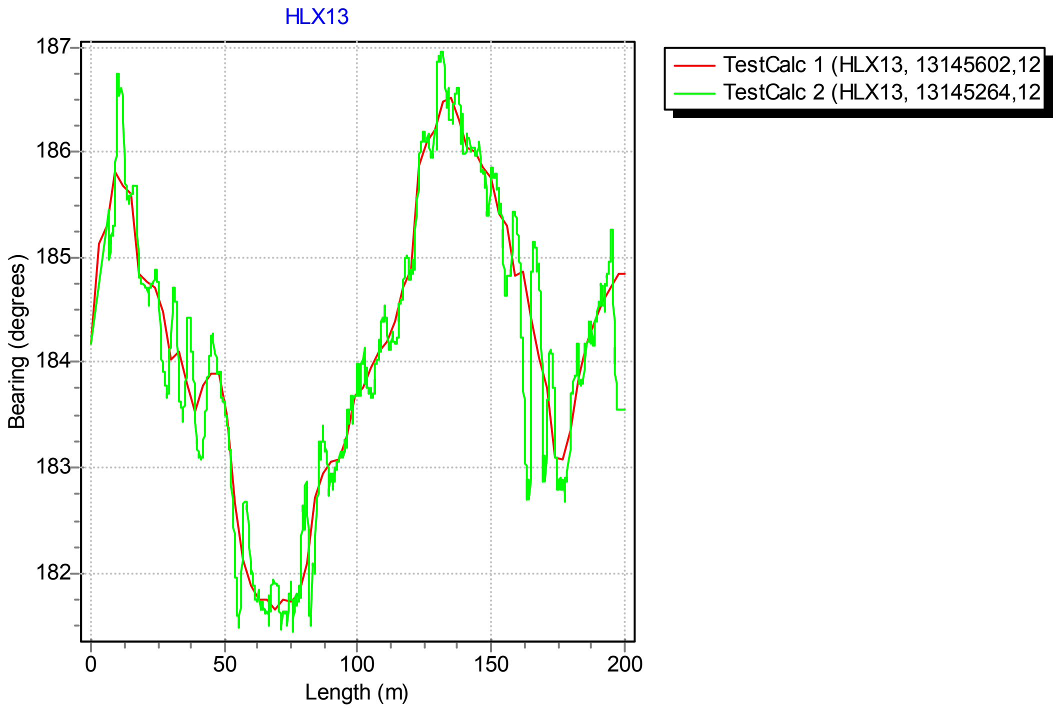


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX13.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX13	13145602	EG154	Borehole deviation multiple measurements	2004-06-03 11:25			I C	070201 12:28
HLX13	13145264	EG159	Acoustic televiewer deviation	2004-06-03 11:25	0.00	197.20		070122 14:51

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX13	13145264	BEARING	6.50	197.20	4.9
HLX13	13145264	INCLINATION	6.50	197.20	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

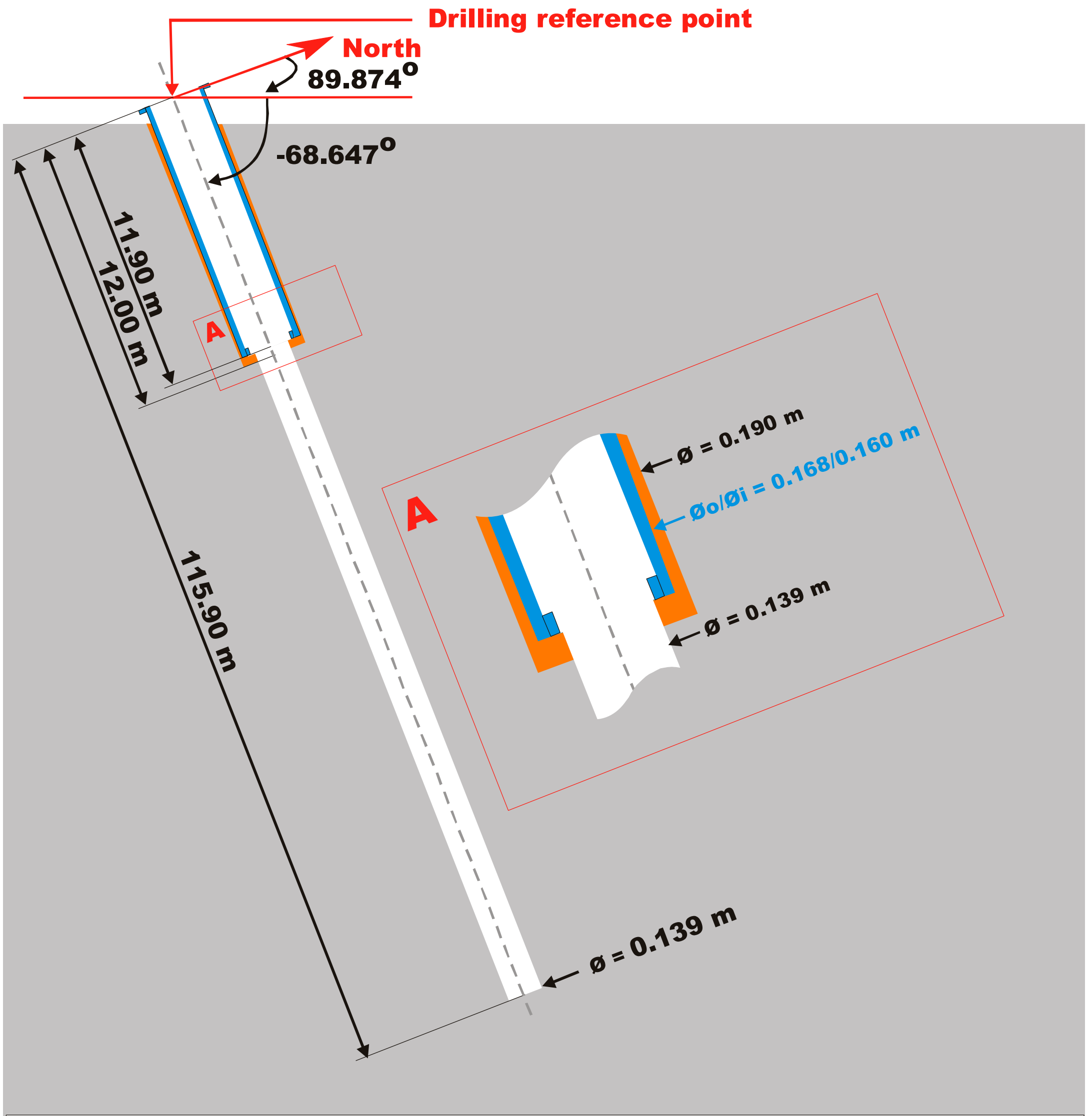
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX13	6366953.00	1547690.42	17.39	0.00	0.00	-58.07	184.18	1.8	4.9	0.00
HLX13	6366928.73	1547688.45	-20.45	45.00	0.77	-56.82	183.90	1.8	4.9	2.08
HLX13	6366915.50	1547687.87	-40.46	69.00	1.18	-56.25	181.64	1.8	4.9	3.21
HLX13	6366902.20	1547687.33	-60.43	93.00	1.60	-56.02	183.07	1.8	4.9	4.35
HLX13	6366888.86	1547686.42	-80.36	117.00	2.02	-56.19	184.71	1.8	4.9	5.49
HLX13	6366875.48	1547685.02	-100.24	141.00	2.44	-55.31	186.05	1.8	4.9	6.65
HLX13	6366861.78	1547683.72	-119.90	165.00	2.88	-54.80	184.43	1.8	4.9	7.82
HLX13	6366847.94	1547682.82	-139.49	189.00	3.31	-54.52	184.39	1.8	4.9	9.01
HLX13	6366841.45	1547682.29	-148.60	200.20	3.52	-54.37	184.85	1.8	4.9	9.56

Borehole description – HLX14

Technical description of borehole HLX14 is given in Figure 1.

Technical data

Borehole HLX14



Drilling reference point

Northing: 6366960.813 (m), RT90 2,5 gon V 0:-15
Easting: 1547692.570 (m), RT90 2,5 gon V 0:-15
Elevation: 17.113 (m), RHB 70

Drilling period

Drilling start date: 2004-03-08
Drilling stop date: 2004-03-11

Figure 1. *Technical description of the borehole HLX14.*

Deviation measurement in HLX14

The only deviation measurement performed in HLX14 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The Mag/acc measurements (ID 13099035) was executed down the borehole between the length 0 – 110.00 m, with the Flexit instrument with 10 m separation between the measuring points. Interpolation with 1 m increment was performed and resulted in a new Mag/acc file (ID 13148086). Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

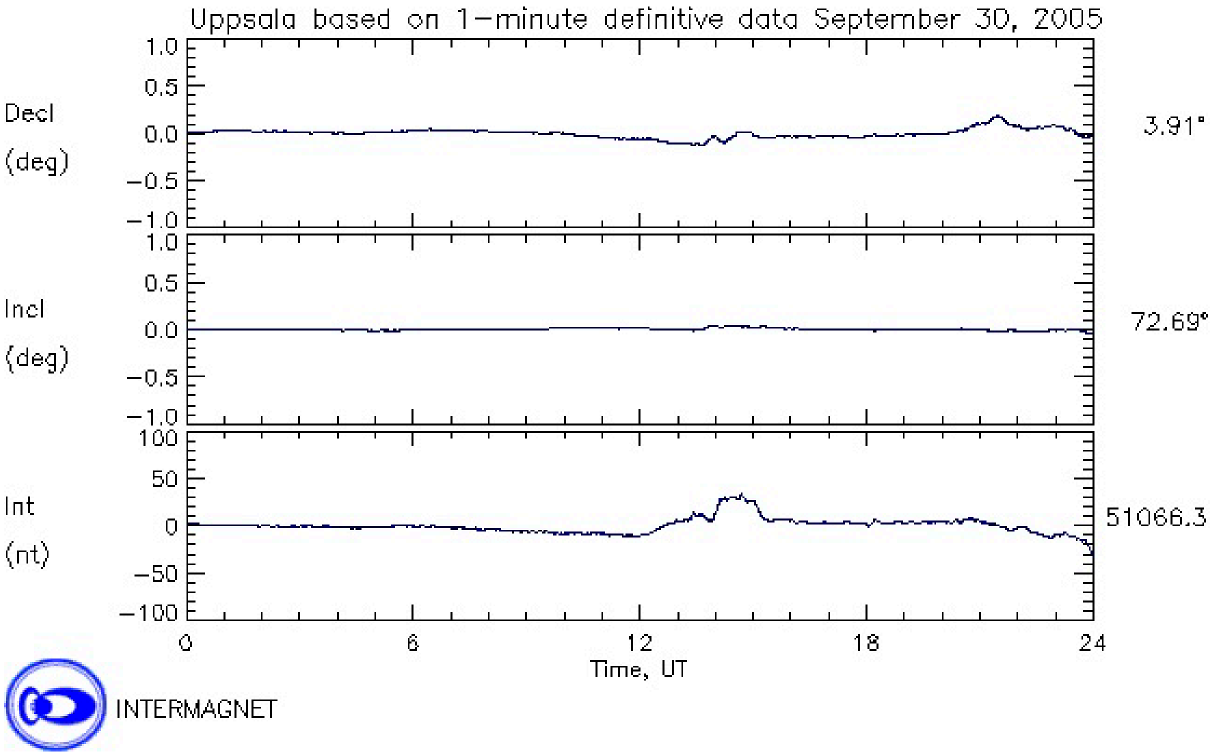


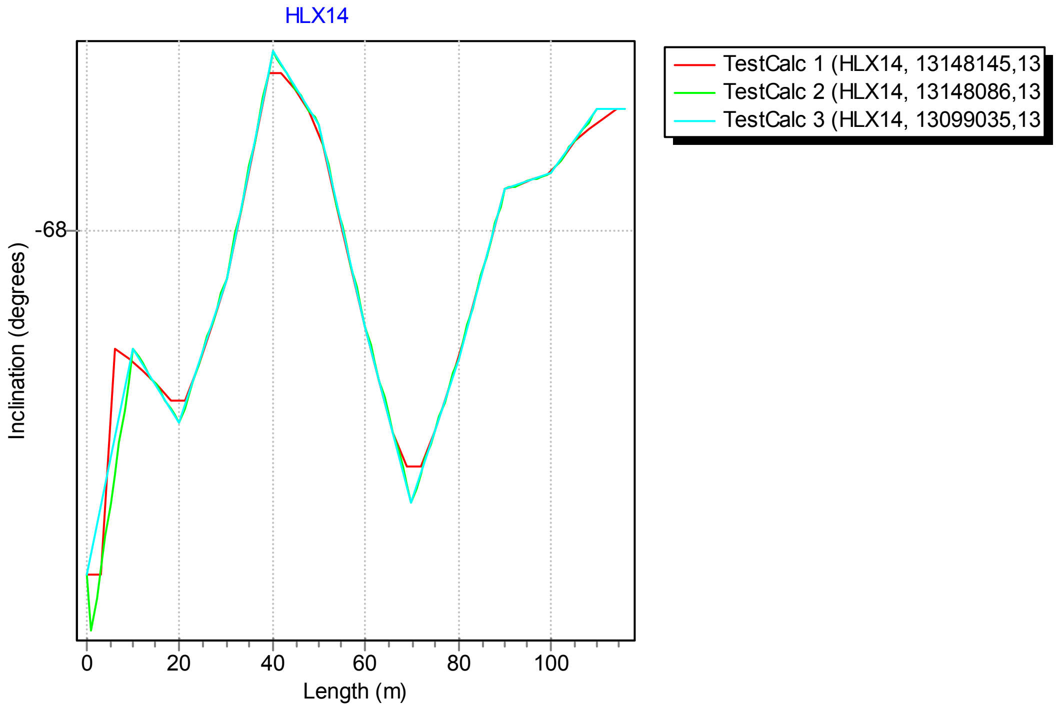
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-09-30.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13148145) the Mag/acc measurement (ID 13148086) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement was executed with 10 m separation between the readings an inclination uncertainty of 3.0 and bearing uncertainty of 6.0 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



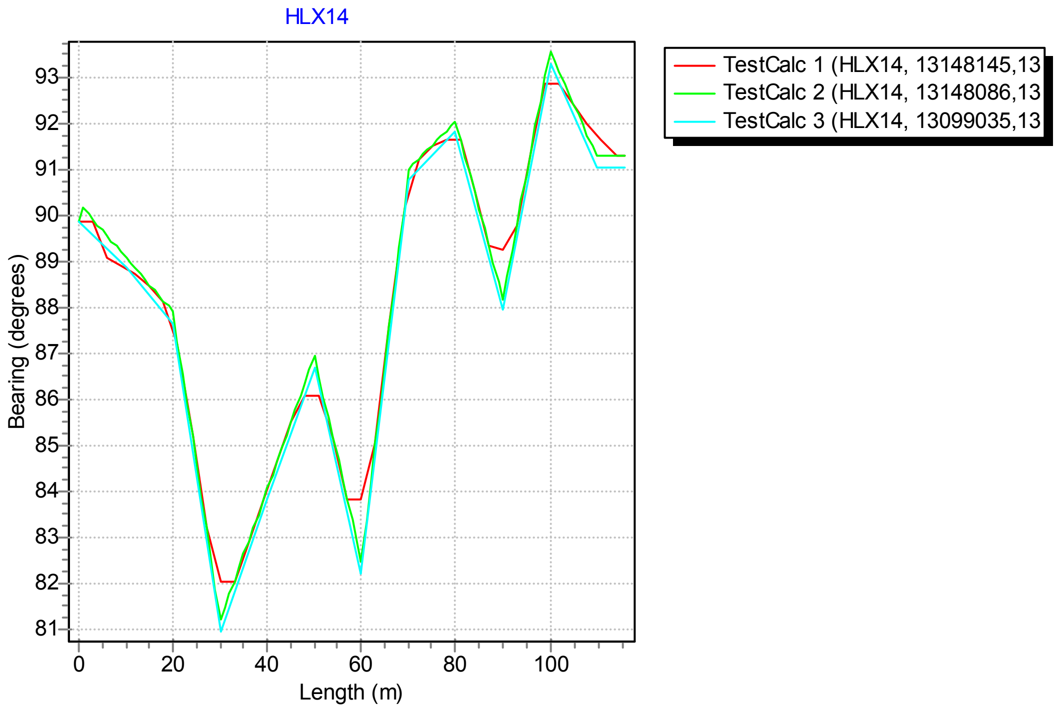


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX14.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX14	13099035	EG157	Magnetic - accelerometer measurement	2005-09-30 12:41	0.00	110.00	EF	070215 16:20
HLX14	13146881	EG154	Borehole deviation multiple measurements	2007-02-02 13:30			EC	070215 16:17
HLX14	13148086	EG157	Magnetic - accelerometer measurement	2007-02-15 00:00	0.00	110.00		070215 16:20
HLX14	13148145	EG154	Borehole deviation multiple measurements	2007-02-15 14:15			I C	070215 16:25

Table 2. Content of the EG154-file.

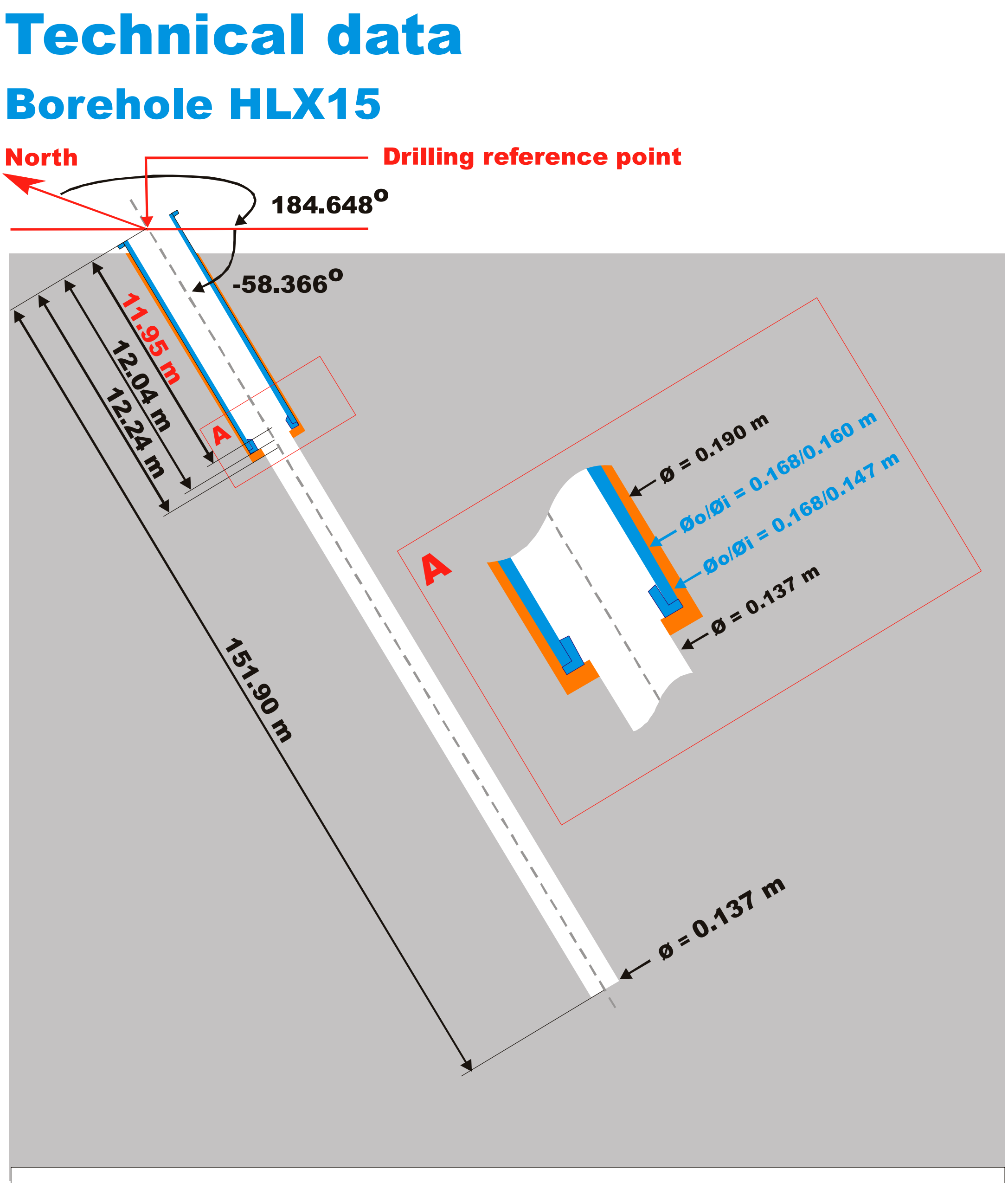
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX14	13148086	BEARING	10.00	110.00	6.000
HLX14	13148086	INCLINATION	10.00	110.00	3.000

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX14	6366960.81	1547692.57	17.11	0.00	0.00	-68.65	89.87	3.0	6.0	0.00
HLX14	6366960.93	1547699.21	0.38	18.00	0.35	-68.32	88.14	3.0	6.0	0.94
HLX14	6366961.74	1547707.00	-19.10	39.00	0.76	-67.70	83.78	3.0	6.0	2.04
HLX14	6366962.42	1547714.88	-38.55	60.00	1.17	-68.18	83.81	3.0	6.0	3.14
HLX14	6366962.50	1547723.74	-60.85	84.00	1.64	-68.11	90.49	3.0	6.0	4.40
HLX14	6366962.36	1547731.63	-80.32	105.00	2.05	-67.83	92.42	3.0	6.0	5.50
HLX14	6366962.24	1547735.74	-90.41	115.90	2.27	-67.77	91.29	3.0	6.0	6.07

Borehole description – HLX15

Technical description of borehole HLX15 is given in Figure 1.



Drilling reference point

Northing: 6365361.975 (m), RT90 2,5 gon V 0:-15
Easting: 1548664.018 (m), RT90 2,5 gon V 0:-15
Elevation: 4.807 (m), RHB 70

Drilling period

Drilling start date: 2004-04-27
Drilling stop date: 2004-04-29

Figure 1. *Technical description of the borehole HLX15.*

Deviation measurement in HLX15

The only deviation measurement performed in HLX15 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145185) is executed between borehole lengths 0 – 147.27 m. The acoustic televiewer measurements (ID 13077082 and 13114892) are error marked measurements which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

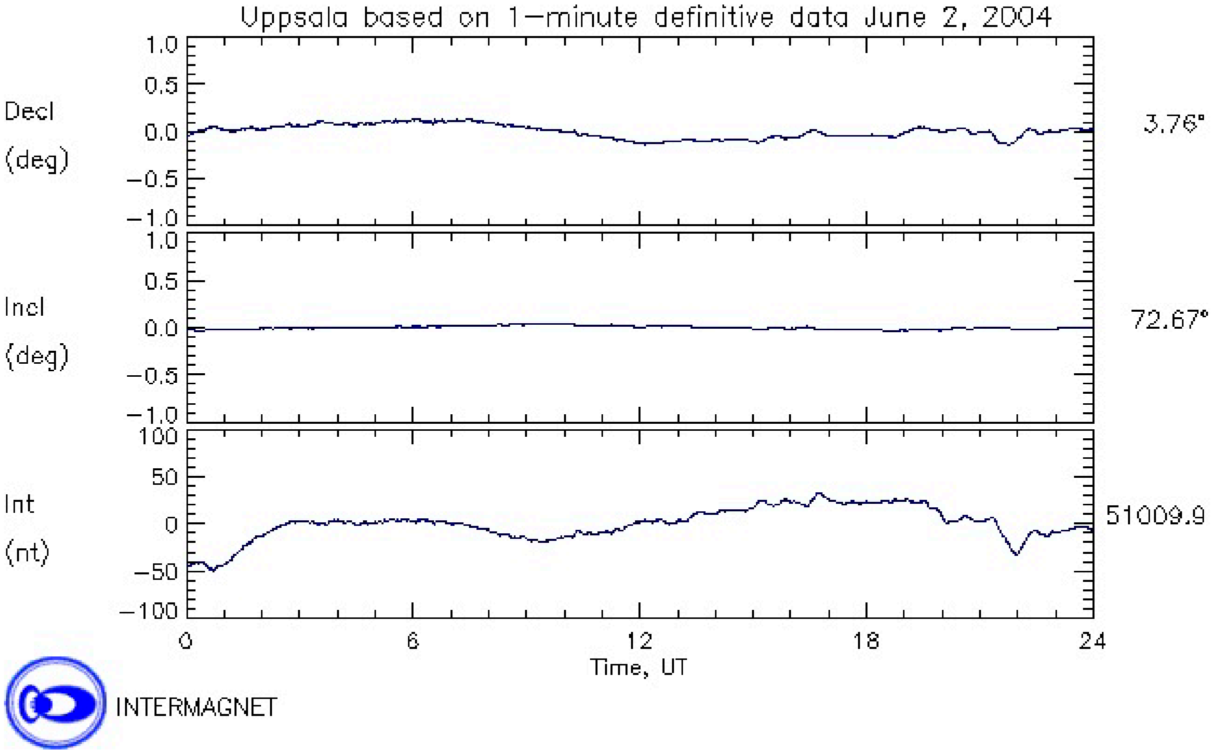


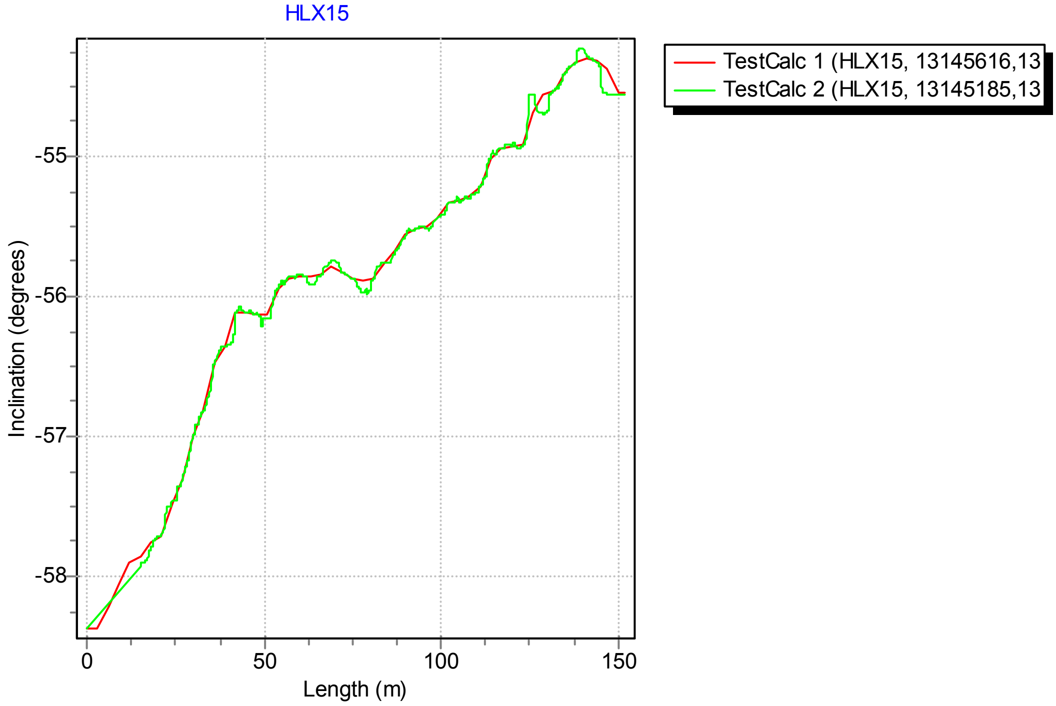
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-06-02.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145616) the acoustic televiewer measurement (ID 13145185) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



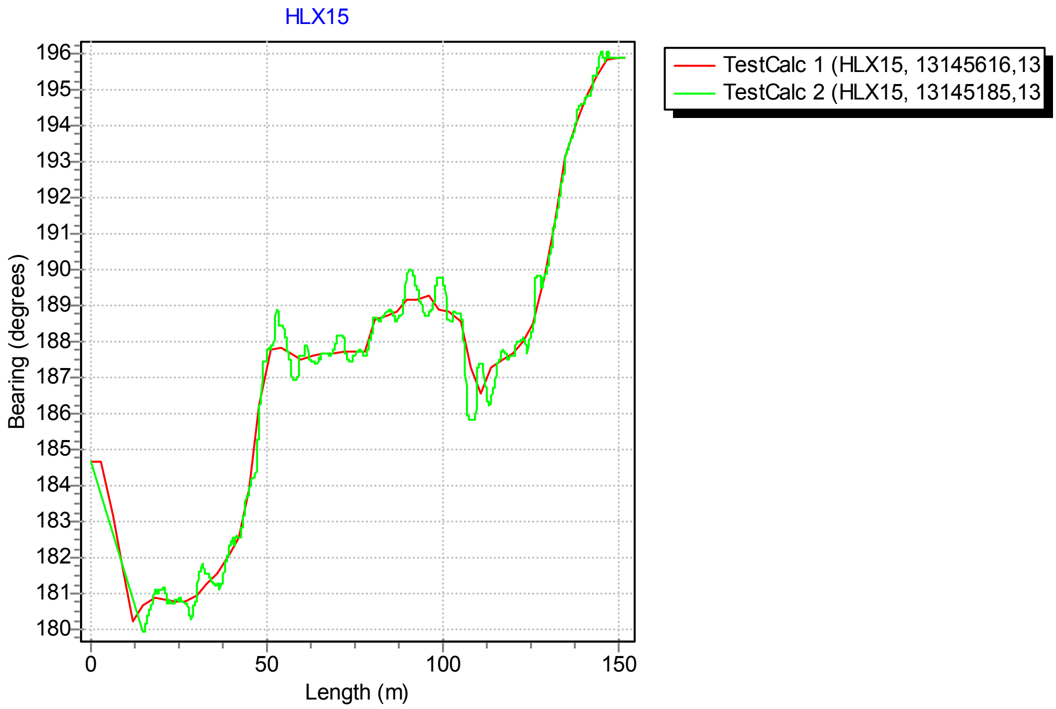


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX15.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX15	13114892	EG159	Acoustic televiewer deviation	2004-06-02 18:28	15.07	147.27	E	070213 09:34
HLX15	13145185	EG159	Acoustic televiewer deviation	2004-06-02 18:28	0.00	147.27		070122 14:51
HLX15	13145616	EG154	Borehole deviation multiple measurements	2004-06-02 18:28			I C	070201 12:28
HLX15	13077082	EG159	Acoustic televiewer deviation	2004-06-02 18:28	15.07	147.27	E	070214 08:00

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX15	13145185	BEARING	15.07	147.27	4.9
HLX15	13145185	INCLINATION	15.07	147.27	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

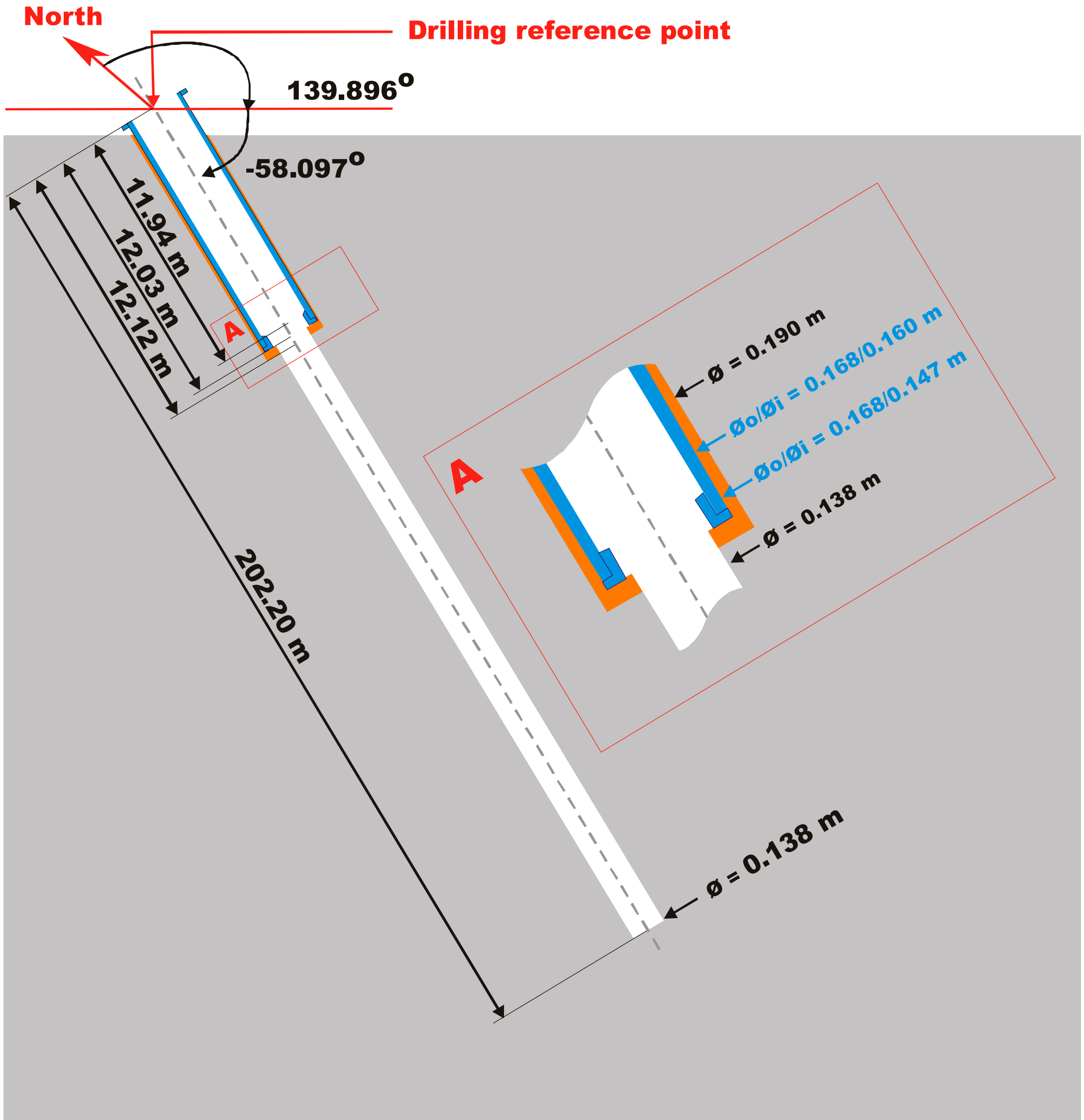
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX15	6365361.97	1548664.02	4.81	0.00	0.00	-58.37	184.65	1.8	4.9	0.00
HLX15	6365346.01	1548663.56	-20.59	30.00	0.50	-56.99	180.94	1.8	4.9	1.37
HLX15	6365332.74	1548662.70	-40.56	54.00	0.92	-55.94	187.85	1.8	4.9	2.51
HLX15	6365319.39	1548660.90	-60.42	78.00	1.34	-55.89	187.72	1.8	4.9	3.66
HLX15	6365306.00	1548658.81	-80.23	102.00	1.77	-55.33	188.80	1.8	4.9	4.82
HLX15	6365292.39	1548656.98	-99.90	126.00	2.20	-54.69	188.50	1.8	4.9	5.99
HLX15	6365277.75	1548653.46	-120.97	151.90	2.68	-54.55	195.88	1.8	4.9	7.28

Borehole description – HLX16

Technical description of borehole HLX16 is given in Figure 1.

Technical data

Borehole HLX16



Drilling reference point

Northing: 6366025.426 (m), RT90 2,5 gon V
Easting: 1549914.882 (m), RT90 2,5 gon V
Elevation: 3.652 (m), RHB 70

Drilling period

Drilling start date: 2004-06-22
Drilling stop date: 2004-06-24

Figure 1. *Technical description of the borehole HLX16.*

<u>Borehole direction surveying in HLX16</u>

There is no deviation measurement performed in HLX16. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Figure 1.

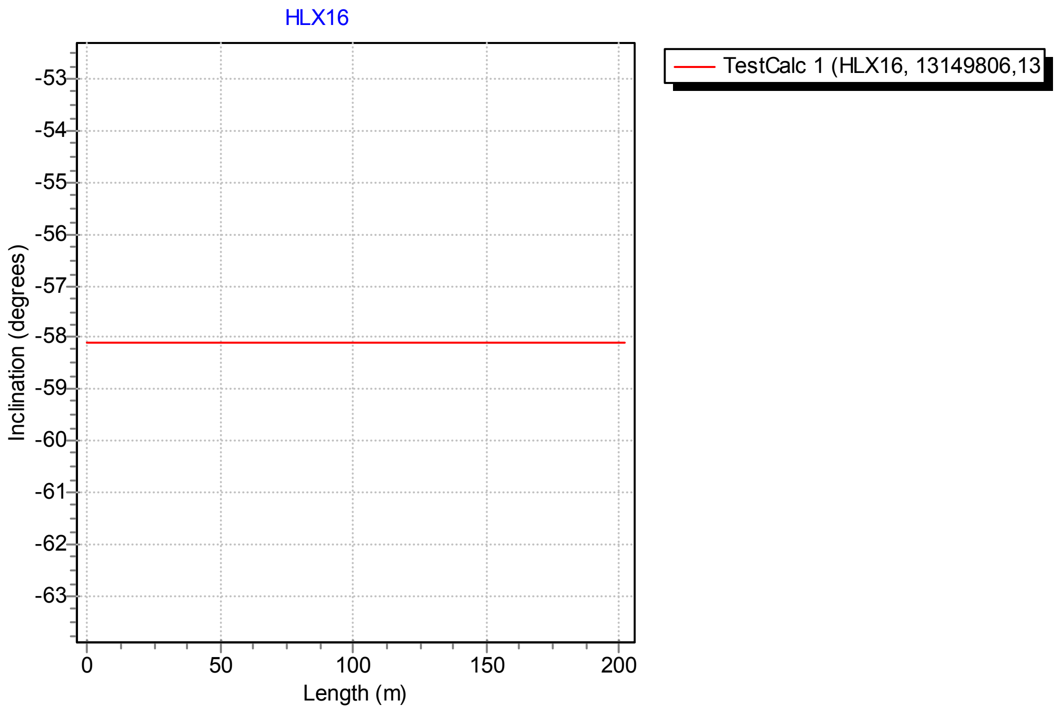
<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13149806) the borehole direction surveying (ID 13022014) from start of the borehole was used, Table 1. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 3. The uncertainty in inclination is calculated according to: $-0.000092*(\text{borehole\_length})^2 + 0.049*\text{borehole length} + 1.16 + 1.8$. The uncertainty in bearing for boreholes of 100-200 m length is set to 12.4 (= 7.5 + 4.9).

The borehole deviation multiple measurement (ID 13146885) was error marked and replaced with (ID 13149806) which was based on the uncertainty calculation above.

Figure 2 show the inclination and bearing of the borehole plotted as a straight line.



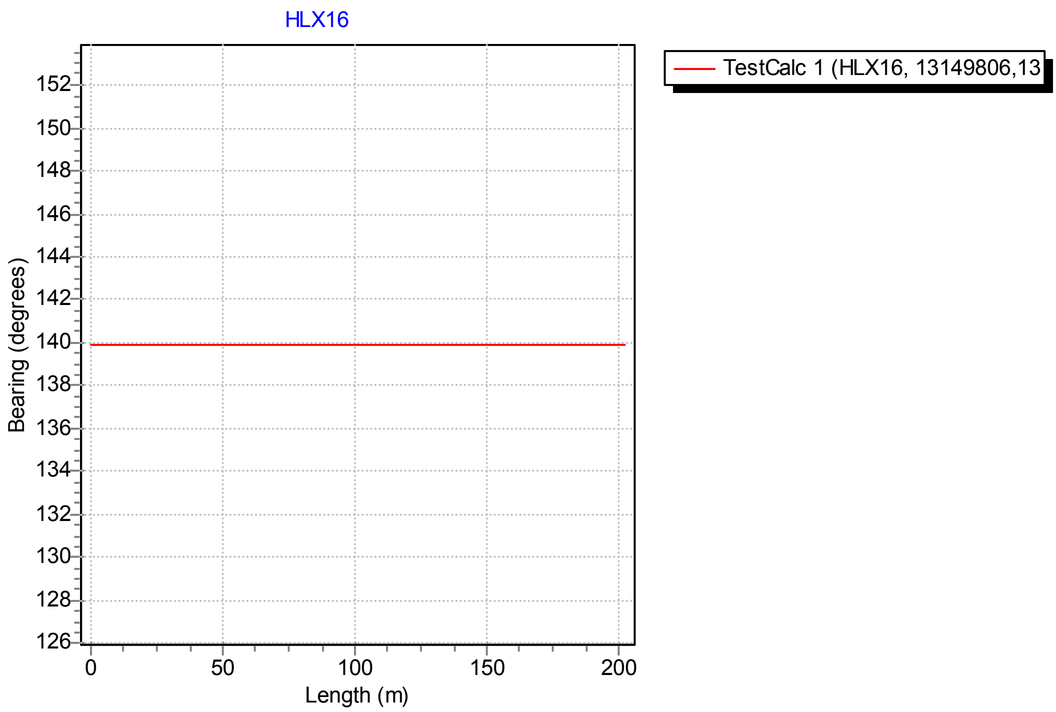


Figure 2. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. Borehole deviation multiple measurements in Sicada for HLX16.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX16	13146885	EG154	Borehole deviation multiple measurements	2007-02-02 14:00			EC	070220 11:09
HLX16	13149806	EG154	Borehole deviation multiple measurements	2007-02-19 13:15			I C	070220 13:07

Table 2. Content of the EG154-file.

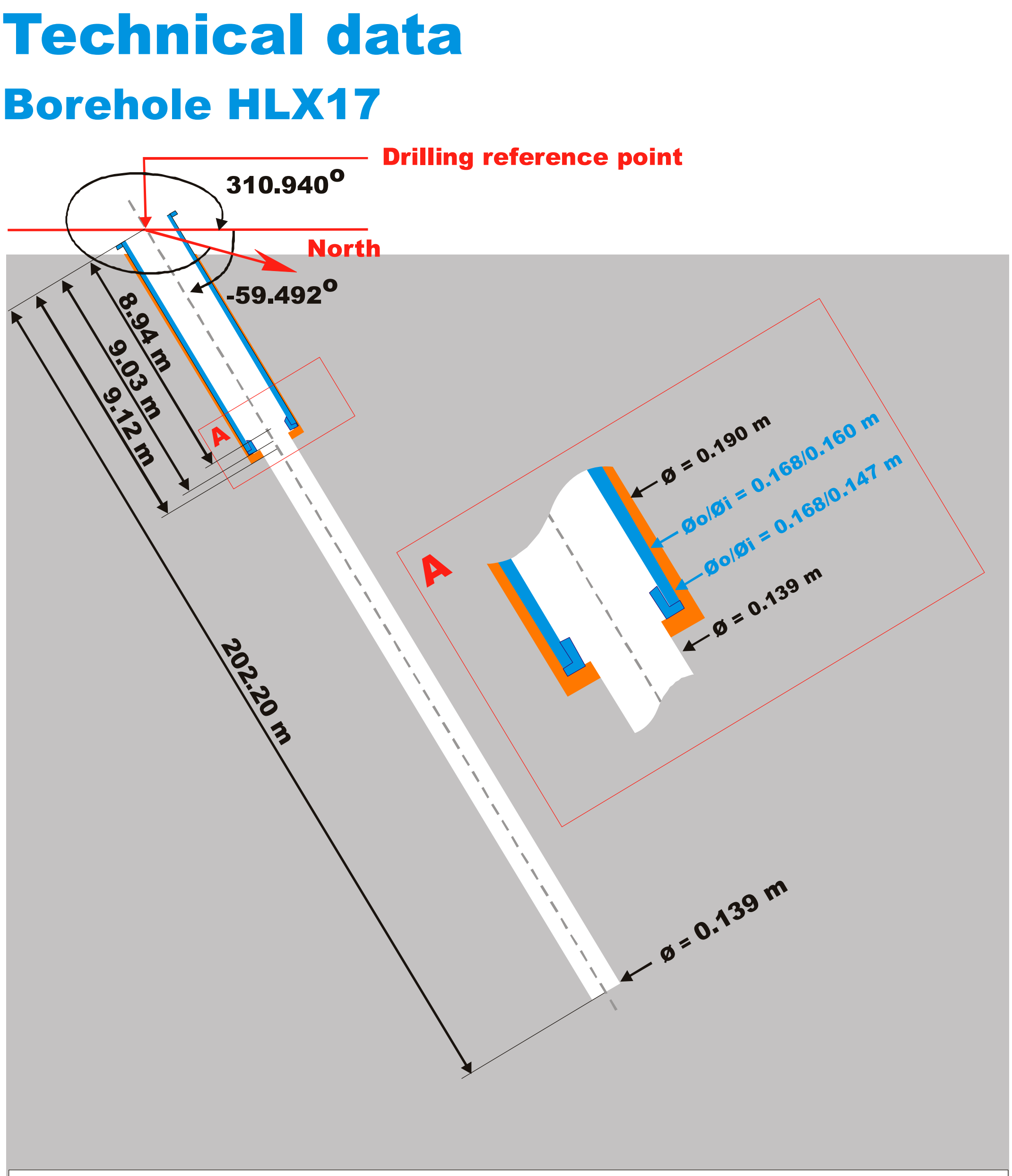
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX16	13022014	BEARING	0.00	0.00	12.400
HLX16	13022014	INCLINATION	0.00	0.00	9.106

Table 3. Subset of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX16	6366025.43	1549914.88	3.65	0.00	0.00	-58.10	139.90	9.1	12.4	0.00
HLX16	6366024.21	1549915.90	1.11	3.00	0.25	-58.10	139.90	9.1	12.4	0.47
HLX16	6365943.69	1549983.72	-168.00	202.20	16.91	-58.10	139.90	9.1	12.4	32.00

Borehole description - HLX17

Technical description of borehole HLX17 is given. in Figure 1.



Drilling reference point

Northing:	**6365951.514 (m), RT90 2,5 gon V**
Easting:	**1550040.753 (m), RT90 2,5 gon V**
Elevation:	**3.350 (m), RHB 70**

Drilling period

Drilling start date: 2004-06-28
Drilling stop date: 2004-07-01

Figure 1. *Technical description of the borehole HLX17.*

Deviation measurement in HLX17

The only deviation measurement performed in HLX17 was with the optical televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Log here named as acoustic televiewer, see Table 1.

The optical televiewer measurement (ID 13145386) is executed between borehole lengths 0 – 200.72 m. The optical televiewer measurement (ID 13077085) is the error marked measurement which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the optical televiewer measurement, see Figure 2.

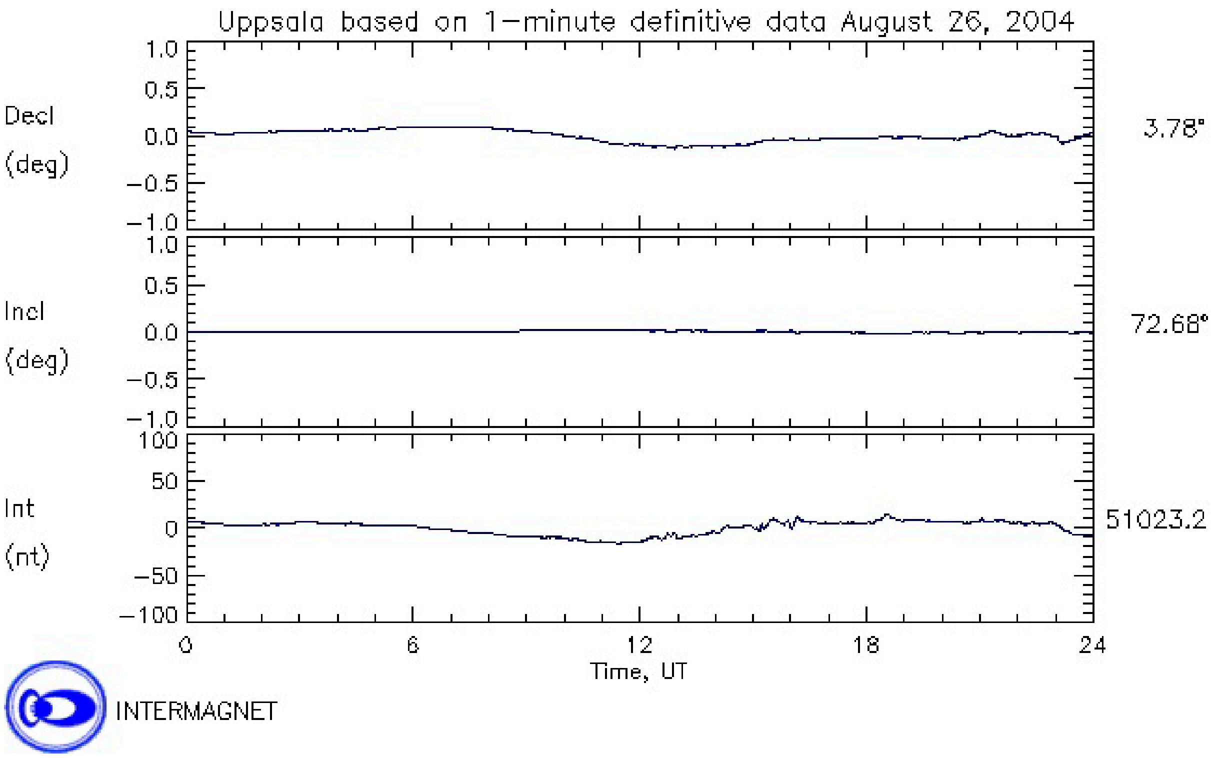


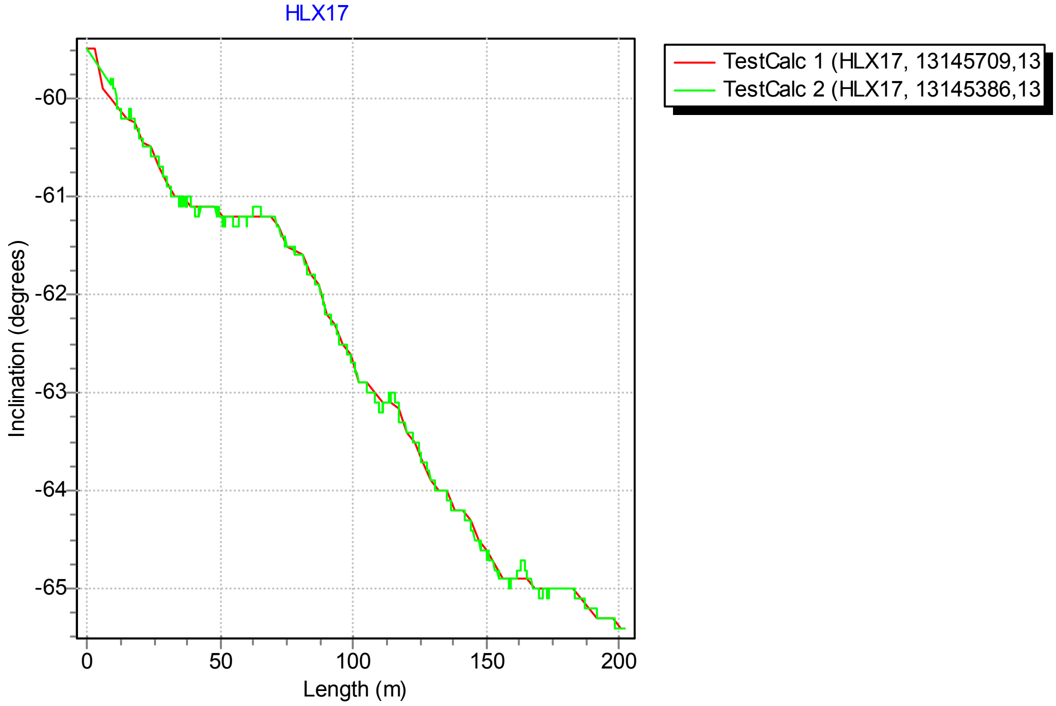
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-08-26.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145709) was the optical televiewer measurement (ID 13145386) used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



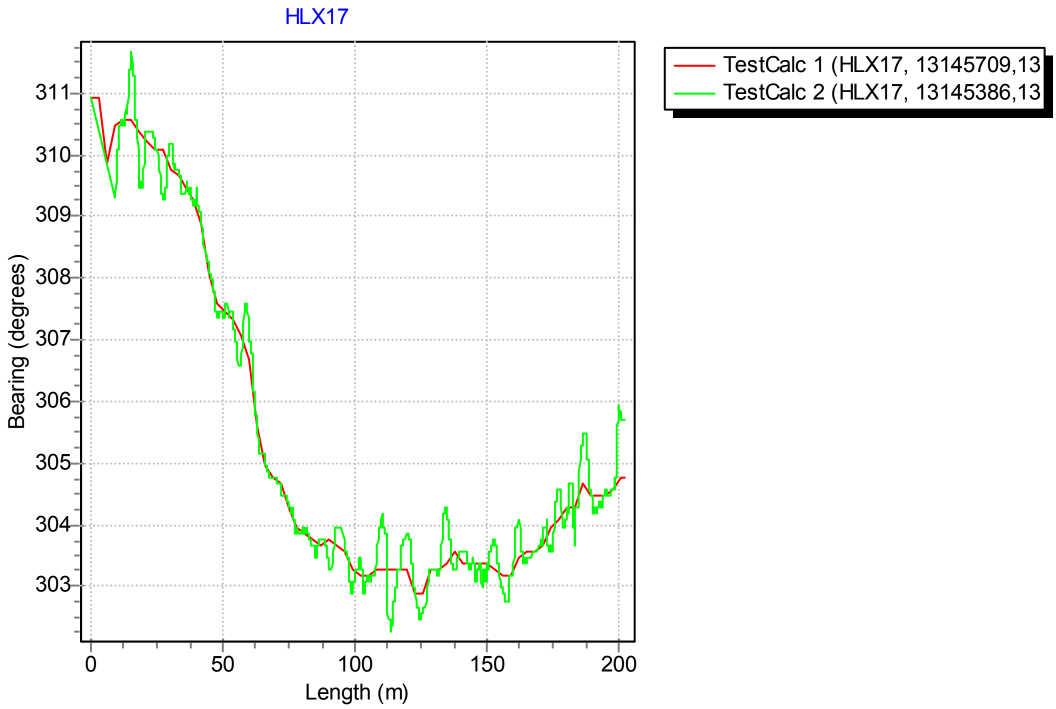


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX17.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX17	13145386	EG159	Acoustic televiewer deviation	2004-08-26 12:30	0.00	200.72		070124 14:52
HLX17	13145709	EG154	Borehole deviation multiple measurements	2004-08-26 12:30			I C	070202 08:16
HLX17	13077085	EG159	Acoustic televiewer deviation	2004-08-26 12:30	9.12	200.72	E	070214 08:01

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX17	13145386	BEARING	9.12	200.72	4.9
HLX17	13145386	INCLINATION	9.12	200.72	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

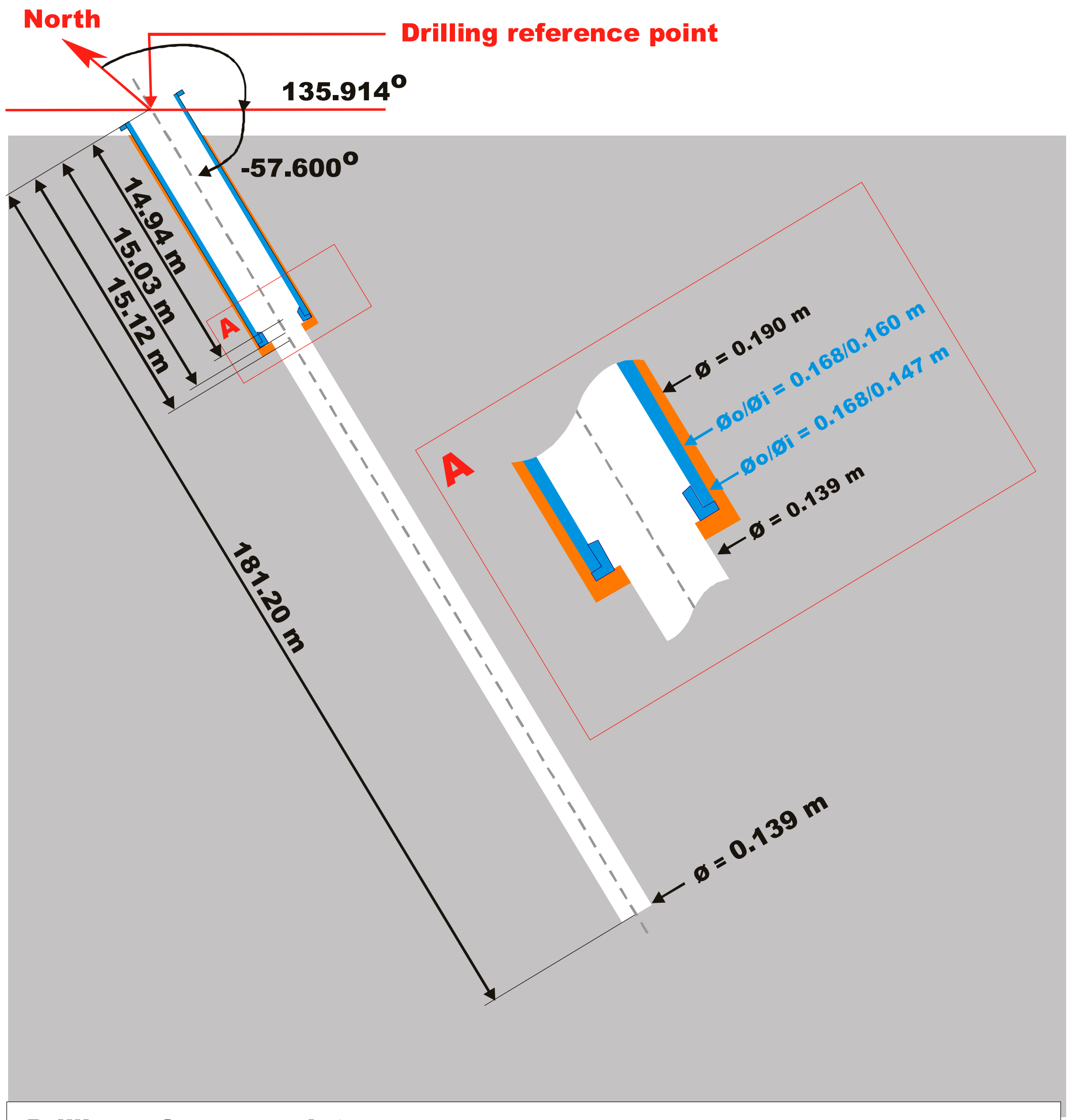
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX17	6365951.51	1550040.75	3.35	0	0.00	-59.49	310.94	1.8	4.9	0
HLX17	6365960.23	1550030.51	-20.06	27	0.42	-60.7	310.07	1.8	4.9	1.15
HLX17	6365967.54	1550021.46	-41.05	51	0.79	-61.2	307.47	1.8	4.9	2.14
HLX17	6365974.3	1550012.11	-62.09	75	1.15	-61.5	304.27	1.8	4.9	3.13
HLX17	6365979.81	1550003.89	-80.62	96	1.46	-62.5	303.57	1.8	4.9	3.97
HLX17	6365985.79	1549994.77	-101.99	120	1.80	-63.4	303.27	1.8	4.9	4.9
HLX17	6365990.86	1549987.03	-120.85	141	2.09	-64.2	303.37	1.8	4.9	5.69
HLX17	6365996.5	1549978.45	-142.54	165	2.41	-64.9	303.57	1.8	4.9	6.56
HLX17	6366001.46	1549971.09	-161.57	186	2.69	-65.1	304.67	1.8	4.9	7.32
HLX17	6366005.3	1549965.51	-176.29	202.2	2.90	-65.4	304.77	1.8	4.9	7.9

Borehole description - HLX18

Technical description of borehole HLX18 is given in Figure 1.

Technical data

Borehole HLX18



Drilling reference point

Northing: 6365919.121 (m), RT90 2,5 gon V

Easting: 1550067.642 (m), RT90 2,5 gon V

Elevation: 4.036 (m), RHB 70

Drilling period

Drilling start date: 2004-07-01

Drilling stop date: 2004-07-06

Figure 1. *Technical description of the borehole HLX18.*

Deviation measurement in HLX18

The only deviation measurement performed in HLX18 was with the optical televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log here named as acoustic televiewer, see Table 1.

The optical televiewer measurement (ID 13145387) is executed between borehole lengths 0 – 179.34 m. The optical televiewer measurement (ID 13077088) is the error marked measurement which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the optical televiewer measurement, see Figure 2.

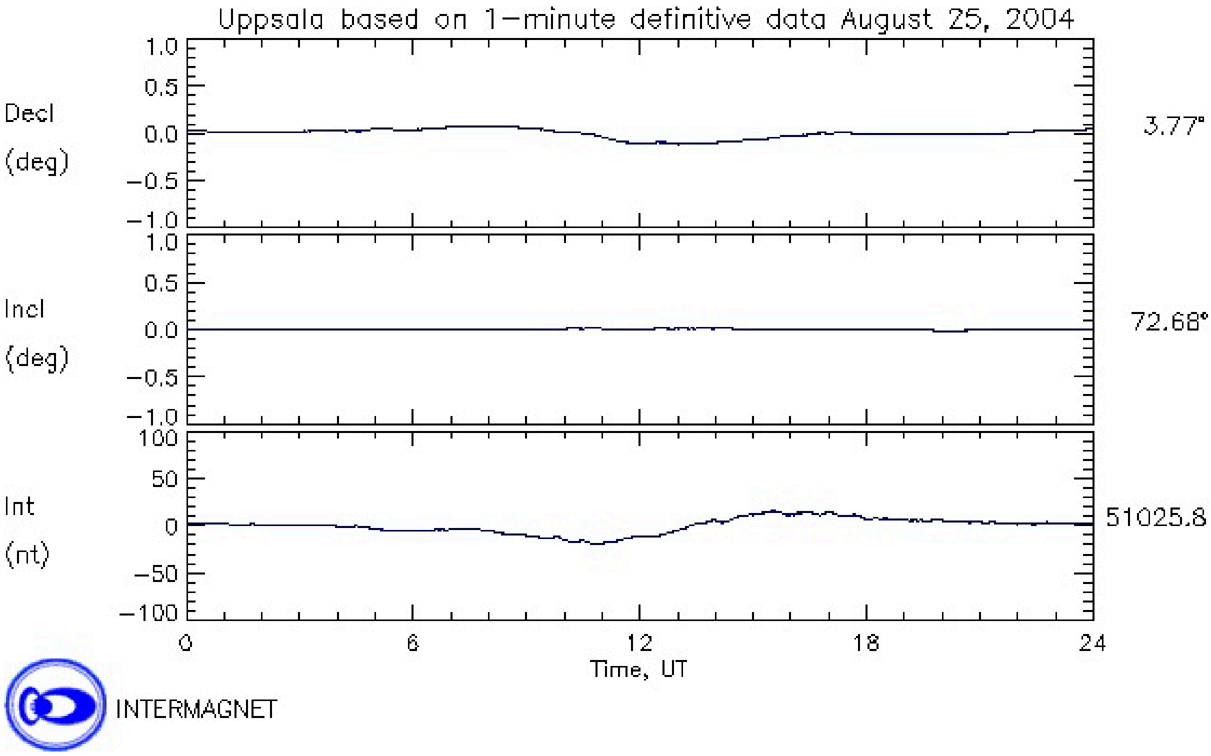


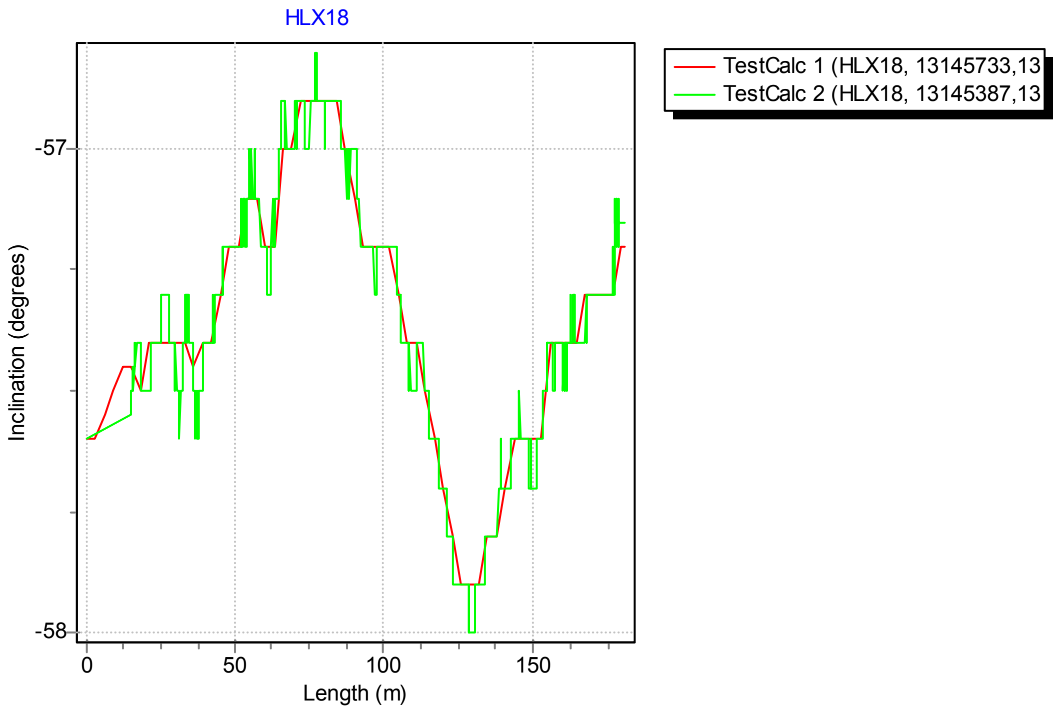
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-08-25.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145733) was the optical televiewer measurement (ID 13145387) used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



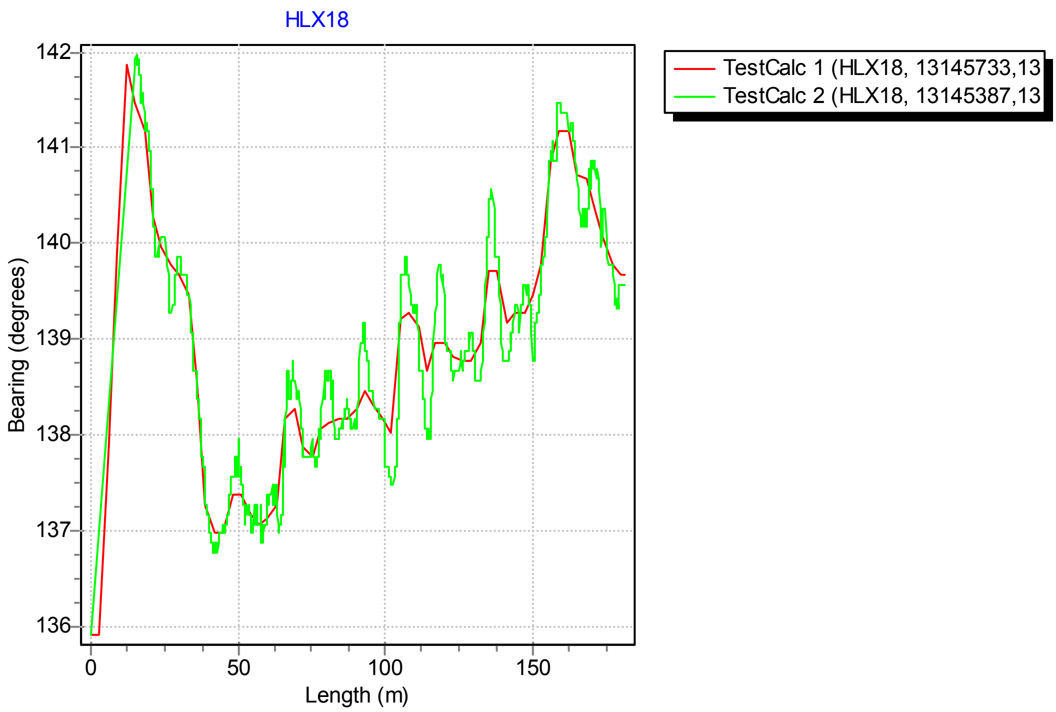


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX18.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX18	13145387	EG159	Acoustic televiewer deviation	2004-08-25 19:20	0.00	179.34		070125 12:35
HLX18	13145733	EG154	Borehole deviation multiple measurements	2004-08-25 19:20			I C	070202 08:16
HLX18	13077088	EG159	Acoustic televiewer deviation	2004-08-25 19:20	15.04	179.30	E	070214 08:02

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX18	13145387	BEARING	15.04	179.34	4.9
HLX18	13145387	INCLINATION	15.04	179.34	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX18	6365919.12	1550067.64	4.04	0.00	0.00	-57.60	135.91	1.8	4.9	0.00
HLX18	6365906.84	1550078.09	-21.26	30.00	0.51	-57.40	139.67	1.8	4.9	1.38
HLX18	6365897.25	1550086.79	-41.46	54.00	0.91	-57.10	137.17	1.8	4.9	2.49
HLX18	6365887.60	1550095.59	-61.60	78.00	1.32	-56.90	138.07	1.8	4.9	3.60
HLX18	6365877.87	1550104.28	-81.74	102.00	1.73	-57.20	138.02	1.8	4.9	4.72
HLX18	6365868.15	1550112.75	-101.99	126.00	2.14	-57.90	138.77	1.8	4.9	5.81
HLX18	6365859.67	1550120.06	-119.76	147.00	2.49	-57.60	139.27	1.8	4.9	6.77
HLX18	6365849.71	1550128.28	-139.98	171.00	2.90	-57.30	140.37	1.8	4.9	7.88
HLX18	6365845.49	1550131.83	-148.56	181.20	3.07	-57.20	139.67	1.8	4.9	8.35

Borehole description - HLX19

Technical description of borehole HLX19 is given in Figure 1.

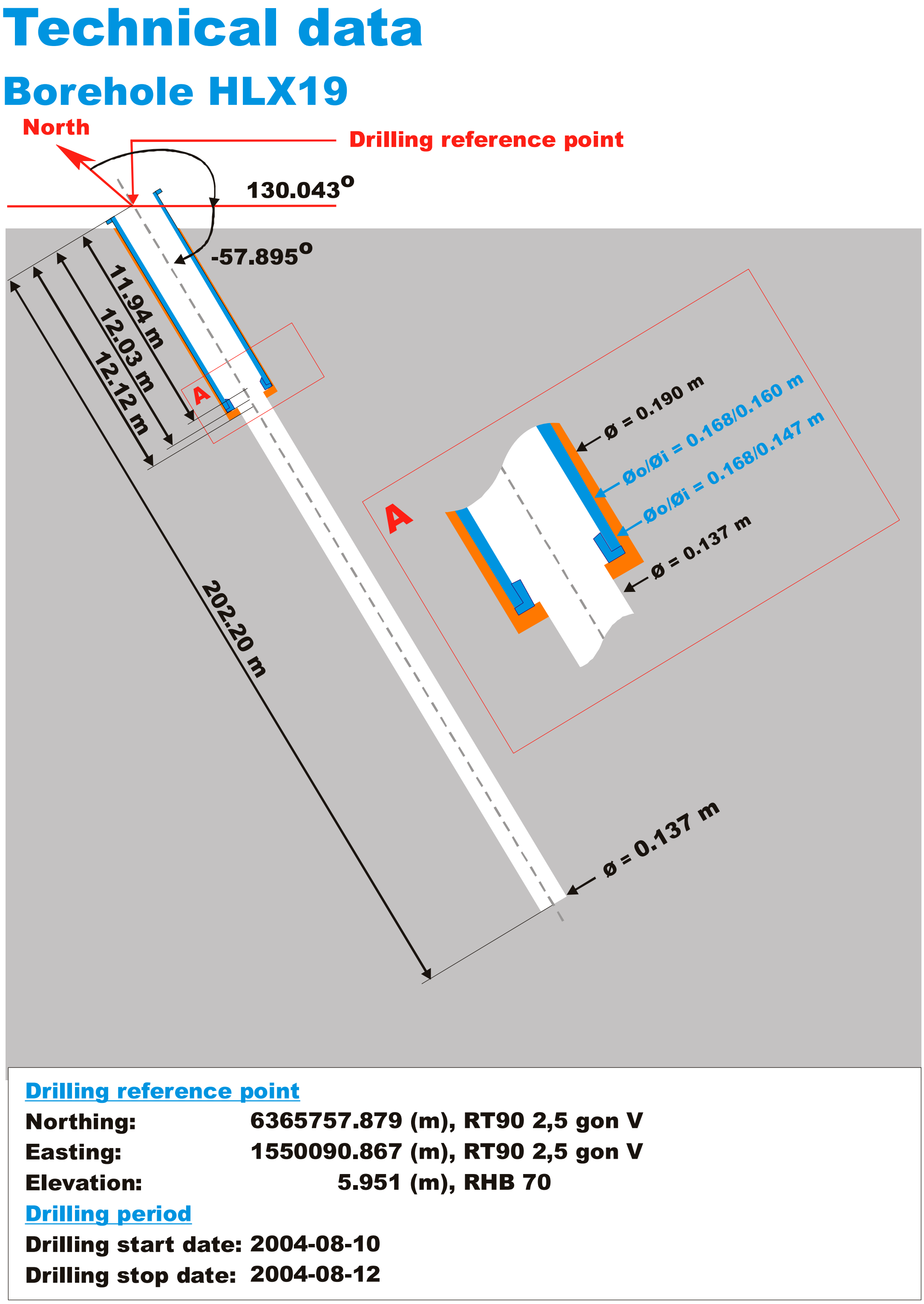


Figure 1. *Technical description of the borehole HLX19.*

Deviation measurement in HLX19

The only deviation measurement performed in HLX19 was with the optical televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log here named as acoustic televiewer, see Table 1.

The optical televiewer measurement (ID 13145385) is executed between borehole lengths 0 – 199.89 m. The optical televiewer measurements (ID 13077083 and 13114890) is error marked measurements which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the optical televiewer measurement, see Figure 2.

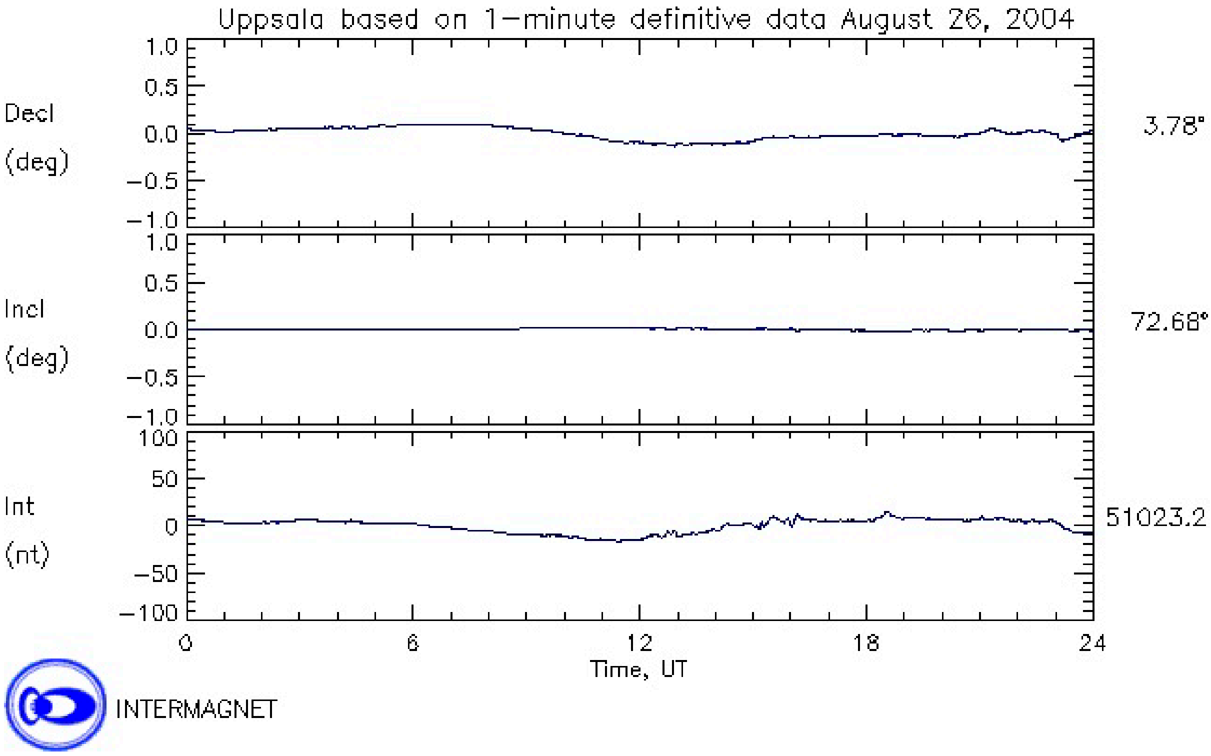


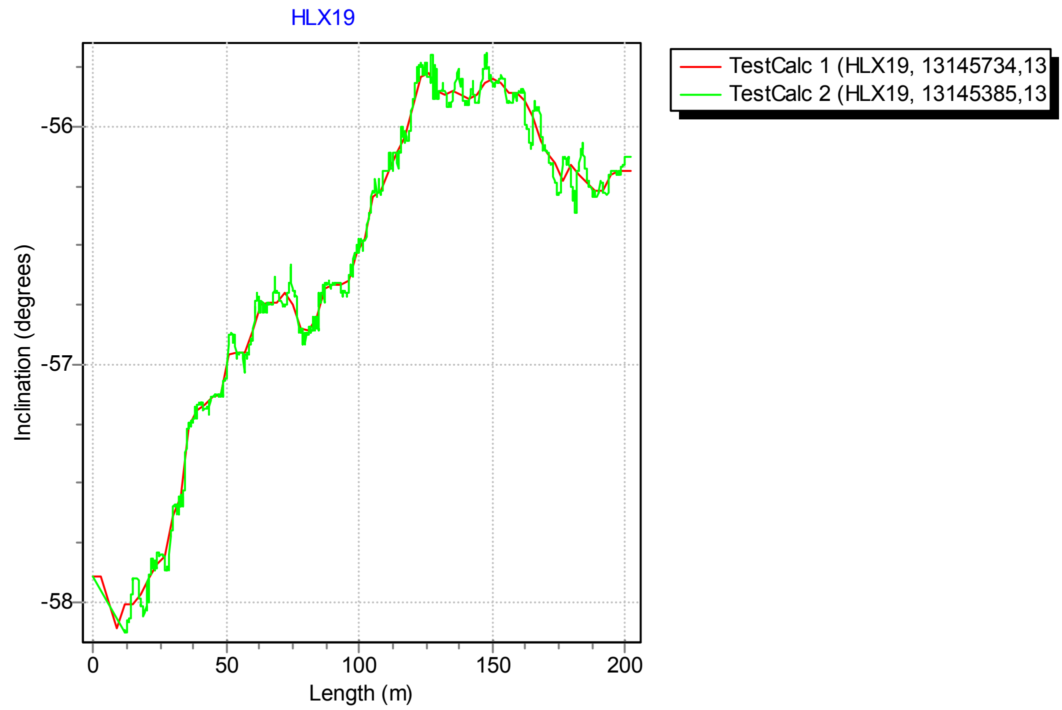
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-08-26.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145734) the optical televiewer measurement (ID13145385) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



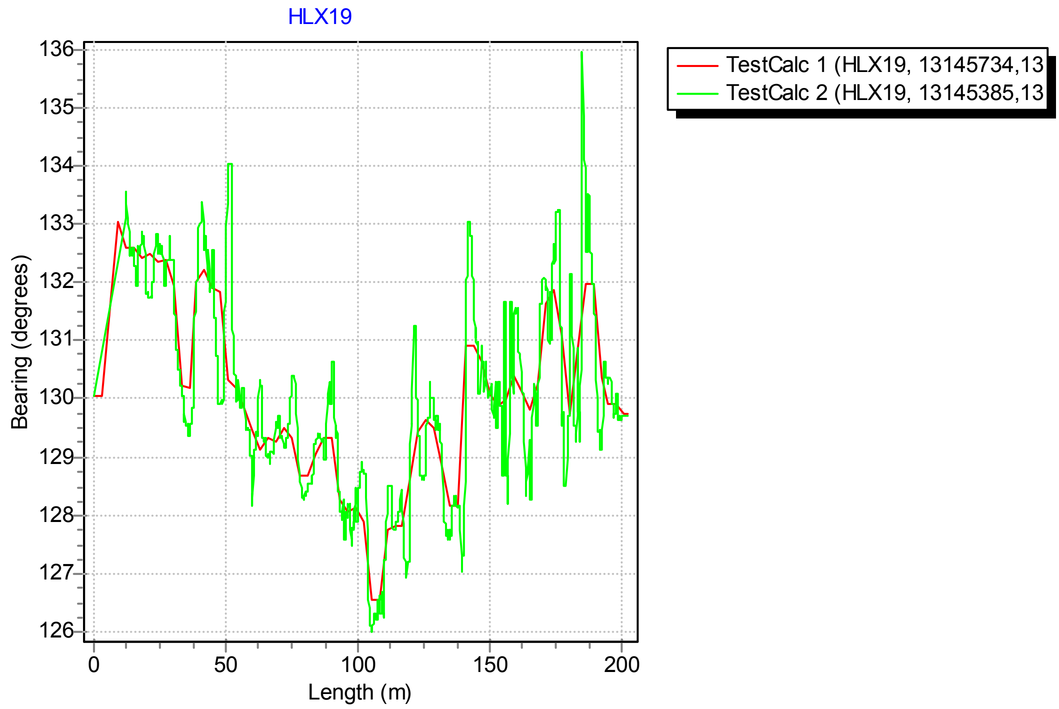


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX19.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX19	13114890	EG159	Acoustic televiewer deviation	2004-08-26 17:35	12.09	199.89	E	070214 08:04
HLX19	13145385	EG159	Acoustic televiewer deviation	2004-08-26 17:35	0.00	199.89		070124 14:52
HLX19	13145734	EG154	Borehole deviation multiple measurements	2004-08-26 17:35			I C	070202 08:17
HLX19	13077083	EG159	Acoustic televiewer deviation	2004-08-26 17:35	12.09	199.89	E	070214 08:03

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX19	13145385	BEARING	12.09	199.89	4.9
HLX19	13145385	INCLINATION	12.09	199.89	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX19	6365757.88	1550090.87	5.95	0.00	0.00	-57.90	130.04	1.8	4.9	0.00
HLX19	6365747.21	1550102.69	-19.47	30.00	0.50	-57.64	131.94	1.8	4.9	1.36
HLX19	6365738.65	1550112.47	-39.65	54.00	0.91	-56.95	130.19	1.8	4.9	2.47
HLX19	6365730.31	1550122.62	-59.73	78.00	1.32	-56.85	128.69	1.8	4.9	3.60
HLX19	6365722.08	1550132.92	-79.79	102.00	1.74	-56.47	127.89	1.8	4.9	4.72
HLX19	6365713.85	1550143.48	-99.71	126.00	2.16	-55.78	129.63	1.8	4.9	5.87
HLX19	6365705.26	1550153.85	-119.57	150.00	2.58	-55.80	130.09	1.8	4.9	7.02
HLX19	6365696.55	1550164.09	-139.45	174.00	3.00	-56.15	131.89	1.8	4.9	8.16
HLX19	6365687.82	1550174.18	-159.40	198.00	3.42	-56.19	129.93	1.8	4.9	9.30
HLX19	6365686.32	1550175.98	-162.89	202.20	3.50	-56.19	129.73	1.8	4.9	9.50

Borehole description – HLX20

Technical description of borehole HLX20 is given in Figure 1.

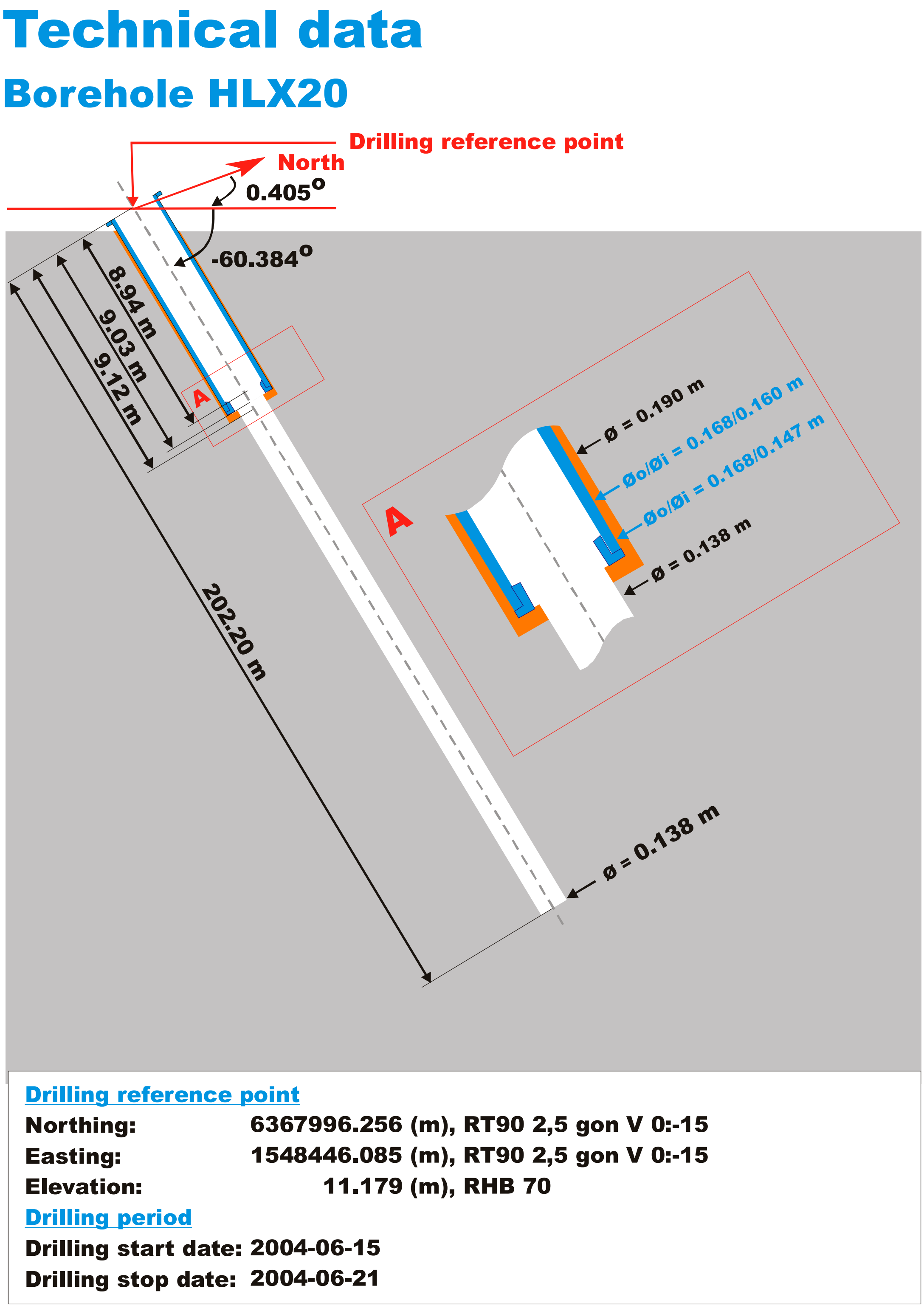


Figure 1. *Technical description of the borehole HLX20.*

Borehole direction surveying in HLX20

There is no deviation measurement performed in HLX20. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Figure 1.

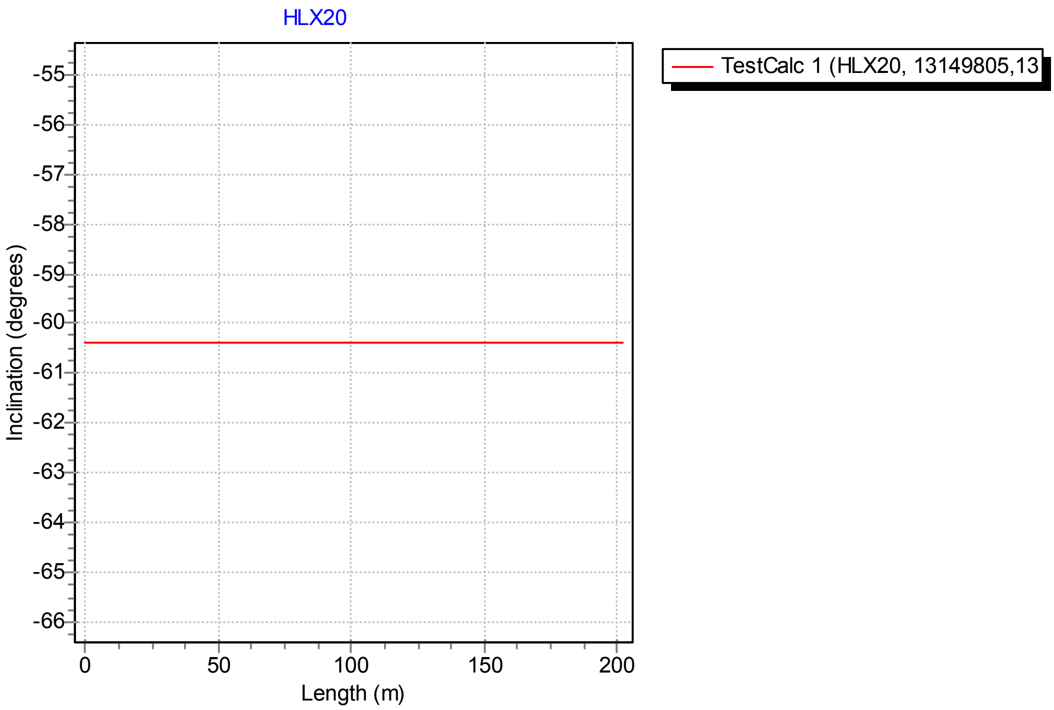
Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13149805) the borehole direction surveying (ID 13024938) from start of the borehole was used, Table 1. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 3. The uncertainty in inclination is calculated according to: $-0.000092*(\text{borehole\_length})^2 + 0.049*\text{borehole length} + 1.16 + 1.8$. The uncertainty in bearing for boreholes of 100-200 m length is set to 12.4 (= 7.5 + 4.9).

The borehole deviation multiple measurement (ID 13146886) was error marked and replaced with (ID 13149805) which was based on the uncertainty calculation above.

Figure 2 shows the inclination and bearing of the borehole plotted as a straight line.



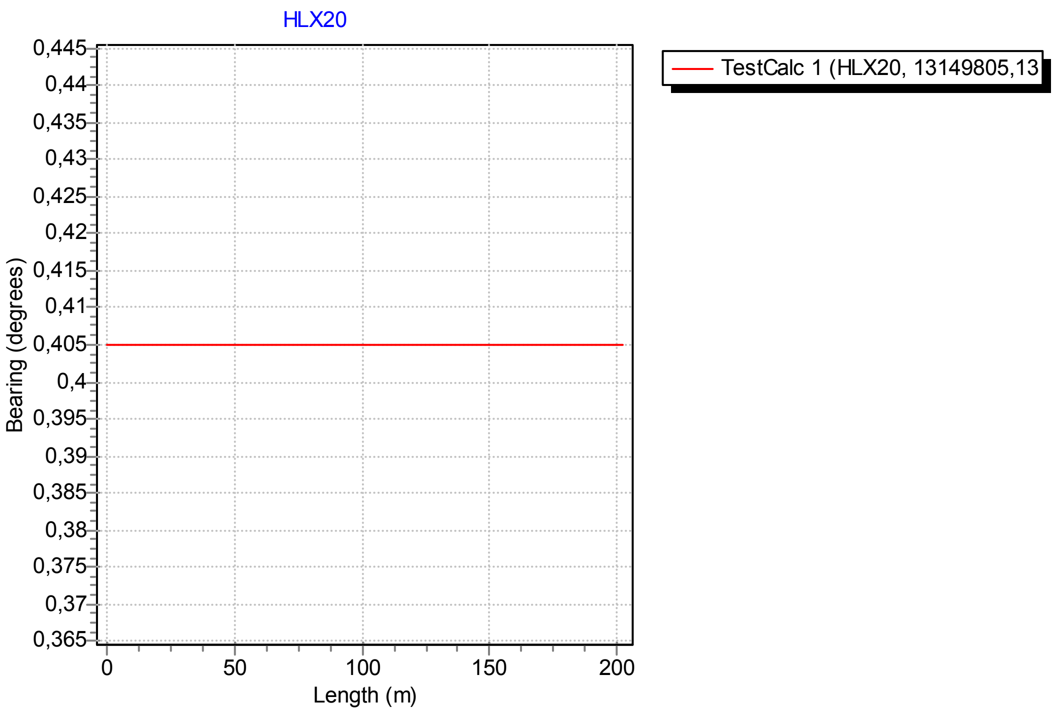


Figure 2. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. Borehole deviation multiple measurements in Sicada for HLX20.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX20	13146886	EG154	Borehole deviation multiple measurements	2007-02-12 10:00			EC	070220 11:09
HLX20	13149805	EG154	Borehole deviation multiple measurements	2007-02-19 13:30			I C	070220 13:07

Table 2. Content of the EG154-file.

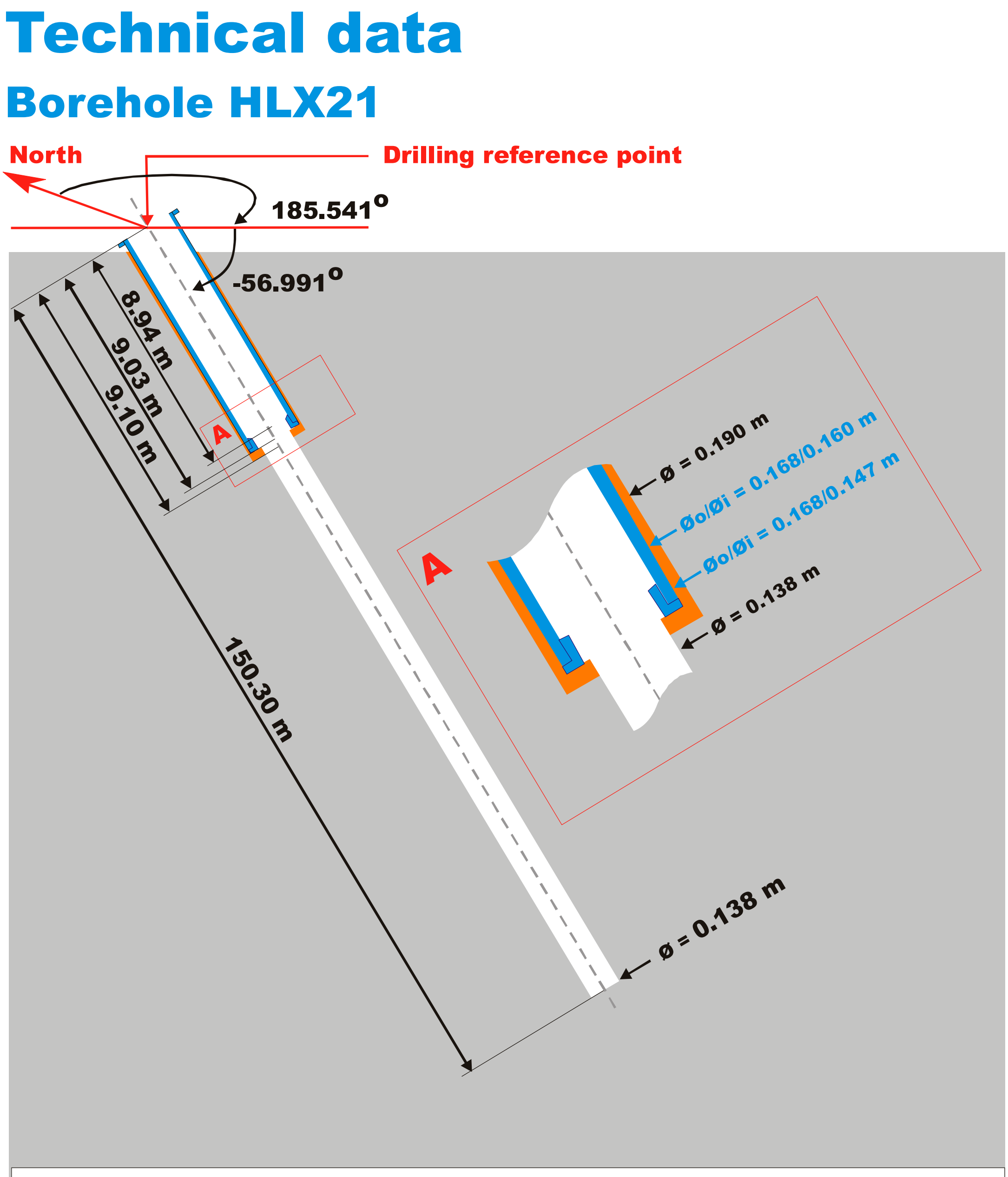
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX20	13024938	BEARING	0.00	0.00	12.400
HLX20	13024938	INCLINATION	0.00	0.00	9.106

Table 3. Subset of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX20	6367996.26	1548446.09	11.18	0.00	0.00	-60.38	0.41	9.1	12.4	0.00
HLX20	6367997.74	1548446.10	8.57	3.00	0.23	-60.38	0.41	9.1	12.4	0.47
HLX20	6368096.18	1548446.79	-164.60	202.20	15.82	-60.38	0.41	9.1	12.4	32.00

Borehole description – HLX21

Technical description of borehole HLX21 is given in Figure 1.



Drilling reference point

Northing: 6366567.931 (m), RT90 2,5 gon V 0:-15
Easting: 1549632.363 (m), RT90 2,5 gon V 0:-15
Elevation: 10.312 (m), RHB 70

Drilling period

Drilling start date: 2004-08-30
Drilling stop date: 2004-09-02

Figure 1. *Technical description of the borehole HLX21.*

Deviation measurement in HLX21

The only deviation measurement performed in HLX21 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13079479) is executed between borehole lengths 0 – 150.30 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

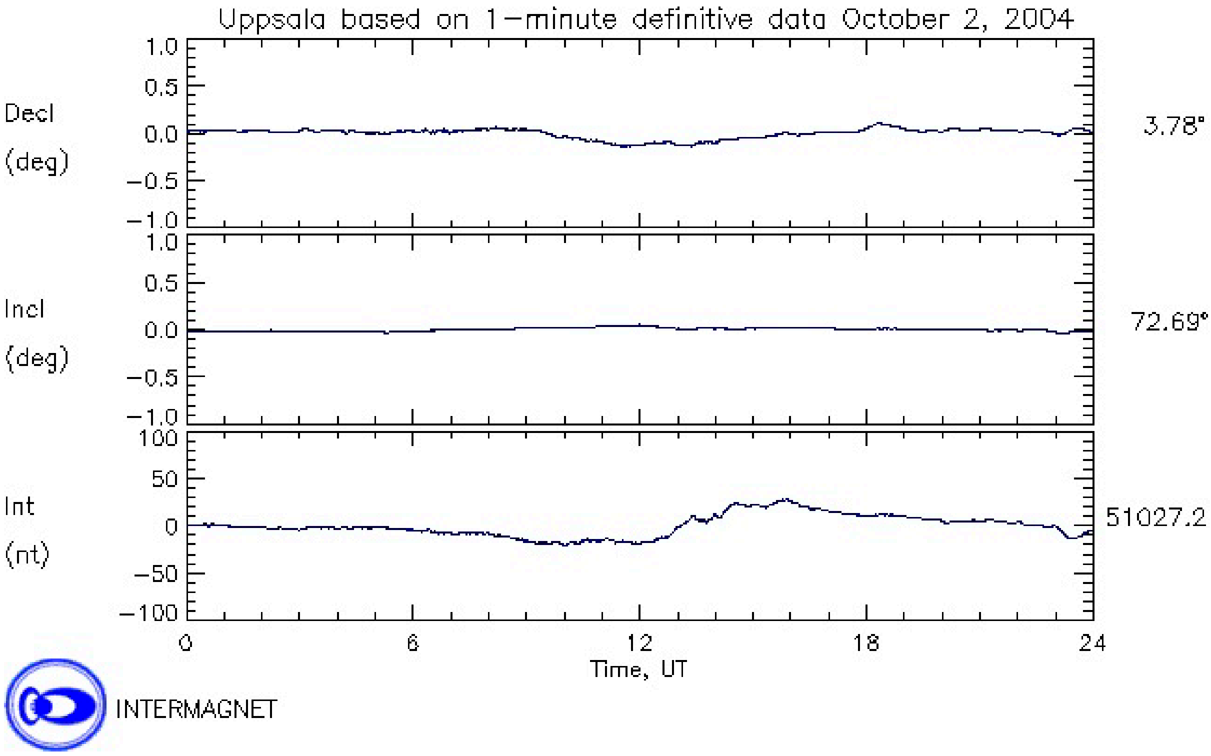


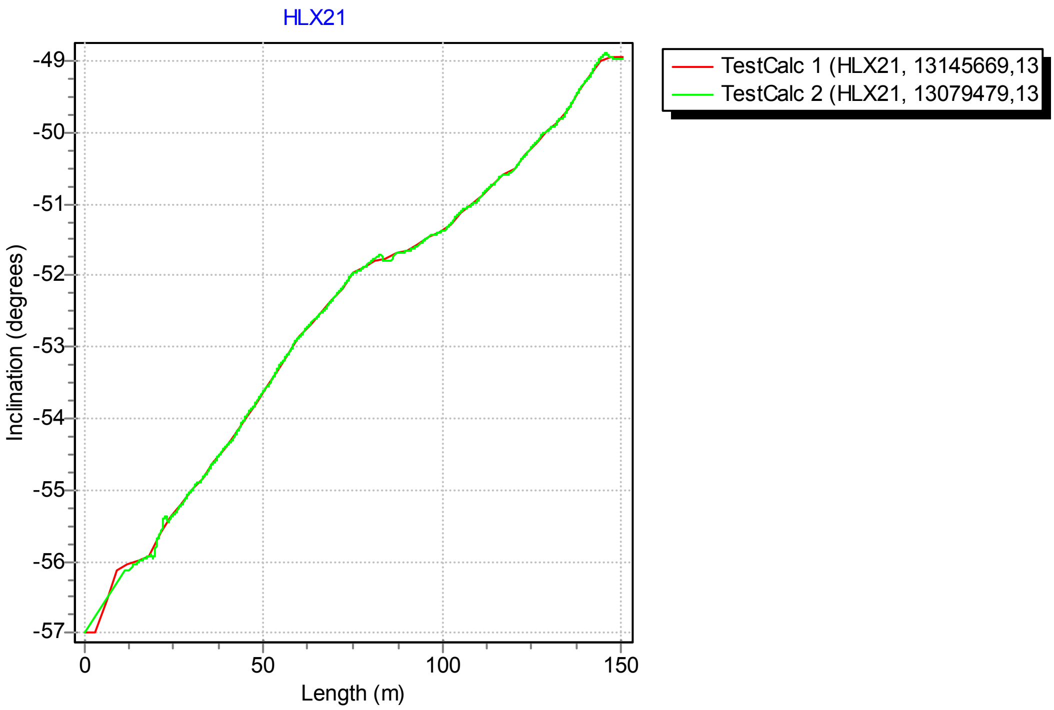
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-02.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145669) the acoustic televiewer measurement (ID 13079479) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other deviation activity listed in Table 1.



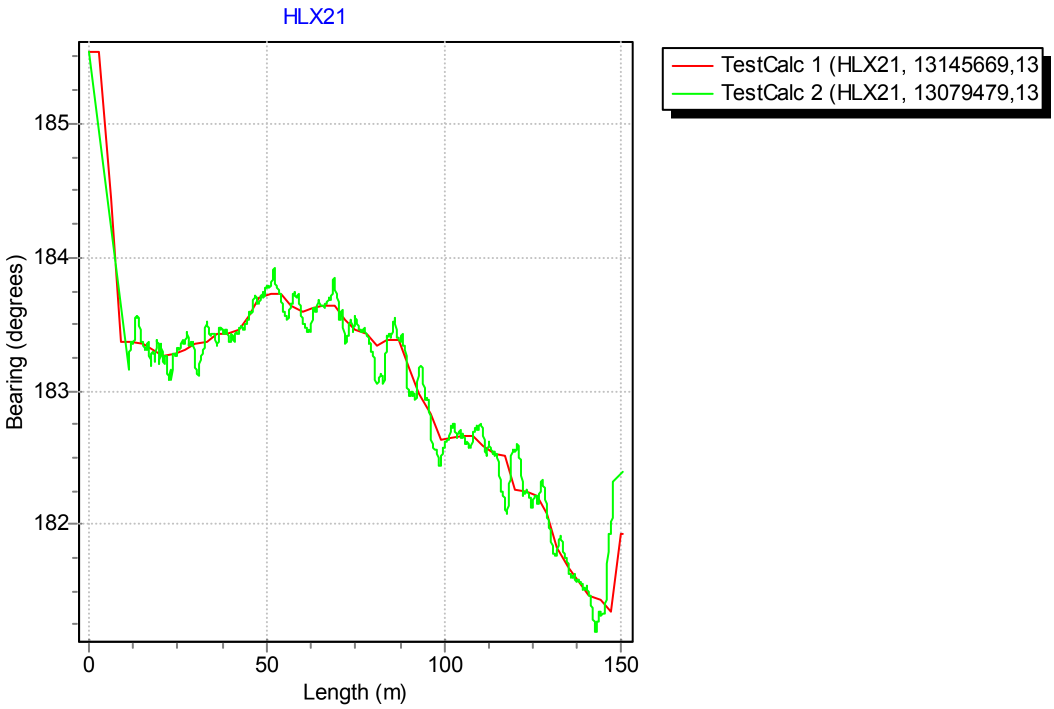


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX21.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX21	13145669	EG154	Borehole deviation multiple measurements	2004-10-02 14:43			I C	070202 08:17
HLX21	13079479	EG159	Acoustic televiewer deviation	2004-10-02 14:43	0.00	150.30		070125 12:32

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX21	13079479	BEARING	11.13	147.73	4.9
HLX21	13079479	INCLINATION	11.13	147.73	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

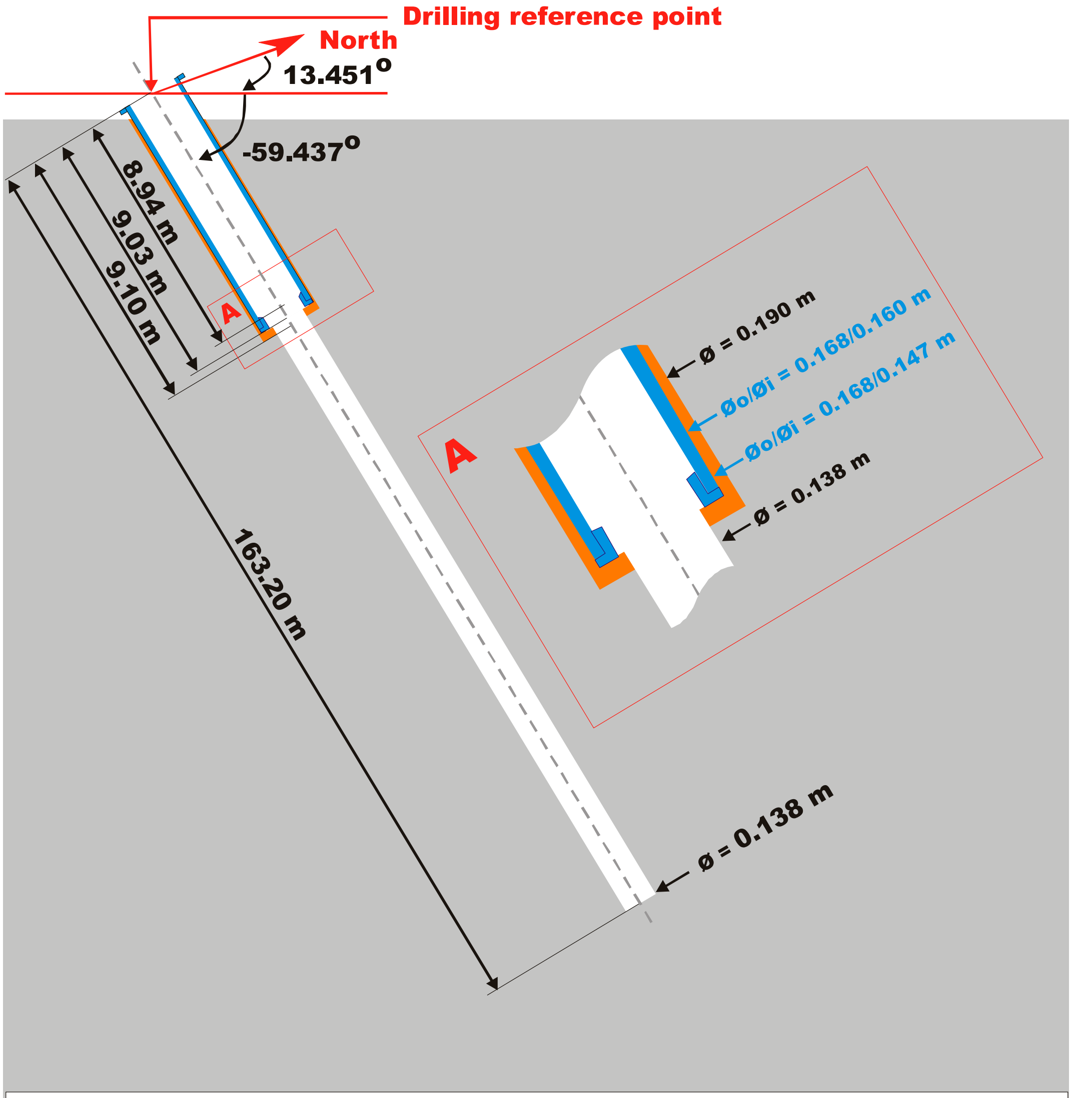
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX21	6366568.75	1549632.36	10.31	0.00	0.00	-56.99	185.54	1.8	4.9	0.00
HLX21	6366548.55	1549631.06	-19.46	36.00	0.64	-54.62	183.42	1.8	4.9	1.73
HLX21	6366532.58	1549630.06	-41.20	63.00	1.14	-52.67	183.62	1.8	4.9	3.10
HLX21	6366517.86	1549629.16	-60.13	87.00	1.61	-51.69	183.38	1.8	4.9	4.37
HLX21	6366500.99	1549628.34	-81.20	114.00	2.14	-50.73	182.53	1.8	4.9	5.81
HLX21	6366485.62	1549627.77	-99.62	138.00	2.62	-49.42	181.57	1.8	4.9	7.13
HLX21	6366477.57	1549627.56	-108.92	150.30	2.87	-48.94	181.93	1.8	4.9	7.81

Borehole description – HLX22

Technical description of borehole HLX22 is given in Figure 1.

Technical data

Borehole HLX22



Drilling reference point

Northing: 6366487.834 (m), RT90 2,5 gon V 0:-15
Easting: 1549661.524 (m), RT90 2,5 gon V 0:-15
Elevation: 10.057 (m), RHB 70

Drilling period

Drilling start date: 2004-08-23
Drilling stop date: 2004-08-26

Figure 1. *Technical description of the borehole HLX22.*

Deviation measurement in HLX22

The only deviation measurement performed in HLX22 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13079480) is executed between borehole lengths 0 – 163.20 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

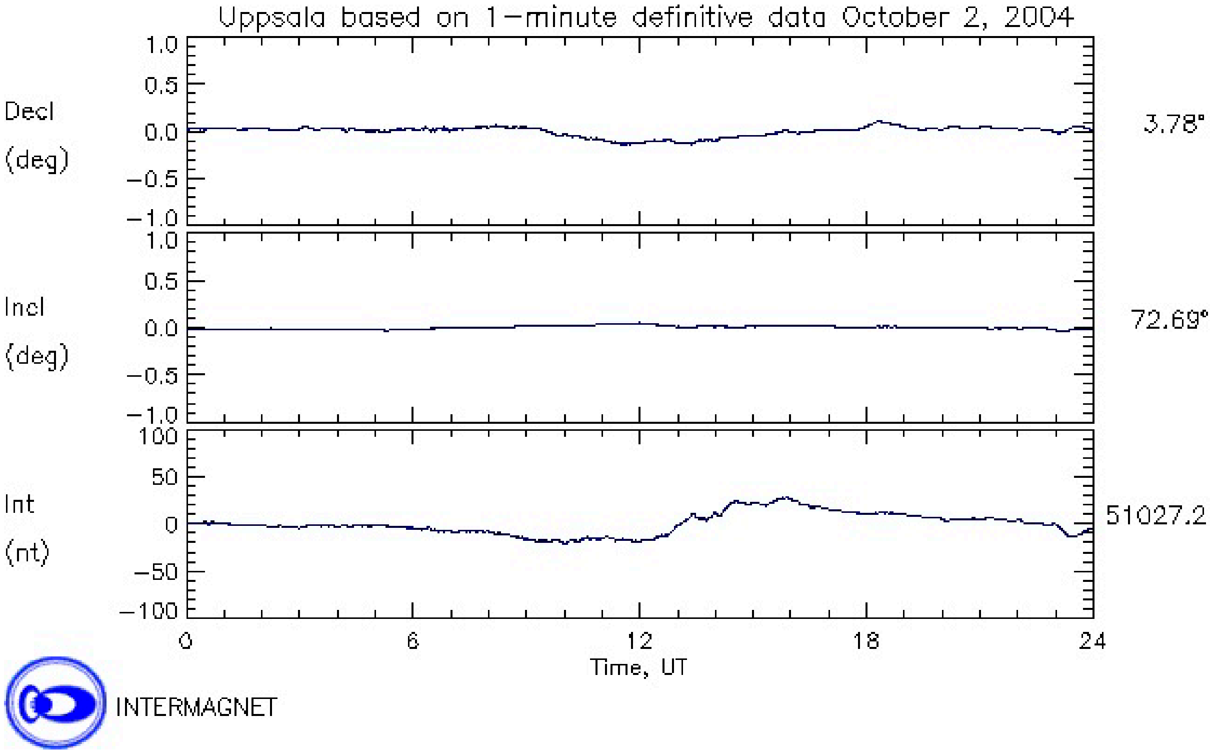


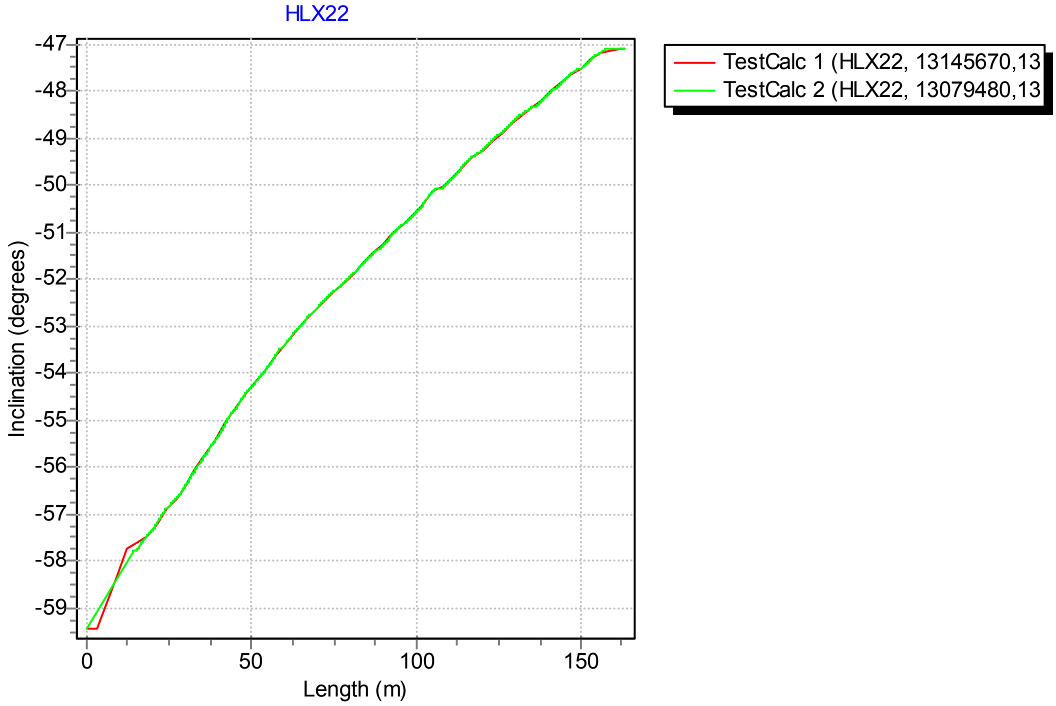
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-02.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145670) the acoustic televiewer measurement (ID 13079480) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other deviation activity listed in Table 1.



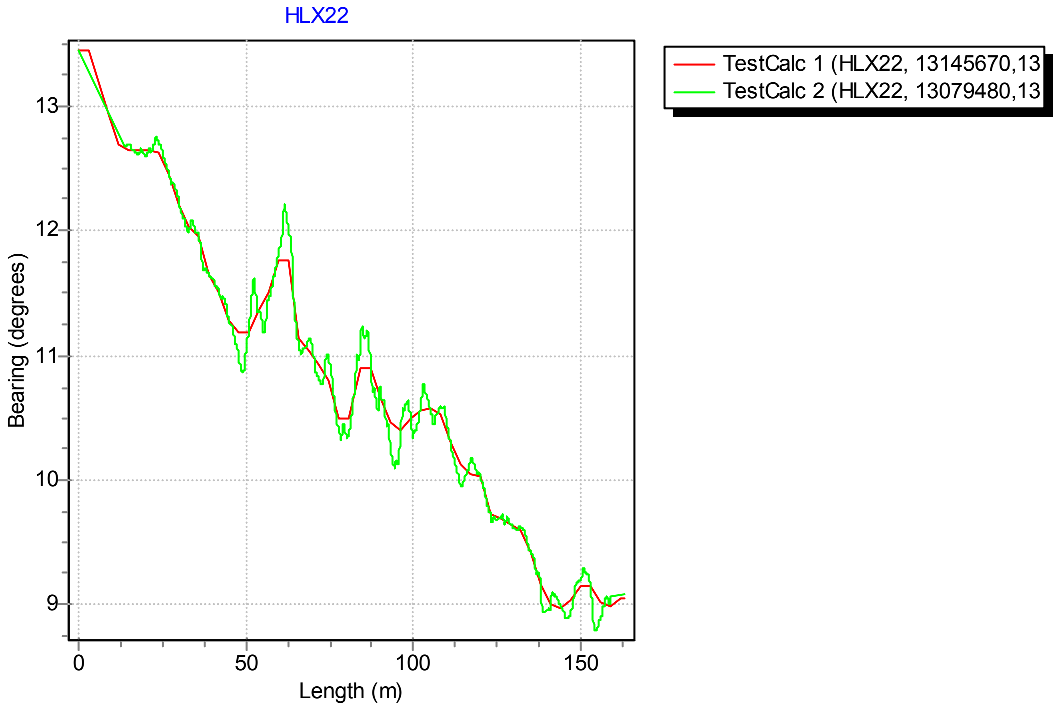


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX22.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX22	13145670	EG154	Borehole deviation multiple measurements	2004-10-02 10:40			I C	070202 08:17
HLX22	13079480	EG159	Acoustic televiewer deviation	2004-10-02 10:40	0.00	163.20		070125 12:32

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX22	13079480	BEARING	14.03	159.13	4.9
HLX22	13079480	INCLINATION	14.03	159.13	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

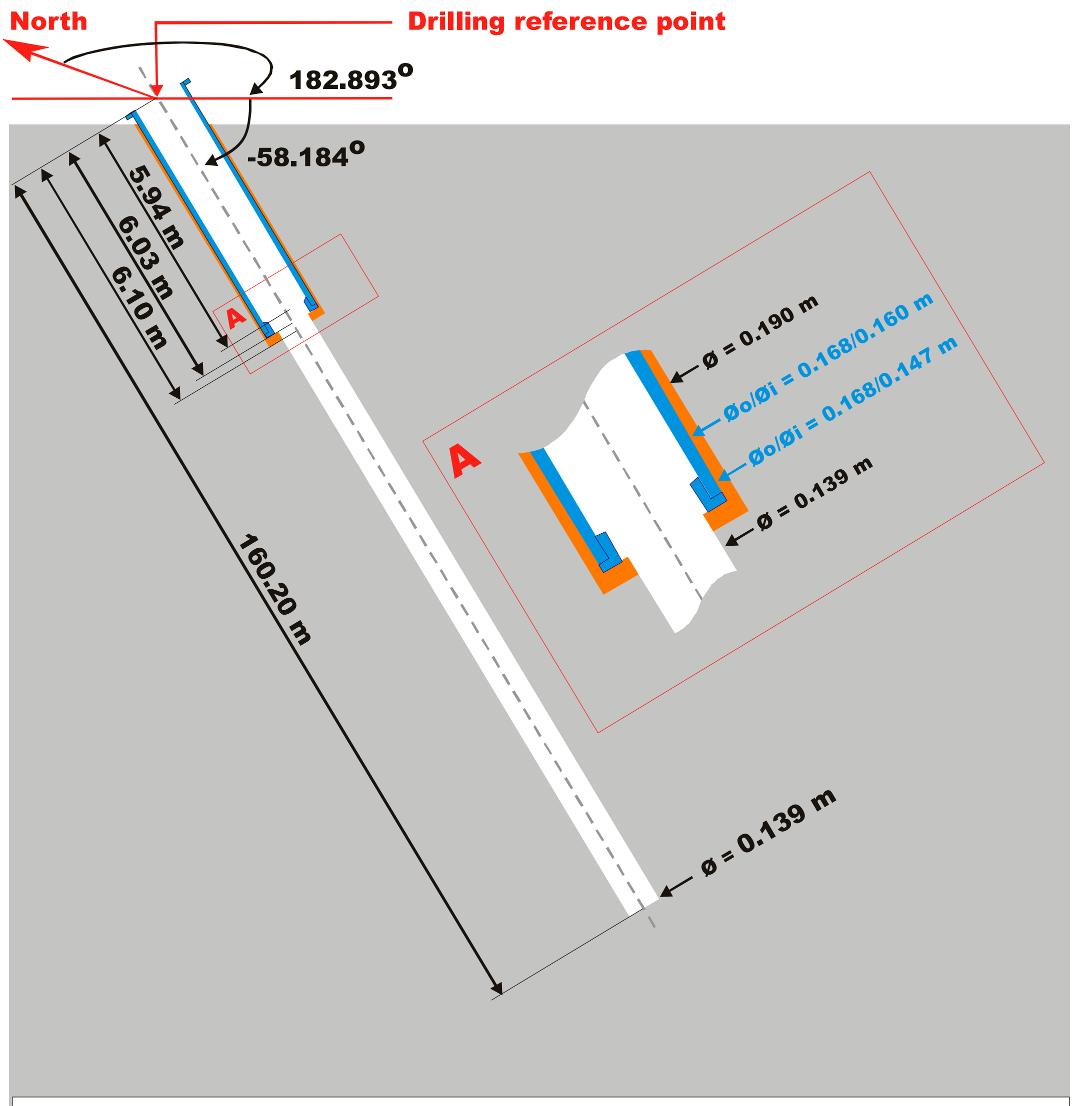
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX22	6366487.83	1549661.54	10.06	0.00	0.00	-59.44	13.45	1.8	4.9	0.00
HLX22	6366506.69	1549665.78	-20.31	36.00	0.61	-55.74	11.95	1.8	4.9	1.66
HLX22	6366520.34	1549668.55	-39.85	60.00	1.05	-53.41	11.76	1.8	4.9	2.85
HLX22	6366536.52	1549671.69	-61.24	87.00	1.57	-51.45	10.89	1.8	4.9	4.26
HLX22	6366551.49	1549674.47	-79.79	111.00	2.05	-49.83	10.31	1.8	4.9	5.57
HLX22	6366568.95	1549677.48	-100.15	138.00	2.60	-48.22	9.16	1.8	4.9	7.08
HLX22	6366585.76	1549680.16	-118.74	163.20	3.14	-47.10	9.04	1.8	4.9	8.54

Borehole description – HLX23

Technical description of borehole HLX23 is given in Figure 1.

Technical data

Borehole HLX23



Drilling reference point

Northing: 6366578.005 (m), RT90 2,5 gon V 0:-15
Easting: 1548888.673 (m), RT90 2,5 gon V 0:-15
Elevation: 14.690 (m), RHB 70

Drilling period

Drilling start date: 2004-09-13
Drilling stop date: 2004-09-16

Figure 1. *Technical description of the borehole HLX23.*

Deviation measurement in HLX23

The only deviation measurement performed in HLX23 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13079483) is executed between borehole lengths 0 – 160.20 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

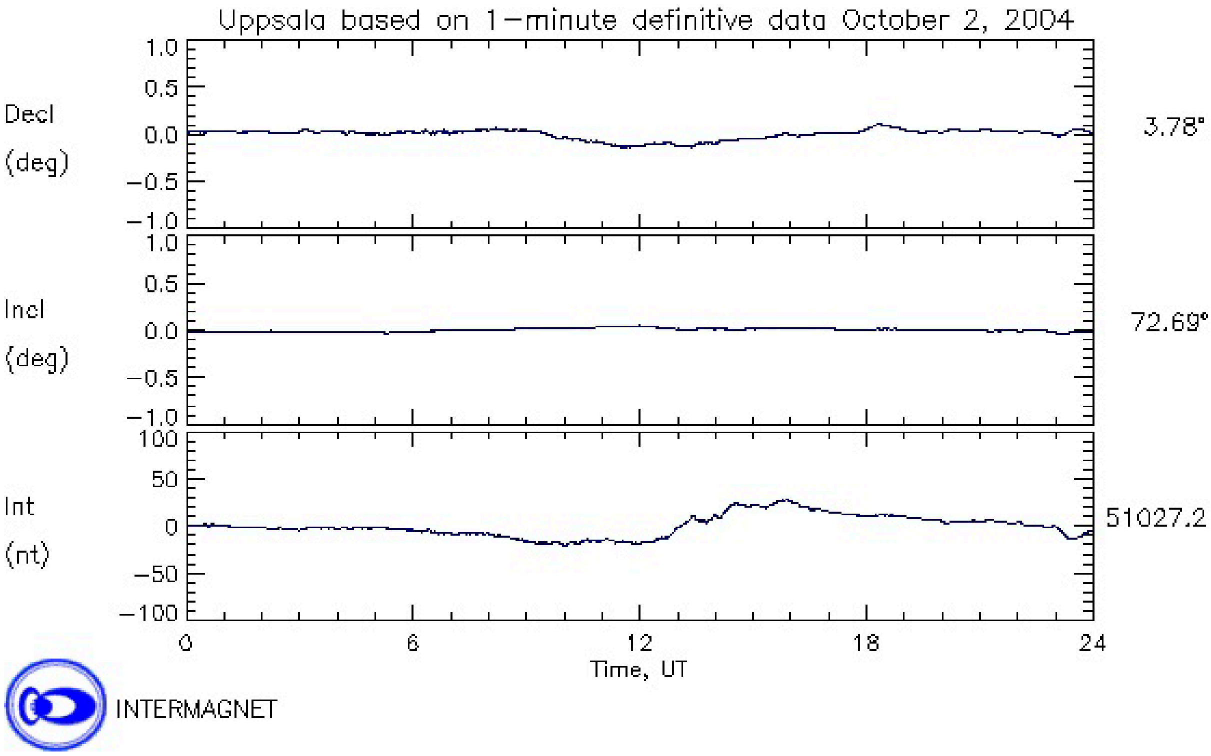


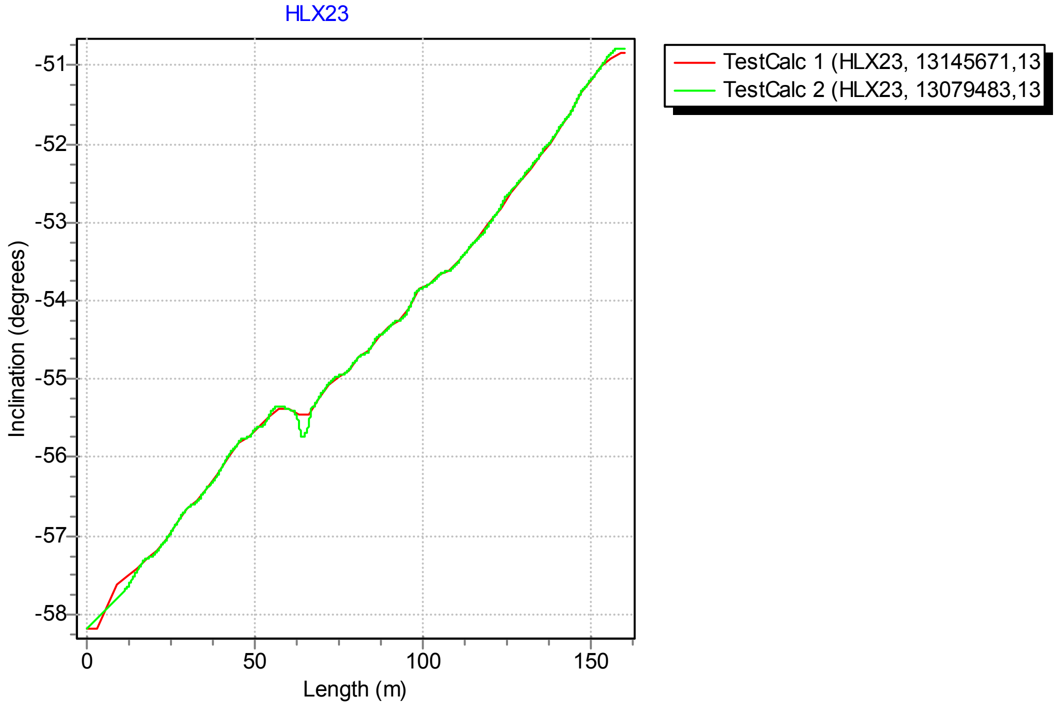
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-02.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145671) the acoustic televiewer measurement (ID 13079483) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other deviation activity listed in Table 1.



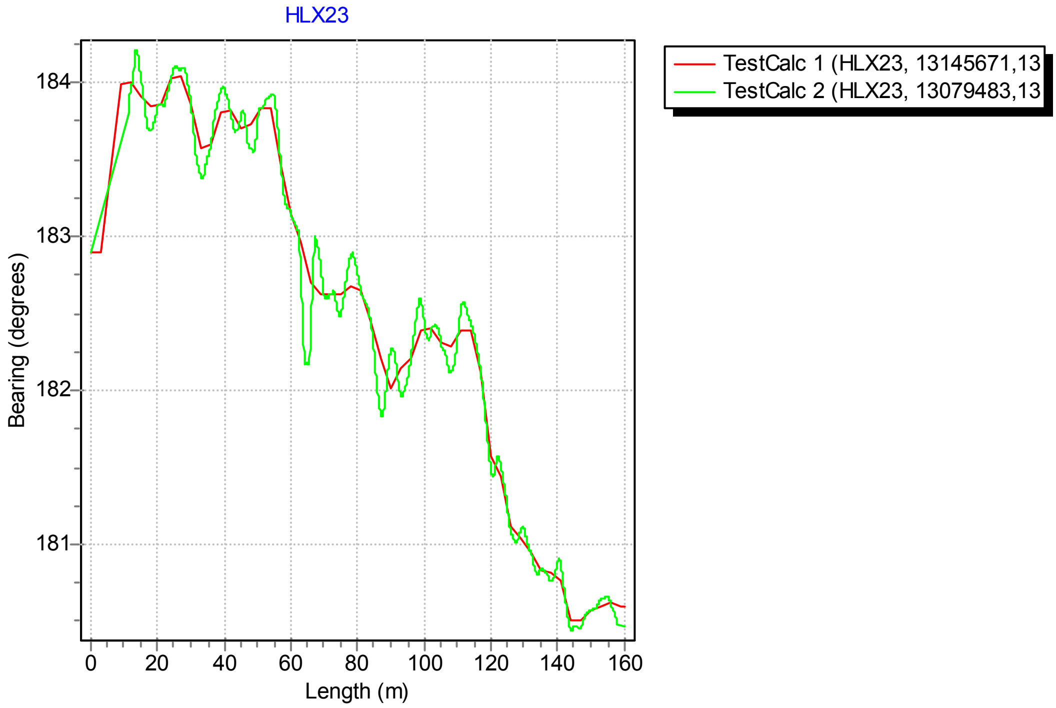


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX23.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX23	13145671	EG154	Borehole deviation multiple measurements	2004-10-02 18:00			I C	070202 08:17
HLX23	13079483	EG159	Acoustic televiewer deviation	2004-10-02 18:00	0.00	160.20		070125 12:32

Table 2. Content of the EG154-file.

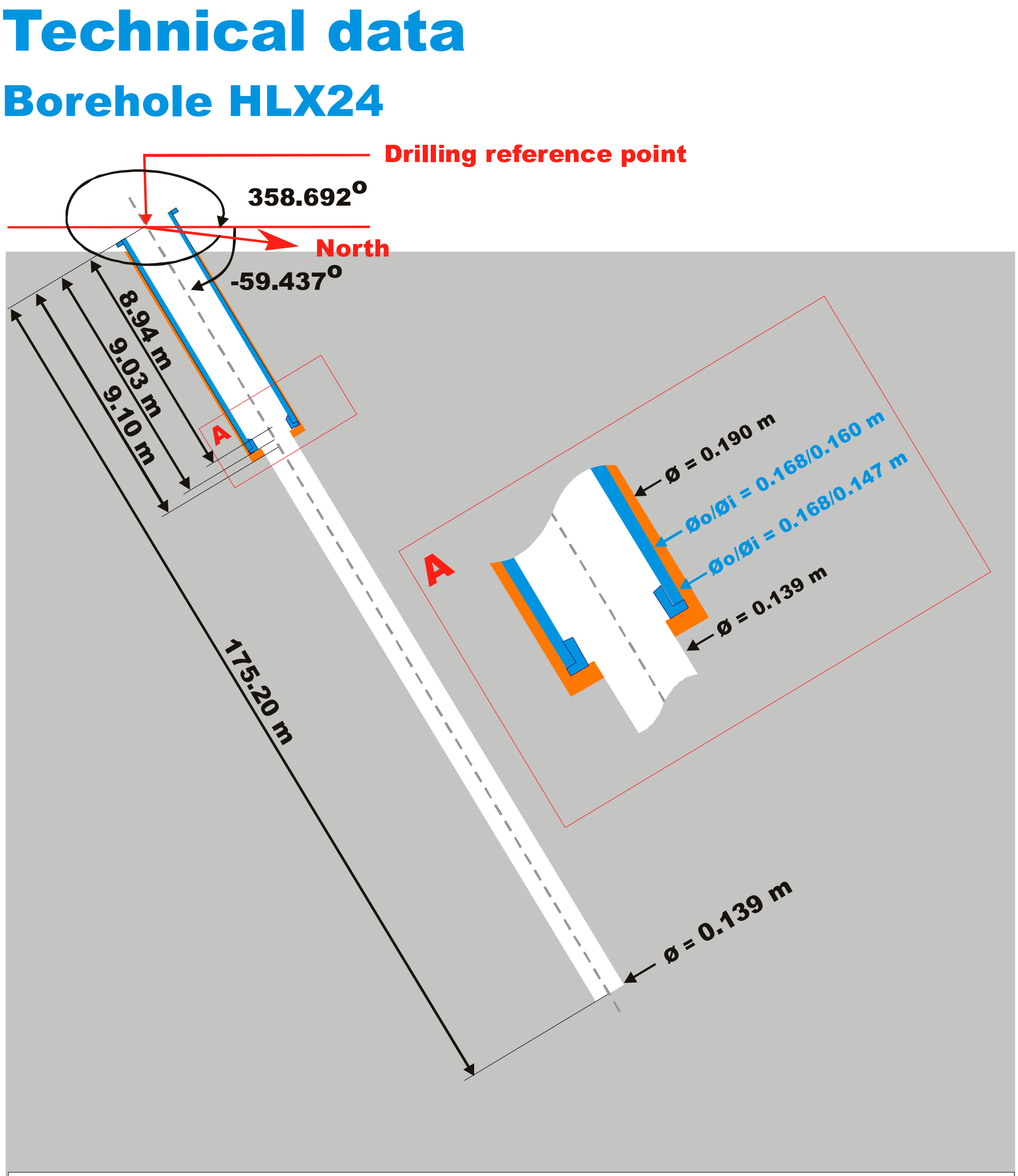
Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX23	13079483	BEARING	11.13	157.93	4.9
HLX23	13079483	INCLINATION	11.13	157.93	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX23	6366578.00	1548888.67	14.69	0.00	0.00	-58.18	182.89	1.8	4.9	0.00
HLX23	6366555.26	1548887.19	-20.59	42.00	0.72	-55.99	183.82	1.8	4.9	1.95
HLX23	6366541.72	1548886.36	-40.38	66.00	1.14	-55.44	182.70	1.8	4.9	3.11
HLX23	6366527.92	1548885.76	-60.01	90.00	1.58	-54.34	182.02	1.8	4.9	4.29
HLX23	6366513.76	1548885.19	-79.38	114.00	2.02	-53.32	182.39	1.8	4.9	5.50
HLX23	6366497.36	1548884.83	-100.82	141.00	2.54	-51.78	180.77	1.8	4.9	6.91
HLX23	6366485.33	1548884.70	-115.78	160.20	2.92	-50.83	180.60	1.8	4.9	7.94

Borehole description – HLX24

Technical description of borehole HLX24 is given in Figure 1.



Drilling reference point	
Northing:	**6366503.722 (m), RT90 2,5 gon V 0:-15**
Easting:	**1548865.890 (m), RT90 2,5 gon V 0:-15**
Elevation:	**12.769 (m), RHB 70**
Drilling period	
Drilling start date:	**2004-09-06**
Drilling stop date:	**2004-09-09**

Figure 1. *Technical description of the borehole HLX24.*

Deviation measurement in HLX24

The only deviation measurement performed in HLX24 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13079484) is executed between borehole lengths 0 – 175.20 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

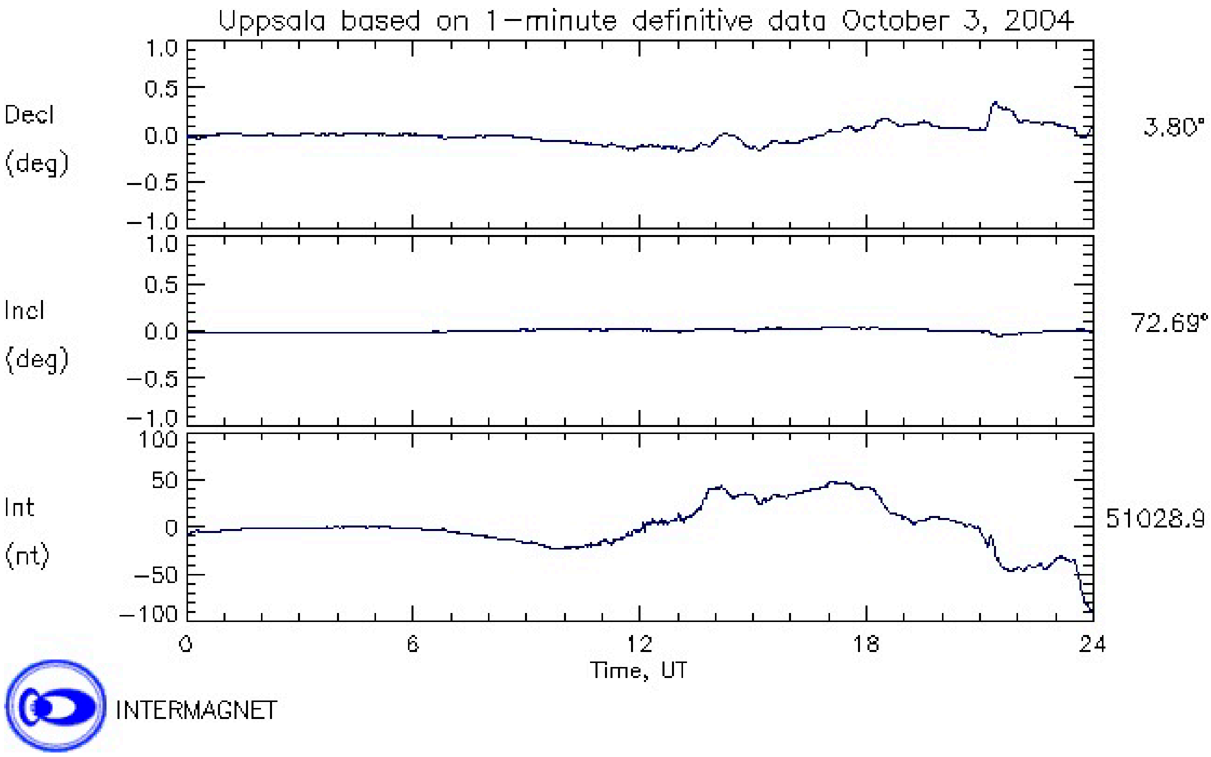


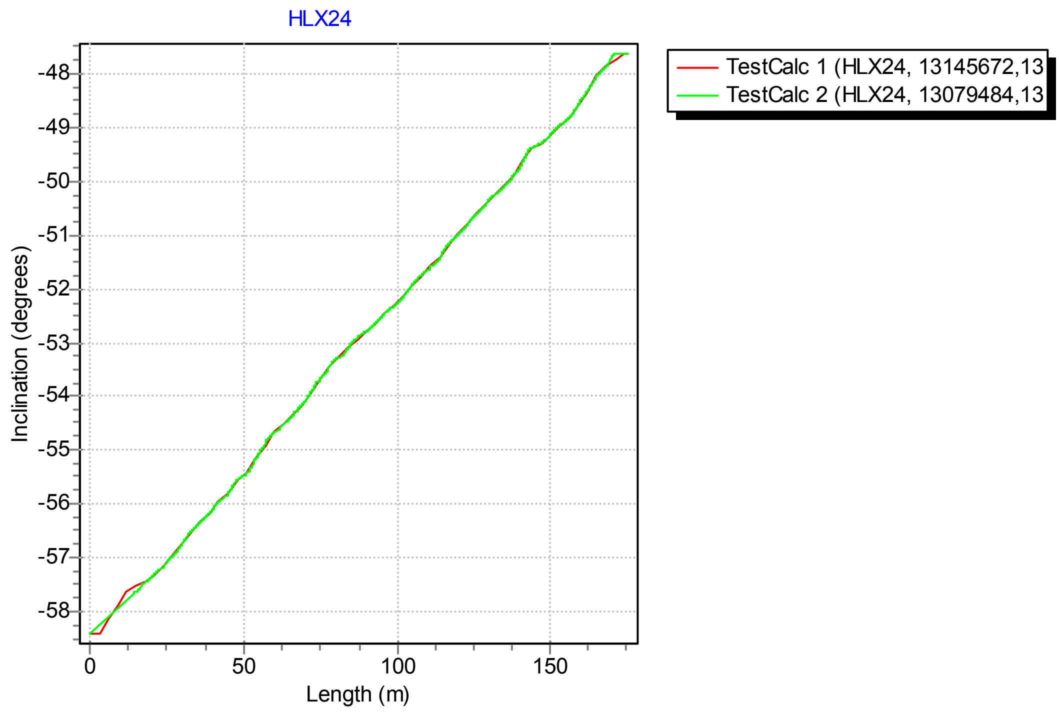
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-03.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145672) the acoustic televiewer measurement (ID 13079484) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other deviation activity listed in Table 1.



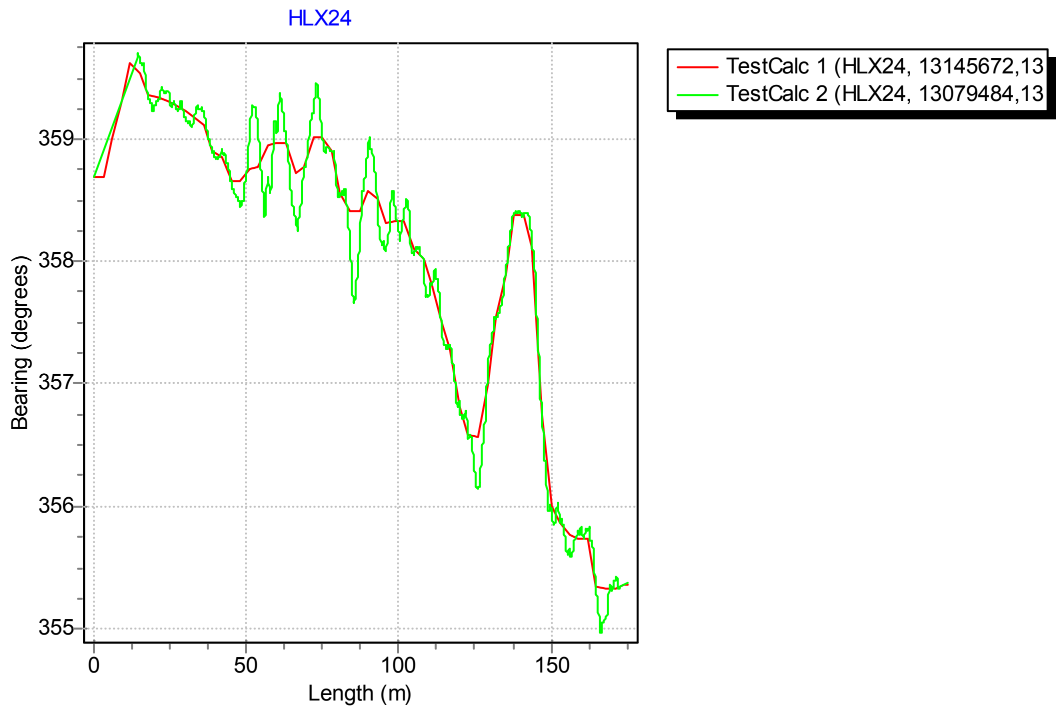


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX24.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX24	13145672	EG154	Borehole deviation multiple measurements	2004-10-03 10:39			I C	070202 08:18
HLX24	13079484	EG159	Acoustic televiewer deviation	2004-10-03 10:39	0.00	175.20		070125 12:33

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX24	13079484	BEARING	14.13	172.53	4.9
HLX24	13079484	INCLINATION	14.13	172.53	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

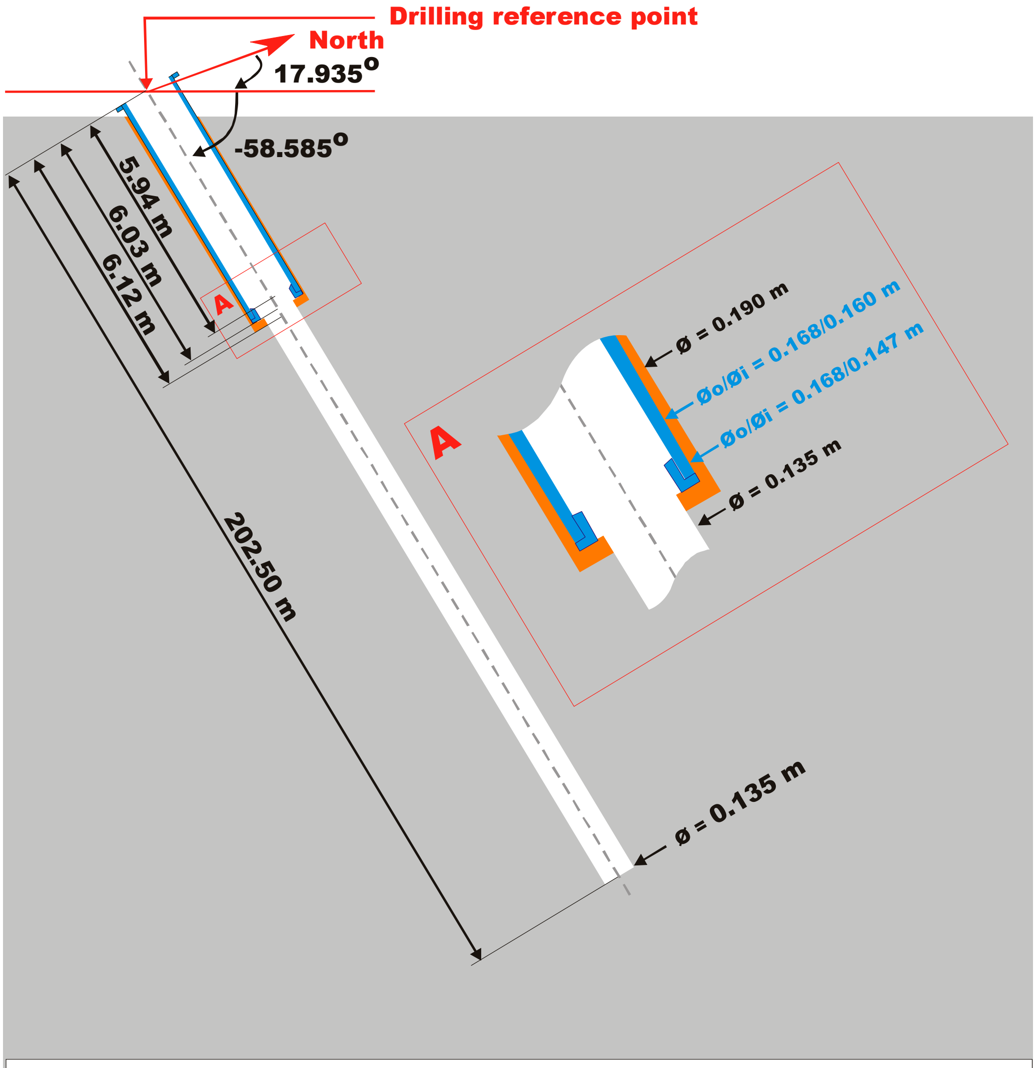
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX24	6366503.72	1548865.89	12.77	0.00	0.00	-58.39	358.69	1.8	4.9	0.00
HLX24	6366524.78	1548865.60	-20.06	39.00	0.66	-56.17	358.91	1.8	4.9	1.80
HLX24	6366538.42	1548865.32	-39.80	63.00	1.09	-54.51	358.97	1.8	4.9	2.97
HLX24	6366552.62	1548865.02	-59.14	87.00	1.54	-52.93	358.41	1.8	4.9	4.19
HLX24	6366569.16	1548864.50	-80.47	114.00	2.06	-51.43	357.50	1.8	4.9	5.60
HLX24	6366586.31	1548863.70	-101.31	141.00	2.60	-49.65	358.38	1.8	4.9	7.07
HLX24	6366602.04	1548862.70	-119.41	165.00	3.10	-48.06	355.33	1.8	4.9	8.42
HLX24	6366608.87	1548862.14	-126.96	175.20	3.31	-47.66	355.35	1.8	4.9	9.01

Borehole description – HLX25

Technical description of borehole HLX25 is given in Figure 1.

Technical data

Borehole HLX25



Drilling reference point

Northing: 6366783.974 (m), RT90 2,5 gon V 0:-15
Easting: 1547776.324 (m), RT90 2,5 gon V 0:-15
Elevation: 20.656 (m), RHB 70

Drilling period

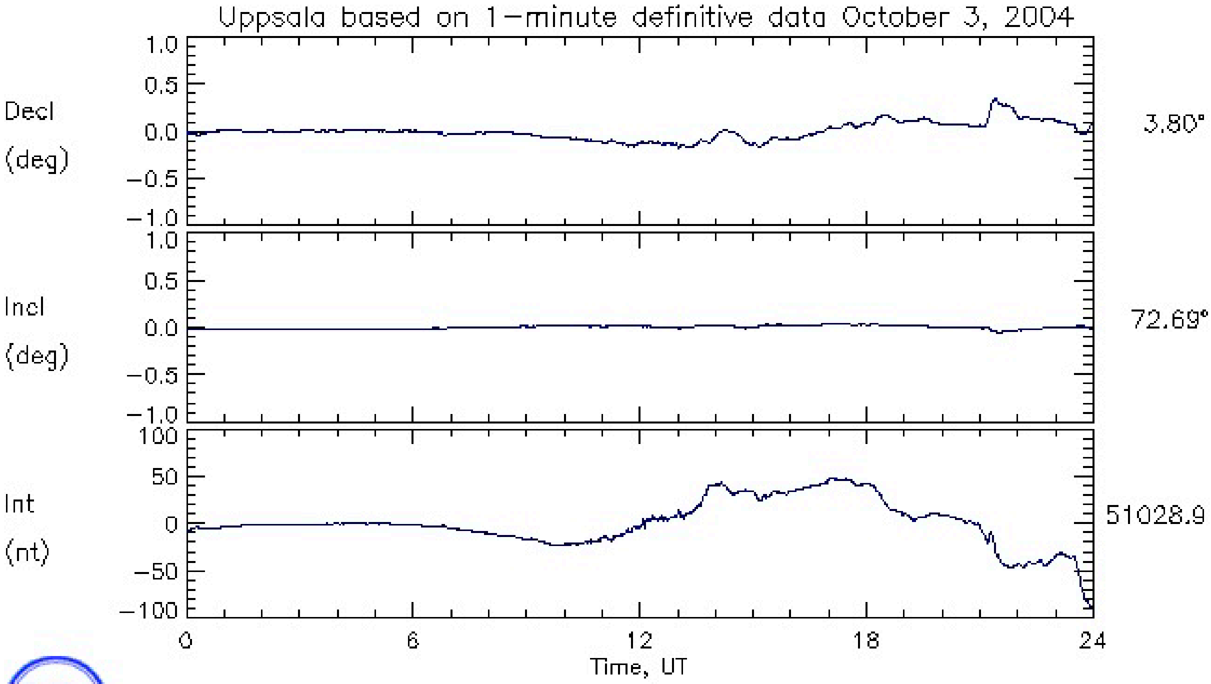
Drilling start date: 2004-08-17
Drilling stop date: 2004-08-19

Figure 1. *Technical description of the borehole HLX25.*

Deviation measurement in HLX25

The only deviation measurement performed in HLX25 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13079485) is executed between borehole lengths 0 – 202.50 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.



INTERMAGNET

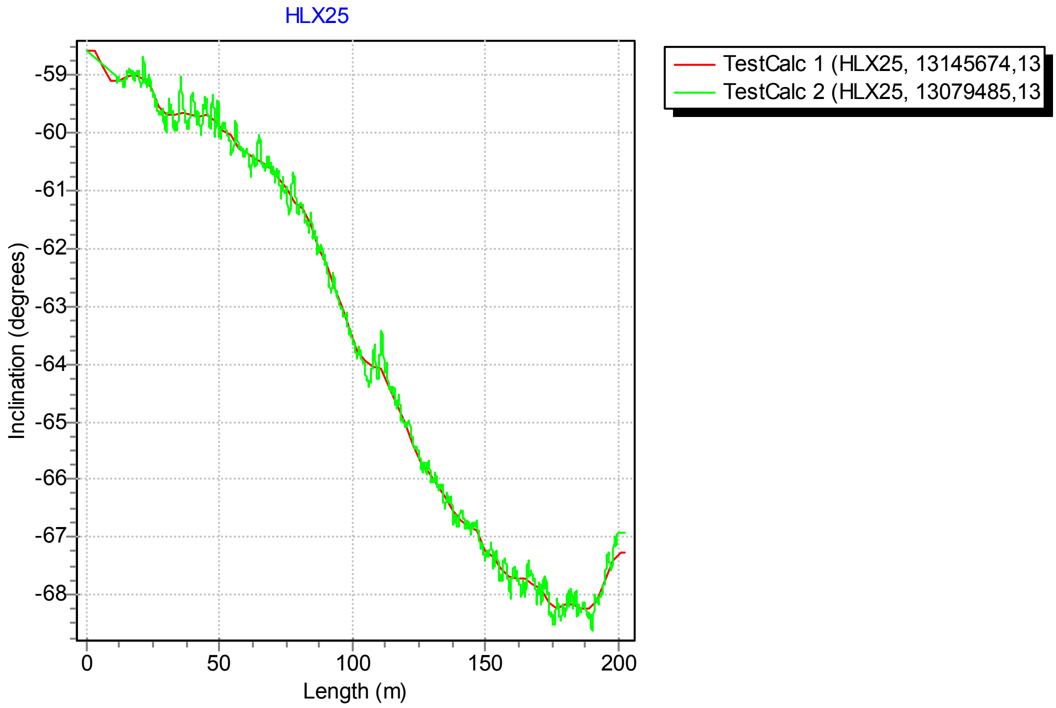
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-03.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145674) the acoustic televiewer measurement (ID 13079485) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other deviation activity listed in Table 1.



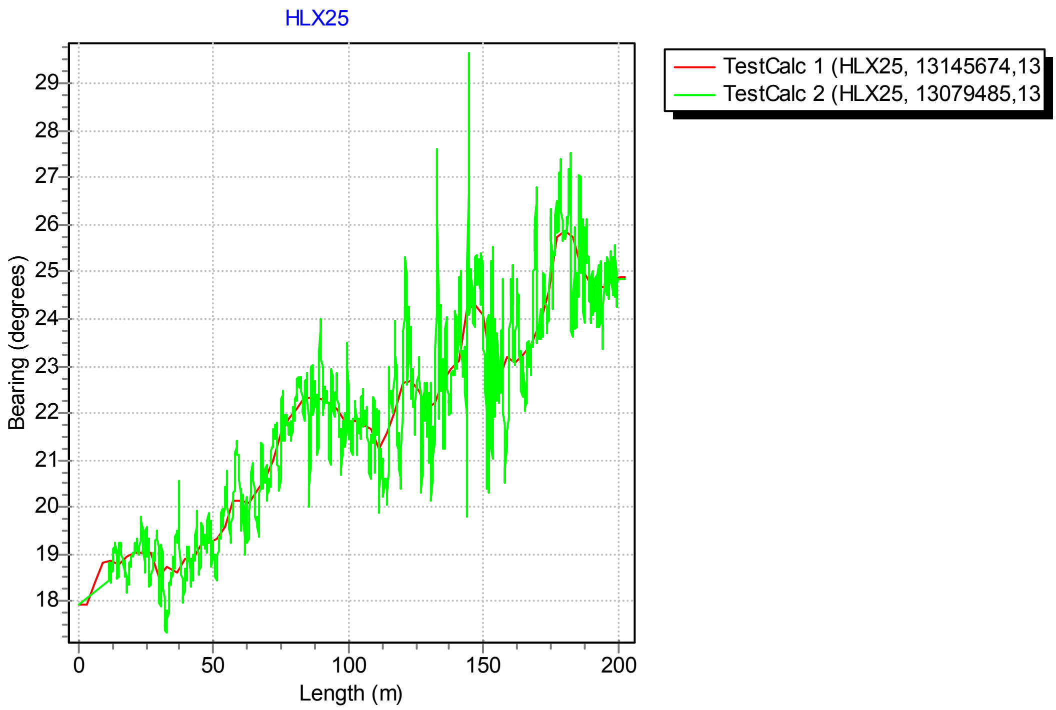


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX25.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX25	13145674	EG154	Borehole deviation multiple measurements	2004-10-03 15:15			I C	070202 08:18
HLX25	13079485	EG159	Acoustic televiewer deviation	2004-10-03 15:15	0.00	202.50		070125 12:33

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX25	13079485	BEARING	11.13	199.93	4.9
HLX25	13079485	INCLINATION	11.13	199.93	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

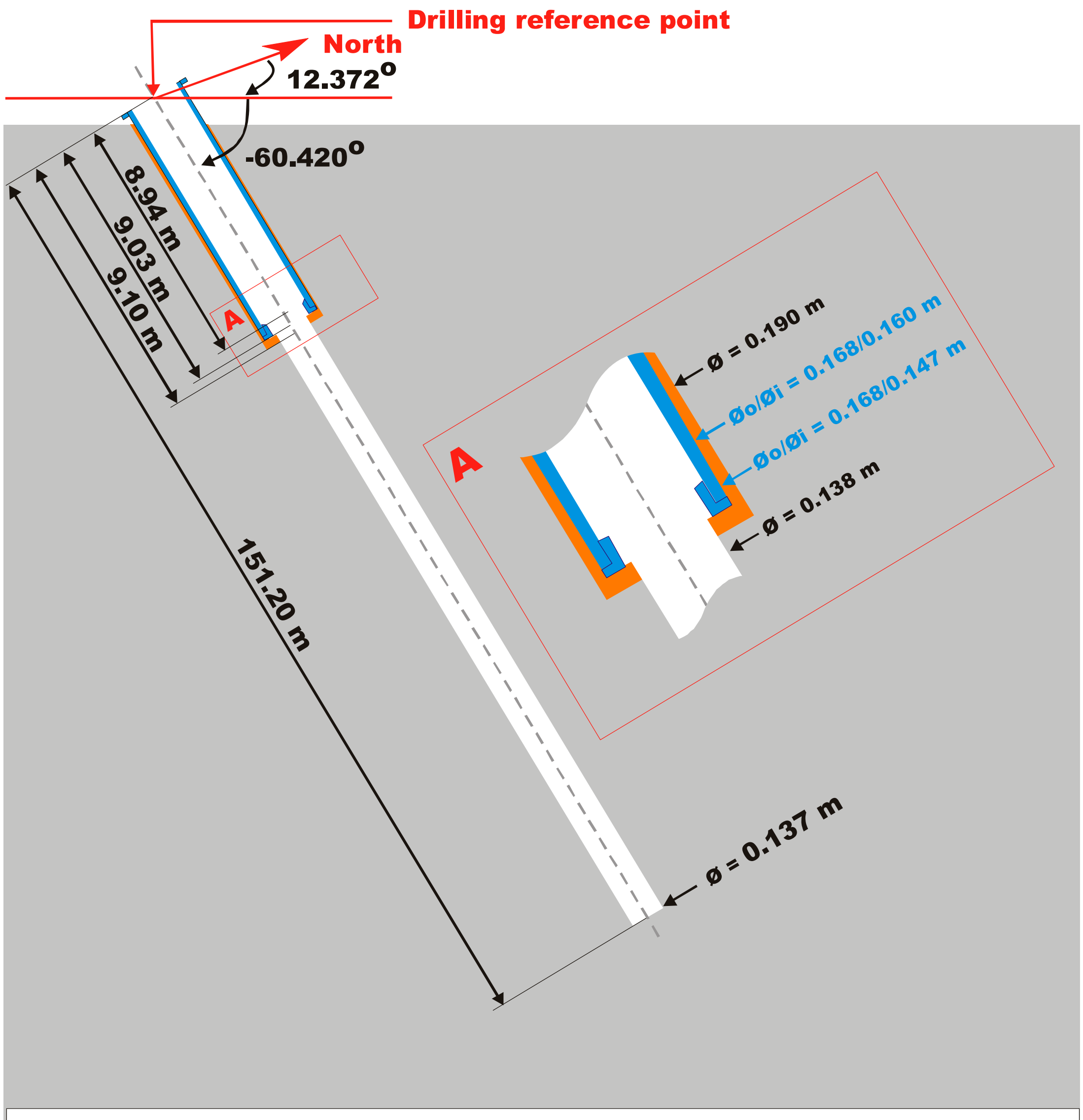
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX25	6366783.97	1547776.32	20.66	0.00	0.00	-58.59	17.94	1.8	4.9	0.00
HLX25	6366807.18	1547784.20	-20.62	48.00	0.77	-59.79	19.23	1.8	4.9	2.09
HLX25	6366818.34	1547788.28	-41.47	72.00	1.14	-60.80	21.00	1.8	4.9	3.10
HLX25	6366827.61	1547792.02	-59.94	93.00	1.45	-62.70	22.22	1.8	4.9	3.95
HLX25	6366837.45	1547795.95	-81.47	117.00	1.79	-64.69	22.06	1.8	4.9	4.85
HLX25	6366845.43	1547799.25	-100.61	138.00	2.06	-66.54	22.93	1.8	4.9	5.59
HLX25	6366852.93	1547802.51	-119.95	159.00	2.31	-67.66	23.18	1.8	4.9	6.29
HLX25	6366860.13	1547805.73	-139.41	180.00	2.56	-68.18	25.88	1.8	4.9	6.96
HLX25	6366867.81	1547809.31	-160.26	202.50	2.83	-67.26	24.91	1.8	4.9	7.68

Borehole description – HLX26

Technical description of borehole HLX26 is given in Figure 1.

Technical data

Borehole HLX26



Drilling reference point

Northing: 6365278.707 (m), RT90 2,5 gon V 0:-15
Easting: 1548600.525 (m), RT90 2,5 gon V 0:-15
Elevation: 6.478 (m), RHB 70

Drilling period

Drilling start date: 2004-09-23
Drilling stop date: 2004-09-28

Figure 1. *Technical description of the borehole HLX26.*

<u>Deviation measurement in HLX26</u>

The only deviation measurement performed in HLX26 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145270) is executed between borehole lengths 0 – 148.43 m. The acoustic televiewer measurement (ID 13077084) is an error marked measurement which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

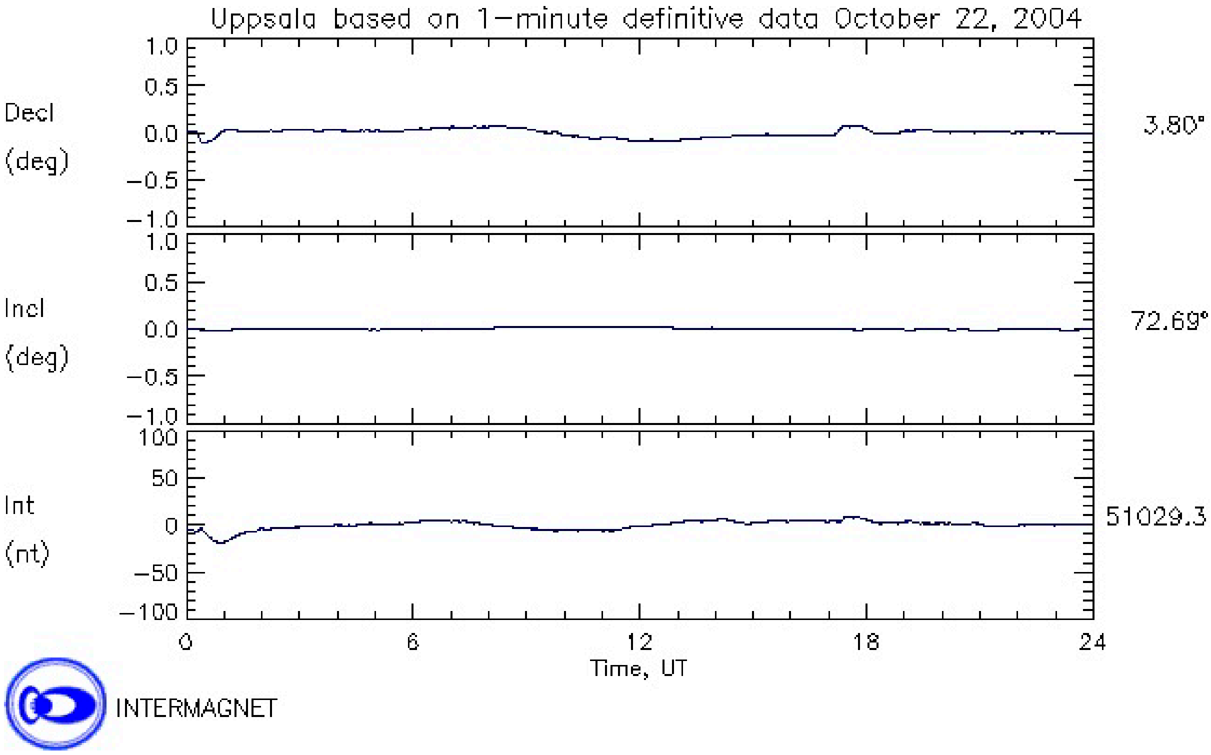


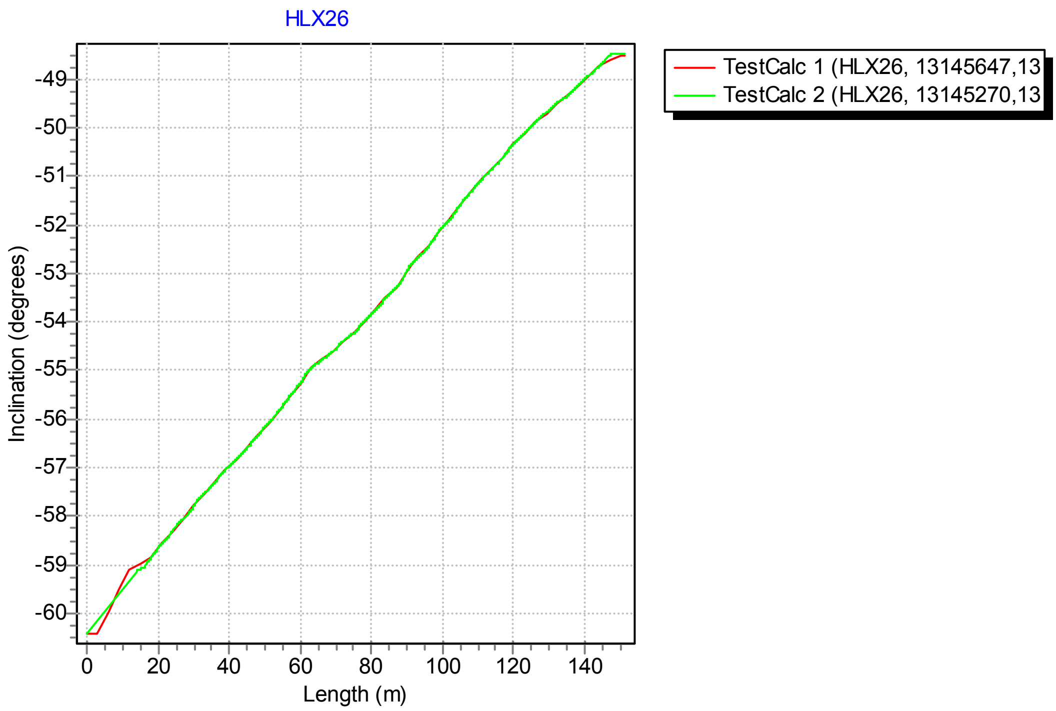
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-22.*

<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13145647) the acoustic televiewer measurement (ID 13145270) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



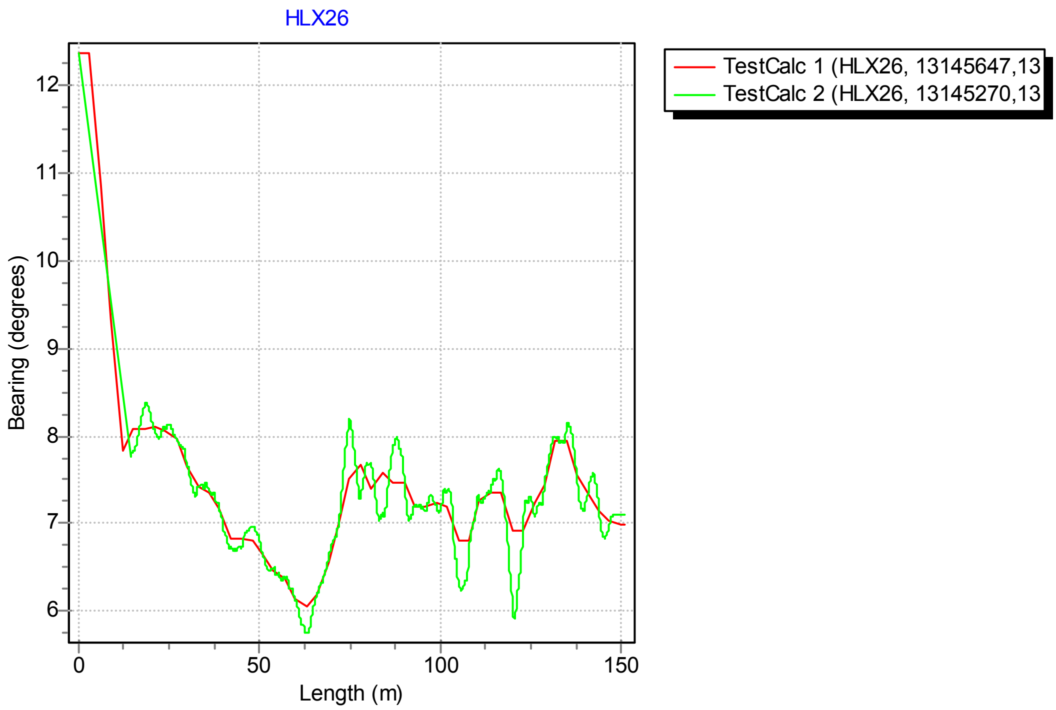


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX26.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX26	13145270	EG159	Acoustic televiewer deviation	2004-10-22 10:38	0.00	148.43		070122 14:51
HLX26	13145647	EG154	Borehole deviation multiple measurements	2004-10-22 10:38			I C	070201 12:28
HLX26	13077084	EG159	Acoustic televiewer deviation	2004-10-22 10:38	14.13	148.43	E	070214 08:06

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX26	13145270	BEARING	14.13	148.43	4.9
HLX26	13145270	INCLINATION	14.13	148.43	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

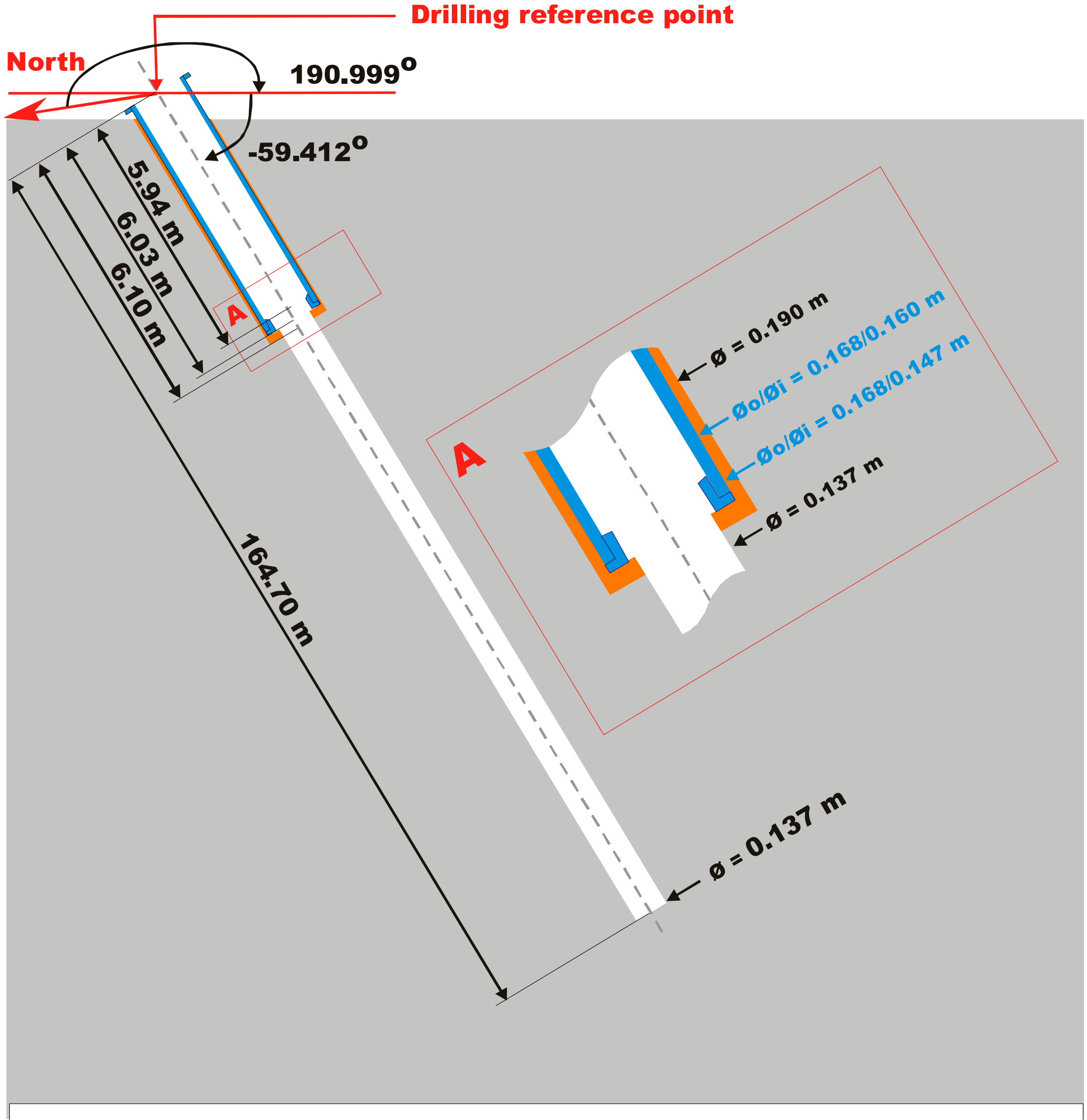
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX26	6365278.71	1548600.52	6.48	0.00	0.00	-60.42	12.37	1.8	4.9	0.00
HLX26	6365293.92	1548602.94	-19.26	30.00	0.49	-57.79	7.66	1.8	4.9	1.32
HLX26	6365306.96	1548604.55	-39.34	54.00	0.90	-55.83	6.46	1.8	4.9	2.45
HLX26	6365320.69	1548606.14	-58.96	78.00	1.34	-53.99	7.67	1.8	4.9	3.63
HLX26	6365336.87	1548608.22	-80.47	105.00	1.85	-51.58	6.81	1.8	4.9	5.03
HLX26	6365351.98	1548610.11	-99.02	129.00	2.33	-49.69	7.43	1.8	4.9	6.33
HLX26	6365366.42	1548611.99	-115.78	151.20	2.79	-48.50	6.98	1.8	4.9	7.58

Borehole description – HLX27

Technical description of borehole HLX27 is given in Figure 1.

Technical data

Borehole HLX27



Drilling reference point
Northing: 6365605.073 (m), RT90 2,5 gon V 0:-15
Easting: 1547882.686 (m), RT90 2,5 gon V 0:-15
Elevation: 8.248 (m), RHB 70

Drilling period
Drilling start date: 2004-09-20
Drilling stop date: 2004-09-22

Figure 1. *Technical description of the borehole HLX27.*

Deviation measurement in HLX27

The only deviation measurement performed in HLX27 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145269) is executed between borehole lengths 0 – 160.43 m. The acoustic televiewer measurements (ID 113077086 and 13114642) are error marked measurements which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

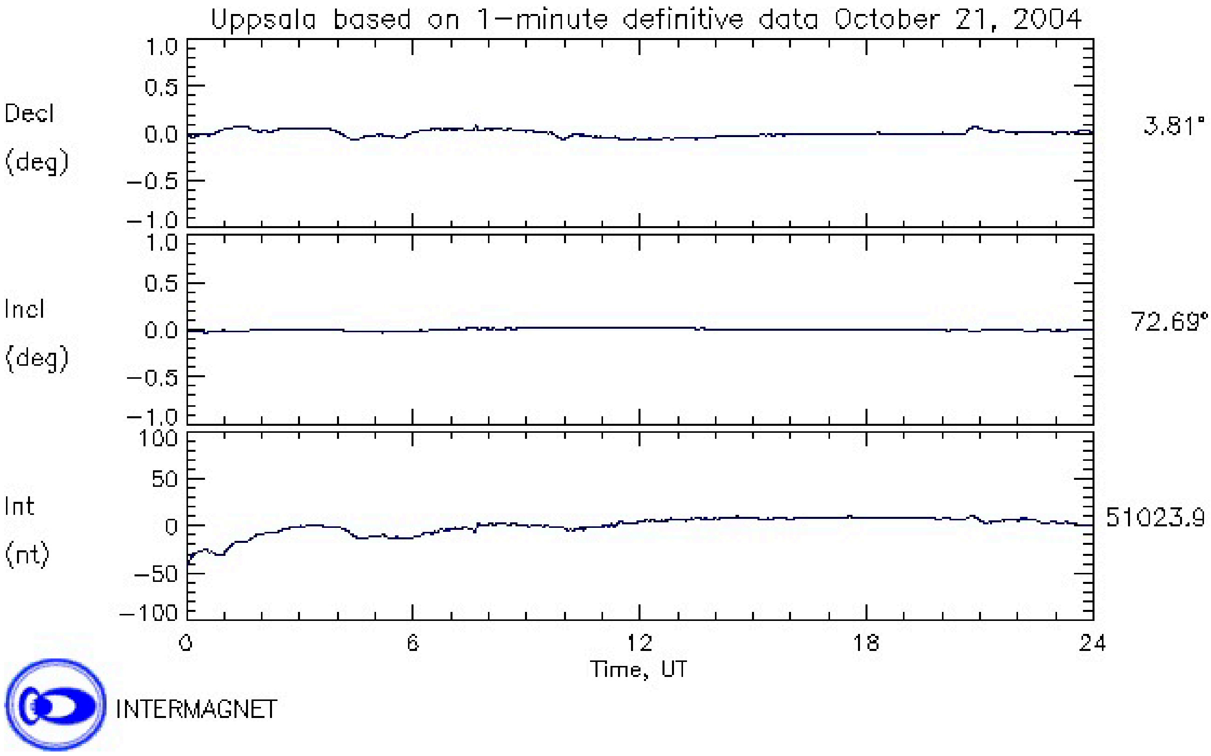


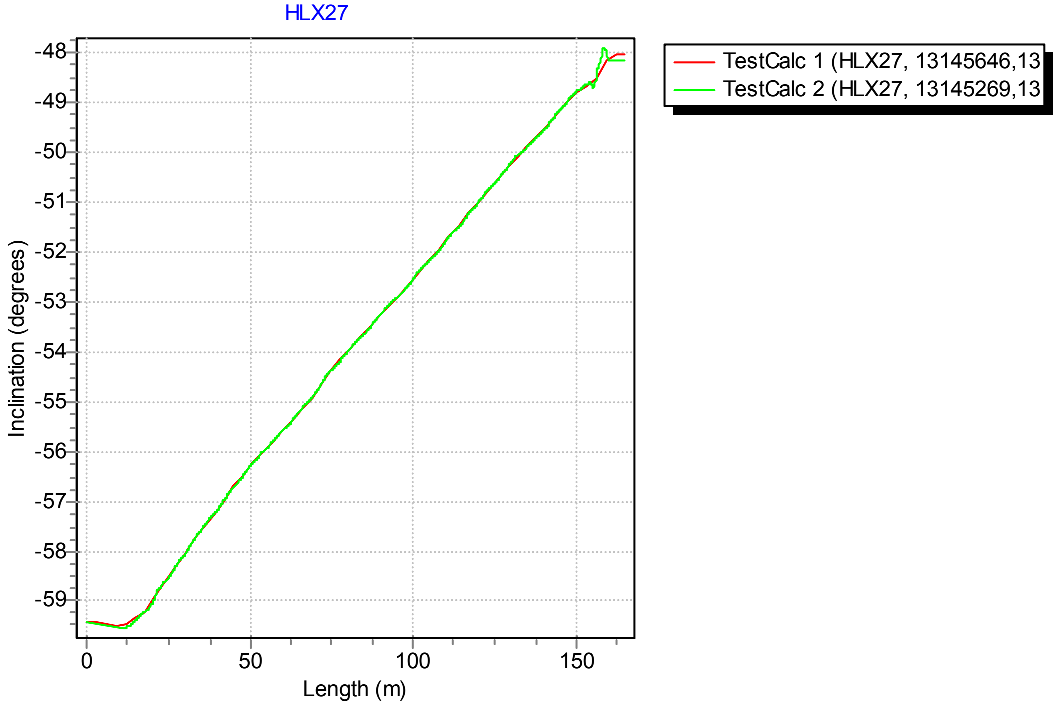
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-21.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145646) the acoustic televiewer measurement (ID 13145269) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



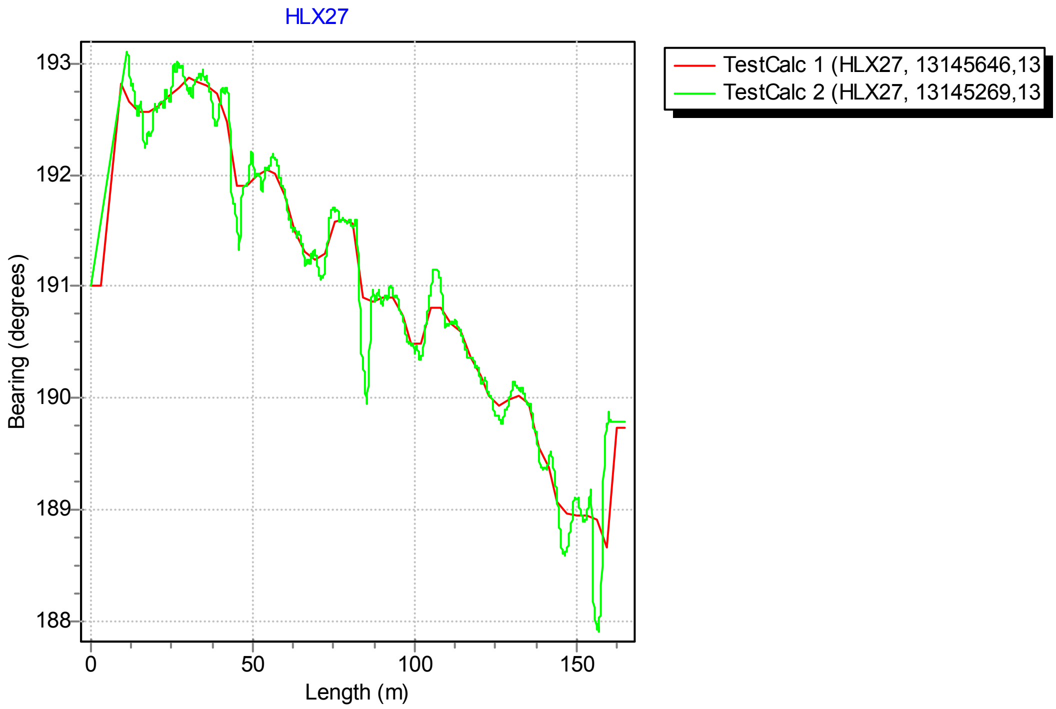


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX27.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX27	13114642	EG159	Acoustic televiewer deviation	2004-10-21 19:09	11.23	160.43	E	070213 09:37
HLX27	13145269	EG159	Acoustic televiewer deviation	2004-10-21 19:09	0.00	160.43		070122 14:51
HLX27	13145646	EG154	Borehole deviation multiple measurements	2004-10-21 19:09			I C	070201 12:28
HLX27	13077086	EG159	Acoustic televiewer deviation	2004-10-21 19:09	11.23	160.43	E	070214 08:07

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX27	13145269	BEARING	11.23	160.43	4.9
HLX27	13145269	INCLINATION	11.23	160.43	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

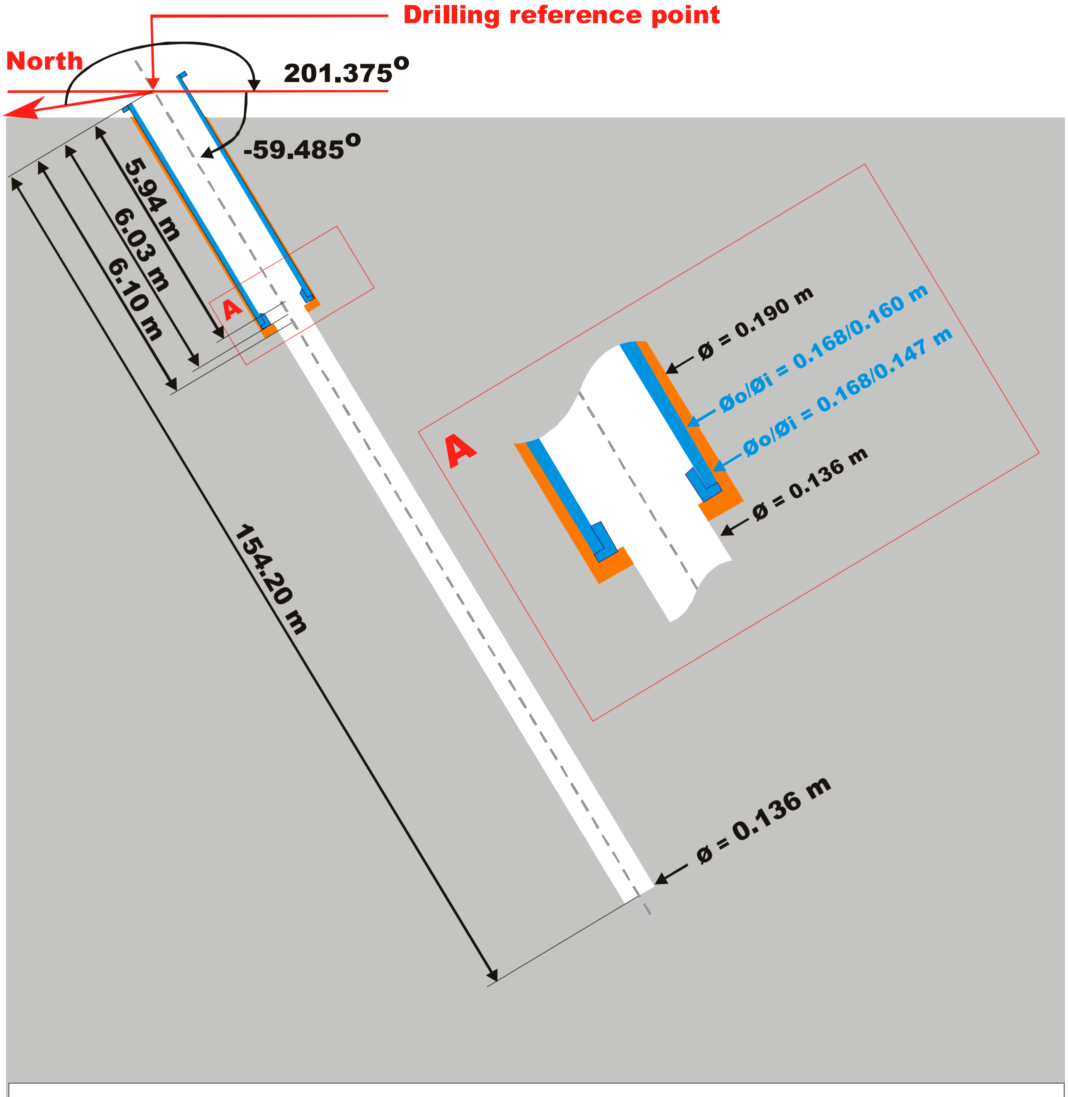
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX27	6365605.07	1547882.69	8.25	0.00	0.00	-59.41	191.00	1.8	4.9	0.00
HLX27	6365588.47	1547879.03	-20.03	33.00	0.54	-57.76	192.84	1.8	4.9	1.46
HLX27	6365575.61	1547876.23	-40.10	57.00	0.95	-55.80	192.01	1.8	4.9	2.58
HLX27	6365562.08	1547873.48	-59.73	81.00	1.38	-53.91	191.56	1.8	4.9	3.77
HLX27	6365546.10	1547870.43	-81.28	108.00	1.90	-51.96	190.81	1.8	4.9	5.16
HLX27	6365531.24	1547867.73	-99.93	132.00	2.37	-50.06	190.02	1.8	4.9	6.45
HLX27	6365513.81	1547864.90	-120.35	159.00	2.93	-48.15	188.66	1.8	4.9	7.96
HLX27	6365510.05	1547864.28	-124.59	164.70	3.05	-48.04	189.73	1.8	4.9	8.29

Borehole description – HLX28

Technical description of borehole HLX28 is given in Figure 1.

Technical data

Borehole HLX28



Drilling reference point

Northing: 6365861.704 (m), RT90 2,5 gon V 0:-15

Easting: 1546834.473 (m), RT90 2,5 gon V 0:-15

Elevation: 13.424 (m), RHB 70

Drilling period

Drilling start date: 2004-09-29

Drilling stop date: 2004-10-02

Figure 1. *Technical description of the borehole HLX28.*

Deviation measurement in HLX28

The only deviation measurement performed in HLX28 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145268) is executed between borehole lengths 0 – 142.13 m. The acoustic televiewer measurements (ID 13077087 and 13113961) are error marked measurements which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

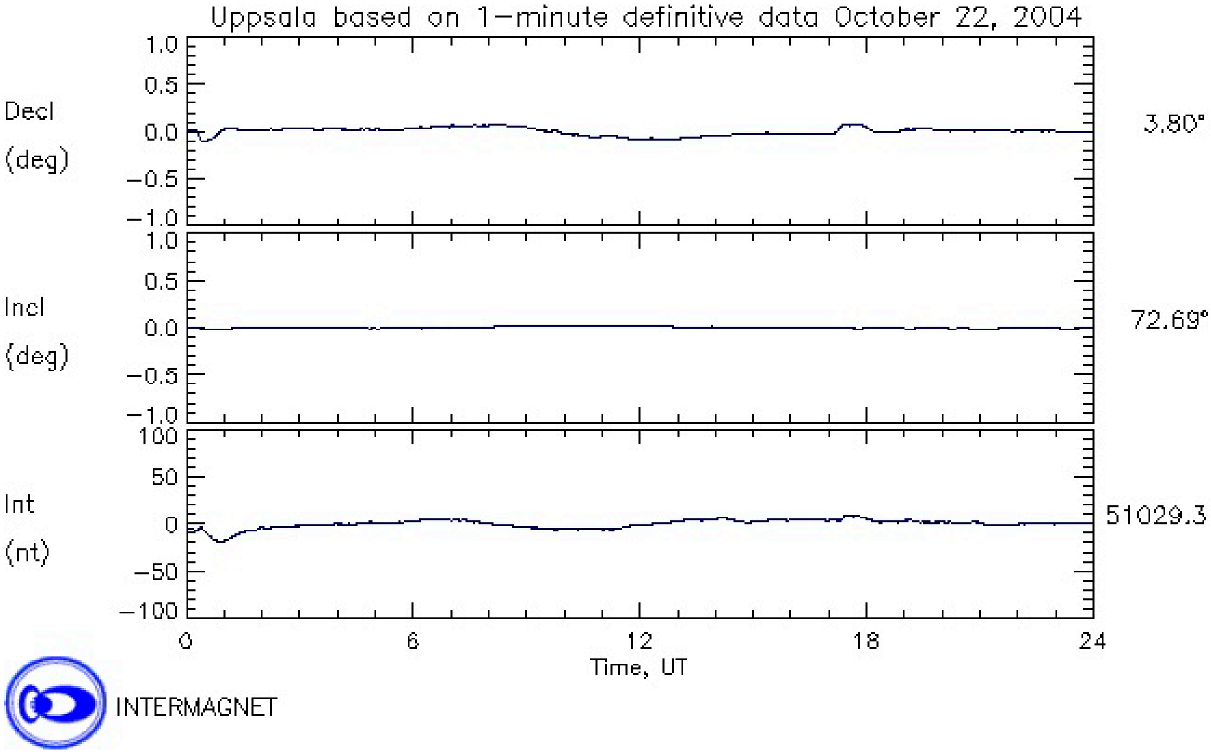


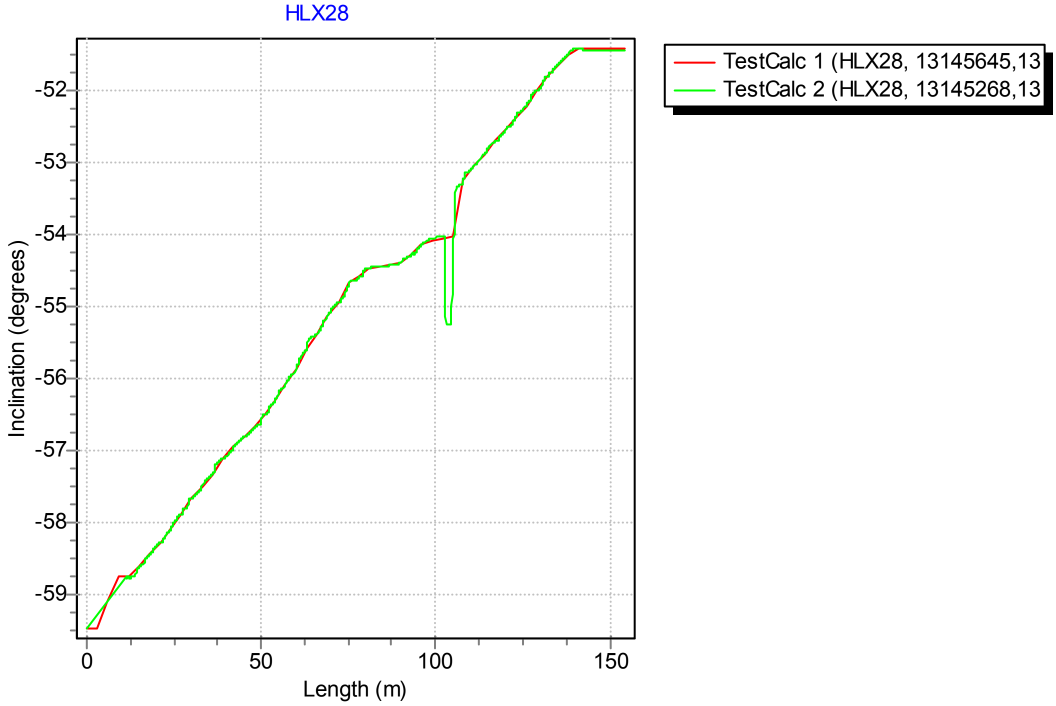
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2004-10-22.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145645) the acoustic televiewer measurement (ID 13145268) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



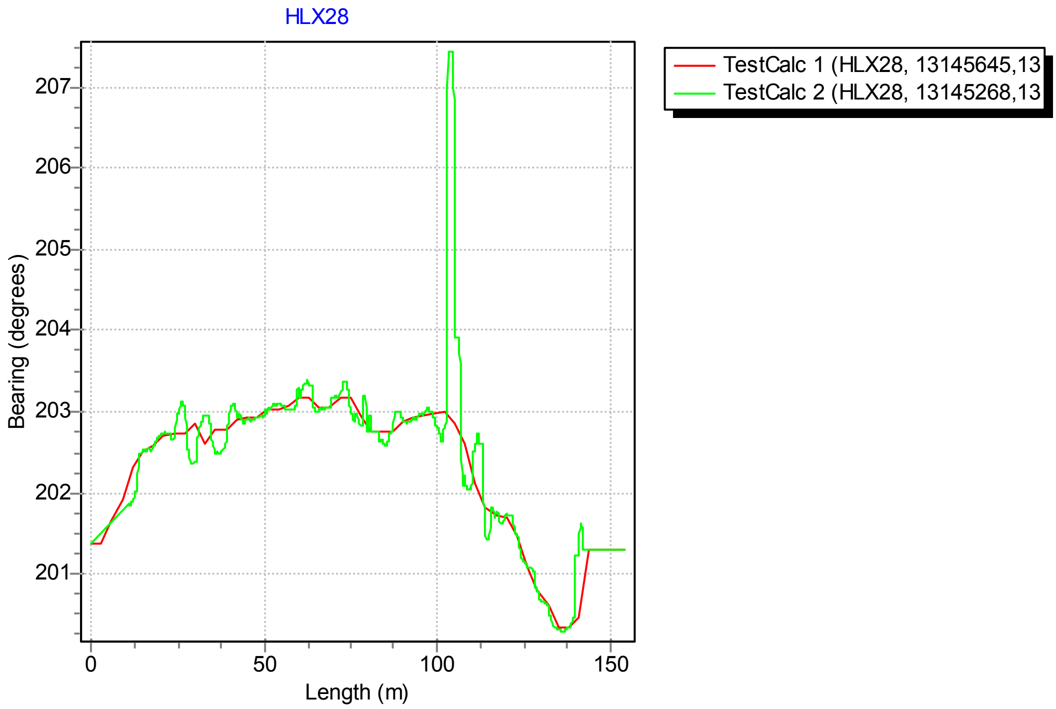


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX28.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX28	13113961	EG159	Acoustic televiewer deviation	2004-10-22 14:10	11.13	142.13	E	070213 09:38
HLX28	13145268	EG159	Acoustic televiewer deviation	2004-10-22 14:10	0.00	142.13		070122 14:51
HLX28	13145645	EG154	Borehole deviation multiple measurements	2004-10-22 14:10			I C	070201 12:29
HLX28	13077087	EG159	Acoustic televiewer deviation	2004-10-22 14:10	11.13	142.13	E	070214 08:09

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX28	13145268	BEARING	11.13	142.13	4.9
HLX28	13145268	INCLINATION	11.13	142.13	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

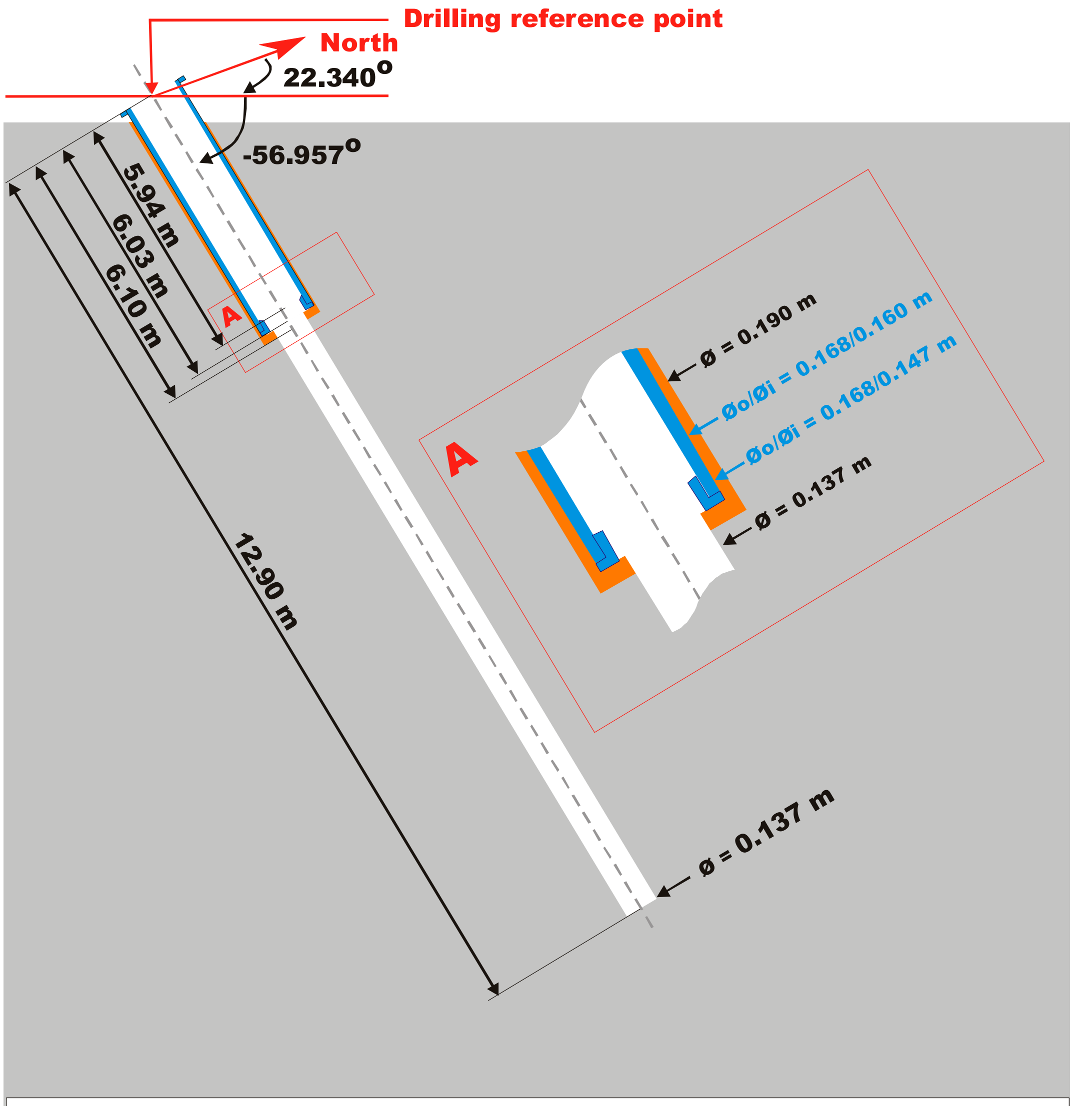
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX28	6365861.70	1546834.47	13.42	0.00	0.00	-59.49	201.38	1.8	4.9	0.00
HLX28	6365842.77	1546826.68	-19.77	39.00	0.64	-57.12	202.78	1.8	4.9	1.75
HLX28	6365830.56	1546821.49	-39.77	63.00	1.06	-55.57	203.18	1.8	4.9	2.89
HLX28	6365817.84	1546816.10	-59.38	87.00	1.50	-54.42	202.76	1.8	4.9	4.07
HLX28	6365803.15	1546809.94	-81.19	114.00	2.00	-52.87	201.82	1.8	4.9	5.43
HLX28	6365789.42	1546804.65	-100.15	138.00	2.46	-51.49	200.35	1.8	4.9	6.69
HLX28	6365780.00	1546801.02	-112.81	154.20	2.78	-51.41	201.31	1.8	4.9	7.56

Borehole description – HLX29

Technical description of borehole HLX29 is given in Figure 1.

Technical data

Borehole HLX29



Drilling reference point

Northing: 6365726.243 (m), RT90 2,5 gon V 0:-15
Easting: 1546733.146 (m), RT90 2,5 gon V 0:-15
Elevation: 10.701 (m), RHB 70

Drilling period

Drilling start date: 2004-10-02
Drilling stop date: 2004-10-03

Figure 1. *Technical description of the borehole HLX29.*

Borehole direction surveying in HLX29

There is no deviation measurement performed in HLX29. Only the borehole direction surveying was performed from the start of the borehole. Here the starting bearing and inclination is presented in Figure 1.

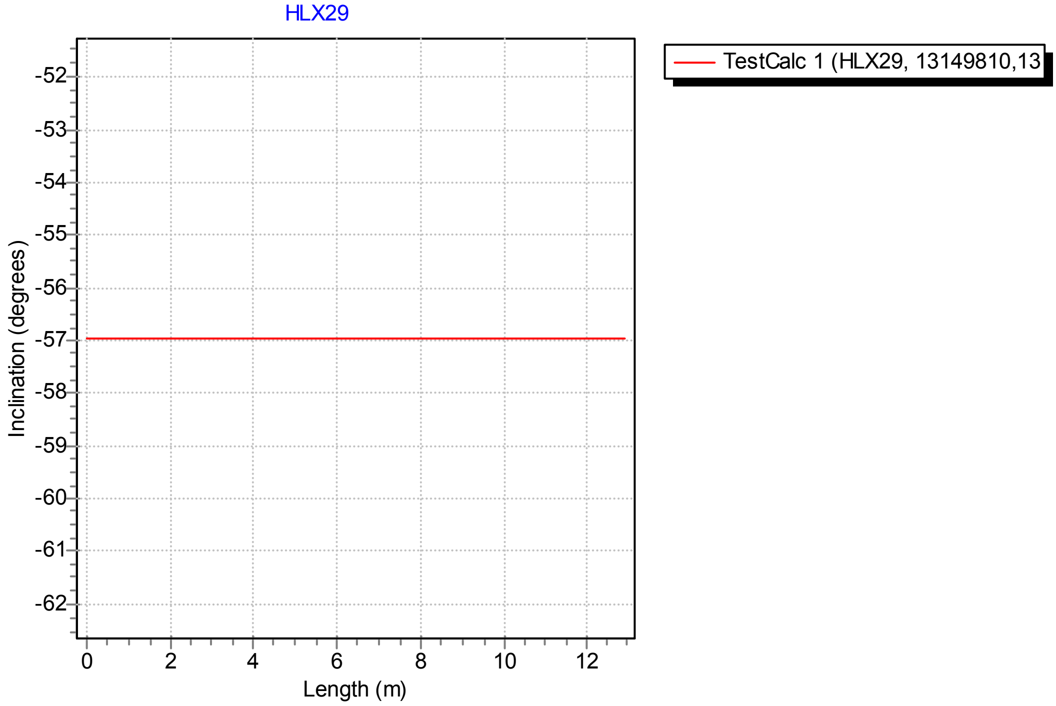
Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13149810) the borehole direction surveying (ID 13054592) from start of the borehole was used, Table 1. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file from Object_location is shown in Table 3. The uncertainty in inclination is calculated according to: $-0.000092*(\text{borehole\_length})^2 + 0.049*\text{borehole length} + 1.16 + 1.8$. The uncertainty in bearing is calculated according to: $0.05*\text{borehole\_length} + 2.5 + 4.9$.

The borehole deviation multiple measurement (ID 13146887) was error marked and replaced with (ID 13149810) which was based on the uncertainty calculation above.

Figure 2 shows the inclination and bearing of the borehole plotted as a straight line.



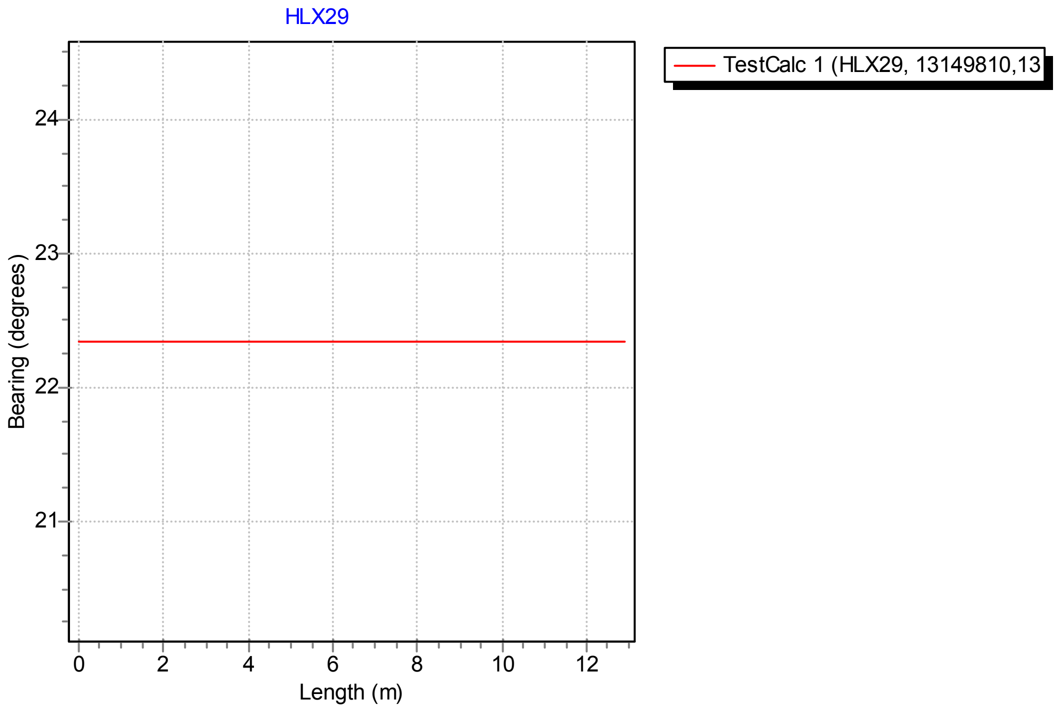


Figure 2. *The Borehole deviation multiple measurements data (red line) plotted as a straight line. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. Borehole deviation multiple measurements in Sicada for HLX29.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX29	13146887	EG154	Borehole deviation multiple measurements	2007-02-02 14:40			EC	070220 11:09
HLX29	13149810	EG154	Borehole deviation multiple measurements	2007-02-19 14:40			I C	070220 13:08

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX29	13054592	BEARING	0.00	0.00	8.045
HLX29	13054592	INCLINATION	0.00	0.00	3.577

Table 3. Subset of the resulting "Object_location" in Sicada.

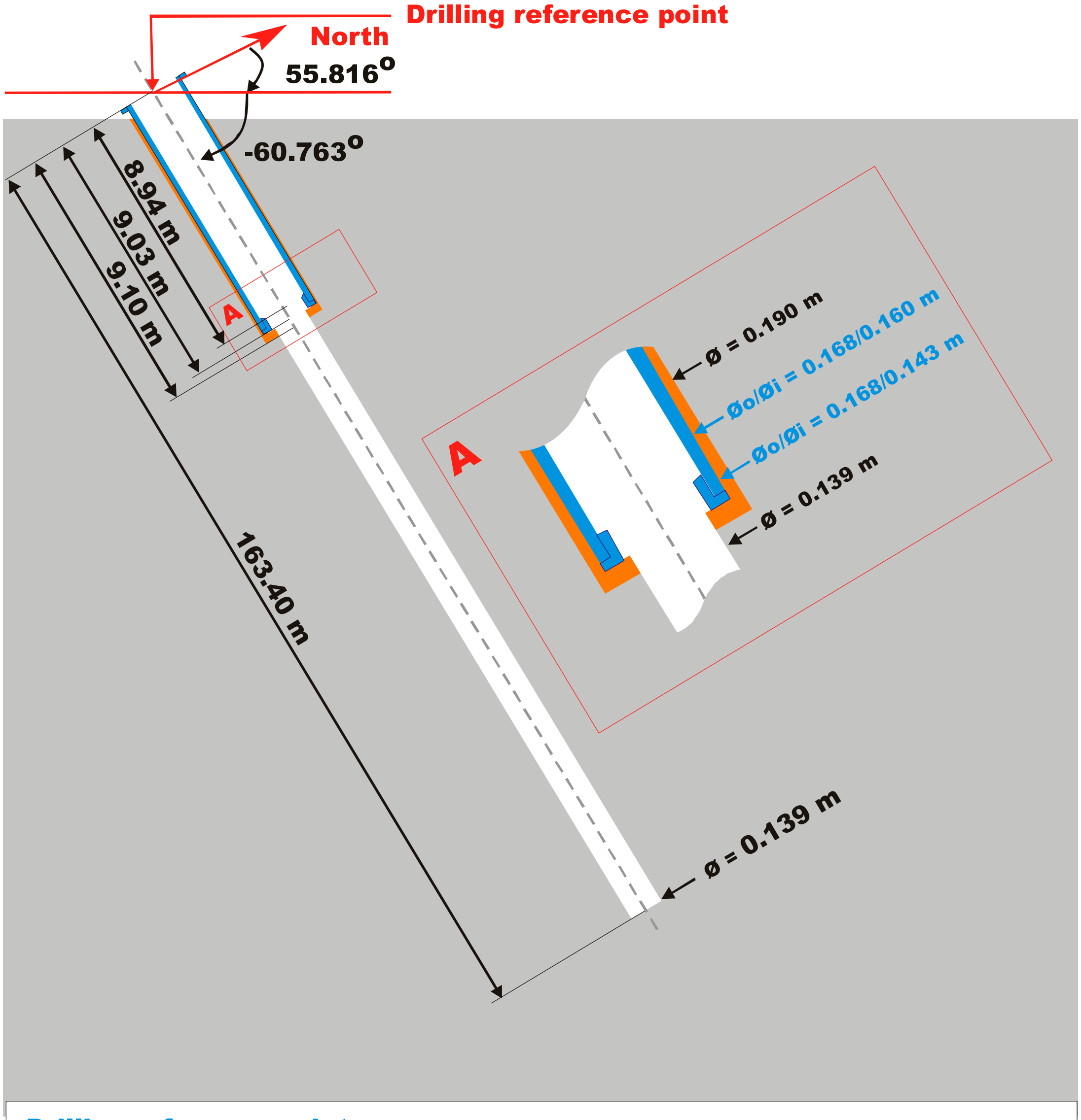
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX29	6365726.24	1546733.15	10.70	0.00	0.00	-56.96	22.34	3.6	8.0	0.00
HLX29	6365727.76	1546733.77	8.19	3.00	0.10	-56.96	22.34	3.6	8.0	0.23
HLX29	6365732.75	1546735.82	-0.11	12.90	0.44	-56.96	22.34	3.6	8.0	0.98

Borehole description – HLX30

Technical description of borehole HLX30 is given in Figure 1.

Technical data

Borehole HLX30



Drilling reference point

Northing: 6366730.734 (m), RT90 2,5 gon V 0:-15

Easting: 1548026.729 (m), RT90 2,5 gon V 0:-15

Elevation: 12.184 (m), RHB 70

Drilling period

Drilling start date: 2004-11-26

Drilling stop date: 2004-11-30

Figure 1. *Technical description of the borehole HLX30.*

<u>Deviation measurement in HLX30</u>

The only deviation measurement performed in HLX30 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142279 and 13138472) were executed down and up the borehole between the length 0 – 159.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13080862 and 13117397) are error marked measurements with adjusted bearing and inclination mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

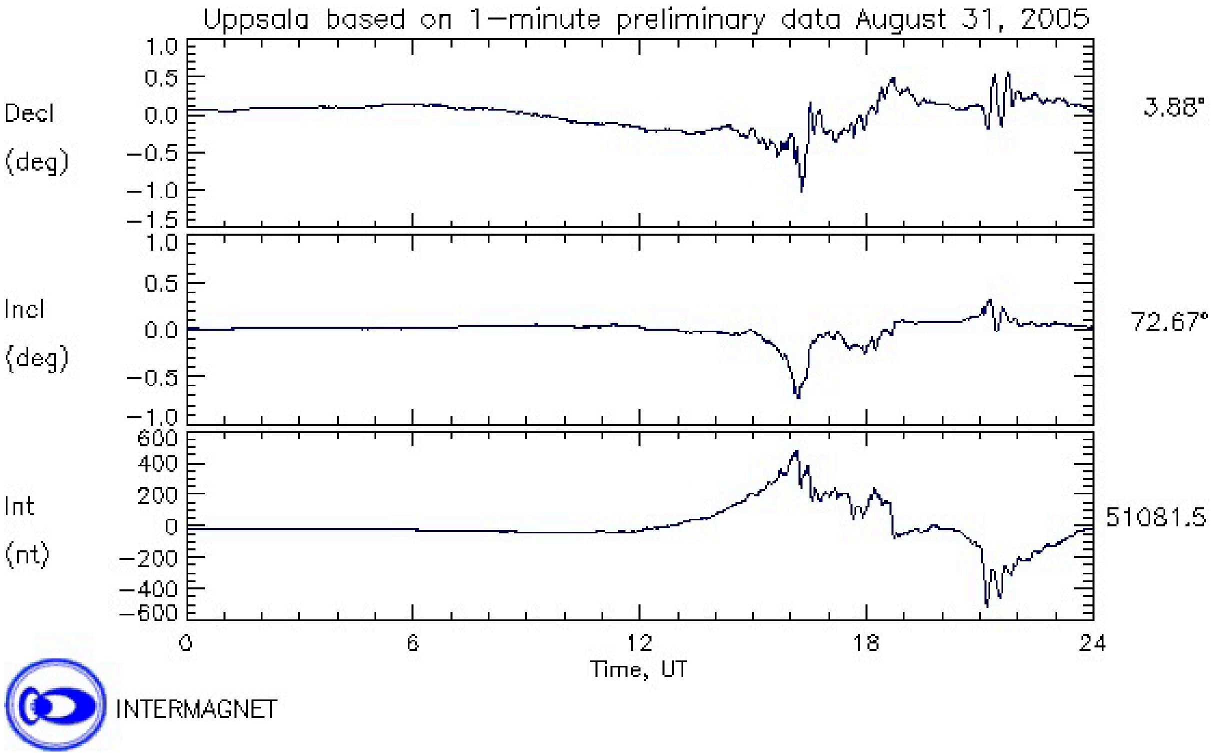


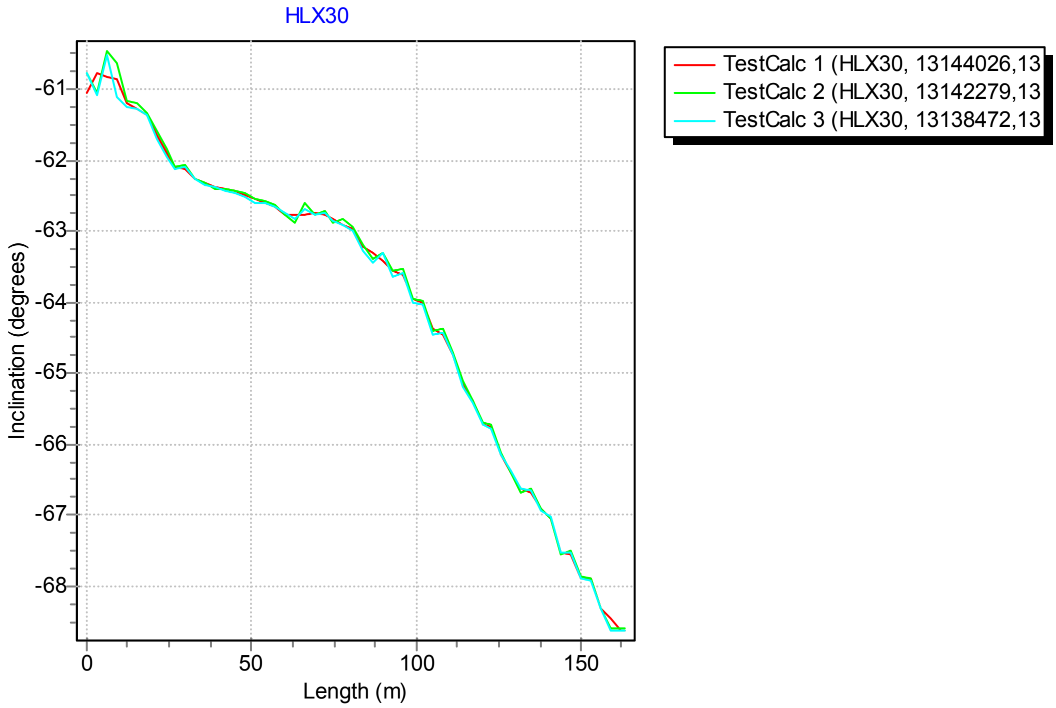
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-08-31.*

<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13144026) the two Mag/acc measurements (ID 13142279 and 13138472) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



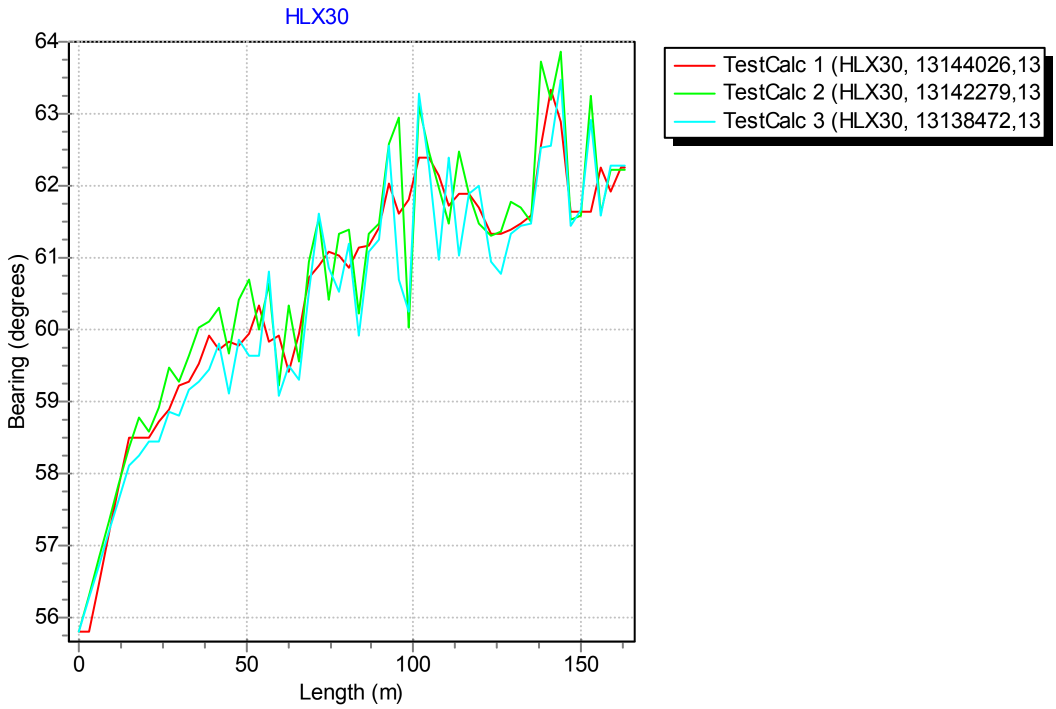


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX30.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX30	13117397	EG157	Magnetic - accelerometer measurement	2005-08-31 13:31	0.00	159.00	EF	070102 14:01
HLX30	13142279	EG157	Magnetic - accelerometer measurement	2005-08-31 14:00	0.00	159.00	CF	070102 14:15
HLX30	13080862	EG157	Magnetic - accelerometer measurement	2005-08-31 14:00	0.00	159.00	EF	060707 11:35
HLX30	13138472	EG157	Magnetic - accelerometer measurement	2005-08-31 15:00	0.00	159.00	CF	070104 15:36
HLX30	13144026	EG154	Borehole deviation multiple measurements	2007-01-04 15:30			I C	070214 08:45

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX30	13138472	BEARING	18.00	159.00	
HLX30	13138472	INCLINATION	3.00	159.00	
HLX30	13142279	BEARING	18.00	159.00	
HLX30	13142279	INCLINATION	3.00	159.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

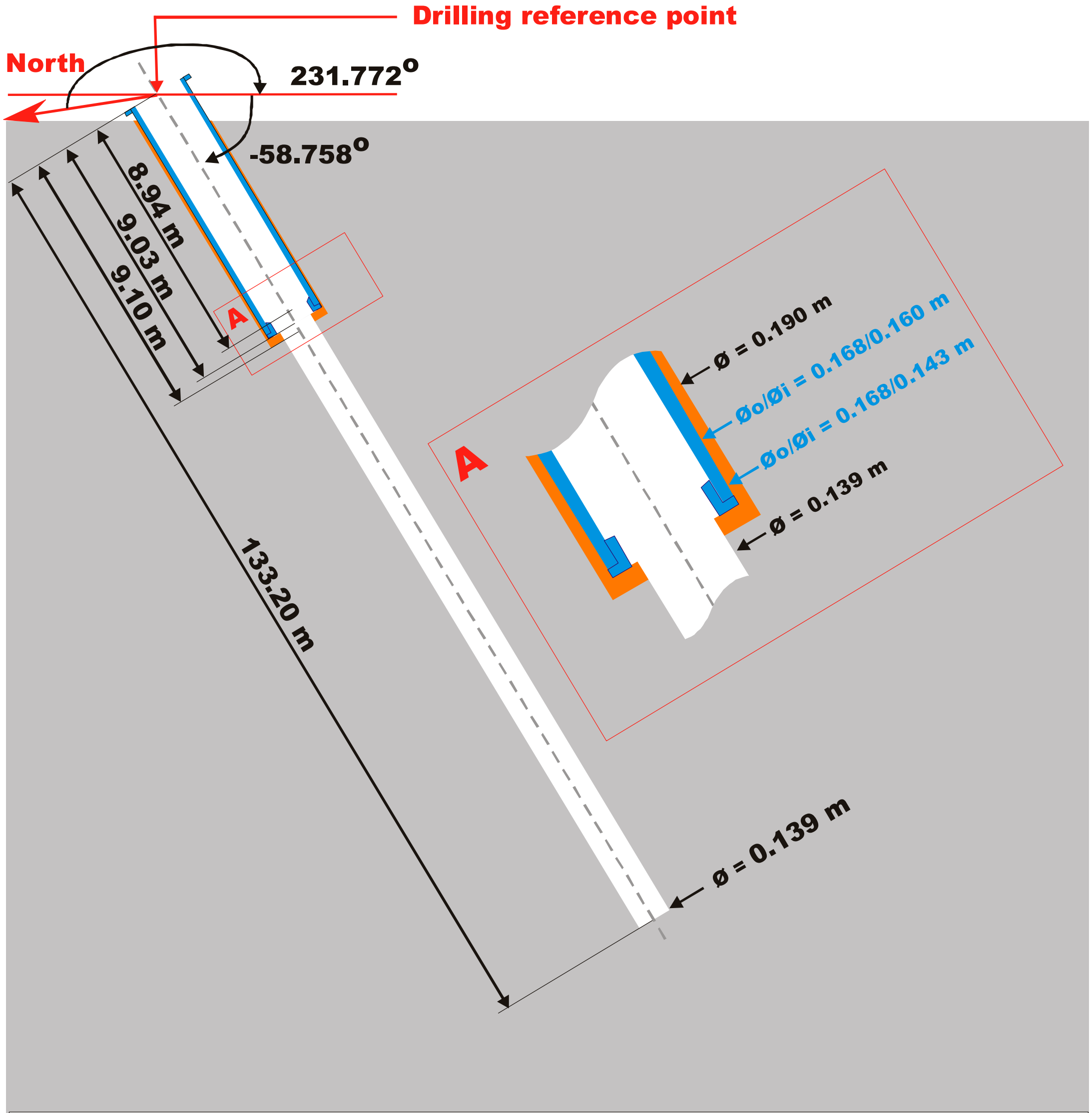
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX30	6366730.73	1548026.73	12.18	0.00	0.00	-61.04	55.82	0.1	0.9	0.00
HLX30	6366739.83	1548041.30	-19.45	36.00	0.04	-62.33	59.55	0.1	0.9	0.28
HLX30	6366745.38	1548050.89	-40.74	60.00	0.07	-62.75	59.94	0.1	0.9	0.46
HLX30	6366750.11	1548059.24	-59.42	81.00	0.10	-62.97	60.88	0.1	0.9	0.61
HLX30	6366755.18	1548068.63	-80.91	105.00	0.12	-64.39	62.39	0.1	0.9	0.79
HLX30	6366759.34	1548076.40	-99.98	126.00	0.14	-66.14	61.33	0.1	0.9	0.93
HLX30	6366763.20	1548083.69	-119.29	147.00	0.16	-67.54	61.64	0.1	0.9	1.06
HLX30	6366766.07	1548089.07	-134.51	163.40	0.18	-68.61	62.25	0.1	0.9	1.16

Borehole description – HLX31

Technical description of borehole HLX31 is given in Figure 1.

Technical data

Borehole HLX31



Drilling reference point

Northing:	6366774.513 (m), RT90 2,5 gon V 0:-15
Easting:	1548172.268 (m), RT90 2,5 gon V 0:-15
Elevation:	12.162 (m), RHB 70

Drilling period

Drilling start date:	2004-12-01
Drilling stop date:	2004-12-03

Figure 1. *Technical description of the borehole HLX31.*

Deviation measurement in HLX31

The only deviation measurement performed in HLX31 was with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13145705) is executed between borehole lengths 14.30 – 131.20 m. The acoustic televiewer measurements (ID 13098729 and 13114648) are error marked measurements which was not median filtered. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

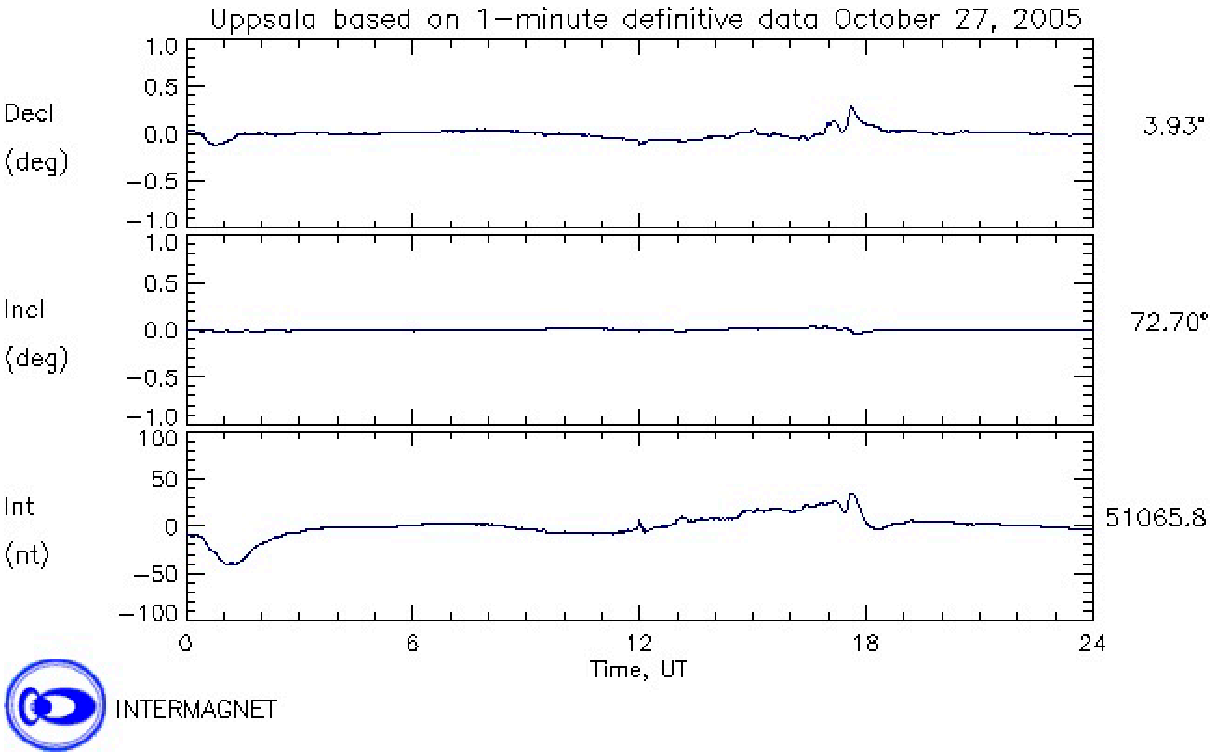


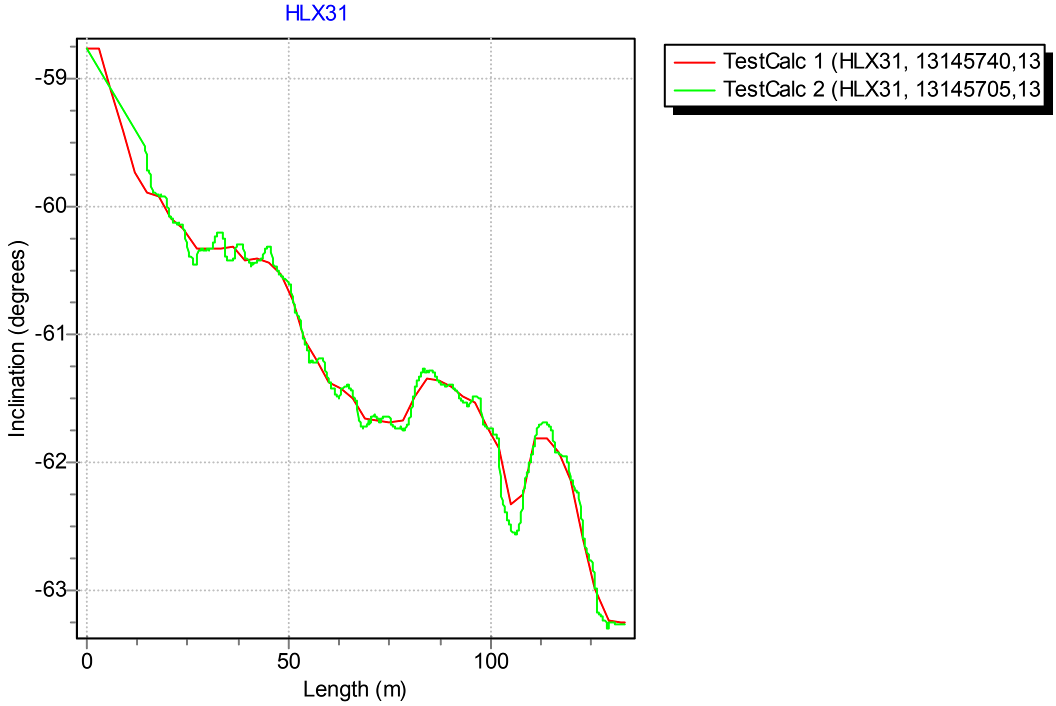
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-10-27.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145740) the acoustic televiewer measurement (ID 13145705) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activity listed in Table 1.



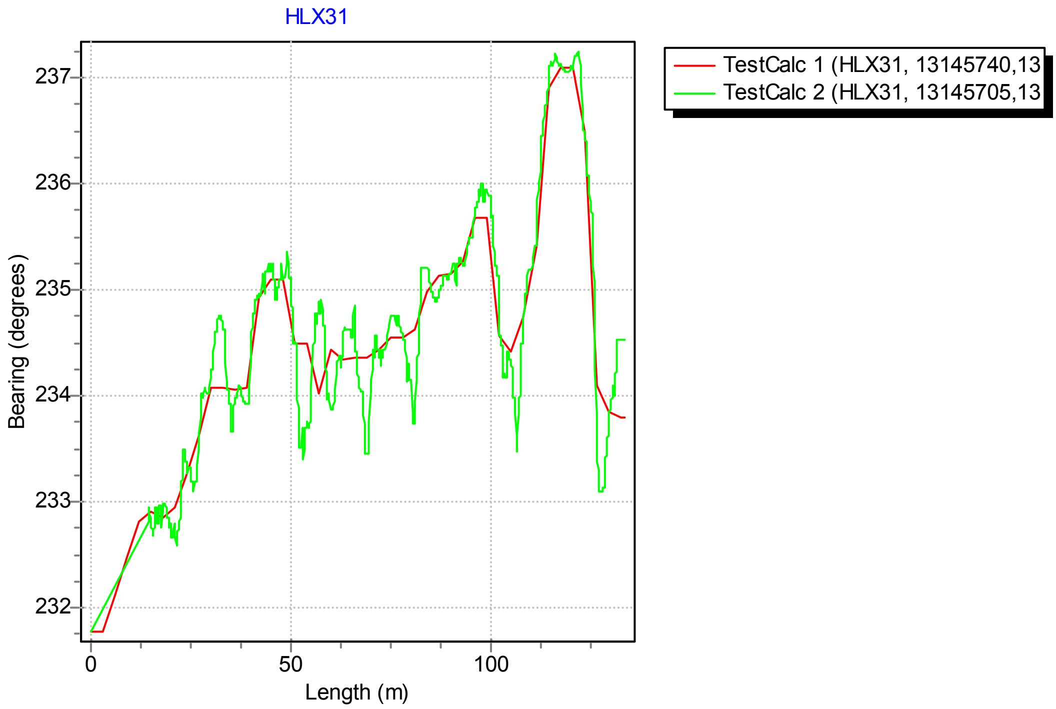


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX31.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX31	13114648	EG159	Acoustic televiewer deviation	2005-10-27 20:32	14.30	131.20	E	070214 08:11
HLX31	13145705	EG159	Acoustic televiewer deviation	2005-10-27 20:32	14.30	131.20		070125 10:57
HLX31	13145740	EG154	Borehole deviation multiple measurements	2005-10-27 20:32			I C	070202 08:19
HLX31	13098729	EG159	Acoustic televiewer deviation	2005-10-27 20:32	14.30	131.20	E	070214 08:10

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX31	13145705	BEARING	14.30	131.20	4.9
HLX31	13145705	INCLINATION	14.30	131.20	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting “Object_location” in Sicada.

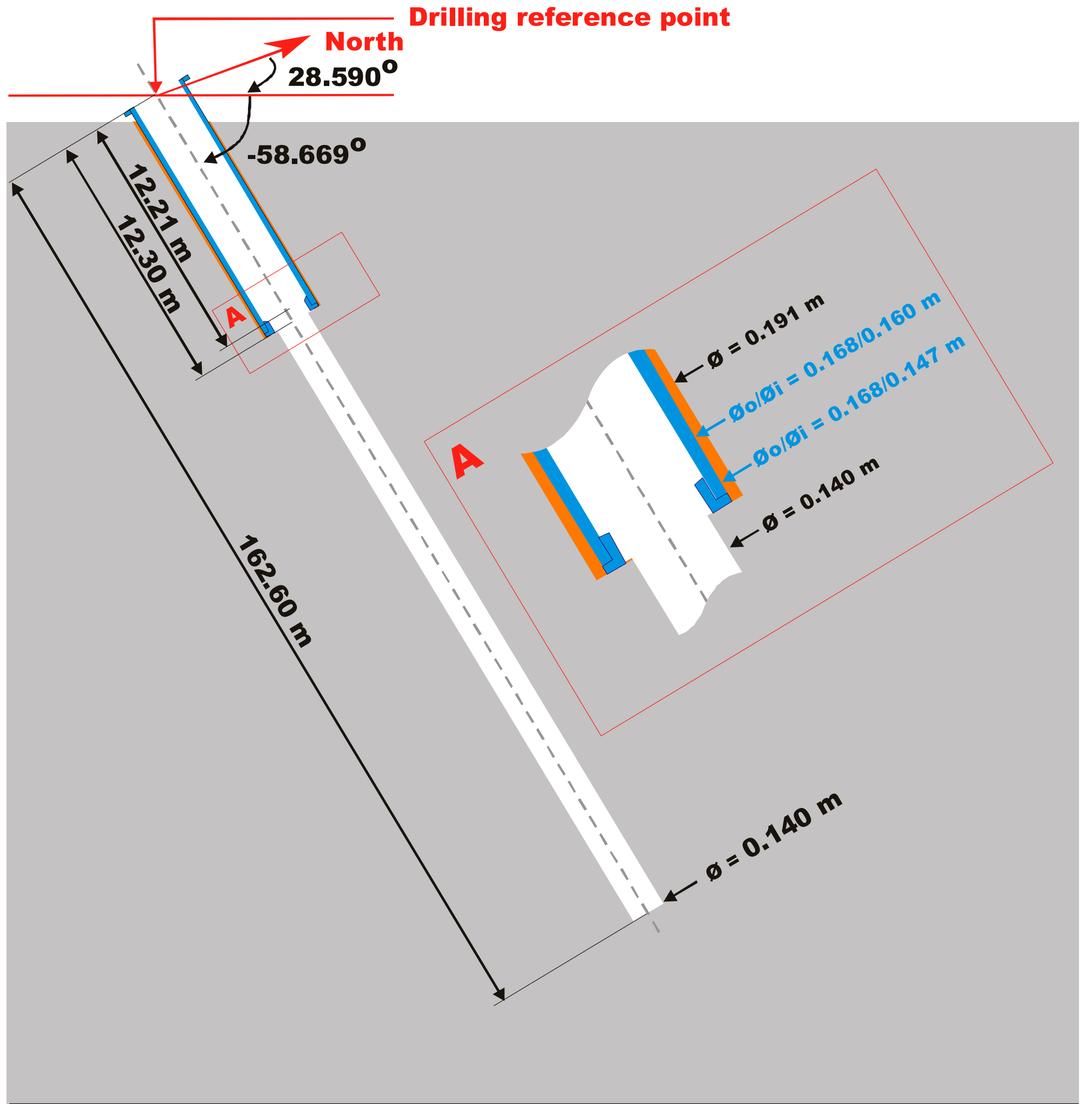
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX31	6366774.51	1548172.27	12.16	0.00	0.00	-58.76	231.77	1.8	4.9	0.00
HLX31	6366763.61	1548157.81	-18.95	36.00	0.57	-60.30	234.06	1.8	4.9	1.54
HLX31	6366756.80	1548148.24	-39.88	60.00	0.94	-61.37	234.44	1.8	4.9	2.55
HLX31	6366750.15	1548138.93	-60.98	84.00	1.30	-61.34	234.99	1.8	4.9	3.52
HLX31	6366744.45	1548130.73	-79.45	105.00	1.61	-62.32	234.41	1.8	4.9	4.37
HLX31	6366738.17	1548121.51	-100.69	129.00	1.96	-63.23	233.84	1.8	4.9	5.33
HLX31	6366737.05	1548119.98	-104.44	133.20	2.02	-63.25	233.79	1.8	4.9	5.49

Borehole description – HLX32

Technical description of borehole HLX32 is given in Figure 1.

Technical data

Borehole HLX32



Drilling reference point

Northing:	**6365725.793 (m), RT90 2,5 gon V 0:-15**
Easting:	**1546734.363 (m), RT90 2,5 gon V 0:-15**
Elevation:	**10.844 (m), RHB 70**

Drilling period

Drilling start date:	**2005-01-04**
Drilling stop date:	**2005-01-11**

Figure 1. *Technical description of the borehole HLX32.*

Deviation measurement in HLX32

The deviation measurement proceesed in HLX32 was measured with the acoustic televiewer. On the data a 31 point median filter was used to reduce oscillation in the bearing. Directly after drilling measurement with Flexit with a point spacing of 10 metres was performed (ID 13099050). This measurement was ERROR- marked. The deviation logging activities are tabulated in Sicada Activity Log, see Table 1.

The acoustic televiewer measurement (ID 13146726) is executed between borehole lengths 17.30 – 160.80 m. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date of the acoustic televiewer measurement, see Figure 2.

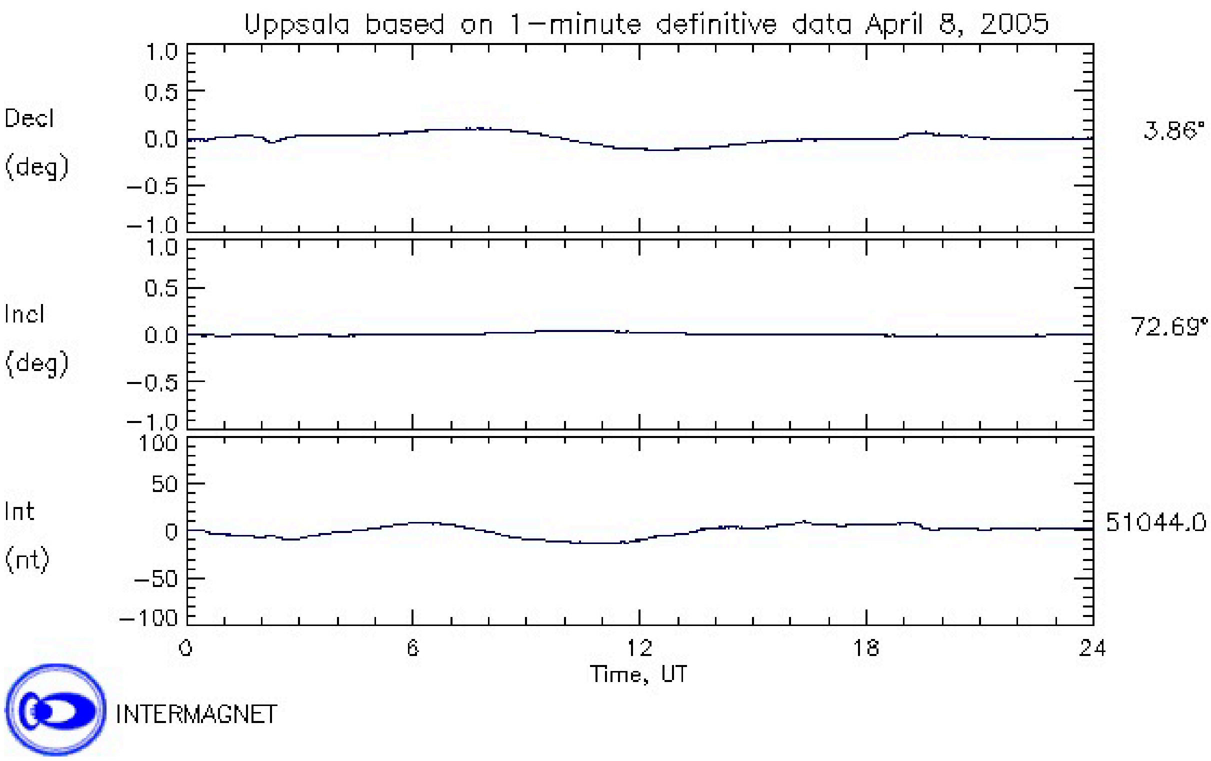


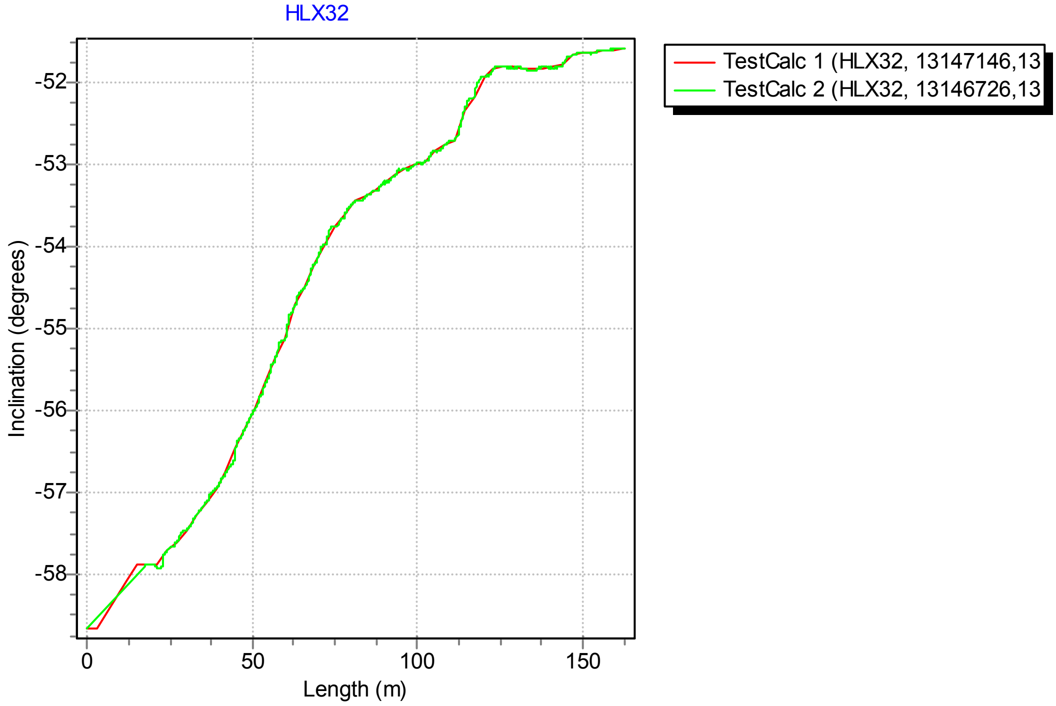
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-04-08.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13147146) the acoustic televiewer measurement (ID 13146726) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not ERROR- marked, deviation activity listed in Table 1.



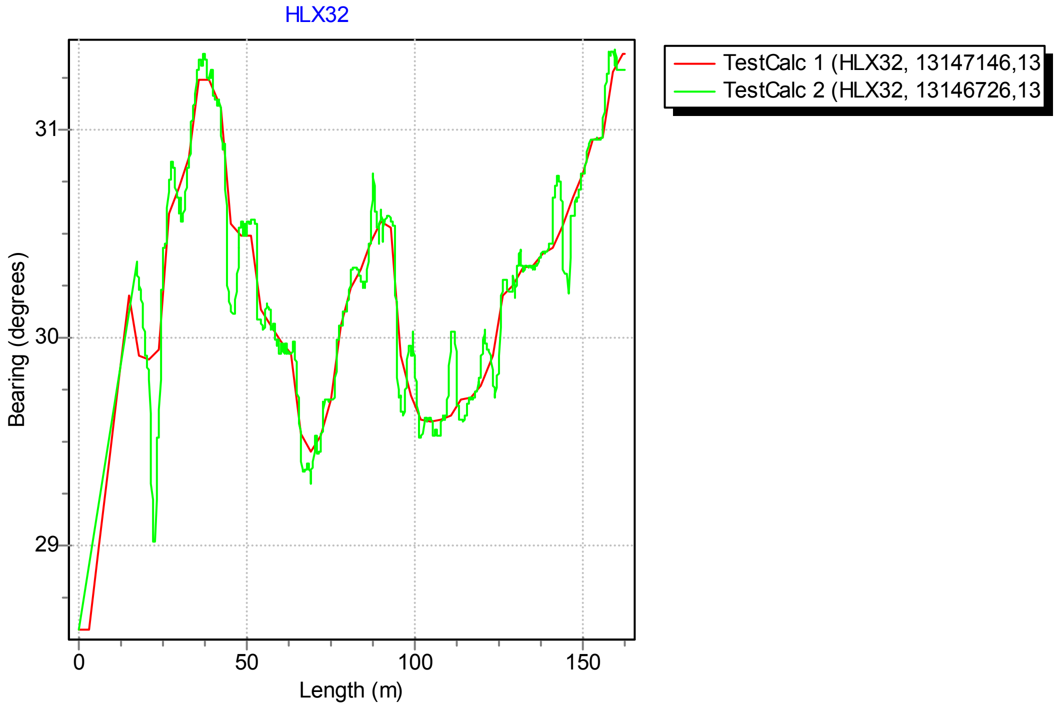


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX32.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX32	13146726	EG159	Acoustic televiewer deviation	2005-04-08 09:20	17.30	160.80		070207 12:55
HLX32	13099050	EG157	Magnetic - accelerometer measurement	2005-09-30 11:50	0.00	150.00	EF	070214 08:14
HLX32	13147146	EG154	Borehole deviation multiple measurements	2007-02-08 08:00			I C	070208 11:20

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX32	13146726	BEARING	17.30	160.80	4.9
HLX32	13146726	INCLINATION	17.30	160.80	1.8

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

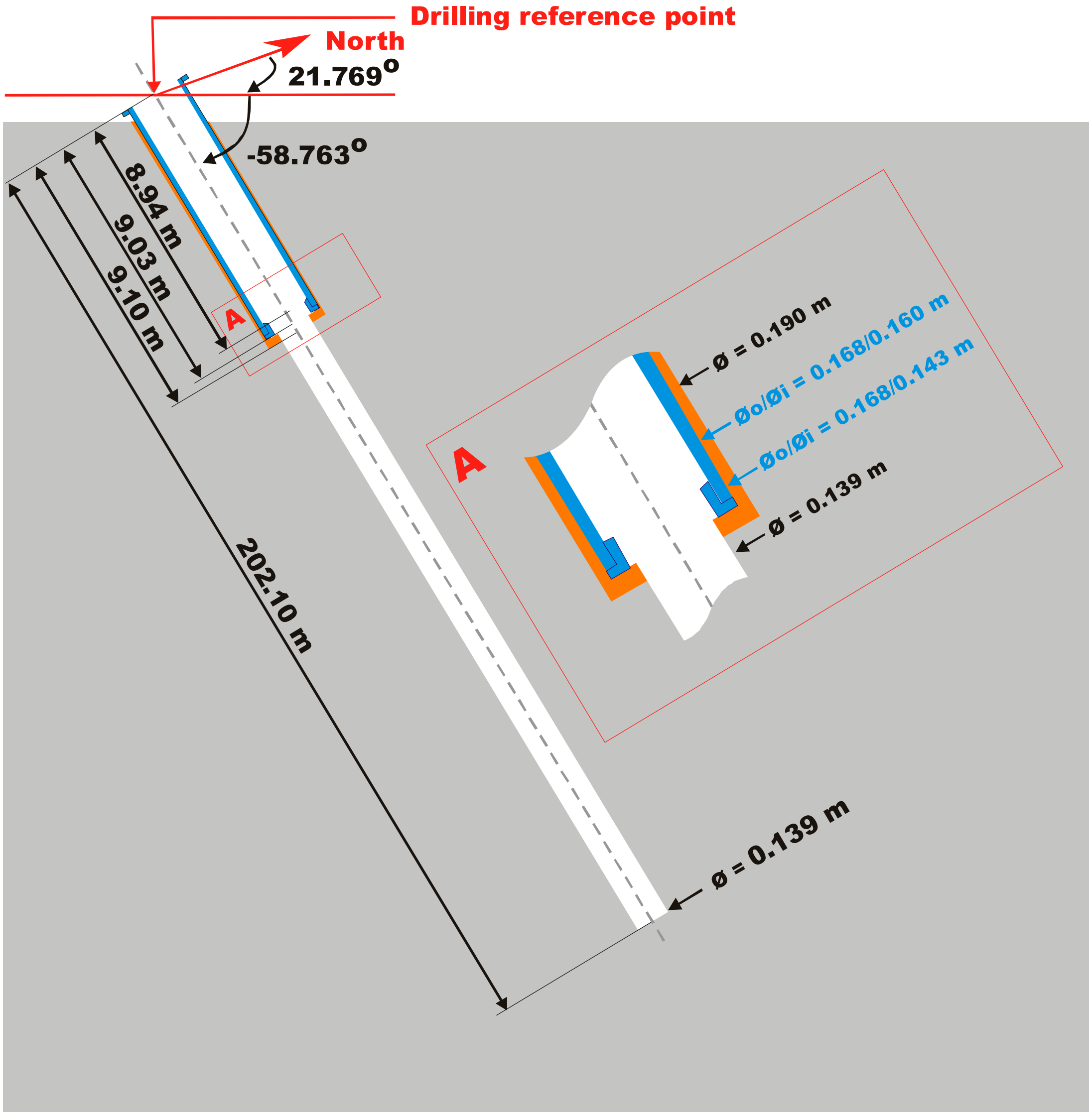
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX32	6365725.79	1546734.36	10.84	0.00	0.00	-58.67	28.59	1.8	4.9	0.00
HLX32	6365742.36	1546743.89	-19.66	36.00	0.60	-57.13	31.25	1.8	4.9	1.64
HLX32	6365753.85	1546750.69	-39.60	60.00	1.02	-55.14	29.98	1.8	4.9	2.78
HLX32	6365766.07	1546757.69	-59.04	84.00	1.47	-53.41	30.33	1.8	4.9	3.99
HLX32	6365780.13	1546765.80	-80.61	111.00	1.98	-52.71	29.62	1.8	4.9	5.37
HLX32	6365792.92	1546773.19	-99.53	135.00	2.44	-51.84	30.35	1.8	4.9	6.64
HLX32	6365807.62	1546781.94	-121.19	162.60	2.98	-51.60	31.37	1.8	4.9	8.10

Borehole description – HLX33

Technical description of borehole HLX33 is given in Figure 1.

Technical data

Borehole HLX33



Drilling reference point

Northing: 6366471.744 (m), RT90 2,5 gon V 0:-15

Easting: 1548562.705 (m), RT90 2,5 gon V 0:-15

Elevation: 12.201 (m), RHB 70

Drilling period

Drilling start date: 2004-12-17

Drilling stop date: 2004-12-20

Figure 1. *Technical description of the borehole HLX33.*

Deviation measurement in HLX33

The only deviation measurement performed in HLX33 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142281 and 13138473) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13080863 and 13117398) are error marked measurements with adjusted bearing mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

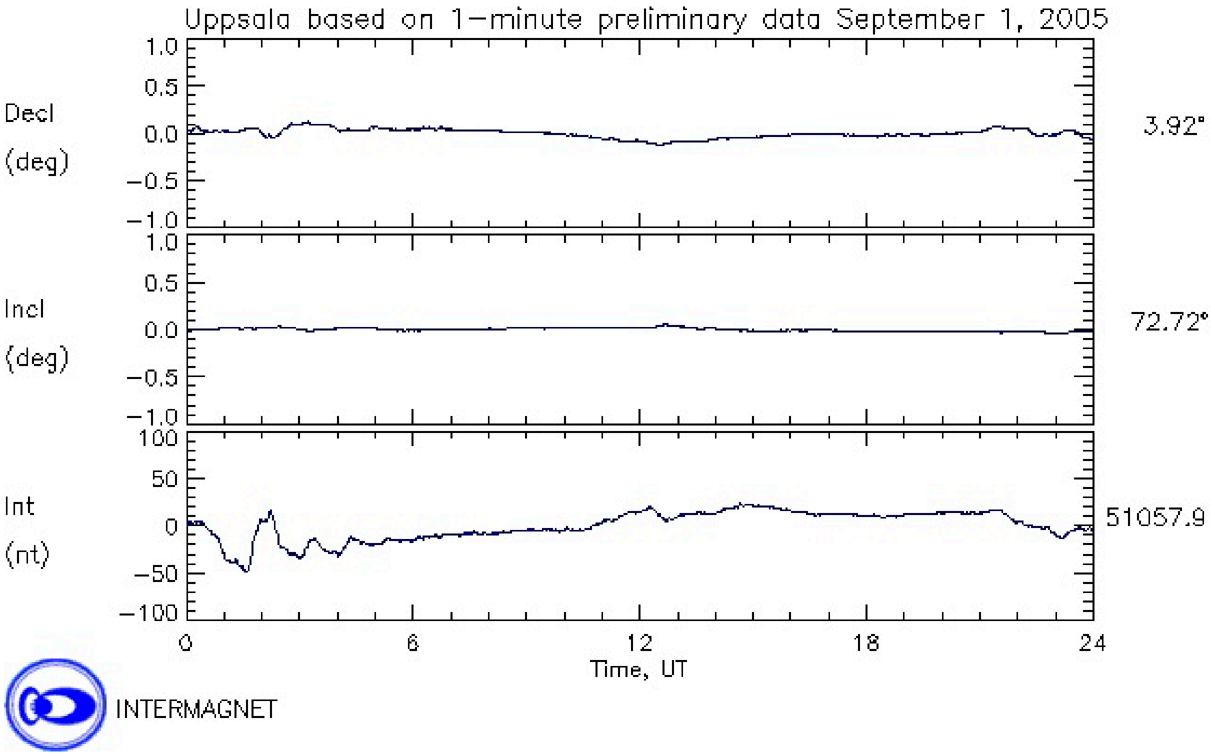


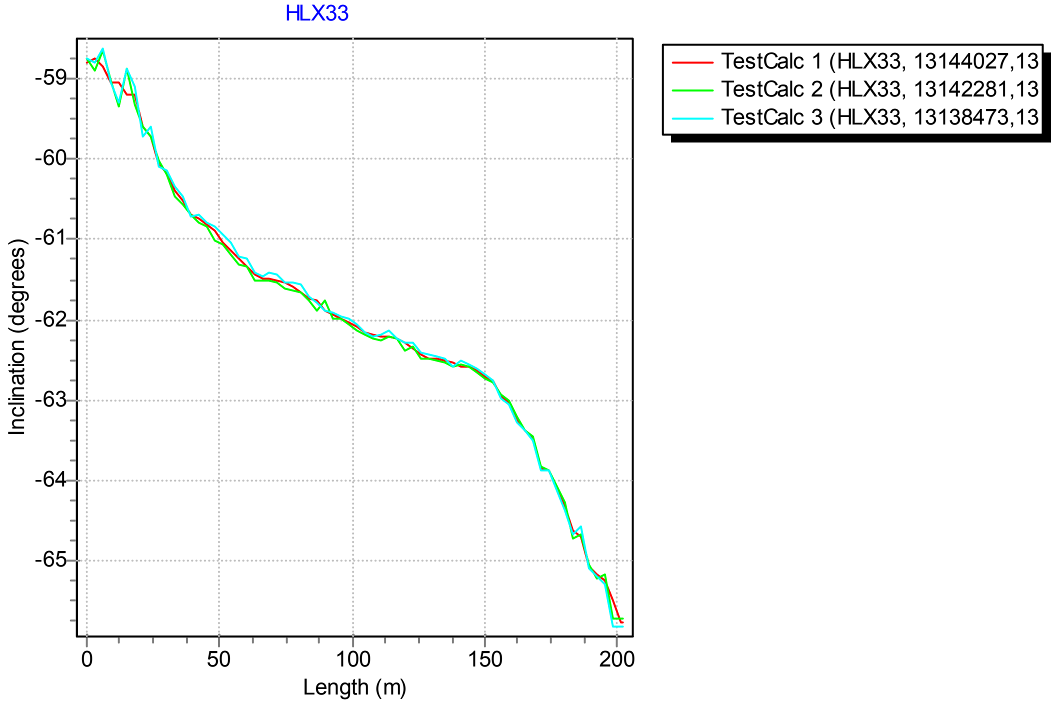
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-09-01.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144027) the two Mag/acc measurements (ID 13142281 and 13138473) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



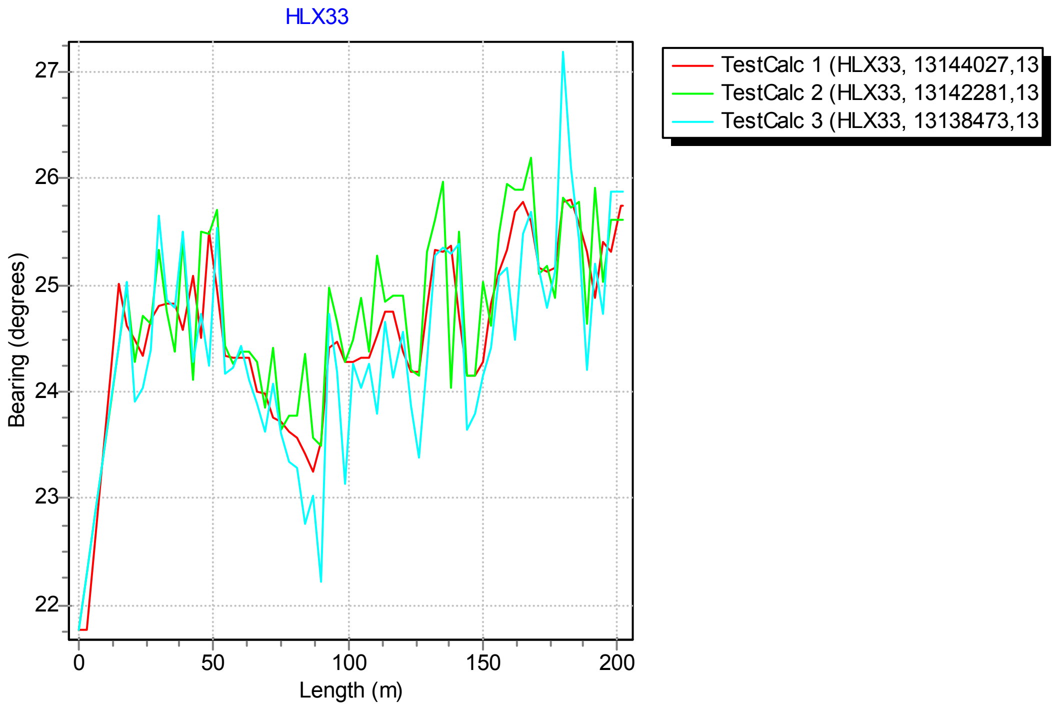


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX33.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX33	13142281	EG157	Magnetic - accelerometer measurement	2005-09-01 12:15	0.00	198.00	CF	070102 14:15
HLX33	13080863	EG157	Magnetic - accelerometer measurement	2005-09-01 12:15	0.00	198.00	EF	060707 11:42
HLX33	13117398	EG157	Magnetic - accelerometer measurement	2005-09-01 12:18	0.00	198.00	EF	070102 14:01
HLX33	13138473	EG157	Magnetic - accelerometer measurement	2005-09-01 13:00	0.00	198.00	CF	070104 15:57
HLX33	13144027	EG154	Borehole deviation multiple measurements	2007-01-04 16:00			I C	070215 16:17

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX33	13138473	BEARING	18.00	198.00	
HLX33	13138473	INCLINATION	3.00	198.00	
HLX33	13142281	BEARING	18.00	198.00	
HLX33	13142281	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

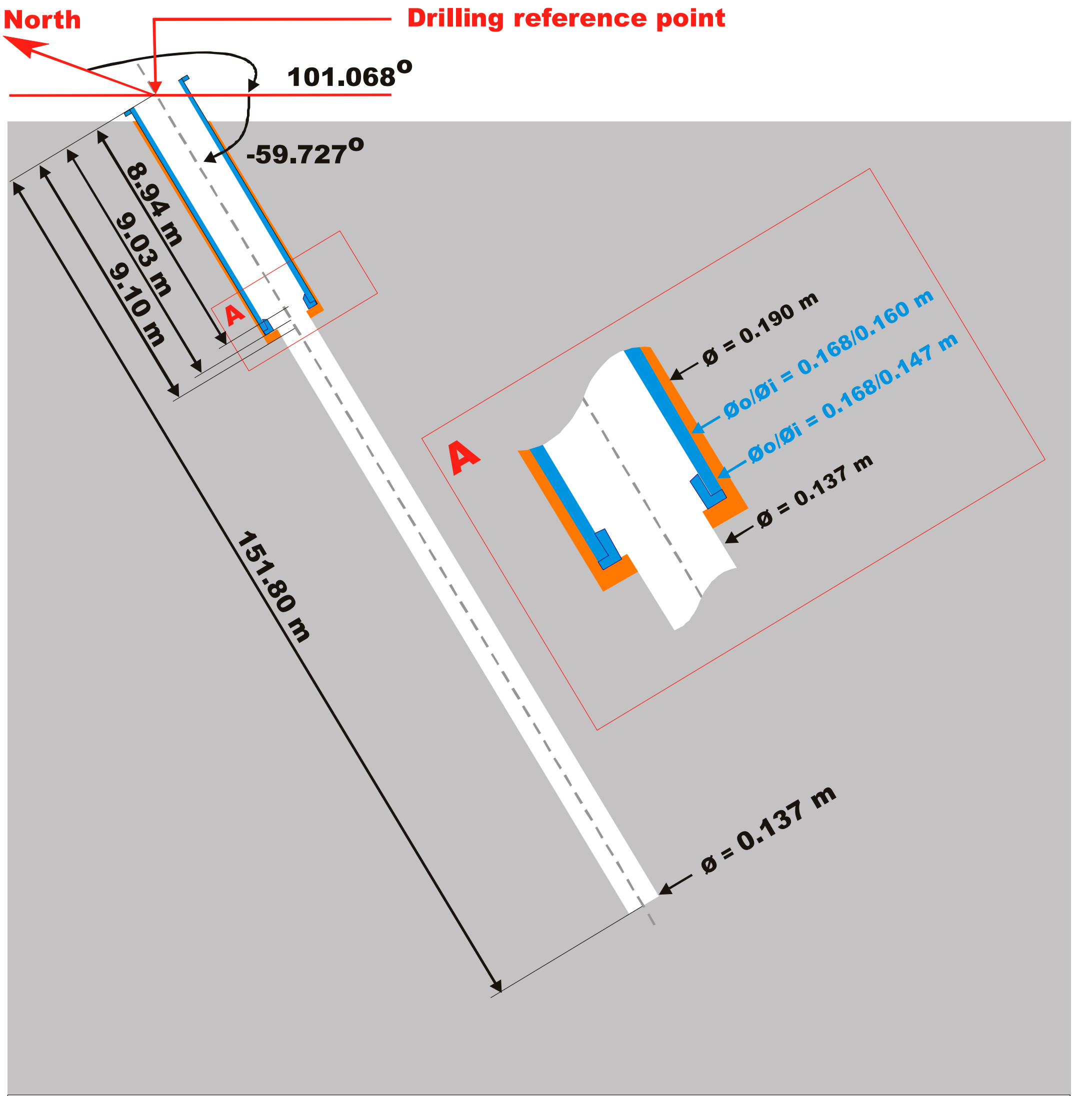
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX33	6366471.74	1548562.71	12.20	0.00	0.00	-58.81	21.77	0.1	0.8	0.00
HLX33	6366489.78	1548570.75	-21.42	39.00	0.04	-60.70	24.58	0.1	0.8	0.28
HLX33	6366499.03	1548575.01	-39.79	60.00	0.07	-61.33	24.31	0.1	0.8	0.43
HLX33	6366509.50	1548579.64	-60.88	84.00	0.09	-61.73	23.43	0.1	0.8	0.59
HLX33	6366518.52	1548583.66	-79.42	105.00	0.11	-62.17	24.33	0.1	0.8	0.74
HLX33	6366528.68	1548588.28	-100.66	129.00	0.14	-62.47	24.79	0.1	0.8	0.90
HLX33	6366537.47	1548592.34	-119.30	150.00	0.16	-62.72	24.29	0.1	0.8	1.04
HLX33	6366547.24	1548596.95	-140.73	174.00	0.18	-63.87	25.12	0.1	0.8	1.19
HLX33	6366555.36	1548600.81	-159.71	195.00	0.20	-65.25	25.41	0.1	0.8	1.32
HLX33	6366558.01	1548602.08	-166.17	202.10	0.21	-65.76	25.74	0.1	0.8	1.36

Borehole description – HLX34

Technical description of borehole HLX34 is given in Figure 1.

Technical data

Borehole HLX34



Drilling reference point

Northing: 6367355.125 (m), RT90 2,5 gon V 0:-15
Easting: 1547489.558 (m), RT90 2,5 gon V 0:-15
Elevation: 14.290 (m), RHB 70

Drilling period

Drilling start date: 2005-05-09
Drilling stop date: 2005-06-14

Figure 1. *Technical description of the borehole HLX34.*

Deviation measurement in HLX34

The only deviation measurement performed in HLX34 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142222 and 13138474) were executed down and up the borehole between the length 0 – 147.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13079714 and 13117400) are error marked measurements with adjusted bearing mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

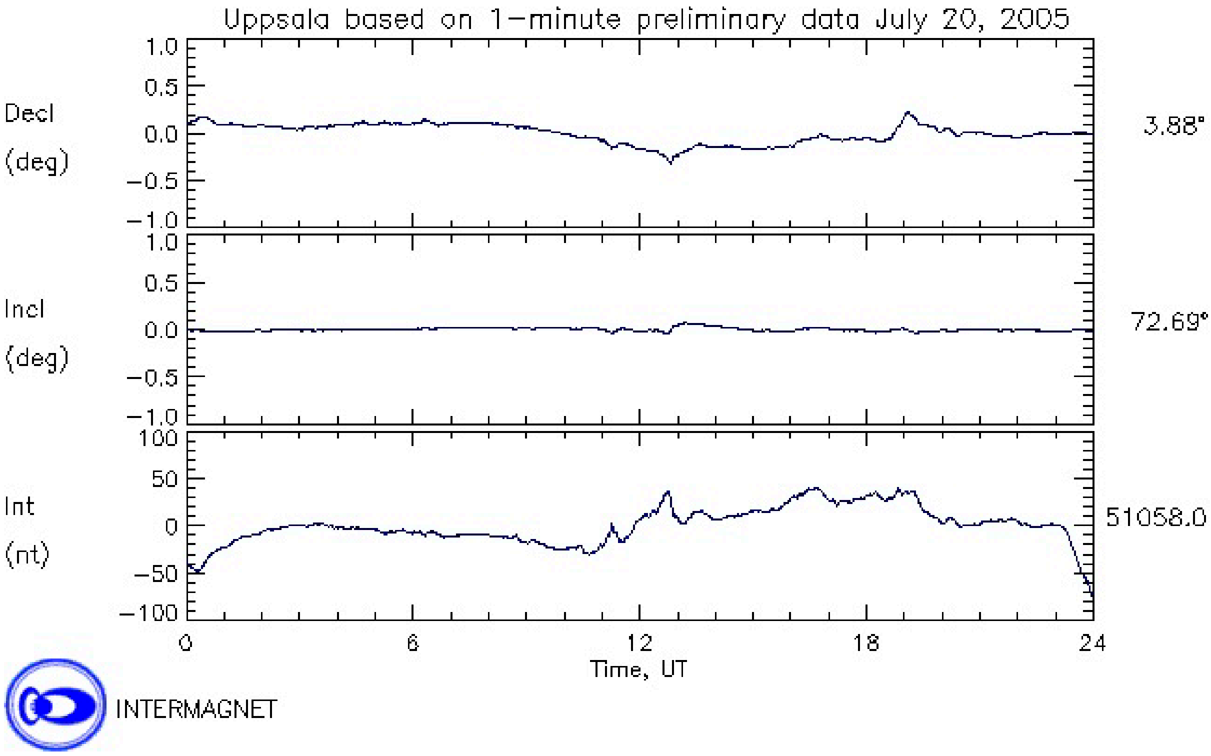


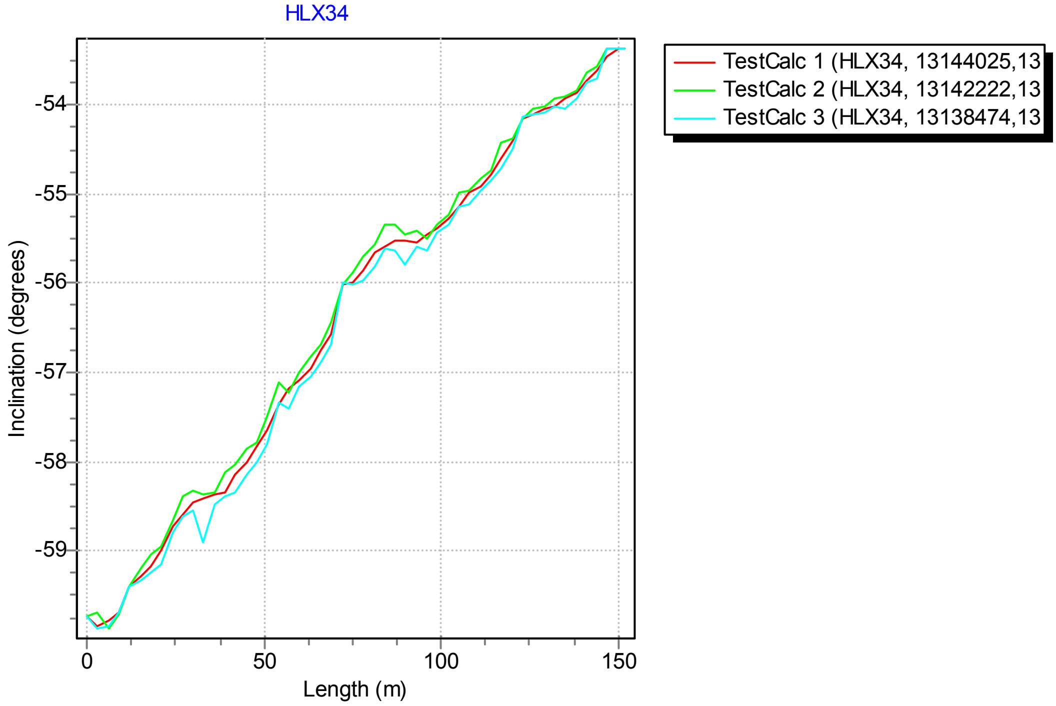
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-07-20.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144025) the two Mag/acc measurements (ID 13142222 and 13138474) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



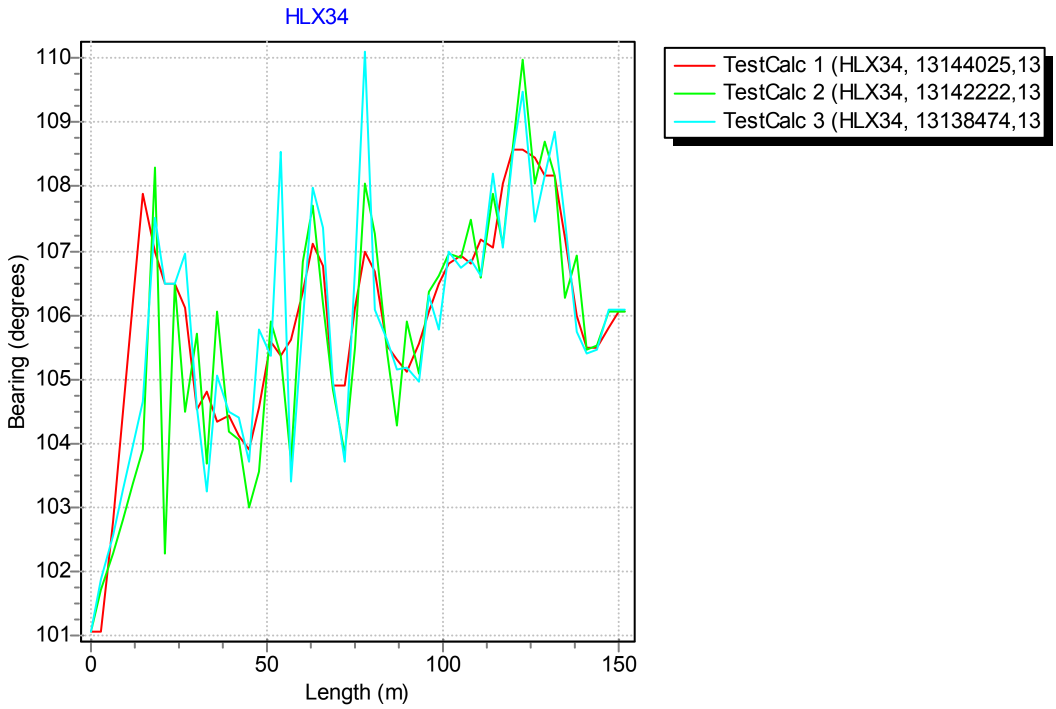


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX34.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX34	13142222	EG157	Magnetic - accelerometer measurement	2005-07-20 15:30	0.00	147.00	CF	070102 14:13
HLX34	13079714	EG157	Magnetic - accelerometer measurement	2005-07-20 15:30	0.00	147.00	EF	060707 11:35
HLX34	13117400	EG157	Magnetic - accelerometer measurement	2005-07-20 15:40	0.00	147.00	EF	070102 14:01
HLX34	13138474	EG157	Magnetic - accelerometer measurement	2005-07-20 16:00	0.00	147.00	CF	070104 14:23
HLX34	13144025	EG154	Borehole deviation multiple measurements	2007-01-04 15:00			I C	070215 16:17

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX34	13138474	BEARING	18.00	147.00	
HLX34	13138474	INCLINATION	3.00	147.00	
HLX34	13142222	BEARING	18.00	147.00	
HLX34	13142222	INCLINATION	3.00	147.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

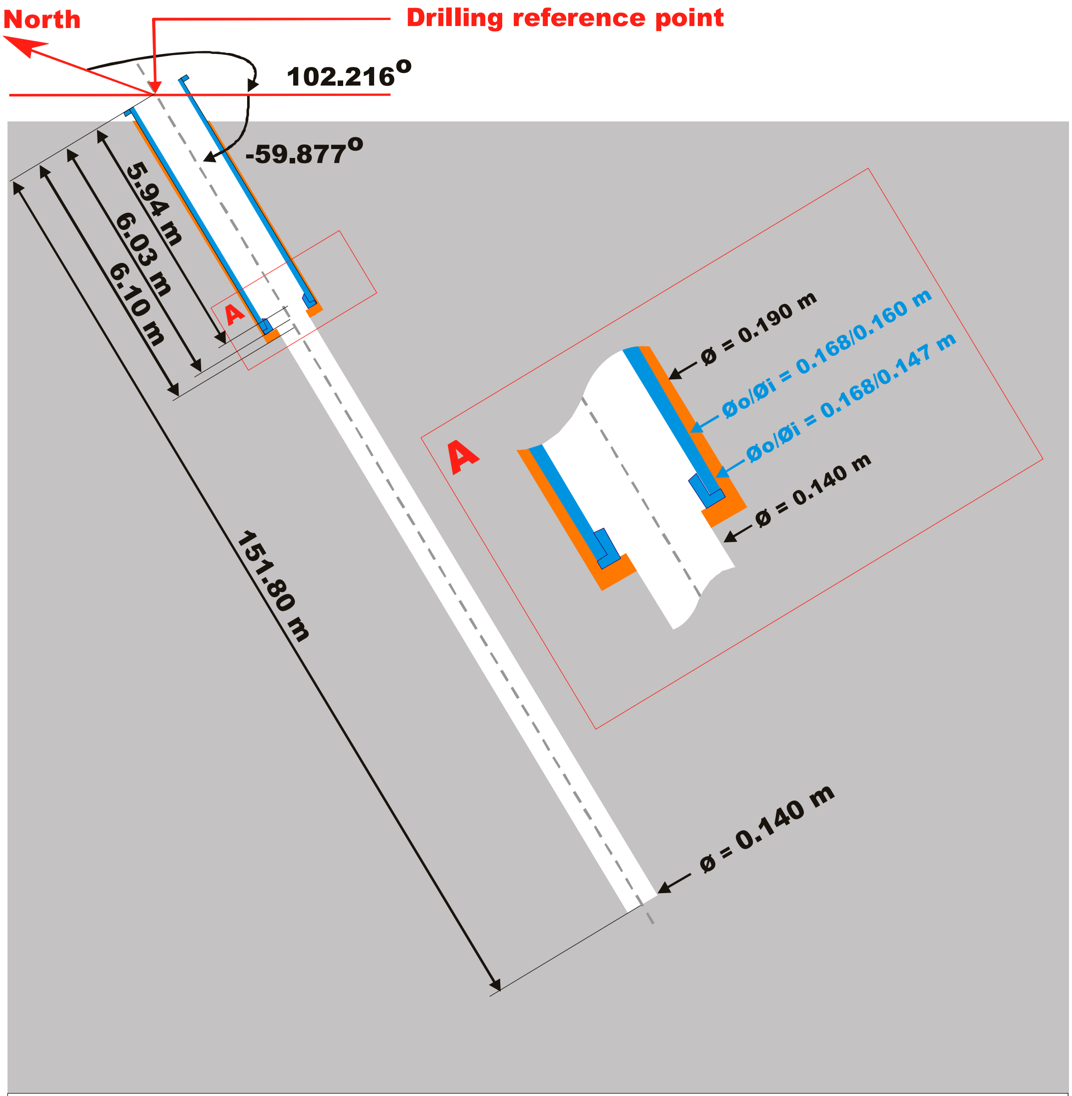
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX34	6367355.13	1547489.56	14.29	0.00	0.00	-59.73	101.07	0.2	1.7	0.00
HLX34	6367349.94	1547508.91	-19.16	39.00	0.06	-58.34	104.44	0.2	1.7	0.58
HLX34	6367346.57	1547521.32	-39.43	63.00	0.10	-56.95	107.10	0.2	1.7	0.96
HLX34	6367342.88	1547534.19	-59.34	87.00	0.14	-55.53	105.30	0.2	1.7	1.35
HLX34	6367339.06	1547547.30	-79.08	111.00	0.18	-54.91	107.18	0.2	1.7	1.74
HLX34	6367334.22	1547562.31	-100.99	138.00	0.23	-53.87	105.99	0.2	1.7	2.20
HLX34	6367332.00	1547570.19	-112.10	151.80	0.26	-53.37	106.06	0.2	1.7	2.44

Borehole description – HLX35

Technical description of borehole HLX35 is given in Figure 1.

Technical data

Borehole HLX35



Drilling reference point

Northing:	**6367194.788 (m), RT90 2,5 gon V 0:-15**
Easting:	**1547437.792 (m), RT90 2,5 gon V 0:-15**
Elevation:	**14.444 (m), RHB 70**

Drilling period

Drilling start date: 2005-05-28
Drilling stop date: 2005-06-02

Figure 1. *Technical description of the borehole HLX35.*

Deviation measurement in HLX35

The only deviation measurement performed in HLX35 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

The Mag/acc measurements (ID 13138476) was executed down the borehole between the length 0 – 147.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13117394 and 13079713) are error marked measurements with adjusted bearing mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

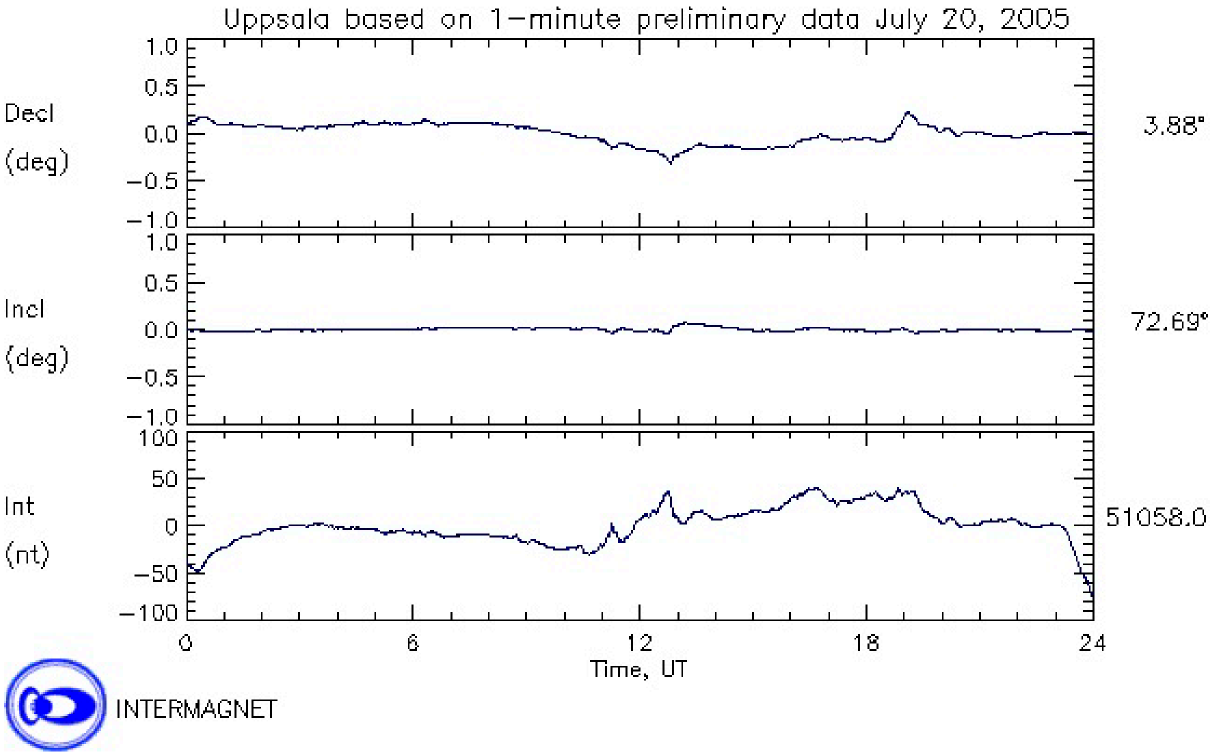


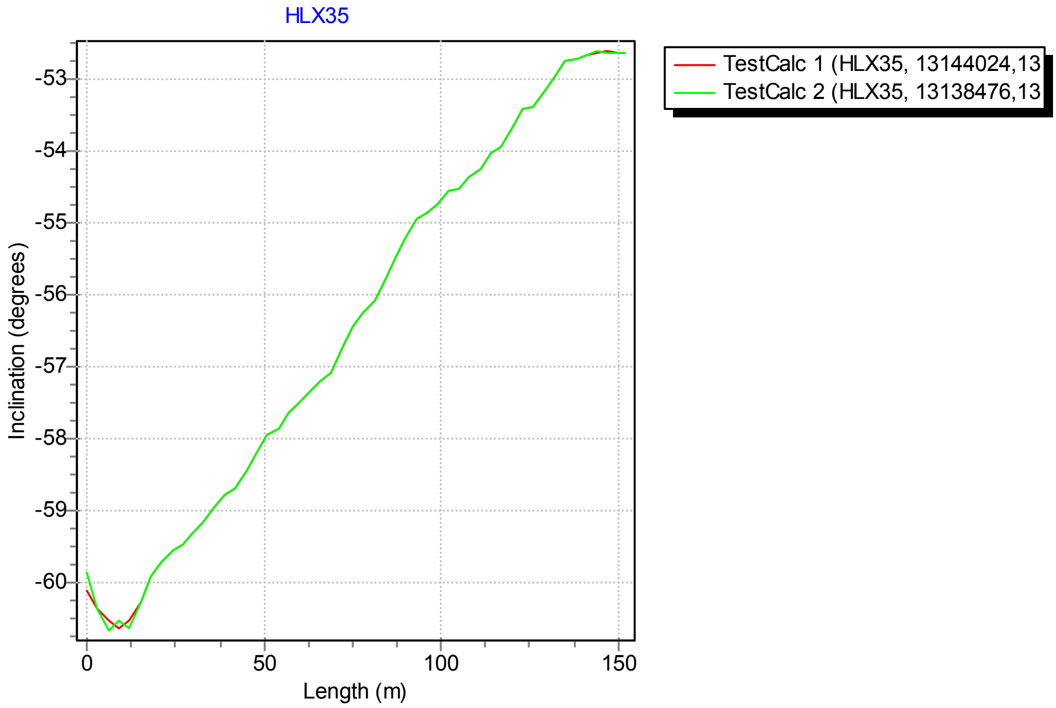
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-07-20.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144024) the Mag/acc measurement (ID 13138476) was used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. When only one measurement is used the standard values of inclination uncertainty, 1.8 and bearing uncertainty of 4.9 is used for calculation of the radius uncertainty for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



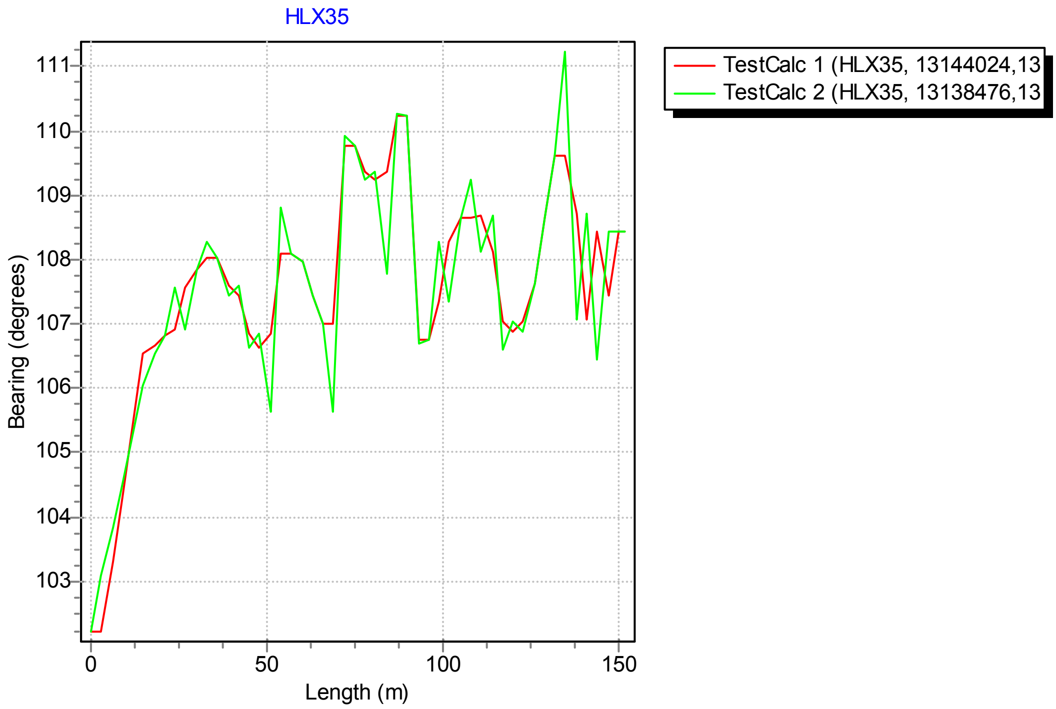


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX35.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX35	13117394	EG157	Magnetic - accelerometer measurement	2005-07-20 13:00	0.00	147.00	ECF	070214 08:20
HLX35	13138476	EG157	Magnetic - accelerometer measurement	2005-07-20 13:00	0.00	147.00	CF	070104 15:23
HLX35	13079713	EG157	Magnetic - accelerometer measurement	2005-07-20 13:00	0.00	147.00	EF	060707 11:44
HLX35	13144024	EG154	Borehole deviation multiple measurements	2007-01-04 15:30			I C	070213 11:29

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX35	13138476	BEARING	18.00	147.00	4.900
HLX35	13138476	INCLINATION	3.00	147.00	1.800

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

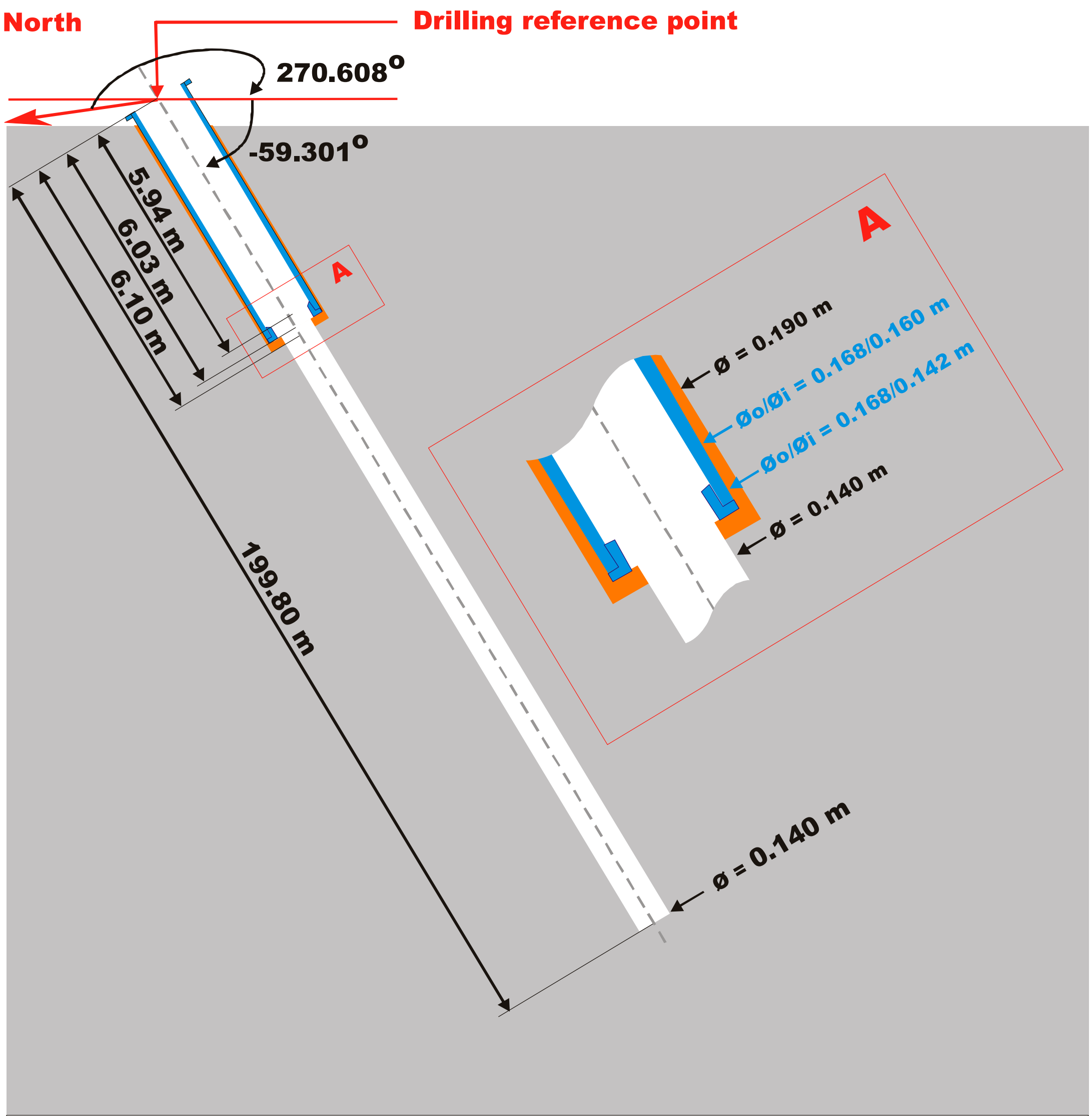
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX35	6367194.79	1547437.79	14.44	0.00	0.00	-60.13	102.22	1.8	4.9	0.00
HLX35	6367189.37	1547456.60	-19.28	39.00	0.62	-58.79	107.60	1.8	4.9	1.68
HLX35	6367185.56	1547468.72	-39.64	63.00	1.02	-57.35	107.43	1.8	4.9	2.76
HLX35	6367181.29	1547481.26	-59.65	87.00	1.43	-55.51	110.24	1.8	4.9	3.90
HLX35	6367176.95	1547494.41	-79.25	111.00	1.87	-54.23	108.68	1.8	4.9	5.08
HLX35	6367171.94	1547509.69	-100.94	138.00	2.38	-52.71	108.72	1.8	4.9	6.46
HLX35	6367169.36	1547517.66	-111.90	151.80	2.64	-52.62	108.44	1.8	4.9	7.18

Borehole description – HLX36

Technical description of borehole HLX36 is given in Figure 1.

Technical data

Borehole HLX36



Drilling reference point

Northing:	**6366172.935 (m), RT90 2,5 gon V 0:-15**
Easting:	**1546558.452 (m), RT90 2,5 gon V 0:-15**
Elevation:	**15.558 (m), RHB 70**

Drilling period

Drilling start date:	**2005-09-20**
Drilling stop date:	**2005-09-22**

Rev 2005-11-24

Figure 1. Technical description of the borehole HLX36.

Deviation measurement in HLX36

The only deviation measurement performed in HLX36 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142338 and 13138468) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13099037 and 13096410) are error marked measurements with adjusted bearing mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

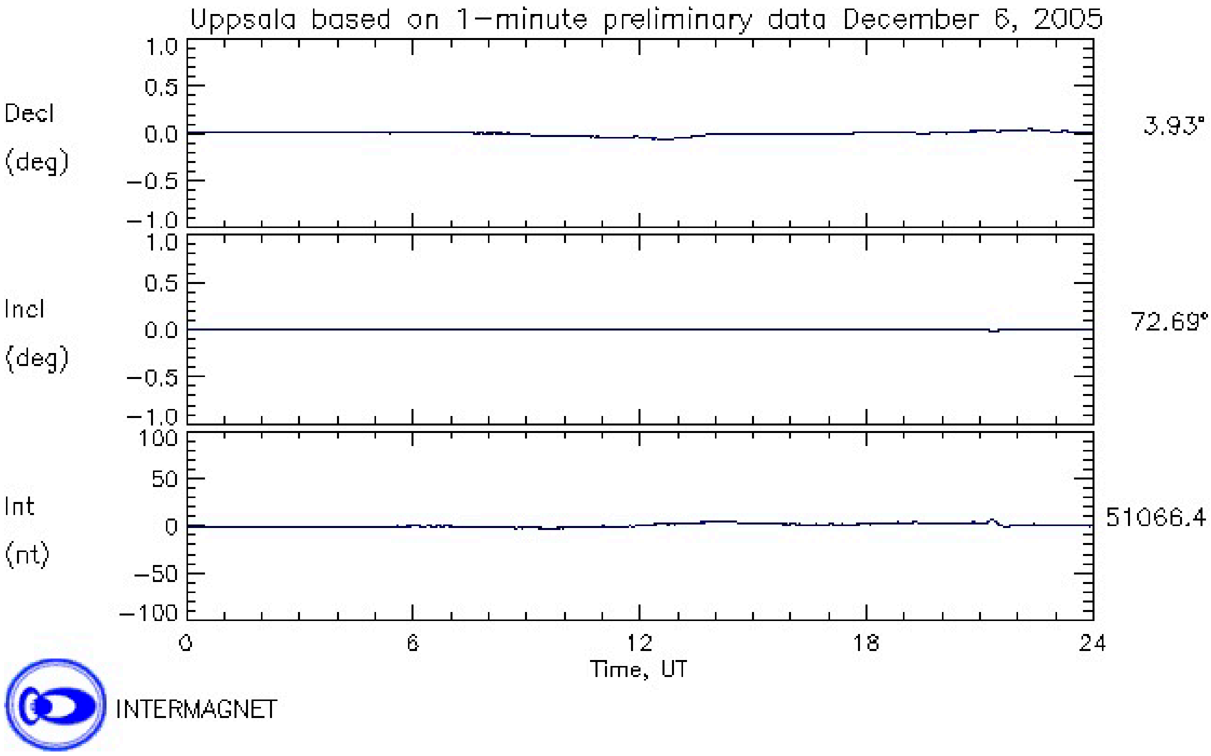


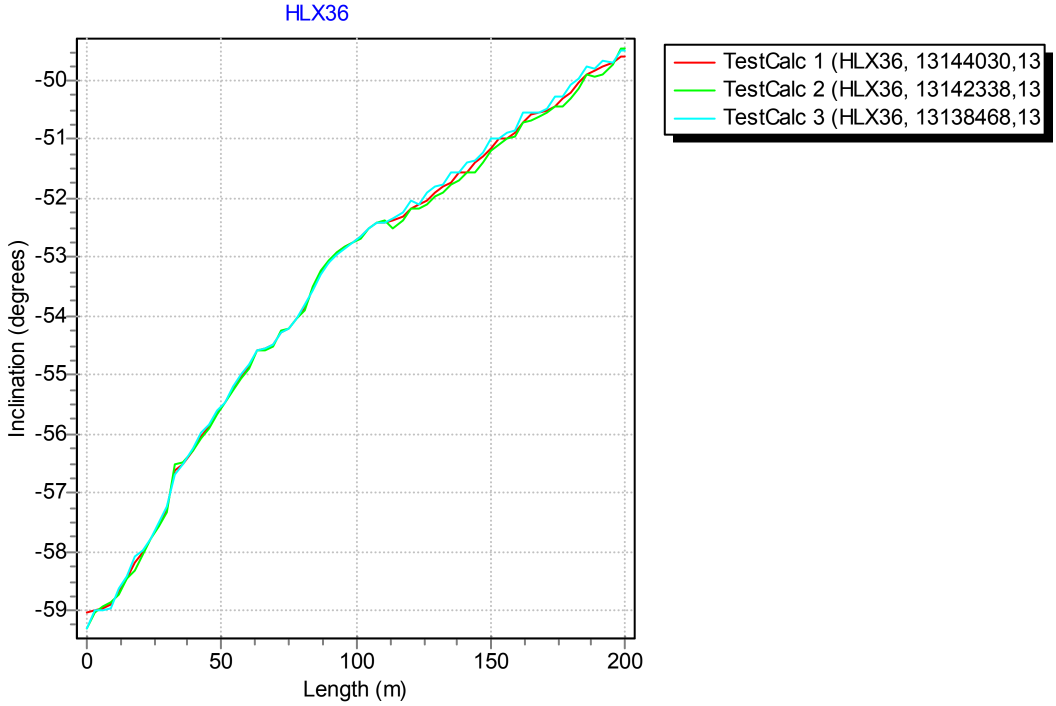
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-12-06.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144030) the two Mag/acc measurements (ID 13142338 and 13138468) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



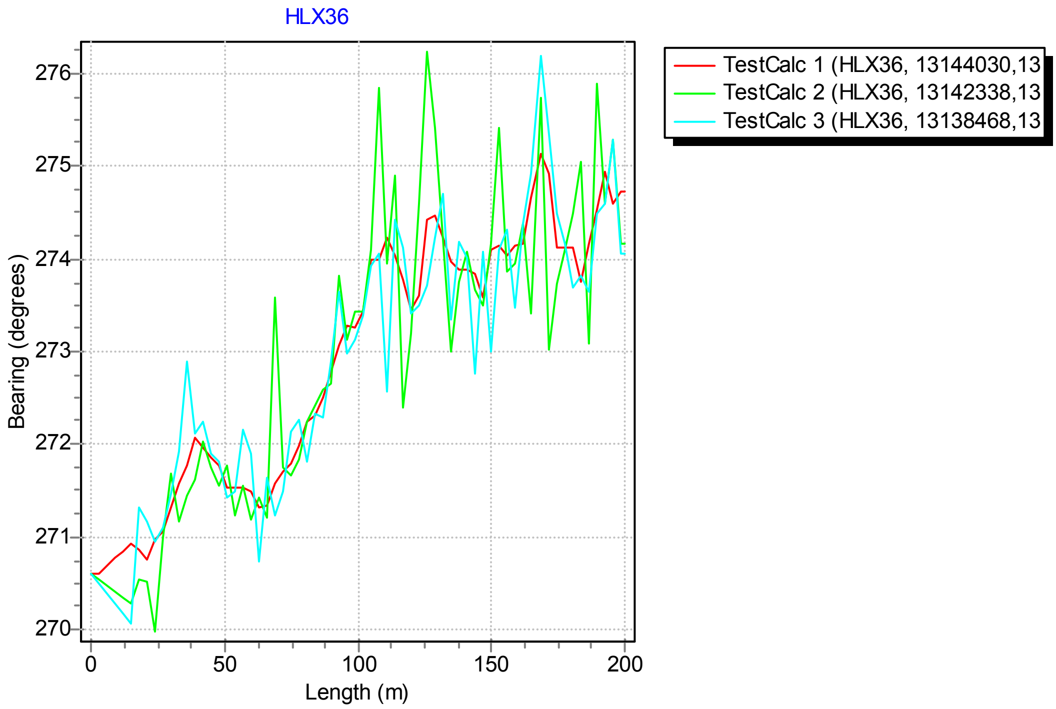


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX36.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX36	13099037	EG157	Magnetic - accelerometer measurement	2005-09-30 10:57	0.00	180.00	EF	070214 08:25
HLX36	13142338	EG157	Magnetic - accelerometer measurement	2005-12-06 18:00	0.00	198.00	CF	070102 14:16
HLX36	13096410	EG157	Magnetic - accelerometer measurement	2005-12-06 18:00	0.00	198.00	EF	070102 14:01
HLX36	13138468	EG157	Magnetic - accelerometer measurement	2005-12-06 18:45	0.00	198.00	CF	070214 08:22
HLX36	13144030	EG154	Borehole deviation multiple measurements	2007-01-04 16:30			I C	070214 08:51

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX36	13138468	BEARING	18.00	198.00	
HLX36	13138468	INCLINATION	3.00	198.00	
HLX36	13142338	BEARING	18.00	198.00	
HLX36	13142338	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

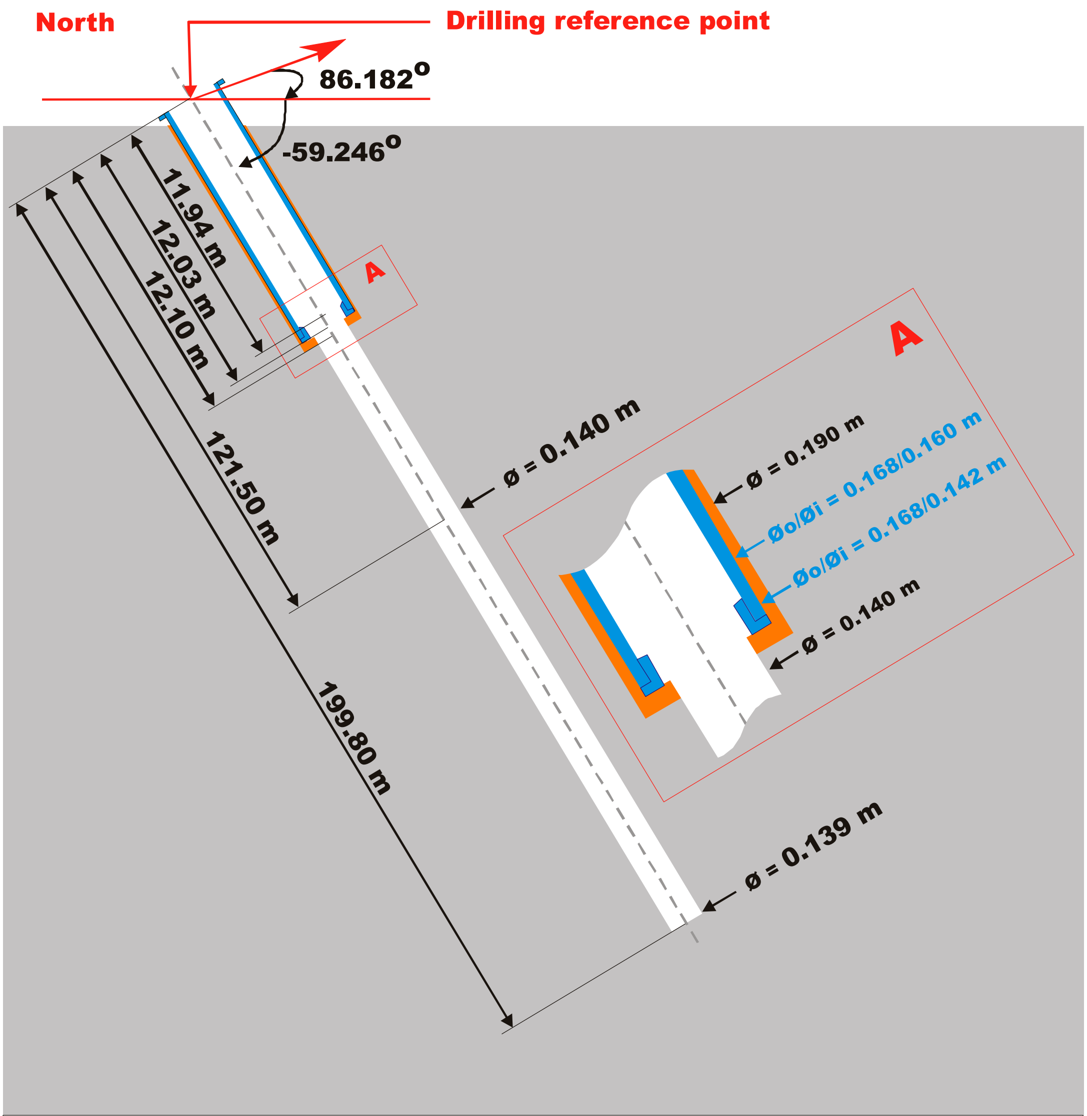
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX36	6366172.93	1546558.45	15.56	0.00	0.00	-59.02	270.61	0.1	1.1	0.00
HLX36	6366173.37	1546536.10	-19.99	42.00	0.05	-56.03	271.97	0.1	1.1	0.42
HLX36	6366173.75	1546522.42	-39.71	66.00	0.09	-54.56	271.33	0.1	1.1	0.67
HLX36	6366174.25	1546508.31	-59.11	90.00	0.12	-53.09	272.78	0.1	1.1	0.93
HLX36	6366175.29	1546491.95	-80.56	117.00	0.16	-52.30	273.77	0.1	1.1	1.24
HLX36	6366176.31	1546477.18	-99.45	141.00	0.19	-51.56	273.88	0.1	1.1	1.51
HLX36	6366177.54	1546460.23	-120.43	168.00	0.23	-50.54	275.14	0.1	1.1	1.83
HLX36	6366178.87	1546442.97	-141.15	195.00	0.27	-49.69	274.61	0.1	1.1	2.15
HLX36	6366179.12	1546439.87	-144.81	199.80	0.28	-49.59	274.74	0.1	1.1	2.21

Borehole description – HLX37

Technical description of borehole HLX37 is given in Figure 1.

Technical data

Borehole HLX37



Drilling reference point

Northing:	**6366183.660 (m), RT90 2,5 gon V 0:-15**
Easting:	**1546406.214 (m), RT90 2,5 gon V 0:-15**
Elevation:	**15.188 (m), RHB 70**

Drilling period

Drilling start date:	**2005-09-26**
Drilling stop date:	**2005-09-28**

Rev 2005-11-24

Figure 1. *Technical description of the borehole HLX37.*

Deviation measurement in HLX37

The only deviation measurement performed in HLX37 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142339 and 13138469) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurements (ID 13117395 and 13096407) are error marked measurements with adjusted bearing mainly in the first parts of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

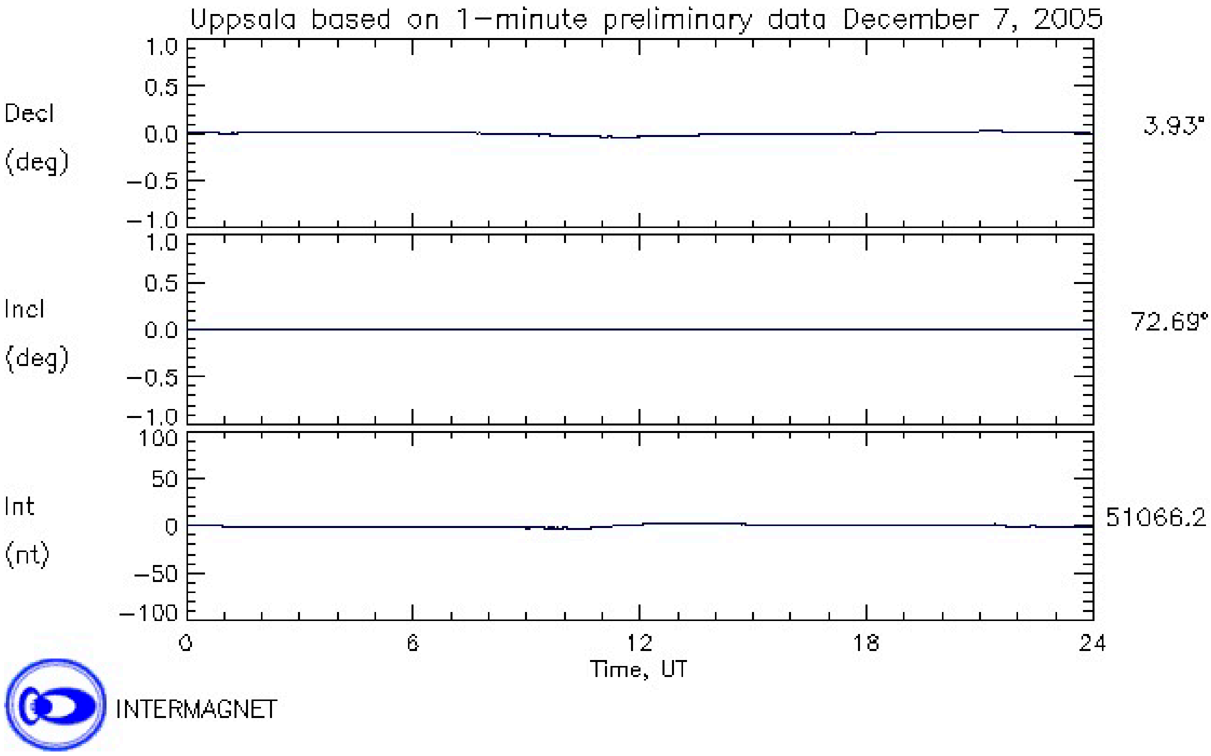


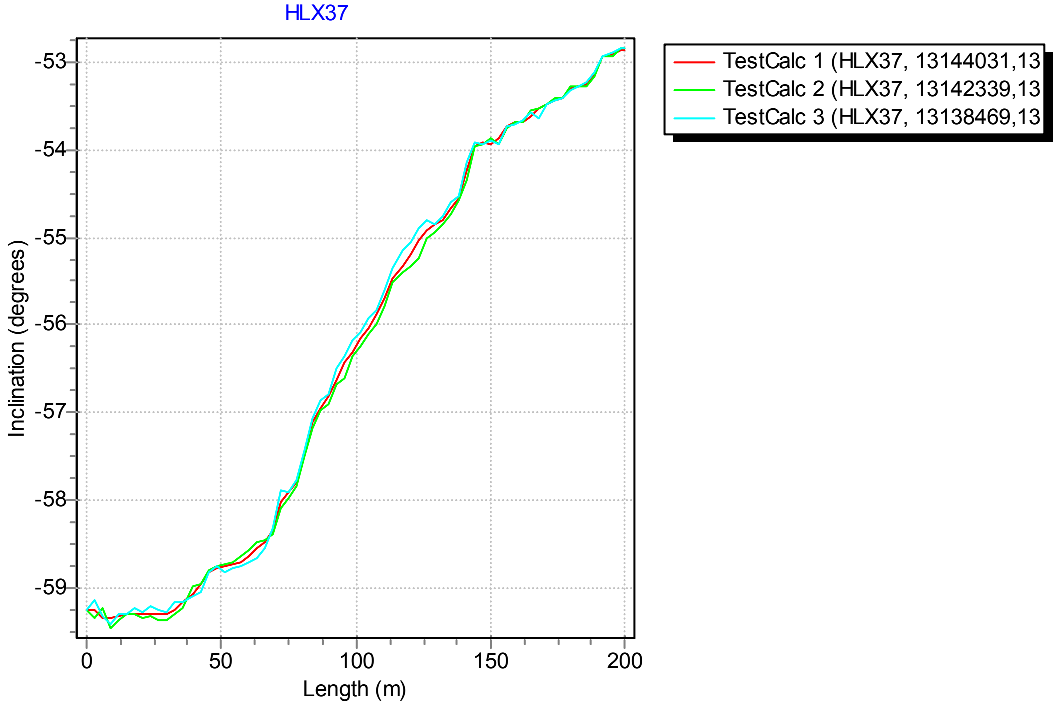
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2005-12-07.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144031) the two Mag/acc measurements (ID 13142339 and 13138469) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



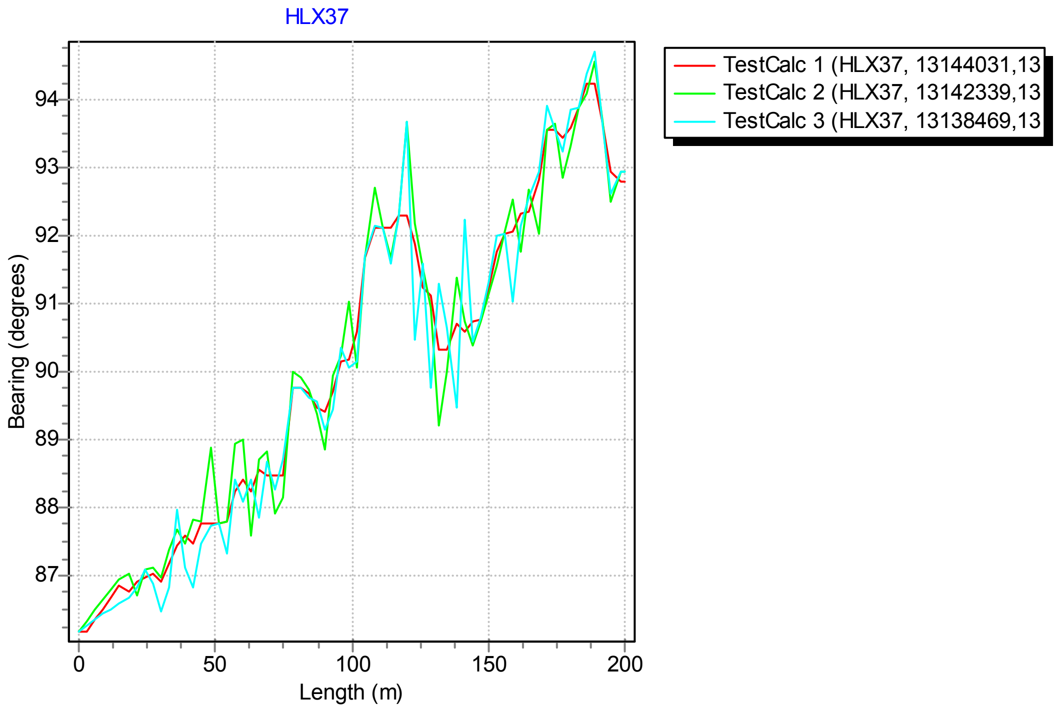


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX37.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX37	13117395	EG157	Magnetic - accelerometer measurement	2005-09-30 09:20	0.00	180.00	EF	070102 14:01
HLX37	13142339	EG157	Magnetic - accelerometer measurement	2005-12-07 13:40	0.00	198.00	CF	070102 14:16
HLX37	13096407	EG157	Magnetic - accelerometer measurement	2005-12-07 13:40	0.00	198.00	EF	060707 11:43
HLX37	13138469	EG157	Magnetic - accelerometer measurement	2005-12-07 14:40	0.00	198.00	CF	070214 08:54
HLX37	13144031	EG154	Borehole deviation multiple measurements	2007-01-04 16:45			I C	070214 08:54

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX37	13138469	BEARING	18.00	198.00	
HLX37	13138469	INCLINATION	3.00	198.00	
HLX37	13142339	BEARING	18.00	198.00	
HLX37	13142339	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

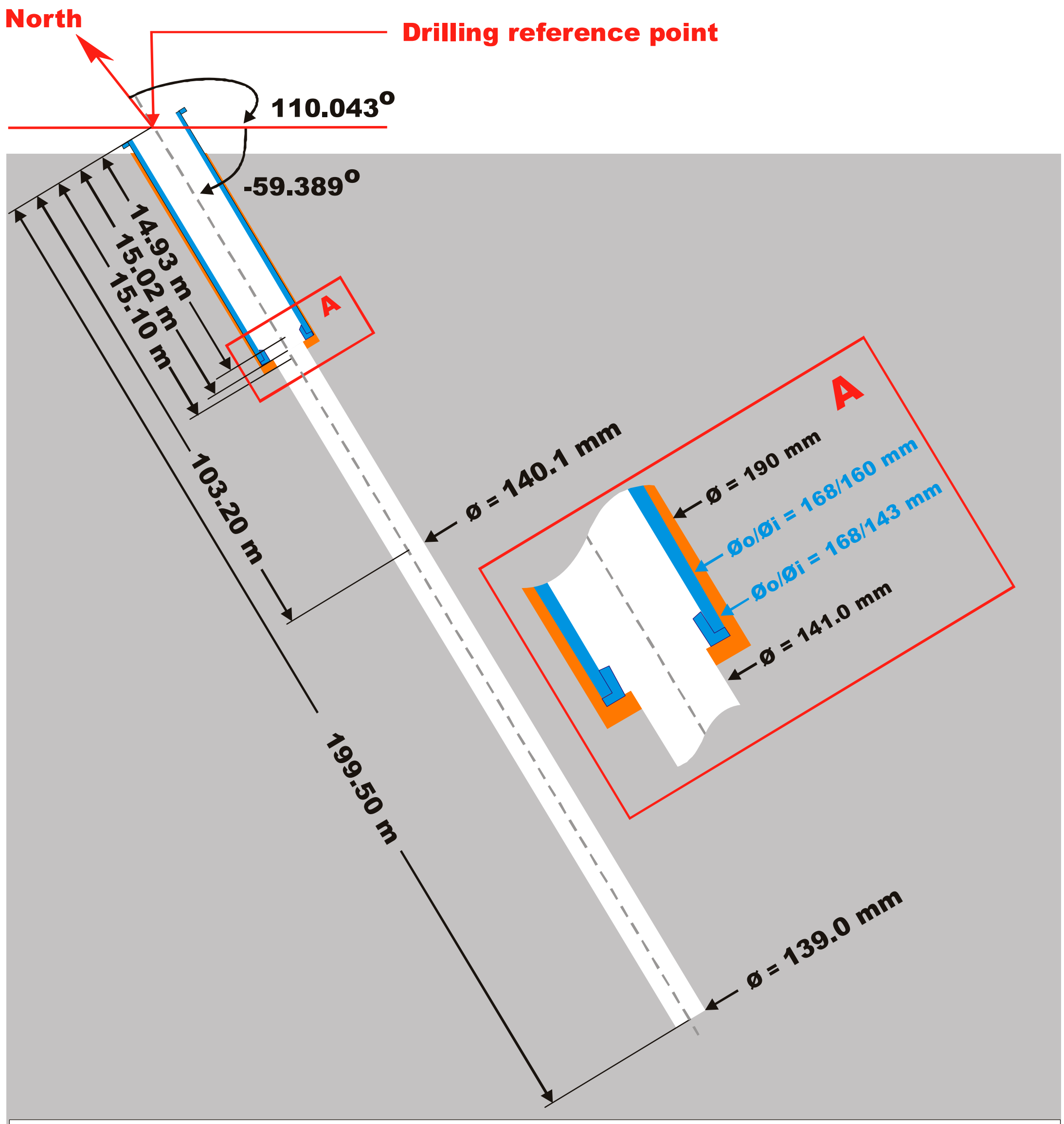
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX37	6366183.66	1546406.21	15.19	0.00	0.00	-59.25	86.18	0.1	0.7	0.00
HLX37	6366184.83	1546427.65	-20.91	42.00	0.04	-58.97	87.49	0.1	0.7	0.26
HLX37	6366185.22	1546438.54	-38.86	63.00	0.06	-58.56	88.25	0.1	0.7	0.39
HLX37	6366185.44	1546451.30	-59.18	87.00	0.09	-56.94	89.47	0.1	0.7	0.55
HLX37	6366185.30	1546464.61	-79.15	111.00	0.12	-55.70	92.11	0.1	0.7	0.71
HLX37	6366184.93	1546478.34	-98.84	135.00	0.14	-54.66	90.32	0.1	0.7	0.88
HLX37	6366184.58	1546494.20	-120.68	162.00	0.17	-53.67	92.34	0.1	0.7	1.07
HLX37	6366183.75	1546508.47	-139.96	186.00	0.20	-53.25	94.24	0.1	0.7	1.25
HLX37	6366183.25	1546516.76	-150.98	199.80	0.22	-52.87	92.78	0.1	0.7	1.35

Borehole description – HLX38

Technical description of borehole HLX38 is given in Figure 1.

Technical data

Borehole HLX38



Drilling reference point

Northing:	**6365868.861 (m), RT90 2,5 gon V**
Easting:	**1547146.084 (m), RT90 2,5 gon V**
Elevation:	**11.530 (m), RHB 70**

Drilling period

Drilling start date:	**2006-04-10**
Drilling stop date:	**2006-04-24**

Rev 2006-12-21

Figure 1. *Technical description of the borehole HLX38.*

Deviation measurement in HLX38

The only deviation measurement performed in HLX38 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142350 and 13138441) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurement (ID 13115950) is error marked measurement with adjusted bearing mainly in the first part of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

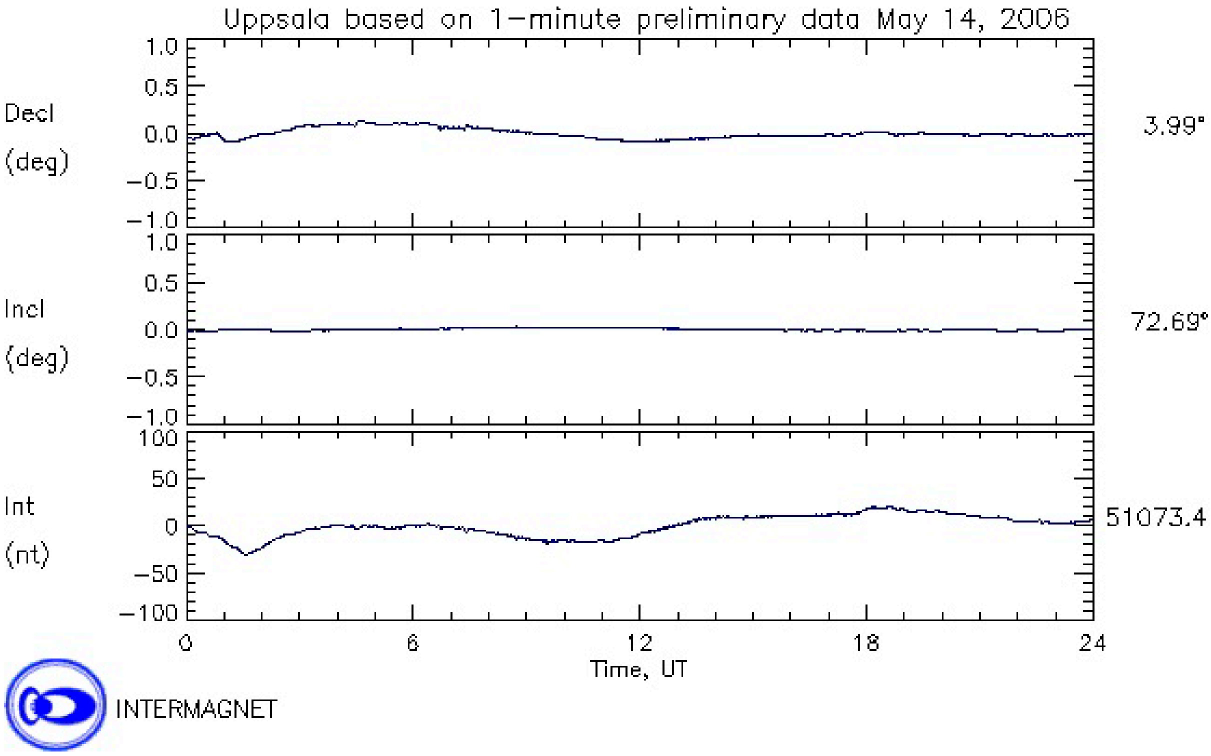


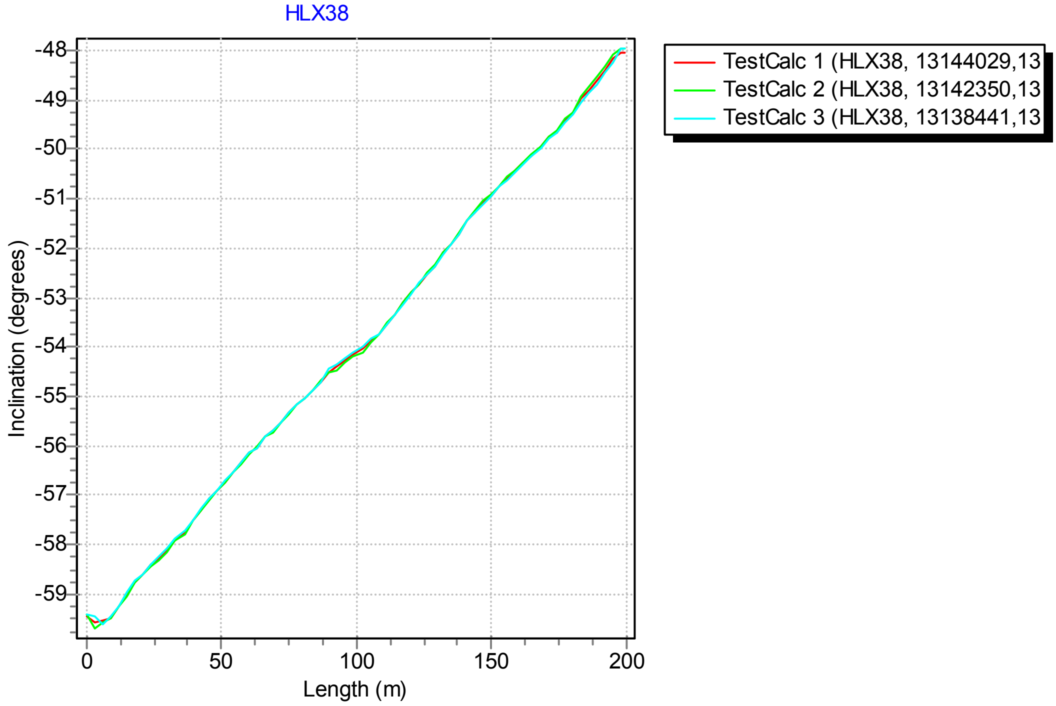
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-14.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144029) the two Mag/acc measurements (ID 13142350 and 13138441) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



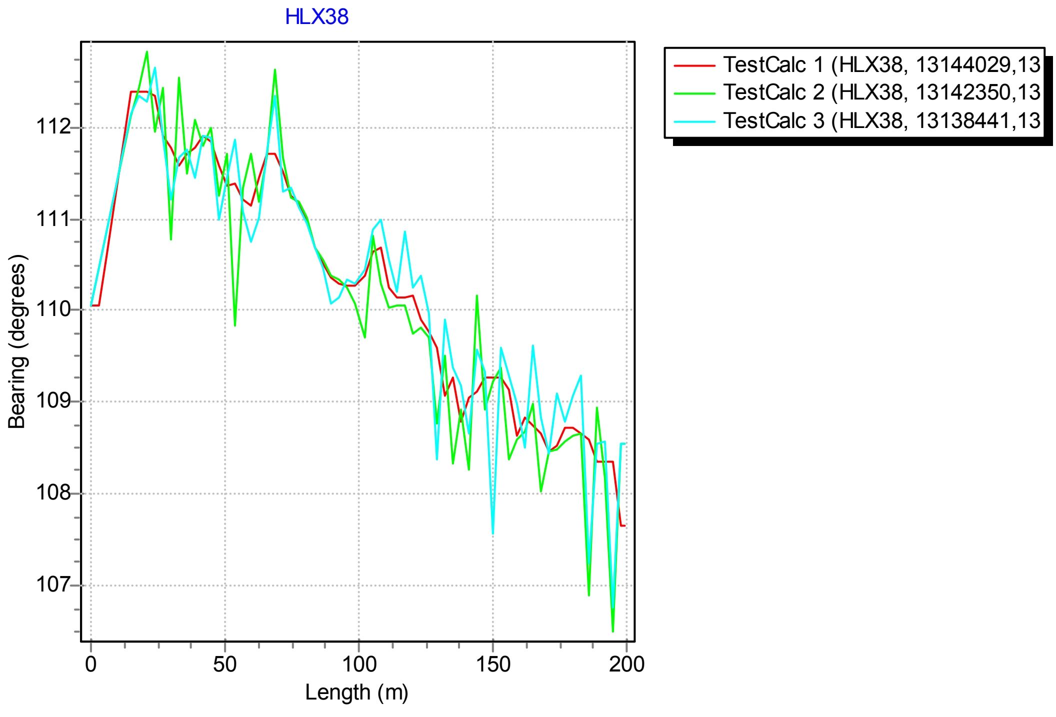


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX38.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX38	13115950	EG157	Magnetic - accelerometer measurement	2006-05-14 00:00	0.00	198.00	EF	061227 09:18
HLX38	13142350	EG157	Magnetic - accelerometer measurement	2006-05-14 18:05	0.00	198.00	CF	070102 14:17
HLX38	13138441	EG157	Magnetic - accelerometer measurement	2006-05-14 18:45	0.00	198.00	CF	070214 08:58
HLX38	13144029	EG154	Borehole deviation multiple measurements	2007-01-05 13:00			I C	070214 08:57

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX38	13138441	BEARING	18.00	198.00	
HLX38	13138441	INCLINATION	3.00	198.00	
HLX38	13142350	BEARING	18.00	198.00	
HLX38	13142350	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

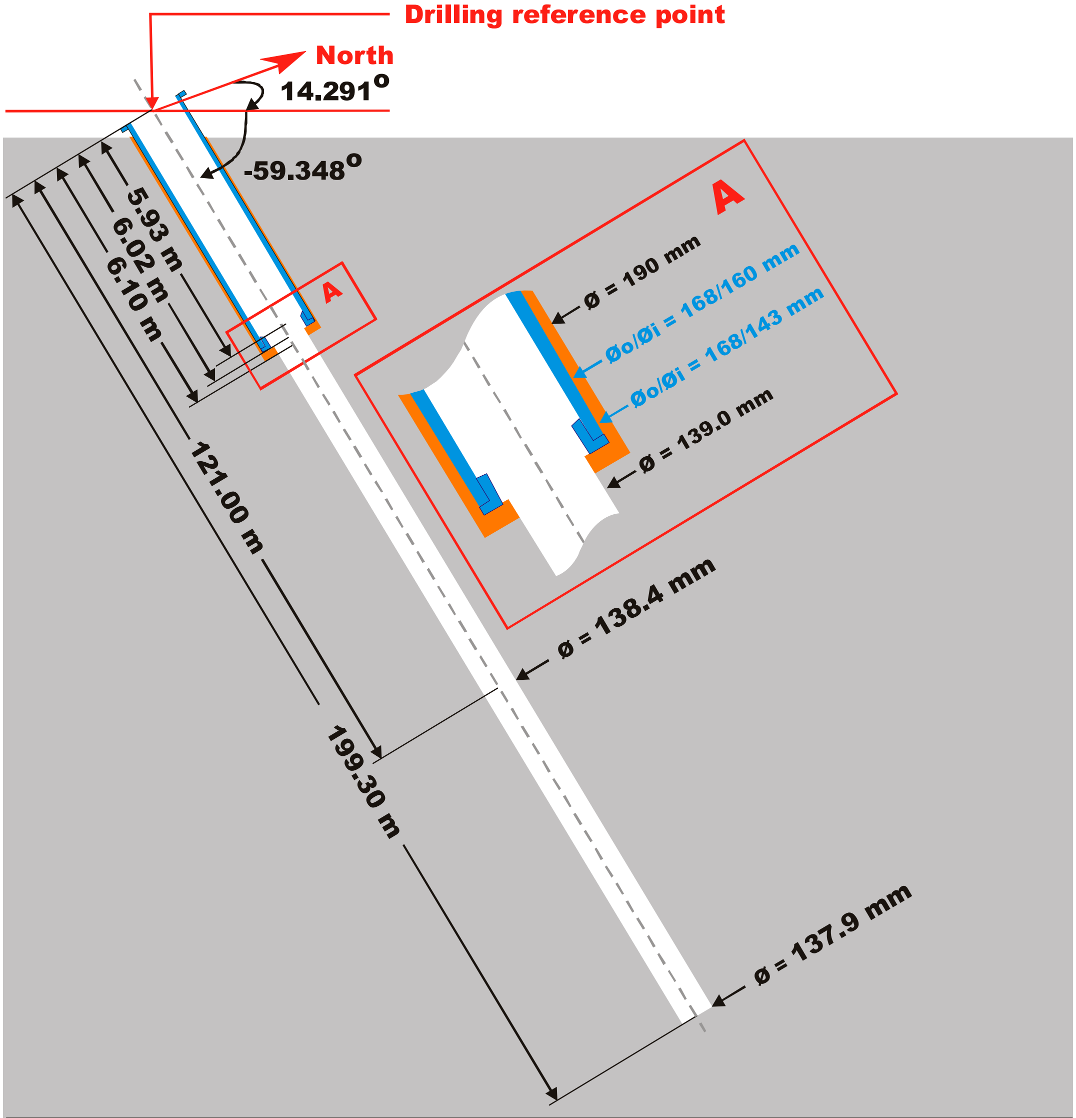
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX38	6365868.86	1547146.08	11.53	0.00	0.00	-59.46	110.04	0.1	0.9	0.00
HLX38	6365861.99	1547163.43	-19.26	36.00	0.02	-57.75	111.71	0.1	0.9	0.28
HLX38	6365857.18	1547175.61	-39.37	60.00	0.04	-56.15	111.13	0.1	0.9	0.48
HLX38	6365852.23	1547188.27	-59.15	84.00	0.05	-54.88	110.69	0.1	0.9	0.69
HLX38	6365847.34	1547201.40	-78.63	108.00	0.07	-53.73	110.69	0.1	0.9	0.91
HLX38	6365841.79	1547216.74	-100.14	135.00	0.09	-51.92	109.27	0.1	0.9	1.16
HLX38	6365836.86	1547230.97	-118.83	159.00	0.10	-50.45	108.63	0.1	0.9	1.39
HLX38	6365831.27	1547247.53	-139.41	186.00	0.12	-48.79	108.60	0.1	0.9	1.65
HLX38	6365828.47	1547256.05	-149.50	199.50	0.13	-48.02	107.66	0.1	0.9	1.79

Borehole description – HLX39

Technical description of borehole HLX39 is given in Figure 1.

Technical data

Borehole HLX39



Drilling reference point

Northing:	**6366887.869 (m), RT90 2,5 gon V**
Easting:	**1546880.479 (m), RT90 2,5 gon V**
Elevation:	**27.044 (m), RHB 70**

Drilling period

Drilling start date:	**2006-06-07**
Drilling stop date:	**2006-06-14**

Rev 2006-12-21

Figure 1. *Technical description of the borehole HLX39.*

Deviation measurement in HLX39

The only deviation measurement performed in HLX39 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142353 and 13138434) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurement (ID 13121671) is an error marked measurement with adjusted bearing mainly in the first part of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

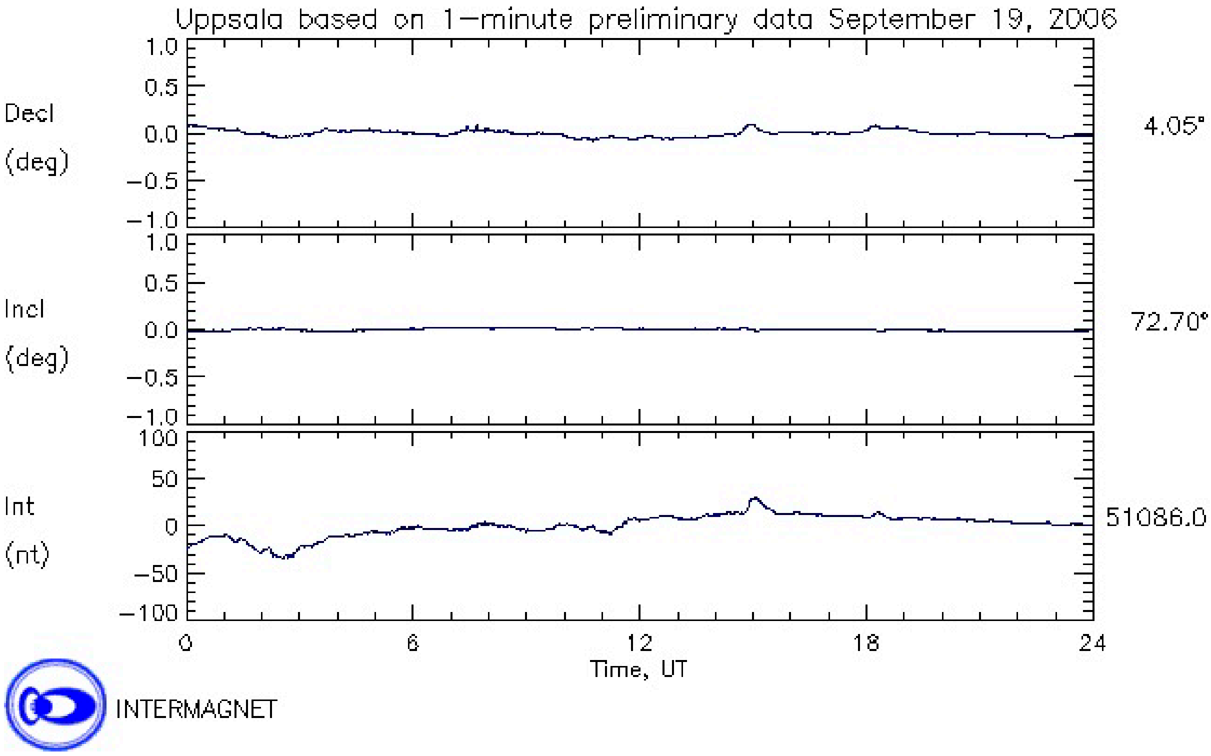


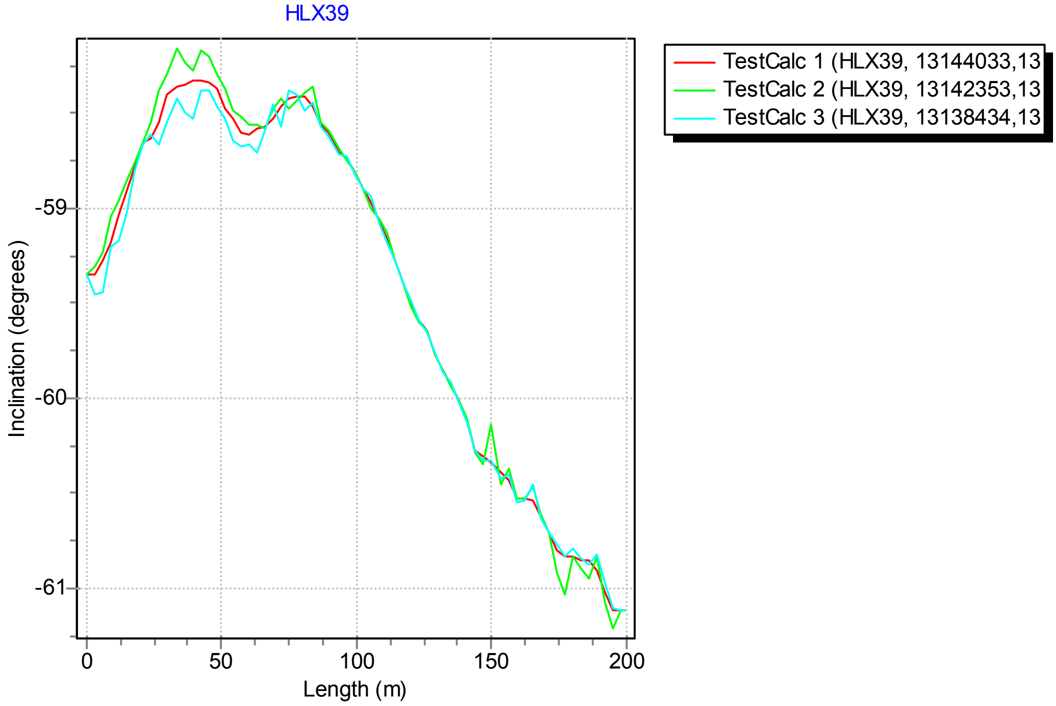
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-19.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144033) the two Mag/acc measurements (ID 13142353 and 13138434) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



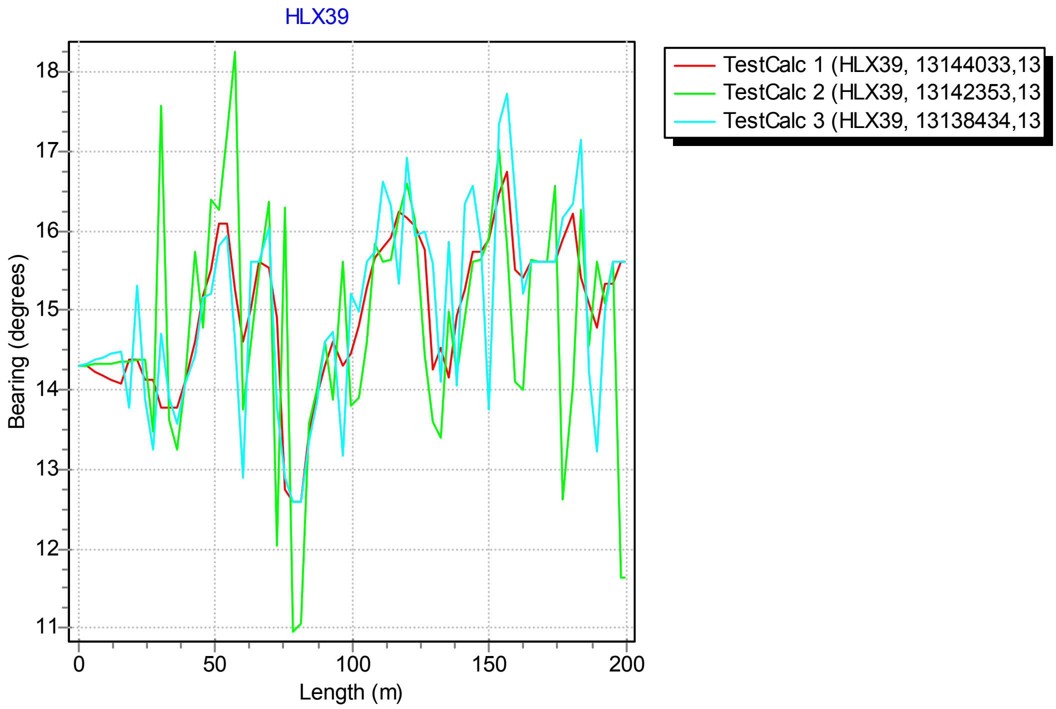


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX39.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX39	13121671	EG157	Magnetic - accelerometer measurement	2006-09-19 20:30	0.00	198.00	EF	070102 14:01
HLX39	13142353	EG157	Magnetic - accelerometer measurement	2006-09-19 21:45	0.00	198.00	CF	070102 14:14
HLX39	13138434	EG157	Magnetic - accelerometer measurement	2006-09-19 22:14	0.00	198.00	CF	070105 13:31
HLX39	13144033	EG154	Borehole deviation multiple measurements	2007-01-05 13:40			I C	070214 09:00

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX39	13138434	BEARING	18.00	198.00	
HLX39	13138434	INCLINATION	3.00	198.00	
HLX39	13142353	BEARING	18.00	198.00	
HLX39	13142353	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

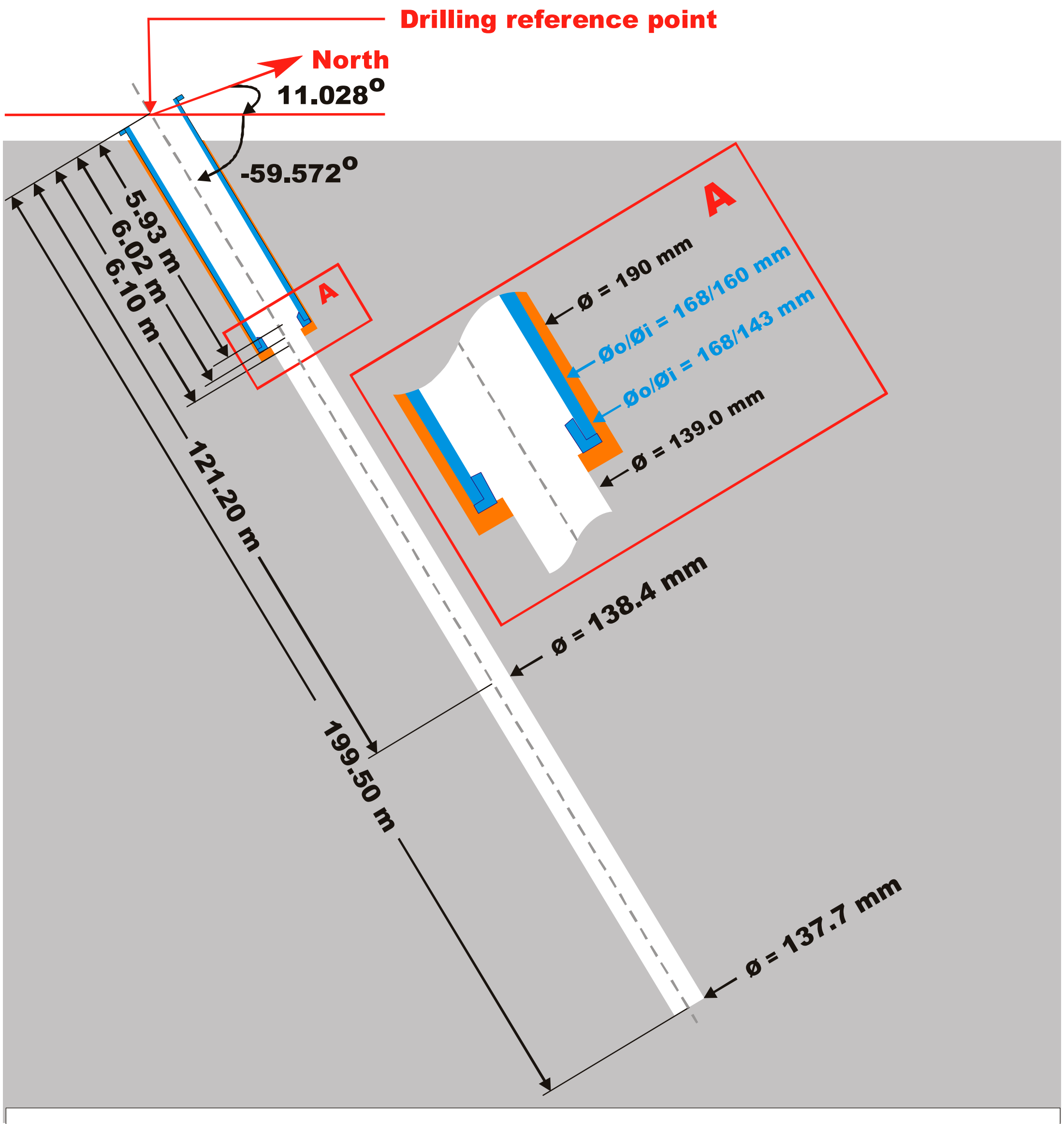
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX39	6366887.87	1546880.48	27.04	0.00	0.00	-59.35	14.29	0.1	1.5	0.00
HLX39	6366904.41	1546884.65	-1.20	33.00	0.04	-58.36	13.77	0.1	1.5	0.44
HLX39	6366916.56	1546887.90	-21.65	57.00	0.06	-58.60	15.27	0.1	1.5	0.77
HLX39	6366928.70	1546891.01	-42.11	81.00	0.09	-58.41	12.60	0.1	1.5	1.09
HLX39	6366939.29	1546893.67	-60.05	102.00	0.11	-58.90	14.80	0.1	1.5	1.38
HLX39	6366951.09	1546897.01	-80.68	126.00	0.14	-59.64	15.77	0.1	1.5	1.69
HLX39	6366959.81	1546899.32	-96.26	144.00	0.16	-60.28	15.74	0.1	1.5	1.93
HLX39	6366972.61	1546902.95	-119.75	171.00	0.18	-60.70	15.60	0.1	1.5	2.27
HLX39	6366983.87	1546906.07	-140.71	195.00	0.21	-61.11	15.34	0.1	1.5	2.58
HLX39	6366985.87	1546906.62	-144.48	199.30	0.21	-61.12	15.60	0.1	1.5	2.63

Borehole description – HLX40

Technical description of borehole HLX40 is given in Figure 1.

Technical data

Borehole HLX40



Drilling reference point

Northing: 6366906.756 (m), RT90 2,5 gon V

Easting: 1546943.948 (m), RT90 2,5 gon V

Elevation: 25.737 (m), RHB 70

Drilling period

Drilling start date: 2006-05-02

Drilling stop date: 2006-05-09

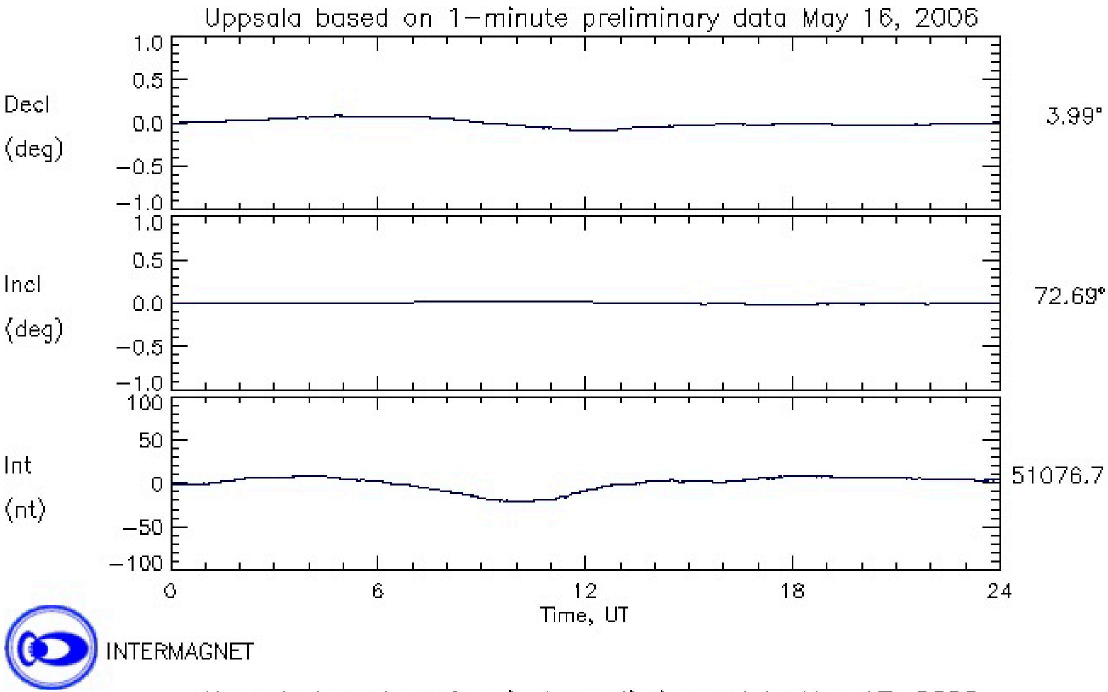
Rev 2006-12-21

Figure 1. *Technical description of the borehole HLX40.*

Deviation measurement in HLX40

The only deviation measurement performed in HLX40 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142351 and 13138467) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurement (ID 13115948) is an ERROR- marked measurement with adjusted bearing mainly in the first part of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the dates and times of the Mag/acc measurements, see Figure 2.



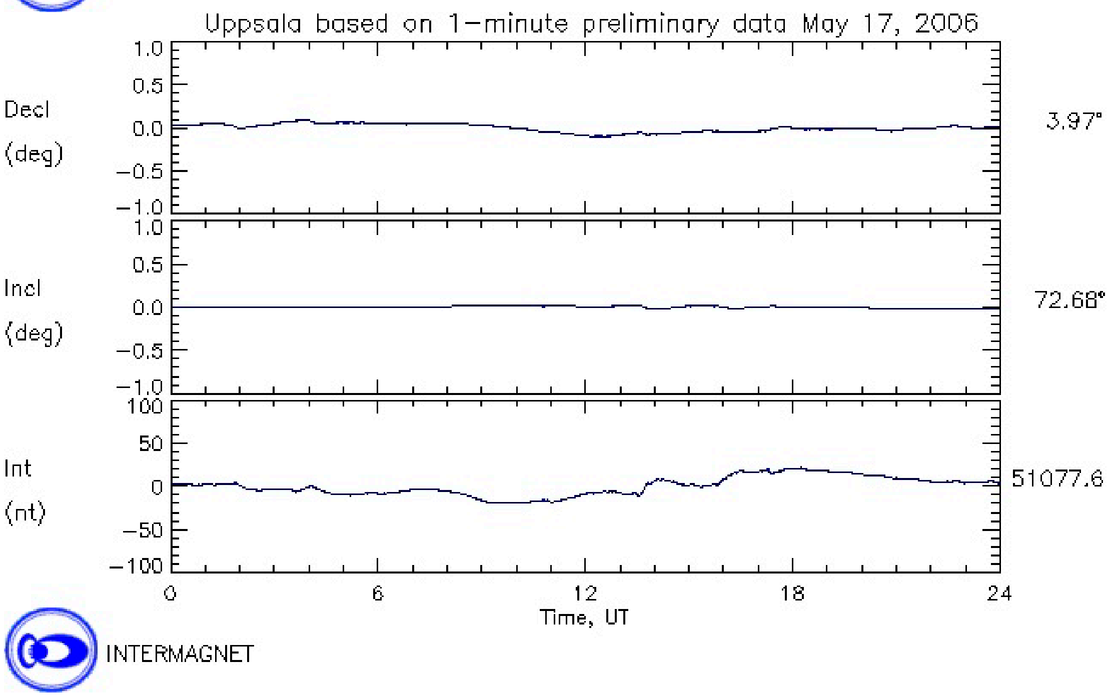


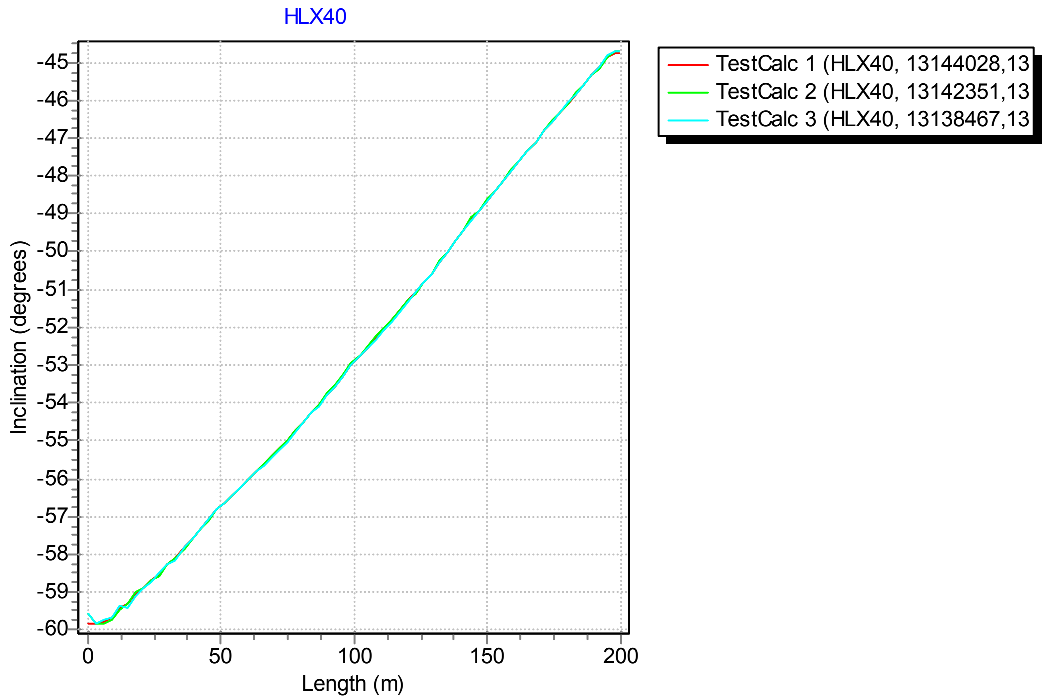
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-05-16 and 2006-05-17.*

<u>Borehole deviation multiple measurements.</u>

In the calculation of *Borehole deviation multiple measurements* (ID 13144028) the two Mag/acc measurements (ID 13142351 and 13138467) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not ERROR- marked, deviation activities listed in Table 1.



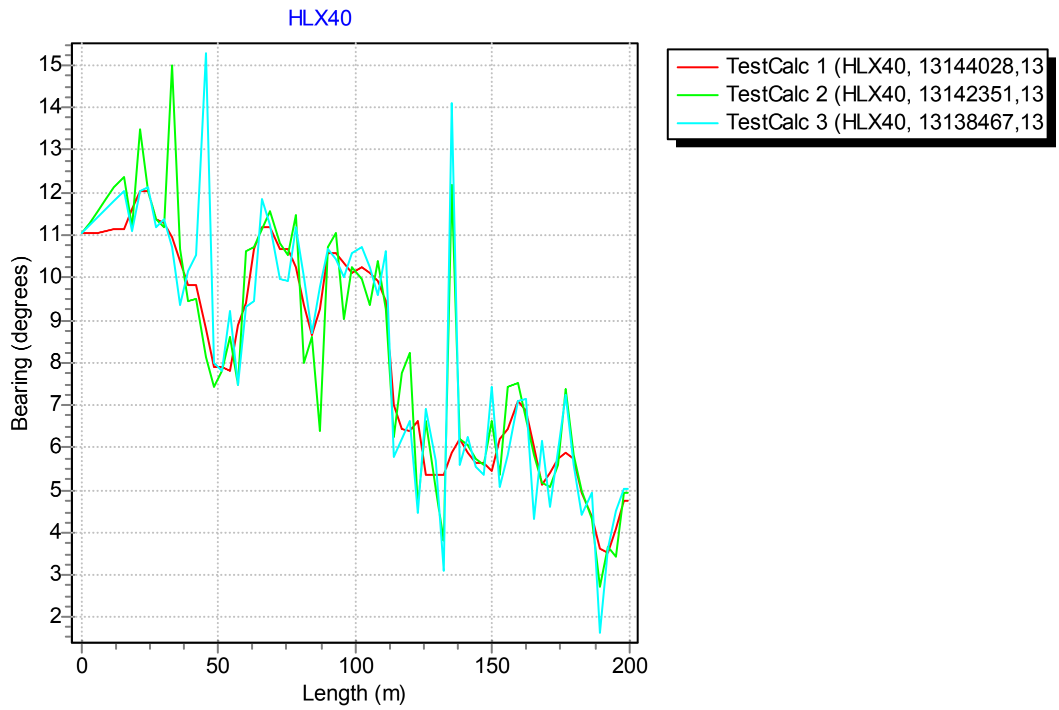


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not ERROR- marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX40.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX40	13142351	EG157	Magnetic - accelerometer measurement	2006-05-16 23:11	0.00	198.00	CF	070102 14:17
HLX40	13138467	EG157	Magnetic - accelerometer measurement	2006-05-17 00:00	0.00	198.00	CF	070105 13:22
HLX40	13115948	EG157	Magnetic - accelerometer measurement	2006-05-17 00:00	0.00	198.00	EF	070102 14:01
HLX40	13144028	EG154	Borehole deviation multiple measurements	2007-01-05 13:30			I C	070214 09:03

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX40	13138467	BEARING	18.00	198.00	
HLX40	13138467	INCLINATION	3.00	198.00	
HLX40	13142351	BEARING	18.00	198.00	
HLX40	13142351	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

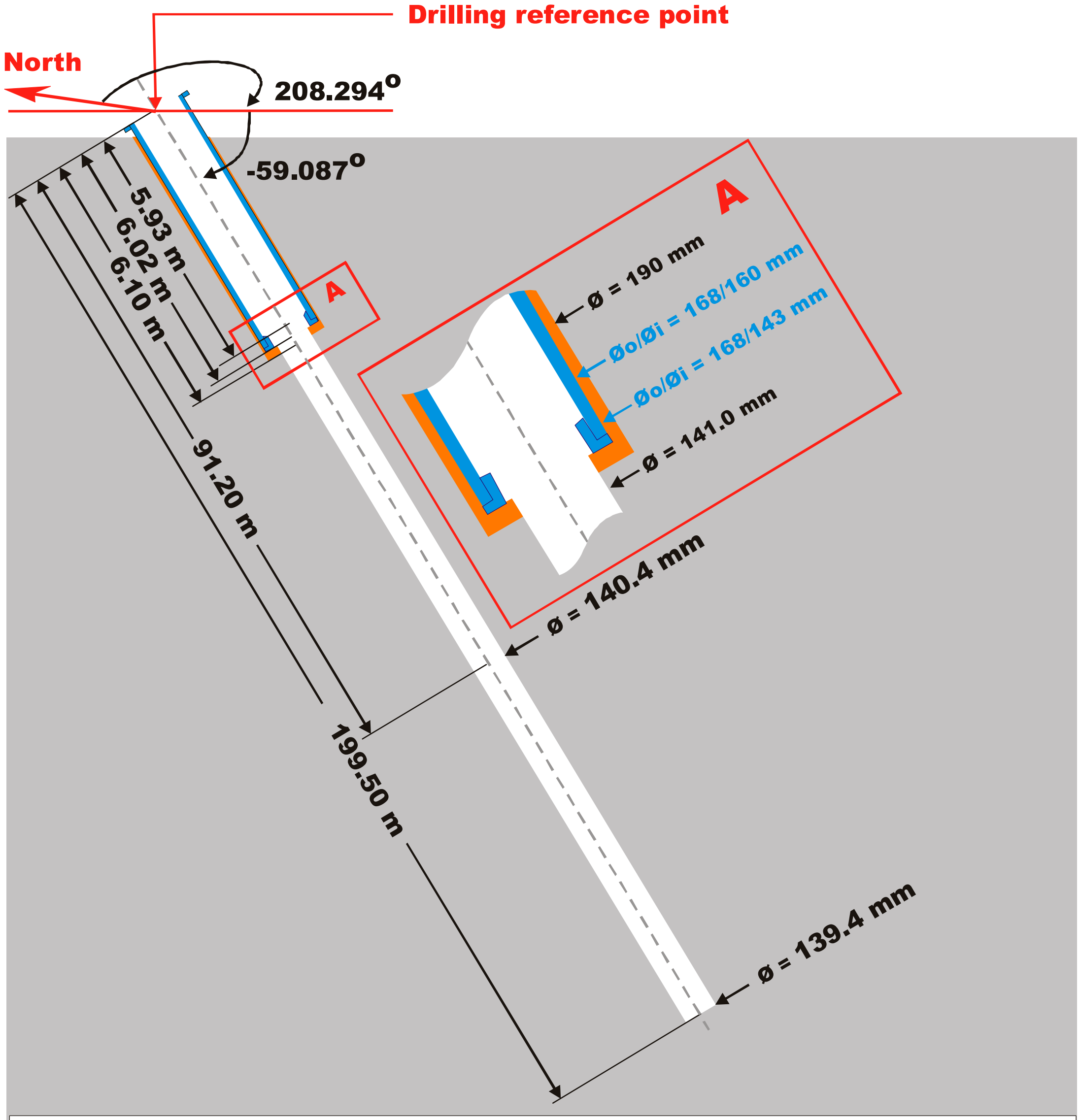
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX40	6366906.76	1546943.95	25.74	0.00	0.00	-59.82	11.03	0.0	1.5	0.00
HLX40	6366921.80	1546946.98	-0.04	30.00	0.01	-58.29	11.29	0.0	1.5	0.41
HLX40	6366934.58	1546949.08	-20.24	54.00	0.02	-56.44	7.79	0.0	1.5	0.76
HLX40	6366947.91	1546951.49	-40.05	78.00	0.04	-54.73	10.27	0.0	1.5	1.12
HLX40	6366961.89	1546953.92	-59.41	102.00	0.05	-52.75	10.25	0.0	1.5	1.50
HLX40	6366978.47	1546956.15	-80.59	129.00	0.06	-50.59	5.37	0.0	1.5	1.95
HLX40	6366995.97	1546957.93	-101.07	156.00	0.08	-48.13	6.46	0.0	1.5	2.42
HLX40	6367014.29	1546959.84	-120.80	183.00	0.09	-45.84	4.94	0.0	1.5	2.92
HLX40	6367025.89	1546960.68	-132.51	199.50	0.10	-44.77	4.73	0.0	1.5	3.23

Borehole description – HLX41

Technical description of borehole HLX41 is given in Figure 1.

Technical data

Borehole HLX41



Drilling reference point

Northing: 6367013.201 (m), RT90 2,5 gon V

Easting: 1547017.609 (m), RT90 2,5 gon V

Elevation: 21.797 (m), RHB 70

Drilling period

Drilling start date: 2006-05-22

Drilling stop date: 2006-06-01

Rev 2006-12-21

Figure 1. *Technical description of the borehole HLX41.*

Deviation measurement in HLX41

The only deviation measurement performed in HLX41 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13142355 and 13138435) were executed down and up the borehole between the length 0 – 198.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. The Mac/acc measurement (ID 13121670) is an error marked measurement with adjusted bearing mainly in the first part of the borehole. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

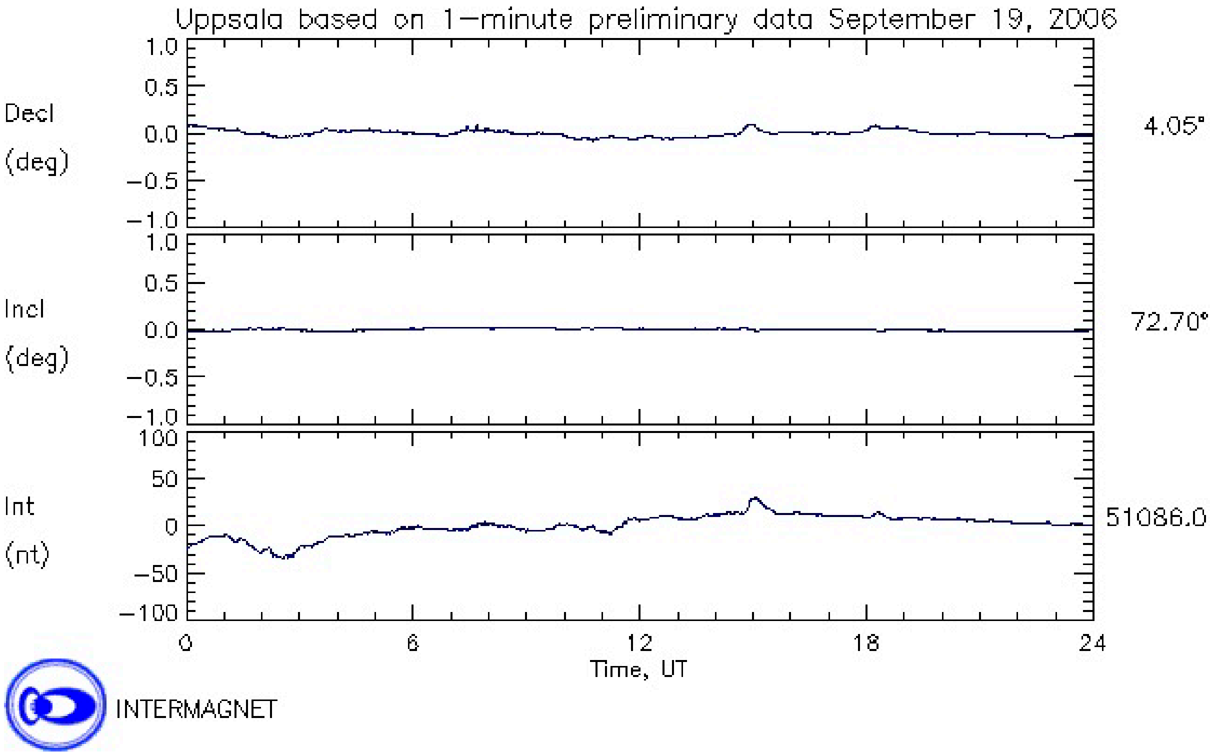


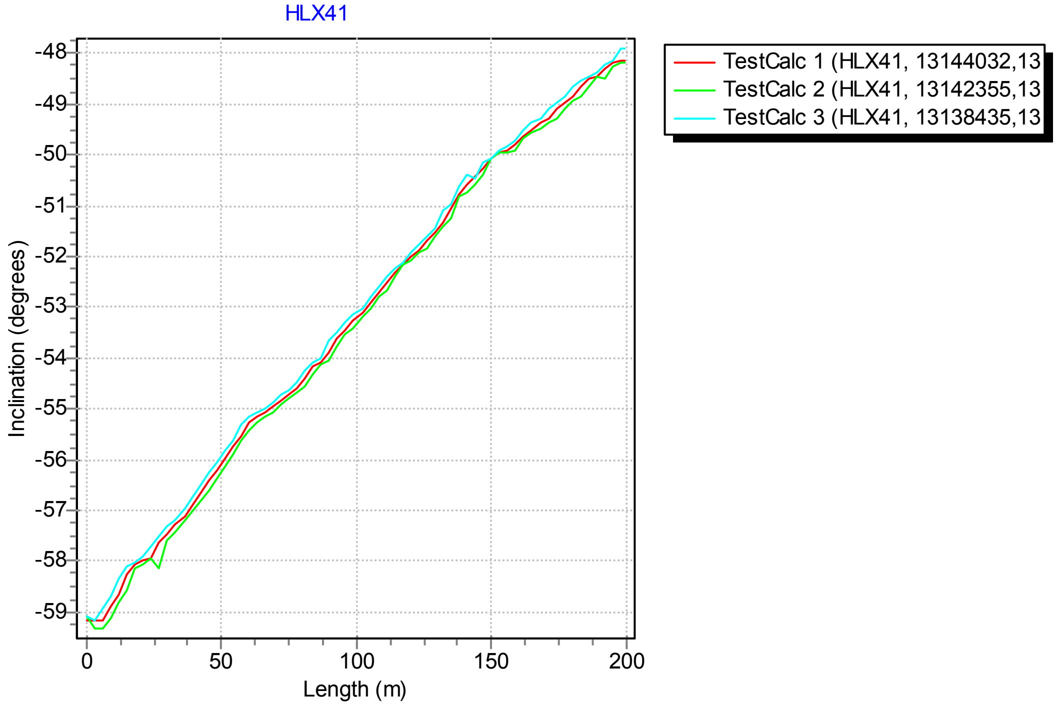
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-09-19.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13144032) the two Mag/acc measurements (ID 13142355 and 13138435) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



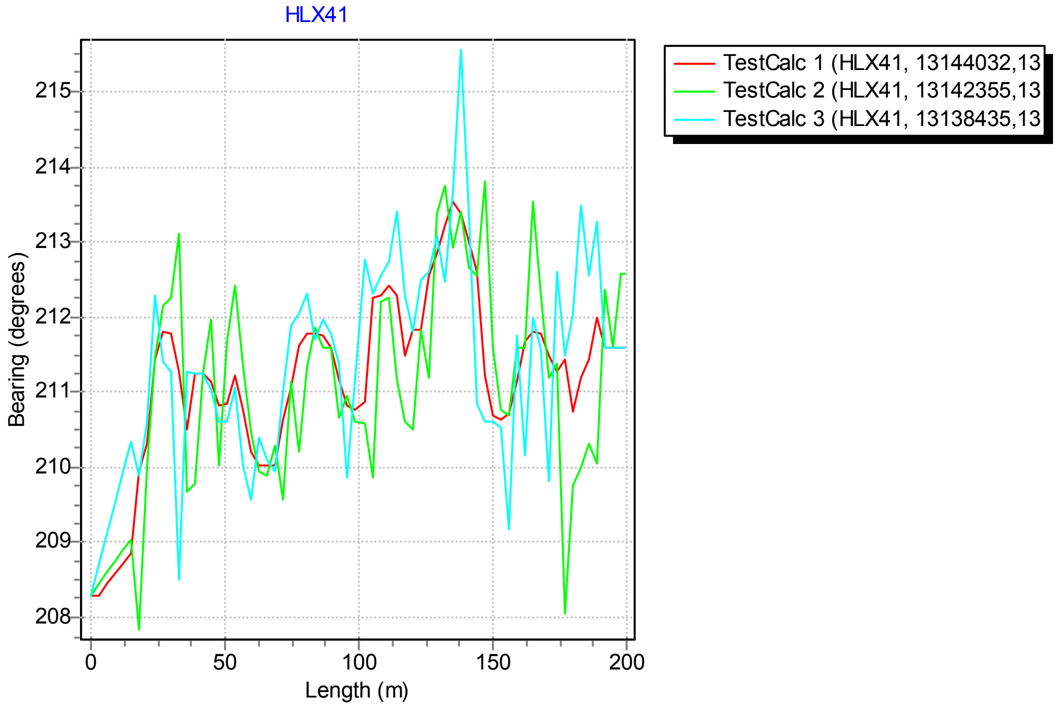


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX41.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX41	13142355	EG157	Magnetic - accelerometer measurement	2006-09-19 20:30	0.00	198.00	CF	070102 14:18
HLX41	13121670	EG157	Magnetic - accelerometer measurement	2006-09-19 20:30	0.00	198.00	EF	070102 14:01
HLX41	13138435	EG157	Magnetic - accelerometer measurement	2006-09-19 21:04	0.00	198.00	CF	070105 13:40
HLX41	13144032	EG154	Borehole deviation multiple measurements	2007-01-05 13:50			I C	070214 09:03

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX41	13138435	BEARING	18.00	198.00	
HLX41	13138435	INCLINATION	3.00	198.00	
HLX41	13142355	BEARING	18.00	198.00	
HLX41	13142355	INCLINATION	3.00	198.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

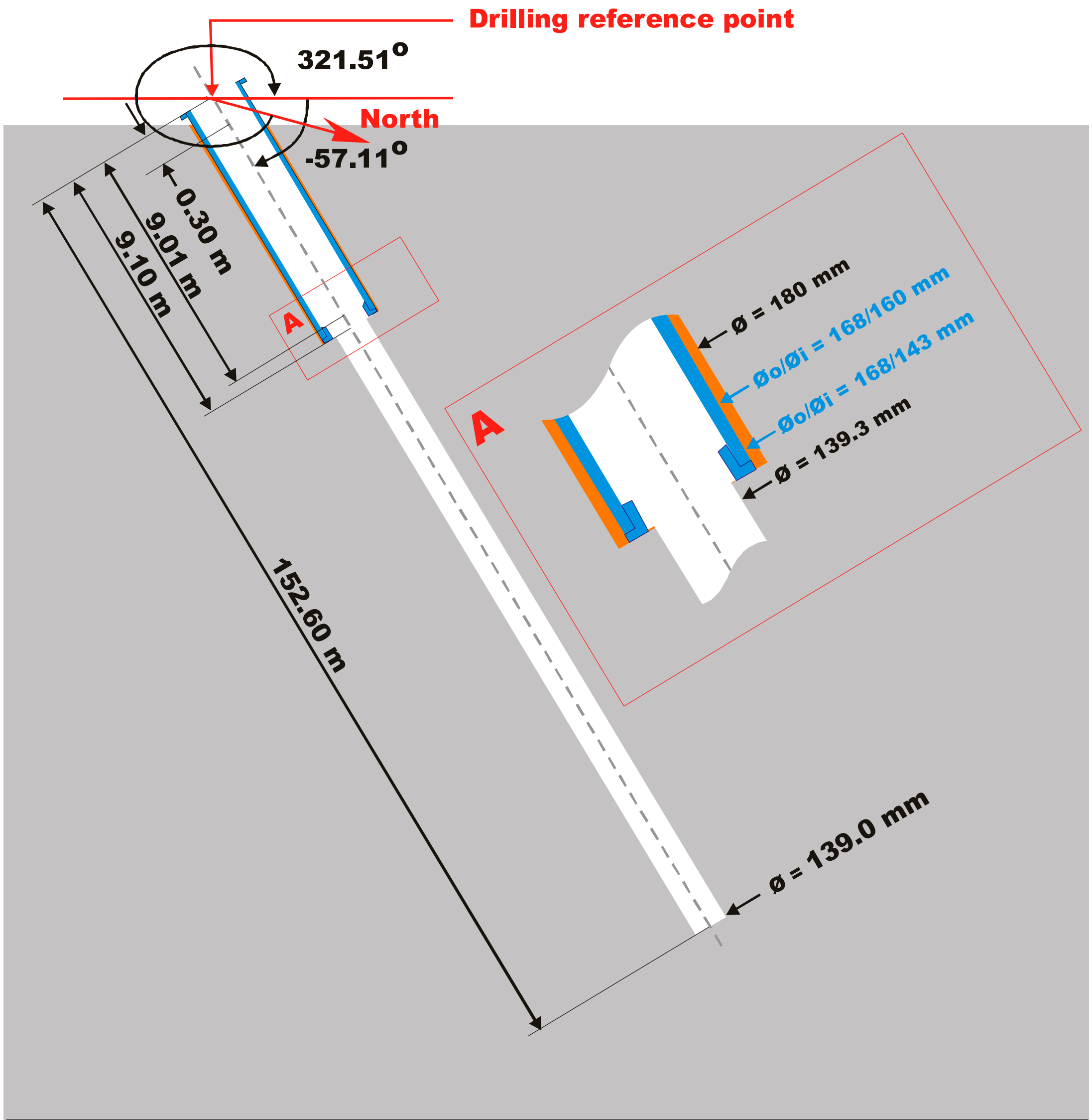
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX41	6367013.20	1547017.61	21.80	0.00	0.00	-59.15	208.29	0.2	1.5	0.00
HLX41	6367000.91	1547010.68	-1.22	27.00	0.05	-57.64	211.79	0.2	1.5	0.38
HLX41	6366991.12	1547004.75	-18.83	48.00	0.09	-56.20	210.82	0.2	1.5	0.69
HLX41	6366979.38	1546997.84	-38.58	72.00	0.14	-54.84	210.64	0.2	1.5	1.06
HLX41	6366965.86	1546989.60	-60.45	99.00	0.20	-53.25	210.78	0.2	1.5	1.48
HLX41	6366953.45	1546981.90	-79.50	123.00	0.25	-51.88	211.82	0.2	1.5	1.88
HLX41	6366939.13	1546972.73	-100.47	150.00	0.31	-50.07	210.68	0.2	1.5	2.33
HLX41	6366924.17	1546963.64	-121.02	177.00	0.37	-48.95	211.43	0.2	1.5	2.80
HLX41	6366911.44	1546955.86	-137.87	199.50	0.42	-48.15	211.60	0.2	1.5	3.21

Borehole description – HLX42

Technical description of borehole HLX42 is given in Figure 1.

Technical data

Borehole HLX42



Drilling reference point

Northing:	**6364827.04 (m), RT90 2,5 gon V 0:-15**
Easting:	**1547446.73 (m), RT90 2,5 gon V 0:-15**
Elevation:	**12.88 (m), RHB 70**

Drilling period

Drilling start date:	**2006-11-13**
Drilling stop date:	**2006-11-16**

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Figure 1. *Technical description of the borehole HLX42.*

Deviation measurement in HLX42

The only deviation measurement performed in HLX42 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13147167 and 13147169) were executed down and up the borehole between the length 0 – 150.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

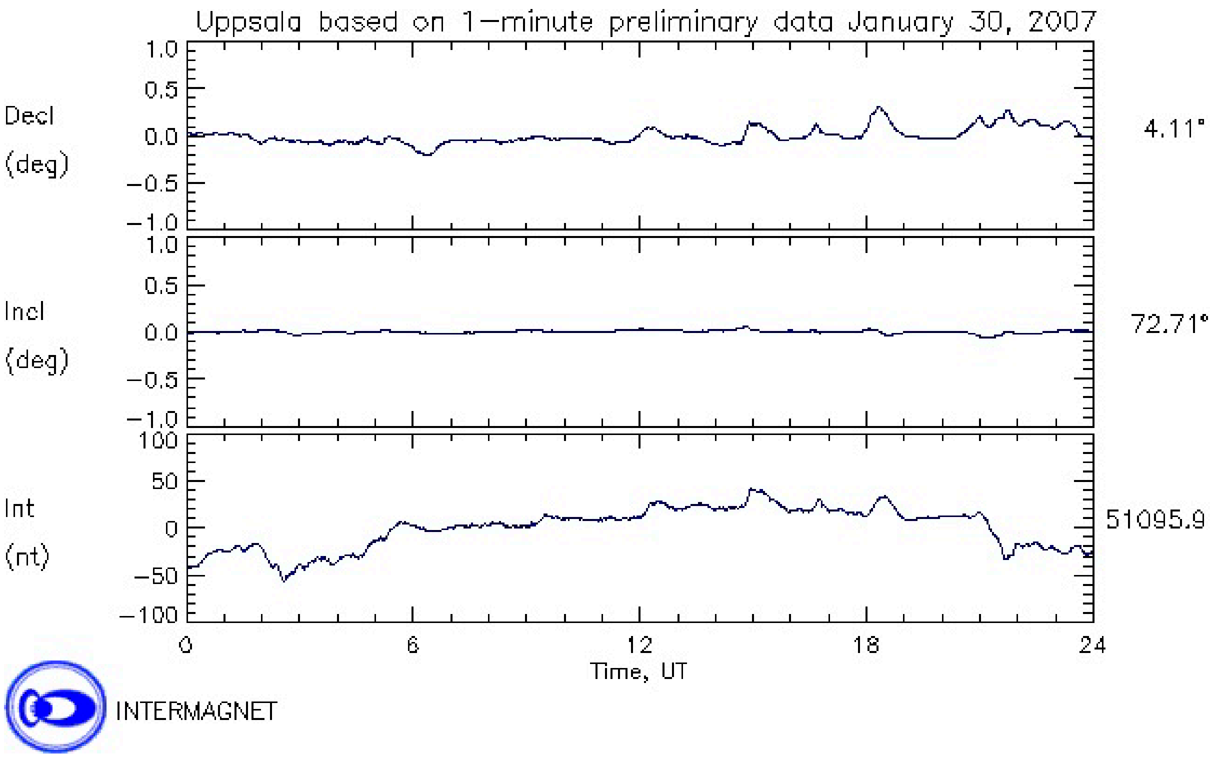


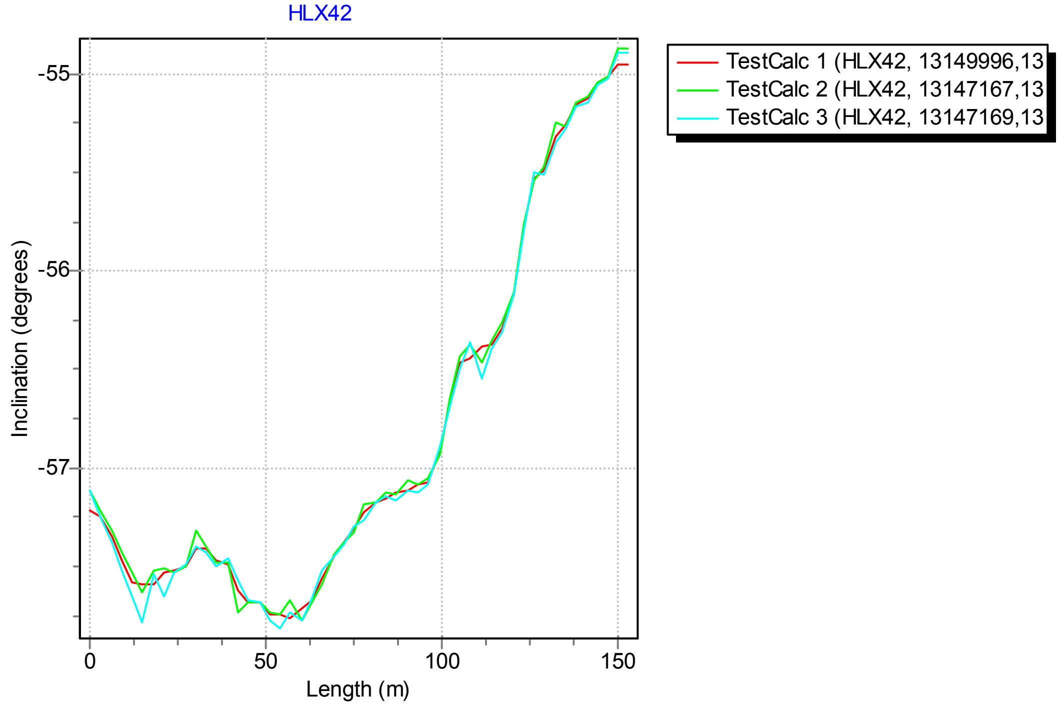
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2007-01-30.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13149996) the two Mag/acc measurements (ID 13147167 and 13147169) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the "Radius uncertainty" is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



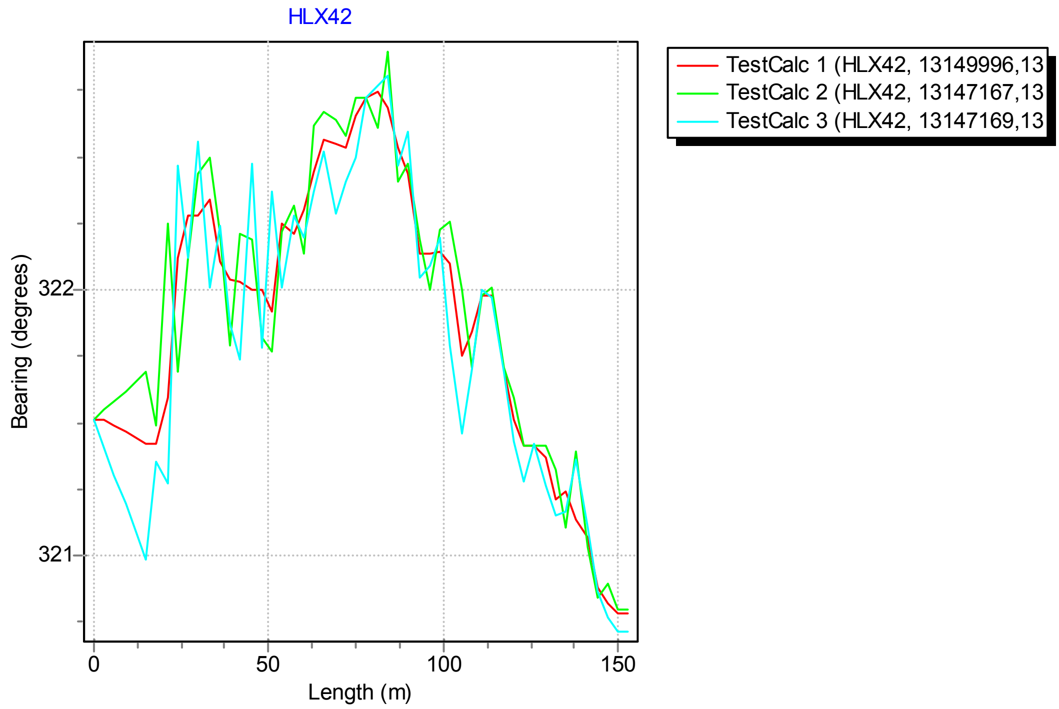


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX42.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX42	13147167	EG157	Magnetic - accelerometer measurement	2007-01-30 15:00	0.00	150.00	CF	070220 13:35
HLX42	13147169	EG157	Magnetic - accelerometer measurement	2007-01-30 15:20	0.00	150.00	CF	070220 13:35
HLX42	13149996	EG154	Borehole deviation multiple measurements	2007-02-22 09:30			I C	070222 13:47

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX42	13147167	BEARING	18.00	150.00	
HLX42	13147167	INCLINATION	3.00	150.00	
HLX42	13147169	BEARING	18.00	150.00	
HLX42	13147169	INCLINATION	3.00	150.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

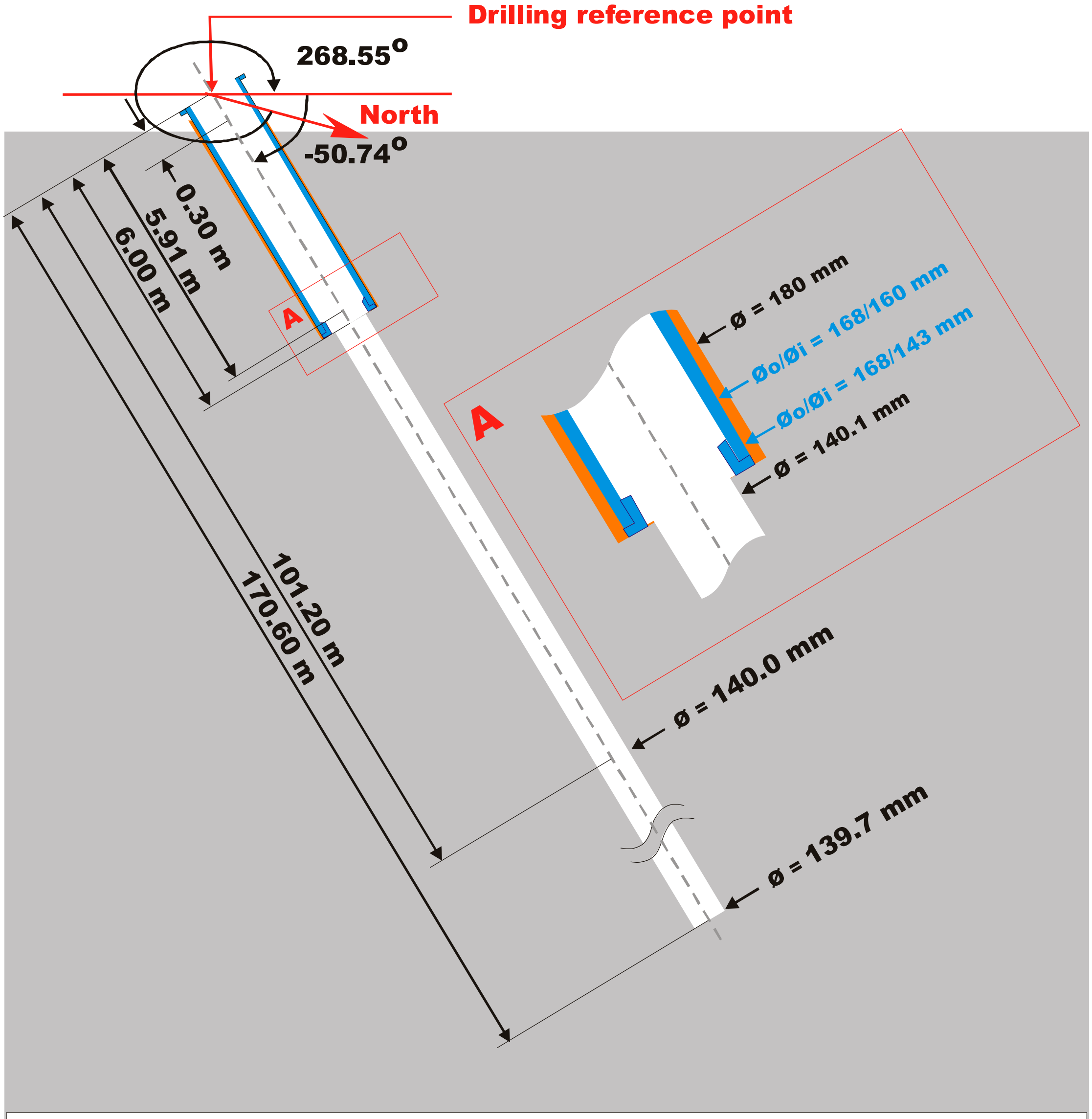
Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX42	6364827.04	1547446.73	12.88	0.00	0.00	-57.21	321.51	0.1	0.3	0.00
HLX42	6364833.36	1547441.70	0.24	15.00	0.01	-57.59	321.42	0.1	0.3	0.04
HLX42	6364843.52	1547433.75	-20.00	39.00	0.03	-57.49	322.04	0.1	0.3	0.11
HLX42	6364853.65	1547425.88	-40.28	63.00	0.05	-57.67	322.45	0.1	0.3	0.17
HLX42	6364863.95	1547418.01	-60.49	87.00	0.07	-57.13	322.54	0.1	0.3	0.24
HLX42	6364874.31	1547409.94	-80.57	111.00	0.08	-56.38	321.98	0.1	0.3	0.30
HLX42	6364884.86	1547401.56	-100.43	135.00	0.10	-55.26	321.24	0.1	0.3	0.37
HLX42	6364892.69	1547395.21	-114.86	152.60	0.12	-54.95	320.77	0.1	0.3	0.42

Borehole description – HLX43

Technical description of borehole HLX43 is given in Figure 1.

Technical data

Borehole HLX43



Drilling reference point

Northing:	**6367517.45 (m), RT90 2,5 gon V 0:-15**
Easting:	**1546626.60 (m), RT90 2,5 gon V 0:-15**
Elevation:	**24.20 (m), RHB 70**

Drilling period

Drilling start date:	**2006-10-19**
Drilling stop date:	**2006-10-26**

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Figure 1. *Technical description of the borehole HLX43.*

Deviation measurement in HLX43

The only deviation measurement performed in HLX43 was with the Mac/acc, Flexit instrument. The deviation logging activity is tabulated in Sicada Activity Log, see Table 1.

Two Mag/acc measurements (ID 13138554 and 13138555) were executed down and up the borehole between the length 0 – 168.00 m, with the Flexit instrument. Corrections of measured data are shown in the File References (Sicada) for the measurements. No geomagnetic disturbance exceeding 0.5 degrees was observed on the date and time of the Mag/acc measurements, see Figure 2.

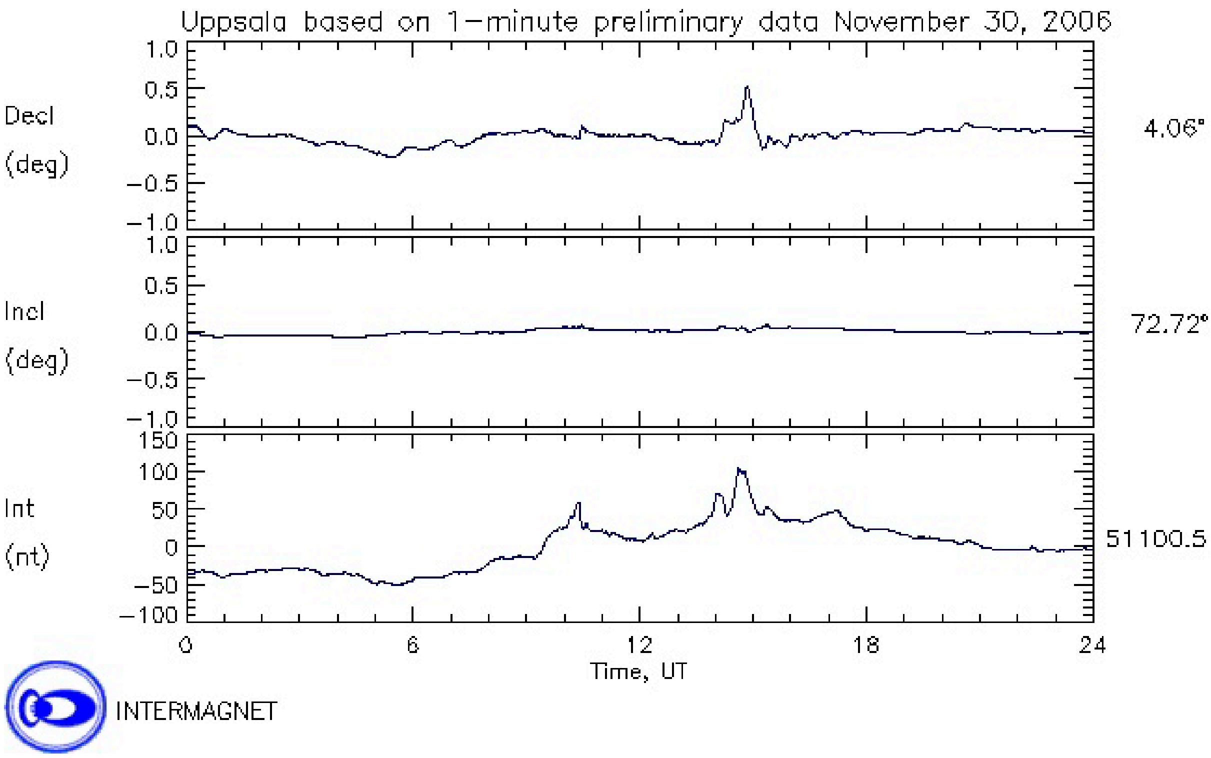


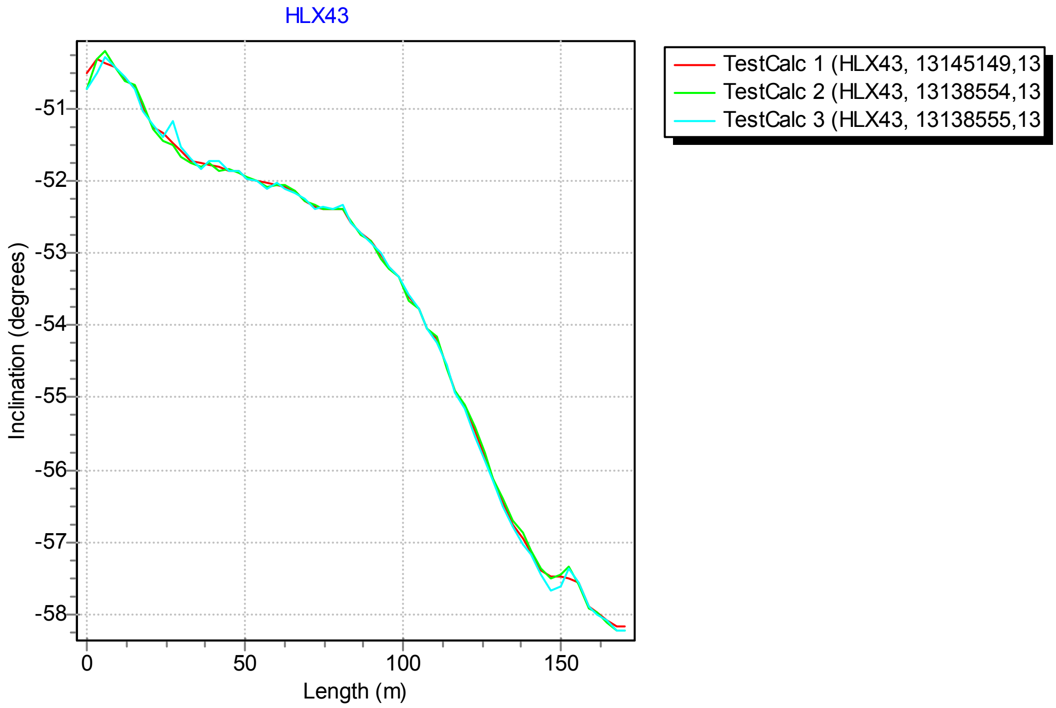
Figure 2. *The geomagnetic field was observed at the Observatory in Uppsala on 2006-11-30.*

Borehole deviation multiple measurements.

In the calculation of *Borehole deviation multiple measurements* (ID 13145149) the two Mag/acc measurements (ID 13138554 and 13138555) were used. Table 2 shows the deviation data for the calculation.

A subset of the resulting deviation file for every approximately 20 m elevation (from Object_location) is shown in Table 3. The inclination and bearing uncertainties are calculated automatically, and based on these values the “Radius uncertainty” is calculated for every measuring level.

Figure 3 show the resulting deviation data together with the other, not error marked, deviation activities listed in Table 1.



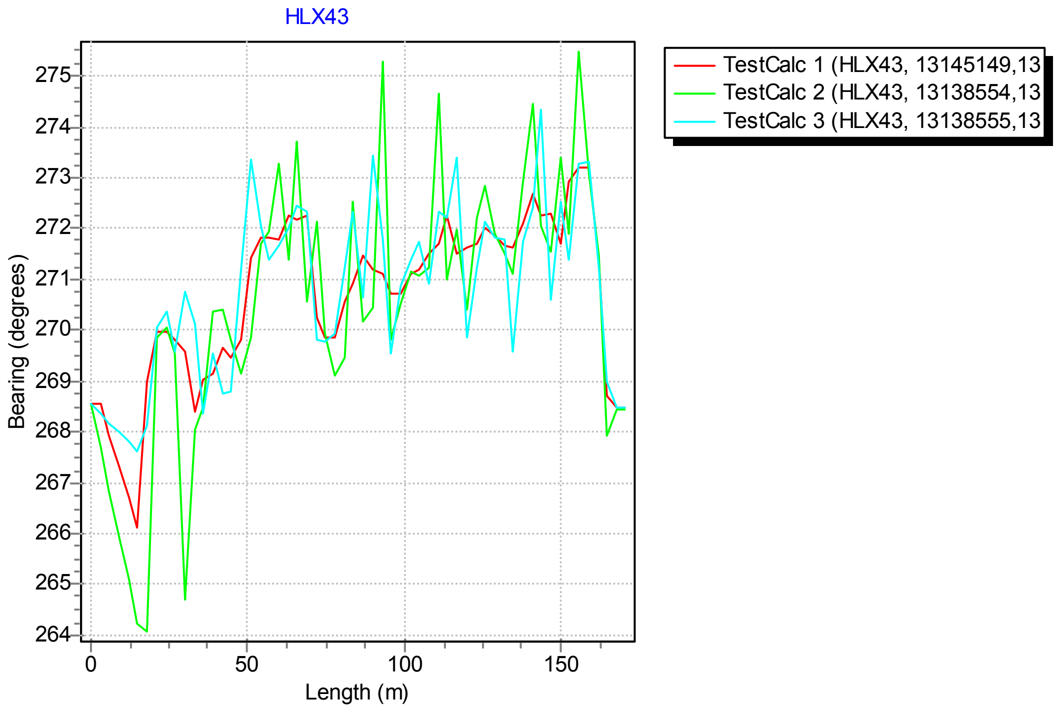


Figure 3. *The Borehole deviation multiple measurements data (red line) together with the other, not error marked, deviation activities specified in Table 1. The upper diagram shows the inclination and the lower shows the bearing.*

Table 1. The deviation logging activities in Sicada for HLX43.

Idcode	Activity Id	Activity Type Code	Activity	Start Date	Secup (m)	Seclow (m)	Flags	_Indat
HLX43	13138554	EG157	Magnetic - accelerometer measurement	2006-11-30 19:30	0.00	168.00	CF	070214 09:05
HLX43	13138555	EG157	Magnetic - accelerometer measurement	2006-11-30 20:25	0.00	168.00	CF	061207 10:51
HLX43	13145149	EG154	Borehole deviation multiple measurements	2007-01-17 17:30			I C	070214 09:05

Table 2. Content of the EG154-file.

Idcode	Deviation Activity Id	Deviation Angle Type	Approved Secup (m)	Approved Seclow (m)	Man Estim Angle Uncert (degrees)
HLX43	13138554	BEARING	18.00	168.00	
HLX43	13138554	INCLINATION	3.00	168.00	
HLX43	13138555	BEARING	18.00	168.00	
HLX43	13138555	INCLINATION	3.00	168.00	

Table 3. Subset (for every approx. 20 m elevation) of the resulting "Object_location" in Sicada.

Idcode	Northing (m)	Easting (m)	Elevation (m)	Length (m)	Elevation Uncertainty	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty
HLX43	6367517.45	1546626.60	24.20	0.00	0.00	-50.51	268.55	0.1	1.8	0.00
HLX43	6367516.93	1546607.67	0.94	30.00	0.03	-51.60	269.57	0.1	1.8	0.61
HLX43	6367516.92	1546590.99	-20.29	57.00	0.05	-52.03	271.82	0.1	1.8	1.14
HLX43	6367517.23	1546576.30	-39.27	81.00	0.07	-52.39	270.58	0.1	1.8	1.61
HLX43	6367517.53	1546560.11	-60.87	108.00	0.10	-54.06	271.49	0.1	1.8	2.13
HLX43	6367517.95	1546546.42	-80.57	132.00	0.12	-56.45	271.65	0.1	1.8	2.56
HLX43	6367518.46	1546533.43	-100.75	156.00	0.14	-57.57	273.18	0.1	1.8	2.98
HLX43	6367518.54	1546525.70	-113.13	170.60	0.15	-58.16	268.46	0.1	1.8	3.23