Technical Report

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Meteorological, hydrological and oceanographical information and data for the site investigation program in the communities of Östhammar and Tierp in the northern part of Uppland

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SMHI

June 2002

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Summary

Northeast Uppland, especially the coast, shows a wind direction distribution that differs from the basic South Swedish pattern, through a frequent occurrence of wind blowing from the North. South and Southwest winds are also frequent. In winter strong northerly winds often bring heavy snowfall, through the moisture uptake from an open sea surface followed by rising air over land. The estimated true annual precipitation (adjusted for measuring losses) is about 700 mm at the coastline, with a maximum 5-15 km inland. The temperature is typical Central Swedish with a yearly mean 5-6°C.

The South-eastern part of Sweden has the lowest values of specific runoff, with a mean (1961-1990) of <10 l/s·km^2. Specific runoff for the regions Östhammar and Tierp is 6-9 l/s·km^2. For the Oskarshamn region it is <6 l/s·km^2. (Raab and Vedin, 1995).

For lakes in both Southern and Northern Sweden the ice freeze-up is strongly related to lake depth; it appears earlier on a lake with small depth than on a lake with great depth. When it comes to ice break-up, there are no significant relationships between the characteristics of different lakes like for ice freeze-up. This is because ice break-up is mostly affected by weather, especially solar radiation.

The water around Forsmark area has a good water exchange except for the deepest parts of the Oregrundsgrepen where periods of stagnation can occur. The area is strongly effected by coastal processes induced by the local wind conditions and the stratification in the sea. Similar conditions are valid for the water around Oskarshamn.

Existing observing stations in the area around Östhammar and Tierp have been located. In figure 0-1 all stations and their locations are shown. In tables 2-1, 2-4, 2-5 and 2-25 the stations are listed. The stations that are not run by SMHI have not been evaluated due to difficulties in accessing data in an easily readable format. At the nuclear power plant Forsmark there is a 100 m tall mast instrument for registration of wind (direction and speed) and temperature at several levels. Measurements started in 1975 and are still going on. Registrations on paper are kept in the archives at Forsmark. Until about 1996 data were collected by SMHI but have never been included in any easily accessed database. However, data was stored on magnetic tapes, of which some years have been located, but not evaluated.

Together with this report "one reference year" with data was selected. At first, the years possible from a hydrological point of view were selected since hydrological data are scarcer than meteorological. The selected year should be as normal as possible, monthly averages and sums should approximately be according to corresponding values for the standard normal period 1961 - 1990. All meteorological parameters should refer to the same station if possible. The parameters, temperature and precipitation, are considered most important when the year is selected. On these conditions meteorological data for 1988 from Örskär was selected, except for air pressure and snow depth which was not measured at Örskär. Data on air pressure are taken from Uppsala Airport which is regarded representative for Örskär. Data on snow cover are from Films kyrkby further inland. For discharge and water level the station Vattholma has been chosen. As oceanographic data over the year is incoherent we can not provide time series for an actual year for these parameters. Data for the specially selected year, 1988 (see below p. 25, 35 and 36), has been delivered in ASCII-format to the Swedish Nuclear Fuel and Waste Management Co.

Data from SMHI-stations are used for long term statistics. The following stations have been chosen to represent the two areas Östhammar and Tierp:

	Östhammar	*Tierp*
Temperature:	Örskär, (Risinge, Films kyrkby)	Untra
Precipitation:	Lövsta, (Örskär, Risinge, Östhammar)	Untra
Pot. Evapotransp.:	Örskär, (Films kyrkby)	
Relative humidity:	Örskär	Films kyrkby
Global radiation:	Örskär (calculated)	Örskär (calculated)
Air pressure:	Uppsala airport	Uppsala airport
Wind:	Örskär	Uppsala airport
Discharge:	Vattholma, FO1 (calculated), LO1 (calculated) (Ulvunge, Gimo, Fors)	Vattholma (Ulvunge, Näs, Odenfors)
Water level:	Vattholma	Vattholma
Ice (lakes):	Norrsjön	Norrsjön
Sea temperature:	Station 130, S, Sr5	Station 130, Station S
Sea water level:	Forsmark	Forsmark
Salinity:	Station Sr5	
Nitrate + nitrite:	Station Sr5	
Ammonium:	Station Sr5	
Total nitrogen:	Station Sr5	
Phosphate phosphorus:	Station Sr5	
Total phosphorus:	Station BY38	
Silicate-silicon:	Station BY38	
Oxygen:	Station Sr5	
Chlorophyll:	Station Sr5	
PH:	Station BY38	
Alkaline:	Station Sr5	

Figure 0-1: *All stations used in the report*

Contents

1. Climate description

1.1 Climate description — meteorology

The most frequent wind directions in southern Sweden are west and south-west, with some local and regional deviations. This makes the East Coast climate somewhat less maritime than that on the West Coast, which also means that the differences are less pronounced between the actual coastal sites and their inland neighbourhood than is the case on the West Coast.

Near-coast locations are far more exposed to strong winds than inland sites. An important feature of the actual coastal areas is that they are largely composed of forest. The great wind exposure at the coastline has very markedly decreased a few km inland (cp. Figure 1-1, representing coastal and inland conditions).

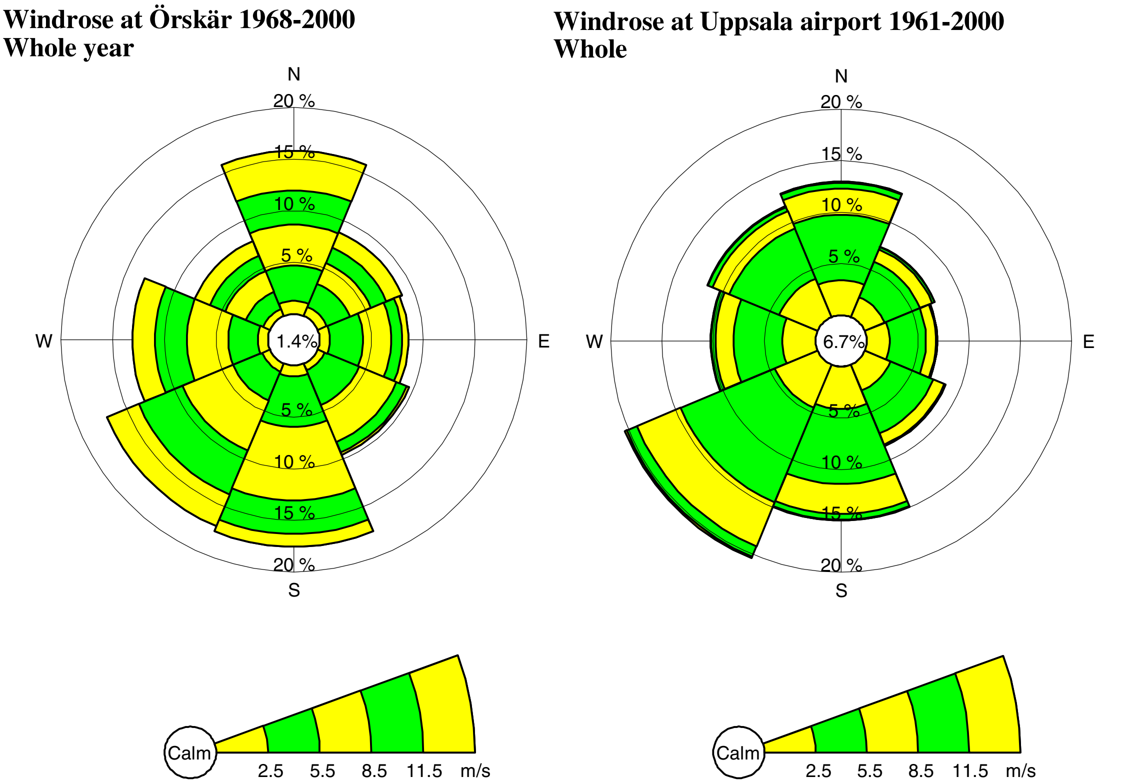

Figure 1-1. *Wind roses showing the average yearly distribution of the wind direction and wind velocity for a coastal station (Örskär) and an inland station (Uppsala airport). The percentage of calm is noted in the centre of each windrose. The wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

North-east Uppland, especially the coast, shows a wind direction distribution that differs from the basic South Swedish pattern, through a frequent occurrence of wind blowing from the North. South and south-west winds are also frequent. In winter strong northerly winds often bring heavy snowfall, through the moisture uptake from an open sea surface

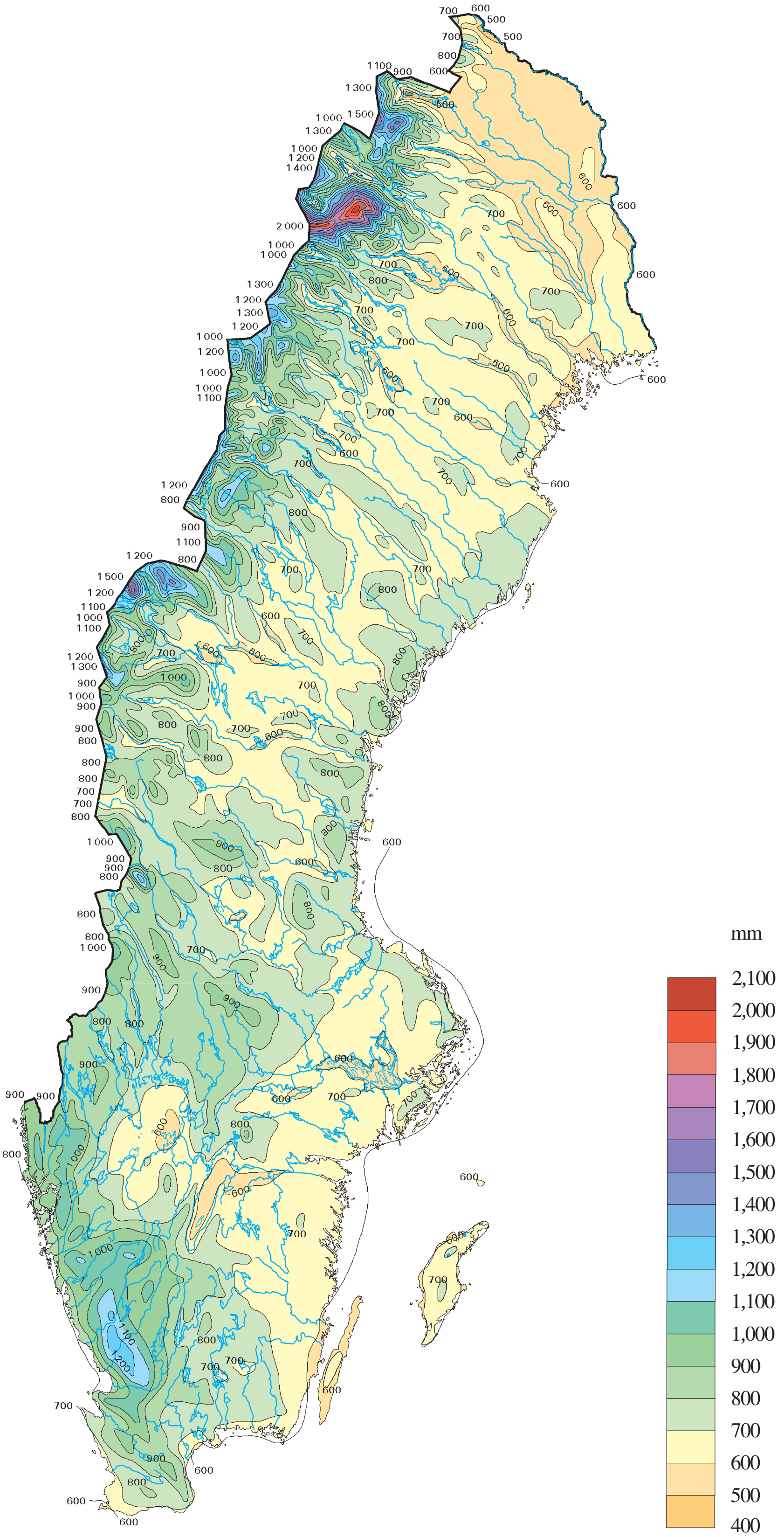

Figure 1-2. *Yearly precipitation, 1961-90. The amounts are corrected for measuring losses. (Raab and Vedin, 1995).*

followed by rising air over land. As a consequence, chaotic road conditions occur more often than in most other parts of Sweden. On these occasions the precipitation maximum usually occurs slightly inland (5 to 15 km) from the coast.

The total gauged precipitation amount holds for about 600 mm annually at the coastline. A maximum can be identified 5-15 km inland, after which the precipitation amount decreases further south-west in Uppland and a minimum is reached over Lake Mälaren with about 500 mm per year. In relative terms this geographical distribution is valid all year. The estimated true annual precipitation (adjusted for measuring losses) exceeds the gauged amounts with about 100 mm or more. (Cp. Figure 1-2.).

Disregarded the mountainous region in Northern Sweden with as high as about 2000 mm (gauged value) per year, the Swedish region with the highest precipitation is the western slopes of the South Swedish highlands with up to about 1100 mm. On the other hand, appreciably less than 500 mm of yearly mean precipitation can be found only in the northernmost part of Sweden with locally about 400 mm, though associated with considerably weaker evaporation rates than in southern Sweden.

The temperature climate is typical Central Swedish with a yearly mean of 5 to 6°C. This could be compared to Stockholm (6,6°C), Malmö (8,2°C) and Östersund (2,5°C). (Cp. Figure 1-3.). The average monthly mean temperature is in January about -4°C, in July 15 to 16°C. The vegetative period (daily mean temperature exceeding 5°C) has a duration of about 180 days, i.e. approximately half the year.

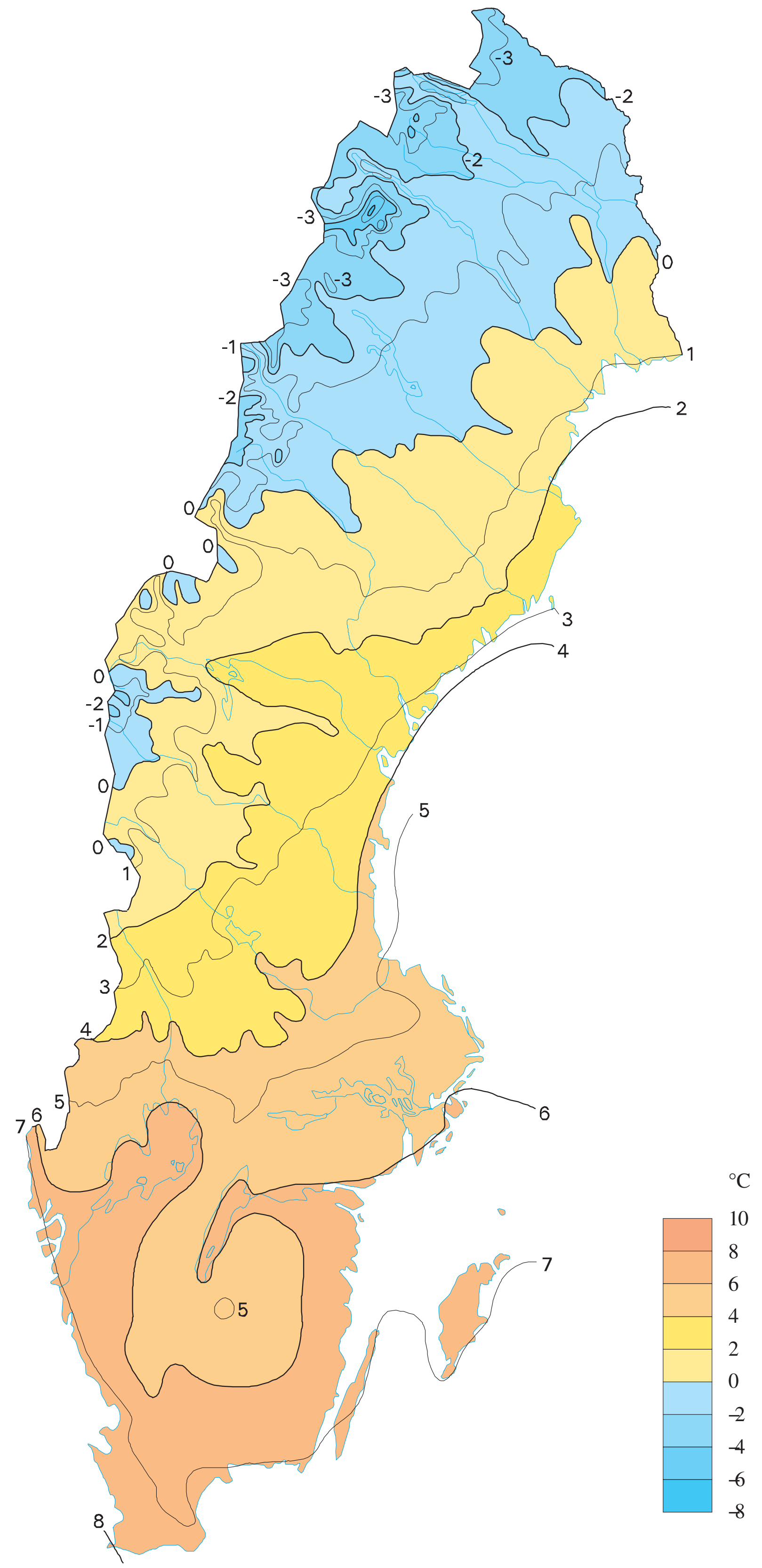

Figure 1-3. *Yearly mean temperature, 1961-90. (Raab and Vedin, 1995).*

The temperature variation over Northern Uppland largely depends on the sea-land dualism, implying smaller annual variations over sea, i.e. higher winter and lower summer temperatures than over land. This is combined with a similar day-night pattern, connected to the small diurnal variations over sea. The monthly mean temperature has its greatest coast-inland difference in November-December, with 1°C lower mean temperature 10-15 km inland from the coast than at the coastline itself. In May-June an almost as great opposite difference is at hand. May has a difference in average daily maximum temperature amounting to 2°C between locations 10 km inland relative to sites at the coastline.

The yearly sunshine time is about 1700 hours in Northeast Uppland, somewhat more (up to 1800 hours) at the coast, somewhat less (1600-1700 hours) in the interior parts. Few places in Sweden have much higher values than the studied near-coast sites. This fits in a general pattern of comparatively abundant sunshine along the coast, while in the interior of Götaland the values go down to 1300 hours. The cloudiness percentage is 65% or slightly more, as yearly mean, and does not vary much over Uppland. In early summer the cloudiness tends to decrease near the coast compared to inland conditions.

Thunderstorms occur in average about 10 days per year, slightly more inland than at the coast. This could be compared to 4-8 days in the most thunder-meagre regions in Northern Sweden, or up to 20-24 days in the part of Western Götaland that constitutes most thunder frequent district in Sweden.

The ground is covered by snow in average 120-130 days a year, with an average yearly maximum depth of snow of about 50 cm. The coast does not differ much from the conditions 10-20 km inland, but further to south-east, at Lake Mälaren, the number of snow-cover days decreases to below 100 and the mean maximum snow-depth diminishes to about 30 cm.

1.2 Climate description — hydrology

The Southeastern part of Sweden has the lowest values of specific runoff, with a mean (1961-1990) of <10 $l/s \cdot km^2$. Specific runoff for the regions Östhammar and Tierp is 6-9 $l/s \cdot km^2$. For the Oskarshamn region it is <6 $l/s \cdot km^2$. (Raab and Vedin, 1995).

For lakes in both Southern and Northern Sweden the ice freeze-up is strongly related to lake depth; it appears earlier on a lake with small depth than on a lake with great depth. The reason for this is that it takes longer for the water in a deep lake to be cooled and be stratified in autumn. For lakes in Northern Sweden there is also a relationship between ice freeze-up and lake area because a large lake is more effected by wind but also that a large lake often has a great depth. In the south of Sweden there is no such relationship; what directs time of freeze-up is here the altitude because the air temperature is mainly lower at high altitudes.

When it comes to ice break-up, there are no such significant relationships between the characteristics of different lakes like for ice freeze-up. This is because ice break-up is mostly effected by weather, especially solar radiation. The period of ice break-up is also much shorter than the period of ice freeze-up. In Southern Sweden there is no relationship between ice break-up and lake area or depth (as for Northern Sweden), but for lakes at high altitude the break-up is late. This is because air temperature during winter and spring is lower at high altitudes and the lakes can form a thicker ice-cover. (Eklund, 1999.)

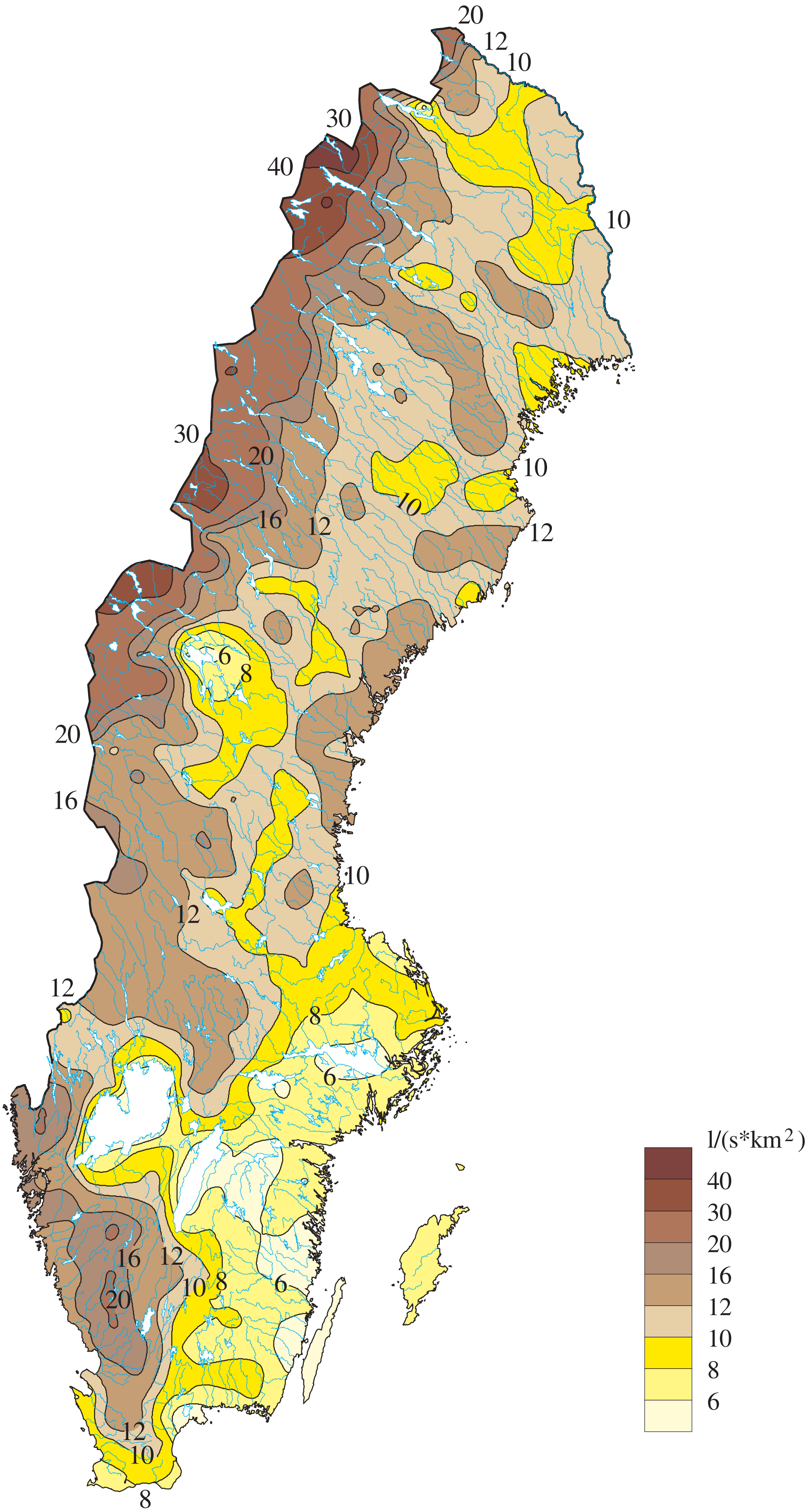

Figure 1-4. *Yearly discharge. Average for 1961-90 (Raab and Vedinl, 1995).*

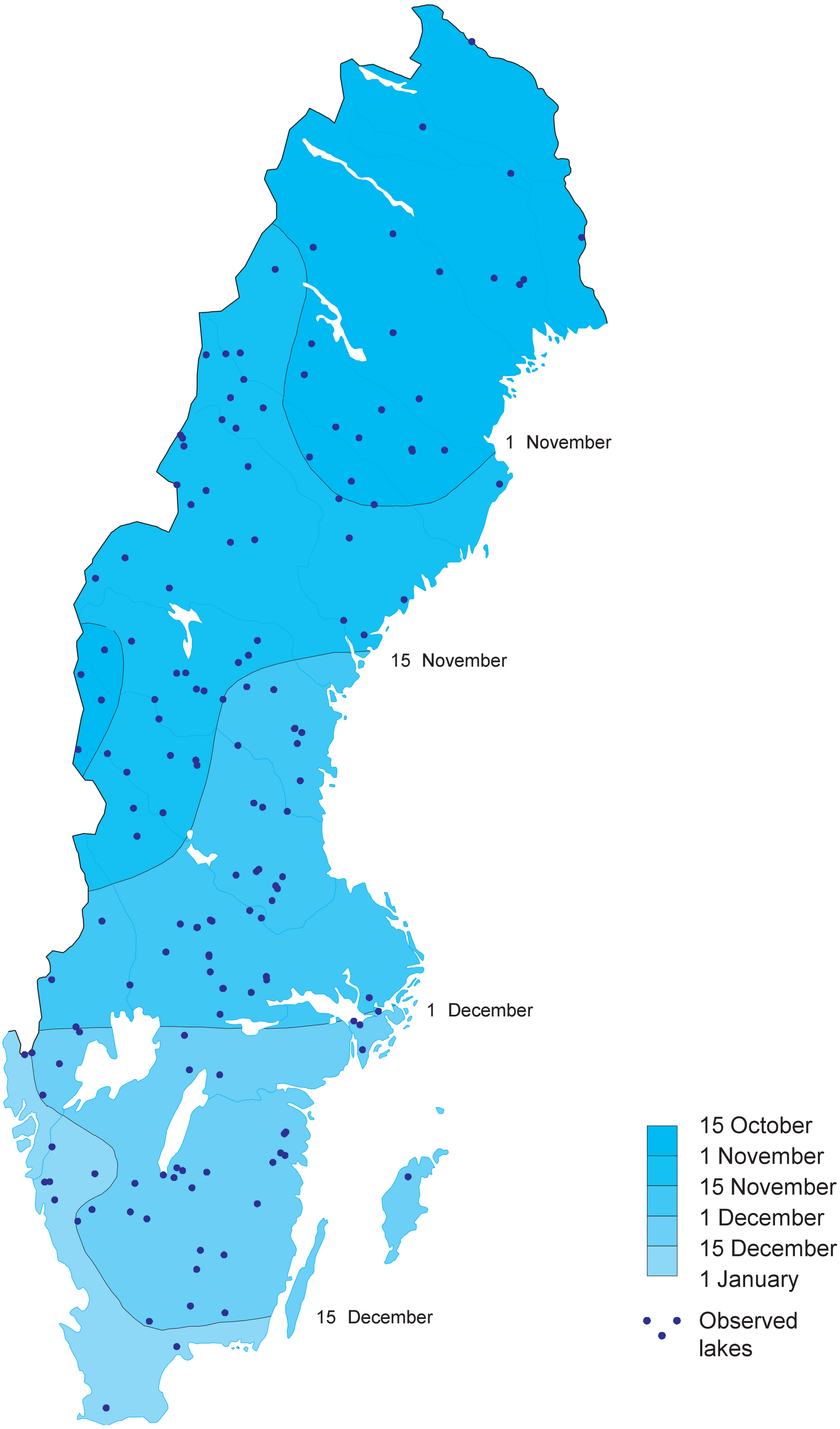

Figure 1-4. *Average date for ice freeze-up. Valid for small lakes, < 10 km² (Raab and Vedin, 1995).*

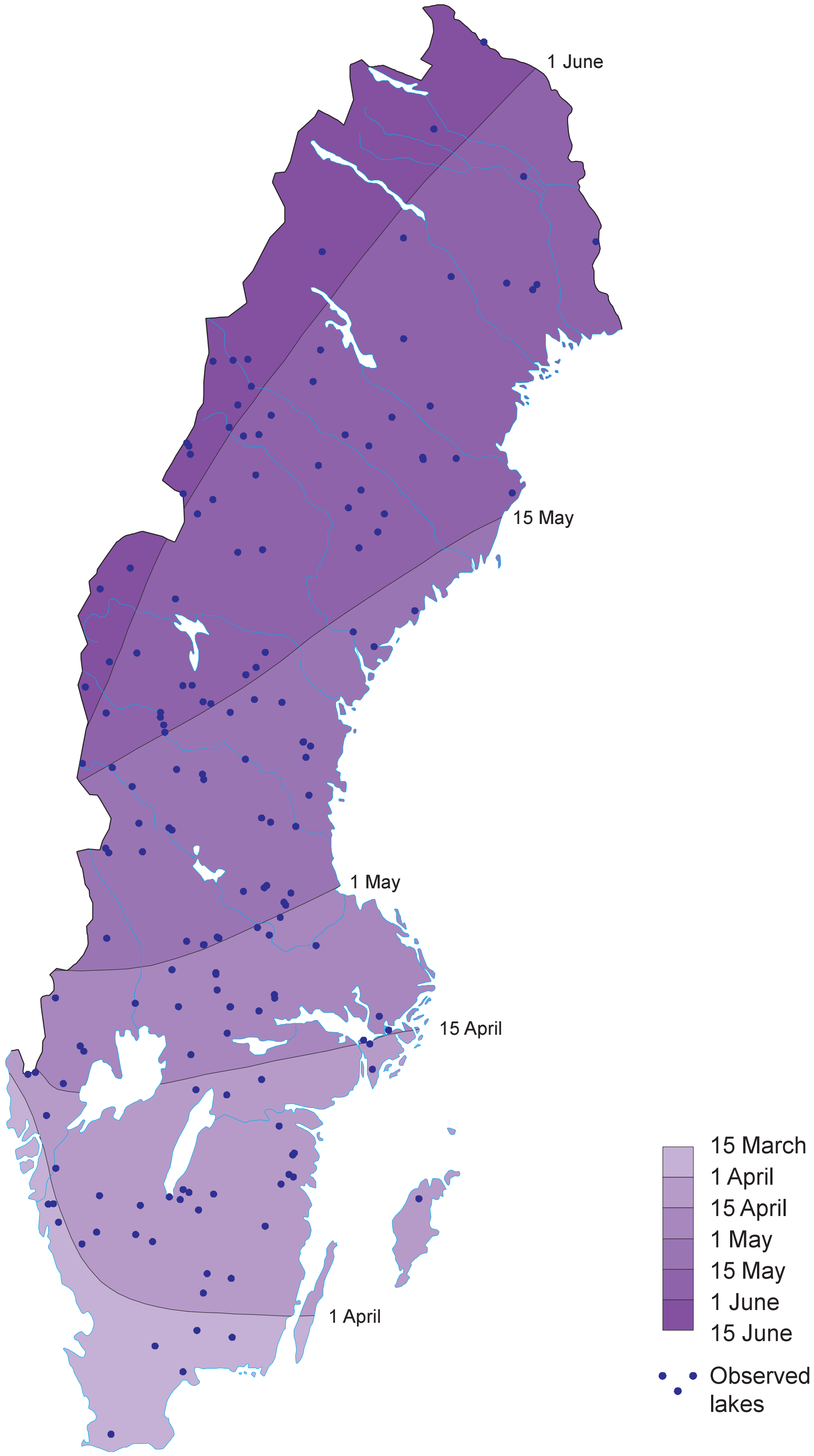

Figure 1-5. *Average date for ice break-up. Valid for small lakes, < 10 km² (Raab and Vedin, 1995.*

1.3 Climate description – oceanography

The overall hydrography in the Bothnian Sea is governed by the freshwater discharge from the rivers in the Bothnian Sea area and in the Bothnian Bay, and by the seasonal variations in the solar radiation. The melting water that is brought to the sea in spring makes the surface water less saline and causes continual weak salinity stratification. Water with higher salinity, imported from the Baltic Sea basin through the Elands Sea, is found in the deeper layers giving raise to a weak halo cline at 50 – 60 meter's depth. The concentration of oxygen below the halocline is lower and the temperature is slightly higher. This is explained by the efficient exchange of water, which takes place each fall comprising the water above the halocline (Wändahl and Bergström, 1973).

The average inflow of saltier deep water from the Baltic Sea basin has been approximated to 900 km^3/yr and average outflow of less saline surface water to 1100 km^3/yr. The average residence time for the Baltic Sea water can then be approximated to 6 years (Wändahl and Bergström, 1973).

As the spring proceeds, the increased solar radiation heats the surface water in the Bothnian Sea and temperature stratification has developed by the end of June. The depth of this surface layer is between 20 – 25 meters (Wändahl and Bergström, 1973). In the fall the surface layer is cooled and the temperature stratification breaks down. By October the temperature is again homogenous throughout the water column. During the winter months, the cooling of the uppermost surface layer can bring the temperature below 0 °C resulting in the formation of sea ice.

The shoreline between The Gävle bay and The Svartklubben consists to a relatively large part of archipelago mixed with open exposed areas. The hydrography is dominated by the freshwater discharge from rivers in The Gävle Bay but also by the wind. The freshwater discharge from the Gävle Bay travels south along the coast and passes the Öregrundsgrepen causing a lower salinity in this area than that found at the more exposed Grundkallen, east of the Gräsön. There is however no salinity stratification in the area (Wändahl and Bergström, 1973).

In the relatively open Öregrundsgrepen, the water exchange is considered good. Rapid motions in the temperature stratification have been observed indicating substantial exchange of water. During northerly winds, a counter clockwise circulation is set up. Surface water is then brought into the area pressing down the thermocline resulting in deepwater leaving the area along the bottom. During southerly winds, the circulation is clockwise and surface water is brought out of the area allowing inflow of deep water along the bottom under the thermocline. The oxygen saturation is on average 95%. Stagnation in the bottom water can occur in the deepest parts of the Öregrundsprepen, west of Gräsö (Wändahl and Bergström, 1973).

The water exchange in the area as a whole is considered average, classification 1 (Naturvårdsverket, 1999).

Summary

The waters around Forsmark and Simpevarp are both areas with good water exchange with the exception of the deepest parts of the Oregrundsgrepen where periods of stagnation can occur. Both areas are strongly affected by coastal processes induced by the local wind conditions and the stratification in the sea.

2 Methodology and statistics

In this chapter you will find information about meteorological, hydrological and oceanographical data and measuring stations in the two selected areas, Östhammar and Tierp (not oceanographical data). Data has been evaluated and different types of presentations and diagrams have been created, containing e.g. mean values, standard deviation and extreme values. The underlying statistical data you will find in the appendices. More diagrams and statistical information has been collected in a ArcView database. Data for the specially selected year, 1988, has been delivered in ASCII-format to the Swedish Nucear Fuel and Waste Management Co.

2.1 Methodology – meteorology

Complete lists of stations in the area that have data during some period for any parameter of interest were published in the earlier report, (Lindell et al, 2000). These lists include stations where observations are no longer made. In tables 2-1 and 2-4 stations with ongoing observations are listed, former stations are included only if their statistics are presented in this report. A remark is made of the information column if only one or two parameters are observed at a station. The co-ordinates in the tables are in the Swedish grid RT90.

If nothing else is stated the stations are operated by SMHI. There are also some stations operated by Swedish National Road Administration (SNRA). These stations are used to detect situations with high risk of icing (of the roadway) and are often located at "cold" places like bridges, crests and so on. Temperature, humidity (dew point), precipitation (amount and type) and wind speed and direction are registered. Most of the SNRA-stations are in operation only in winter.

Long-term average values of temperature and precipitation refer to the so-called standard normal period 1961 - 2000, which will be used until 2020 in climatological analysis. In 1995 about 100 manual weather stations were replaced by automatic ones, in many cases at a new site. The environment of a station may also change in a 40 year period in a way that has an influence on the measured values.

All stations where measurements were made for shorter periods during 1961 - 2000 have been revised and tested for homogeneity, (Alexandersson H, Karlström C, 2001). For stations with non-complete data, the missing values were interpolated using nearby stations. New so-called reference normal values referring to the present location of the stations for the period 1961-1990 were then computed. If a station has been located at the same site the entire period and no major changes in the surroundings have taken place the reference normal value is identical with the period normal, which is calculated from the measurements. In this report the interpolated values are used for monthly values of temperature and precipitation for stations without a complete data set.

MESAN is a system for analysing surface meteorological parameters and clouds. This system has been in use at SMHI for about 5 years. Field data has been saved since 1997. The analysis in MESAN refers to mean values for an area of 11x11 km^2. More details about MESAN in Lindell et al (2000) and Häggmark et al (1997). MESAN — data can also be used as a source of information for today and tomorrow. However, MESAN-data can hardly produce the small-scale variation in precipitation or temperature, which depend on differences in the local terrain or vegetation.

2.1.1 Östhammar

Apart from SMHI and SNRA weather stations, Table 2-1, there are some other sets of meteorological data.

At the nuclear power plant Forsmark there is a 100 m tall mast instrument for registration of wind (direction and speed) and temperature at several levels. Measurements started in 1975 and are still going on. Registrations on paper are kept in the archives at Forsmark. Until about 1996 data were collected by SMHI but have never been included in any easily accessed database. However, data was stored on magnetic tapes and data for the period 1992 - 1996 can be retrieved. For more details see Appendix 4.

About 2 km further to the East from Forsmark at the so called ”Biotest-lake” (biological monitoring) on a small island there is another site for wind measurements at a level of 10 m above ground and temperature at 2 m. The measurements at the Biotest-lake are performed by SMHI on behalf of The Swedish National Board of Fisheries (Fiskeriverket). Data have been collected in digital form since about 1982, but are now available from 1992 only. The collection of wind and air temperature from this site will probably cease in January 2002. The temperature measured there is however influenced by the warm cooling-water from the power plant.

Table 2-1. Existing data[1] for Östhammar

Station no	Station name	Co-ordinates,	RT90	Period	Information
10832	Örskär	671476	164097	1881-1995	No air pressure
10832	Örskär A	671475	164099	1995-	
10815	Östhammar	668510	164176	1989	Only prec
10811	Risinge	667533	163423	1962-	Only temp, prec
10725	Lövsta	670070	161437	1925-	Only prec
10714	Films Kyrkby	668149	161626	1982-2000	
10714	Films Kyrkby A	668156	161629	2000-	
9753	Uppsala Flygplats	664306	159991	1949-	
307	Uppskedika V[2]	668148	163416	1990-	
320	Dannemora V[2]	667855	161318	1990-	
324	Gräsö V[1]	670861	164362	2001-	
2994	Forsmark MAST[3]	670029	163015	1992 - 1996	Raw data
2389	Forsmark biotest[4]	670256	163118	1992 - 1998	Only wind, temp

1) More information about parameters and time periods is found in appendix 1.
2) SNRA station, Not stored in SMHI:s database. Operates during winter only.
3) Wind at 2 levels, temp at 2 levels, tempdiff at 5 levels. 1999-2001 available as 6 hour averages.
4) Operated by SMHI (”Fiskeriverket”). Wind 10m, temp 2m. Data for 1992 - 1998 are available.

Choice of meteorological data representing Östhammar

Data from SMHI-stations are used for long term statistics. Data for Örskär are regarded representative of coastal areas of Östhammar (Forsmark) for most meteorological parameters. As was noted in the introduction temperature and precipitation shows a gradient from the coast towards inland. A station as close as possible to Östhammar was chosen for the precipitation - Lövsta some km inland from the coast. Temperature is represented by data for Örskär. Data on temperature and precipitation are presented for two more stations near Östhammarto illustrate the spatial variation of these elements.

Air pressure decrease with height above sea level so measurements from different places can not be directly compared. The measured values are therefore reduced to mean sea level. The reduced air pressure does not vary much over Uppland and data for Uppsala Airport are chosen to represent Östhammar.

Temperature

The average monthly mean temperature varies between -4 °C in January-February and 15 °C in July, Figure 2-1. The year to year variation is much greater in winter months than in summer, this is clearly seen both in terms of standard deviation and in absolute maximum and minimum values. Average temperature condition in Östhammar does not differ much from Tierp although it is noticeable that the influence from the sea is greater at Örskär. The winter is slightly warmer and the winter minimum (as well as the summer maximum) occurs somewhat later in the season as compared to Tierp. Note that the extreme monthly mean temperatures refer to the period 1941 - 2000 while the averages refer to the standard normal period 1961-1990.

All data shown in figures 2-1 and 2-6 are also given in Tables App1-2--App1-7 in appendix 1.

The coldest years during the period 1961-2000 occurred in the 1980s. The winters 1985 and 1987 were quite comparable to the war winters 1940-42. However, since 1988 almost every year has been warmer than normal as measured by the yearly mean temperature. In particular this is obvious when looking at the running 5-year means. The only exception in the last decade is 1996 when the yearly mean was very close to normal.

Temperature diagrams are shown for two more places near Östhammar, Risinge (some 10 km inland) and Films Kyrkby about 15 km further inland. The coast-inland differences mentioned in section 1 are clearly reflected by data for these stations. The temperature at Örskär in December is 1,7 °C higher than at Risinge. On the other hand the summer temperature is somewhat lower at the coast (0,2 °C) but the main difference is that the temperature at inland stations increase more rapid in the spring. Temperature data for the two inland stations, Risinge and Films Kyrkby, are very similar, see figures 2-3 to 2-6.

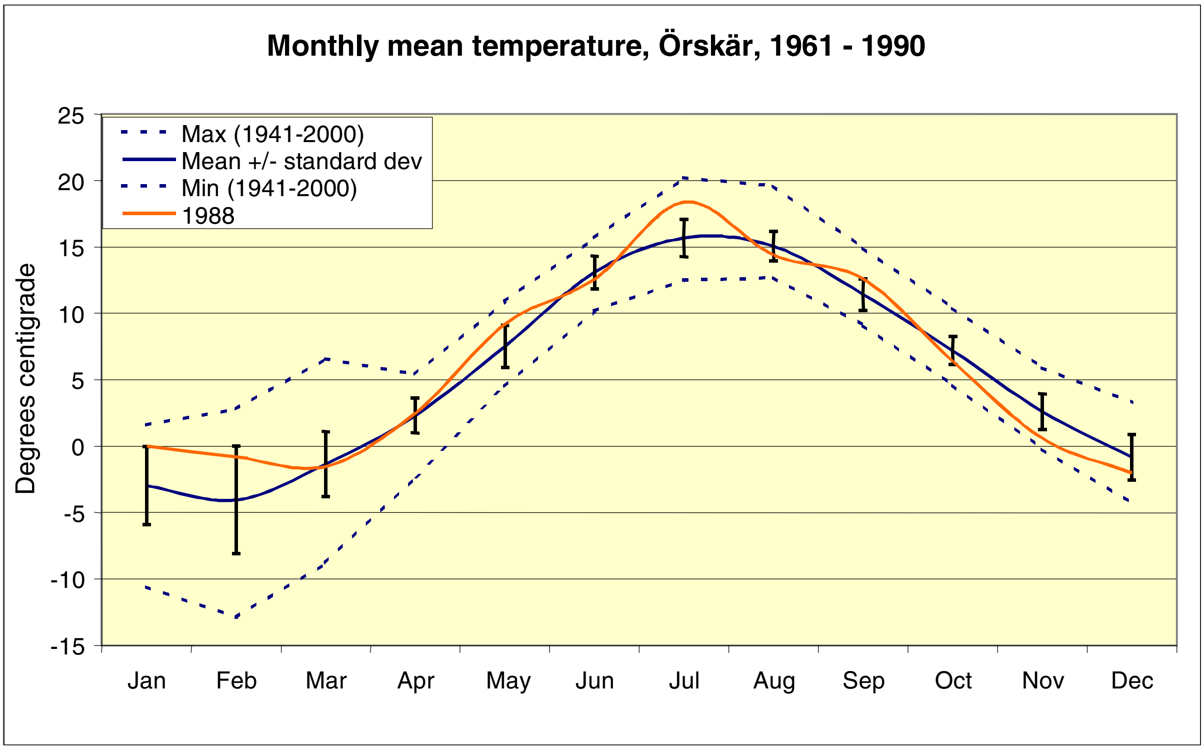

Figure 2-1. *Monthly mean temperature for the standard normal period 1961-1990, Örskär. Vertical lines represent standard deviation and dashed lines maximum and minimum of monthly mean temperature. Monthly means for the selected year 1988 are included (red line).*

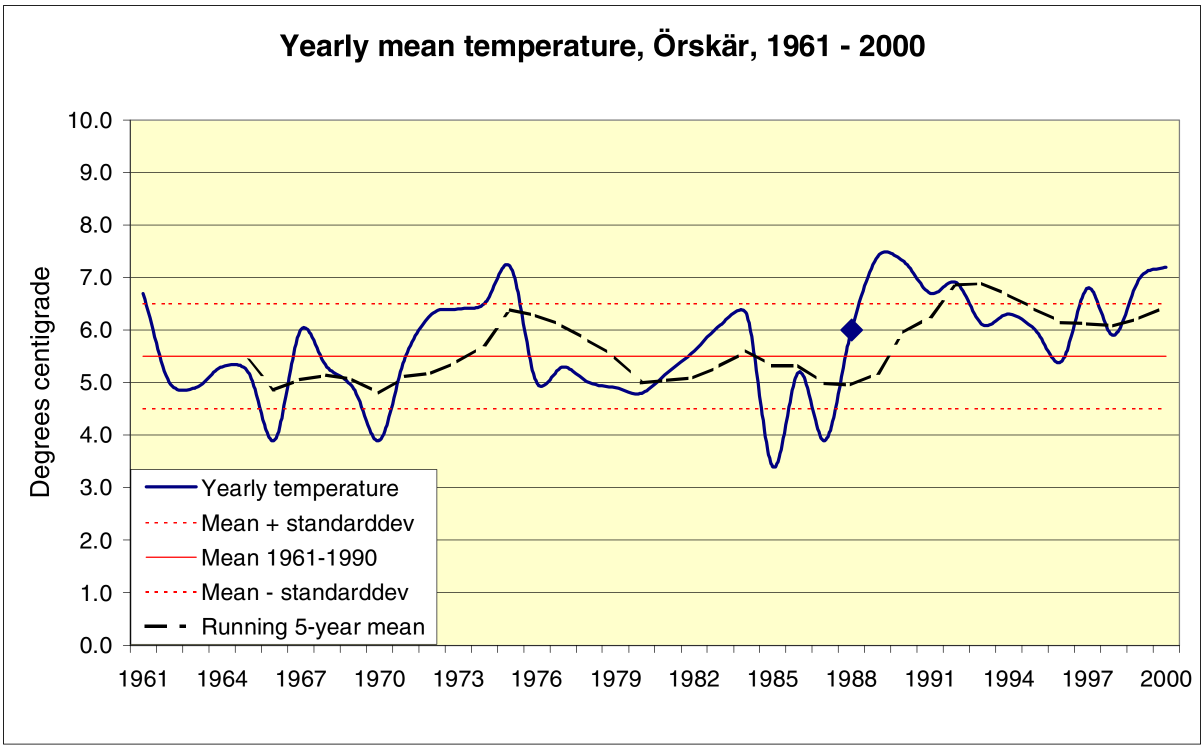

Figure 2-2. *Yearly mean temperature for the period 1961-2000, Örskär and running 5-year mean temperature (dashed curve). Average yearly mean temperature for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). Diamond refers to the year 1988.*

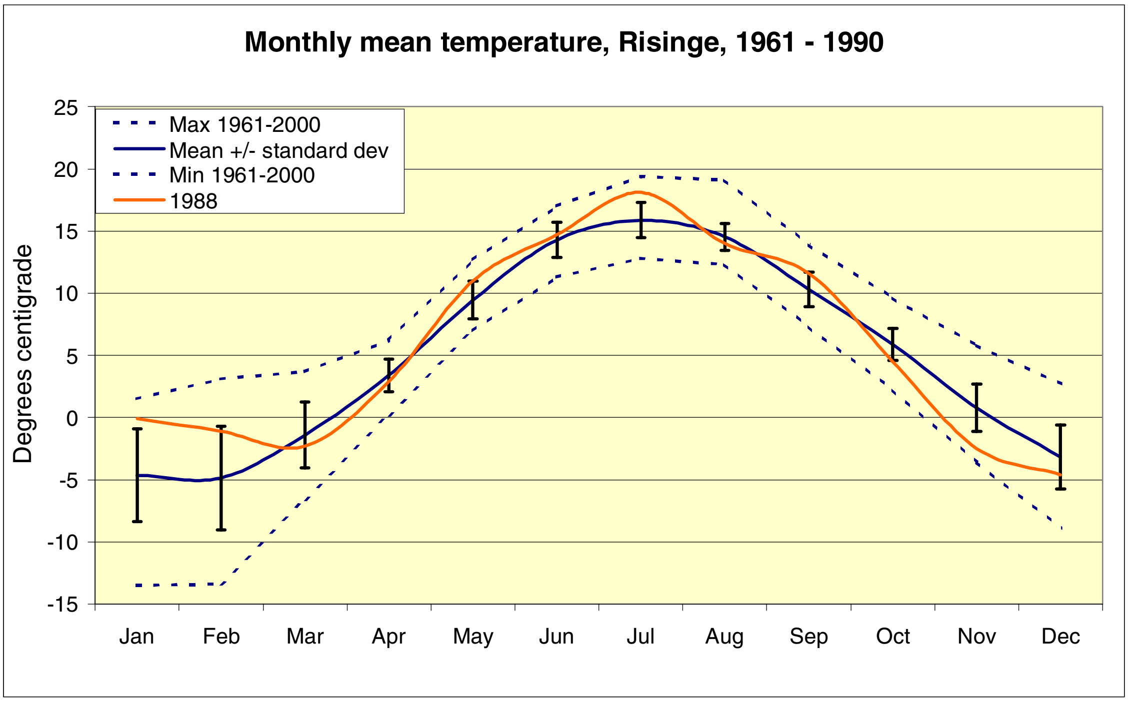

Figure 2-3. *Monthly mean temperature for the standard normal period 1961-1990, Risinge. Vertical lines represent standard deviation and dashed lines maximum and minimum of monthly mean temperature. Monthly means for the selected year 1988 are included (red line)*

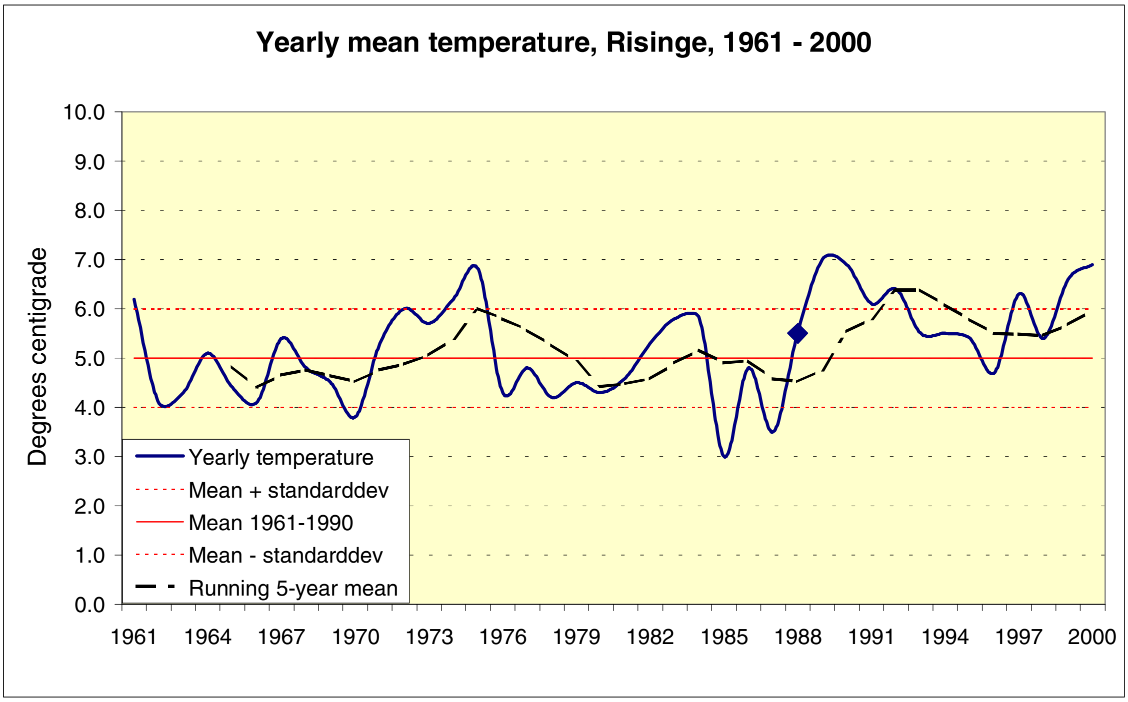

Figure 2-4. *Yearly mean temperature for the period 1961-2000, Risinge and running 5-year mean temperature (dashed curve). Average yearly mean temperature for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). Diamond refers to the year 1988*

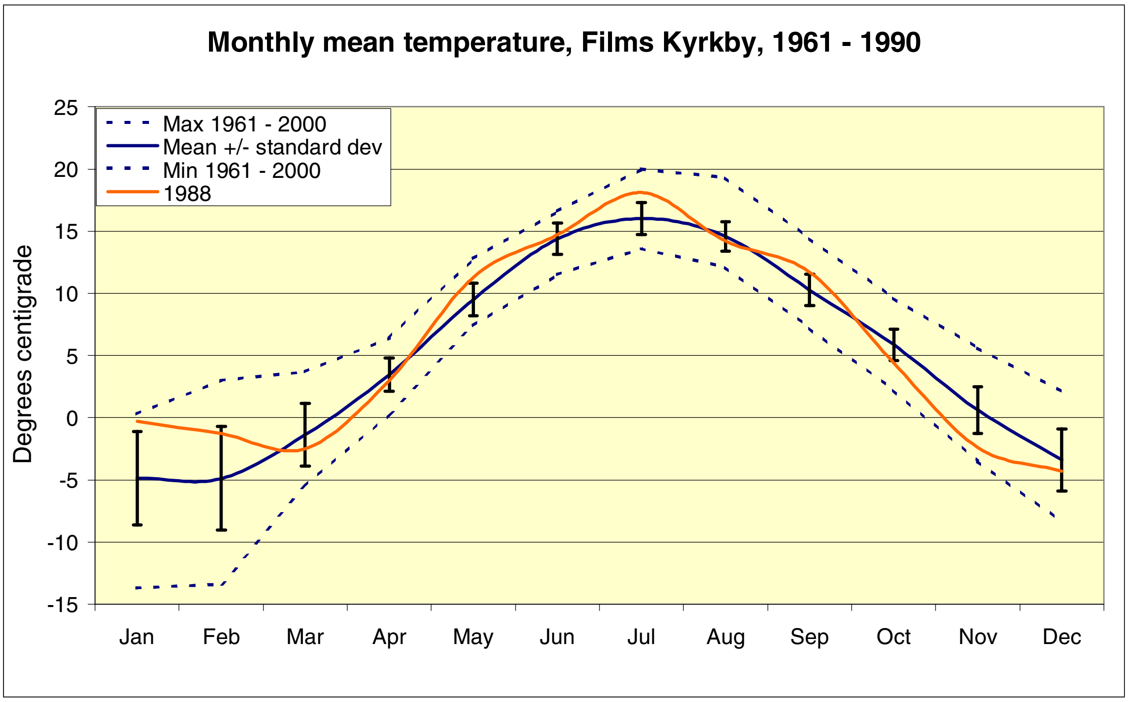

Figure 2-5. *Monthly mean temperature for the standard normal period 1961-1990, Films Kyrkby. Vertical lines represent standard deviation and dashed lines maximum and minimum of monthly mean temperature. Monthly means for the selected year 1988 are included (red line)*

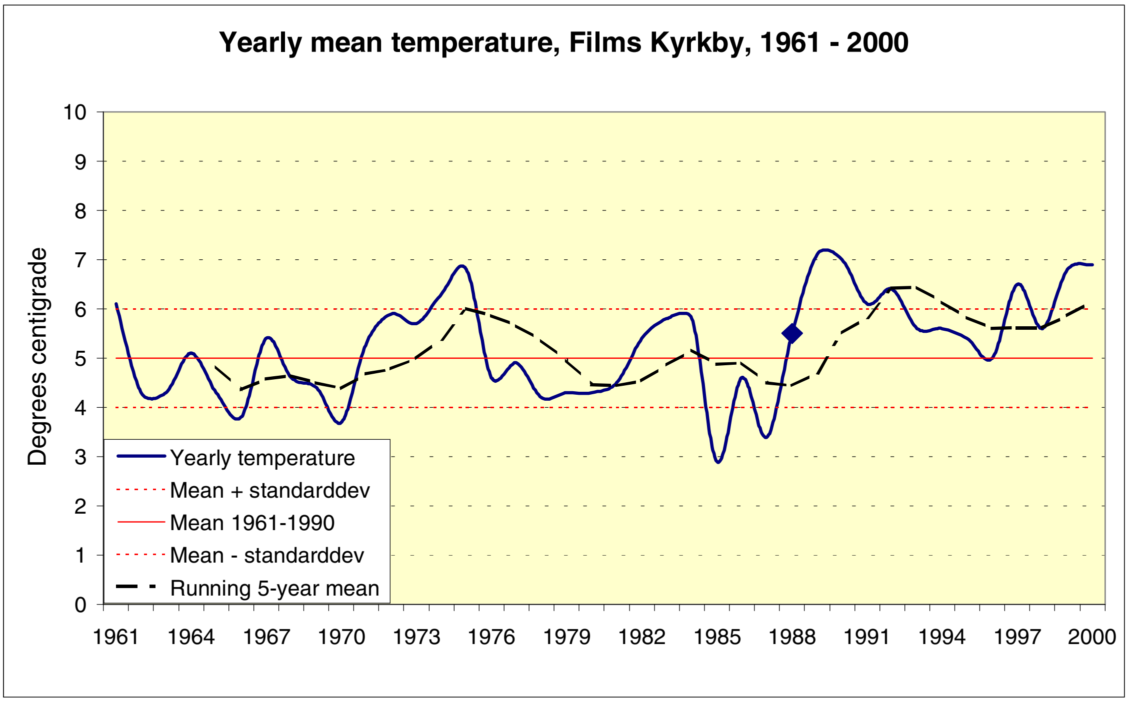

Figure 2-6. *Yearly mean temperature for the period 1961-2000, Films Kyrkby and running 5-year mean temperature (dashed curve). Average yearly mean temperature for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). Diamond refers to the year 1988*

Precipitation

Measured precipitation shows a large variation from place to place, in Uppland the maximum occurs some km inland from the coast. It has minimum at the coastline but declines also further inland from the maximum. As an example Lövsta (about 10 km from the coast) receives 60-70 mm more precipitation per year than the island Örskär. On the other hand Lövsta receives about 30 mm more per year than Untra in Tierp (about 20 km inland).

The measured precipitation is always less than the real. There are losses because of evaporation, adhesion and above all because of wind especially when it is snowing, (Eriksson, 1983). Monthly and yearly sums of precipitation given here have been corrected for measuring losses. The correction factors are given in Table 2-2.

Table 2.2 Correction factors[1)] for adjusting measured precipitation

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Örskär	1.353	1.346	1.240	1.172	1.172	1.147	1.160	1.162	1.164	1.156	1.226	1.333	1.207
Lövsta	1.275	1.286	1.147	1.100	1.105	1.093	1.101	1.105	1.099	1.100	1.159	1.268	1.150
Risinge	1.289	1.265	1.167	1.111	1.097	1.093	1.104	1.097	1.108	1.105	1.161	1.283	1.149
Östhammar	1.273	1.281	1.156	1.111	1.111	1.106	1.108	1.104	1.103	1.105	1.164	1.286	1.148
Untra	1.245	1.237	1.114	1.073	1.077	1.071	1.070	1.076	1.074	1.070	1.123	1.236	1.121

1) Correction factors have recently been modified and will be published within a year. These are the new (modified) ones. (Alexandersson, 2002?)

Monthly sums of precipitation for Lövsta, Örskär, Risinge and Östhammar are shown in Figure 2-7, 2-9, 2-11 and 2-13 and Tables App1-8, App1-9, App1-11, App1-12 and App1-14 in appendix 1. The monthly sum of precipitation are much larger in the summer (about 90 mm in July-August) than in the winter (about 40 mm in March-April). The variation from one year to another is also greater in summer. The extreme values (measured, not adjusted for measuring losses) refer to all the 20th century. The maximum values show the same annual pattern as the averages with the highest maximum in August and the smallest in February.

The year to year variation of yearly sum of precipitation is illustrated in Figure 2-8, 2-10 and 2-12 and in Tables App1-10, App1-13 and App1-15 in the Appendix 1 for the period 1961 - 2000. The greatest value in these years (1252 mm in 1981) is about 3 times the least one (411 mm in 1972). It has been said, (Raab and Vedin, 1995), that in a 10-year period will the monthly sum of precipitation vary between 30 and 200% of the normal value for each month. About 25-30 % of yearly precipitation falls as snow (Raab and Vedin, 1995).

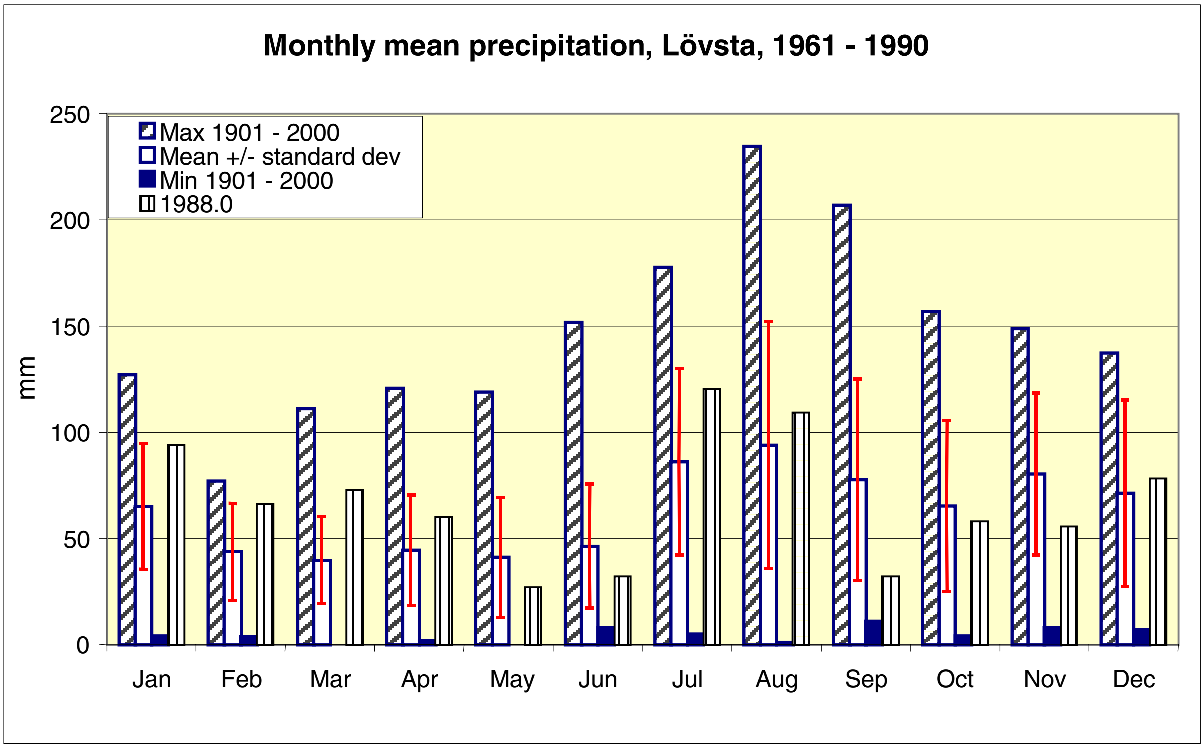

Figure 2-7. *Average monthly sum of precipitation for the standard normal period 1961-1990, Lövsta (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for 1988 are also included (striped columns).*

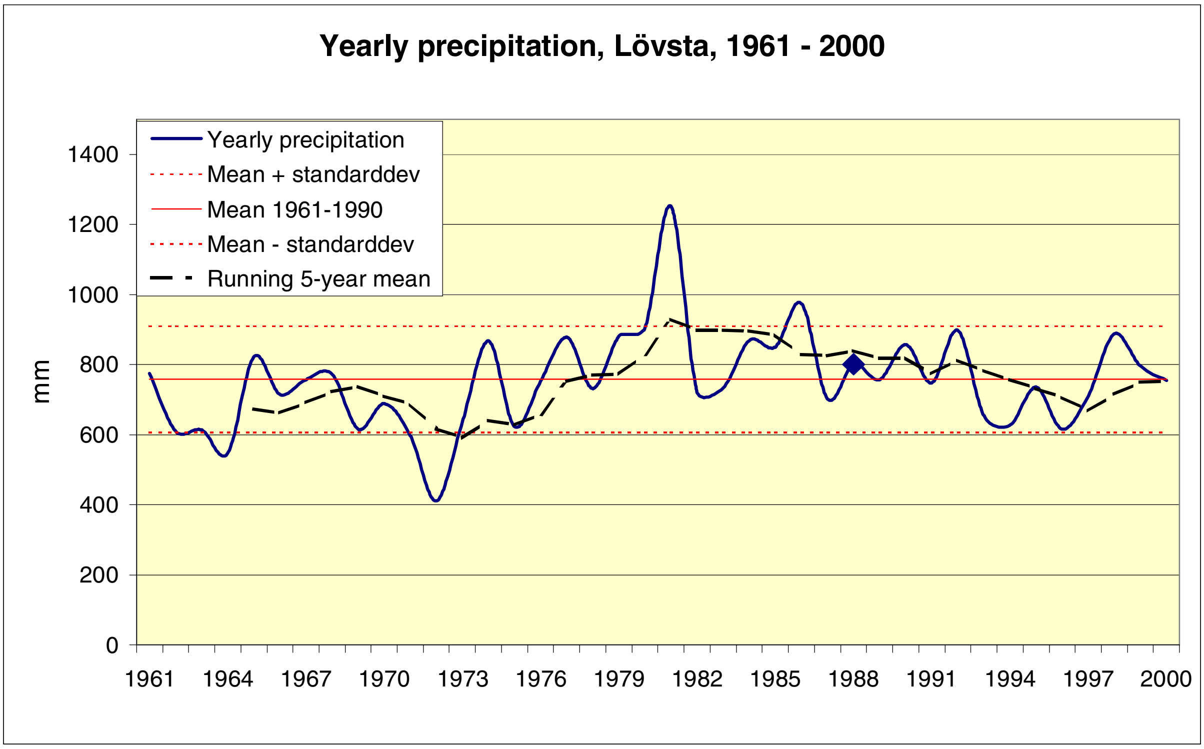

Figure 2-8. *Yearly sums of precipitation (continuous curve) for the period 1961- 2000, Lövsta and running 5-year mean sum of precipitation (dashed curve). Average yearly precipitation for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). The year 1988 is marked with a diamond. Corrected values for measuring losses.*

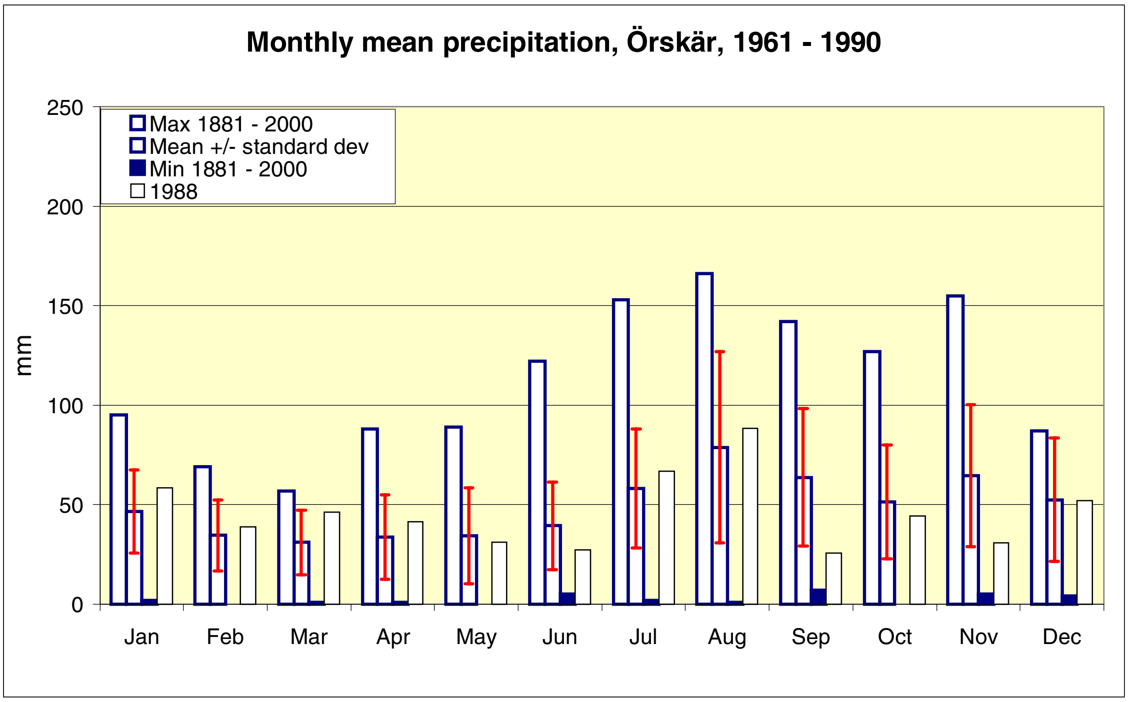

Figure 2-9. *Average monthly sum of precipitation for the standard normal period 1961-1990, Örskär (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for 1988 are also included (striped columns).*

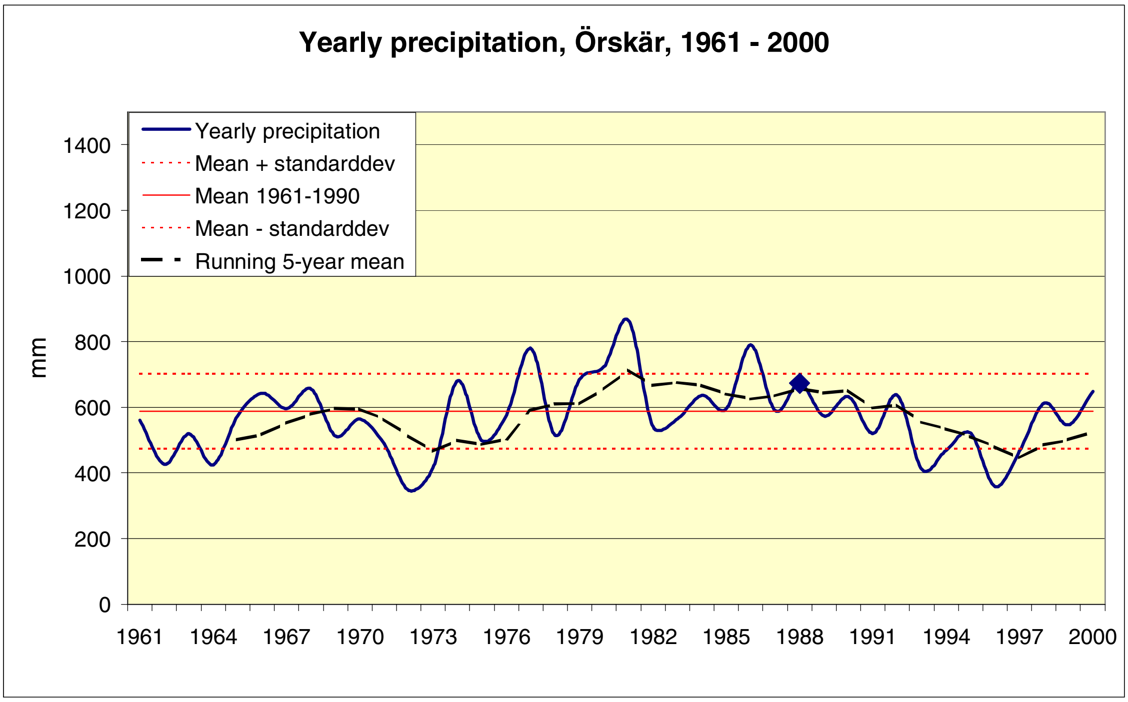

Figure 2-10. *Yearly sums of precipitation (continuous curve) for the period 1961- 2000, Örskär and running 5-year mean sum of precipitation (dashed curve). Average yearly precipitation for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). The year 1988 is marked with a diamond. Corrected values for measuring losses.*

To show the spatial variation corresponding diagrams are given for Örskär and Risinge. Risinge is situated about the same distance from the coast as Lövsta but further to the South. The precipitation amount is less (5 - 25 mm) at Örskär than at Lövsta every month, while differences between Risinge and Lövsta are quite small.

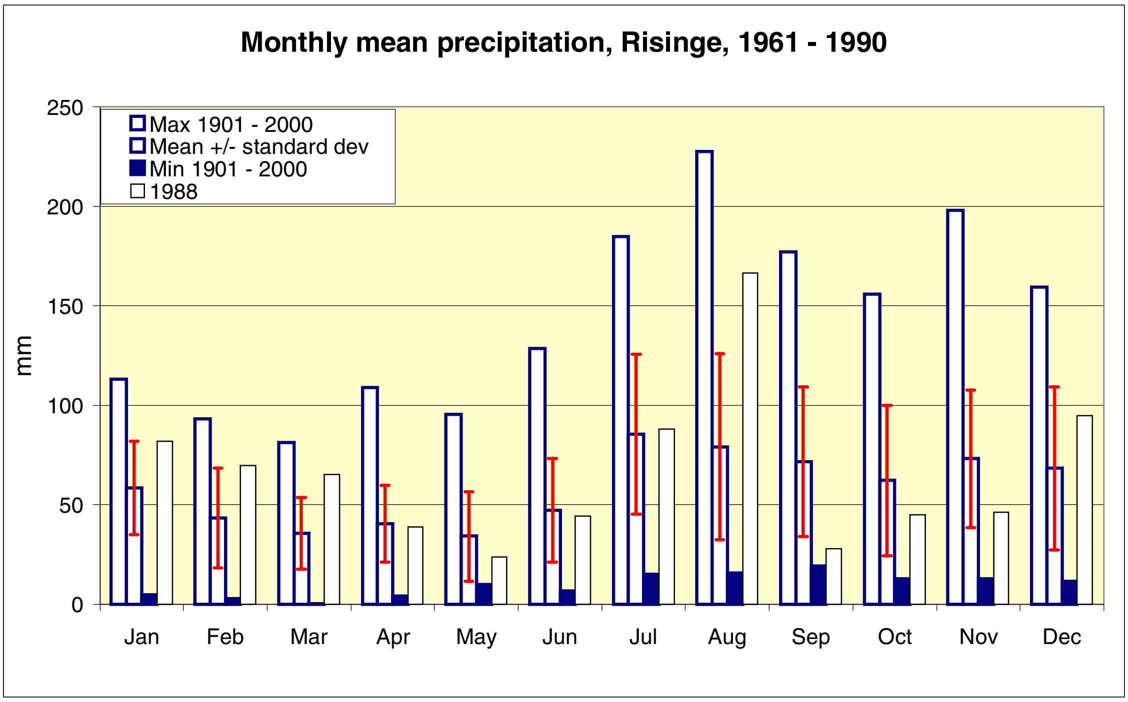

Figure 2-11. *Average monthly sum of precipitation for the standard normal period 1961-1990, Risinge (unfilled columns), max and min . Vertical lines represent standard deviation about mean. Monthly sums for 1988 are also included (striped columns)*

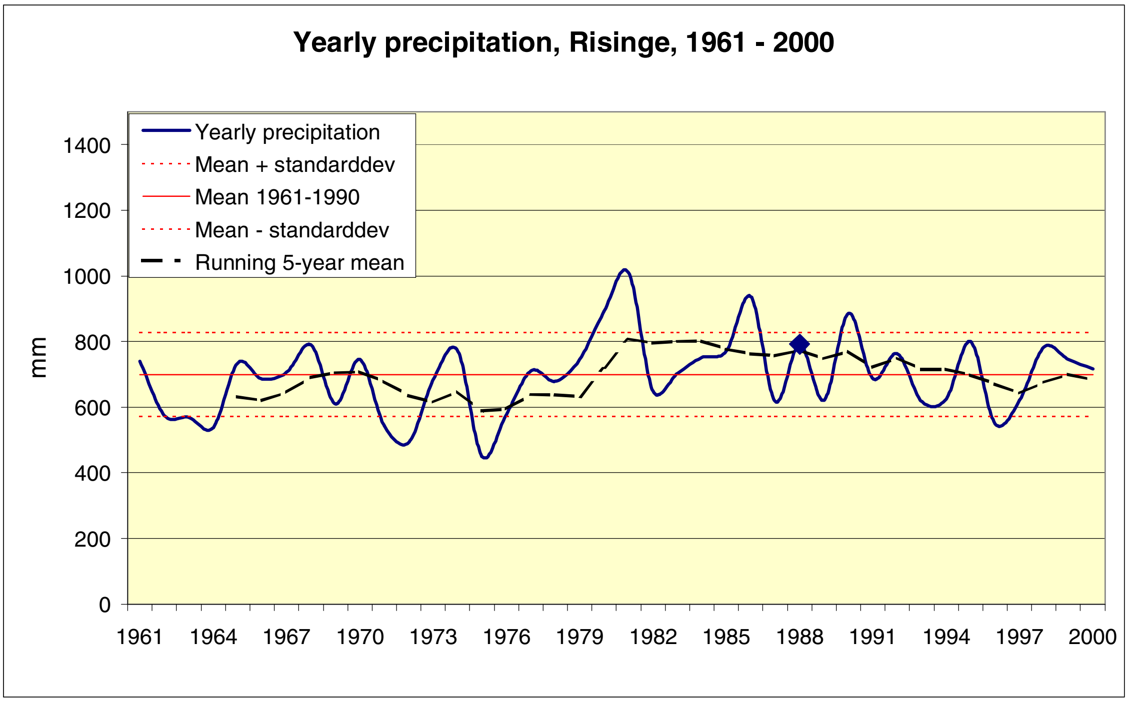

Figure 2-12. *Yearly sums of precipitation (continuous curve) for the period 1961- 2000, Risinge and running 5-year mean sum of precipitation (dashed curve). Average yearly precipitation for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). The year 1988 is marked with a diamond. Corrected values for measuring losses.*

Since 1989 measurements of precipitation are made in the small town of Östhammar. Yearly amount of precipitation is mostly 50 - 100 mm less in Östhammar than in Lövsta but about 100 mm more than at Örskär.

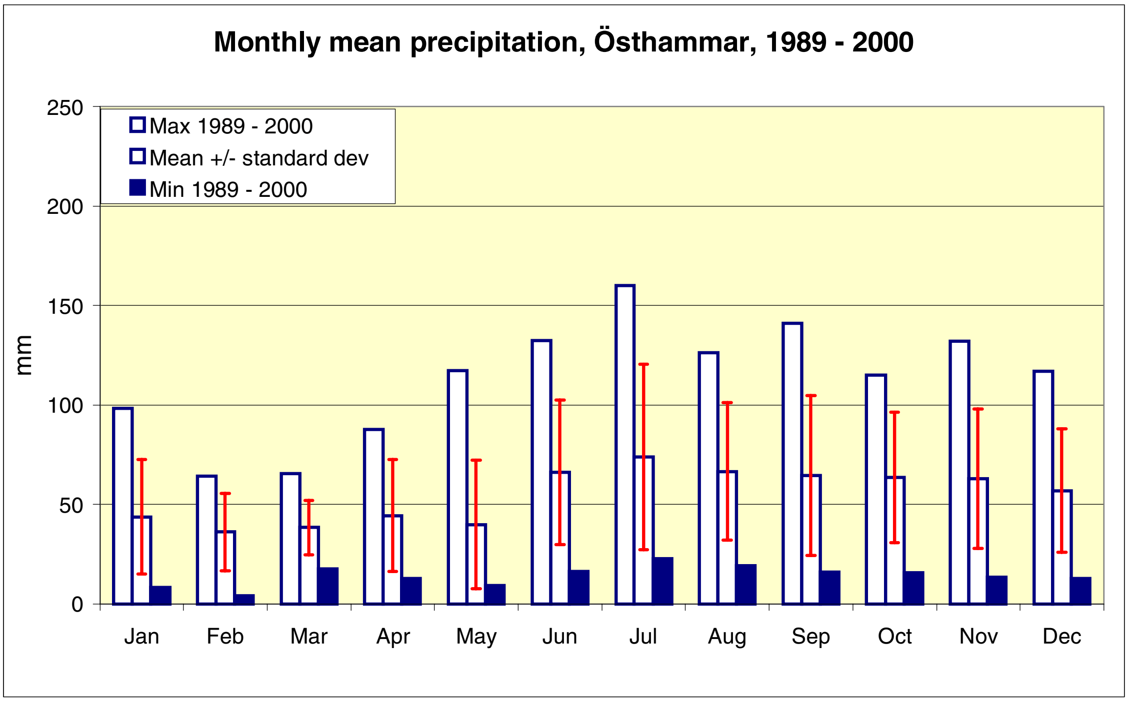

Figure 2-13. *Average monthly sum of precipitation for the period 1989-2000, Östhammar (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for 1988 are also included (striped columns).*

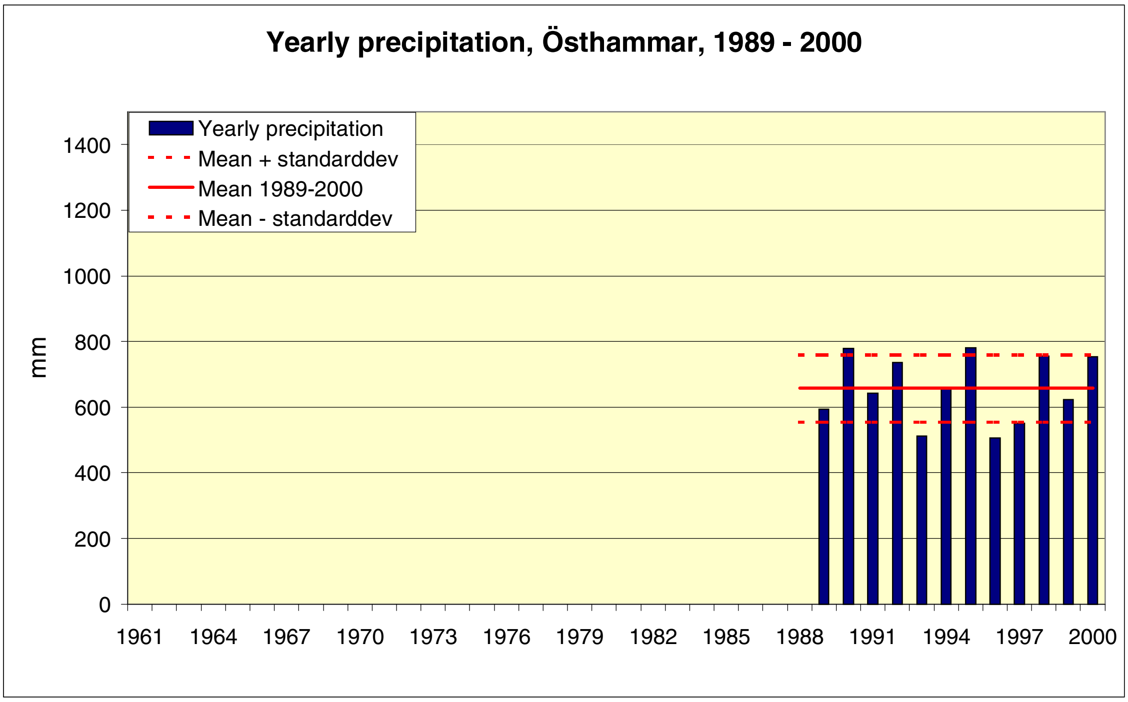

Figure 2-14. *Yearly sums of precipitation (continuous curve) for the period 1989- 2000, Östhammar. Average yearly precipitation for period 1989-2000 +/- one standard deviation are drawn (red continuous and dotted lines). Corrected values for measuring losses*

Potential evapotranspiration

Potential evapotranspiration is a measure of the ability of the atmosphere to remove water from the surface through the processes of evaporation and transpiration assuming no control of water supply. Usually the Penman formula is used to estimate potential evapotranspiration with data on global radiation, air temperature, air humidity and wind speed as input. The Penman formula gives a realistic estimate of evapotranspiration from a grass surface and short crops when there is no shortage of water.

There are no measurements of actual evaporation run by SMHI but a hydrological model is used to calculate evaporation in Sweden. The actual evaporation is calculated from potential evaporation and soil water. Evapotranspiration has been calculated as long term annual and monthly mean values for the period 1961-1990 (Brandt et al, 1994, Brandt and Grahn, 1998). This evaporation information is available for 25*25 km squares.

Monthly and annual means of potential evapotranspiration for the period 1961-78 have been calculated for many Swedish weather stations using the Penman formula with routine meteorological observations (Eriksson, 1981).

The same method is used to estimate potential evapotranspiration for the period 1961-2000 (when possible) for temperature stations in the area. Meteorological parameters needed are daily mean of temperature, wind speed, cloud amount and humidity (vapour pressure). Global radiation is estimated by a simple formula involving cloud amount. For winter months the Penman formula gives values close to or below zero. On the other hand the formula was not developed with winter conditions in mind and these values should be used with caution.

If more than five daily values are missing the monthly value is missing. The monthly mean values are calculated as the mean of the non-missing values, but when the yearly sum is calculated the missing monthly values (if it is only one or two) has been replaced by the long-term mean for the month in question.

The results are presented in diagrams and tables similar to those of precipitation.

At Örskär air humidity has been reported only since November 1968. Potential evapotranspiration has been calculated for the period 1969 - 2000, Figure 2-15 and 2-16. In 1995 the manually operated station was replaced by an automatic one and in connection with that a two months period lacking observations. The cloud amount measured by automatic stations is somewhat less reliable than those made by a skilled observer. The instrument can not detect high clouds; total cloud amount is therefore underestimated. On the average the potential evaporation in summer at Örskär is about 100 mm per month and 500 mm per year.

In Risinge only temperature and precipitation are measured and no calculation of potential evaporation can be made.

At Films Kyrkby measurements of humidity started in 1963. Potential evapotranspiration has been calculated for the period 1963 - 2000. There are however many periods of 7-10 days without enough observations for the calculations to be fulfilled at this station. Especially is it so for July and December. Over the total period 1963 - 2000 there is loss of about 17% of daily values of potential evapotranspiration. In 1981 in connection with a shift of observers there was a two months period lacking observations. In June 2000 an automatic station was started in Films Kyrkby. In order to fill the gaps calculations were made with data for Uppsala Airport for the missing days.

The potential evapotranspiration is about the same for Uppsala and Films Kyrkby. The result is shown in Figure 2-17 and 2-18. Summer values of potential evapotranspiration are about 10 mm lower per month in Films Kyrkby than at Örskär and yearly values are about 400 mm.

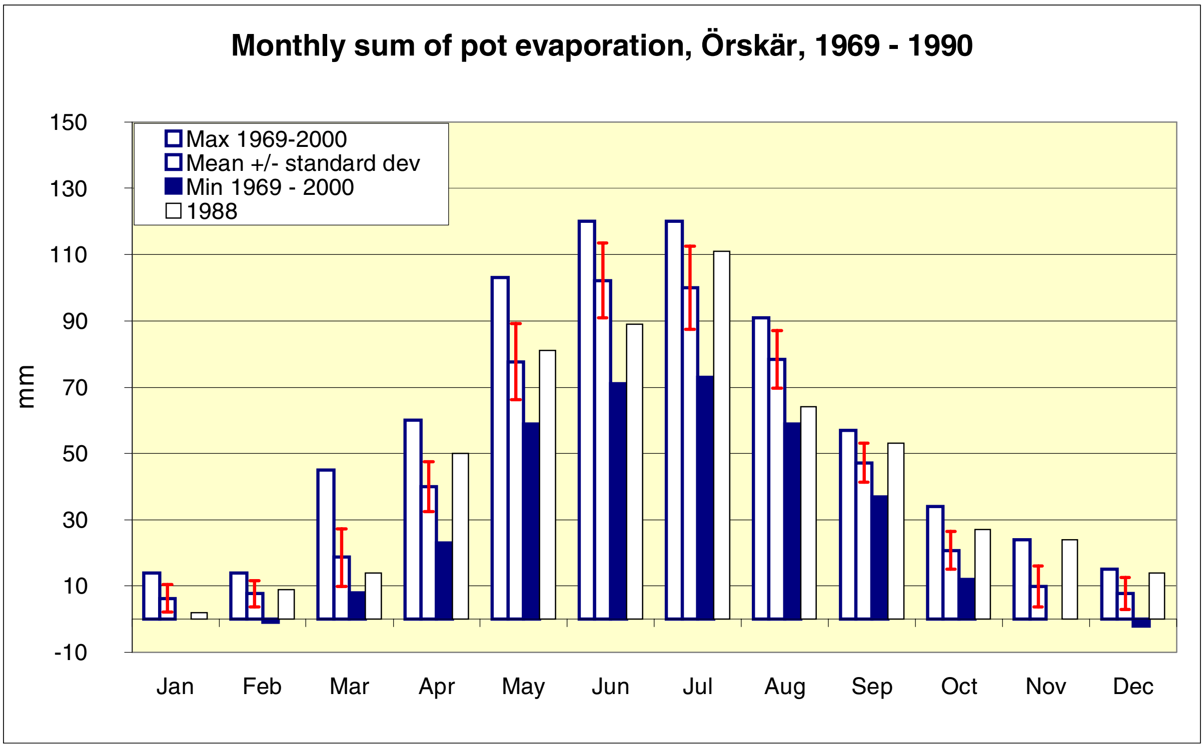

Figure 2-15. *Average of the monthly sum of potential evapotranspiration for the period 1969 -1990, Örskär (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for selected year 1988 are also included (striped columns)*

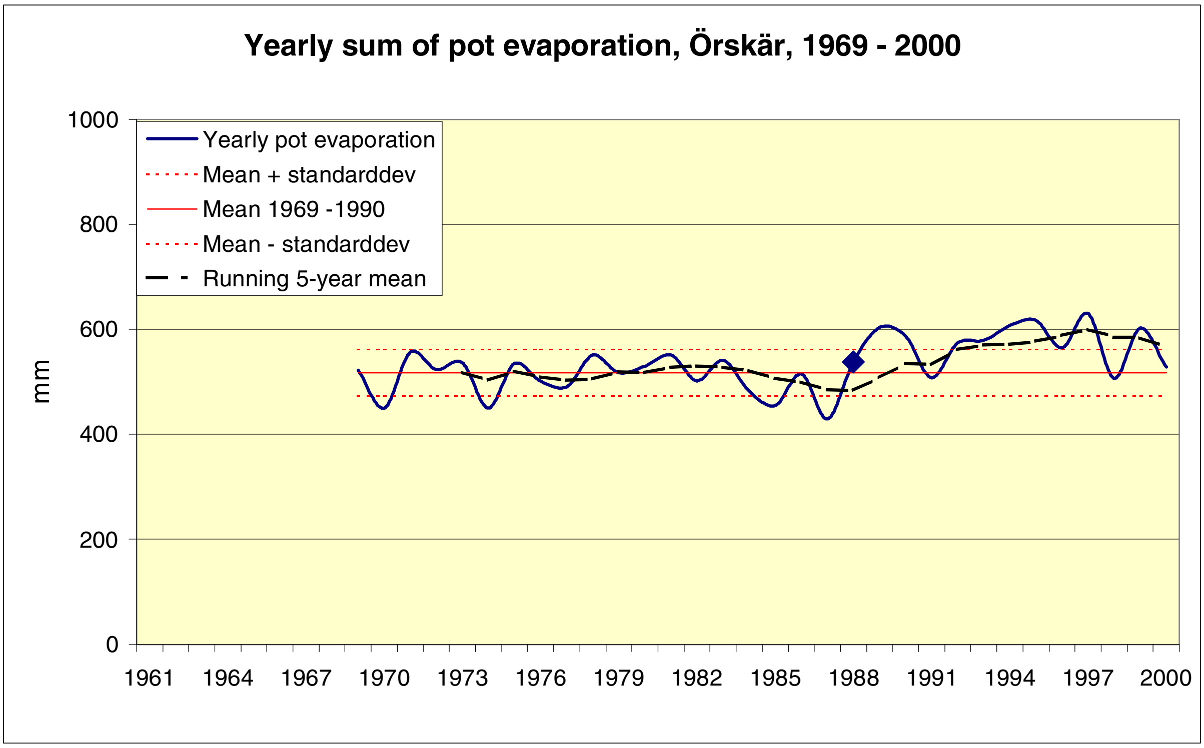

Figure 2-16. *Yearly sums of potential evapotranspiration (continuous curve) for the period 1969 - 2000, Örskär and running 5-year mean sum of potential evapotranspiration (dashed curve). Average yearly potential evapotranspiration for the period 1969-1990 +/- one standard deviation is drawn (red continuous and dotted lines). The year 1988 is marked with a diamond.*

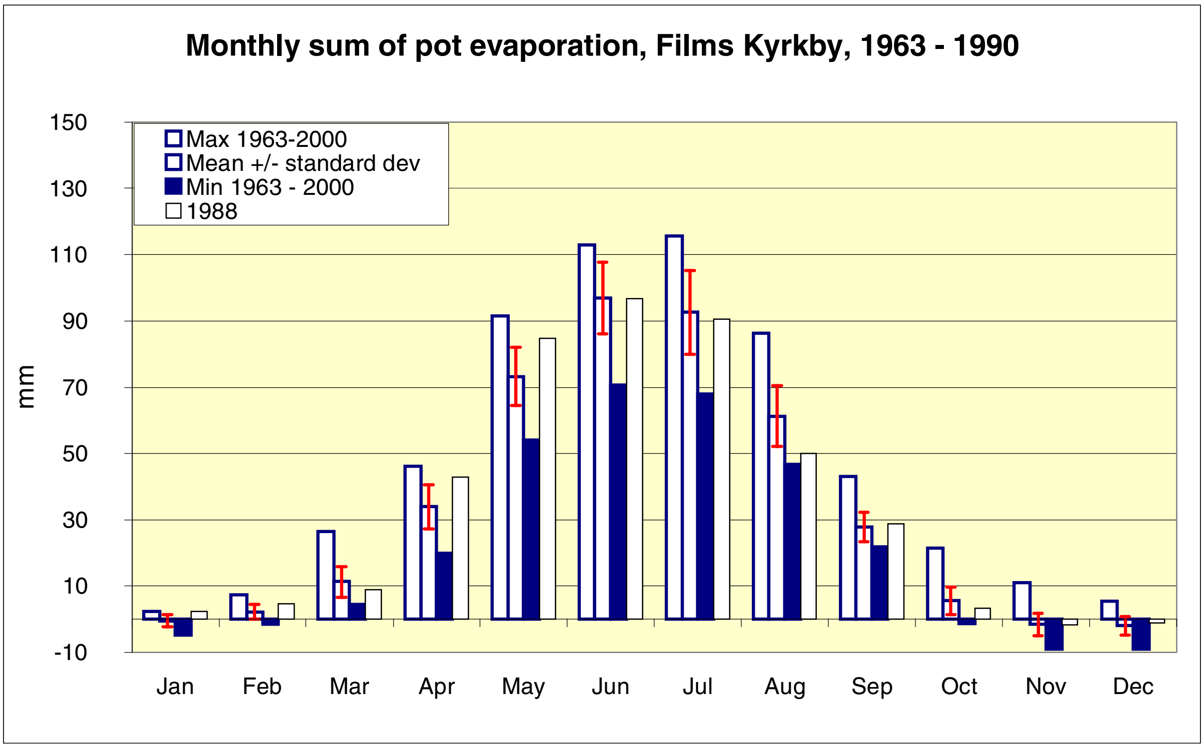

Figure 2-17. *Average of the monthly sum of potential evapotranspiration for the period 1963 -1990, Films Kyrkby (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for selected year 1988 are also included (striped columns)*

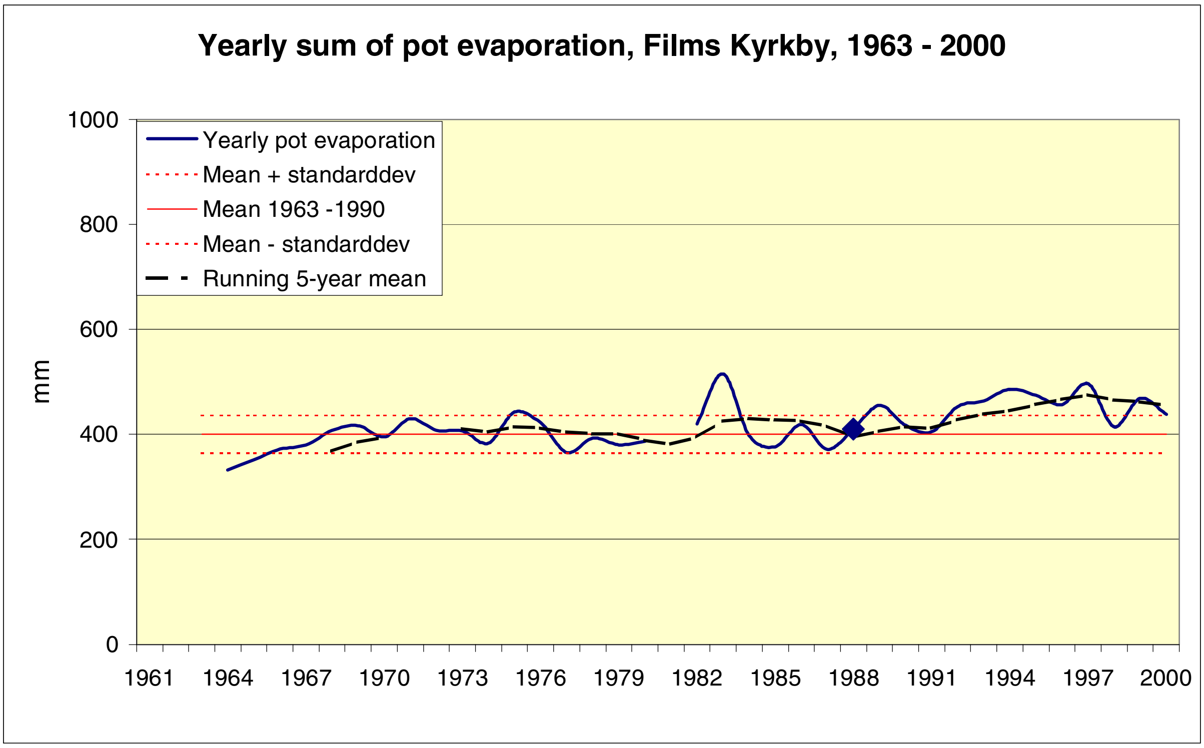

Figure 2-18. *Yearly sums of potential evapotranspiration (continuous curve) for the period 1963 - 2000, Films Kyrkby and running 5-year mean sum of potential evapotranspiration (dashed curve). Average yearly potential evapotranspiration for the period 1963-1990 +/- one standard deviation is drawn (red continuous and dotted lines). The year 1988 is marked with a diamond*

Relative Humidity

The most well known measure of humidity is relative humidity, which is expressed in per cent. percentageIn saturated air the relative humidity is 100% and in the air on a summer day it is usually 40-60%.

At Örskär measurements of humidity started in 1969, observations are made every 3 hours. Figure 2-5 shows the diurnal and annual variation of average relative humidity (%) for the period 1969-1990. The isoplethdiagram is based on the mean values of all data for each combination of hour and month (at most 682 observations).

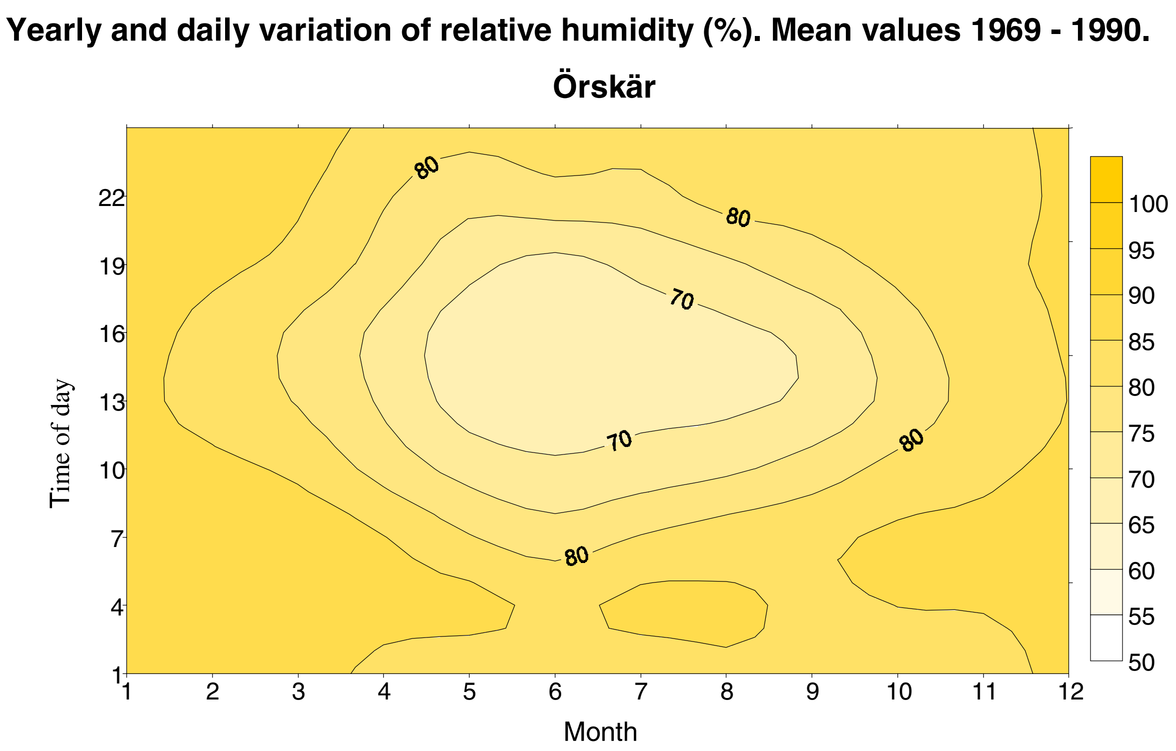

Figure 2-19. *Diurnal and annual variation of relative humidity (%), Örskär. Mean values for period 1969 -1990.*

On the average the relative humidity is over 85% all day in midwinter. In the summer it has a marked diurnal cycle with 80 - 100% at night and less than 70% at noon. The pattern shown for Örskär is typical of the coastline. Variations are greater inland, compare Fig 2-30 in the Tierp section (2.1.2).

Global radiation

Like many other meteorological parameters the global radiation shows a significant variation between coastal and inland areas. This depends mainly on differences in cloudiness. In the summer it is often overcast over land but clear sky over sea. In the winter differences between north and south is more important.

Global radiation has only been measured at 12 places in Sweden since the late 1950s. Cloud observations has been made at many places. In this work global radiation has been computed (Taesler and Andersson, 1984). The basis for the computations is the synoptic observations from Örskär. In Figure 220 average monthly sums of global radiation for the period 1961 -1990 are presented together with standard deviation and extreme monthly values. The selected year 1988 is also included.

All data shown in figure 2-20 are also given in Table App1-20 in appendix 1.

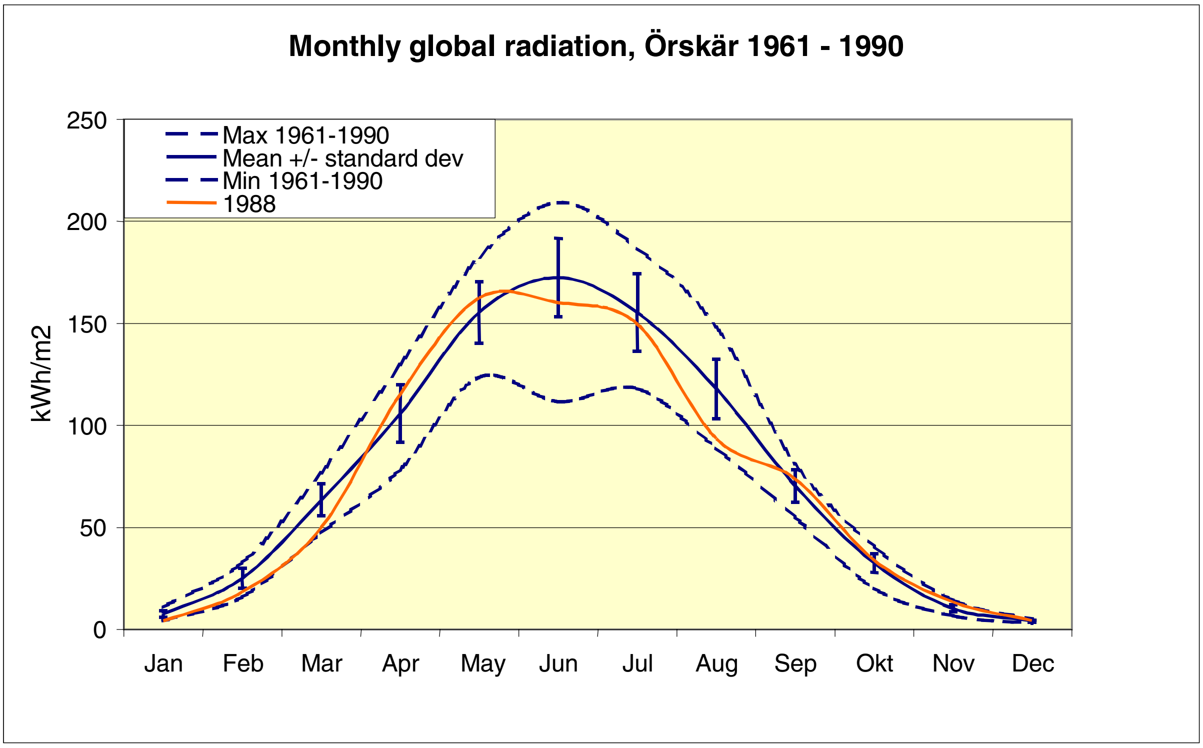

Figure 2-20. *Average monthlysum of global radiation in kWh/ m^2 for the period 1961 - 1990, Örskär. Vertical lines represent standard deviation and dashed lines maximum and minimum of monthly mean global radiation. monthly sum*

Air pressure

Air pressure is usually above 950 and below 1050 hPa. Occasionally higher or lower values are reported. The lowest air pressure observed in Sweden is 937.2 hPa and the highest is 1063.2 hPa.

Monthly mean values of air pressure has only small annual amplitude in comparison to the day to day variations. On the average the air pressure does not deviate more than a few hPa from the normal value 1013 hPa. Both the highest and the lowest air pressures are more common in the winter. This implies that air pressure variations are greater in winter.

It is quite clear that the observations are much less scattered in the summer than in the winter. Frequency distributions of air pressure observations for January, April, July and October are shown i Figure 2-21 and in Table App1-30in appendix 1. In January the observations range from 956 hPa to 1044 hPa while in July the range is 984 - 1031 hPa. The distribution for January has a low, flat maximum with less than 25% of the observations within the range 1005 - 1015 hPa while the one for July more than 40% of observations fall in that range. Air pressure values are reduced to mean sea level. 40% of the Great changes of air pressure are not well documented, especially over shorter time than three hours. One of the most rapid air pressure falls that have been observed in Sweden, 20 hPa in three hours, was reported from Sandhammaren in the south of Sweden on 23rd of January 1995. That day an intensive cyclone moved towards northeast from Skåne to Åland.

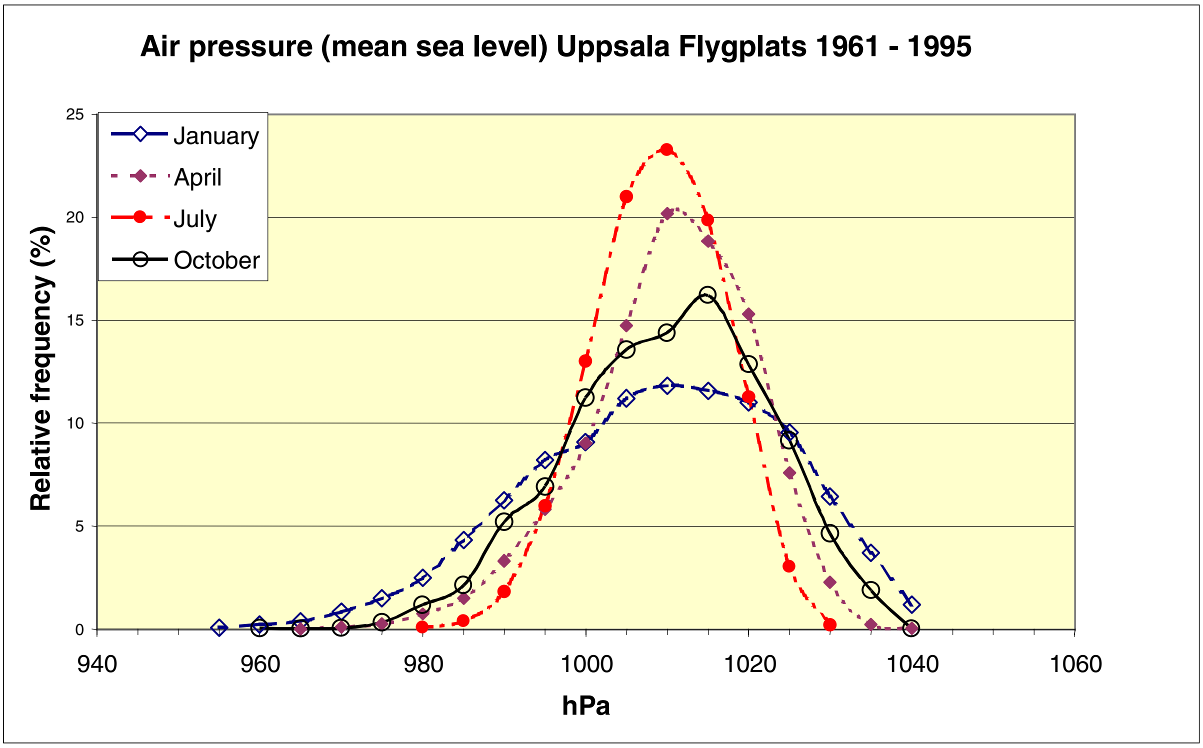

Figure 2-21. *Relative frequency (%) of air pressure at mean sea level (hPa) , Uppsala Airport, 1961 - 1995. Curves are given for January (dashed), April (dotted), July and October (unbroken). hour*

Changes of air pressure of that magnitude are very unusual. In Figure 2-22 the frequency of pressure fall and rise with a magnitude greater than 5 hPa in three hours is shown for Uppsala Airport. Great changes in air pressure are much more frequent in the winter than in the summer, this is true for both rising and for falling pressure. The frequency of pressure fall is greater than the one of pressure rise using the limit 5 hPa in three hours.

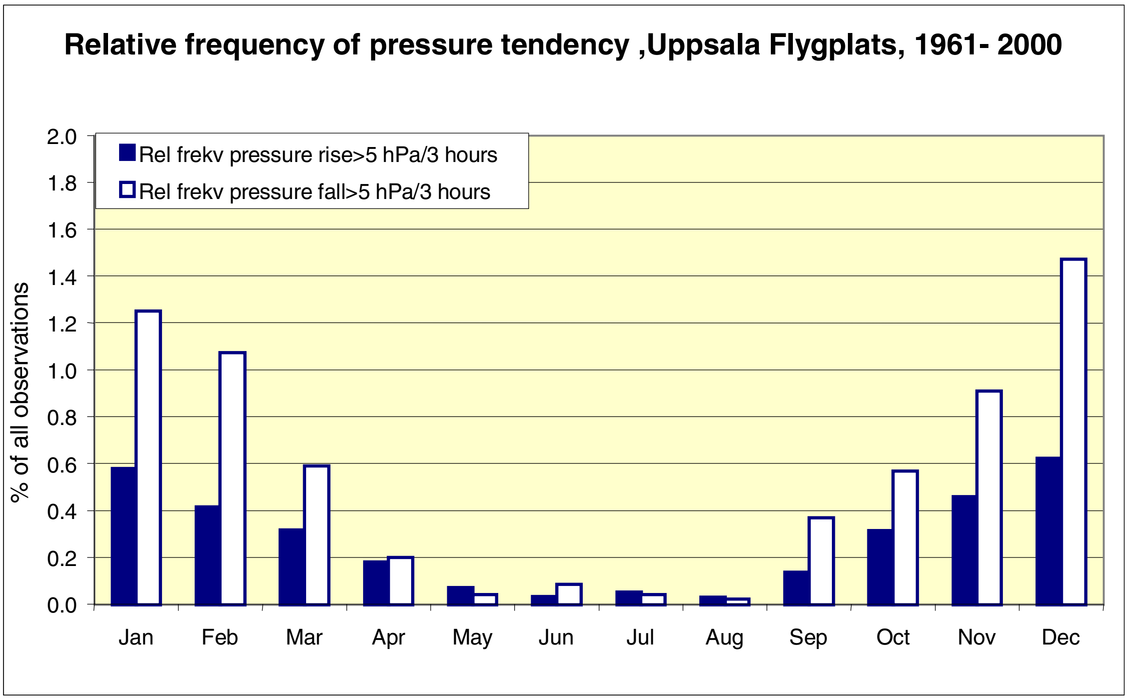

Figure 2-22. *Relative frequency (%) of air pressure tendency greater than 5 hPa/ 3 hours, Uppsala Airport, 1961 - 1995. Frequencies are based on observations every 3 hours.*

Wind

The observation station Örskär is located close to a lighthouse and observations were made by the staff until 1995, today it is an automatic station. The wind measurement equipment is placed on top of the lighthouse at a height of 39 m above the ground. It was moved in 1968 and the period 1968-2000 was selected in order to get homogeneous data.

Most frequent wind directions are in the sector south-to-west as in the rest of the country but there are also a great deal of northerly winds especially in spring and summer. speciallyThere is only a small proportion of calm, which partly is due to the height of the anemometer and partly to the position at the coast.

Compared to inland conditions, see Figure 2-31 (Tierp) the wind speeds are higher and the dominance of southwesterly winds is less.

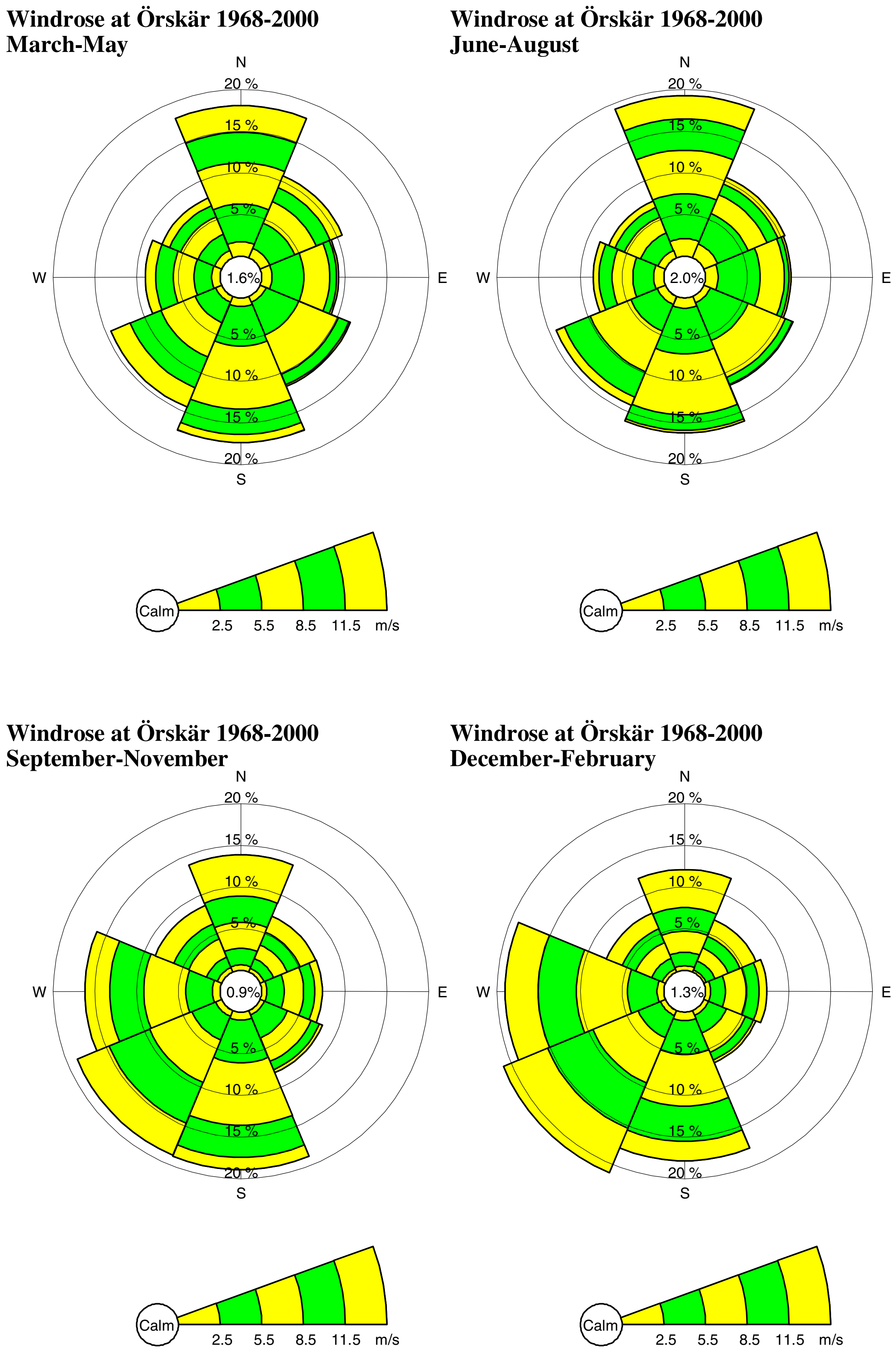

Figure 2-23. *Frequencies (%) of wind (simultaneous direction and speed), 1968 - 2000, Örskär for spring, summer, autumn and winter. Percent of calm is noted in the centre of each windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

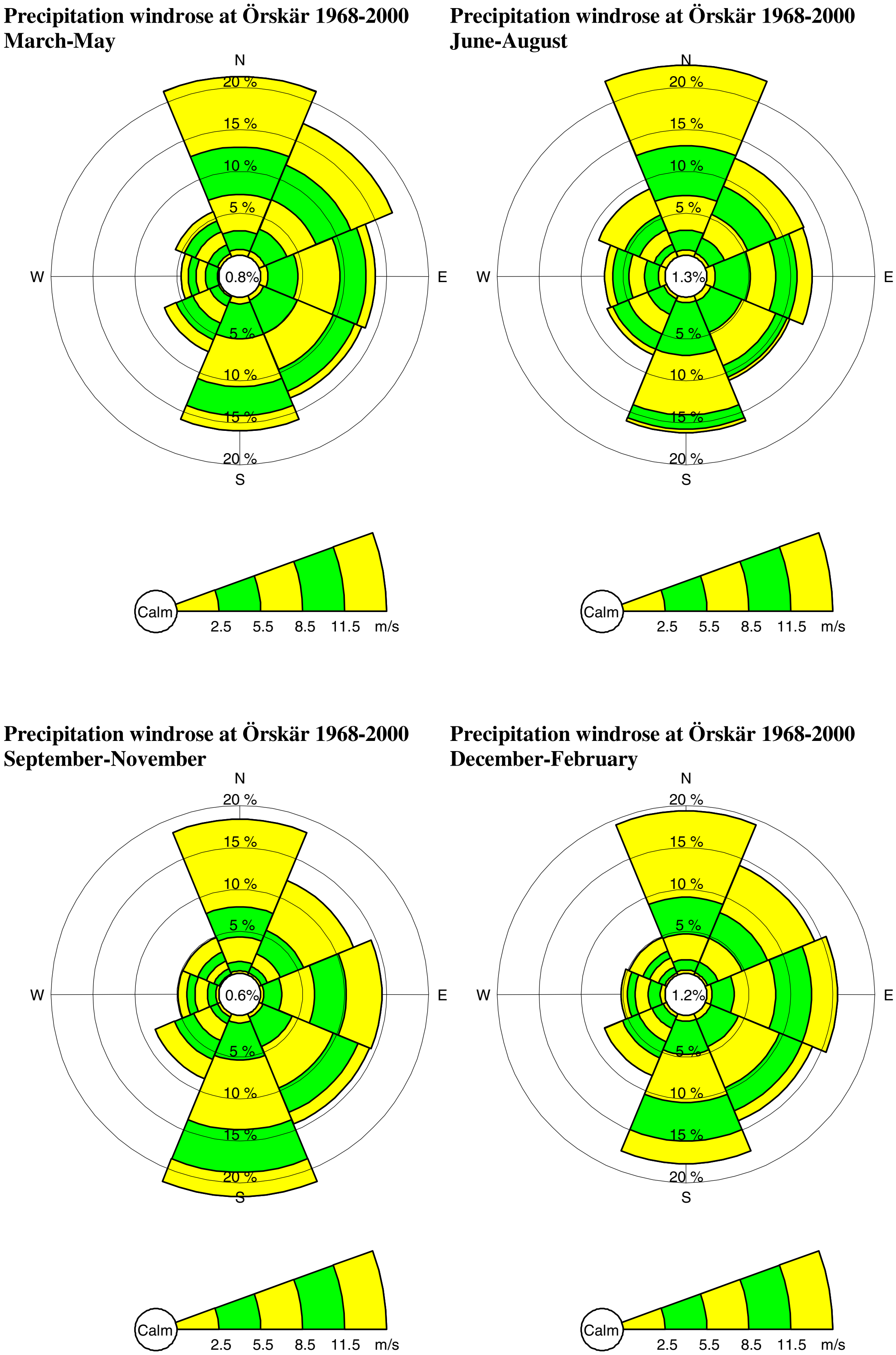

Figure 2-24. *Frequencies (%) of wind (simultaneous direction and speed) in connection with precipitaion. Period 1968 - 2000, Örskär for spring, summer, autumn and winter. Percent of calm is noted in the centre of each windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

In connection with precipitation the most common winds are from the south and from the north. Combination of high windspeeds and northerly-easterly winds are common especially when the precipitation falls as snow, Figure 2-25.

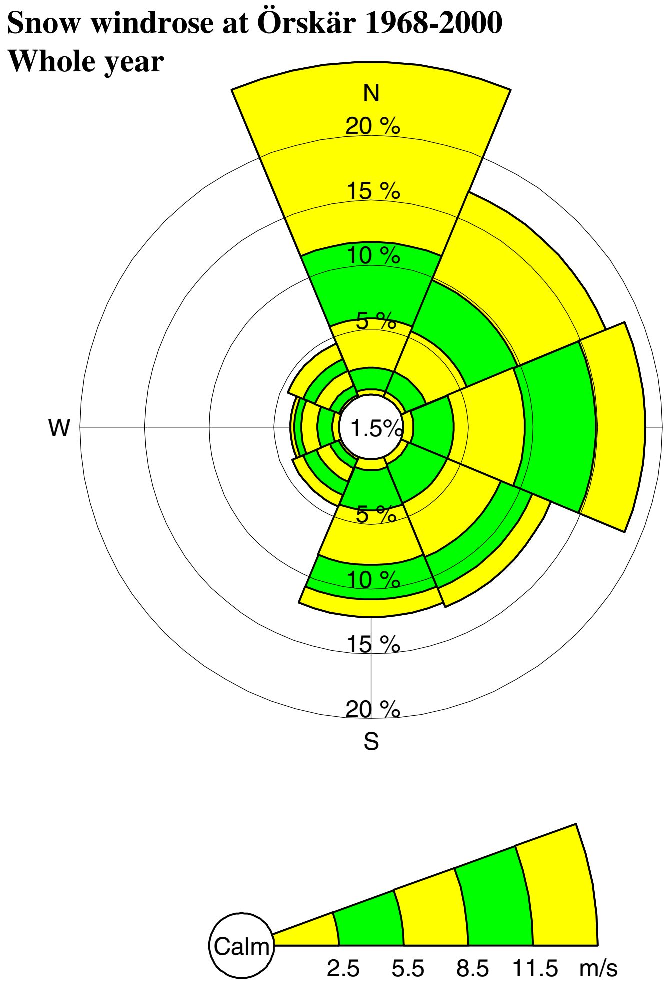

Figure 2-25. *Frequencies (%) of wind (simultaneous direction and speed) in connection with Snow. Period 1968 - 2000, Örskär for the whole year. Percent of calm is noted in the centre of the windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

All data for the different wind frequency figures are shown in the Tables App1-22--App1-24 in appendix 1.

Specially selected year

One "reference" year with data for at least every three hour was selected. One and the same set of data was selected for both Östhammar and Tierp. Data for the specially selected year, 1988 (see below p. l

The selected year should be as normal as possible, monthly averages and sums should approximately be in accordance with corresponding values for the standard normal period 1961 - 1990. All meteorological parameters should refer to the same station if possible. The parameters temperature and precipitation are considered most important when the year is selected.

On these conditions data for 1988 from Örskär was selected, except for air pressure and snow depth which was not measured at Örskär. Data on air pressure are taken from Uppsala Airport which is regarded representative of Örskär. Data on snow cover are from Films Kyrkby further inland. This is because snow depth was measured every day at very few places in this area during 1988. How close to normal this set of data is can be studied in table 2-3.

The yearly mean temperature was 0.5 °C above normal, especially the winter was very warm, +3°C, and also July. the winter especiallyThe computed global radiation seems fairly close to normal.

Table 2-3. Selected year 1988 compared to the normal period 1961-1990, Örskär

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temperature, °C													
Mean 61-90	-3.0	-4.0	-1.4	2.3	7.5	13.1	15.7	15.1	11.4	7.2	2.6	-0.8	5.5
Stand dev	2.9	4.1	2.5	1.3	1.6	1.2	1.4	1.1	1.2	1.1	1.3	1.7	1.0
1988	0.0	-0.8	-1.5	2.5	9.2	12.6	18.4	14.4	12.6	6.4	0.6	-2.0	6.0
Precipitation, mm													
Mean 61-90	34	26	25	29	29	34	50	68	55	45	53	39	487
Stand dev	16	13	13	18	21	19	26	42	30	25	30	24	96
1988	58	39	46	42	31	27	67	88	26	44	31	52	551
Global radiation, kWh/m^2													
Mean 61-90	7.8	25.3	64.1	106.9	157.1	174.4	157.6	120.0	71.5	33.1	10.5	4.2	933
Stand dev	1.5	4.7	7.9	13.8	14.5	18.7	18.0	14.0	7.7	4.4	1.7	0.6	44
1988	4.5	18.8	51.2	116.2	164.5	162.3	151.7	96.7	74.9	34.1	13.7	4.5	893
Potential evapotranspiration, mm													
Mean 69-90	6	8	19	40	78	102	100	78	47	21	10	8	517
Stand dev	4	4	9	8	12	11	12	9	6	6	6	5	44
1988	2	9	14	50	81	89	111	64	53	27	24	14	538

2.1.2 Tierp

In table 2-4 stations with ongoing observations are listed, former stations are included only if their statistics are presented in this report. A remark is made in the information column if only one or two parameters are observed at a station. The co-ordinates in the tables are in RT90-format.

For Tierp there are no extra meteorological data apart from SMHI and SNRA weather stations. Data older than about 5 years are not stored on disc at SNRA and that makes it laborious to get but we have access to data from the last 5 winter seasons for Hyttön and Mehedeby.

Table 2-4. Existing data[1)] for Tierp

Station no	Station name	Co-ordinates,	RT90	Period	Information
10712	Dannemora	667780	161625	1963-1981	
10714	Films Kyrkby	668149	161626	1982-2000	
10714	Films Kyrkby A	668156	161629	2000-	
10727	Untra	670330	158437	1965-	Only prec, temp (87)
305	Mehedeby V[2)]	670349	158817	1990-	No wind
310	Överboda V[2)]	672245	158880	1990-	whole year
311	Skärplinge V[2)]	670732	160623	1990-	
2131	Hyttön V[1)]	671117	158304	1995-	

[1)] Parameters: Temperature, precipitation, relative humidity, air pressure, wind (direction and speed)
[2)] SNRA station, Not stored in SMHI:s database. Operate

Choice of meteorological data representing Tierp

Data from SMHI-stations are used for long term statistics. As was noted in the introduction, temperature and precipitation show a gradient from the coast towards inland. A station as close as possible to Tierp was chosen for these parameters - Untra, situated close to the river Dalälven.

Wind speed and direction are usually measured at a level of 10 m above the ground. An ideal site is an open place free from disturbing obstacles. Both parameters can vary from one location to another according to the local environment, terrain, vegetation, buildings etc. buildings, etc.Data for Uppsala Airport are regarded representative for inland open areas in Uppland.

Air pressure decrease with height above sea level so measurements from different places can not be directly compared. The measured values are therefore reduced to mean sea level. The reduced air pressure does not vary much over Uppland and data for Uppsala Airport are chosen to represent Tierp.

Temperature

The average monthly mean temperature varies between about -5 °C in January-February and about 16 °C in July, figure 2-26. The year to year variation is much greater in winter months than in summer, this is clearly seen both in terms of standard deviation and in maximum and minimum values. Average temperature conditions in Tierp are slightly more continental than at Örskär in Östhammar, compare figure 2-1 and 2-26. The temperature rises more in the spring and early summer as compared to Örskär and the winter minimum is as cold in January as in February while Örskär shows a minimum in February.

Unfortunately temperature registrations ceased in 1987 at Untra, therefore monthly mean temperatures for the period 1987 - 1990 have been interpolated from other stations. The extreme values refer to the period 1961 - 1990.

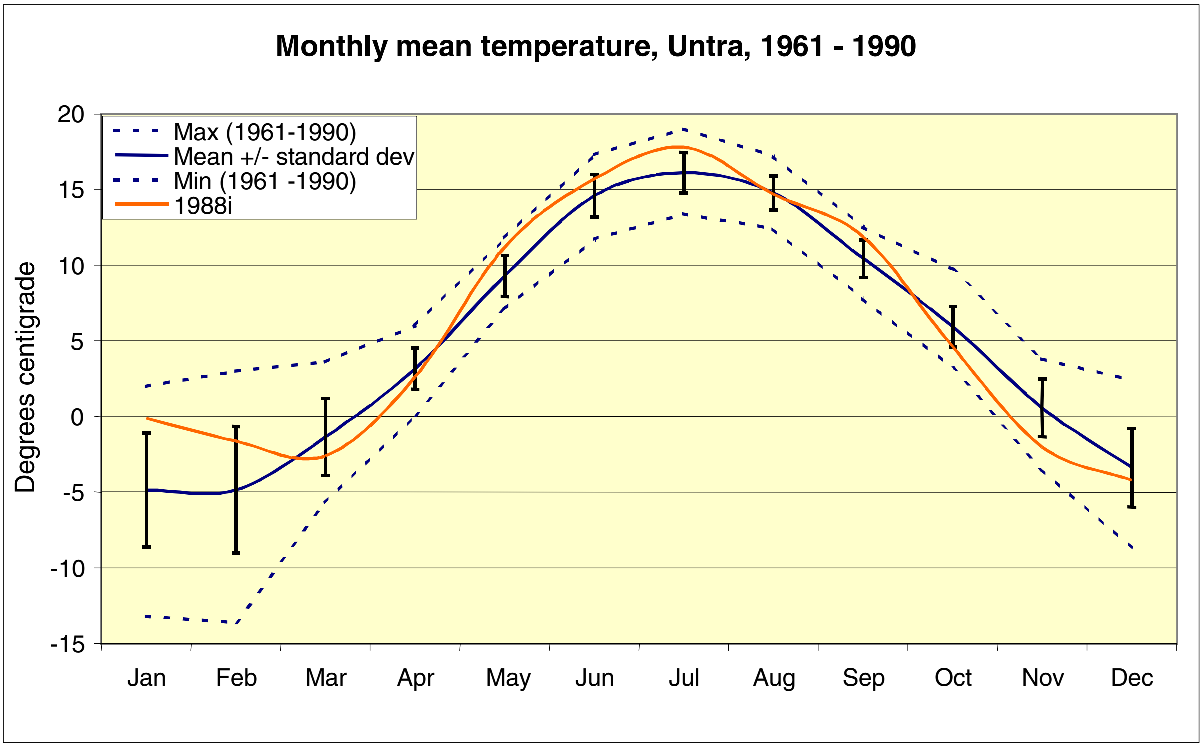

Figure 2-26. *Monthly mean temperature for the standard normal period 1961-1990, Untra. Vertical lines represent standard deviation and dashed lines maximum and minimum of monthly mean temperature. Monthly means for the selected year 1988 are included (red line).*

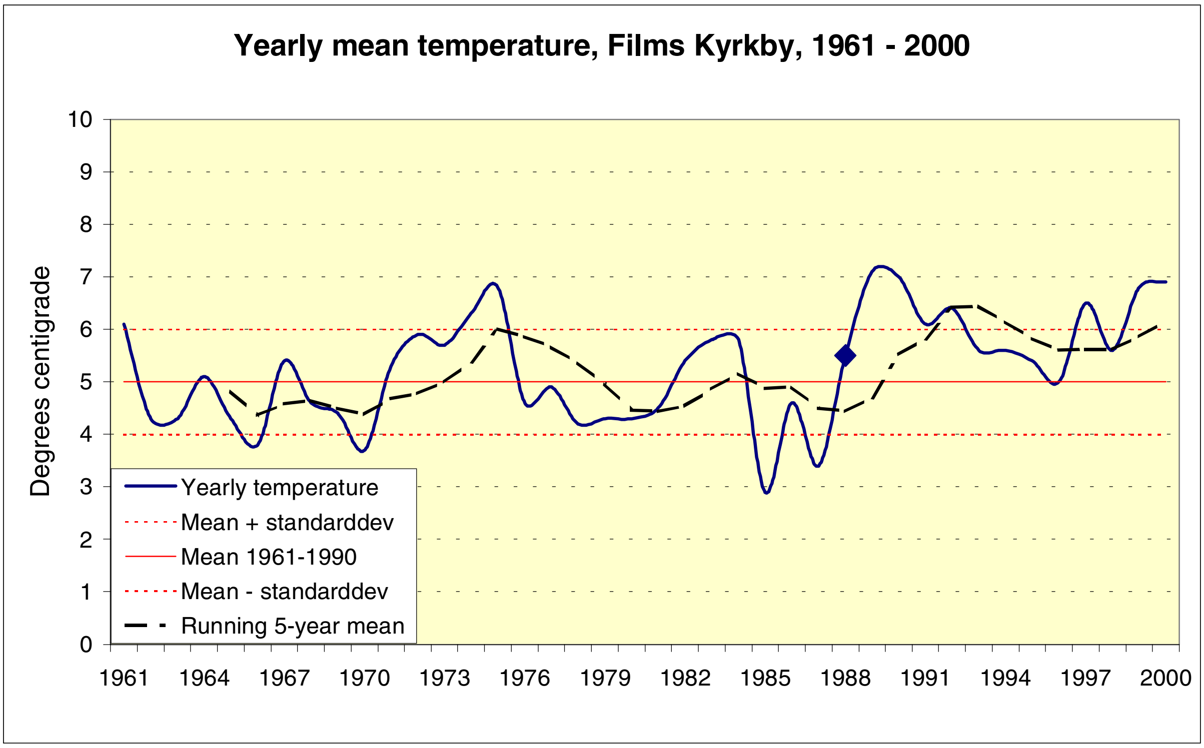

Figure 2-27. *Yearly mean temperature for the period 1961-2000, Films Kyrkby and running 5-year mean temperature (dashed curve). Average yearly mean temperature for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). Diamond refers to the year 1988.*

The yearly mean temperatures for Films Kyrkby are plotted in Figure 2-27 since there are no actual measurements of temperature at Untra since 1987. The temperature ”trends” are very much alike regardless of which station is plotted. Similar to Örskär the last decade has been warmer than normal except for 1996 when yearly mean temperature was normal. The average yearly mean for the period 1991-2000 was 1 °C above the average yearly mean (5 °C) for the standard normal period 1961-1990.

All data shown in figure 2-26 and 2-27 are also given in Tables App1-5 and App1-6 in appendix 1.

Precipitation

Measured precipitation shows a great variation from place to place, in Uppland the maximum occures some km inland from the coast. It has minimum at the coastline but declines also further inland from the maximum. As an example Lövsta in Östhammar (about 10 km from the coast) receives 60-70 mm more precipitation per year than the island Örskär. On the other hand Lövsta gets about 30 mm more than Untra in Tierp (about 20 km inland).

The measured precipitation is always less than the real. There are losses because of evaporation, adhesion and above all because of wind especially when it is snowing, (Eriksson, 1983). Monthly and yearly sums of precipitation given here have been corrected for measuring losses. The correction factors are given in Table 2-2.

Monthly sums of precipitation for Tierp (Untra) are shown in Figure 2-28 and Table App1-8 in appendix 1. The annual variation in monthly sums of precipitation is similar to the one for Lövsta in Östhammar but the values are somewhat lower. On the average the maximum occurs in August and the minimum in March. The variation from one year to another is considerable high and an individual year can show a different annual pattern. The extreme values (measured, not adjusted for measuring losses) shown in Figure 2-28 refer to the period 1931 - 2000. considerably

The year to year variation of yearly sum of precipitation is illustrated in Figure 2-29 for the period 1961 - 2000. The greatest value in these years was 1148 mm in 1981 and the least one was 499 mm in 1972. About 25 -30 % of yearly precipitation falls as snow (Raab and Vedin, 1995).

All data shown in figure 2-28 and 2-29 are also given in Tables App1-8 and App1-10 in appendix 1.

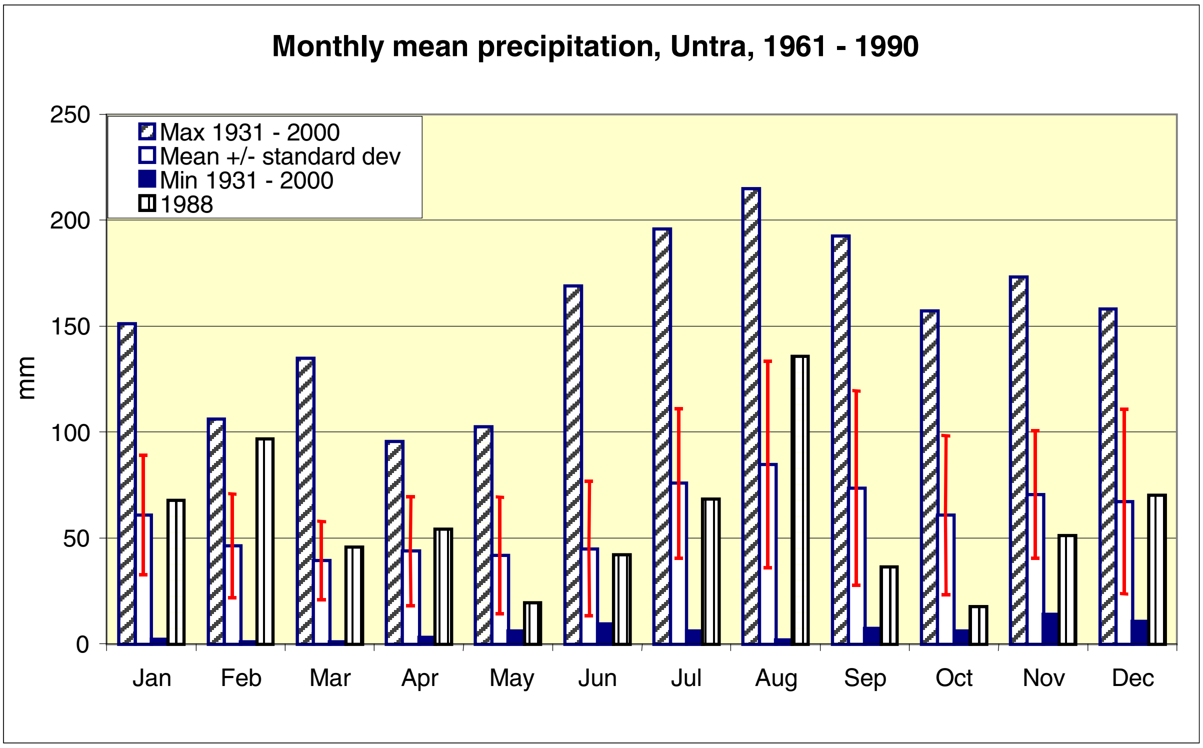

Figure 2-28. *Average monthly sum of precipitation for the standard normal period 1961-1990, Untra (unfilled columns), max and min. Vertical lines represent standard deviation about mean. Monthly sums for 1988 are also included (striped columns).*

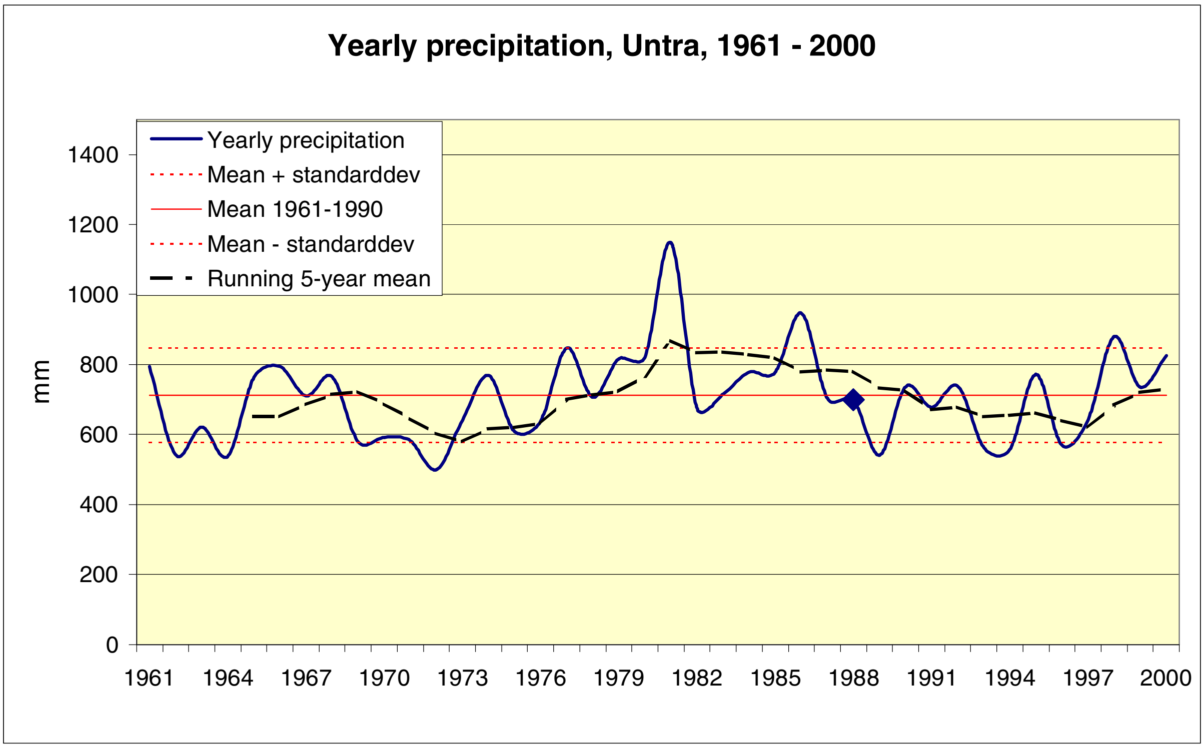

Figure 2-29. *Yearly sums of precipitation (continuous curve) for the period 1961- 2000, Untra and running 5-year mean sum of precipitation (dashed curve). Average yearly precipitation for the standard normal period 1961-1990 +/- one standard deviation are drawn (red continuous and dotted lines). The year 1988 is marked with a diamond. Corrected.*

Relative Humidity

The most well known measure of humidity is relative humidity, which is expressed in per cent. percentageIn saturated air the relative humidity is 100% and in the air on a summer day it is usually 40-60%.

At Films Kyrkby measurements of humidity started in 1963, observations are made every 3 hours except at 21 hours (UTC). Figure 2-30 shows the diurnal and annual variation of average relative humidity (%) for the period 1963-1990. The isoplethdiagram is based on the mean values of all data for each combination of hour and month. The diagram does not cover the entire night due to lack of observations at 21h.

On the average the relative humidity is over 85% all day in midwinter. On averageThe pattern shown for Films Kyrkby is typical of inland conditions. Both diurnal and annual variations are much less at sea or at the coast, compare Figure 2-19 in the Östhammar section (2.1.1).

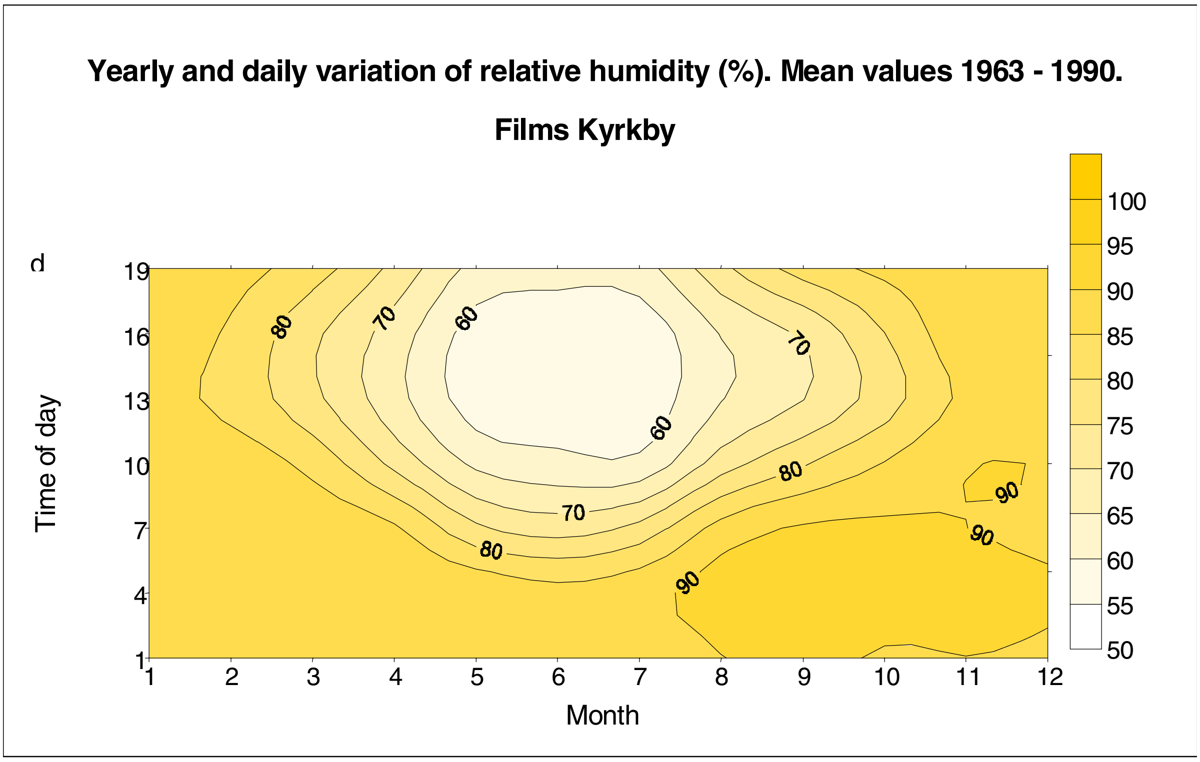

Figure 2-30. *Diurnal and annual variation of relative humidity (%), Films Kyrkby. Mean values for period 1963 -1990.*

Air pressure

The air pressure (reduced to mean sea level) does not vary much over Uppland and data for Uppsala Airport are chosen to represent Tierp. Frequency distributions of air pressure observations for January, April, July and October are shown i Figure 2-21 in section 2.1.1 and in Tables App1-30 and App1-31 in appendix 1. In January the observations range from 956 hPa to 1044 hPa while in July the range is 984 - 1031 hPa.

Global radiation

Global radiation has not been computed for Tierp. See Figure 2-20 in section Östhammar (2.1.1).

Wind

Wind speed and direction are usually measured at a level of 10 m above the ground. An ideal site is an open place free from disturbing obstacles. Both parameters can vary from one location to another according to the local environment, terrain, vegetation, buildings etc. buildings, etc.Data for Uppsala Airport are regarded representative for inland open areas in Tierp.

Most frequent wind directions in all seasons are southwest, in spring and summer winds from the north are quite common. In autumn and winter about two thirds of the cases are from the sector north-to-southeast. two-thirds

Compared to coastal areas, see Figure 2-23 the wind speed is lower and the frequency of calm is much higher, almost 7% compared to 1.5% at Örskär.

In connection with precipitation the most common winds are from the south and from the north. Winds from southwest-to-west are much less common in combination with precipitation than they are in western parts of Sweden. The combination of high wind speed and northerly wind is common especially when the precipitation falls as snow, Figure 2-33.

All data for the different wind frequency figures are shown in the Tables App1-25--App1-27 in appendix 1.

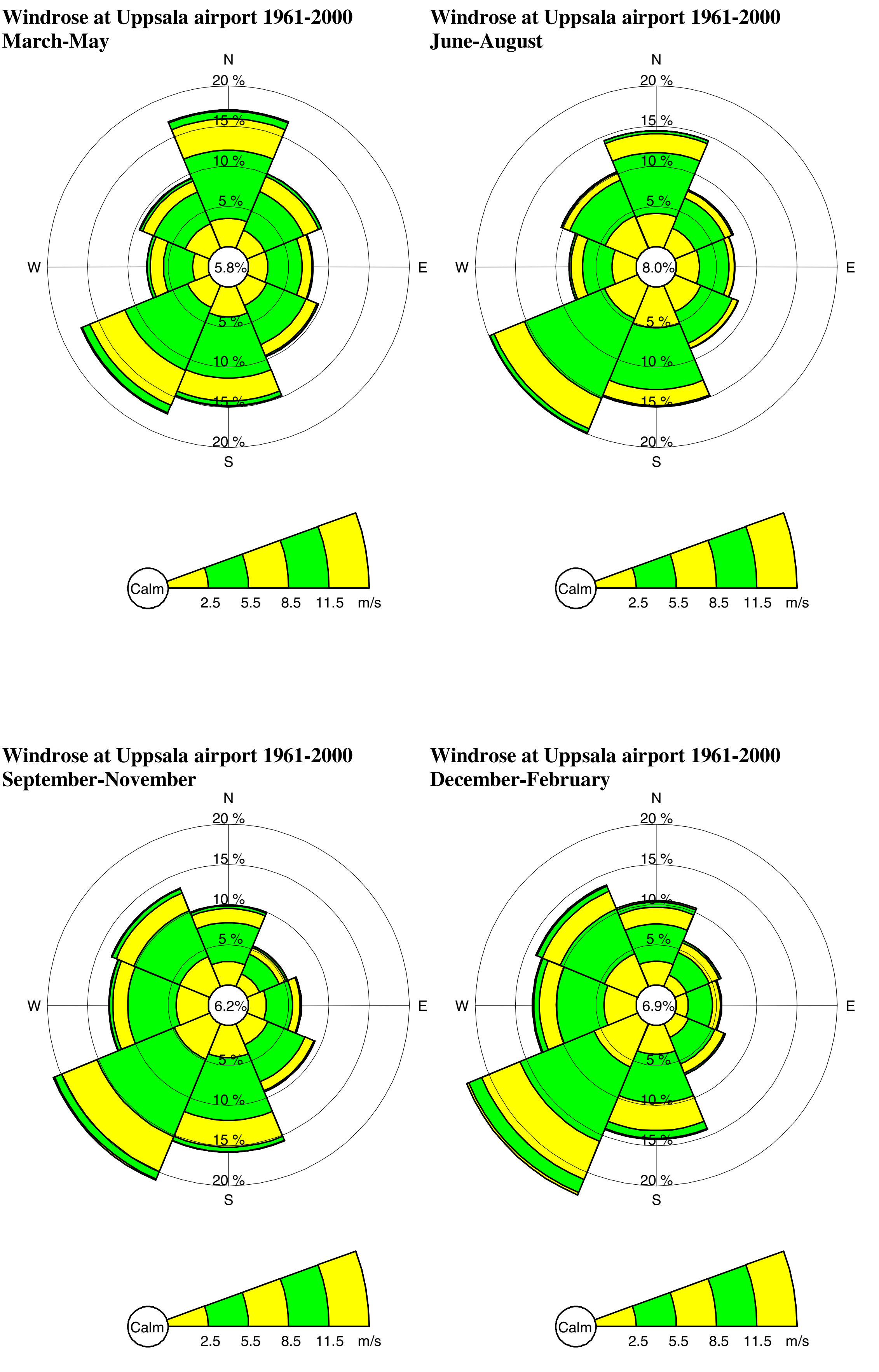

Figure 2-31. *Frequencies (%) of wind (simultaneous direction and speed), 1961 - 2000, Uppsala Airport for spring, summer, autumn and winter. Percent of calm is noted in the centre of each windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

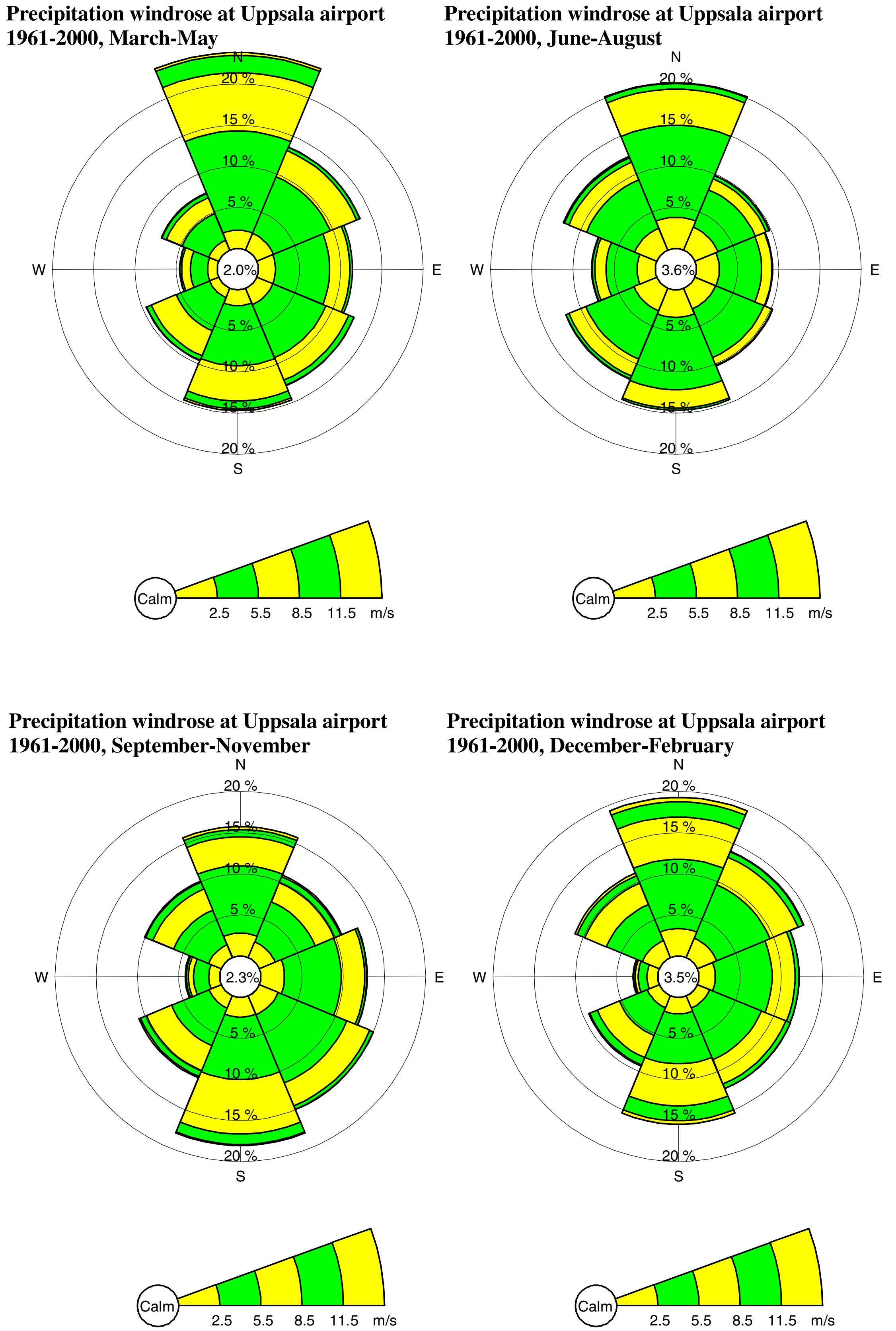

Figure 2-32. *Frequencies (%) of wind (simultaneous direction and speed) in connection with precipitation.Period 1961 - 2000, Uppsala Airport for spring, summer, autumn and winter. Percent of calm is noted in the centre of each windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s*

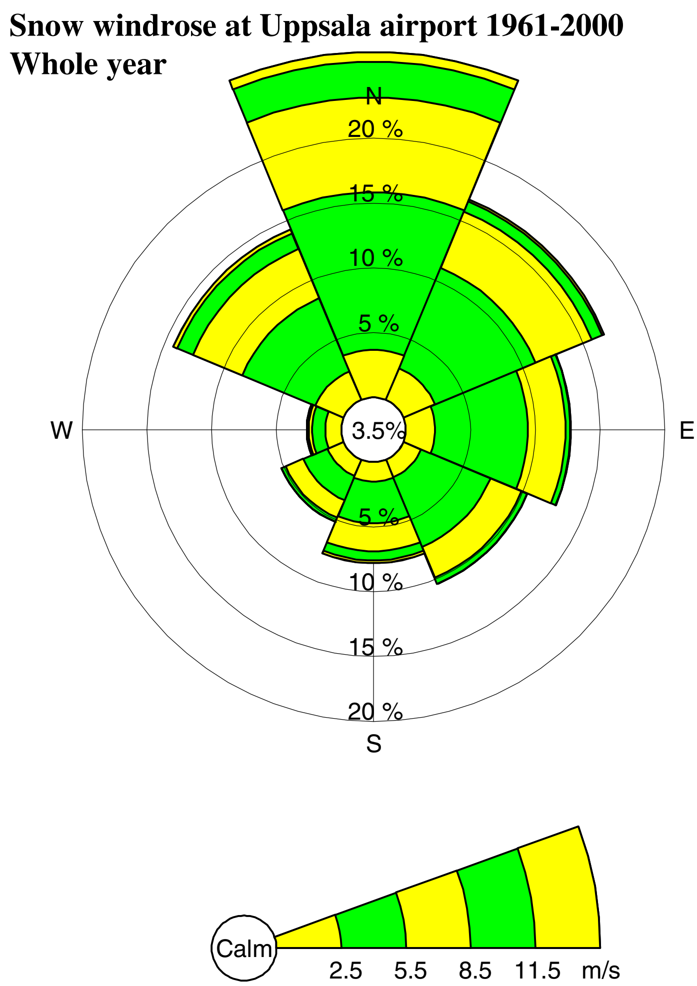

Figure 2-33. *Frequencies (%) of wind (simultaneous direction and speed) in connection with Snow. Period 1961 - 2000, Uppsala Airport for the whole year. Percent of calm is noted in the centre of the windrose. Wind direction is grouped into 8 classes of 45° (N, NE, E, SE, S, SW, W and NW). Wind speed is classified in intervals of 3 m/s.*

Specially selected year

It is the same as for Östhammar, se section 2.1.1.

2.2 Methodology – hydrology

Data from a number of hydrological stations has been used to describe the characteristics of the two different regions, Östhammar and Tierp. Some stations can represent both areas. Station 2299 Tärnsjö is listed but not used in this investigation since it has a small catchment area and the drainage divide of groundwater and surface water disagree. The record series from station Gimo is rather short and must therefore be handled with care in the evaluation. By modelling, 40 years of daily mean discharge has been simulated for two sites within the area of interest (OL1 and FO1). Using the unit l/s·km^2 has a specific purpose; by doing so it will be easy to compare discharge in different areas. One year has been specially chosen as being close to a statistically "normal" one; for the Östhammar-Tierp area the year 1988 has been chosen. All data shown in the figures are also given in tables in appendix 2.

Table 2-5. Hydrological stations. Area = catchment area (km^2). Co-ordinates in RT90.

Stn No	Name	River	Lake %	Area	N	E	Period	Represents
50110	Vattholma	Fyrisån	5	294	665713	160736	1917-2000	Östhammar-Tierp
910	Uvlunge	Vendelån	2.6	263	666663	160043	1917-1942	Östhammar-Tierp
2299	Tärnsjö	Stalbobäcken	2	13.7	666859	156333	1975-2000	-
573	Gimo	Olandsån	3.2	587	667489	163287	1922-1932	Östhammar
1256	Fors	Olandsån	3.2	577	667170	163344	1931-1959	Östhammar
1053	Näs	Tämnarån	4.2	1176	670862	159995	1925-1971	Tierp
1260	Odensfors	Tämnarån	6.3	772	668382	158822	1930-1950	Tierp
	OL1	Olandsån	1.4	880.9	669252	163452	1962-2001	Östhammar
	FO1	Forsmarksån	4.6	375.5	669500	163249	1962-2001	Östhammar

2.2.1 Östhammar

Discharge

The hydrological station 50110 Vattholma is chosen to be the main representative for stations in the Östhammar-Tierp area. It has a continuous record series with registrations since 1917, an annual mean specific discharge of 7.5 l/s·km^2 and a catchment area of medium size (294 km^2). Other stations that give completion data are 910 Uvlunge (represents Östhammar-Tierp), 573 Gimo and 1256 Fors (represent Östhammar only). A statistical analysis has been made to determine the characteristics of discharge where the minimum 50 years, maximum 50 and 100 years has been carried out by frequency analysis. Long term minimum and maximum as well as long term average has been determined by mean value calculation.

Table 2-6. Characteristic discharge 50110 Vattholma 1917-2000 (l/s·km^2). Catchment area: 294 km^2. Daily mean values.

LLQ50[1)]	MLQ	MQ	MHQ	HHQ50	HHQ100
0.18	1.1	7.5	30	69	77

[1)] LLQ50 = lowest minimum flow 50 years, MLQ = longterm average of annual minimum discharge, MQ = longterm average discharge, MHQ = longterm average of annual maximum discharge, HHQ50 = highest maximum flow 50 years, HHQ100 = highest maximum flow 100 years

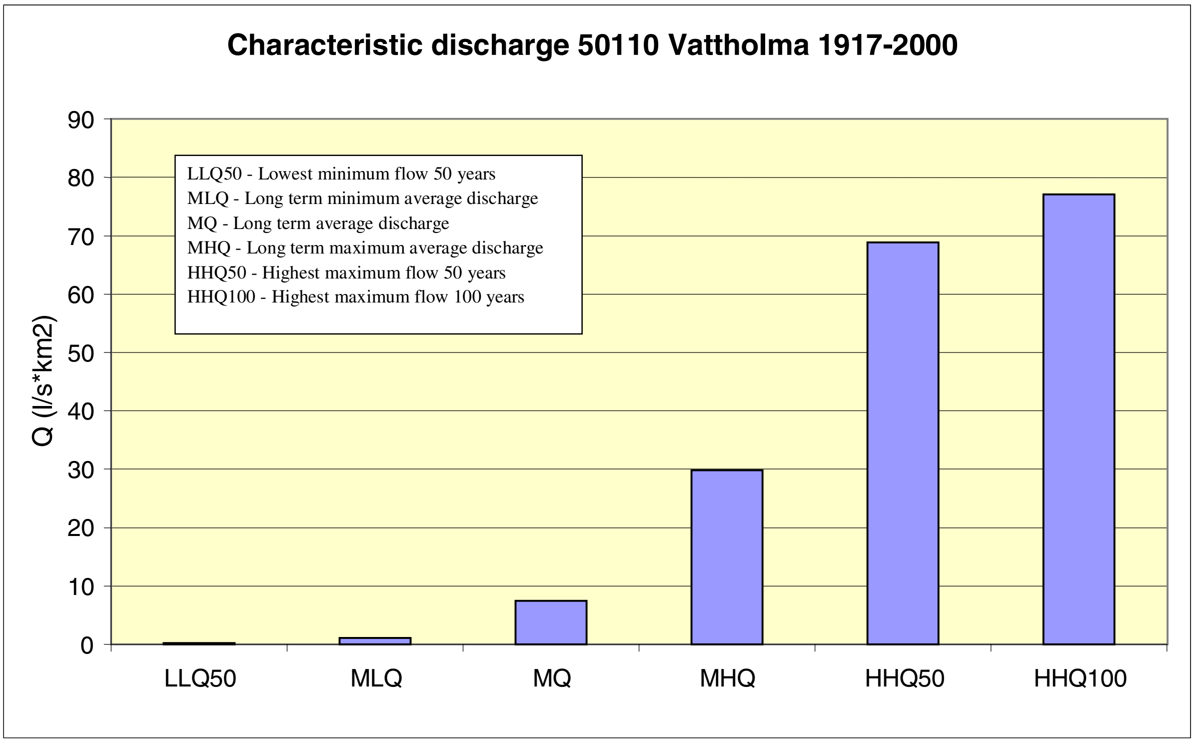

Figure 2-34. *Characteristic discharge 50110 Vattholma 1917-2000. Daily mean values (l/s·km²).*

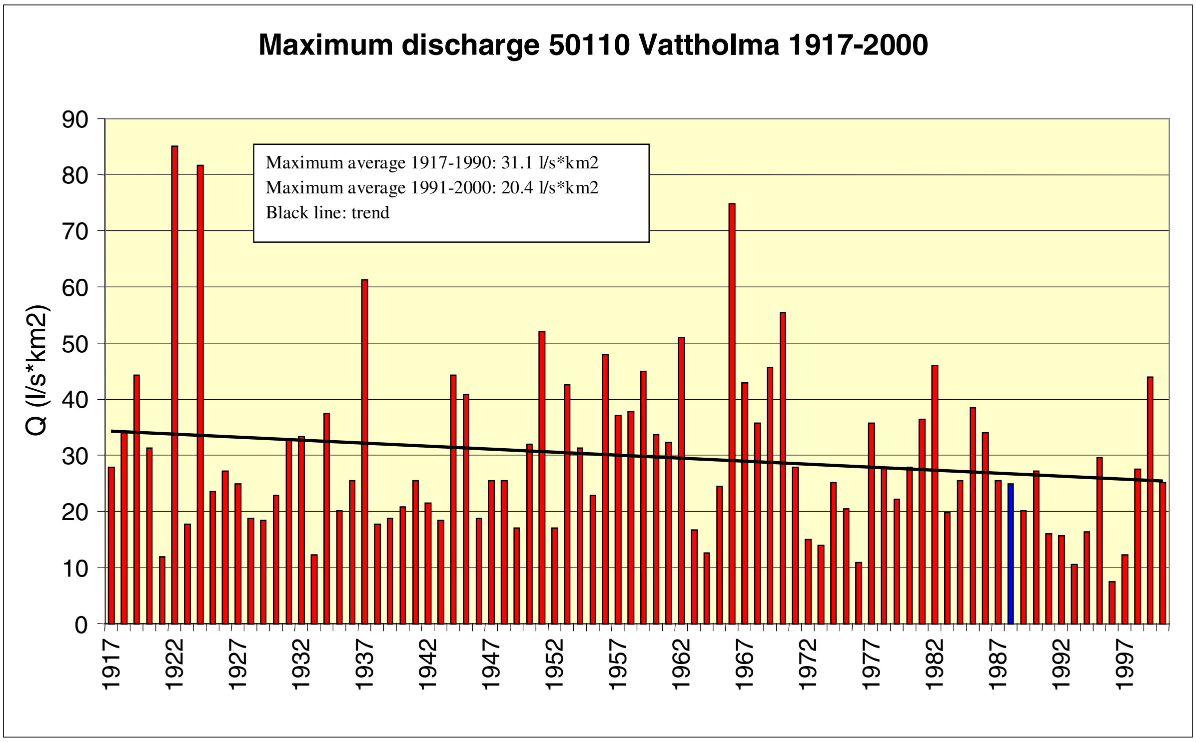

Figure 2-35. *Maximum daily mean discharge 50110 Vattholma 1917-2000 with trend (l/s·km²). 1988 specially selected year.*

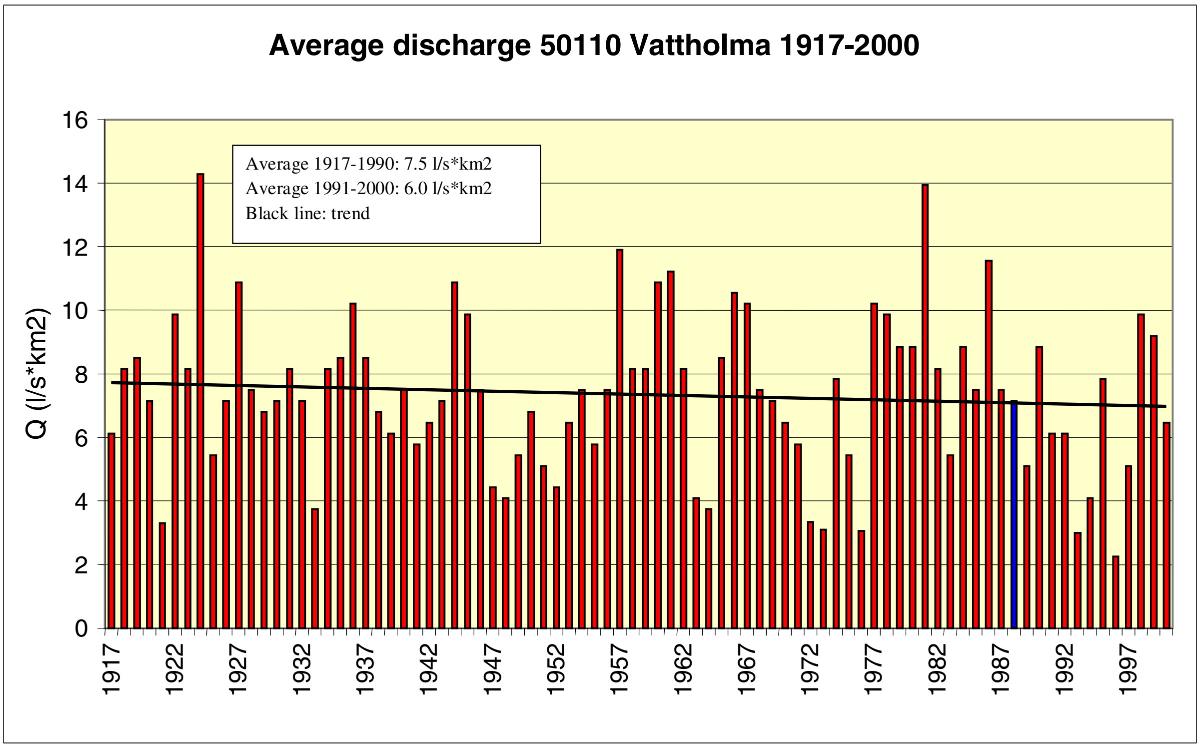

Figure 2-36. *Average discharge 50110 Vattholma 1917-2000 with trend (l/s·km^2). 1988 specially selected year.*

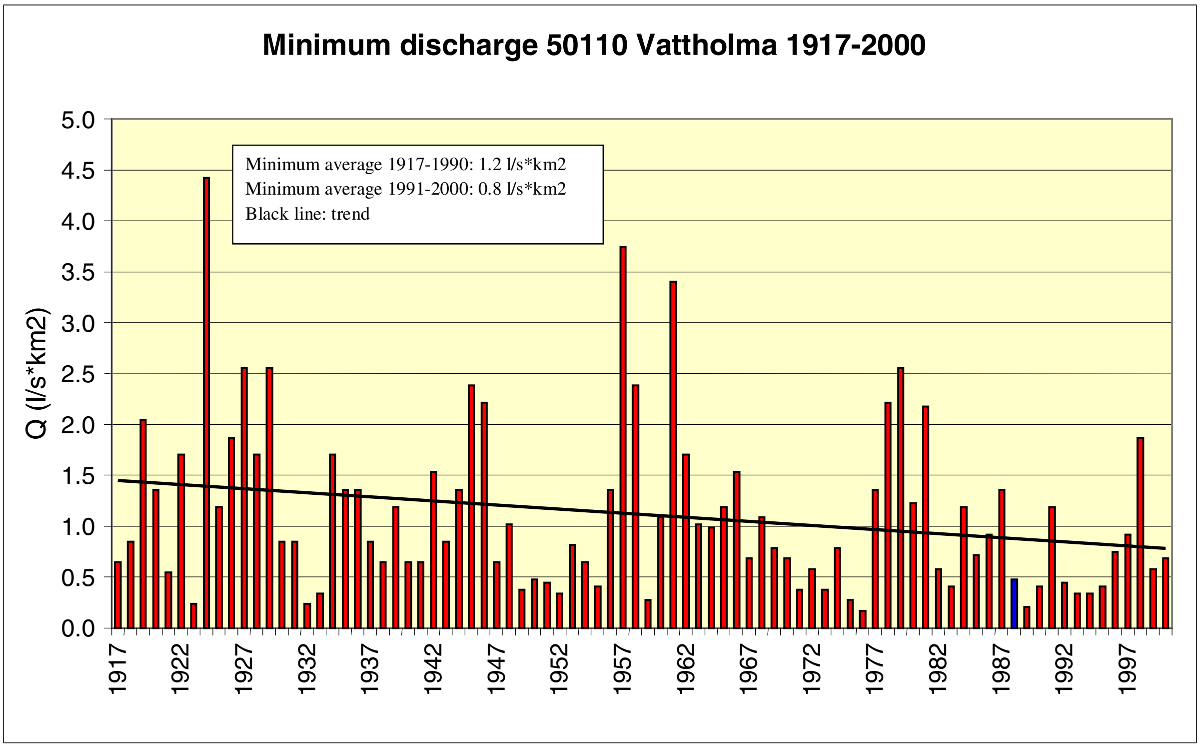

Figure 2-37. *Minimum daily mean discharge 50110 Vattholma 1917-2000 with trend (l/s·km^2). 1988 specially selected year.*

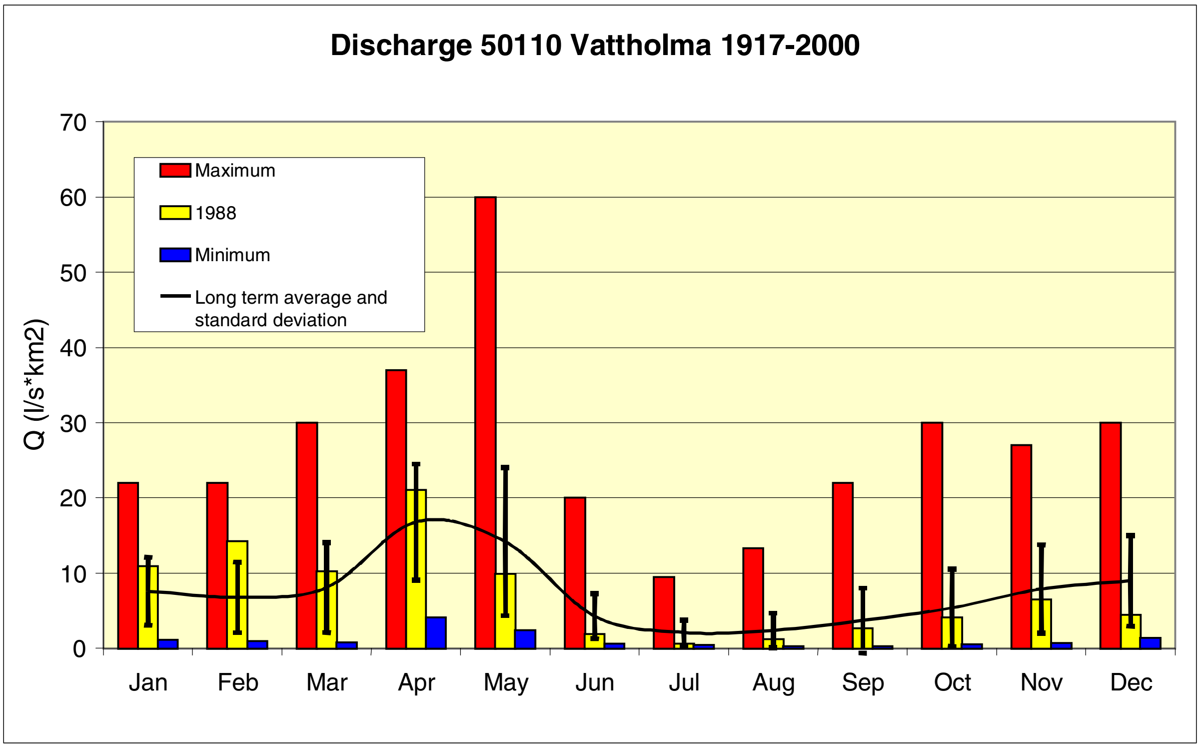

Figure 2-38. *Monthly discharge 50110 Vattholma 1917-2000. Maximum and minimum daily mean, long term average and standard deviation (l/s·km²). 1988 specially selected year.*

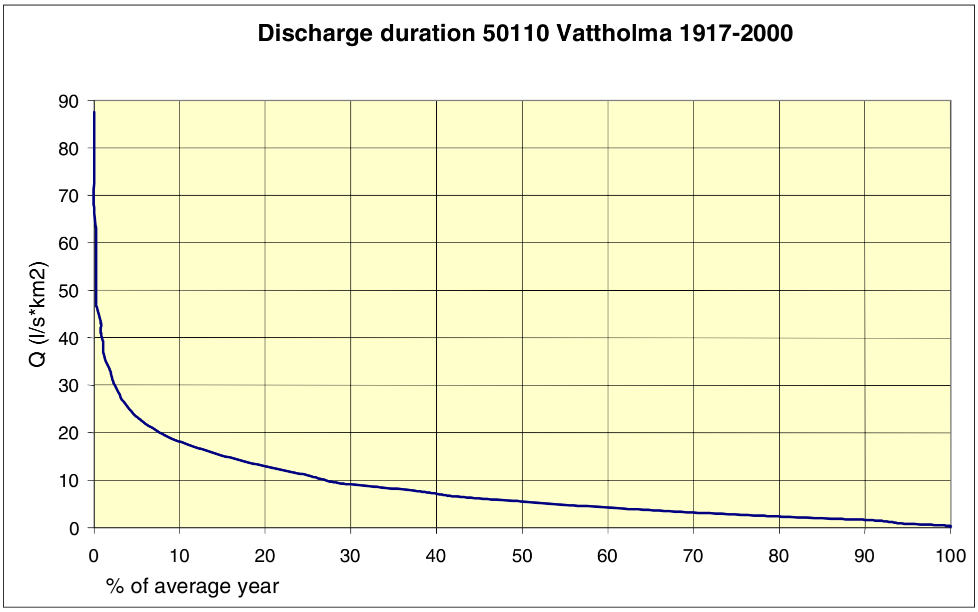

Figure 2-39. *Discharge duration based on daily mean values for 50110 Vattholma 1917-2000 (l/s·km²).*

Table 2-7. Characteristic monthly discharge 50110 Vattholma 1917-2000 (l/s·km²). Catchment area: 294 km². Daily mean values.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	22	22	30	37	60	20	9.5	13	22	30	27	30
Med	7.6	6.8	8.1	17	14	4.3	2.1	2.4	3.7	5.4	7.9	9.0
Min	1.1	0.9	0.8	4.1	2.4	0.7	0.4	0.3	0.3	0.5	0.8	1.4
Std	4.5	4.7	6.0	7.7	9.9	3.0	1.7	2.3	4.3	5.1	5.9	6.0

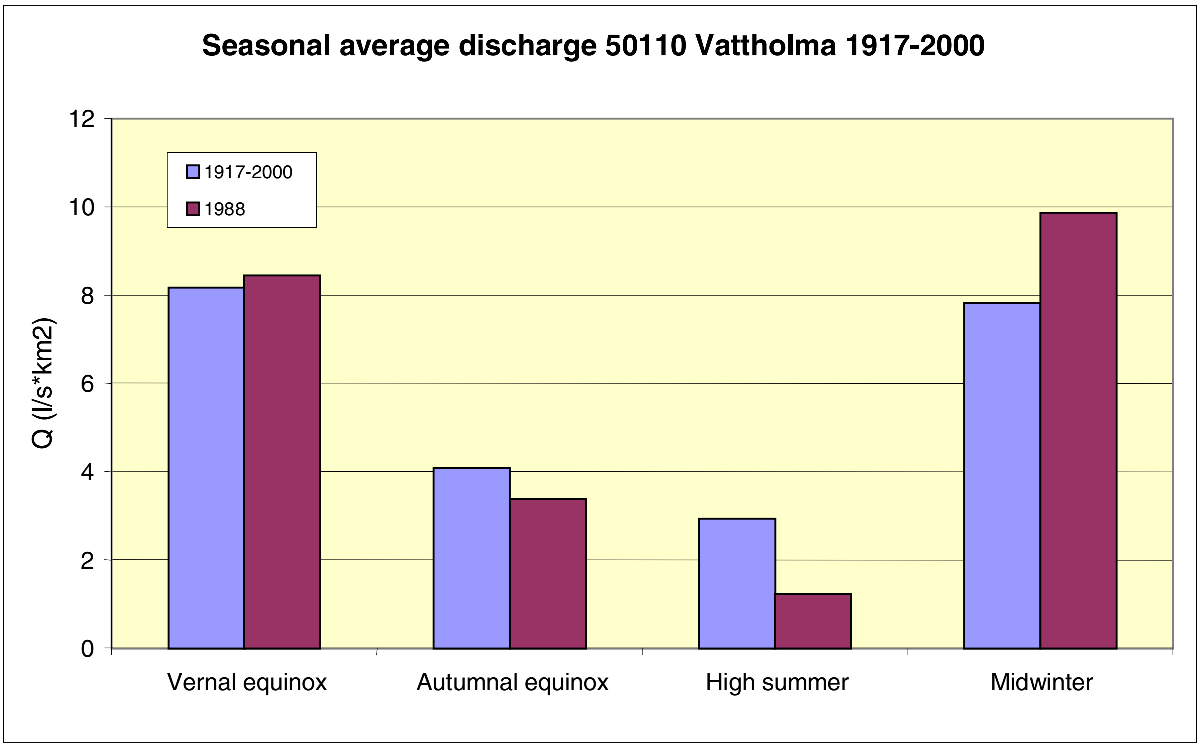

Figure 2-40. *Seasonal average discharge 50110 Vattholma 1917-2000 (l/s·km²). Vernal equinox (March 20), autumnal equinox (Sept 23), high summer (average Jun-Aug) and Midwinter (average Dec-Feb). 1988 specially selected year.*

Table 2-8. Seasonal average discharge 50110 Vattholma 1917-2000 (l/s·km²). Catchment area: 294 km². Daily mean values.

Season	Vernal equinox (March 23)	Autumnal equinox (Sept 20)	High summer (Jun-Aug)	Midwinter (Dec-Feb)
Discharge	8.2	4.1	2.9	7.8

Table 2-9. Calculated characteristic discharge FO1 Forsmarksån 1962-2001 (l/s·km²). Catchment area: 375.5 km². Daily mean values. Calc min = calculated minimum.

Calc min	MLQ	MQ	MHQ	HHQ50	HHQ100
0.19	1.1	8.0	37	91	103

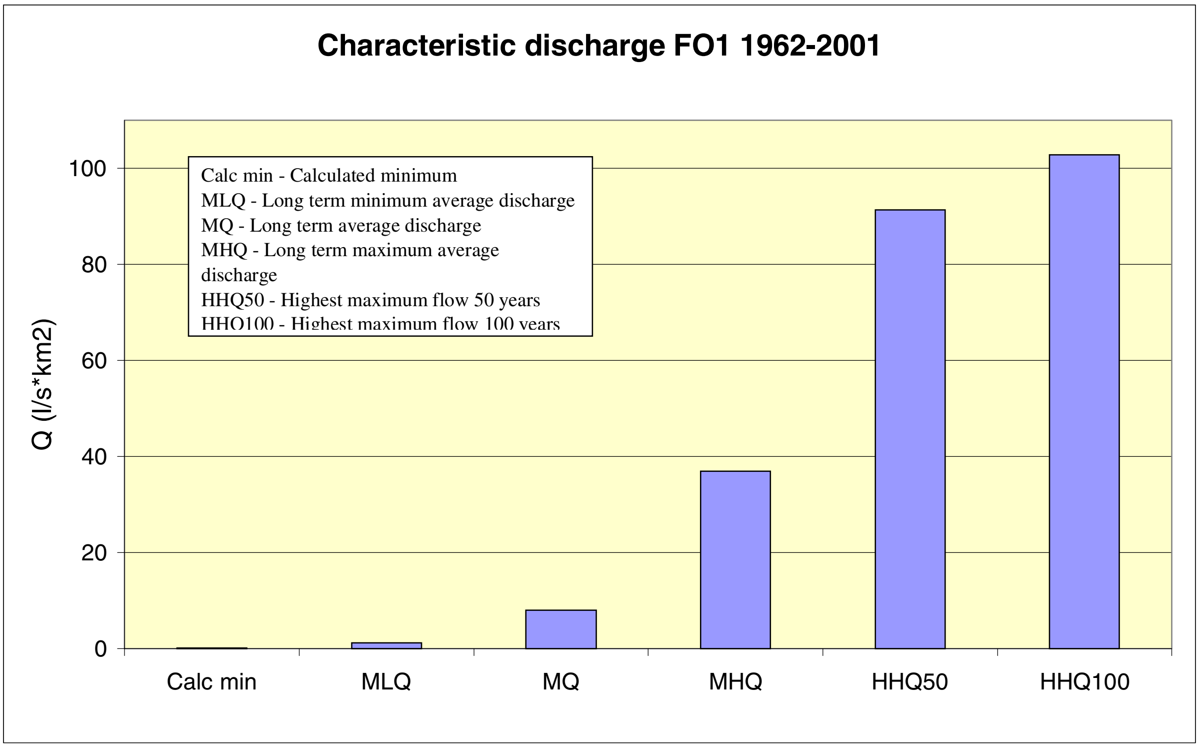

Figure 2-41. *Calculated characteristic discharge FO1 Forsmarksån 1962-2001. Daily mean values (l/s·km²).*

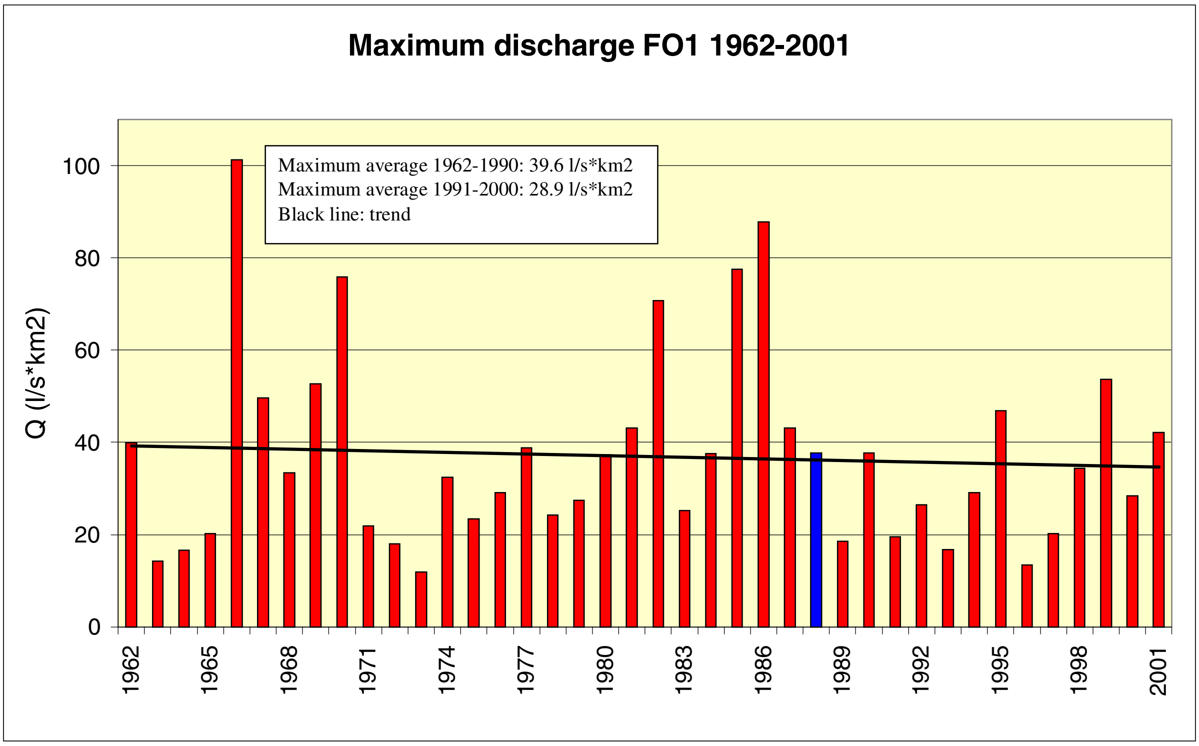

Figure 2-42. *Calculated maximum daily mean discharge FO1 Forsmarksån 1962-2001 with trend (l/s·km²). 1988 specially selected year.*

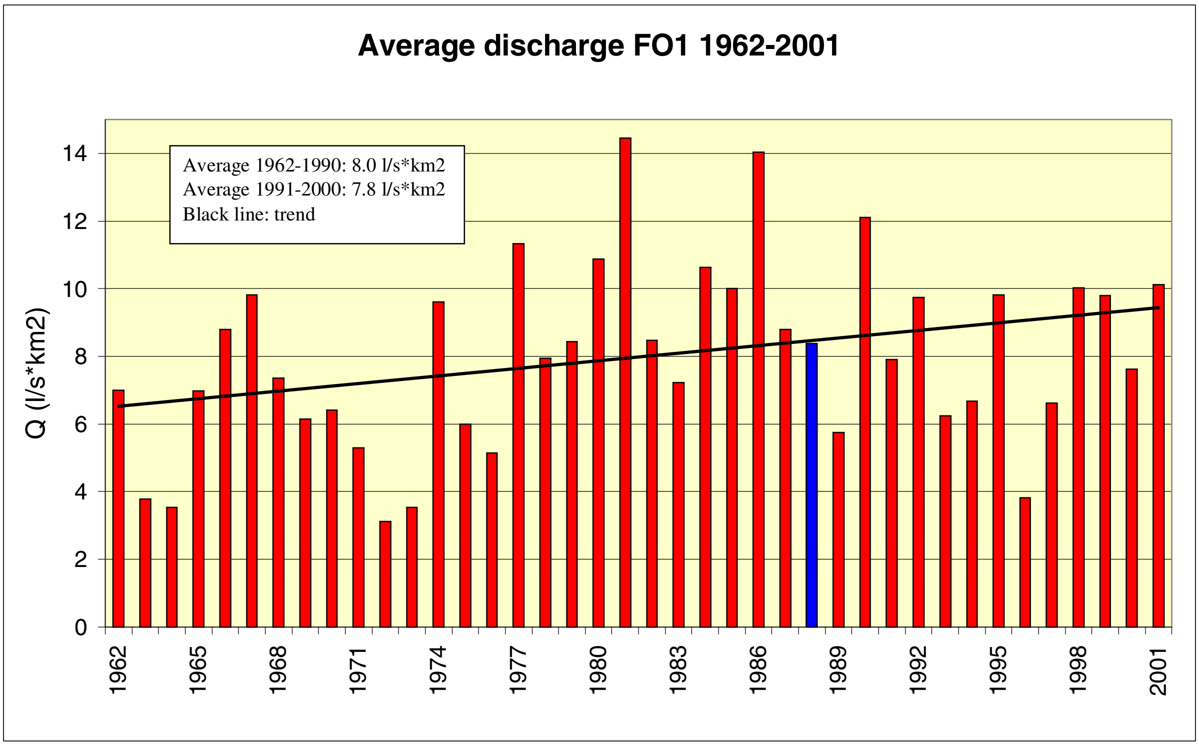

Figure 2-43. *Calculated average discharge FO1 Forsmarksån 1962-2001 with trend (l/s·km^2). 1988 specially selected year.*

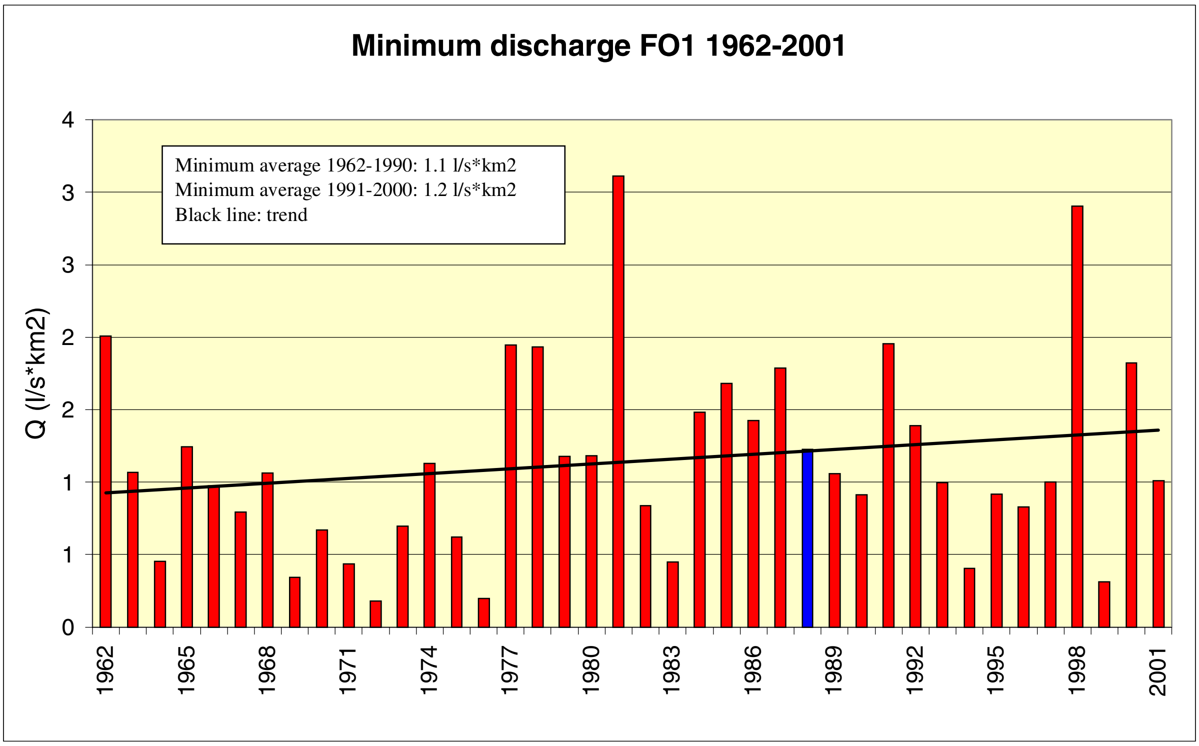

Figure 2-44. *Calculated minimum daily mean discharge FO1 Forsmarksån 1962-2001 with trend (l/s·km^2). 1988 specially selected year.*

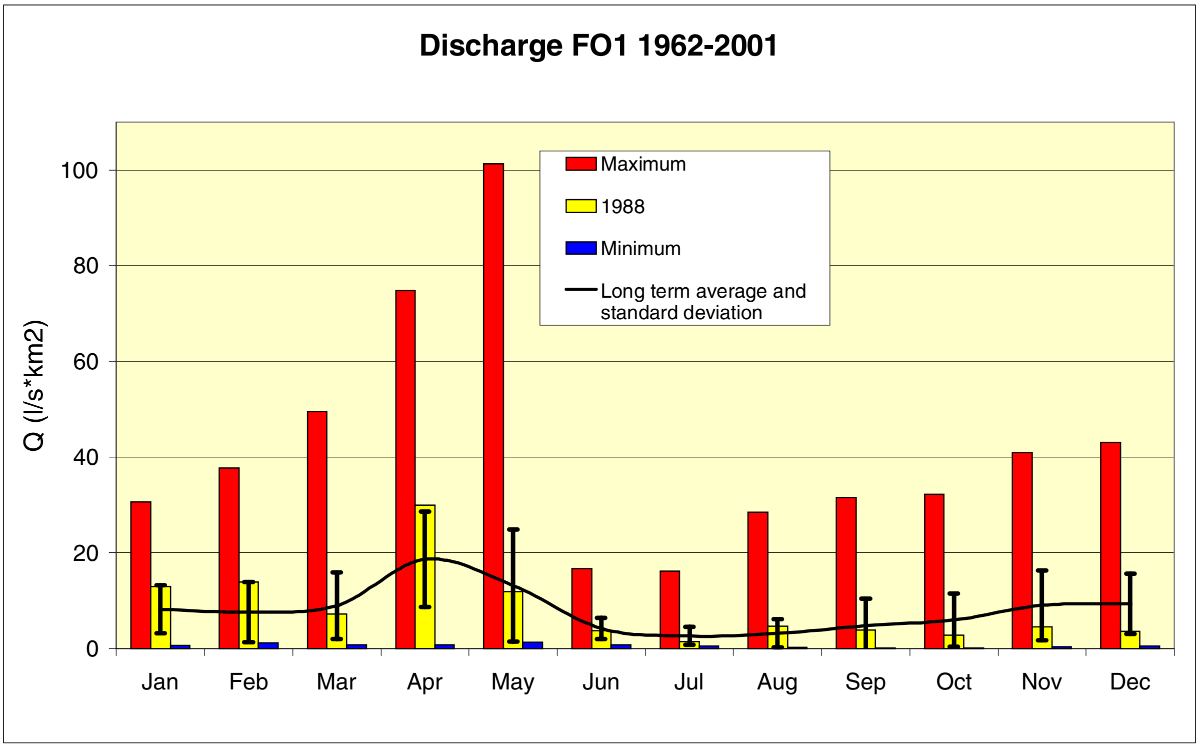

Figure 2-45. *Calculated monthly discharge FO1 Forsmarksån 1962-2001. Maximum and minimum daily mean, long term average and standard deviation (l/s·km^2). 1988 specially selected year.*

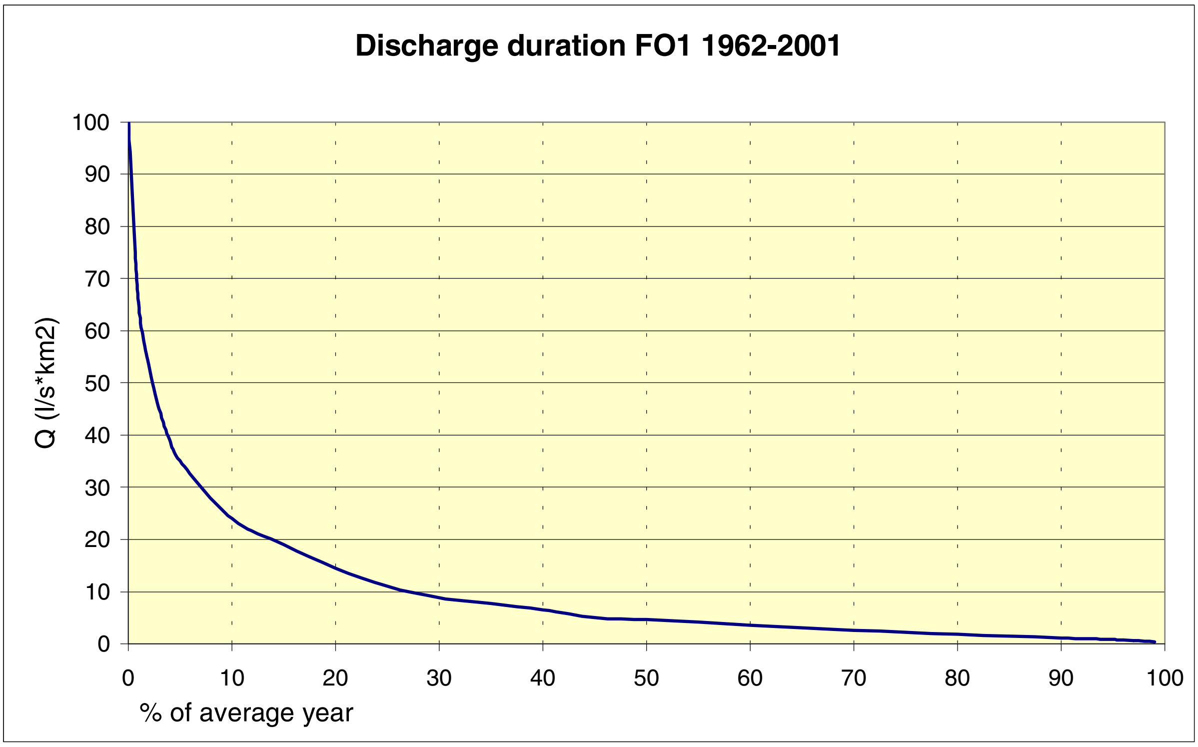

Figure 2-46. *Discharge duration based on daily mean values for FO1 Forsmarksån 1962-2001 (l/s·km^2).*

Table 2-10. Calculated characteristic monthly discharge FO1 Forsmarksån 1962-2001 (l/s·km²). Catchment area: 375.5 km². Daily mean values.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	31	38	50	75	101	17	16	29	32	32	41	43
Med	8.2	7.7	9.0	19	13	4.2	2.6	3.2	4.8	6.0	9.0	9.4
Min	0.7	1.1	0.8	0.8	1.4	0.8	0.5	0.2	0.2	0.2	0.3	0.5
Std	5.0	6.3	6.9	10.0	9.9	11.8	2.2	1.9	2.9	5.6	5.6	7.3

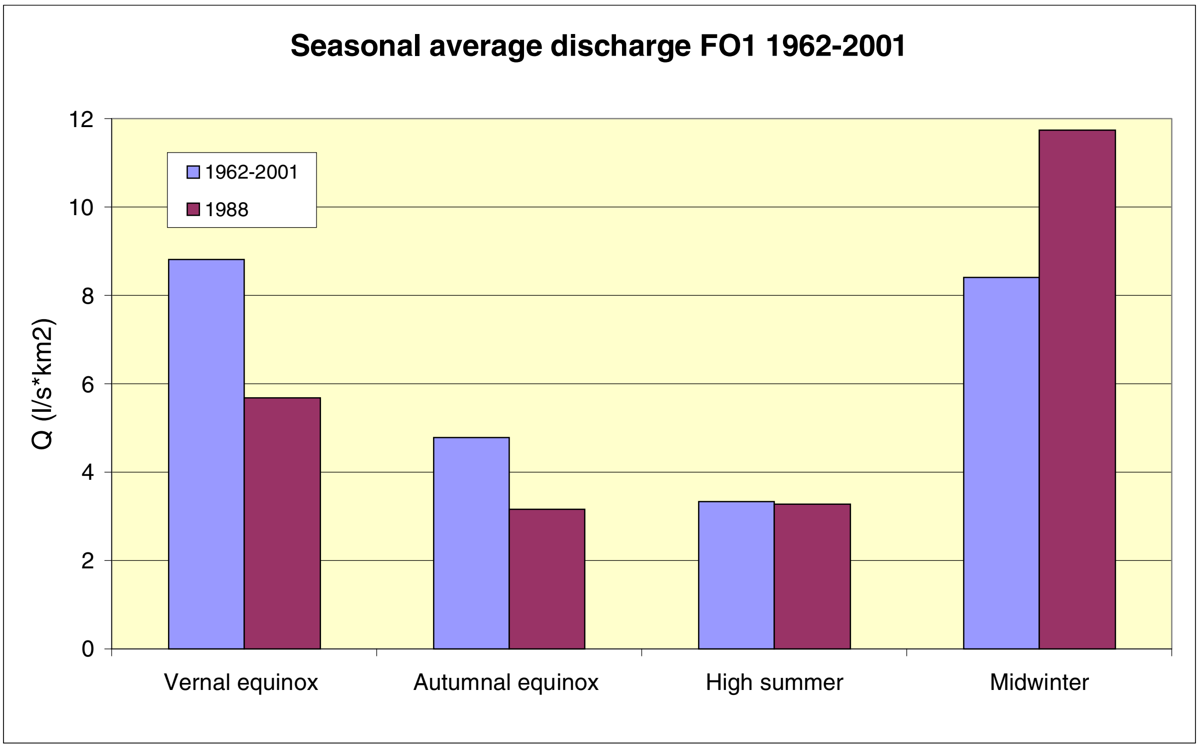

Figure 2-47. *Seasonal average discharge FO1 Forsmarksån 1962-2001 (l/s·km²). Vernal equinox (March 20), autumnal equinox (Sept 23), high summer (average Jun-Aug) and Midwinter (average Dec-Feb). 1988 specially selected year.*

Table 2-11. Calculated seasonal average discharge FO1 Forsmarksån 1962-2001 (l/s·km²). Catchment area: 375.5 km². Daily mean values.

Season	Vernal equinox (March 23)	Autumnal equinox (Sept 20)	High summer (Jun-Aug)	Midwinter (Dec-Feb)
Discharge	8.8	4.8	3.3	8.4

Table 2-12. Calculated characteristic discharge OL1 Olandsån 1962-2001 ($l/s \cdot km^2$). Catchment area: 880.9 km^2. Daily mean values. Calc min = calculated minimum.

Calc min	MLQ	MQ	MHQ	HHQ50	HHQ100
0.01	0.5	7.4	55	111	122

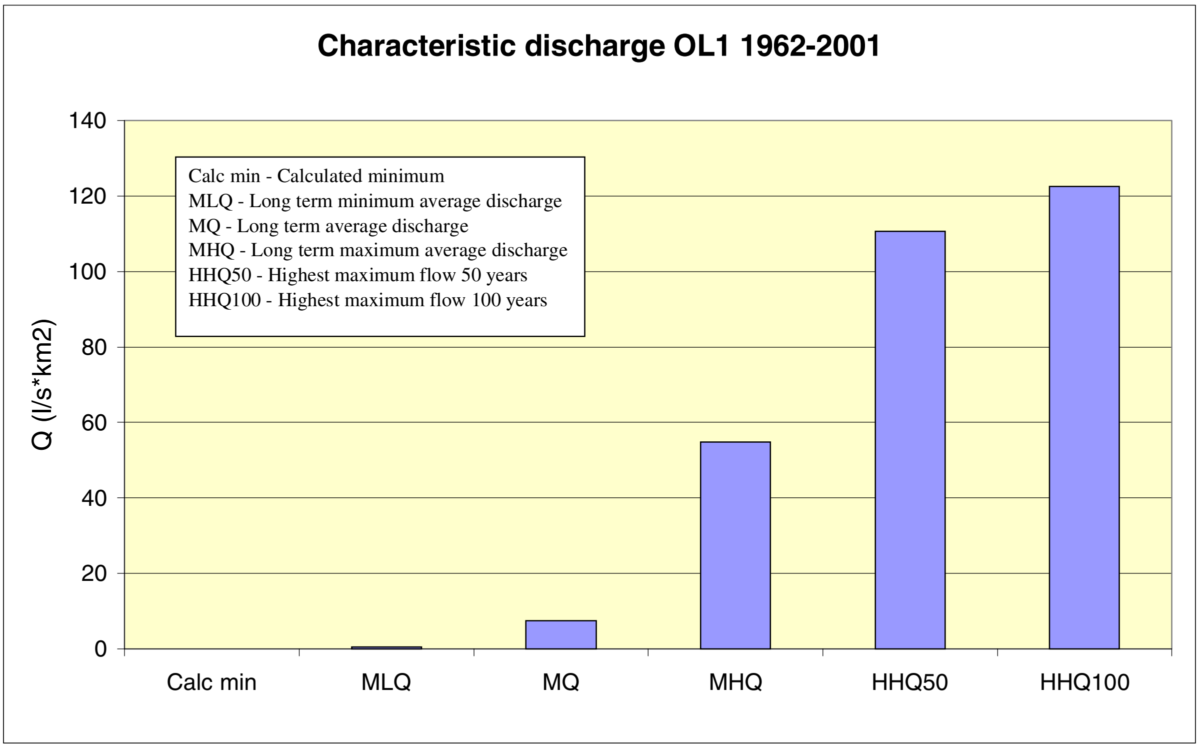

Figure 2-48. *Calculated characteristic discharge OL1 Olandsån 1962-2001. Daily mean values ($l/s \cdot km^2$).*

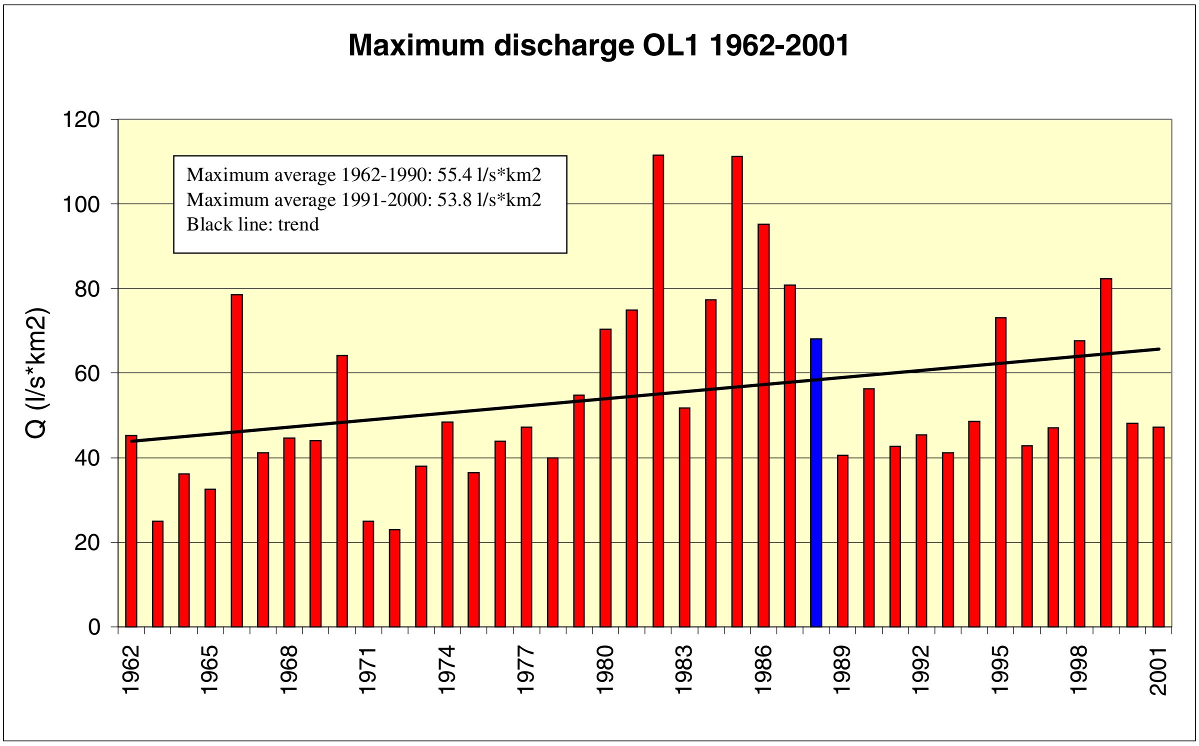

Figure 2-49. *Calculated maximum daily mean discharge OL1 Olandsån 1962-2001 with trend ($l/s \cdot km^2$). 1988 specially selected year.*

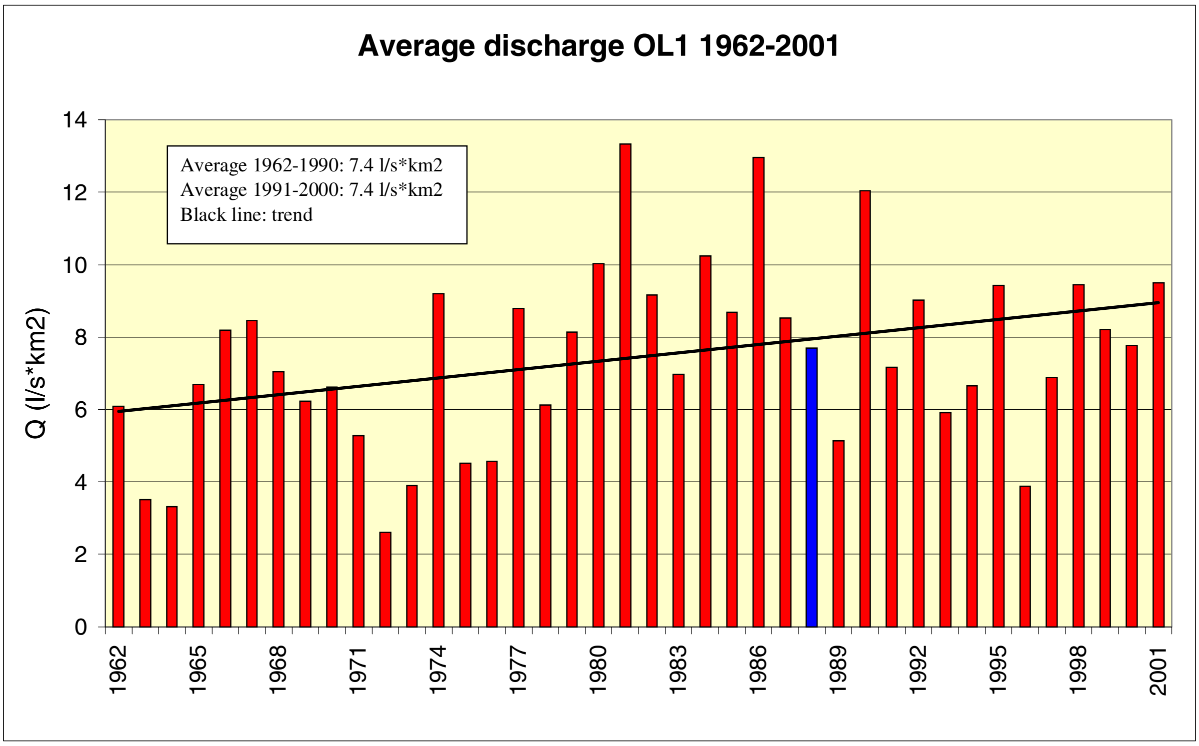

Figure 2-50. *Calculated average discharge OL1 Olandsån 1962-2001 with trend (l/s·km²). 1988 specially selected year.*

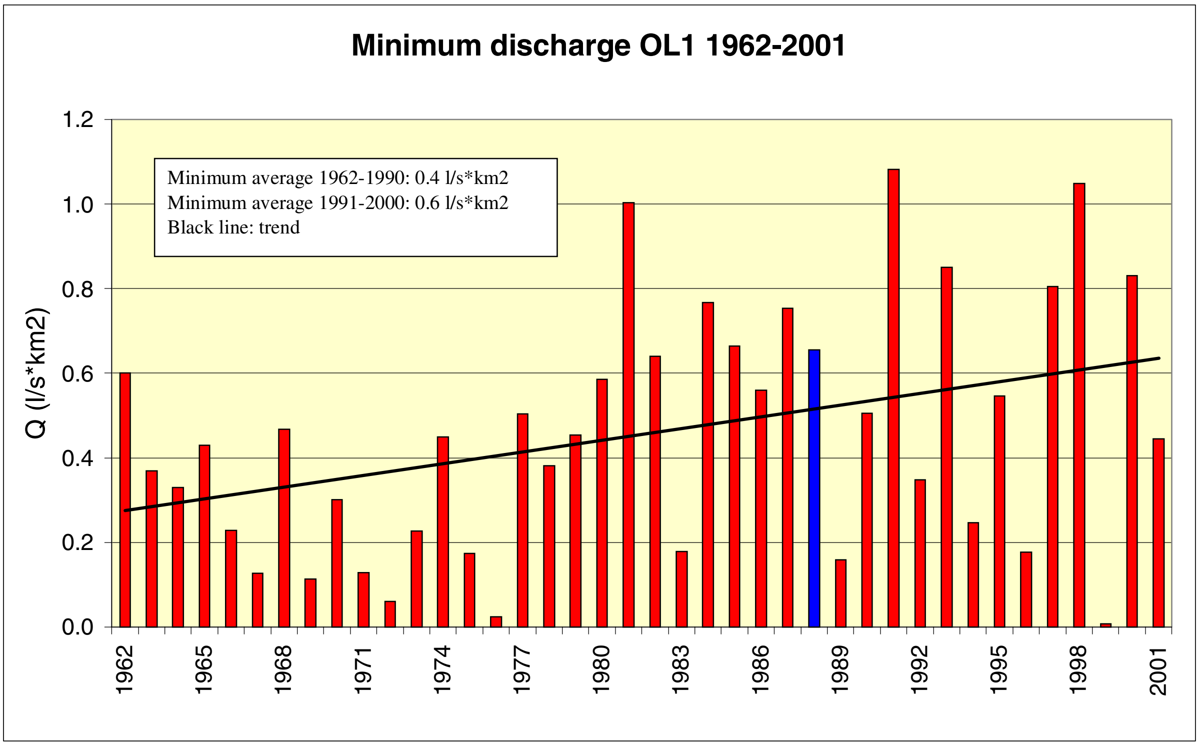

Figure 2-51. *Calculated minimum daily mean discharge OL1 Olandsån 1962-2001 with trend (l/s·km²). 1988 specially selected year.*

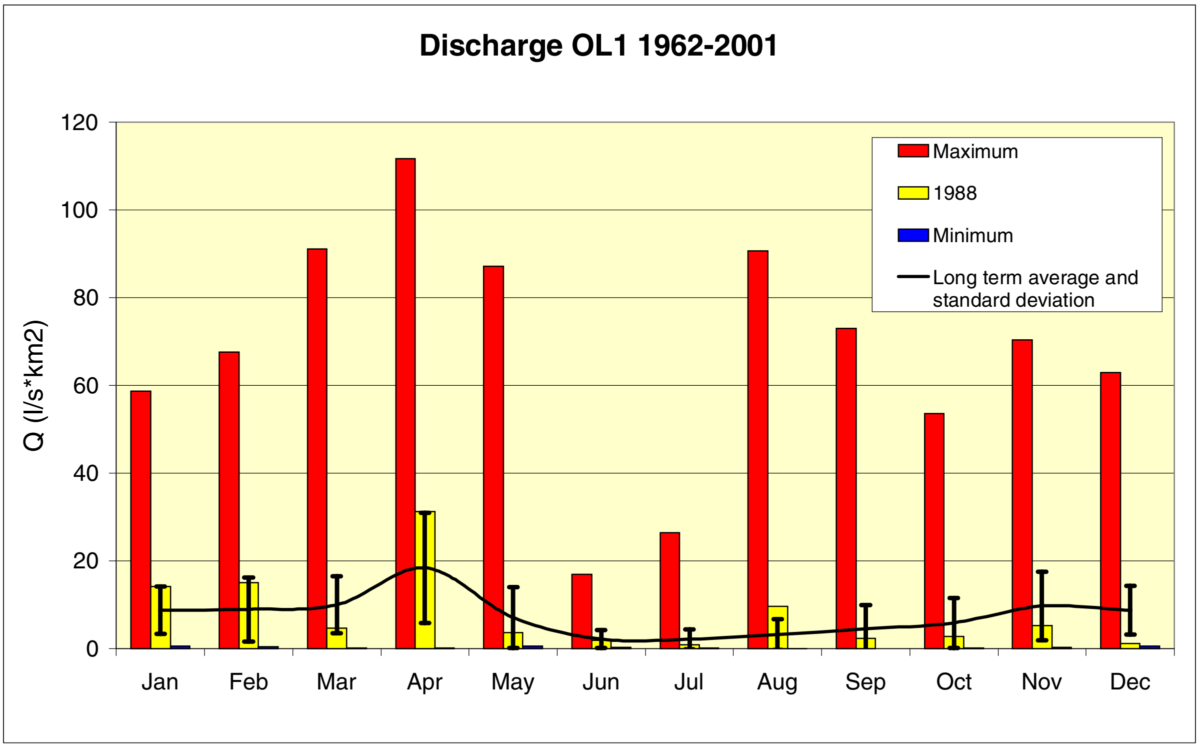

Figure 2-52. *Calculated monthly discharge OL1 Olandsån 1962-2001. Maximum and minimum daily mean, long term average and standard deviation (l/s·km^2). 1988 specially selected year.*

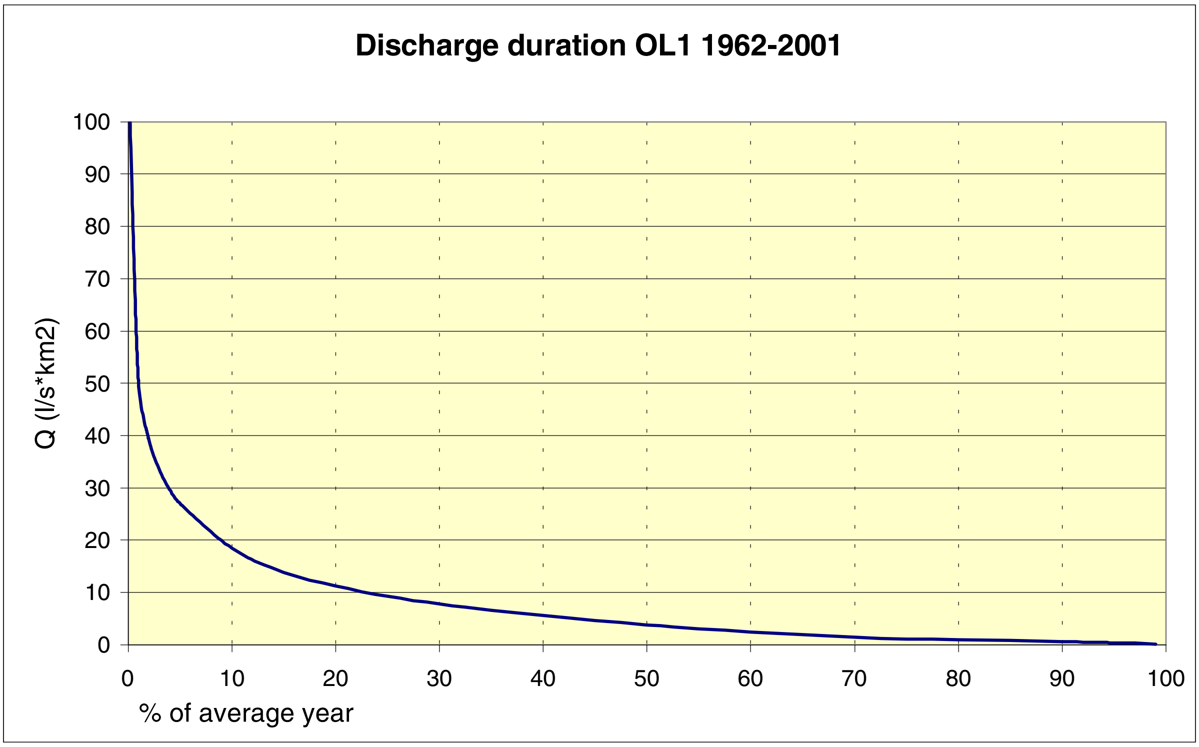

Figure 2-53. *Discharge duration based on daily mean values for OL1 Olandsån 1962-2001 (l/s·km^2).*

Table 2-13. Calculated characteristic monthly discharge OL1 Olandsån 1962-2001 (l/s·km²). Catchment area: 880.9 km². Daily mean values.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	59	68	91	112	87	17	26	91	73	54	70	63
Med	8.7	9.0	10	18	7.1	2.2	2.1	3.2	4.5	5.9	9.7	8.7
Min	0.6	0.4	0.2	0.2	0.5	0.2	0.1	0	0	0.1	0.3	0.6
Std	5.4	7.3	6.5	12.6	7.0	2.1	2.2	3.5	5.4	5.6	7.8	5.6

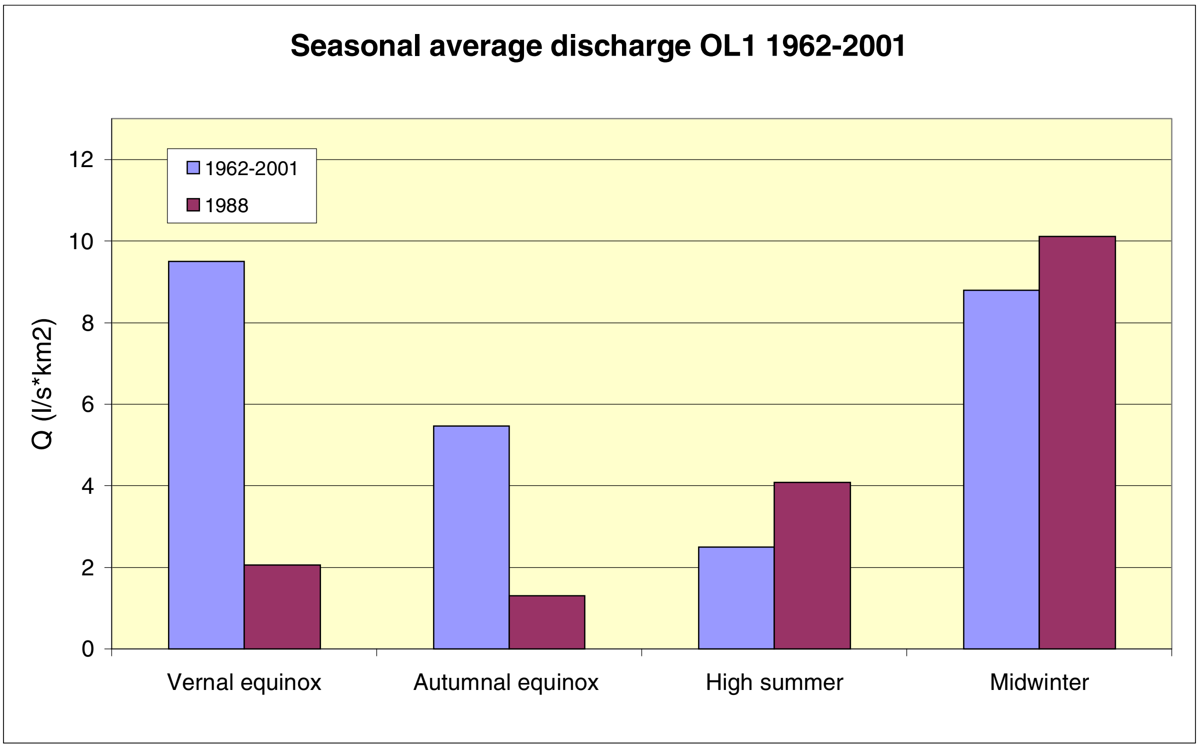

Figure 2-54. *Seasonal average discharge OL1 Olandsån 1962-2001 (l/s·km²). Vernal equinox (March 20), autumnal equinox (Sept 23), high summer (average Jun-Aug) and Midwinter (average Dec-Feb). 1988 specially selected year.*

Table 2-14. Calculated seasonal average discharge OL1 Olandsån 1962-2001 (l/s·km²). Catchment area: 880.9 km². Daily mean values.

Season	**Vernal equinox (March 23)**	**Autumnal equinox (Sept 20)**	**High summer (Jun-Aug)**	**Midwinter (Dec-Feb)**
Discharge	9.5	5.5	2.5	8.8

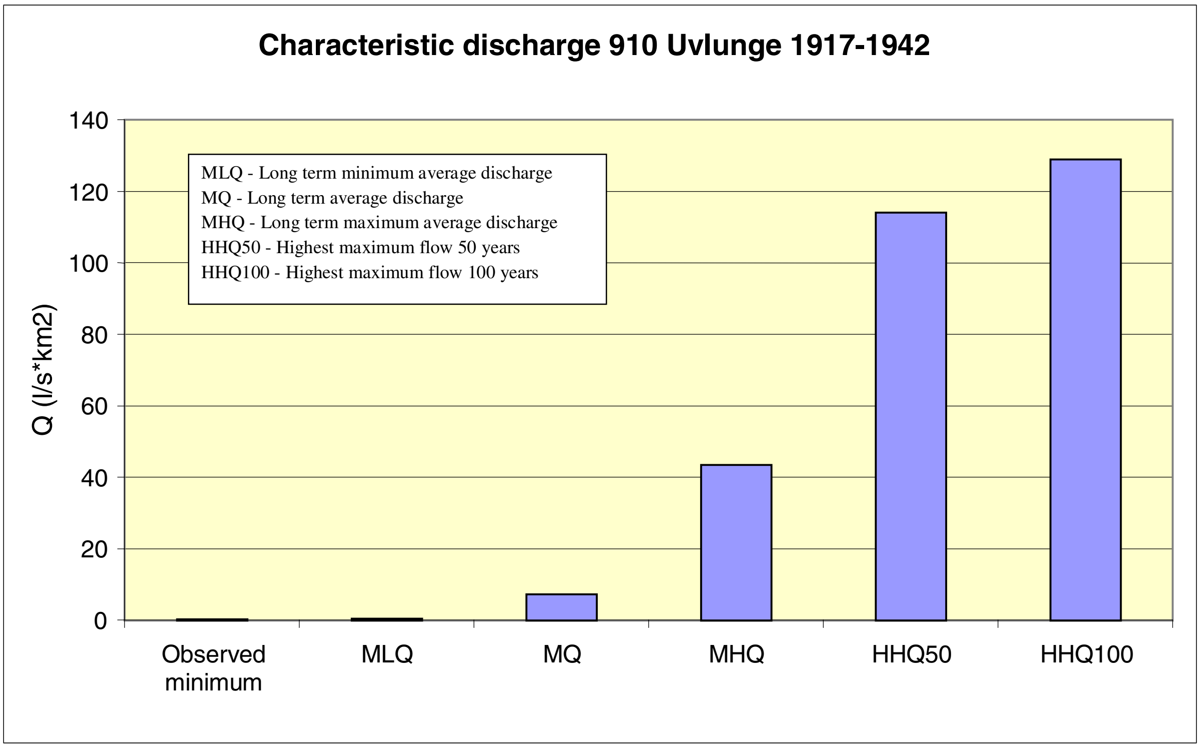

Figure 2-55. *Characteristic discharge 910 Uvlunge 1917-1942 with observed minimum. Daily mean values (l/s·km^2).*

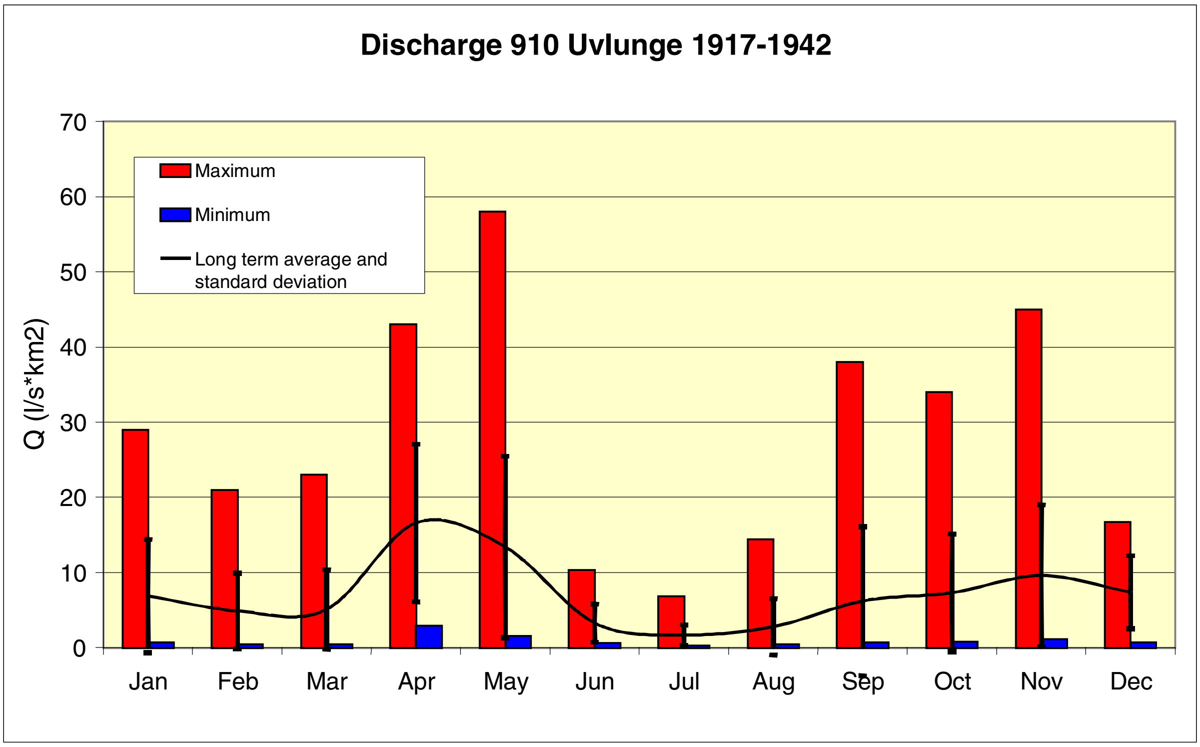

Figure 2-56. *Monthly discharge 910 Uvlunge 1917-1942. Maximum and minimum daily mean, long term average and standard deviation (l/s·km^2).*

Table 2-15. Characteristic discharge 910 Uvlunge 1917-1942 (l/s·km^2). Catchment area: 263 km^2. Daily mean values. Obs min = observed minimum.

Obs min	MLQ	MQ	MHQ	HHQ50	HHQ100
0.15	0.46	7.2	43	114	129

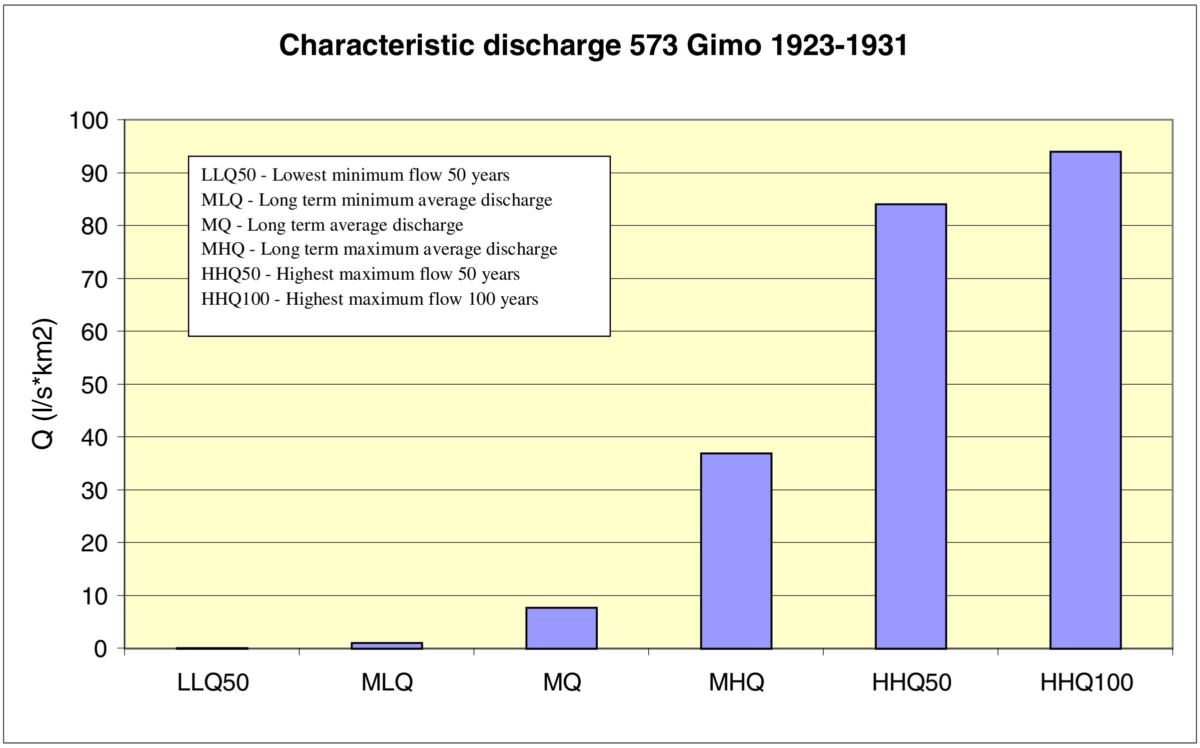

Figure 2-57. *Characteristic discharge 573 Gimo 1923-1931. Daily mean values (l/s·km^2).*

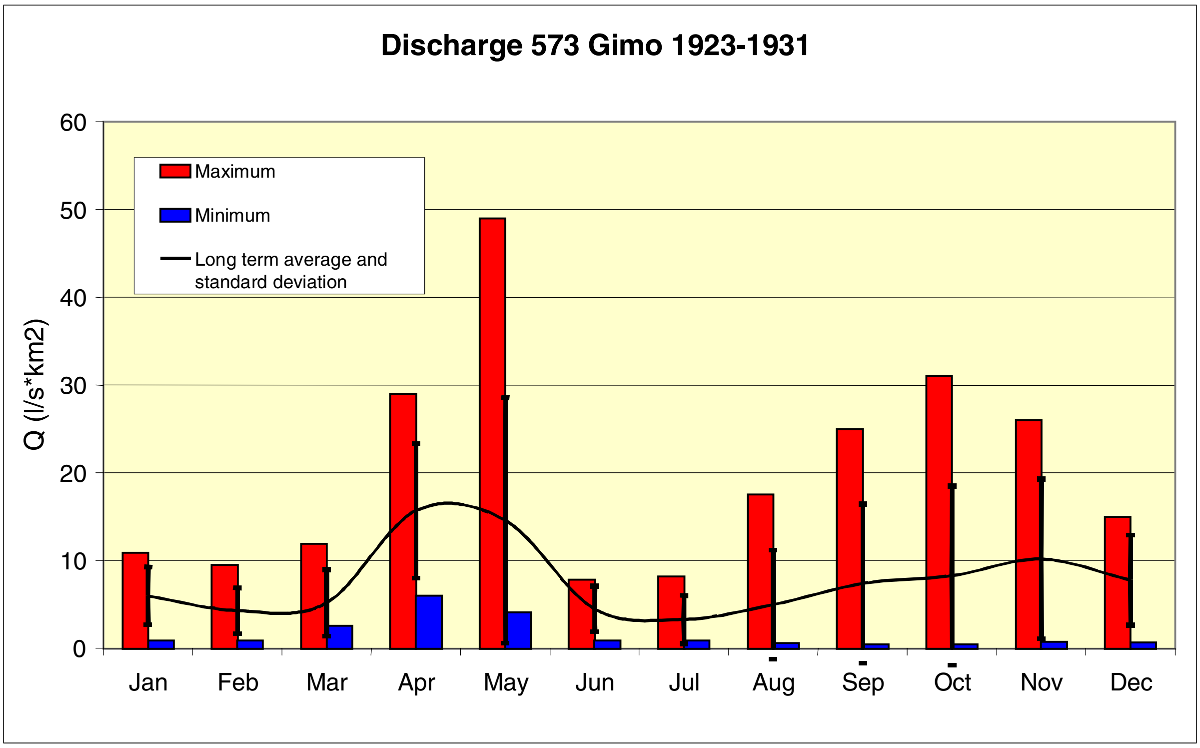

Figure 2-58. *Monthly discharge 573 Gimo 1923-1931. Maximum and minimum daily mean, long term average and standard deviation (l/s·km^2).*

Table 2-16. Characteristic discharge 573 Gimo 1922-1932 (l/s·km^2). Catchment area: 587 km^2. Daily mean values.

LLQ50	MLQ	MQ	MHQ	HHQ50	HHQ100
0.02	1.1	7.7	37	84	94

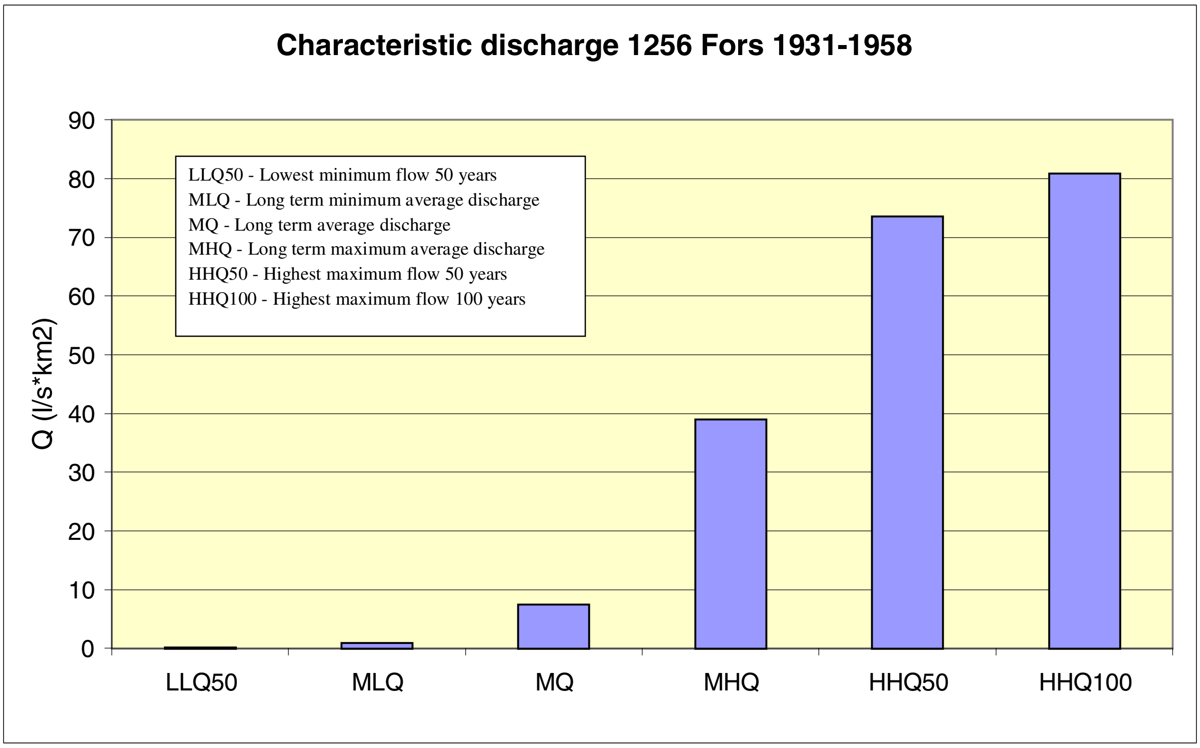

Figure 2-59. *Characteristic discharge 1256 Fors 1931-1958. Daily mean values (l/s·km^2).*

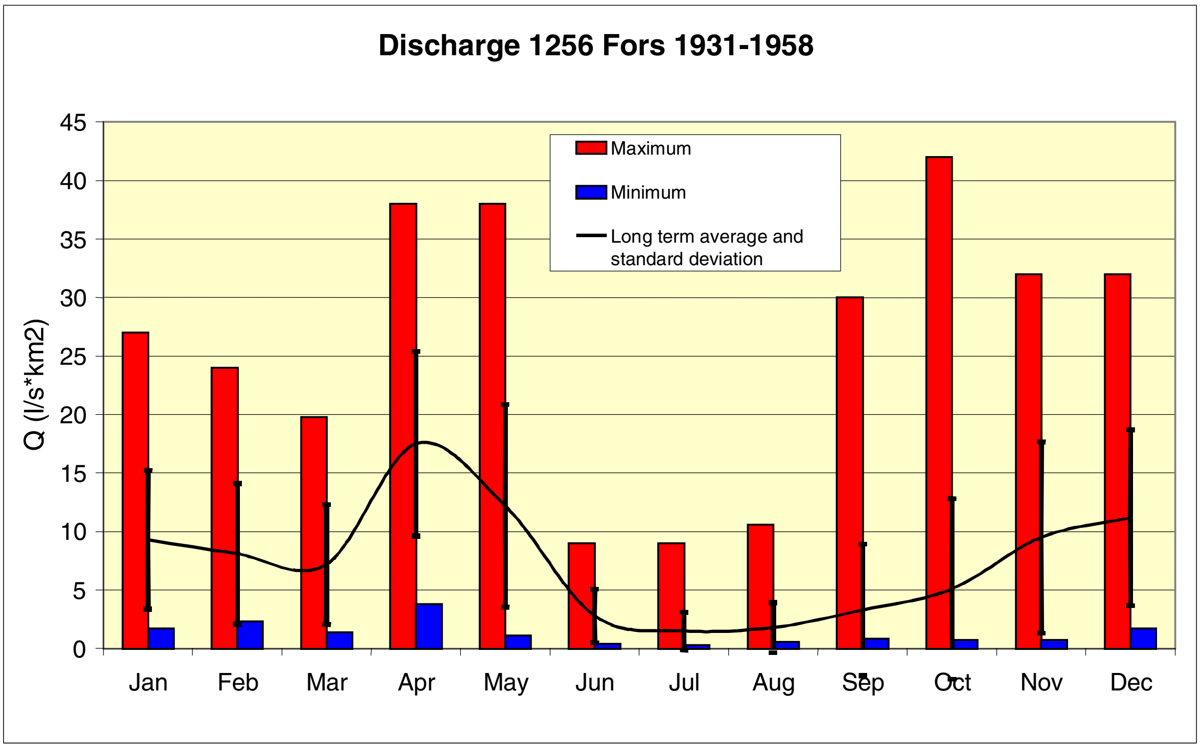

Figure 2-60. *Monthly discharge 1256 Fors 1931-1958. Maximum and minimum daily mean, long term average and standard deviation (l/s·km^2).*

Table 2-17. Characteristic discharge 1256 Fors 1931-1958 (l/s·km^2). Catchment area: 577 km^2.

LLQ50	MLQ	MQ	MHQ	HHQ50	HHQ100
0.17	0.97	7.5	39	74	81

Water level

A statistical analysis has been made on water level data from the station 50110 Vattholma. This station was a fusion of the stations 563 Vattholma (1917-1978) and 2244 Vattholma 2 (1980-2000). The station was changed in 1979 when the measuring weir was rebuilt and the station renamed. However, the water level data is valid only for the very location where the station is situated and not comparable to other locations. All water level data is uncorrected and can be influenced by ice jam or backwater caused by vegetation. The characteristic water levels and the seasonal average levels show the extremes and levels to be expected during different parts of the year. All levels are given in the RH00 system.

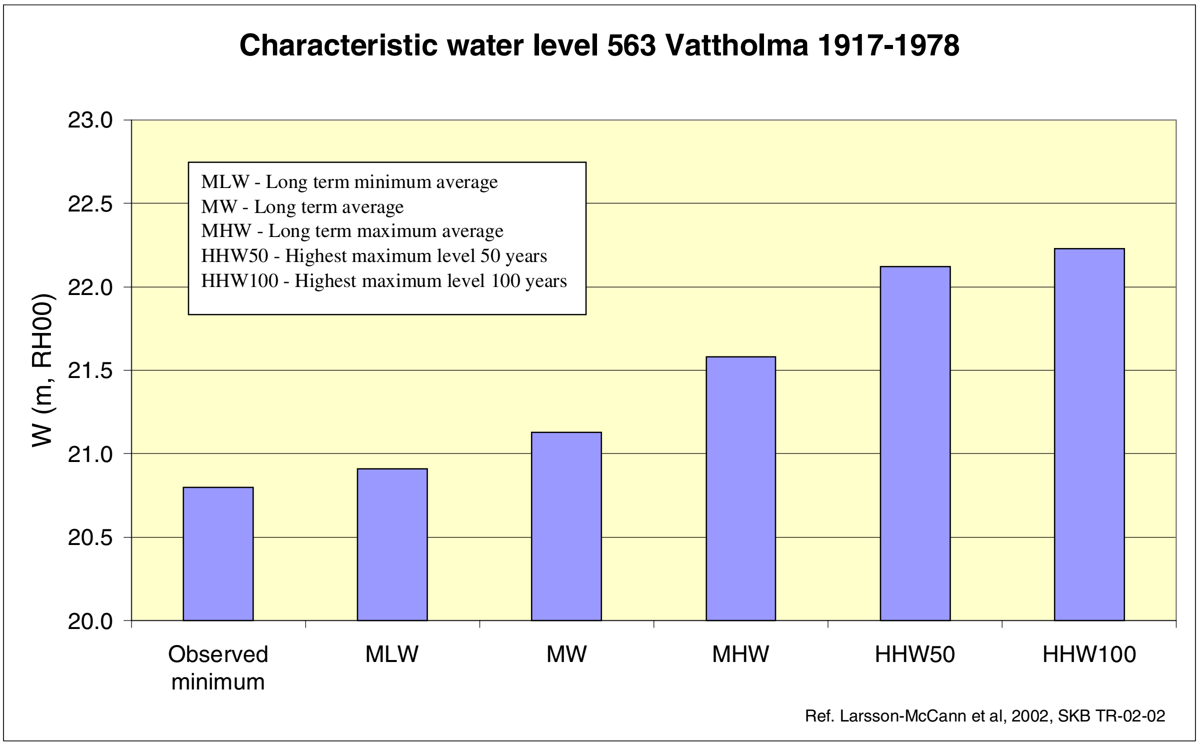

Figure 2-61. *Characteristic water level 563 Vattholma 1917-1978 (m).*

Table 2-18. Characteristic water level 563 Vattholma 1917-1978 (m; RH00). Obs min = observed minimum.

Obs min	MLW[1)]	MW	MHW	HHW50	HHW100
20.80	20.91	21.10	21.58	22.12	22.23

[1)] MLW = longterm average of annual minimum water level, MW = longterm average water level, MHW = longterm average of annual maximum water level, HHW50 = highest maximum water level 50 years, HHW100 = highest maximum water level 100 years

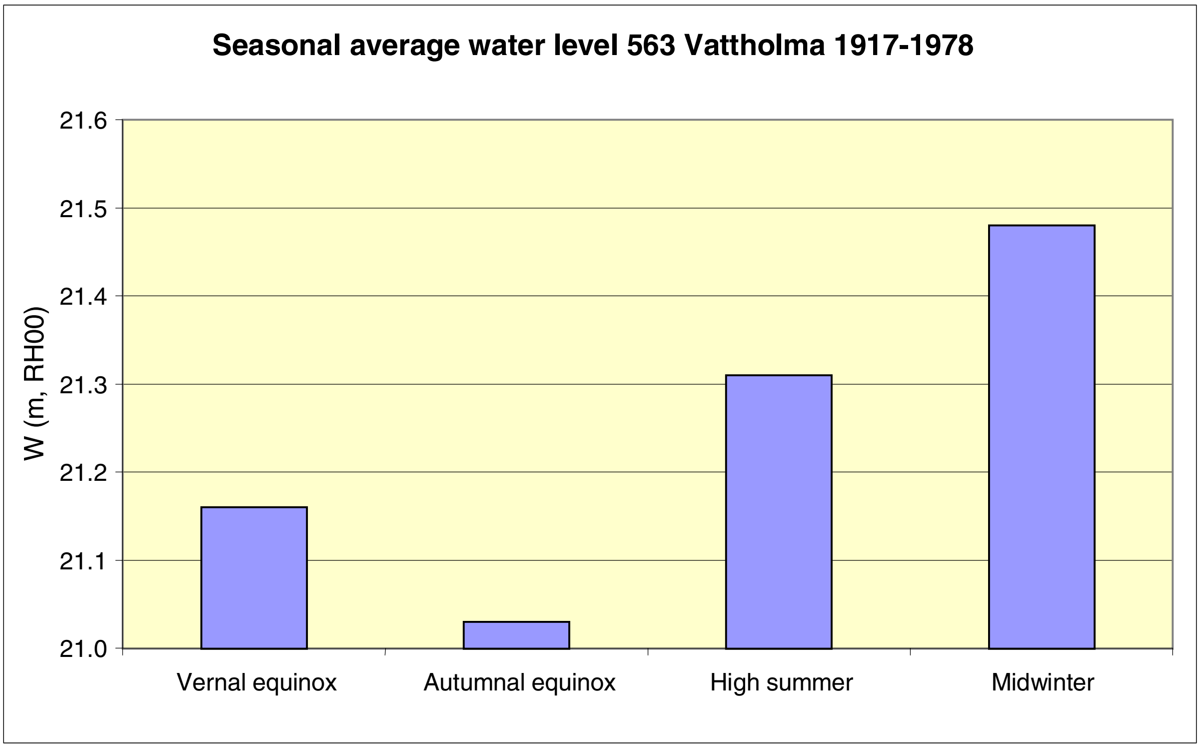

Figure 2-62. *Seasonal average water level 563 Vattholma 1917-1978 (m). Vernal equinox (March 20), autumnal equinox (Sept 23), high summer (average Jun-Aug) and Midwinter (average Dec-Feb).*

Table 2-19. Seasonal average water level 563 Vattholma 1917-1978 (m; RH00).

Season	Vernal equinox (March 20)	Autumnal equinox (Sept 23)	High summer (Jun-Aug)	Midwinter (Dec-Feb)
Water level	21.16	21.03	21.31	21.48

Ice period

The lake Norrsjön is chosen to represent the ice period for the Östhammar-Tierp area. The lake area is 2 km^2 and it has a mean depth of 4.4 m. Norrsjön has a continuous record serie with registrations since 1981. In a square of 100x100 km covering the Östhammar and Tierp regions, 77 lakes were found with a mean area of 1.4 km^2 and a mean depth of 1.7 m.

Table 2-20. Ice period Norrsjön 1981-2000.

Period	Date	Number of days
Maximum	Nov 9 – May 4	177
Average	Dec 1 – Apr 12	133
Minimum	Dec 31 – Mar 10	70

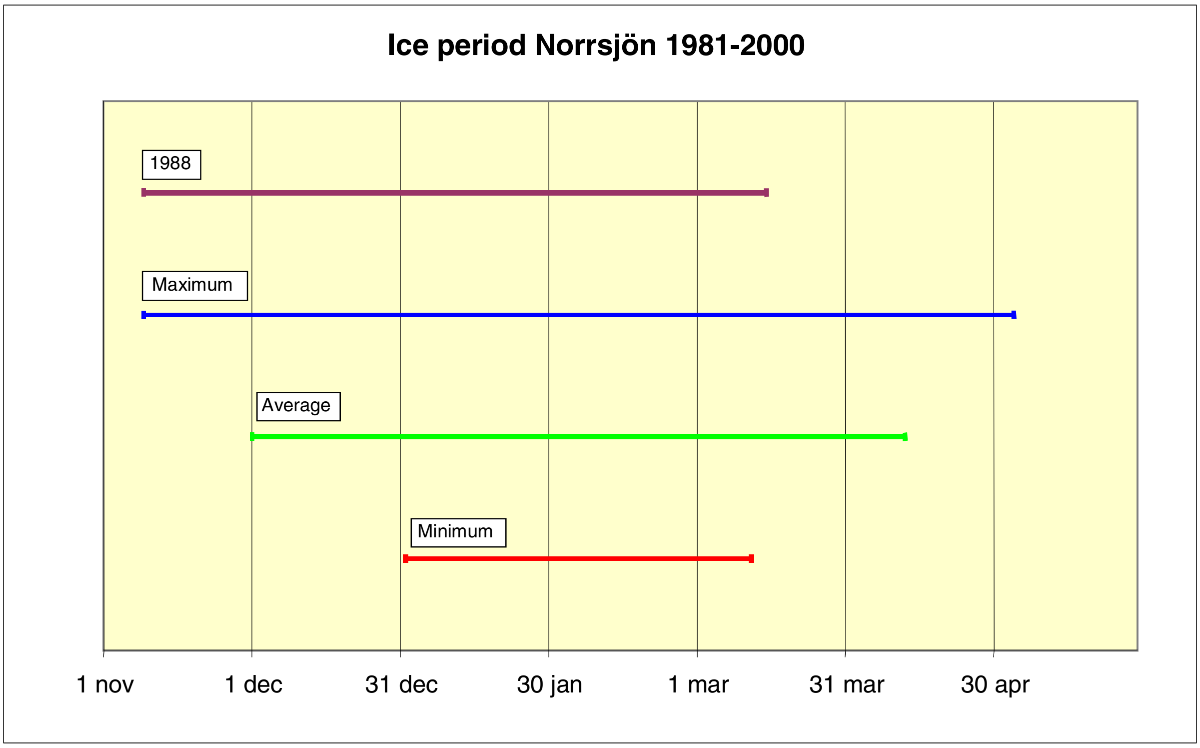

Figure 2-63. *Ice period Norrsjön 1981-2000. Maximum, average and minimum period. 1988 specially selected year.*

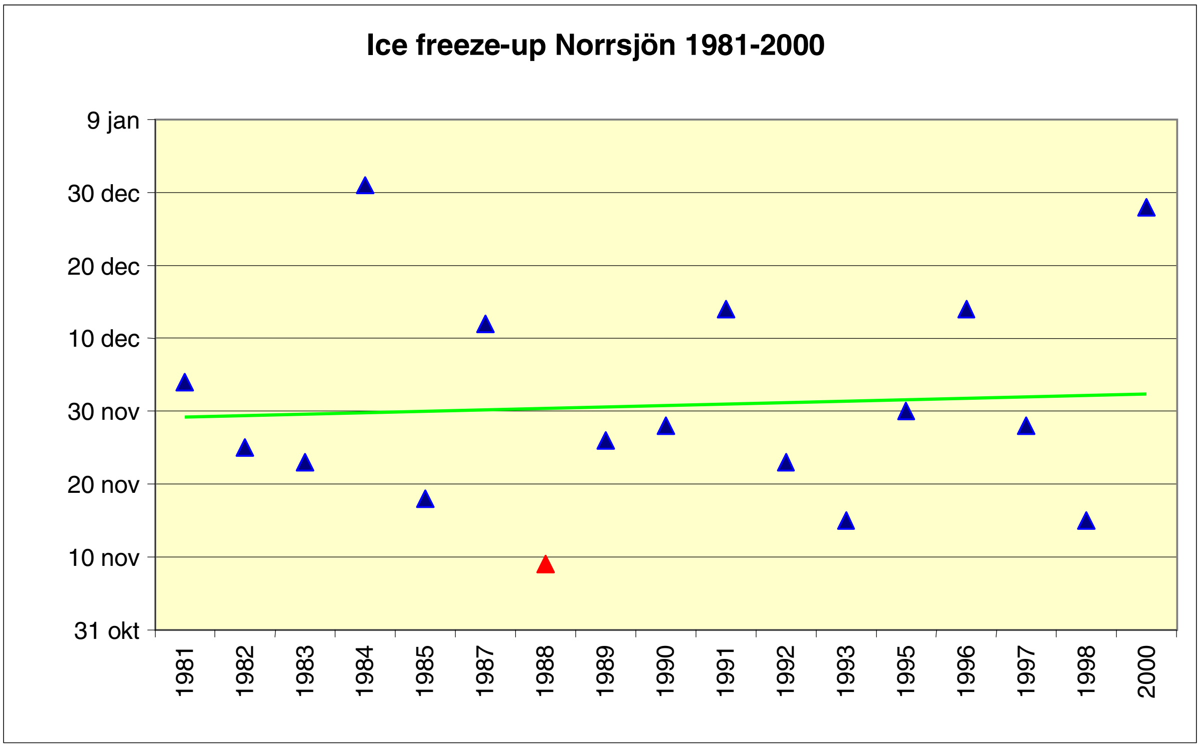

Figure 2-64. *Ice freeze-up Norrsjön 1981-2000 with trend. 1988 specially selected year.*

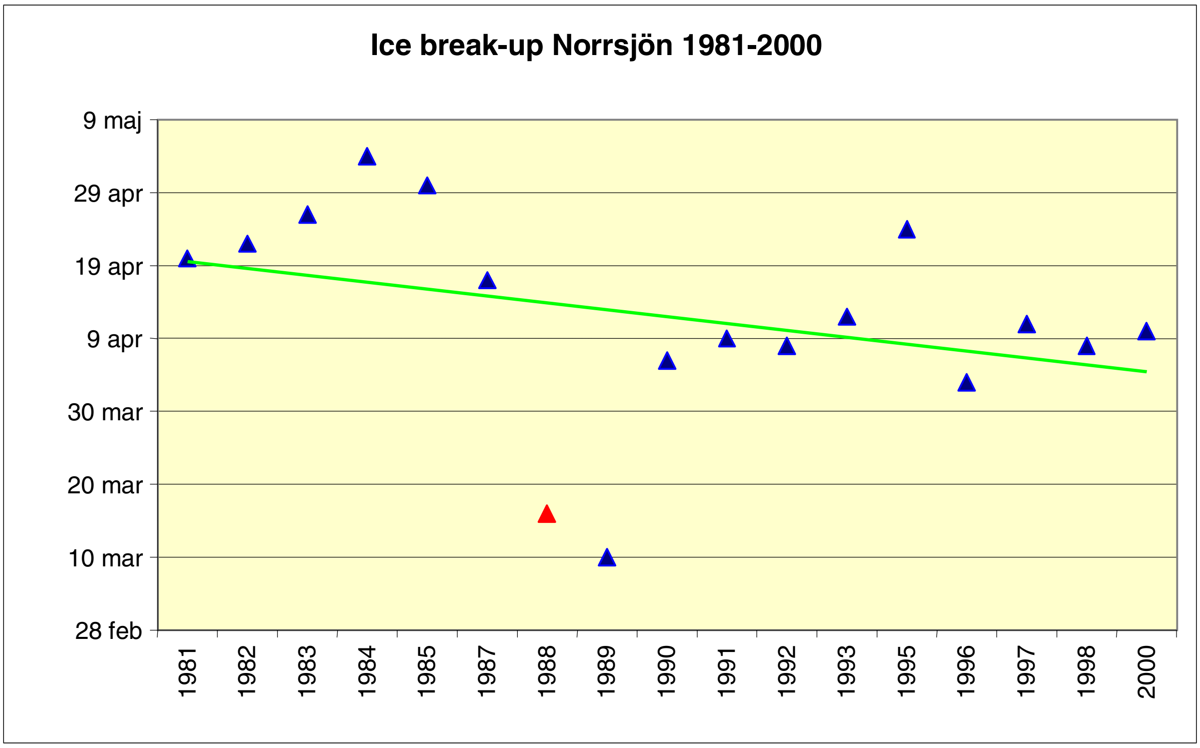

Figure 2-65. *Ice break-up Norrsjön 1981-2000 with trend. 1988 specially selected year.*

External data

An investigation to find hydrological data from other sources than SMHI has been made. Records of discharge and/or water level can be found from:

Lövstabruk; flood records made by Ultuna University of Agricultural Sciences in Fyrisån about 1970-1995, at a location close upstream Lövstabruk. (Barbro Grönberg, Administrative board in Uppsala)

Forsmarksån; two sampling stations run by the Administrative board in Uppsala, close to Forsmarks bruk and Lövsta bruk (Anna-Kristina Brunberg, Uppsala University)

Frebro; records of water level, Tämnarån (Anna Blomlöf, head of Water and Drainage, Tierp municipality)

Lake Tämnaren; records of inlet and outlet discharge and water level 1977-2001 (Sven Ahlgren, Technical Department, Uppsala municipality)

SKB studies:
Hydrogeological conditions in the Finnsjön area (SKB AR 89-24, SKB TR 91-24)
Hydrological and meteorological conditions at Gideå and Finnsjön during the Chernobyl fallout study 1986-1991 (SKB AR 93-21)

Tämnarån; records of water level at Ubblixbo, Lindstan and Annedal (Torgny Lindgren, Tierp)

Nopex project (Allan Rodhe, Uppsala University)

2.2.2 Tierp

Discharge

The hydrological station 50110 Vattholma is chosen to be the main representative for stations in the Östhammar-Tierp area. It has a continuous record series with registrations since 1917, an annual mean specific discharge of 7.5 $l/s \cdot km^2$ and a catchment area of medium size (294 km^2). Other stations that give completion data are 910 Uvlunge (represents Östhammar-Tierp), 1053 Näs and 1260 Odensfors (represent Tierp only). Statistics from 1053 Näs is presented below, although it might not be quite representative due to its large catchment area. Another station in the neighbourhood is 2299 Tärnsjö, but it is less representative since it has a small catchment area located some 40 km southwest from the Tierp region. A statistical analysis has been made to determine the characteristics of discharge where the minimum 50 years, maximum 50 and 100 years has been carried out by frequency analysis. Long term minimum and maximum as well as long term average has been determined by mean value calculation.

Tables and diagrams with discharge data from 50110 Vattholma and 910 Uvlunge are referred to the chapter of Östhammar region (2.2.1).

Water level

Tables and diagrams of water level are referred to the chapter of Östhammar region (2.2.1).

Ice period

Tables and diagrams of ice period are referred to the chapter of Östhammar region (2.2.1).

External data

See section 2.2.1 Östhammar.

Table 2-21. Characteristic discharge 1053 Näs 1925-1970 (l/s·km²). Catchment area: 1176 km². Daily mean values.

LLQ50	MLQ	MQ	MHQ	HHQ50	HHQ100
0.01	1.2	7.7	39	86	96

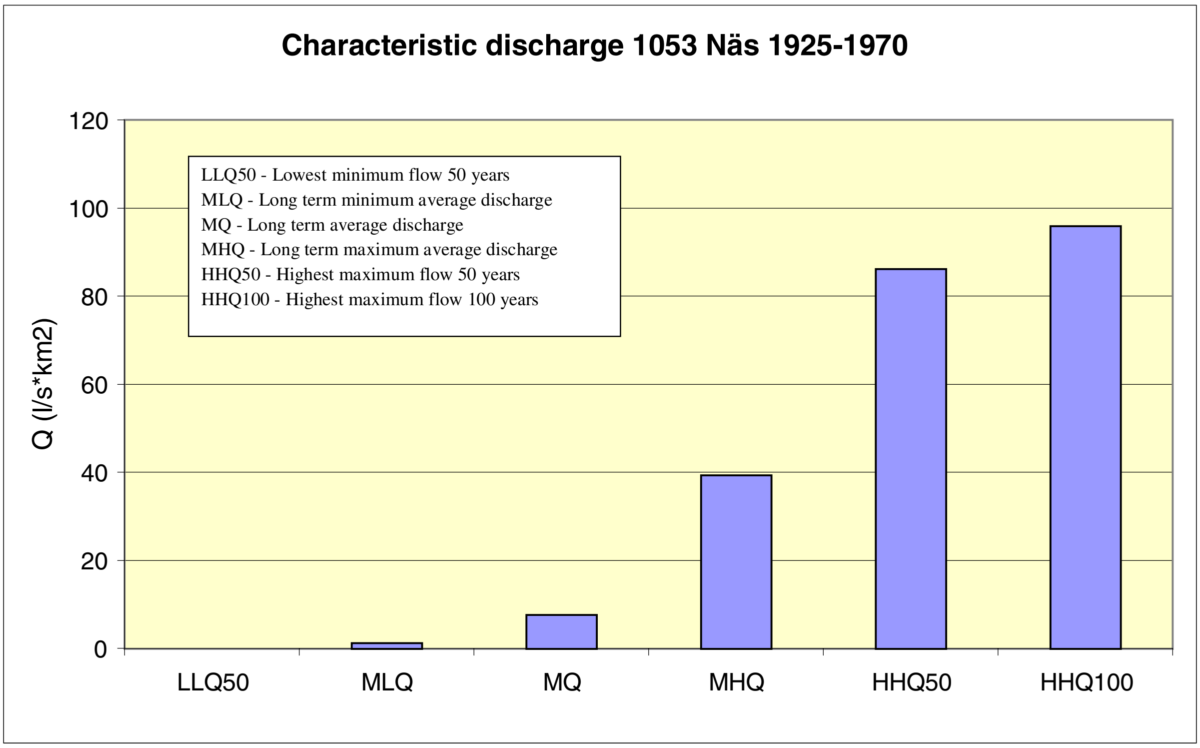

Figure 2-66. *Characteristic discharge 1053 Näs 1925-1970. Daily mean values (l/s·km²).*

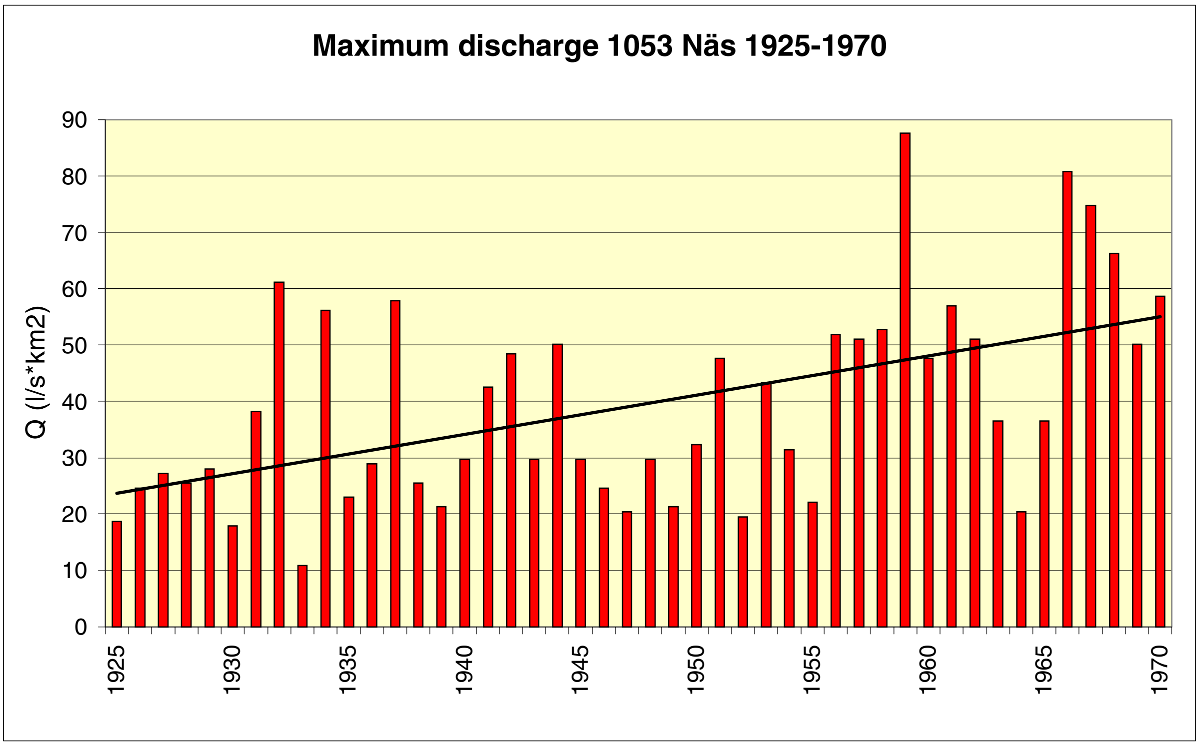

Figure 2-67. *Maximum daily mean discharge 1053 Näs 1925-1970 with trend (l/s·km²).*

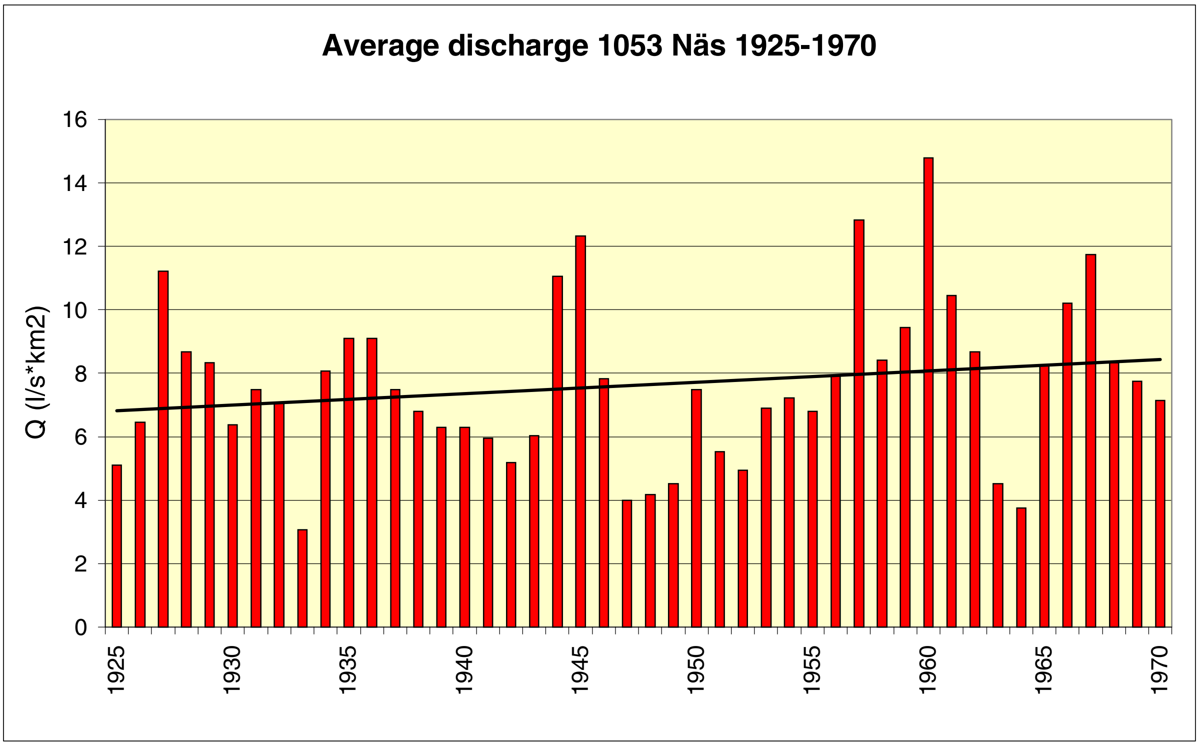

Figure 2-68. *Average discharge 1053 Näs 1925-1970 with trend (l/s·km^2).*

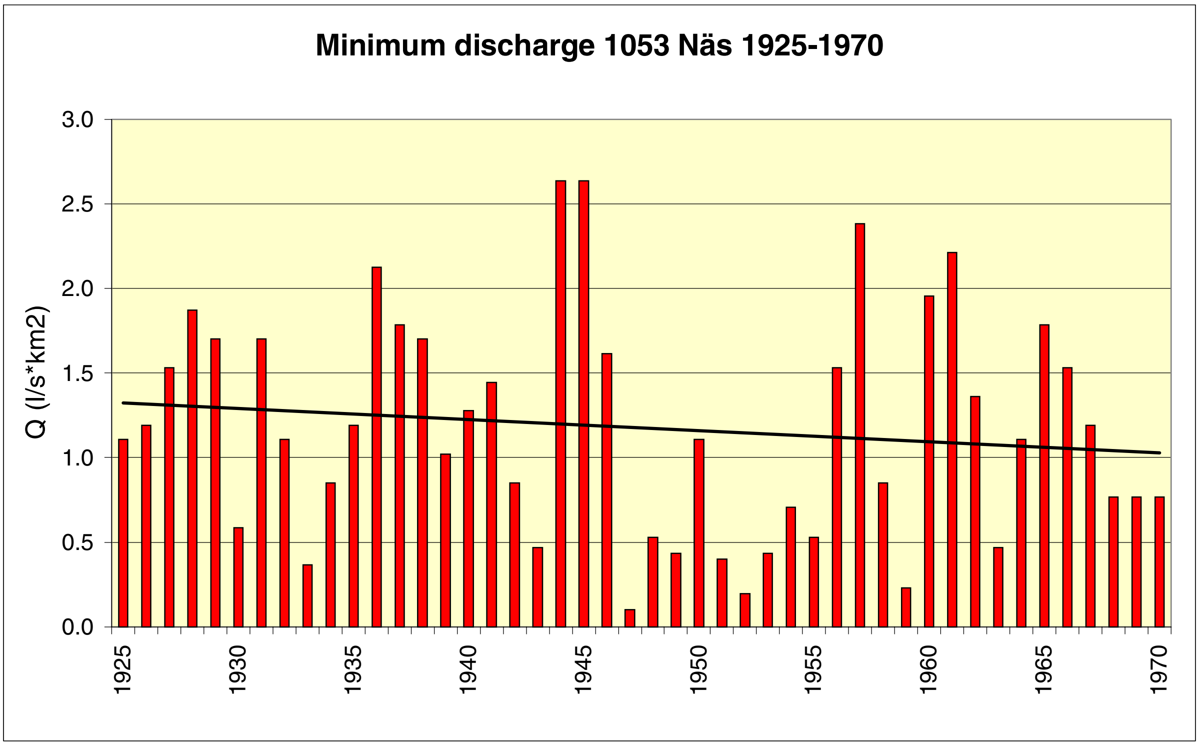

Figure 2-69. *Minimum daily mean discharge 1053 Näs 1925-1970 with trend (l/s·km^2).*

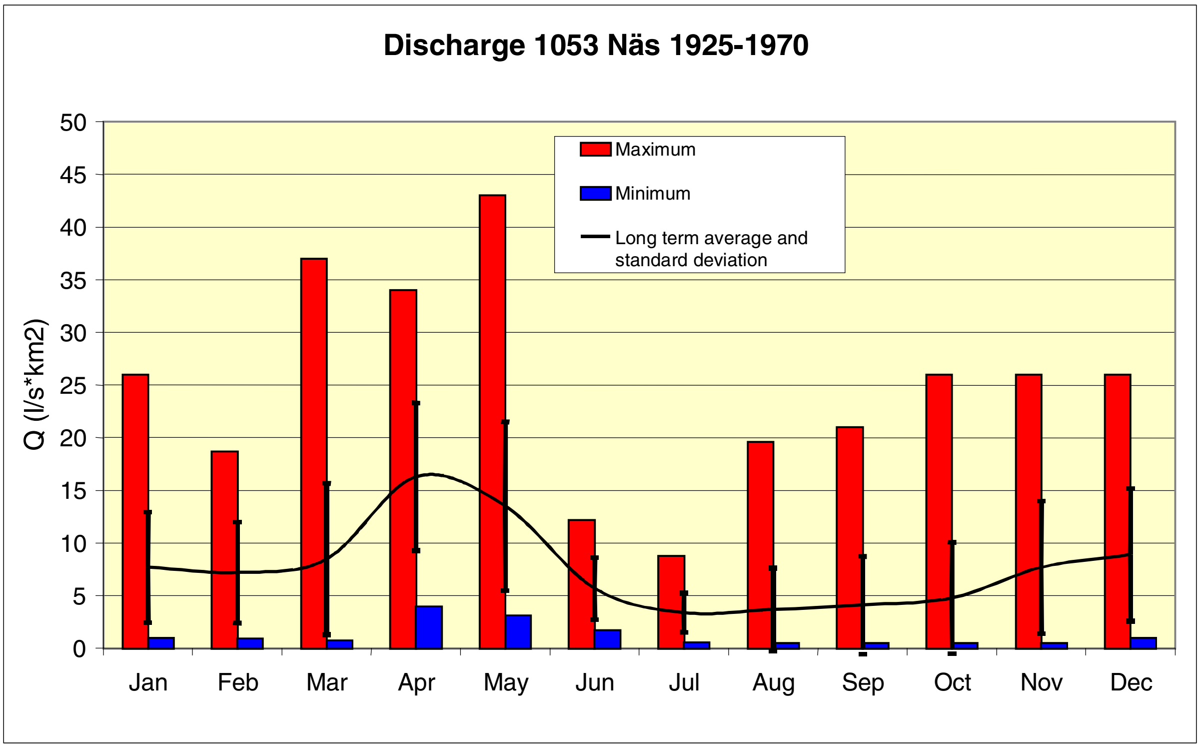

Figure 2-70. *Monthly discharge 1053 Näs 1925-1970. Maximum and minimum daily mean, long term average and standard deviation (l/s·km²).*

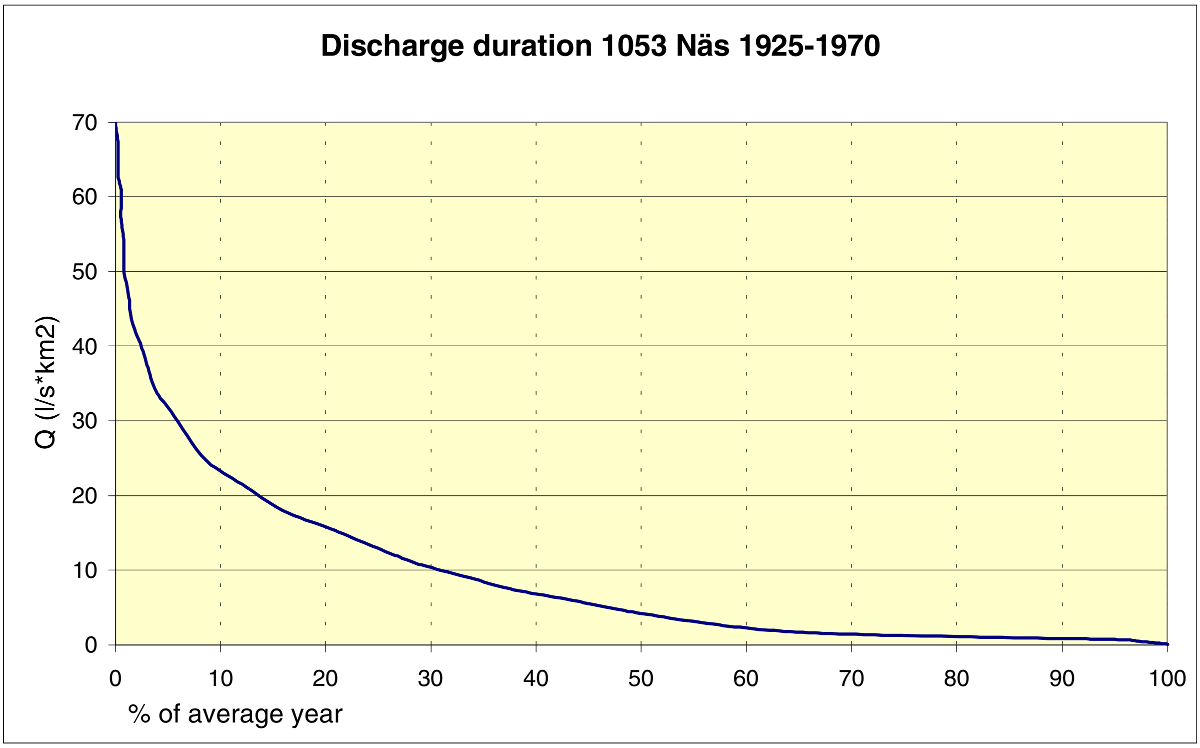

Figure 2-71. *Discharge duration based on daily mean values for 1053 Näs 1925-1970 (l/s·km²).*

Table 2-22. Calculated characteristic monthly discharge 1053 Näs 1925-1970 (l/s·km²). Catchment area: 1176 km². Daily mean values.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max	26	19	37	34	43	12	8.8	20	21	26	26	26
Med	7.7	7.2	8.5	16	14	5.7	3.4	3.7	4.1	4.8	7.7	8.9
Min	1.0	0.9	0.8	4.0	3.1	1.7	0.6	0.5	0.5	0.5	0.5	1.0
Std	5.3	4.8	7.2	7.0	8.0	2.9	1.9	3.9	4.6	5.3	6.3	6.3

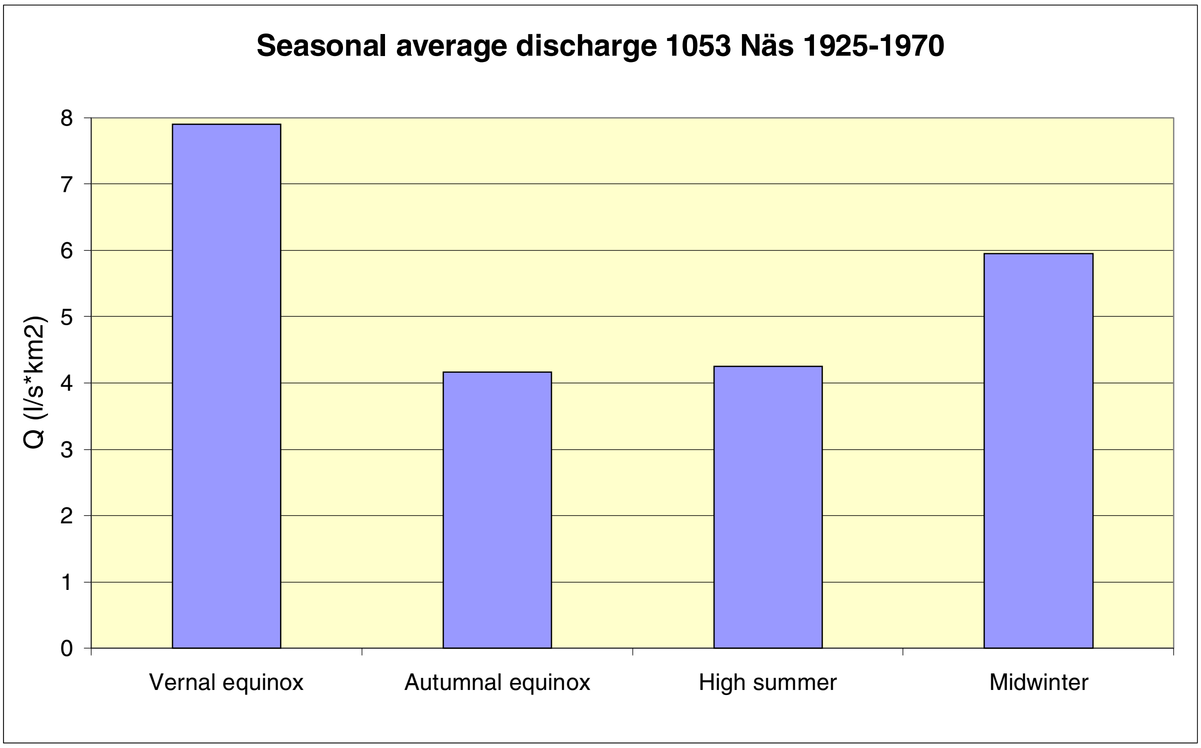

Figure 2-72. *Characteristic discharge 1053 Näs 1925-1970 with observed minimum. Daily mean values (l/s·km²).*

Table 2-23. Calculated seasonal average discharge 1053 Näs 1925-1970 (l/s·km²). Catchment area: 1176 km². Daily mean values.

Season	Vernal equinox (March 23)	Autumnal equinox (Sept 20)	High summer (Jun-Aug)	Midwinter (Dec-Feb)
Discharge	7.9	4.2	4.3	6.0

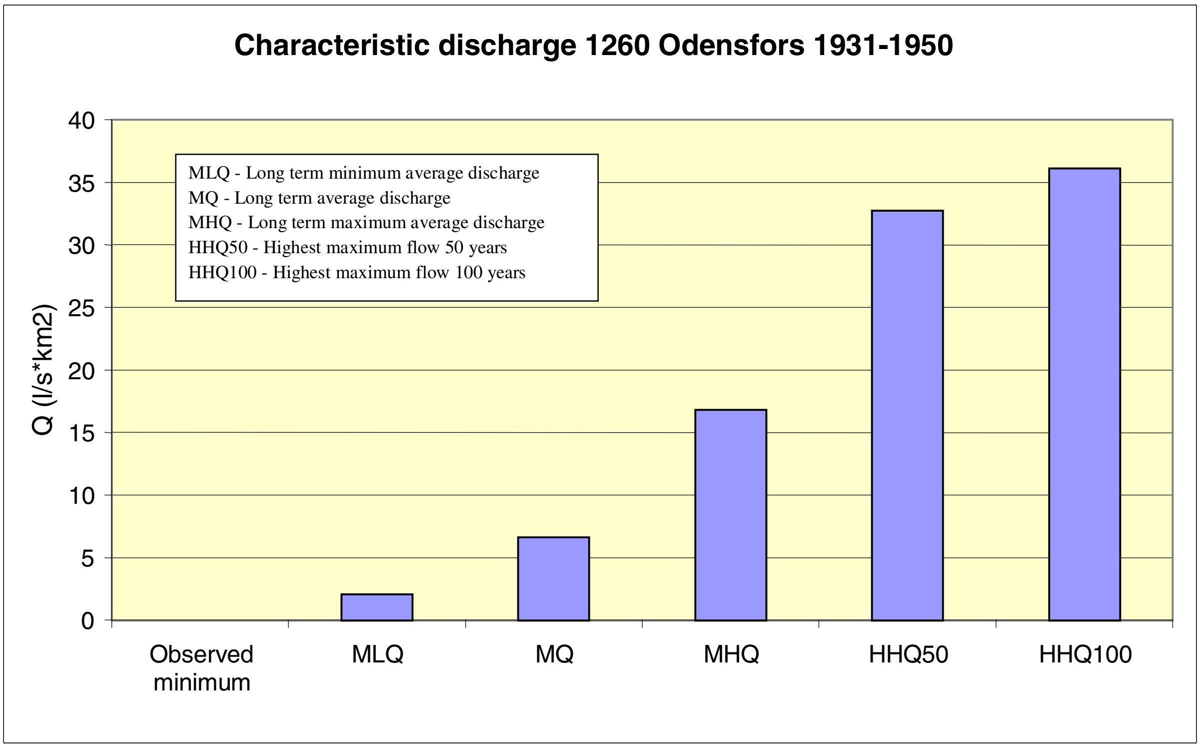

Figure 2-73. *Characteristic discharge 1260 Odensfors 1931-1950 with observed minimum. Daily mean values (l/s·km²).*

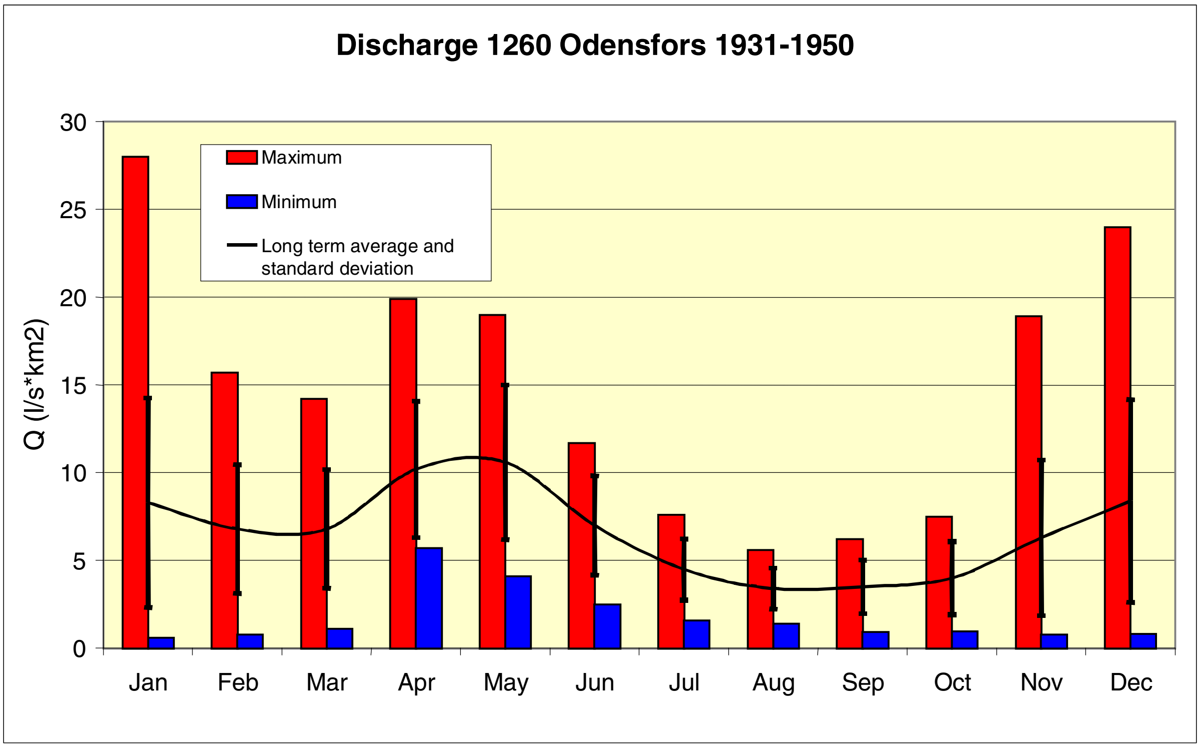

Figure 2-74. *Monthly discharge 1260 Odensfors 1931-1950. Maximum and minimum daily mean, long term average and standard deviation (l/s·km²).*

Table 2-24. Characteristic discharge 1260 Odensfors 1931-1946 (l/s·km²). Catchment area: 772 km². Daily mean values. Obs min = observed minimum.

Obs min	MLQ	MQ	MHQ	HHQ50	HHQ100
0	2.1	6.6	17	33	36

2.3 Methodology – oceanography

2.3.1 Östhammar

Automatic registration of temperature was made in the sea outside Forsmark at different stations between 1972-1981.The temperature was registrated at several levels 1-2 times every hour during parts of the years. The stations around Forsmark where SMHI has available data are described in table 2-25.

Water level is measured hourly with an accuracy of 1 cm. The gauge is connected to the national Swedish datum level RH70. Land rise is significant and must be correct for, otherwise old positive and young negative extremes will be biased. The correction made consists of equating the long-term annual mean water level to zero. Note that the actual annual mean water level is not necessarily zero by this procedure.

Criteria for selection of oceanographic measurements delivered to SKB:

1. *The measurements shall represent the conditions in the areas indicated by SKB*
2. *The measurements shall contain measurements at several occasions*
3. *The measurements shall not be influenced by the nuclear power plants or by other activities such as industrial or urban waste water outlets*

Table 2-25. Stations in the Forsmark area where SMHI has available data.

Station	Co-ordinates, RT90	Parameter	Bottom depth	Map year
S	6704904 1629069	Temperature	~7 m	Parts of 1977-1980
130	6700185 1642114	Temperature	~29 m	Parts of 1972-1976
TEK	6699809 1634586	Temperature	~7 m	Parts of 1977-1979
XS-A	6713197 1621903	Temperature	~4 m	Parts of 1977-1981
SR5	6779964 1703617	Temperature, nutrients, oxygen, pH, alkalinity, secchi depth	~120 m	Monthly 1980-
Forsmark 2179	6701250 1632370	Water level	-	1976-2001

Two stations, S and 130, were chosen to represent the Forsmark area in this report as they have the longest time period of measurements. Seasonal variations of temperature are shown in two types of graphs; seasonal variation over the year for selected depths and monthly profiles of measurements over depth. The station SR5 is used to describe the oceanographical conditions off the coast. Only data from the uppermost 20m at SR5 are used for comparison with S and 130.

As data over the year is incoherent, general graphs of temperature over time do not provide any useful information and are therefore not presented in the report.

All data shown in the figures are also given in tables in appendix 3.

External data

Contacts with Länsstyrelsen in Uppsala län have shown that there is no co-ordinated effort to collect hydrographic data in this area off the Uppland coast. Existing data collections are small and managed by commercial as well as non-commercial organisations. The data format and quality is unknown. A survey of this data can be found in Wallström, 1999. The data described in this publication is judged not to be of any use in the present context and it was thus decided not to excavate it.

Other reports

Table 2-27. Other report at SMHI

Report title	Author	Year/no
Sammanställning av meteorologiska och hydrologiska observationer gällande området vid Simpevarp juni 1959-15 aug 1961	Anononymous	1961
Plan/program för hydrografiska/hydrologiska undersökningar vid Simpevarp	Anononymous	1961-1971
Hydrografiska observationer vid Oskarshamns atomkraftverk	Anononymous	1969/H270
Ang. planerad utbyggnad av Oskarshamnsverket	Ehlin	1969/H482
Temperaturkartläggning av kylvattenutbredningen vid Oskarshamnsverket 1979-1982	Anononymous	1980/1802/41
Hydrografiska kontrollundersökningar vid Oskarshamnsverket 1979-1982	Westman	1980/1201/324
Temperaturövervakning i vattenrecipienten utanför Oskarshamnsverket 1979-1982	Bergstrand	1984
Strömundersökning i Kalmarsund	Wickström et al	1970/H145
Yttrande ang. koncessionsansökan för Forsmarks kraftstation	Andersson	1971/H86
De oceanografiska förhållandena i Öregrundsgrepen och inverkan på dessa av en vid Forsmark planerad kärnkraftstation	Holmström/ Andersson	1971/H483 och 484
Komplettering av 1971/H483-484 (2 volymer)	Andersson	1974/H286
Oceanografiska förhållanden i Öregrundsgrepen 1972	Andersson	1975
Vattnets grumlighet i Öregrundsgrepen under 1974 och 1975 (i samband med muddrings- och tippningsarbeten för Forsmarks kärnkraftstation)	Anononymous	1976
Forsmarks kraftstation. Oceanografiska undersökningar 1973-74	Andersson/ Gidhagen	1976/H463
Forsmarks kraftstation. Oceanografiska undersökningar 1974-75	Anononymous	
Forsmarks kraftstation. Oceanografiska undersökningar 1977-78	Andersson	1979/315
SMHI:s undersökningar i Öregrundsgrepen 1979-1981 (1982-09-09)	Andersson	1982
SMHI:s undersökningar i Öregrundsgrepen perioden 1982-1983	Andersson/ Hillgren	1985

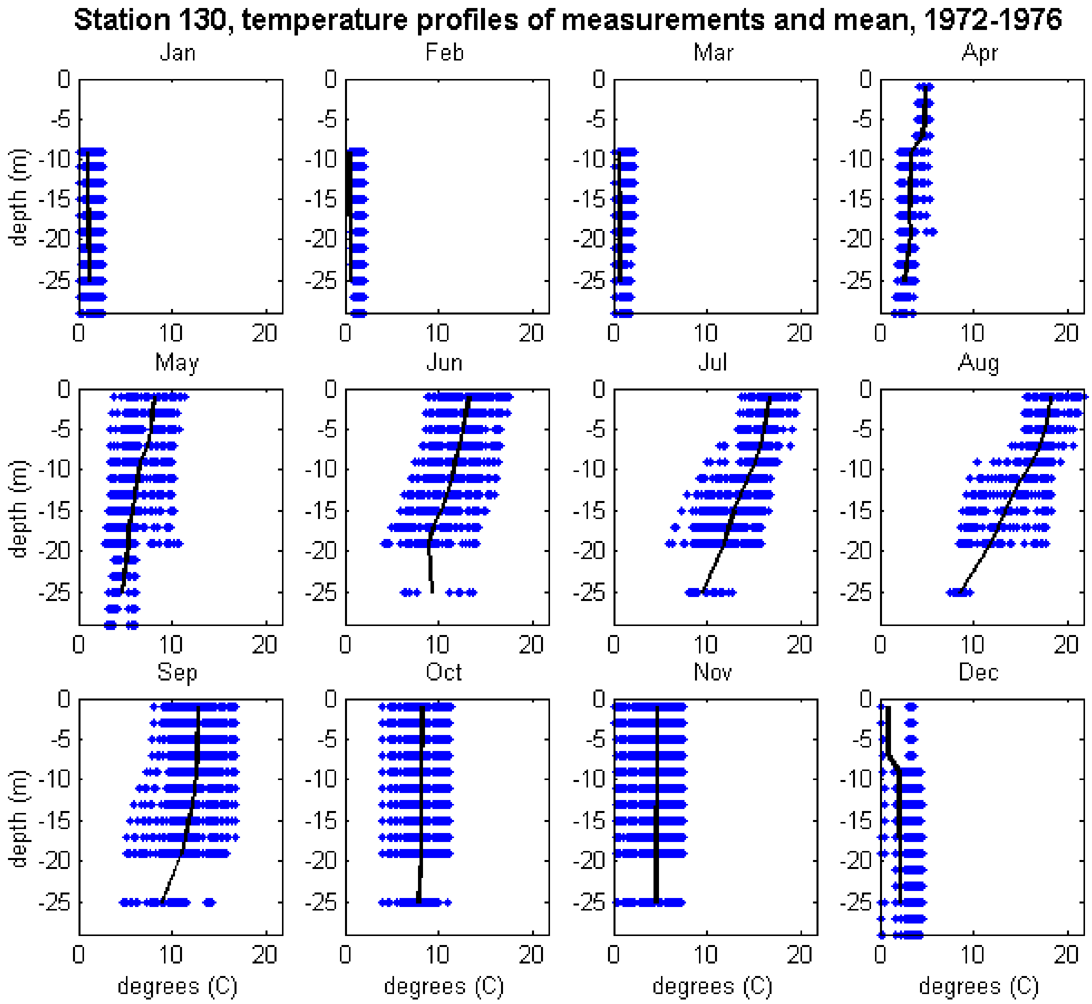

Figure 2-75. *Temperature profiles at station 130, 1972-1976. The daily mean of measurements (dots) and mean over depth (solid line) are plotted in the diagrams. During winter and spring the variations in temperature are small between years whereas in summer and autumn the temperature variations are larger between years. There is a thermocline established in April, which continues to develop until August. In October, the water column is well mixed.*

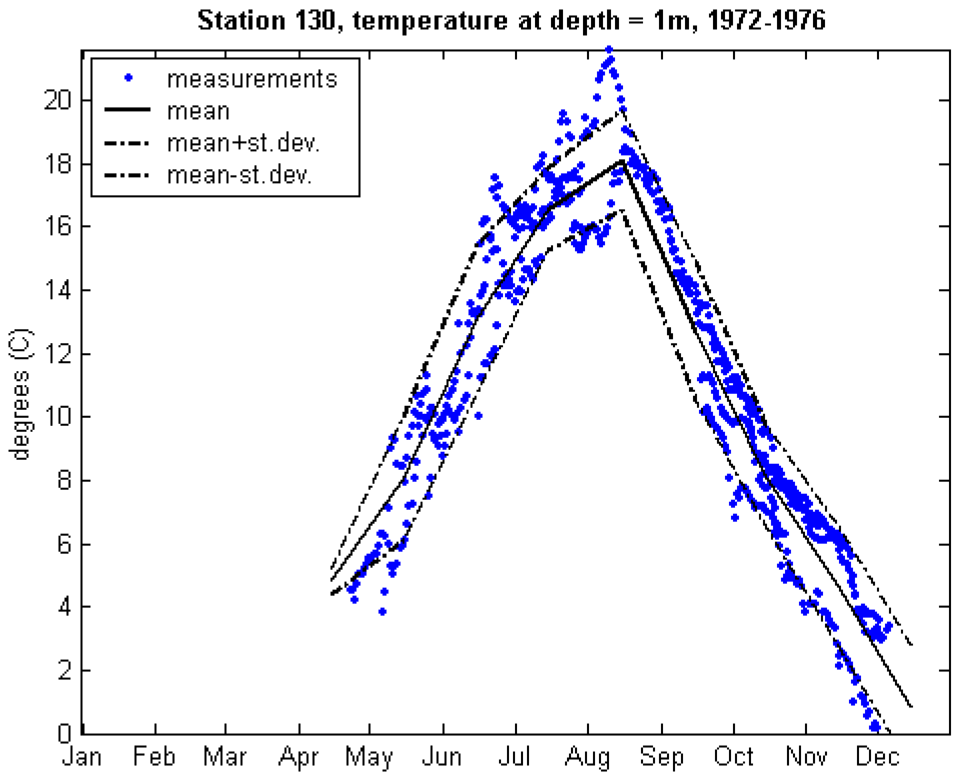

Figure 2-76. *Temperature at 1 m depth, 1972-1976. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The chain-like formations of the measurements are formed since the measurements are not independent of each other.*

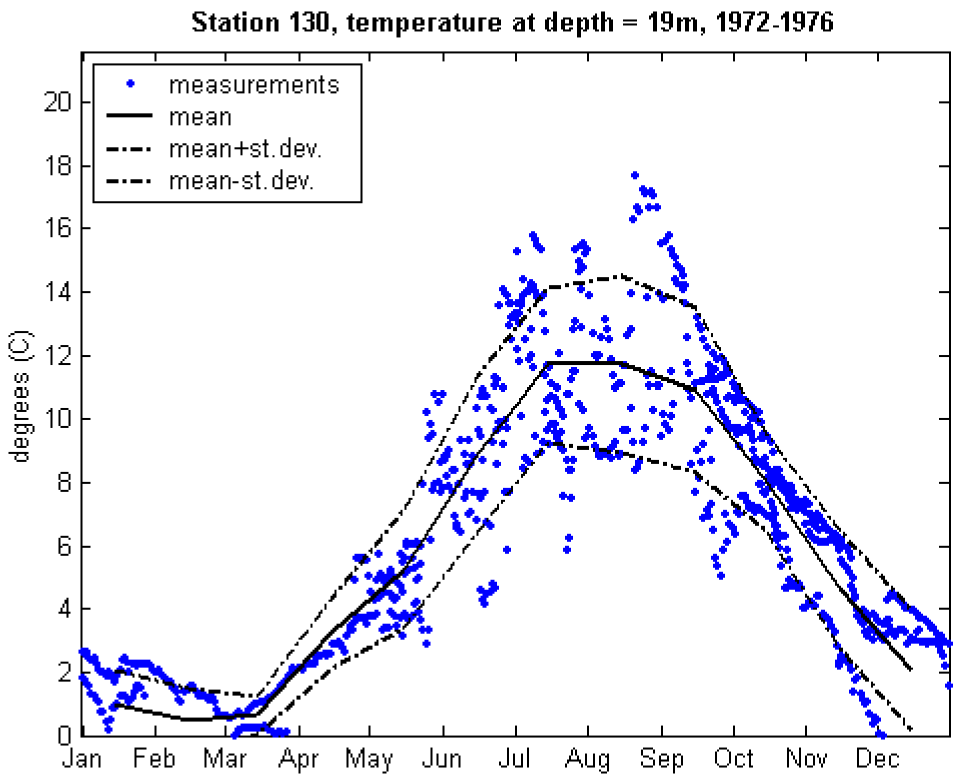

Figure 2-77. *Temperature at 19 m depth, 1972-1976. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The diagram shows that the variation in temperature increases with depth during summer. This is probably true but it can also be an effect of the lower measuring frequency during the winter months.*

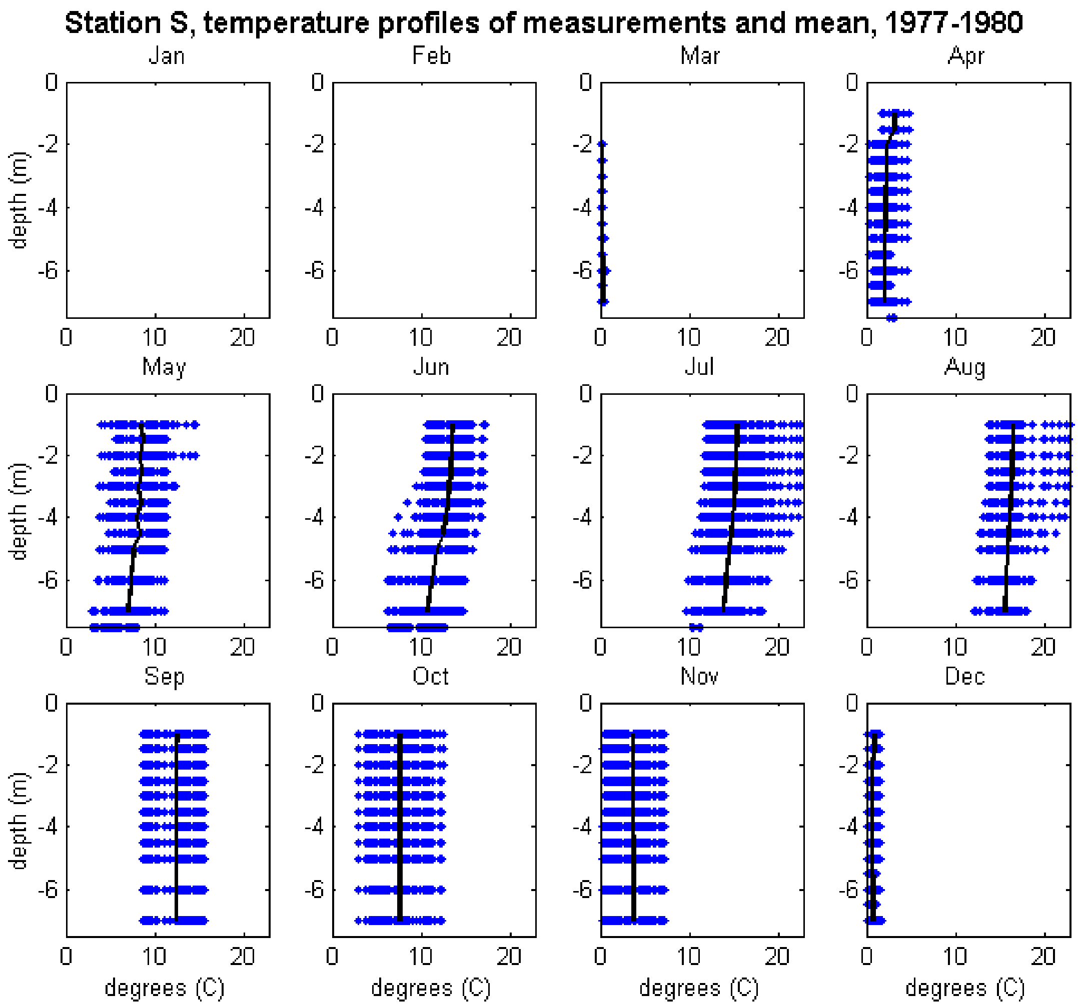

Figure 2-78. *Temperature profiles at station S, 1977-1980. The daily mean of measurements (dots) and mean over depth (solid line) are plotted in the diagrams. The station is very shallow so the water column is well mixed most of the time. In summer though, weak temperature stratification can occur.*

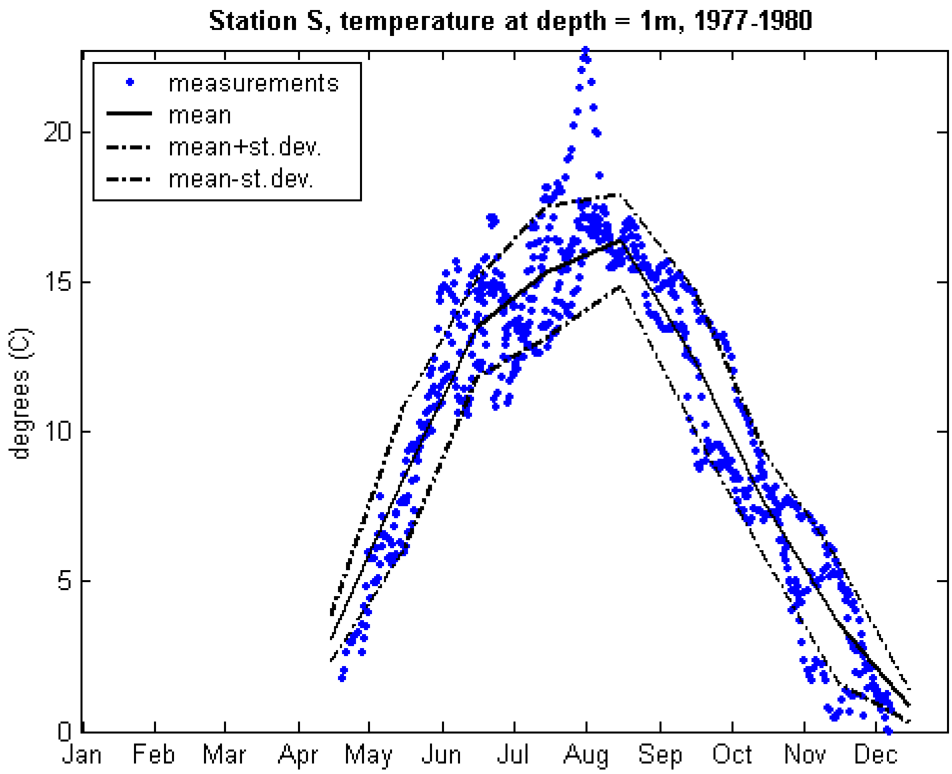

Figure 2-79. *Temperature at 1 m depth, 1977-1980. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The chain-like formations of the measurements are formed since the measurements are not independent of each other.*

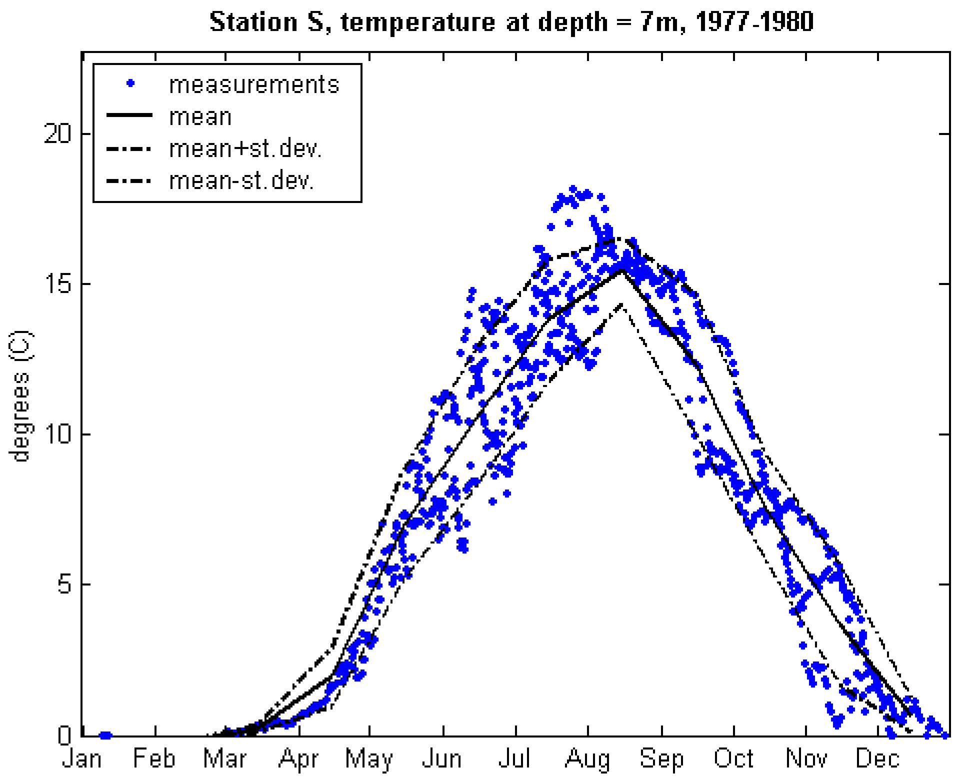

Figure 2-80. *Temperature at 7 m depth, 1977-1980. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The bottom water does not differ much from the surface water in temperature due to effective mixing of the shallow water.*

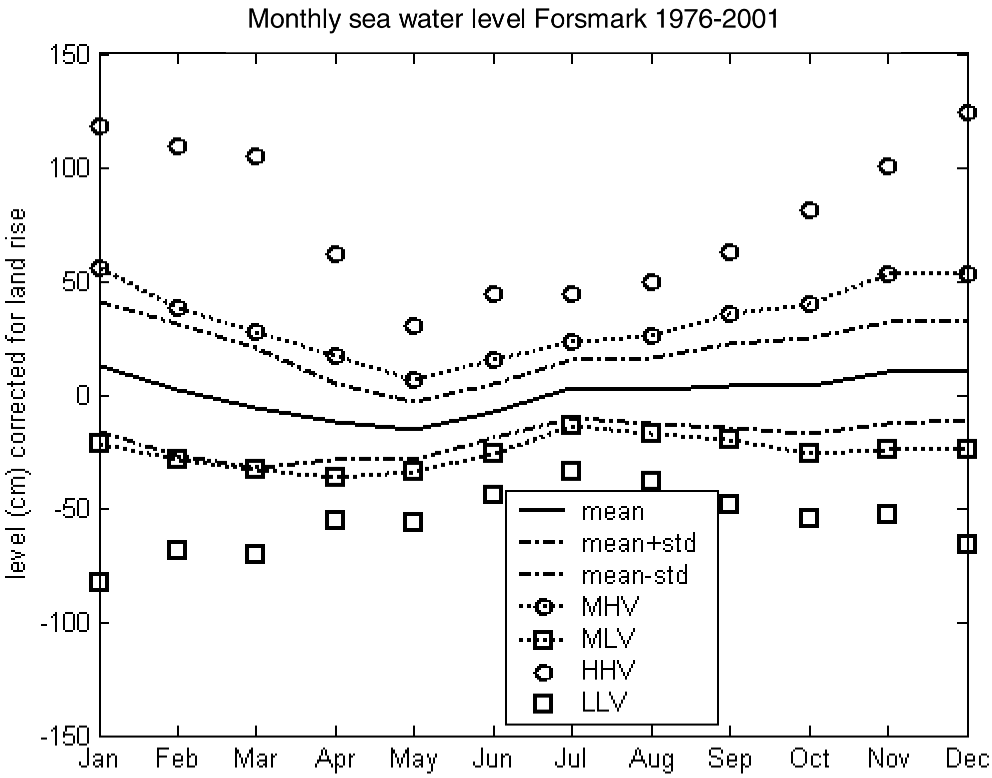

Figure 2-81. *Monthly sea water level (cm) statistics at Forsmark 1976-2001. To obtain correct extreme value statistics, levels have been corrected for land rise. Montly mean water level and one standard deviation are shown. MHV/MLV signifies mean high/low water level, i.e. mean of all years 1976-2001. HHV/LLV signifies highest/lowest water level ever during 1976-2001. Based on hourly measurements.*

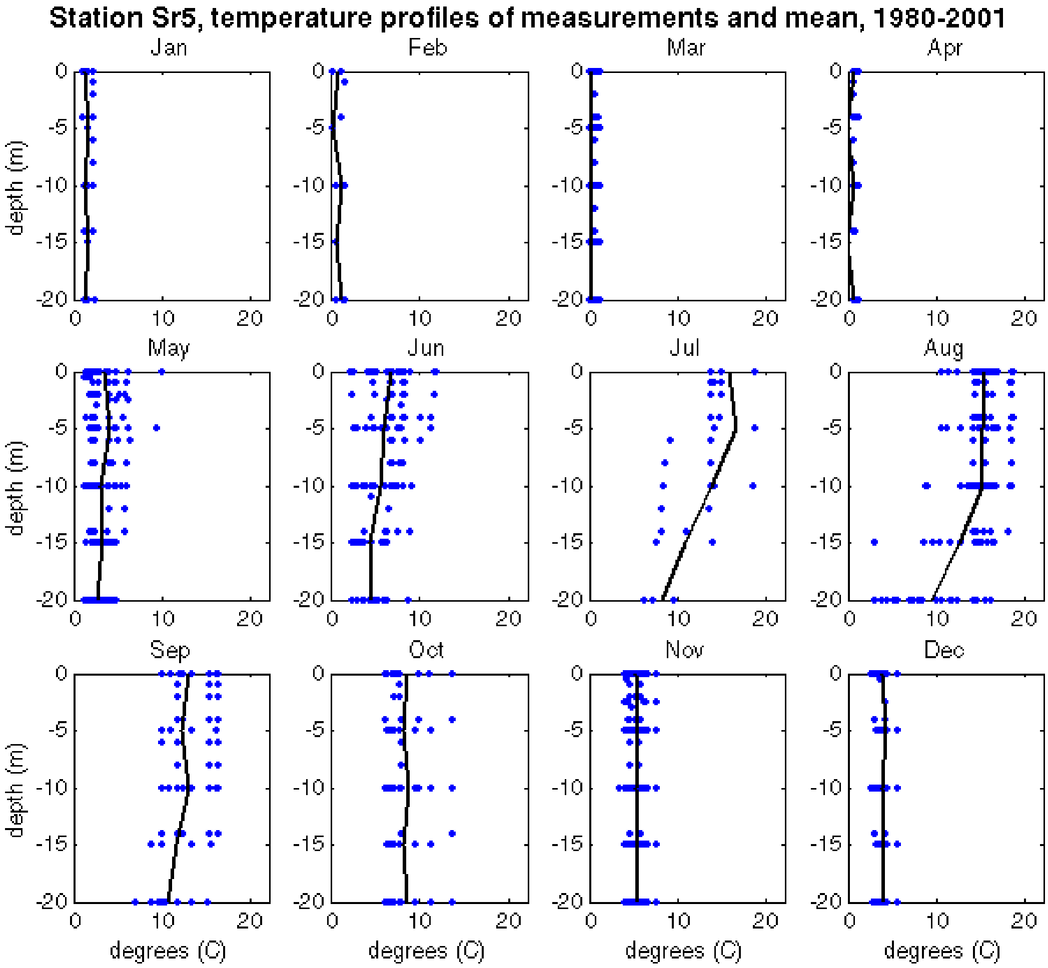

Figure 2-82. *Temperature profiles at station Sr5, 1980-2001. The daily mean of measurements (dots) and mean over depth (solid line) are plotted in the diagrams. During winter and spring the variations in temperature are small between years whereas in summer and autumn the temperature variations are larger between years. There is a thermocline established in April, which continues to develop until August. In October, the water column is well mixed.*

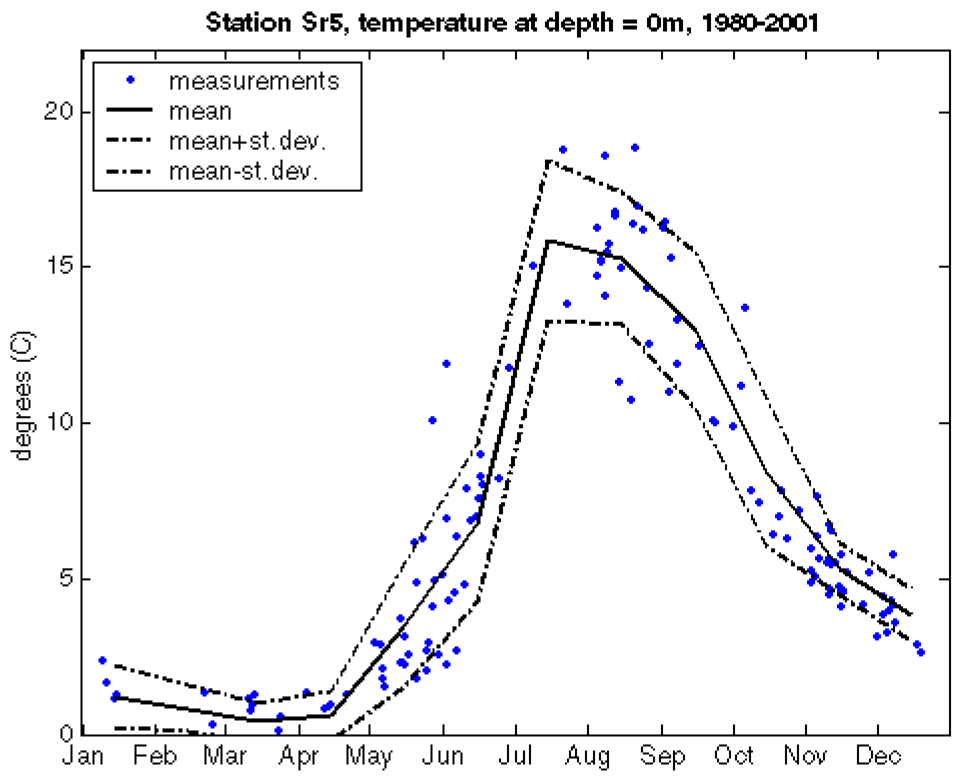

Figure 2-83. *Temperature at 0 m depth, 1980-2001. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The chain-like formations of the measurements are formed since the measurements are not independent of each other.*

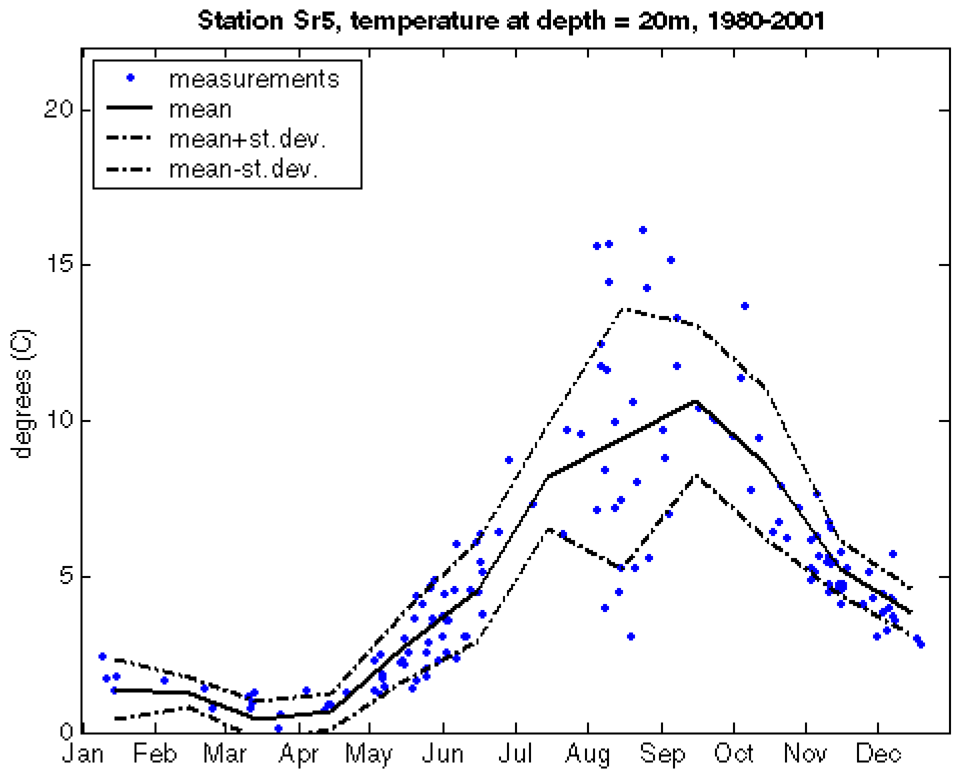

Figure 2-84. *Temperature at Sr5 at 20 m depth, 1980-2001. The daily mean of measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The diagram shows that the variation in temperature increases with depth during summer. This is probably true but it can also be an effect of the lower measuring frequency during the winter months.*

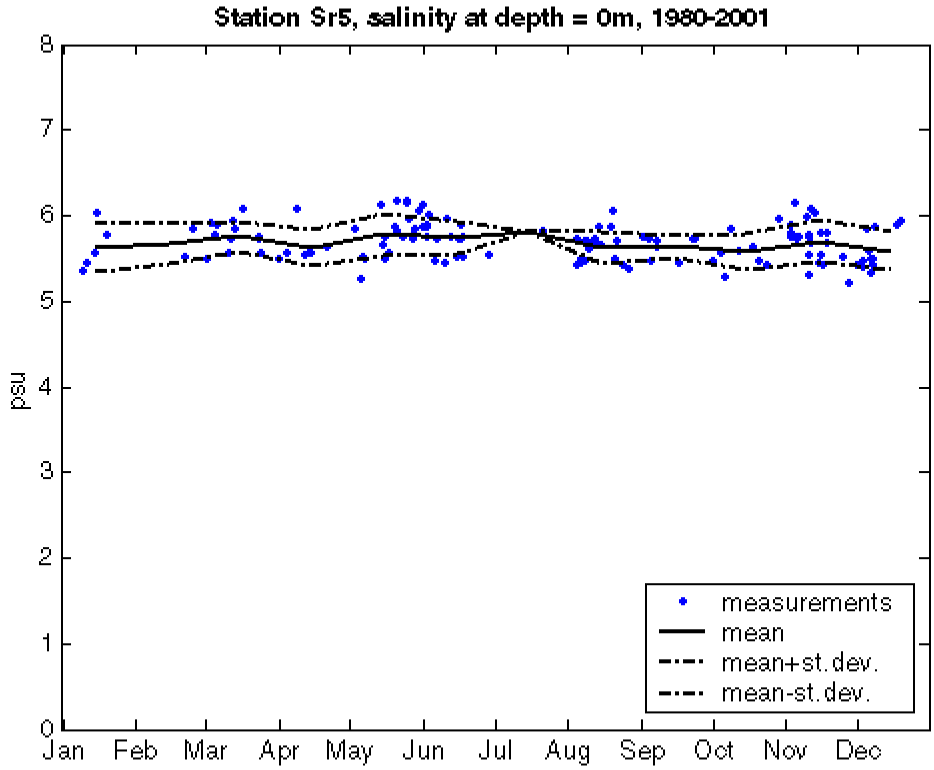

Figure 2-85. *Salinity at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The salinity is quite constant over the year and does not vary in the top 20 m of the water column.*

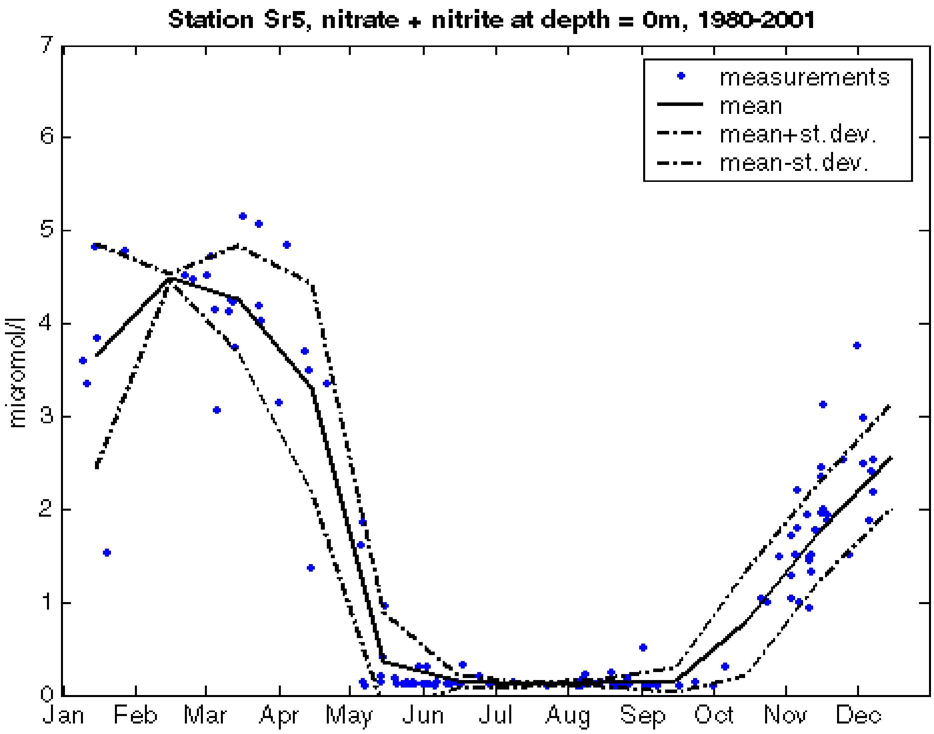

Figure 2-86. *Nitrite + nitrate at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. There is quite a variation in nitrite and nitrate between years as well as a strong seasonal variation. During summer, the nitrogen is almost completely consumed. However, the nitrogen content never goes down to 0 since the level of detection is 0.1 µmol/l. The variations in the upper 20 m are small*

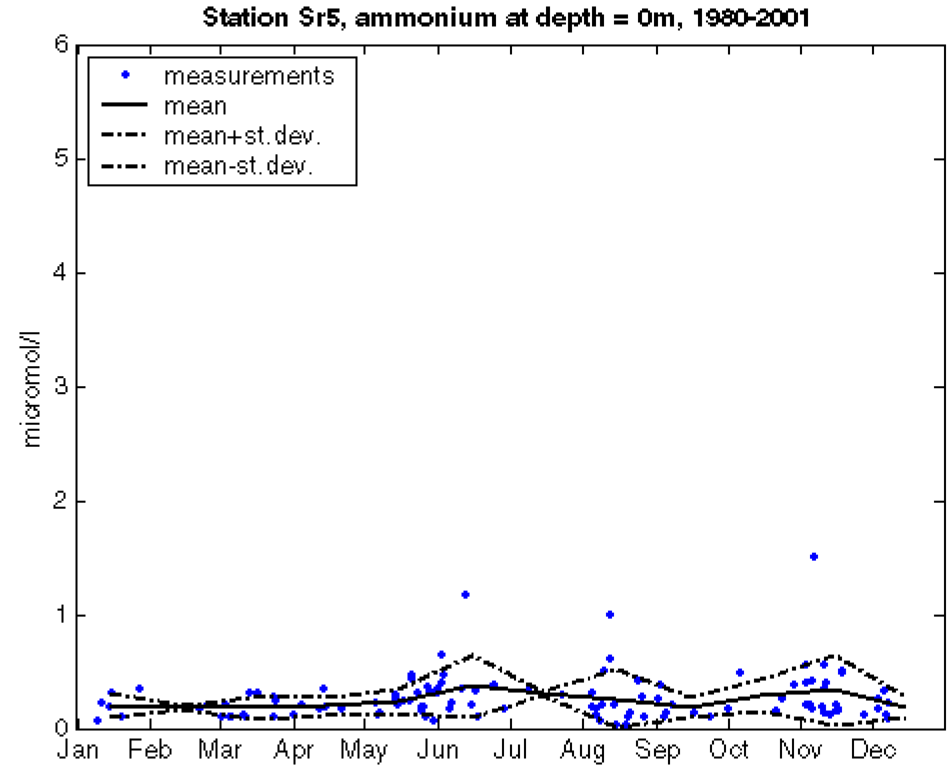

Figure 2-87. *Ammonium at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The largest variations occur in August-October depending on the magnitude of the autumn algae bloom.*

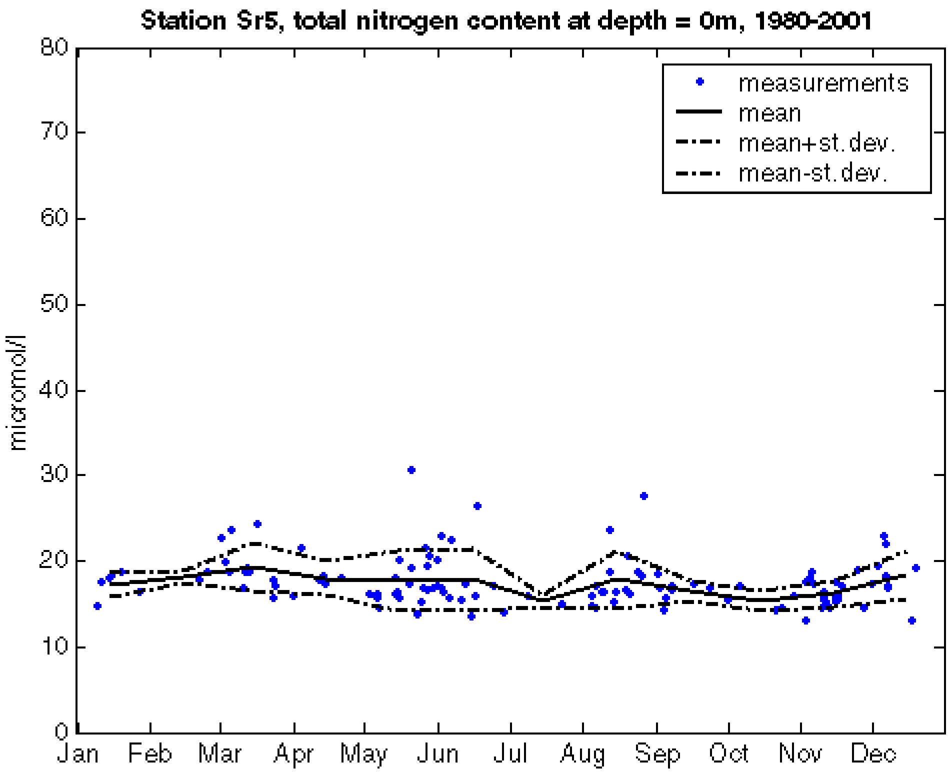

Figure 2-88. *Total nitrogen content at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The total nitrogen content is fairly constant over the year and in the upper 20 m.*

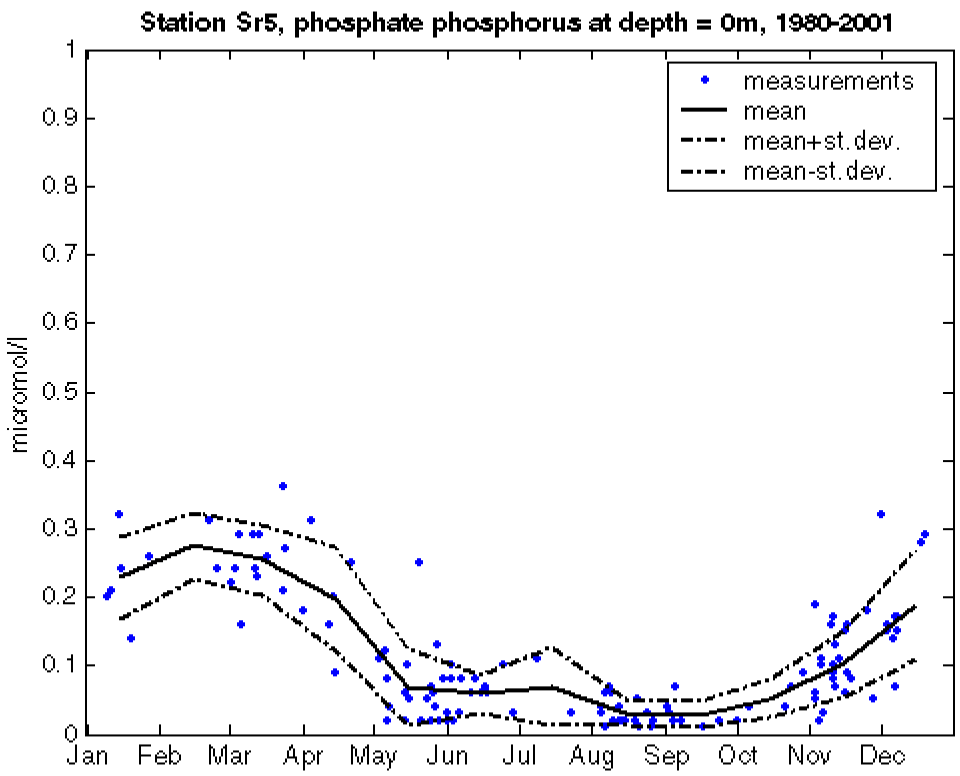

Figure 2-89. *Phosphate phosphorus at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. Inorganic phosphorus has a distinct seasonal cycle with the lowest values in the end of summer.*

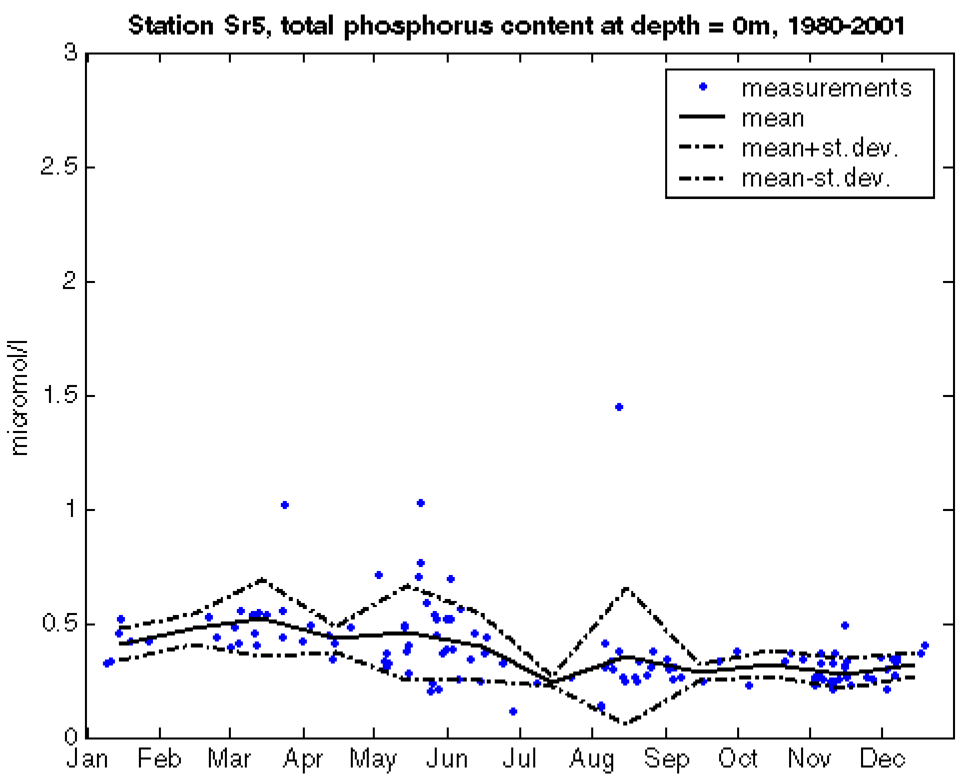

Figure 2-90. *Total phosphorus content at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. There is a weak seasonal cycle, which is quite constant over the top 20 m.*

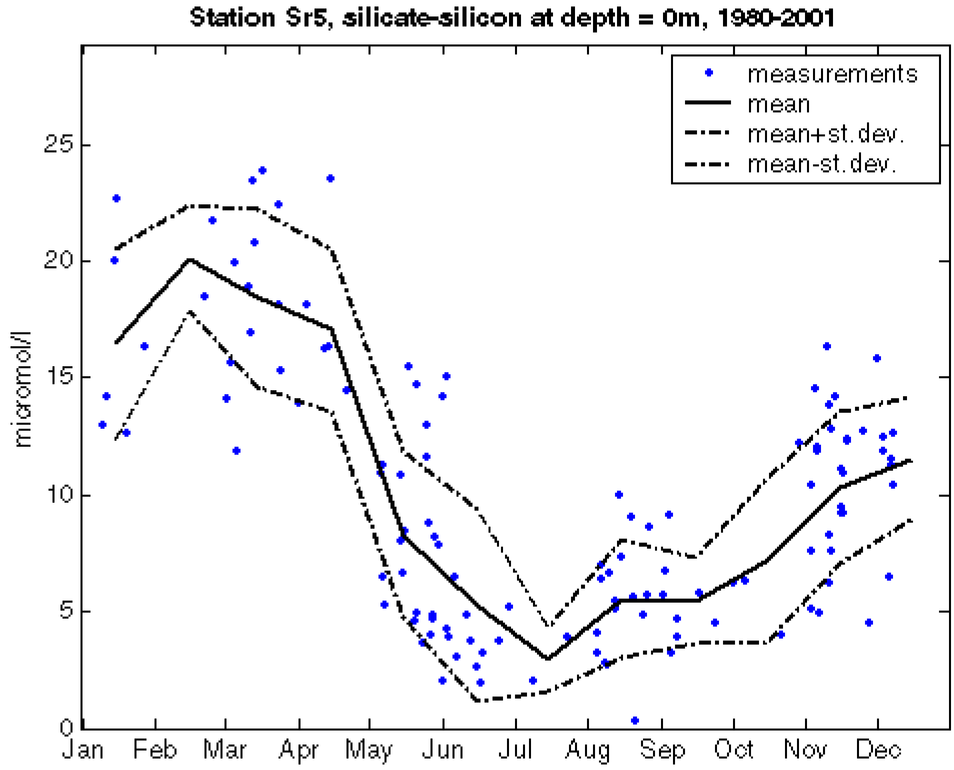

Figure 2-91. *Silicate-silicon content at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. Silicate-silicon has a seasonal cycle with a low during the summer months. There is a higher standard deviation at 20 m but the monthly means are very similar.*

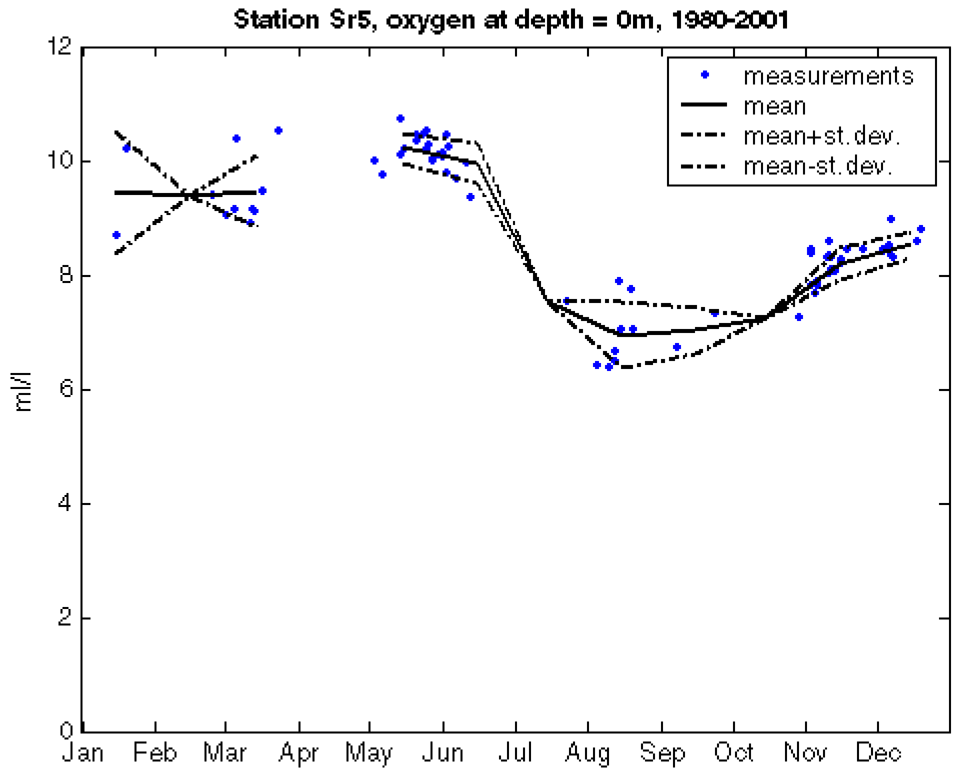

Figure 2-92. *Oxygen at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The oxygen in the surface water is good all year round with a low at the end of summer when the biological decomposition reaches a maximum.*

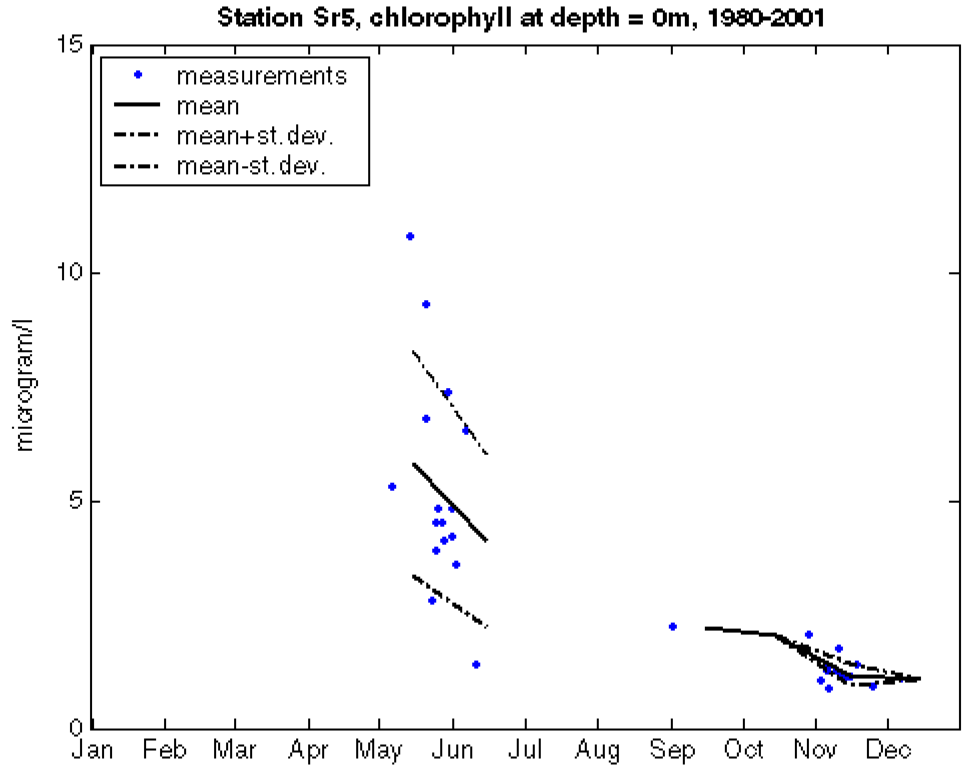

Figure 2-93. *Chlorophyll at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. There is a maximum in chlorophyll in April due to the spring bloom. At 20 m depth the maximum is not as high. Since the blooms occur on a weekly scale and the measuring takes place once a month, the chance of coming across a bloom is smaller than missing it.*

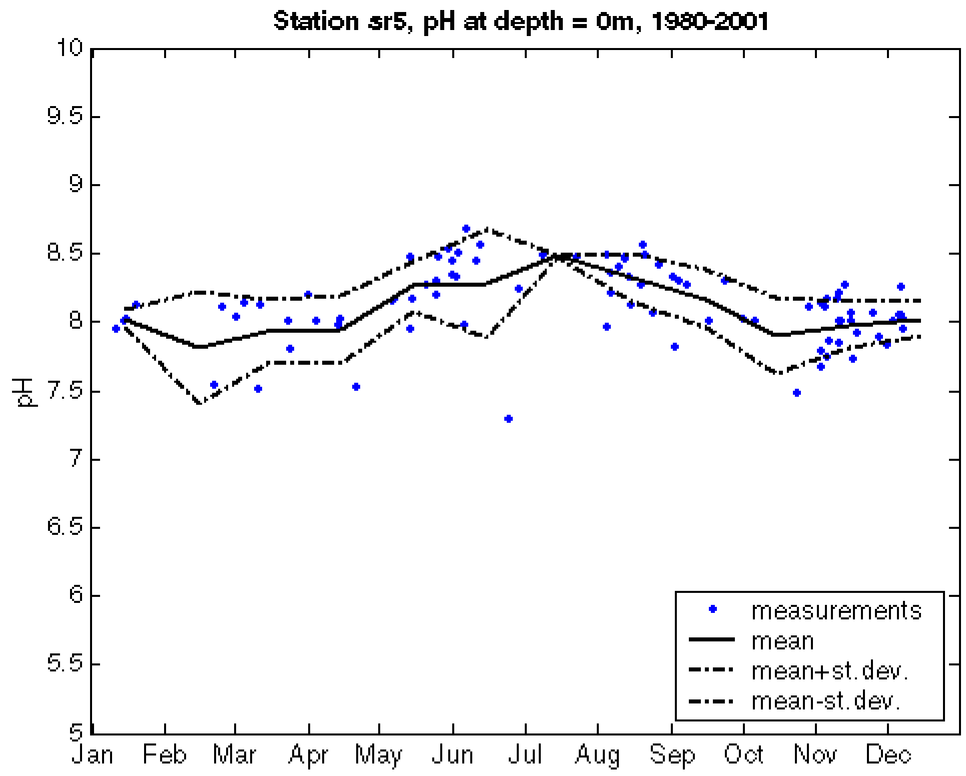

Figure 2-94. *pH at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The pH value is slightly basic in seawater with little variations over the year.*

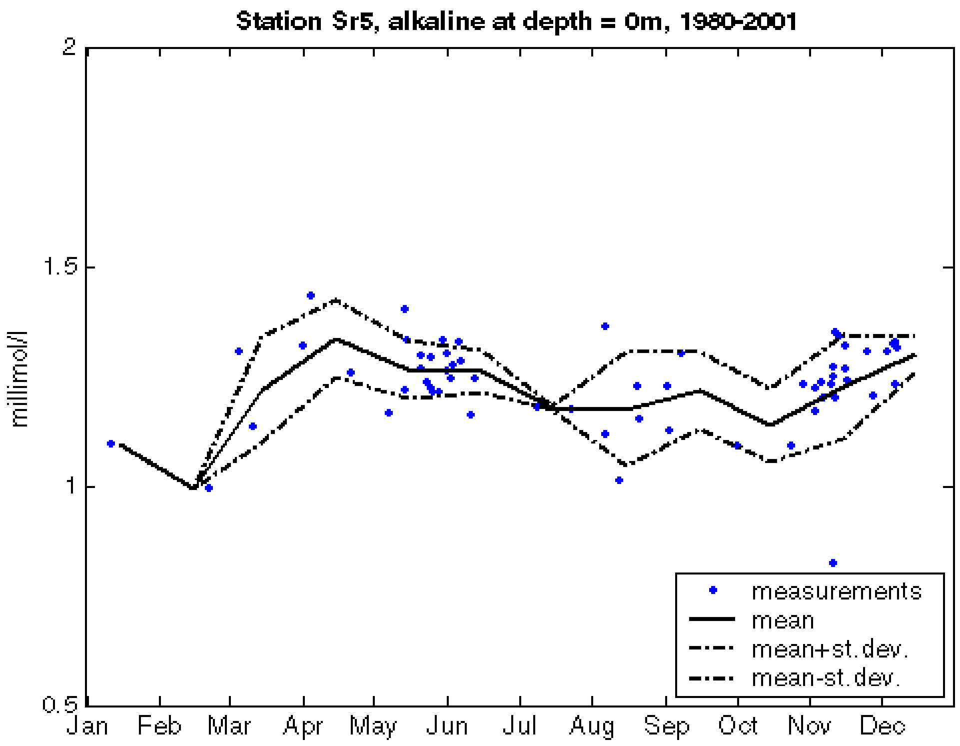

Figure 2-95. *Alkalinity at 0 m depth, 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The alkalinity values are uniform throughout the top 20 m of the water column with little variation over the year.*

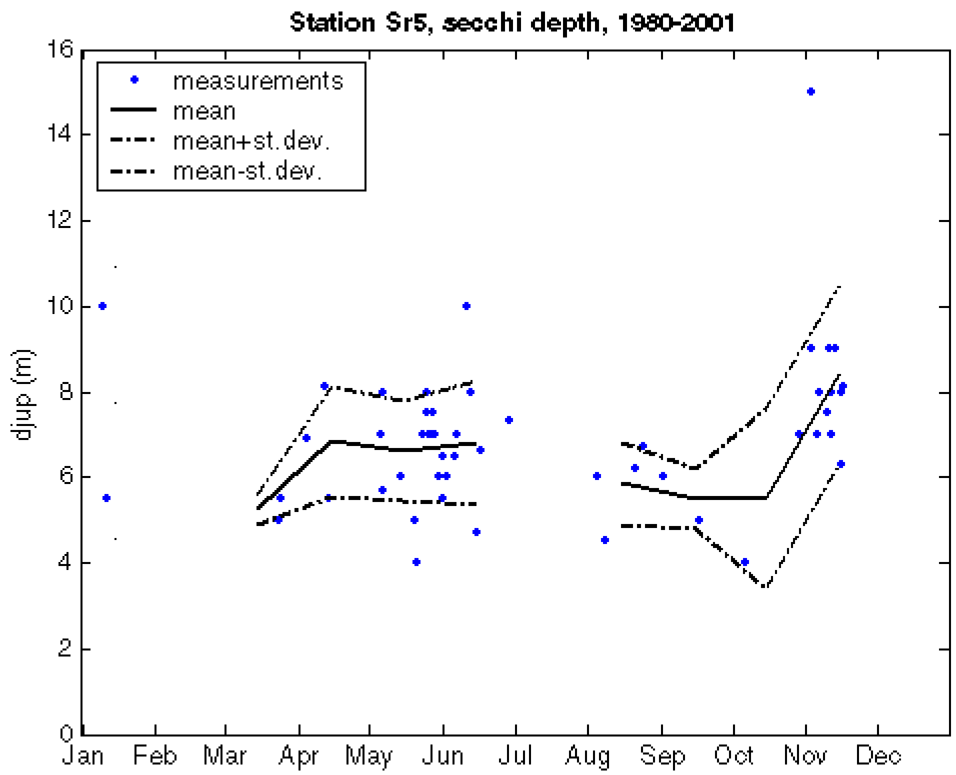

Figure 2-96. *Secchi depth 1980-2001. The monthly measurements (dots), seasonal mean (solid line) and standard deviation (dotted line) are plotted in the diagrams. The Secchi depth is collected only when the sun is 15º above the horizon, which makes winter measurements more scarse.*

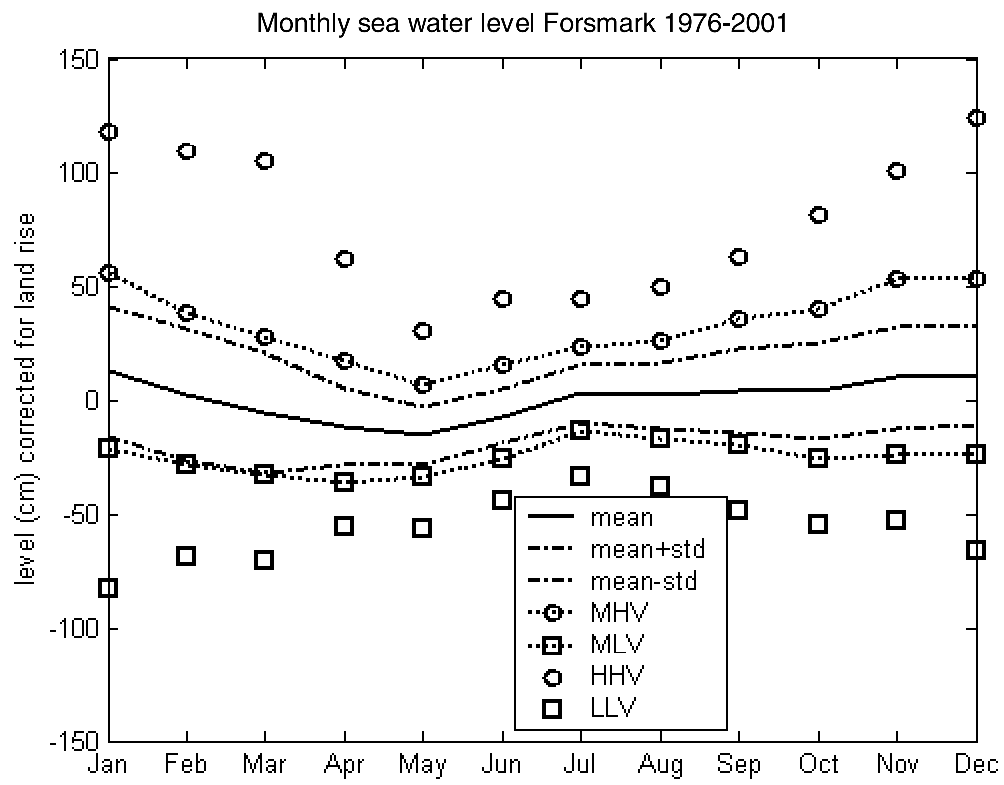

Figure 2-97. *Monthly sea water level (cm) statistics at Forsmark 1976-2001. To obtain correct extreme value statistics, levels have been corrected for land rise. Montly mean water level and one standard deviation are shown. MHV/MLV signifies mean high/low water level, i.e. mean of all years 1976-2001. HHV/LLV signifies highest/lowest water level ever during 1976-2001. Based on hourly measurements.*

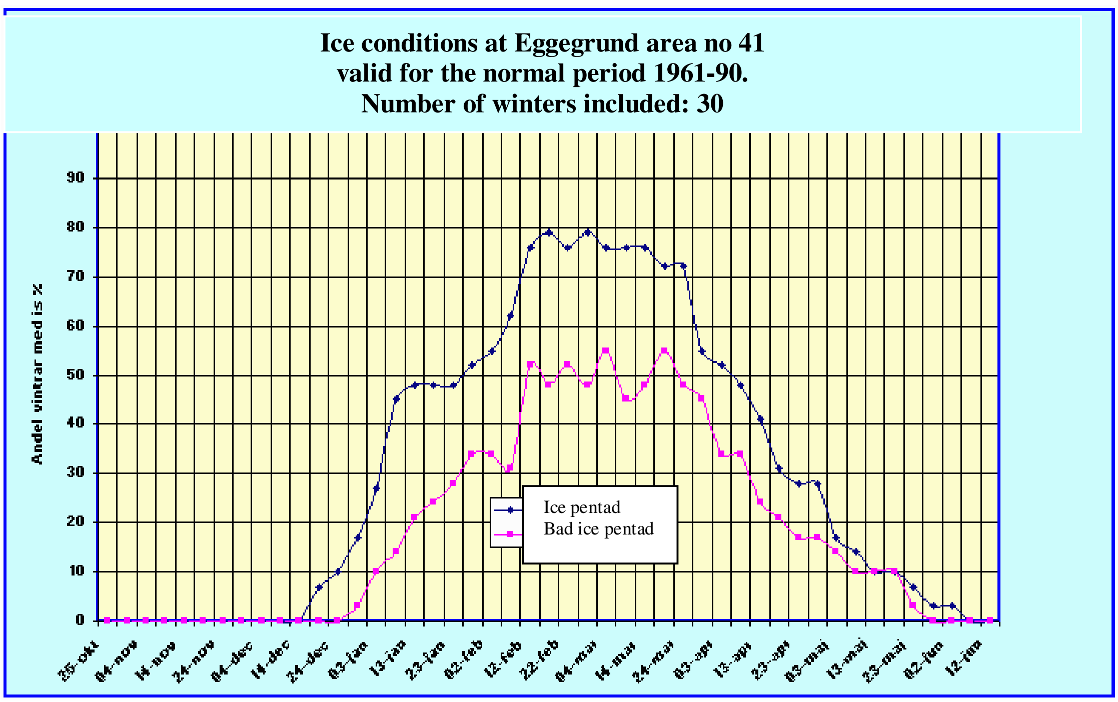

Figure 2-98. *Frequency versus time of year. The blue curve indicates a five day period with ice of any kind during three days or more. The pink curve indicates a five day period with severe ice during three days or more. Severe ice has a thickness over 15 cm.*

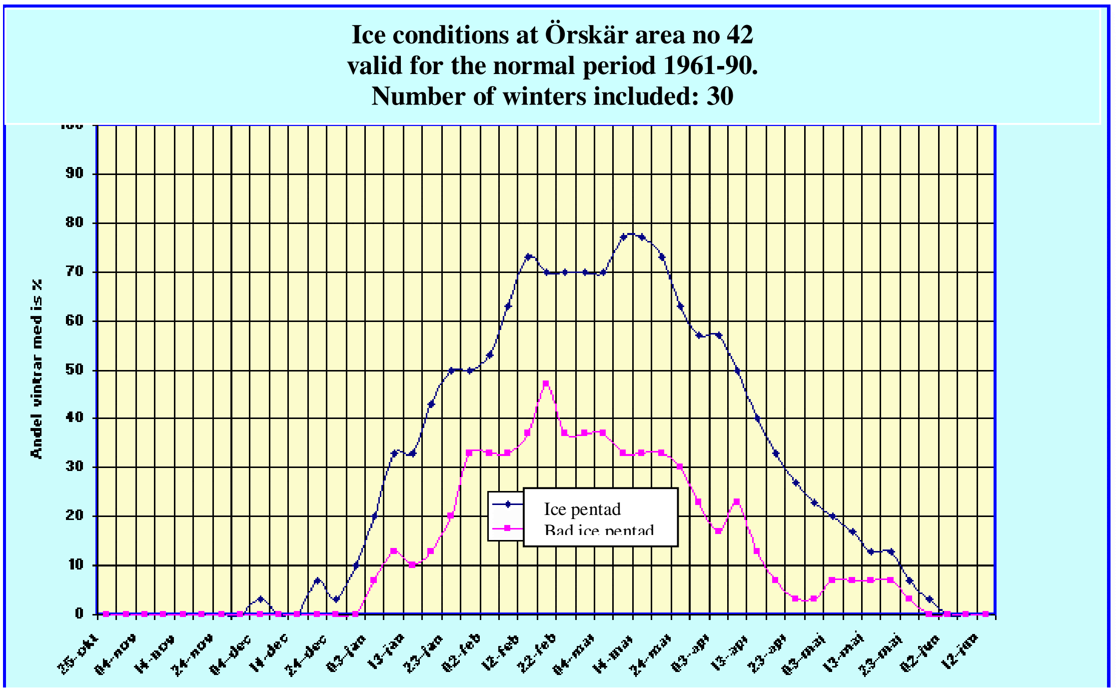

Figure 2-99. *Frequency versus time of year. The blue curve indicates a five day period with ice of any kind during three days or more. The pink curve indicates a five day period with severe ice during three days or more. Severe ice has a thickness over 15 cm.*

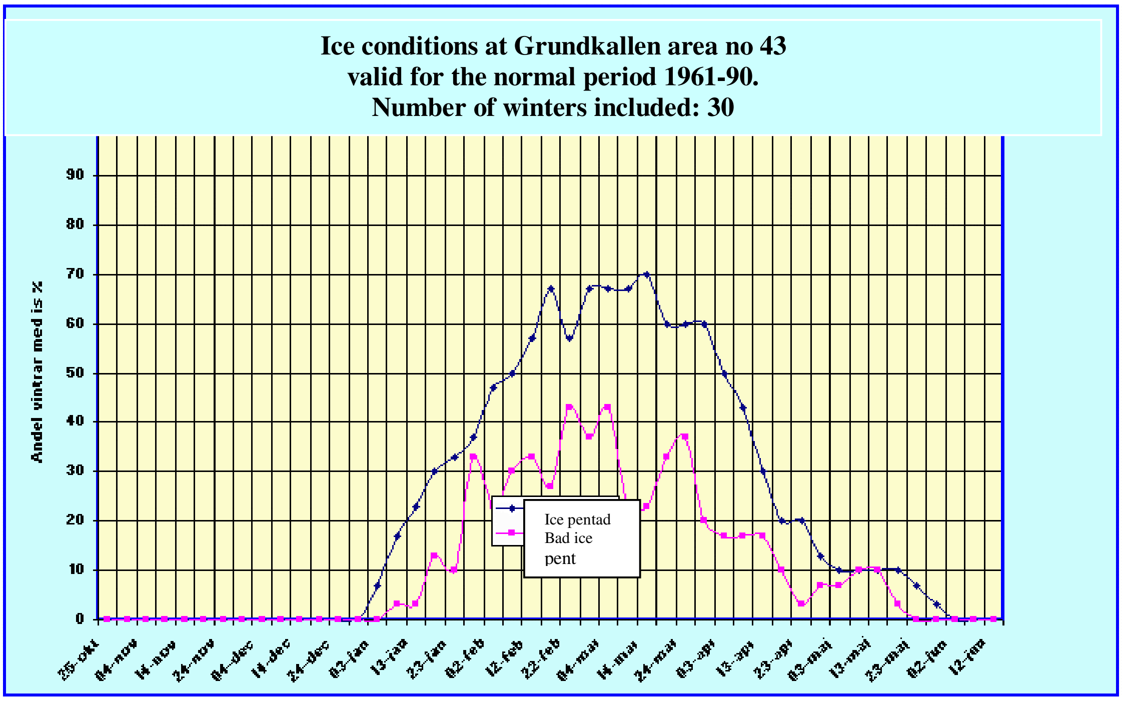

Figure 2-100. *Frequency versus time of year. The blue curve indicates a five day period with ice of any kind during three days or more. The pink curve indicates a five day period with severe ice during three days or more. Severe ice has a thickness over 15 cm.*

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Meteorological tables:

Table App1-2. Temperature (°C), average monthly mean and extremes, Örskär

Stn no 10832	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean 1961-90	-3.0	-4.0	-1.4	2.3	7.5	13.1	15.7	15.1	11.4	7.2	2.6	-0.8	5.5
Max	1.6	2.8	3.3	5.4	10.8	15.3	18.5	17.0	13.5	10.4	4.9	3.2	7.4
Min	-10.0	-13.0	-5.3	-1.5	4.6	10.8	12.6	12.7	9.1	5.4	0.2	-4.4	3.4
Stand dev	2.9	4.1	2.4	1.3	1.6	1.2	1.4	1.1	1.2	1.1	1.3	1.7	1.0
Median	-2.4	-3.2	-1.5	2.6	7.2	13.0	15.6	15.2	11.4	7.2	2.7	-0.7	5.3
Mean 1991-2000	-0.7	-1.9	0.5	3.5	7.9	12.8	16.4	16.2	12.0	7.4	2.8	0.1	6.4
1988	0.0	-0.8	-1.5	2.5	9.2	12.6	18.4	14.4	12.6	6.4	0.6	-2.0	6.0
1941-2000													
Abs max	1.6	2.8	6.6	5.4	10.9	15.7	20.2	19.6	14.9	10.4	5.9	3.3	
Year	1989	1990	1958	1990	1992	1960	1941	1997	1999	1961	2000	1972	
Abs min	-10.6	-12.9	-8.8	-2.3	4.5	10.2	12.5	12.7	9.1	4.6	-0.2	-4.3	
Year	1942	1966	1942	1956	1970	1958	1977	1987	1986	1992	1956	1978	

Table App1-3. Temperature (°C), average monthly mean and extremes, Films Kyrkby

Stn no 10714	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean 1961-90	-4.9	-4.9	-1.4	3.5	9.5	14.4	16.0	14.6	10.3	5.9	0.6	-3.4	5.0
Max	1.9	3.0	3.7	6.4	12.5	16.5	18.7	17.2	12.4	9.6	3.7	2.1	7.1
Min	-13.7	-13.4	-5.5	0.3	7.4	11.7	13.6	12.1	7.2	3.2	-3.5	-8.7	2.9
Stand dev	3.8	4.2	2.5	1.3	1.3	1.3	1.3	1.2	1.3	1.3	1.9	2.5	1.0
Median	-4.5	-4.3	-1.9	3.6	9.3	14.2	16.0	14.7	10.2	6.0	1.0	-3.0	4.8
Mean 1991-2000	-2.2	-2.8	0.5	4.6	9.6	14.0	16.9	15.6	10.6	5.8	1.2	-1.9	6.0
1988	-0.3	-1.3	-2.5	3.0	11.3	14.7	18.1	14.2	11.7	4.4	-2.4	-4.3	5.5
1961-2000													
Abs max	0.3	3.0	3.7	6.4	12.8	16.6	20.0	19.3	14.4	9.6	5.6	2.1	
Year	1973	1990	1990	1990	1992	1999	1994	1997	1999	1961	2000	1972	
Abs min	-13.7	-13.4	-5.5	0.3	7.4	11.5	13.6	12.1	7.2	2.2	-3.5	-8.4	
Year	1987	1985	1969	1966	1987	1993	1977	1987	1986	1992	1965	1995	

Table App1-4. Temperature (°C), average monthly mean and extremes, Risinge

Stn no 10811	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean 1961-90	-4.7	-4.9	-1.4	3.4	9.4	14.3	15.9	14.5	10.3	5.9	0.8	-3.2	5.0
Max	1.5	3.1	3.7	6.2	12.5	17.0	18.8	16.6	13.0	9.6	3.8	2.7	7.0
Min	-13.5	-13.4	-6.6	0.2	7.0	11.6	12.8	12.3	7.3	3.0	-3.6	-8.9	3.0
Stand dev	3.7	4.2	2.6	1.3	1.5	1.4	1.4	1.1	1.4	1.3	1.9	2.5	1.0
Median	-4.3	-4.4	-1.5	3.5	9.6	14.0	15.7	14.7	10.4	6.0	1.2	-3.0	4.8
Mean 1991-2000	-2.3	-3.0	0.4	4.4	9.3	13.9	16.7	15.5	10.5	5.8	1.3	-1.9	5.9
1988	-0.1	-1.1	-2.3	2.9	11	14.7	18.1	14	11.6	4.5	-2.5	-4.6	5.5
1961-2000													
Abs max	1.5	3.1	3.7	6.2	12.7	17.0	19.4	19.1	13.9	9.6	5.8	2.7	7.0
Year	1989	1990	1990	1968	1992	1966	1994	1997	1999	2000	2000	1972	
Abs min	-13.5	-13.4	-6.6	0.2	7.0	11.3	12.8	12.3	7.3	2.2	-3.6	-8.9	3.0
Year	1987	1985	1962	1966	1987	1993	1977	1987	1986	1992	1965	1978	

Table App1-5. Temperature (°C), average monthly mean and extremes, Untra (Tierp)

Untra 1961-1990	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean	-4.9	-4.8	-1.4	3.2	9.3	14.6	16.1	14.8	10.4	5.9	0.6	-3.4	6.4
Max	2.0	3.0	3.6	6.0	11.8	17.3	19.0	17.2	12.5	9.7	3.8	2.4	8.4
Min	-13.2	-13.6	-5.7	0.1	7.1	11.7	13.4	12.4	7.8	3.2	-3.5	-8.7	4.8
Std	3.8	4.2	2.5	1.4	1.4	1.4	1.3	1.1	1.3	1.3	1.9	2.6	0.9
Median	-4.7	-4.1	-1.8	3.2	9.5	14.3	16.0	15.0	10.4	6.1	1.0	-3.0	6.4
Mean 1991-2000	-3.7	-3.5	-0.9	2.6	7.4	11.1	12.5	11.6	8.0	4.7	0.5	-2.4	4.0
1988i	-0.1	-1.6	-2.6	2.6	11.2	15.7	17.8	14.7	11.9	4.6	-2.0	-4.2	5.7

Table App1-6. Yearly mean temperature 1961 - 2000, Örskär and Films Kyrkby

10832	Örskär				10714	Films Kyrkby		
Year	Temp (°C)	Running 5-yr mean	Standard error		Year	Temp (°C)	Running 5yr-mean	Standard error
1961	6.7				1961	6.1		
1962	5.0				1962	4.3		
1963	4.9				1963	4.3		
1964	5.3				1964	5.1		
1965	5.2	5.4			1965	4.3	4.8	
1966	3.9	4.9			1966	3.8	4.4	
1967	6.0	5.1			1967	5.4	4.6	
1968	5.3	5.1			1968	4.6	4.6	
1969	4.9	5.1	0.6		1969	4.4	4.5	0.5
1970	3.9	4.8	0.7		1970	3.7	4.4	0.5
1971	5.5	5.1	0.6		1971	5.3	4.7	0.6
1972	6.3	5.2	0.7		1972	5.9	4.8	0.7
1973	6.4	5.4	0.8		1973	5.7	5.0	0.7
1974	6.5	5.7	0.9		1974	6.3	5.4	0.8
1975	7.2	6.4	0.9		1975	6.8	6.0	0.9
1976	5.0	6.3	1.0		1976	4.6	5.9	1.0
1977	5.3	6.1	1.0		1977	4.9	5.7	0.9
1978	5.0	5.8	0.9		1978	4.2	5.4	1.0
1979	4.9	5.5	0.9		1979	4.3	5.0	1.0
1980	4.8	5.0	0.8		1980	4.3	4.5	0.9
1981	5.2	5.0	0.6		1981	4.5	4.4	0.7
1982	5.6	5.1	0.5		1982	5.4	4.5	0.7
1983	6.1	5.3	0.5		1983	5.8	4.9	0.6
1984	6.3	5.6	0.5		1984	5.8	5.2	0.6
1985	3.4	5.3	1.0		1985	2.9	4.9	1.1
1986	5.2	5.3	1.0		1986	4.6	4.9	1.1
1987	3.9	5.0	1.1		1987	3.4	4.5	1.1
1988	6.0	5.0	1.1		1988	5.5	4.4	1.2
1989	7.4	5.2	1.5		1989	7.1	4.7	1.6
1990	7.3	6.0	1.3		1990	7.0	5.5	1.4
1991	6.7	6.3	1.4		1991	6.1	5.8	1.4
1992	6.9	6.9	1.3		1992	6.4	6.4	1.4
1993	6.1	6.9	1.2		1993	5.6	6.4	1.3
1994	6.3	6.7	0.7		1994	5.6	6.1	0.8

10832	Örskär				10714	Films Kyrkby		
Year	Temp (°C)	Running 5-yr mean	Standard error		Year	Temp (°C)	Running 5yr-mean	Standard error
1995	6.0	6.4	0.5		1995	5.4	5.8	0.5
1996	5.4	6.1	0.5		1996	5.0	5.6	0.6
1997	6.8	6.1	0.6		1997	6.5	5.6	0.7
1998	5.9	6.1	0.5		1998	5.6	5.6	0.6
1999	7.0	6.2	0.6		1999	6.8	5.9	0.7
2000	7.2	6.5	0.7		2000	6.9	6.2	0.7
1961-1990					1961 - 90			
Mean 61-90	5.5				Mean	5.0		
MAX 61-90	7.4				Max	7.1		
MIN	3.4				Min	2.9		
STD	1.0				Stand dev	1.0		
MEDIAN	5.3				Median	4.8		
1991-2000					1991-00			
Mean 91-00	6.4				Mean 91-00	6.0		

Table App1-7. Yearly mean temperature 1961 - 2000, Risinge

10811	Risinge		
Year	Temp (°C)	Running 5-yr mean	Standard error
1961	6.2		
1962	4.1		
1963	4.3		
1964	5.1		
1965	4.4	4.8	
1966	4.1	4.4	
1967	5.4	4.7	
1968	4.8	4.8	
1969	4.5	4.6	0.4
1970	3.8	4.5	0.5
1971	5.3	4.8	0.5
1972	6.0	4.9	0.6
1973	5.7	5.1	0.7
1974	6.2	5.4	0.8
1975	6.8	6.0	0.8
1976	4.3	5.8	1.0
1977	4.8	5.6	1.0
1978	4.2	5.3	1.0
1979	4.5	4.9	1.0
1980	4.3	4.4	0.9
1981	4.6	4.5	0.6
1982	5.3	4.6	0.6
1983	5.8	4.9	0.6
1984	5.8	5.2	0.6
1985	3.0	4.9	1.0
1986	4.8	4.9	1.0
1987	3.5	4.6	1.1
1988	5.5	4.5	1.1
1989	7.0	4.8	1.5
1990	6.9	5.5	1.3
1991	6.1	5.8	1.3
1992	6.4	6.4	1.3
1993	5.5	6.4	1.2
1994	5.5	6.1	0.8
1995	5.4	5.8	0.5

10811	Risinge		
Year	Temp (°C)	Running 5-yr mean	Standard error
1996	4.7	5.5	0.6
1997	6.3	5.5	0.7
1998	5.4	5.5	0.6
1999	6.6	5.7	0.7
2000	6.9	6.0	0.8
Mean 91-00	5.9		

Table App1-8. Average, max and min precipitation, Untra (Tierp)

Untra	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1961-1990 Mean	61	46	39	44	42	45	76	85	74	61	71	67	712
Max	132	101	88	103	111	162	172	206	207	155	149	195	1148
Min	4	7	1	3	9	10	16	7	8	18	21	13	499
Stand dev	28	24	18	26	28	32	35	49	46	37	30	44	133
Median	58	46	40	42	40	37	70	76	62	50	64	57	708
Mean 91-00	45	39	40	44	43	77	76	73	66	53	72	63	696
Mean 61-00	57	44	39	44	42	53	76	82	72	59	71	66	708
1988	68	97	46	54	19	42	68	136	36	18	51	70	700
1931– 2000													
Max	151	106	135	96	103	169	196	215	193	157	173	158	
Year	1959	1957	1937	1989	1968	1991	2000	1945	1984	1952	1944	1981	
Min	2	1	1	3	6	10	6	2	7	6	14	11	
Year	1992	1959	1964	1987	1941	1965	1955	1947	1989	1937	1953	1972	

Table App1-9. Average, max and min precipitation, Lövsta (Östhammar)

Stn no 10725	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1961-1990 Mean	65	44	39	44	41	46	87	95	78	66	80	71	760
Max	128	94	86	107	132	166	196	259	227	172	173	174	1256
Min	5	5	1	2	6	14	25	15	17	17	22	9	412
Stand dev	30	24	21	26	29	30	45	60	49	41	39	45	155
Median	65	40	37	39	34	45	70	79	61	53	73	60	758
Mean91-00	51	42	48	49	50	80	87	69	62	68	65	70	745
Mean61-00	61	44	41	45	44	55	87	89	74	66	76	71	756
1988	94	67	72	60	27	32	121	111	32	58	55	78	804
1901 - 2000													
Max	127	77	111	121	119	152	178	235	207	157	149	137	
Year	1959	1957	1908	1995	1961	1981	1977	1981	1984	1952	1981	1981	
Min	4	4	0	2	0	8	5	1	11	4	8	7	
Year	1964	1980	1923	1987	1940	1933	1955	1947	1993	1937	1931	1972	

Table App1-10. Yearly sum of precipitation (corrected) for Lövsta and Untra, 1961 - 2000

10725	Lövsta			10727	Untra		
Year	Yearly sum	Running 5-yr mean	Standard error	Year	Yearly sum	Running 5-yr mean	Standard error
1961	776			1961	794		
1962	611			1962	542		
1963	614			1963	621		
1964	547			1964	537		
1965	823	674		1965	763	651	
1966	715	662		1966	795	651	
1967	758	691		1967	710	685	
1968	773	723		1968	765	714	
1969	617	737	96	1969	579	722	106
1970	689	710	70	1970	592	688	103
1971	599	687	77	1971	582	646	86
1972	411	618	117	1972	499	604	97
1973	638	591	116	1973	641	579	99
1974	868	641	145	1974	769	617	101
1975	623	628	144	1975	608	620	92
1976	753	658	145	1976	638	631	87
1977	879	752	125	1977	847	701	99
1978	732	771	125	1978	706	714	95
1979	881	774	87	1979	816	723	78
1980	905	830	93	1980	821	766	82
1981	1252	930	166	1981	1148	868	150
1982	722	898	175	1982	675	833	152
1983	733	898	189	1983	716	835	161
1984	869	896	184	1984	778	828	157
1985	850	885	181	1985	778	819	156
1986	975	830	128	1986	946	778	120
1987	702	826	115	1987	703	784	103
1988	801	839	89	1988	700	781	96
1989	758	817	92	1989	540	733	127
1990	858	819	93	1990	736	725	126
1991	748	773	67	1991	678	671	101
1992	898	812	54	1992	738	678	98
1993	654	783	77	1993	563	651	99
1994	627	757	93	1994	557	654	65

1995	736	732	91	1995	772	661	81
1996	616	706	99	1996	568	640	87
1997	712	669	93	1997	642	620	84
1998	888	715	106	1998	880	684	115
1999	796	749	92	1999	735	720	106
2000	755	753	92	2000	824	730	103
Mean 1961-90	758			Mean 1961-90	712		
Max	1252			Max	1148		
Min	411			Min	499		
Stand dev	154			Stand dev	135		
Median	755			Median	708		
1991-2000				1991-2000			
Mean 91-00	743			Mean 91-00	696		

Table App1-11. Average, max and min precipitation, (corrected values), Örskär

Stn no 10832	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1961-1990 Mean	46	35	31	34	34	39	58	79	64	51	65	52	588
Max	98	65	70	97	104	116	147	192	165	122	190	116	865
Min	3	5	2	3	8	6	8	6	13	18	28	7	347
Stand dev	21	18	16	21	24	22	30	48	35	29	36	31	114
Median	45	36	29	30	30	38	50	67	63	41	56	45	575
Mean91-00	33	30	34	38	32	67	58	37	49	50	48	43	519
Mean61-00	43	33	32	35	34	46	58	68	60	51	60	50	571
1988	58	39	46	42	31	27	67	88	26	44	31	52	551
1881 - 2000	Measured												
Max	95	69	57	88	89	122	153	166	142	127	155	87	
Year	1959	1950	1983	1890	1968	1991	1898	1980	1984	1885	1977	1965	
Min	2	0	1	1	0	5	2	1	7	0	5	4	
Year	1964	1917	1953	1902	1911	1933	1955	1947	1906	1920	1892	1933	

Table App1-12 . Average, max and min precipitation, (corrected values), Risinge

Stn no 10811	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1961-1990 Mean	59	43	36	40	34	47	86	79	72	62	73	68	699
Max	113	93	81	86	96	127	185	227	177	156	198	159	1010
Min	5	3	0	4	10	8	17	16	20	13	23	12	450
Stand dev	24	25	18	19	22	26	40	47	38	38	35	41	128
Median	60	36	36	42	28	45	78	70	67	50	68	54	705
Mean91-00	53	40	40	47	42	74	71	68	62	66	63	64	691
Mean61-00	57	43	37	42	36	54	82	76	69	63	71	67	697
1988	82	70	65	39	24	44	88	166	28	45	46	95	792
1901 - 2000													
Max	113	93	81	109	96	129	185	227	177	156	198	159	
Year	1985	1962	1983	1995	1968	1991	1977	1986	1984	1980	1981	1981	
Min	5	3	0	4	10	7	15	16	19	13	13	12	
Year	1964	1980	1964	1987	1971	1992	1994	1983	2000	1975	1999	1972	

Table App1-13. Yearly sum of precipitation (corrected) for Örskär and Risinge, 1961 - 2000

10832	Örskär			10811	Risinge		
Year	Yearly sum	Running 5-yr mean	Standard error	Year	Yearly sum	Running 5-yr mean	Standard error
1961	562			1961	741		
1962	427			1962	575		
1963	519			1963	569		
1964	425			1964	538		
1965	573	501		1965	734	631	
1966	643	517		1966	686	620	
1967	596	551		1967	706	647	
1968	656	579		1968	790	691	
1969	513	596	85	1969	610	705	86
1970	564	594	80	1970	745	707	75
1971	488	563	66	1971	543	679	92
1972	347	514	97	1972	492	636	109
1973	417	466	93	1973	684	615	104
1974	681	499	118	1974	773	648	110
1975	499	486	117	1975	450	589	125
1976	577	504	117	1976	578	595	110
1977	780	591	124	1977	711	639	95
1978	514	610	129	1978	679	638	92
1979	686	611	106	1979	746	633	88
1980	724	656	110	1980	893	721	99
1981	865	714	125	1981	1010	808	134
1982	541	666	108	1982	649	795	146
1983	564	676	111	1983	704	800	151
1984	637	666	106	1984	751	802	144
1985	595	640	104	1985	771	777	122
1986	790	625	108	1986	937	762	113
1987	590	635	94	1987	617	756	111
1988	673	657	80	1988	792	774	103
1989	574	644	85	1989	621	748	115
1990	632	652	83	1990	887	771	126
1991	520	598	52	1991	687	721	100
1992	636	607	50	1992	763	750	79
1993	411	555	81	1993	617	715	90
1994	470	534	80	1994	625	716	81

1995	521	512	80	1995	800	698	77
1996	359	479	90	1996	549	671	93
1997	467	445	89	1997	621	642	93
1998	612	486	84	1998	783	676	95
1999	546	501	82	1999	746	700	89
2000	647	526	98	2000	716	683	77

Table App1-14 . Average, max and min precipitation, (corrected values), Östhammar, 1989-2000

Stn no 10815	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1989-2000 Mean	44	36	38	44	40	66	74	67	65	63	63	57	657
Max	98	64	66	88	117	133	160	126	141	115	132	117	780
Min	8	4	18	13	9	16	23	19	16	16	14	13	506
Stand dev	29	20	14	28	32	36	47	35	40	33	35	31	102
Median	42	36	36	43	25	57	54	60	49	59	61	52	650

Table App1-15. Yearly sum of precipitation (corrected) for Östhammar, 1989 - 2000

10815	Östhammar		
Year	Yearly sum	Running 5-yr mean	Standard error
1989	593		
1990	780		
1991	642		
1992	736		
1993	512		
1994	657		
1995	780		
1996	506		
1997	552		
1998	755		
1999	623		
2000	753		

Table App1-16. Correction factors for adjusting measured precipitation

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Örskär	1.353	1.346	1.240	1.172	1.172	1.147	1.160	1.162	1.164	1.156	1.226	1.333	1.207
Lövsta	1.275	1.286	1.147	1.100	1.105	1.093	1.101	1.105	1.099	1.100	1.159	1.268	1.150
Risinge	1.289	1.265	1.167	1.111	1.097	1.093	1.104	1.097	1.108	1.105	1.161	1.283	1.149
Östhammar	1.273	1.281	1.156	1.111	1.111	1.106	1.108	1.104	1.103	1.105	1.164	1.286	1.148
Untra	1.245	1.237	1.114	1.073	1.077	1.071	1.07	1.076	1.074	1.07	1.123	1.236	1.121

Table App1-17. Average monthly sum of potential evapotranspiration (mm), 1969-1990, Örskär

Stn no 10832	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1969-1990 Mean	6	8	19	40	78	102	100	78	47	21	10	8	517
Max	14	14	45	60	103	120	120	91	57	34	24	15	603
Min	0	-1	8	23	59	71	73	59	37	12	0	-2	429
Stand dev	4	4	9	8	12	11	12	9	6	6	6	5	44
Median	6	9	17	41	76	103	103	81	47	20	9	9	523
Mean 91-00	11	11	26	48	86	106	111	88	49	25	7	5	572
1988	2	9	14	50	81	89	111	64	53	27	24	14	538

Table App1-18 . Average monthly sum of potential evapotranspiration (mm), 1963 -1990, Films Kyrkby

Stn no 10714	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
1963-1990 Mean	0	2	11	34	73	97	93	61	28	6	-2	-2	402
Max	2	7	27	46	92	113	116	86	43	21	11	5	515
Min	-5	-2	4	20	54	71	68	47	22	-1	-9	-9	332
Stand dev	2	2	5	7	9	11	13	9	4	4	3	3	36
Median	-1	2	10	34	74	98	90	61	26	6	-2	-2	402
Mean91-00	2	5	20	44	85	95	99	68	31	9	0	-2	456
1988	2	5	9	43	85	97	91	50	29	3	-2	-1	410

Table App1-19. Yearly sum of potential evapotranspiration (mm) for Örskär and Films Kyrkby, 1961-2000

Stn no 10832	Örskär				Stn no 10714	Films Kyrkby		
Year	Yearly sum	Running 5-yr mean	Standard error		Year	Yearly sum	Running 5yr-mean	Standard error
1961					1961			
1962					1962			
1963					1963			
1964					1964	332		
1965					1965	351		
1966					1966	372		
1967					1967	380		
1968					1968	407	368	
1969	522				1969	417	385	
1970	450				1970	395	394	
1971	556				1971	430	406	
1972	523				1972	408	411	25
1973	536	517			1973	407	411	18
1974	450	503			1974	383	405	15
1975	535	520			1975	442	414	19
1976	501	509			1976	422	412	17
1977	491	503	27		1977	365	404	24
1978	551	506	33		1978	393	401	24
1979	517	519	22		1979	380	400	24
1980	530	518	22		1980	387	389	20
1981	551	528	24		1981		381	20
1982	502	530	27		1982	420	395	15
1983	541	528	18		1983	515	425	43
1984	483	521	25		1984	398	430	44
1985	455	506	33		1985	376	427	50
1986	515	499	33		1986	419	426	50
1987	429	485	39		1987	371	416	52
1988	538	484	46		1988	410	395	34
1989	603	508	60		1989	455	406	38
1990	587	534	60		1990	417	414	31
1991	508	533	61		1991	405	412	31
1992	574	562	56		1992	453	428	26
1993	579	570	50		1993	464	439	27

Stn no 10832	Örskär				Stn no 10714	Films Kyrkby		
Year	Yearly sum	Running 5-yr mean	Standard error		Year	Yearly sum	Running 5yr-mean	Standard error
1994	607	571	31		1994	486	445	24
1995	617	577	27		1995	474	456	26
1996	565	588	27		1996	457	467	26
1997	630	600	30		1997	497	475	25
1998	507	585	46		1998	415	466	32
1999	602	584	44		1999	469	462	26
2000	528	566	43		2000	438	455	26

Table App1-20. Monhtly means of global radiation Örskär 1961-1990

Örskär	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Mean	7.8	25.3	64.1	106.9	157.1	174.4	157.6	120.0	71.5	33.1	10.5	4.2	932.5
Stand dev	1.47	4.69	7.87	13.82	14.49	18.69	18.03	13.95	7.69	4.42	1.73	0.56	44.43
Max	10.9	32.9	77.2	129.9	183.2	209.8	187.7	149.6	81.8	40.8	14.3	5.1	1051.9
Min	4.5	16.6	47.7	79.7	128.9	115.5	122.4	92.9	57.2	20.9	6.9	3.0	842.4
Median	7.9	24.7	64.6	110.8	160.0	173.8	158.4	120.4	72.3	33.5	10.1	4.3	924.0
1988	4.5	18.8	51.2	116.2	164.5	162.3	151.7	96.7	74.9	34.1	13.7	4.5	893.2

Table App1-21. Selected year 1988 compared to the normal period 1961-1990, Örskär

Örskär	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Temp													
Mean 1961-90	-3.0	-4.0	-1.4	2.3	7.5	13.1	15.7	15.1	11.4	7.2	2.6	-0.8	5.5
Stand dev	2.9	4.1	2.4	1.3	1.6	1.2	1.4	1.1	1.2	1.1	1.3	1.7	1.0
1988	0.0	-0.8	-1.5	2.5	9.2	12.6	18.4	14.4	12.6	6.4	0.6	-2.0	6.0
Precip													
Mean 1961-90	34	26	25	29	29	34	50	68	55	45	53	39	487
Stand dev	16	13	13	18	21	20	26	42	30	25	30	24	96
1988	58	39	46	42	31	27	67	88	26	44	31	52	551
Global rad													
Mean 1961-90	7.8	25.3	64.1	106.9	157.1	174.4	157.6	120.0	71.5	33.1	10.5	4.2	932.5
Stand dev	1.47	4.69	7.87	13.82	14.49	18.69	18.03	13.95	7.69	4.42	1.73	0.56	44.43
1988	4.5	18.8	51.2	116.2	164.5	162.3	151.7	96.7	74.9	34.1	13.7	4.5	893.2
Pot evapotran													
Mean 1969-90	6	8	19	40	78	102	100	78	47	21	10	8	517
Stand dev	4	4	9	8	12	11	12	9	6	6	6	5	44
1988	2	9	14	50	81	89	111	64	53	27	24	14	538

Table App1-22. Relative frequency of wind speed (m/s) and wind direction, All cases. Örskär, 1968 - 2000

March - May

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5 -			3.23	1.53	0.23	0.20	0.95	2.51	1.27	0.98	10.89
8.5	11.4	0.01	3.65	1.84	0.81	1.36	3.06	3.99	2.08	1.47	18.27
5.5	8.4	0.01	4.96	2.81	3.10	5.12	7.57	4.46	2.51	2.25	32.81
2.5	5.4	0.01	4.50	3.24	3.83	4.26	4.73	2.65	2.11	2.12	27.45
0.5	2.4	0.22	1.75	1.24	1.22	0.76	1.03	0.78	1.01	0.94	8.95
-	0.4	1.63									1.63
Sum		1.89	18.09	10.66	9.20	11.70	17.34	14.39	8.98	7.76	100.00

June – August

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			2.80	0.86	0.25	0.09	0.30	1.05	0.72	0.82	6.91
8.5	11.4		3.76	1.42	0.57	0.91	1.88	3.33	1.57	1.25	14.68
5.5	8.4		5.23	2.45	2.90	4.80	7.28	5.27	2.50	2.07	32.50
2.5	5.4	0.00	5.40	3.95	5.05	4.92	5.48	3.46	2.48	2.26	33.00
0.5	2.4	0.24	2.11	1.79	1.50	0.82	1.25	1.05	1.23	0.97	10.95
	0.4	1.97									1.97
Sum		2.21	19.29	10.47	10.27	11.55	16.19	14.16	8.49	7.37	100.00

Sept – Nov

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			4.95	2.05	0.89	0.38	1.48	4.14	2.97	2.41	19.28
8.5	11.4		3.14	1.66	1.33	1.08	3.84	5.27	4.08	1.96	22.35
5.5	8.4		3.10	1.77	2.32	3.06	7.52	5.51	5.04	2.32	30.64
2.5	5.4		2.01	1.26	2.11	3.01	5.13	3.06	3.19	1.38	21.15
0.5	2.4	0.18	0.67	0.49	0.61	0.55	0.95	0.78	0.93	0.58	5.74
	0.4	0.86									0.86
Sum		1.04	13.87	7.22	7.26	8.08	18.91	18.76	16.21	8.64	100.00

Dec – Feb

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			4.58	2.11	0.93	0.33	2.31	5.74	3.96	2.05	22.01
8.5	11.4		2.81	1.53	1.58	1.01	4.24	5.88	4.61	1.77	23.42
5.5	8.4	0.01	2.55	1.69	2.48	2.50	6.18	5.90	6.10	2.07	29.48
2.5	5.4	0.00	1.64	1.17	1.78	2.31	4.08	2.88	3.55	1.36	18.78
0.5	2.4	0.15	0.54	0.27	0.60	0.61	1.02	0.65	0.81	0.41	5.05
	0.4	1.26									1.26
Sum		1.42	12.12	6.77	7.37	6.75	17.83	21.04	19.04	7.65	100.00

All year

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			3.85	1.62	0.57	0.25	1.24	3.32	2.20	1.55	14.62
8.5	11.4		3.33	1.61	1.08	1.09	3.24	4.61	3.07	1.61	19.64
5.5	8.4		3.97	2.19	2.70	3.89	7.17	5.29	4.00	2.17	31.38
2.5	5.4	0.01	3.42	2.42	3.21	3.64	4.87	3.03	2.84	1.78	25.21
0.5	2.4	0.20	1.27	0.95	0.99	0.69	1.06	0.82	1.00	0.73	7.71
	0.4	1.44									1.44
Sum		1.65	15.84	8.79	8.56	9.55	17.58	17.06	13.12	7.85	100.00

Table App1-23. Relative frequency of wind speed (m/s) and wind direction, Precipitation. Örskär, 1968 - 2000

March - May

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5	-		8.41	5.39	1.12	0.91	1.80	1.50	0.86	1.14	21.13
8.5	11.4		5.65	4.47	3.13	2.79	3.45	2.18	0.93	1.43	24.01
5.5	8.4	0.04	4.37	3.78	5.01	4.63	5.74	2.18	1.11	1.67	28.51
2.5	5.4	0.04	2.22	2.85	3.57	4.33	4.17	1.16	1.46	1.19	21.00
0.5	2.4	0.13	0.70	0.74	0.86	0.59	0.80	0.21	0.15	0.38	4.55
-	0.4	0.80									0.80
Sum		1.02	21.34	17.23	13.68	13.24	15.95	7.23	4.51	5.80	100.00

June – August

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			9.64	3.59	1.81	0.39	0.41	0.72	0.95	3.36	20.88
8.5	11.4		5.90	3.67	2.53	1.45	1.70	1.96	1.95	1.90	21.06
5.5	8.4		4.15	3.03	3.03	4.36	7.11	2.53	1.87	1.86	27.94
2.5	5.4		2.37	1.99	4.16	4.00	6.31	2.04	1.64	0.91	23.42
0.5	2.4	0.06	0.63	0.45	1.01	0.72	0.63	0.39	0.78	0.74	5.43
	0.4	1.27									1.27
Sum		1.33	22.69	12.73	12.55	10.92	16.16	7.65	7.20	8.77	100.00

Sept – Nov

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			10.46	6.45	4.24	1.48	2.88	2.48	1.04	1.88	30.91
8.5	11.4		3.59	3.02	3.77	3.18	5.07	2.48	0.98	1.14	23.24
5.5	8.4		2.93	1.65	3.93	5.33	8.30	2.18	1.49	0.98	26.79
2.5	5.4		1.13	0.81	2.16	3.79	4.44	0.89	0.99	0.69	14.90
0.5	2.4	0.32	0.29	0.28	0.35	0.47	0.92	0.39	0.36	0.13	3.51
	0.4	0.64									0.64
Sum		0.96	18.40	12.20	14.45	14.25	21.63	8.42	4.87	4.83	100.00

Dec – Feb

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			10.31	6.05	3.08	1.29	2.74	2.33	0.77	1.76	28.34
8.5	11.4		4.38	3.30	4.29	2.95	4.59	2.09	0.90	0.88	23.38
5.5	8.4	0.03	3.08	3.09	4.95	5.32	5.73	1.73	1.58	1.15	26.66
2.5	5.4		1.22	1.36	2.61	3.51	3.97	1.46	1.43	0.79	16.36
0.5	2.4	0.08	0.41	0.29	0.63	0.74	0.70	0.42	0.57	0.26	4.10
	0.4	1.17									1.17
Sum		1.27	19.39	14.10	15.57	13.81	17.73	8.03	5.25	4.84	100.00

All year

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			9.77	5.61	2.81	1.14	2.22	1.94	0.88	1.89	26.25
8.5	11.4		4.64	3.51	3.73	2.76	4.06	2.18	1.09	1.21	23.18
5.5	8.4	0.02	3.46	2.86	4.41	4.98	6.62	2.05	1.49	1.33	27.22
2.5	5.4	0.01	1.64	1.62	2.94	3.82	4.49	1.35	1.37	0.87	18.10
0.5	2.4	0.15	0.47	0.41	0.66	0.64	0.77	0.37	0.47	0.32	4.26
	0.4	0.99									0.99
Sum		1.17	19.98	14.01	14.55	13.34	18.15	7.89	5.29	5.62	100.00

Table App1-24. Relative frequency of wind speed (m/s) and wind direction, Snow. Örskär, 1968 - 1995

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5	-		13.88	7.37	3.84	1.55	1.37	0.91	0.29	1.29	30.51
8.5	11.4		5.88	4.23	5.46	2.62	2.64	1.12	0.52	0.99	23.46
5.5	8.4		3.80	3.40	5.52	4.52	4.21	1.14	1.26	1.23	25.07
2.5	5.4		1.67	1.72	3.10	3.24	3.13	0.73	1.14	0.77	15.50
0.5	2.4	0.05	0.42	0.42	0.78	0.62	0.82	0.21	0.51	0.18	4.01
-	0.4	1.45									1.45
Sum		1.51	25.65	17.13	18.70	12.54	12.17	4.11	3.72	4.47	100.00

Table App1-25. Relative frequency of wind speed (m/s) and wind direction, all cases. Uppsala Flygplats, 1961 - 2000

March - May

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5 -			0.15	0.02			0.08	0.14	0.02	0.09	0.51
8.5	11.4		0.93	0.38	0.13	0.19	0.55	1.03	0.36	0.36	3.93
5.5	8.4		3.92	2.02	1.26	1.47	2.86	4.70	1.65	1.48	19.36
2.5	5.4	0.01	8.48	5.22	4.25	5.28	7.63	8.47	3.63	4.27	47.24
0.5	2.4	0.2	3.53	2.40	2.41	2.69	3.73	2.98	1.95	3.31	23.20
-	0.4	5.75									5.75
Sum		5.97	17.01	10.04	8.05	9.64	14.86	17.32	7.63	9.50	100.00

June – August

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.02	0.01			0.01	0.08	0.02	0.01	0.15
8.5	11.4		0.36	0.17	0.05	0.07	0.17	0.56	0.23	0.16	1.77
5.5	8.4		2.35	0.96	0.68	0.72	1.99	4.05	1.41	0.98	13.14
2.5	5.4		7.56	4.05	3.67	4.24	7.65	10.78	3.68	4.80	46.44
0.5	2.4	0.20	4.17	2.70	2.9	3.53	5.10	4.48	3.01	4.37	30.48
	0.4	8.04									8.04
Sum		8.24	14.46	7.88	7.30	8.56	14.92	19.96	8.35	10.32	100.00

Sept – Nov

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.10	0.03	0.01	0.01	0.05	0.18	0.07	0.10	0.55
8.5	11.4		0.36	0.22	0.15	0.13	0.57	1.01	0.39	0.55	3.38
5.5	8.4		1.75	0.89	0.98	1.21	3.33	4.70	1.87	2.37	17.10
2.5	5.4		4.84	2.65	3.24	5.01	7.82	10.44	6.04	6.18	46.21
0.5	2.4	0.06	2.93	1.70	2.22	2.81	4.02	4.77	4.00	4.04	26.55
	0.4	6.21									6.21
Sum		6.27	9.98	5.50	6.60	9.17	15.79	21.09	12.36	13.25	100.00

Dec – Feb

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.19	0.02	0.01		0.14	0.29	0.14	0.17	0.97
8.5	11.4		0.65	0.24	0.15	0.20	0.97	1.75	0.70	0.72	5.38
5.5	8.4		2.08	1.33	1.00	1.24	3.46	5.15	2.14	2.39	18.79
2.5	5.4		4.63	3.04	3.03	3.54	6.03	10.03	5.88	6.00	42.17
0.5	2.4	0.03	2.96	1.57	1.46	1.84	3.63	5.83	4.02	4.44	25.79
	0.4	6.90									6.90
Sum		6.93	10.53	6.20	5.64	6.83	14.23	23.04	12.89	13.71	100.00

All year

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.12	0.02			0.07	0.17	0.06	0.09	0.54
8.5	11.4		0.57	0.25	0.12	0.15	0.57	1.08	0.41	0.44	3.60
5.5	8.4		2.52	1.31	0.97	1.15	2.91	4.66	1.76	1.80	17.07
2.5	5.4		6.38	3.74	3.54	4.51	7.30	9.96	4.80	5.31	45.54
0.5	2.4	0.12	3.40	2.09	2.25	2.73	4.12	4.51	3.24	4.04	26.51
	0.4	6.73									6.73
Sum		6.86	12.99	7.41	6.89	8.55	14.97	20.38	10.27	11.67	100.00

Table App1-26. Relative frequency of wind speed (m/s) and wind direction, precipitation, Uppsala Flygplats, 1961 - 2000

March - May

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5	-		0.34	0.03		0.03	0.23	0.04	0.02	0.07	0.75
8.5	11.4		2.10	0.40	0.30	0.67	0.95	0.60	0.21	0.56	5.80
5.5	8.4		7.10	3.47	2.46	2.98	4.25	3.29	1.07	2.08	26.71
2.5	5.4		12.06	7.46	6.60	6.99	7.29	4.38	2.08	3.49	50.35
0.5	2.4	0.13	2.24	2.20	2.08	2.13	1.94	1.22	1.17	1.32	14.43
-	0.4	1.96									1.96
Sum		2.1	23.84	13.55	11.43	12.80	14.67	9.52	4.56	7.53	100.00

June – August

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.03	0.05				0.05	0.06	0.16	0.34
8.5	11.4		0.72	0.42	0.10	0.07	0.24	0.38	0.29	0.57	2.81
5.5	8.4	0.04	4.41	1.41	1.25	1.06	2.28	2.23	1.39	2.31	16.37
2.5	5.4	0.04	11.17	4.92	5.11	6.40	8.77	6.32	3.75	6.35	52.83
0.5	2.4	0.19	3.80	3.03	2.78	2.72	3.36	3.01	2.22	2.91	24.02
	0.4	3.63									3.63
Sum		3.90	20.14	9.83	9.25	10.25	14.65	11.99	7.70	12.31	100.00

Sept – Nov

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.35	0.17	0.04	0.04	0.13	0.19	0.14	0.13	1.17
8.5	11.4		0.87	0.82	0.30	0.46	1.30	0.78	0.23	0.92	5.69
5.5	8.4		3.52	2.51	2.84	3.00	6.63	3.28	0.65	2.76	25.19
2.5	5.4		8.19	5.26	6.89	9.02	7.56	4.94	1.83	4.58	48.28
0.5	2.4	0.02	2.81	2.08	2.86	2.48	2.43	1.63	1.34	1.68	17.33
	0.4	2.34									2.34
Sum		2.37	15.74	10.84	12.92	15.00	18.05	10.82	4.19	10.07	100.00

Dec – Feb

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.55	0.07	0.03	0.01	0.43	0.12	0.07	0.32	1.60
8.5	11.4		1.85	0.70	0.45	0.58	1.82	0.97	0.16	1.00	7.54
5.5	8.4		5.12	3.65	2.81	3.21	5.09	2.90	0.36	2.82	25.96
2.5	5.4		8.42	7.03	6.91	6.80	6.09	3.69	1.06	4.74	44.74
0.5	2.4	0.02	3.36	2.54	1.97	1.61	2.01	1.58	1.33	2.25	16.67
	0.4	3.50									3.50
Sum		3.52	19.30	13.99	12.17	12.21	15.44	9.26	2.99	11.12	100.00

All year

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.36	0.08	0.02	0.02	0.24	0.11	0.07	0.19	1.09
8.5	11.4		1.48	0.62	0.32	0.49	1.25	0.74	0.21	0.80	5.91
5.5	8.4	0.01	5.03	3.02	2.48	2.74	4.84	2.98	0.76	2.61	24.46
2.5	5.4	0.01	9.59	6.31	6.50	7.31	7.19	4.58	1.91	4.70	48.10
0.5	2.4	0.07	3.03	2.41	2.37	2.15	2.33	1.75	1.43	2.00	17.54
	0.4	2.90									2.90
Sum		2.99	19.48	12.44	11.68	12.71	15.86	10.16	4.38	10.31	100.00

Table App1-27. Relative frequency of wind speed (m/s) and wind direction. Snow. Uppsala Flygplats, 1961 - 1995

From	To	Calm	N	NE	E	SE	S	SW	W	NW	Sum
11.5			0.73	0.17	0.03	0.01	0.2	0.01	0.05	0.31	1.52
8.5	11.4		2.77	0.85	0.39	0.51	0.71	0.35	0.1	1.32	7
5.5	8.4		7.32	4.71	2.9	2.57	2.17	1.47	0.27	4.13	25.53
2.5	5.4		12.17	8.4	7.17	5.83	3.23	2.04	1.01	6.11	45.94
0.5	2.4	0.04	3.67	2.64	2.25	1.46	1.49	1.34	1.24	2.37	16.5
	0.4	3.51									3.51
Sum		3.55	26.66	16.77	12.75	10.37	7.79	5.2	2.67	14.24	100

Table App1-28. Yearly and daily variation of relative humidity (%). Mean values. Örskär, 1969 - 1990.

Hour	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	87	87	87	83	82	83	82	84	84	84	84	86
4	87	87	88	87	86	84	86	86	85	85	85	86
7	88	88	88	85	80	77	80	82	84	86	86	86
10	87	86	84	78	73	71	72	74	77	82	84	86
13	87	83	80	74	68	67	69	69	71	77	82	85
16	87	84	79	74	67	66	68	69	71	78	83	85
19	88	86	84	78	72	68	71	74	78	81	84	86
22	87	87	86	81	77	78	78	82	82	83	83	86
1	87	87	87	83	82	83	82	84	84	84	84	86

Table App1-29. Yearly and daily variation of relative humidity (%). Mean values. Films Kyrkby, 1963 - 1990.

Hour	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
1	89	89	89	86	86	86	85	90	91	90	90	89
4	90	90	90	90	89	87	88	92	93	92	91	90
7	89	88	89	86	76	73	77	87	91	91	90	89
10	89	88	83	74	64	62	61	72	79	85	90	90
13	87	83	76	67	58	56	57	65	70	78	86	88
16	88	84	76	68	58	57	57	65	71	80	88	89
19	88	87	82	74	63	62	63	74	82	86	89	89
22												

Table App 2-1. Characteristic discharge.

Q-station / calculation site	Area (km2)	Period	LLQ50	MLQ	MQ	MHQ	HHQ50	HHQ100	**(m3/s)**
50110 Vattholma	294,0	1917-2000	0,05	0,33	2,2	8,8	20	23	
2299 Tärnsjö	13,7	1975-2000	0,01	0,03	0,11	0,50	1,0	1,1	
1619 Forshultesjön nedre	103,2	1955-2000	0 [1)]	0,06	0,59	2,7	6,1	6,8	
573 Gimo	587	1923-1931	0,01	0,62	4,5	22	49	55	
1256 Fors	577	1931-1958	0,10	0,56	4,3	23	42	47	
1260 Odensfors	772	1931-1950	0 [1)]	1,59	5,1	13	25	28	
1053 Näs	1176	1925-1970	0,01	1,38	9,0	46	101	113	
910 Uvlunge	263	1917-1942	0.04 [1)]	0,12	1,9	11	30	34	
OL1 Olandsån	880,9	1962-2001	0.01 [2)]	0,40	6,6	48	98	108	
FO1 Forsmarksån	375,5	1962-2001	0.07 [2)]	0,43	3,0	14	34	39	
GE1 Gerseboån	24,8	1962-2001	0 [2)]	0,01	0,12	0,53	1,3	1,4	
LA1 Laxemarån	41,3	1962-2001	0.01 [2)]	0,03	0,22	1,8	4,1	4,6	

Q-station / calculation site	Area (km2)	Period	LLQ50	MLQ	MQ	MHQ	HHQ50	HHQ100	**(l/s*km2)**
50110 Vattholma	294,0	1917-2000	0,18	1,1	7,5	30	69	77	
2299 Tärnsjö	13,7	1975-2000	0,69	2,1	8,2	37	74	82	
1619 Forshultesjön nedre	103,2	1955-2000	0	0,58	5,7	26	59	66	
573 Gimo	587	1923-1931	0,02	1,1	7,7	37	84	94	
1256 Fors	577	1931-1958	0,17	0,97	7,5	39	74	81	
1260 Odensfors	772	1931-1950	0	2,1	6,6	17	33	36	
1053 Näs	1176	1925-1970	0,01	1,2	7,7	39	86	96	
910 Uvlunge	263	1917-1942	0,15	0,46	7,2	43	114	129	
OL1 Olandsån	880,9	1962-2001	0,01	0,45	7,5	55	111	122	
FO1 Forsmarksån	375,5	1962-2001	0,19	1,15	8,0	37	91	103	
GE1 Gerseboån	24,8	1962-2001	0	0,40	4,8	21	52	56	
LA1 Laxemarån	41,3	1962-2001	0,24	0,73	5,3	43	99	111	

[1)] Observed minimum
[2)] Calculated minimum

Table App 2-2. Maximum, minimum and average discharge 50110 Vattholma 1917-2000. Daily mean values.

m3/s	Max	Min	Average	l/s*km2	Max	Min	Average
1917	8,2	0,19	1,8		27,9	0,6	6,1
1918	10	0,25	2,4		34,0	0,9	8,2
1919	13	0,6	2,5		44,2	2,0	8,5
1920	9,2	0,4	2,1		31,3	1,4	7,1
1921	3,5	0,16	0,97		11,9	0,5	3,3
1922	25	0,5	2,9		85,0	1,7	9,9
1923	5,2	0,07	2,4		17,7	0,2	8,2
1924	24	1,3	4,2		81,6	4,4	14,3
1925	6,9	0,35	1,6		23,5	1,2	5,4
1926	8	0,55	2,1		27,2	1,9	7,1
1927	7,3	0,75	3,2		24,8	2,6	10,9
1928	5,5	0,5	2,2		18,7	1,7	7,5
1929	5,4	0,75	2		18,4	2,6	6,8
1930	6,7	0,25	2,1		22,8	0,9	7,1
1931	9,6	0,25	2,4		32,7	0,9	8,2
1932	9,8	0,07	2,1		33,3	0,2	7,1
1933	3,6	0,1	1,1		12,2	0,3	3,7
1934	11	0,5	2,4		37,4	1,7	8,2
1935	5,9	0,4	2,5		20,1	1,4	8,5
1936	7,5	0,4	3		25,5	1,4	10,2
1937	18	0,25	2,5		61,2	0,9	8,5
1938	5,2	0,19	2		17,7	0,6	6,8
1939	5,5	0,35	1,8		18,7	1,2	6,1
1940	6,1	0,19	2,2		20,7	0,6	7,5
1941	7,5	0,19	1,7		25,5	0,6	5,8
1942	6,3	0,45	1,9		21,4	1,5	6,5
1943	5,4	0,25	2,1		18,4	0,9	7,1
1944	13	0,4	3,2		44,2	1,4	10,9
1945	12	0,7	2,9		40,8	2,4	9,9
1946	5,5	0,65	2,2		18,7	2,2	7,5
1947	7,5	0,19	1,3		25,5	0,6	4,4
1948	7,5	0,3	1,2		25,5	1,0	4,1
1949	5	0,11	1,6		17,0	0,4	5,4

1950	9,4	0,14	2	32,0	0,5	6,8
1951	15,3	0,13	1,5	52,0	0,4	5,1
1952	5	0,1	1,3	17,0	0,3	4,4
1953	12,5	0,24	1,9	42,5	0,8	6,5
1954	9,2	0,19	2,2	31,3	0,6	7,5
1955	6,7	0,12	1,7	22,8	0,4	5,8
1956	14,1	0,4	2,2	48,0	1,4	7,5
1957	10,9	1,1	3,5	37,1	3,7	11,9
1958	11,1	0,7	2,4	37,8	2,4	8,2
1959	13,2	0,08	2,4	44,9	0,3	8,2
1960	9,9	0,32	3,2	33,7	1,1	10,9
1961	9,5	1	3,3	32,3	3,4	11,2
1962	15	0,5	2,4	51,0	1,7	8,2
1963	4,9	0,3	1,2	16,7	1,0	4,1
1964	3,7	0,29	1,1	12,6	1,0	3,7
1965	7,2	0,35	2,5	24,5	1,2	8,5
1966	22	0,45	3,1	74,8	1,5	10,5
1967	12,6	0,2	3	42,9	0,7	10,2
1968	10,5	0,32	2,2	35,7	1,1	7,5
1969	13,4	0,23	2,1	45,6	0,8	7,1
1970	16,3	0,2	1,9	55,4	0,7	6,5
1971	8,2	0,11	1,7	27,9	0,4	5,8
1972	4,4	0,17	0,98	15,0	0,6	3,3
1973	4,1	0,11	0,91	13,9	0,4	3,1
1974	7,4	0,23	2,3	25,2	0,8	7,8
1975	6	0,08	1,6	20,4	0,3	5,4
1976	3,2	0,05	0,9	10,9	0,2	3,1
1977	10,5	0,4	3	35,7	1,4	10,2
1978	8,2	0,65	2,9	27,9	2,2	9,9
1979	6,5	0,75	2,6	22,1	2,6	8,8
1980	8,2	0,36	2,6	27,9	1,2	8,8
1981	10,7	0,64	4,1	36,4	2,2	13,9
1982	13,5	0,17	2,4	45,9	0,6	8,2
1983	5,8	0,12	1,6	19,7	0,4	5,4
1984	7,5	0,35	2,6	25,5	1,2	8,8
1985	11,3	0,21	2,2	38,4	0,7	7,5

1986	10	0,27	3,4		34,0	0,9	11,6
1987	7,5	0,4	2,2		25,5	1,4	7,5
1988	7,3	0,14	2,1		24,8	0,5	7,1
1989	5,9	0,06	1,5		20,1	0,2	5,1
1990	8	0,12	2,6		27,2	0,4	8,8
1991	4,7	0,35	1,8		16,0	1,2	6,1
1992	4,6	0,13	1,8		15,6	0,4	6,1
1993	3,1	0,1	0,88		10,5	0,3	3,0
1994	4,8	0,1	1,2		16,3	0,3	4,1
1995	8,7	0,12	2,3		29,6	0,4	7,8
1996	2,2	0,22	0,66		7,5	0,7	2,2
1997	3,6	0,27	1,5		12,2	0,9	5,1
1998	8,1	0,55	2,9		27,6	1,9	9,9
1999	12,9	0,17	2,7		43,9	0,6	9,2
2000	7,4	0,2	1,9		25,2	0,7	6,5
				Average 1917-1990:	31,1	1,2	7,5
				Average 1991-2000	20,4	0,8	6,0

Table App 2-3. Monthly discharge 50110 Vattholma 1917-2000. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1917	0,33	0,27	0,23	1,2	0,71	0,19	0,12	0,08	0,08	0,16	0,22	0,42
To		2,2	2	2,4	4,9	4,2	1,3	0,6	0,69	1,1	1,6	2,3	2,6
	2000	6,4	6,6	8,9	10,7	17,7	5,9	2,8	3,9	6,4	8,9	7,8	8,7
StdMQ		1,3	1,4	1,8	2,3	2,9	0,9	0,5	0,7	1,3	1,5	1,7	1,8
(dm3/s/km2) :													
	1917	1,1	0,92	0,8	4,1	2,4	0,66	0,41	0,28	0,27	0,54	0,75	1,4
To		7,6	6,8	8,1	16,8	14,2	4,3	2,1	2,4	3,7	5,4	7,9	9
	2000	22	22	30	37	60	20	9,5	13,3	22	30	27	30
StdMQ		4,5	4,7	6,0	7,7	9,9	3,0	1,7	2,3	4,3	5,1	5,9	6,0

Table App 2-4. Discharge duration based on daily mean values for 50110 Vattholma 1917-2000.

l/s*km2		%
85-90	87,5	0,0
80-85	82,5	0,0
75-80	77,5	0,0
70-75	72,5	0,0
65-70	67,5	0,0
60-65	62,5	0,3
55-60	57,5	0,3
50-55	52,5	0,3
48-50	49	0,3
46-48	47	0,3
44-46	45	0,5
42-44	43	0,8
40-42	41	0,8
38-40	39	1,1
36-38	37	1,1
34-36	35	1,4
32-34	33	1,9
30-32	31	2,2
28-30	29	2,7
26-28	27	3,3
24-26	25	4,1
22-24	23	5,2
20-22	21	6,8
18-20	19	8,8
16-18	17	11,8
14-16	15	15,3
12-14	13	19,7
10-12	11	24,9
9-10	9,5	28,2
8-9	8,5	33,4
7-8	7,5	38,6
6-7	6,5	42,5
5-6	5,5	49,9
4-5	4,5	57,5
3-4	3,5	66,6
2-3	2,5	77,8
1-2	1,5	91,2
0.8-1	0,9	94,0
0.6-0.8	0,7	96,4
0.4-0.6	0,5	98,9
0.2-0.4	0,3	100,0
0.0-0.2	0,1	100,0

Table App 2-5. Maximum, minimum and average discharge 1619 Forshultesjön nedre 1955-2000. Daily mean values.

m3/s	Max	Min	Average	l/s*km2	Max	Min	Average
1955	2,3	0,01	0,43		22,3	0,1	4,2
1956	2,6	0,02	0,45		25,2	0,2	4,4
1957	1,7	0,04	0,46		16,5	0,4	4,5
1958	5	0,14	0,79		48,4	1,4	7,7
1959	3	0	0,6		29,1	0,0	5,8
1960	4,3	0,08	1,3		41,7	0,8	12,6
1961	3,1	0,2	0,75		30,0	1,9	7,3
1962	0,99	0,13	0,41		9,6	1,3	4,0
1963	2	0,11	0,49		19,4	1,1	4,7
1964	1,1	0,01	0,27		10,7	0,1	2,6
1965	1,3	0,03	0,44		12,6	0,3	4,3
1966	4,6	0,05	1,1		44,6	0,5	10,7
1967	3,2	0,02	0,71		31,0	0,2	6,9
1968	3,9	0,03	0,65		37,8	0,3	6,3
1969	3,3	0,01	0,71		32,0	0,1	6,9
1970	6,6	0,03	1		64,0	0,3	9,7
1971	2,9	0,04	0,46		28,1	0,4	4,5
1972	4,6	0,02	0,66		44,6	0,2	6,4
1973	2	0,03	0,45		19,4	0,3	4,4
1974	2,8	0,02	0,83		27,1	0,2	8,0
1975	2	0,02	0,54		19,4	0,2	5,2
1976	1,6	0,04	0,2		15,5	0,4	1,9
1977	4,7	0,05	0,84		45,5	0,5	8,1
1978	3	0,02	0,52		29,1	0,2	5,0
1979	3,6	0,05	0,65		34,9	0,5	6,3
1980	2,3	0,05	0,57		22,3	0,5	5,5
1981	3,1	0,06	0,59		30,0	0,6	5,7
1982	2	0,05	0,34		19,4	0,5	3,3
1983	1,1	0,01	0,2		10,7	0,1	1,9
1984	1,3	0,21	0,65		12,6	2,0	6,3
1985	5	0,22	1		48,4	2,1	9,7
1986	2,3	0,09	0,65		22,3	0,9	6,3
1987	3,7	0,11	0,64		35,9	1,1	6,2
1988	3,7	0,05	0,87		35,9	0,5	8,4
1989	0,57	0,01	0,19		5,5	0,1	1,8
1990	2,2	0,02	0,37		21,3	0,2	3,6
1991	1,3	0,12	0,46		12,6	1,2	4,5
1992	0,81	0,01	0,24		7,8	0,1	2,3
1993	1,4	0,02	0,37		13,6	0,2	3,6
1994	2,7	0,09	0,8		26,2	0,9	7,8
1995	2,7	0,09	0,66		26,2	0,9	6,4
1996	2,6	0,1	0,44		25,2	1,0	4,3
1997	1,5	0,07	0,37		14,5	0,7	3,6
1998	2	0,13	0,8		19,4	1,3	7,8
1999	2,8	0,04	0,59		27,1	0,4	5,7
2000	3,9	0,09	0,72		37,8	0,9	7,0
				Average 1917-1990:	27,8	0,6	5,9
				Average 1991-2000	21,0	0,7	5,3

Table App 2-6. Monthly discharge 1619 Forshultesjön nedre 1955-2000. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1955	0,05	0,07	0,07	0,06	0,04	0,02	0,03	0,02	0	0	0,02	0,06
To		0,71	0,73	0,89	1,4	1	0,34	0,16	0,21	0,2	0,25	0,49	0,69
	2000	2,2	2,3	3,4	3,8	3,2	1,1	0,59	1,3	1	2	3,6	3,4
StdMQ		0,6	0,5	0,7	0,9	0,8	0,2	0,1	0,2	0,2	0,3	0,7	0,7
(dm3/s/km2) :													
	1955	0,48	0,68	0,68	0,58	0,39	0,19	0,29	0,19	0	0	0,19	0,58
To		6,9	7,1	8,7	13,7	10	3,3	1,6	2	1,9	2,4	4,7	6,7
	2000	21	22	33	37	31	10,7	5,7	12,6	9,7	19,4	35	33
StdMQ		5,6	4,6	6,8	8,9	7,6	2,2	1,4	2,0	1,7	3,3	6,9	7,2

Table App 2-7. Discharge duration based on daily mean values for 1619 Forshultesjön nedre 1955-2000.

l/s*km2		%
60-65	62,5	0,0
55-60	57,5	0,0
50-55	52,5	0,0
48-50	49,0	0,0
46-48	47,0	0,3
44-46	45,0	0,3
42-44	43,0	0,5
40-42	41,0	0,5
38-40	39,0	0,8
36-38	37,0	0,8
34-36	35,0	1,1
32-34	33,0	1,6
30-32	31,0	2,2
28-30	29,0	2,5
26-28	27,0	3,3
24-26	25,0	3,8
22-24	23,0	4,4
20-22	21,0	5,5
18-20	19,0	7,1
16-18	17,0	8,8
14-16	15,0	10,1
12-14	13,0	12,3
10-12	11,0	16,2
9-10	9,5	19,7
8-9	8,5	22,2
7-8	7,5	25,2
6-7	6,5	29,6
5-6	5,5	34,0
4-5	4,5	40,3
3-4	3,5	50,4
2-3	2,5	63,8
1-2	1,5	83,0
0.8-1	0,9	86,0
0.6-0.8	0,7	89,9
0.4-0.6	0,5	94,2
0.2-0.4	0,3	97,5
0.0-0.2	0,1	100,0

Table App 2-8. Maximum, minimum and average discharge 1053 Näs 1925-1970.
Daily mean values.

m3/s	Max	Min	Medel	l/skm2	Max	Min	Medel
1925	22	1,3	6		18,7	1,1	5,1
1926	29	1,4	7,6		24,7	1,2	6,5
1927	32	1,8	13,2		27,2	1,5	11,2
1928	30	2,2	10,2		25,5	1,9	8,7
1929	33	2	9,8		28,1	1,7	8,3
1930	21	0,69	7,5		17,9	0,6	6,4
1931	45	2	8,8		38,3	1,7	7,5
1932	72	1,3	8,3		61,2	1,1	7,1
1933	12,8	0,43	3,6		10,9	0,4	3,1
1934	66	1	9,5		56,1	0,9	8,1
1935	27	1,4	10,7		23,0	1,2	9,1
1936	34	2,5	10,7		28,9	2,1	9,1
1937	68	2,1	8,8		57,8	1,8	7,5
1938	30	2	8		25,5	1,7	6,8
1939	25	1,2	7,4		21,3	1,0	6,3
1940	35	1,5	7,4		29,8	1,3	6,3
1941	50	1,7	7		42,5	1,4	6,0
1942	57	1	6,1		48,5	0,9	5,2
1943	35	0,55	7,1		29,8	0,5	6,0
1944	59	3,1	13		50,2	2,6	11,1
1945	35	3,1	14,5		29,8	2,6	12,3
1946	29	1,9	9,2		24,7	1,6	7,8
1947	24	0,12	4,7		20,4	0,1	4,0
1948	35	0,62	4,9		29,8	0,5	4,2
1949	25	0,51	5,3		21,3	0,4	4,5
1950	38	1,3	8,8		32,3	1,1	7,5
1951	56	0,47	6,5		47,6	0,4	5,5
1952	23	0,23	5,8		19,6	0,2	4,9
1953	51	0,51	8,1		43,4	0,4	6,9
1954	37	0,83	8,5		31,5	0,7	7,2
1955	26	0,62	8		22,1	0,5	6,8
1956	61	1,8	9,3		51,9	1,5	7,9
1957	60	2,8	15,1		51,0	2,4	12,8
1958	62	1	9,9		52,7	0,9	8,4
1959	103	0,27	11,1		87,6	0,2	9,4
1960	56	2,3	17,4		47,6	2,0	14,8
1961	67	2,6	12,3		57,0	2,2	10,5
1962	60	1,6	10,2		51,0	1,4	8,7
1963	43	0,55	5,3		36,6	0,5	4,5
1964	24	1,3	4,4		20,4	1,1	3,7
1965	43	2,1	9,7		36,6	1,8	8,2
1966	95	1,8	12		80,8	1,5	10,2
1967	88	1,4	13,8		74,8	1,2	11,7
1968	78	0,9	9,8		66,3	0,8	8,3
1969	59	0,9	9,1		50,2	0,8	7,7
1970	69	0,9	8,4		58,7	0,8	7,1

Table App 2-9. Monthly discharge 1053 Näs 1925-1970. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1925	1,2	1,1	0,88	4,7	3,7	2	0,66	0,62	0,56	0,57	0,61	1,2
To		9,1	8,4	10	19,2	15,9	6,7	4	4,4	4,8	5,6	9,1	10,5
	1970	31	22	44	40	51	14,4	10,3	23	25	31	31	31
StdMQ		6,2	5,6	8,4	8,3	9,4	3,5	2,2	4,6	5,5	6,2	7,4	7,4
(dm3/s/km2) :													
	1925	1	0,94	0,75	4	3,1	1,7	0,56	0,53	0,48	0,48	0,52	1
To		7,7	7,2	8,5	16,3	13,5	5,7	3,4	3,7	4,1	4,8	7,7	8,9
	1970	26	18,7	37	34	43	12,2	8,8	19,6	21	26	26	26
StdMQ		5,3	4,8	7,2	7,0	8,0	2,9	1,9	3,9	4,6	5,3	6,3	6,3

Table App 2-10. Discharge duration based on daily mean values for 1053 Näs 1925-1970.

l/skm2	%
87	0,0
85	0,0
82	0,0
78	0,0
74	0,0
70	0,0
67	0,3
63	0,3
61	0,5
59	0,5
57	0,5
54	0,8
52	0,8
50	0,8
48	1,1
46	1,4
45	1,4
43	1,6
40	2,5
37,5	3,0
34	3,8
31,5	5,2
28	6,8
24,5	8,8
21,5	12,1
18	15,9
15,5	20,5
12	26,6
10,5	29,6
9	33,7
7,5	37,5
5,8	44,1
4,3	49,6
2,5	58,4
1,6	66,6
1,1	80,3
0,7	95,6
0,5	97,3
0,3	98,6
0,2	99,5
0,1	100,0
0,1	100,0

Table App 2-11. Monthly discharge 910 Uvlunge 1917-1942. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1917	0,19	0,12	0,12	0,77	0,43	0,16	0,08	0,12	0,19	0,21	0,28	0,19
To		1,8	1,3	1,3	4,4	3,5	0,86	0,45	0,73	1,6	1,9	2,5	1,9
	1942	7,7	5,4	6	11,3	15,2	2,7	1,8	3,8	9,9	9	11,8	4,4
StdMQ		2,0	1,3	1,4	2,8	3,2	0,7	0,4	1,0	2,6	2,1	2,5	1,3
(dm3/s/km2) :													
	1917	0,72	0,46	0,46	2,9	1,6	0,61	0,3	0,46	0,72	0,8	1,1	0,72
To		6,9	4,9	5,1	16,6	13,4	3,3	1,7	2,8	6,2	7,3	9,6	7,4
	1942	29	21	23	43	58	10,3	6,8	14,4	38	34	45	16,7
StdMQ		7,5	5,0	5,3	10,5	12,1	2,5	1,4	3,8	9,9	7,8	9,4	4,9

Table App 2-12. Monthly discharge 573 Gimo 1923-1931. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1923	0,52	0,52	1,5	3,5	2,4	0,54	0,53	0,38	0,27	0,25	0,45	0,41
To		3,5	2,5	3,1	9,2	8,6	2,6	1,9	2,9	4,3	4,8	6	4,6
	1931	6,4	5,6	7	17,2	29	4,6	4,8	10,3	14,5	18,3	15,2	8,8
StdMQ		1,9	1,5	2,2	4,5	8,2	1,5	1,6	3,7	5,3	6,0	5,3	3,0
(dm3/s/km2) :													
	1923	0,89	0,89	2,6	6	4,1	0,92	0,9	0,65	0,46	0,43	0,77	0,7
To		6	4,3	5,2	15,7	14,6	4,5	3,3	5	7,4	8,3	10,2	7,8
	1931	10,9	9,5	11,9	29	49	7,8	8,2	17,5	25	31	26	15
StdMQ		3,3	2,6	3,8	7,7	14,0	2,6	2,8	6,2	9,1	10,2	9,1	5,1

Table App 2-13. Monthly discharge 1256 Fors 1931-1958. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1931	1	1,3	0,8	2,2	0,66	0,24	0,15	0,32	0,48	0,41	0,43	1
To		5,4	4,7	4,1	10,1	7	1,6	0,89	1,1	1,9	3	5,5	6,5
	1958	15,3	13,7	11,4	22	22	5,2	5,2	6,1	17,5	24	18,4	18,5
StdMQ		3,4	3,5	3,0	4,6	5,0	1,3	0,9	1,2	3,2	4,5	4,7	4,3
(dm3/s/km2) :													
	1931	1,7	2,3	1,4	3,8	1,1	0,42	0,26	0,55	0,83	0,71	0,75	1,7
To		9,3	8,1	7,2	17,5	12,2	2,8	1,5	1,8	3,3	5,1	9,5	11,2
	1958	27	24	19,8	38	38	9	9	10,6	30	42	32	32
StdMQ		5,9	6,0	5,1	7,9	8,7	2,3	1,6	2,1	5,6	7,7	8,2	7,5

Table App 2-14. Monthly discharge 1260 Odensfors 1931-1950. Maximum and minimum daily mean, long term average and standard deviation.

Month		1	2	3	4	5	6	7	8	9	10	11	12
(m3/s):													
	1931	0,46	0,59	0,84	4,4	3,2	1,9	1,2	1,1	0,72	0,73	0,6	0,62
To		6,4	5,3	5,2	7,8	8,2	5,4	3,4	2,7	2,7	3,1	4,9	6,5
	1950	22	12,1	11	15,4	14,7	9	5,9	4,3	4,8	5,8	14,6	18,5
StdMQ		4,6	2,8	2,6	3,0	3,4	2,2	1,3	0,9	1,2	1,6	3,4	4,5
(dm3/s/km2) :													
	1931	0,6	0,76	1,1	5,7	4,1	2,5	1,6	1,4	0,93	0,95	0,78	0,8
To		8,3	6,8	6,8	10,2	10,6	7	4,5	3,4	3,5	4	6,3	8,4
	1950	28	15,7	14,2	19,9	19	11,7	7,6	5,6	6,2	7,5	18,9	24
StdMQ		6,0	3,7	3,4	3,9	4,4	2,8	1,7	1,2	1,5	2,1	4,4	5,8

Table App 2-15. Characteristic water level.

Q-station	Area (km2)	Period	Zero level	LLW50	MLW	MW	MHW	HHW50	HHW100	(m)
563 Vattholma	284,0	1917-1978	20,70		0,21	0,43	0,88	1,42	1,53	
				20,8*	20,91	21,13	21,58	22,12	22,23	
2244 Vattholma 2	293,8	1980-2000	19,00		1,99	2,20	2,56	3,02	3,11	
				20,95	20,99	21,20	21,56	22,02	22,11	
2299 Tärnsjö	13,7	1975-2000								
1619 Forshultesjön nedre	103,2	1955-2000	42,00		0,30	0,53	1,05	1,74	1,89	
				42,00	42,30	42,53	43,05	43,74	43,89	

* Observed minimum

Table App 2-16. Seasonal average discharge.

Q	50110 Vattholma (294 km2)		1619 Forshultesjön (103.2 km2)		1053 Näs (1176 km2)	
Whole period	m3/s	l/s*km2	m3/s	l/s*km2	m3/s	l/skm2
Vernal equinox (March 20)	2,4	8,2	0,9	8,7	9,3	7,9
Autumnal equinox (Sept 23)	1,2	4,1	0,2	1,9	4,9	4,2
High summer (Average Jun-Aug)	0,9	2,9	0,2	2,3	5,0	4,3
Midwinter (Average Dec-Feb)	2,3	7,8	0,7	6,9	7,0	6,0

Q	50110 Vattholma (294 km2)	
1988	m3/s	l/s*km2
Vernal equinox	2,5	8,4
Autumnal equinox	1,0	3,4
High summer	0,36	1,2
Midwinter	2,9	9,9

Q	1619 Forshultesjön (103.2 km2)	
1981	m3/s	l/s*km2
Vernal equinox	1,3	12,6
Autumnal equinox	0,17	1,6
High summer	0,24	2,3
Midwinter	0,69	6,7

Table App 2-17. Seasonal average water level.

W RH00	Zero level: 20.70 m 563 Vattholma		Zero level: 19.00 2244 Vattholma 2		Zero level: 42.00 m 1619 Forshultesjön	
	Level (cm)	Total level (m)	Level (cm)	Total level (m)	Level (cm)	Total level (m)
Vernal equinox (March 20)	46	21,16	225	21,25	65	42,65
Autumnal equinox (Sept 23)	33	21,03	211	21,11	40	42,40
High summer (Average Jun-Aug)	61	21,31	223	21,23	69	42,69
Midwinter (Average Dec-Feb)	78	21,48	251	21,51	107	43,07

Table App 2-18. Ice period.

Norrsjön (Tierp)
Area: 2 km2
Depth average: 4.4 m

Year	Ice freeze-up Date	Ice freeze-up Day No	Ice break-up Date	Ice break-up Day No
1981	00-12-04	36864	01-04-20	37001
1982	00-11-25	36855	01-04-22	37003
1983	00-11-23	36853	01-04-26	37007
1984	00-12-31	36891	01-05-04	37015
1985	00-11-18	36848	01-04-30	37011
1987	00-12-12	36872	01-04-17	36998
1988	00-11-09	36839	01-03-16	36966
1989	00-11-26	36856	01-03-10	36960
1990	00-11-28	36858	01-04-06	36987
1991	00-12-14	36874	01-04-09	36990
1992	00-11-23	36853	01-04-08	36989
1993	00-11-15	36845	01-04-12	36993
1995	00-11-30	36860	01-04-24	37005
1996	00-12-14	36874	01-04-03	36984
1997	00-11-28	36858	01-04-11	36992
1998	00-11-15	36845	01-04-08	36989
2000	00-12-28	36888	01-04-10	36991
Min	00-11-09	36839	01-03-10	36960
Medel	00-12-01	36861	01-04-12	36993
Max	00-12-31	36891	01-05-04	37015
MinPeriod	00-12-31	36891	01-03-10	36960
Minimum	35			
AverPeriod	00-12-01	36861	01-04-12	36993
Average	66			

Gnötteln (Oskarshamn)
Area: 1.8 km2
Depth average: 1.7 m

Year	Ice freeze-up Date	Ice freeze-up Day No	Ice break-up Date	Ice break-up Day No
1918			01-04-13	36994
1928			01-04-19	37000
1957	00-11-30	36860	01-05-01	37012
1958	00-11-30	36860	01-04-28	37009
1959	00-12-07	36867	01-04-15	36996
1960	01-01-13	36904	01-03-09	36959
1961	00-11-17	36847	01-04-22	37003
1963	00-12-09	36869	01-04-13	36994
1964	00-12-20	36880	01-04-14	36995
1965	00-11-16	36846	01-04-30	37011
1966	00-12-23	36883	01-03-22	36972
1967	00-11-25	36855	01-04-04	36985
1968	00-11-13	36843	01-04-17	36998
1969	00-11-25	36855	01-04-28	37009
1970	00-11-08	36838	01-04-12	36993
1971	00-11-19	36849	01-04-04	36985
1972	01-01-01	36892	01-03-22	36972
1973	00-11-26	36856	01-03-27	36977
1974	00-12-31	36891	01-04-08	36989
1975	00-11-22	36852	01-04-07	36988
1976	00-11-19	36849	01-04-23	37004
1977	00-11-27	36857	01-04-08	36989
1978	00-12-05	36865	01-04-20	37001
1979	00-12-10	36870	01-04-19	37000
1980	00-12-01	36861	01-04-08	36989
1981	00-11-27	36857	01-04-04	36985
1982	00-12-08	36868	01-04-03	36984
1983	00-11-20	36850	01-04-10	36991

Maximum	88			
Middle		36927		
1988	00-11-09	36839	01-03-16	36966
Middle		36902		

1986	00-12-20	36880	01-04-23	37004
1987	00-12-03	36863	01-04-10	36991
1989	00-11-25	36855	01-02-06	36928
1990	00-11-22	36852	01-03-25	36975
1991	01-01-20	36911	01-03-19	36969
1992	00-12-21	36881	01-03-21	36971
1993	00-11-22	36852	01-04-04	36985
1994	01-01-03	36894	01-03-21	36971
1995	00-11-11	36841	01-04-23	37004
1996	00-12-14	36874	01-03-16	36966
1997	01-01-25	36916	01-03-27	36977
1998	00-11-08	36838	01-03-27	36977
1999	00-12-05	36865	01-03-20	36970
2000	00-12-25	36885	01-04-11	36992
Min:	00-11-08	36838	01-02-06	36928
Average:	00-12-05	36865	01-04-06	36987
Max:	01-01-25	36916	01-05-01	37012
MinPeriod	01-01-25	36916	01-02-06	36928
Minimum	6			
AverPeriod	00-12-05	36865	01-04-06	36987
Average	61			
MaxPeriod	00-11-08	36838	01-05-01	37012
Maximum	87			
Middle		36925		
1981	00-11-27	36857	01-04-04	36985
Middle		36921		

Tabell temperatur station forsmark 130. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad	1	2	3	4	5	6	7	8	9	10	11	12
djup 1m												
mv	NaN	-0.4	0.1	3.1	6.5	13.1	16.5	18.1	12.7	8.1	4.6	0.3
max	NaN	-0.2	2.3	5.4	11.3	17.6	19.6	21.6	16.8	11.2	7.4	3.6
min	NaN	-0.5	-0.4	2.1	3.8	8.7	13.7	15.5	8.1	4.1	0.1	-0.8
s	NaN	0.1	0.6	0.8	2.0	2.4	1.3	1.6	2.2	1.6	1.8	1.5
N	0.0	57.0	279.0	98.0	126.0	75.0	107.0	63.0	87.0	150.0	122.0	251.0
djup 3m												
mv	NaN	-0.4	0.1	3.0	6.4	12.8	16.3	17.7	12.6	8.1	4.6	0.3
max	NaN	-0.3	2.3	5.2	10.6	17.3	19.4	21.1	16.7	11.2	7.4	3.6
min	NaN	-0.5	-0.4	2.1	3.5	8.6	13.5	15.3	8.0	4.0	0.2	-0.8
s	NaN	0.1	0.6	0.7	1.9	2.2	1.2	1.5	2.2	1.6	1.8	1.5
N	0.0	57.0	279.0	98.0	126.0	87.0	107.0	77.0	87.0	150.0	122.0	251.0
djup 5m												
mv	NaN	-0.4	0.2	3.0	6.3	12.5	16.0	17.4	12.6	8.1	4.6	0.3
max	NaN	-0.3	2.2	5.4	10.7	16.6	19.0	20.6	16.8	11.2	7.4	3.6
min	NaN	-0.6	-0.4	2.1	3.4	8.6	13.2	15.3	7.9	4.0	0.3	-0.8
s	NaN	0.1	0.6	0.7	1.9	2.1	1.2	1.3	2.2	1.6	1.7	1.5
N	0.0	57.0	279.0	98.0	126.0	87.0	107.0	77.0	87.0	150.0	122.0	251.0
djup 7m												
mv	NaN	-0.4	0.2	3.0	6.1	12.1	15.6	16.9	12.6	8.1	4.6	0.3
max	NaN	-0.3	2.2	5.2	10.2	16.4	18.7	20.6	16.8	11.2	7.4	3.6
min	NaN	-0.5	-0.3	2.1	3.4	8.2	11.3	13.9	7.8	4.0	0.3	-0.8
s	NaN	0.1	0.6	0.7	1.8	2.1	1.3	1.3	2.2	1.6	1.7	1.5
N	0.0	57.0	279.0	98.0	126.0	87.0	107.0	77.0	87.0	150.0	122.0	251.0
djup 9m												
mv	0.9	0.0	0.3	2.9	5.8	11.6	15.1	16.2	12.5	8.1	4.6	0.7
max	2.6	2.0	2.3	5.1	10.0	16.3	17.4	19.2	16.8	11.2	7.4	4.4
min	-0.6	-0.6	-0.4	2.1	3.4	7.4	9.9	10.3	7.3	4.0	0.3	-0.8
s	1.1	0.8	0.6	0.7	1.6	2.2	1.5	1.6	2.2	1.6	1.8	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0

djup 11m												
mv	0.9	0.0	0.3	2.9	5.7	11.2	14.3	15.3	12.3	8.1	4.6	0.7
max	2.6	2.0	2.3	5.2	10.2	16.2	16.8	18.3	16.7	11.2	7.4	4.4
min	-0.6	-0.6	-0.4	2.1	3.4	7.0	9.2	9.6	6.4	4.0	0.3	-0.8
s	1.1	0.8	0.6	0.7	1.6	2.3	1.9	2.1	2.3	1.6	1.7	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0
djup 13m												
mv	0.9	0.0	0.3	2.8	5.5	10.6	13.5	14.4	12.1	8.0	4.6	0.7
max	2.6	2.0	2.2	5.1	9.9	16.0	16.8	18.2	16.7	11.2	7.4	4.4
min	-0.6	-0.6	-0.4	2.0	3.3	6.3	7.9	9.2	5.8	4.0	0.3	-0.8
s	1.1	0.8	0.6	0.7	1.5	2.3	2.2	2.6	2.3	1.6	1.8	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0
djup 15m												
mv	1.0	0.1	0.3	2.8	5.3	10.0	12.9	13.6	11.7	8.0	4.6	0.8
max	2.6	2.0	2.2	5.2	10.1	15.0	16.4	18.2	16.7	11.1	7.4	4.4
min	-0.6	-0.6	-0.3	1.9	3.2	5.9	7.2	8.8	5.4	4.0	0.3	-0.8
s	1.1	0.8	0.5	0.7	1.6	2.3	2.4	2.9	2.3	1.6	1.7	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0
djup 17m												
mv	1.0	0.1	0.4	2.7	5.0	9.2	12.4	12.8	11.3	8.0	4.6	0.8
max	2.6	2.0	2.1	4.9	9.8	14.2	15.8	18.2	16.7	11.1	7.4	4.4
min	-0.6	-0.6	-0.3	1.8	3.0	4.8	6.4	8.5	5.2	4.0	0.4	-0.7
s	1.1	0.8	0.5	0.6	1.5	2.5	2.5	2.8	2.5	1.5	1.7	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0
djup 19m												
mv	1.0	0.1	0.3	2.7	4.9	8.7	11.8	12.0	10.9	8.0	4.6	0.8
max	2.6	2.0	2.1	5.6	10.8	14.1	15.8	17.7	15.8	11.1	7.4	4.5
min	-0.5	-0.6	-0.3	1.6	2.9	4.1	5.9	8.3	5.0	4.0	0.3	-0.8
s	1.1	0.8	0.5	0.8	1.6	2.4	2.5	2.6	2.6	1.5	1.7	1.7
N	89.0	118.0	364.0	128.0	149.0	87.0	107.0	77.0	87.0	150.0	122.0	344.0
djup 25m												
mv	1.1	0.1	0.3	2.4	4.3	8.5	9.5	9.6	8.9	7.8	4.5	0.9
max	2.6	2.0	1.8	3.7	6.1	13.6	12.7	13.9	14.1	10.9	7.2	4.4
min	-0.5	-0.6	-0.3	1.5	3.1	6.3	8.0	7.4	4.7	4.0	0.2	-1.0
s	1.1	0.8	0.5	0.5	1.1	2.5	1.4	1.8	2.4	1.4	1.7	1.7
N	89.0	118.0	364.0	120.0	92.0	26.0	38.0	45.0	58.0	150.0	122.0	344.0

Tabell temperatur station forsmark S. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad	1	2	3	4	5	6	7	8	9	10	11	12
djup 1m												
mv	NaN	-0.2	0.1	1.9	8.4	13.6	15.4	16.1	13.9	7.6	3.3	0.4
max	NaN	-0.1	0.4	4.8	14.6	17.1	22.5	22.8	15.7	12.4	7.2	1.5
min	NaN	-0.3	-0.1	0.4	4.0	10.6	11.9	13.7	8.7	3.0	0.4	-0.3
s	NaN	0.0	0.1	0.7	2.4	1.6	2.2	1.2	1.7	1.8	2.2	0.4
N	0.0	96.0	155.0	154.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	131.0
djup 1.5m	0											
mv	NaN	-0.2	0.1	1.8	8.6	13.5	15.4	16.1	13.9	7.6	3.3	0.4
max	NaN	-0.1	0.3	4.7	11.3	17.0	22.4	22.7	15.6	12.4	7.2	1.5
min	NaN	-0.2	-0.1	0.4	5.7	10.5	11.8	13.7	8.7	2.9	0.4	-0.3
s	NaN	0.0	0.1	0.8	1.7	1.7	2.2	1.2	1.7	1.8	2.2	0.5
N	0.0	47.0	93.0	95.0	49.0	92.0	128.0	243.0	290.0	95.0	118.0	85.0
djup 2m												
mv	-0.2	-0.2	0.1	1.8	8.3	13.4	15.3	16.1	13.9	7.6	3.3	0.4
max	-0.0	-0.1	0.3	4.6	14.5	17.0	22.4	22.7	15.6	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	3.9	10.5	11.8	13.7	8.7	2.9	0.4	-0.3
s	0.1	0.0	0.1	0.7	2.3	1.6	2.2	1.1	1.7	1.8	2.2	0.4
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0
djup 2.5m	0											
mv	-0.2	-0.2	0.1	1.8	8.5	13.4	15.3	16.0	13.9	7.6	3.3	0.4
max	-0.1	-0.1	0.4	4.6	11.2	17.0	22.4	22.7	15.6	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	5.4	10.3	11.7	13.7	8.7	2.9	0.4	-0.3
s	0.1	0.0	0.1	0.7	1.7	1.7	2.2	1.1	1.7	1.8	2.2	0.4
N	31.0	75.0	124.0	123.0	49.0	92.0	128.0	243.0	290.0	95.0	118.0	108.0
djup 3m												
mv	-0.2	-0.2	0.1	1.8	8.1	13.2	15.2	16.0	13.9	7.6	3.3	0.4
max	-0.1	-0.1	0.4	4.6	12.4	16.9	22.4	22.7	15.6	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	3.8	9.5	11.7	13.7	8.7	2.9	0.4	-0.3
s	0.1	0.0	0.1	0.7	2.2	1.6	2.2	1.1	1.7	1.8	2.2	0.4
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0

djup 3.5m												
mv	-0.2	-0.2	0.1	1.8	8.4	13.2	15.1	16.0	13.8	7.6	3.3	0.4
max	-0.1	-0.1	0.3	4.6	11.2	16.8	22.4	22.5	15.5	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	5.0	8.5	11.4	13.4	8.7	2.9	0.4	-0.3
s	0.1	0.0	0.1	0.8	1.7	1.7	2.2	1.1	1.7	1.8	2.2	0.4
N	31.0	75.0	124.0	123.0	49.0	92.0	128.0	243.0	290.0	95.0	118.0	108.0
djup 4m												
mv	-0.2	-0.2	0.1	1.7	7.9	12.8	14.9	15.9	13.8	7.6	3.3	0.4
max	-0.0	-0.1	0.4	4.6	11.2	16.7	22.2	22.3	15.5	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	3.8	7.4	11.2	13.1	8.6	3.0	0.4	-0.3
s	0.1	0.0	0.1	0.8	2.0	1.7	2.2	1.1	1.7	1.8	2.1	0.4
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0
djup 4.5m												
mv	-0.2	-0.2	0.1	1.7	8.3	12.6	14.8	15.8	13.8	7.6	3.3	0.4
max	-0.0	-0.1	0.4	4.6	11.2	16.2	21.3	21.3	15.5	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.3	4.8	6.8	10.6	12.7	8.7	3.0	0.4	-0.3
s	0.1	0.0	0.1	0.8	1.7	1.8	2.2	1.0	1.7	1.8	2.1	0.4
N	31.0	75.0	124.0	123.0	49.0	92.0	128.0	243.0	290.0	95.0	118.0	108.0
djup 5m												
mv	-0.2	-0.2	0.2	1.7	7.6	11.8	14.5	15.8	13.8	7.6	3.3	0.4
max	-0.0	-0.1	0.4	4.6	11.2	15.7	20.4	19.9	15.5	12.4	7.2	1.5
min	-0.3	-0.3	-0.1	0.4	3.7	6.5	10.3	12.6	8.7	3.0	0.4	-0.3
s	0.1	0.0	0.1	0.8	1.9	2.0	2.2	0.9	1.7	1.8	2.1	0.4
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0
djup 6m												
mv	-0.2	-0.2	0.3	1.6	7.3	11.0	14.2	15.7	13.8	7.6	3.3	0.5
max	-0.0	-0.1	0.7	4.5	11.2	15.0	18.8	18.6	15.5	12.4	7.2	1.6
min	-0.3	-0.3	-0.1	0.4	3.5	6.3	9.9	12.3	8.6	3.0	0.3	-0.2
s	0.1	0.0	0.2	0.7	1.8	2.1	2.1	0.8	1.7	1.8	2.1	0.5
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0
djup 7m												
mv	-0.2	-0.2	0.2	1.6	7.0	10.6	13.9	15.5	13.8	7.6	3.3	0.4
max	-0.0	-0.1	0.5	4.5	11.2	14.7	18.2	18.0	15.5	12.4	7.2	1.8
min	-0.3	-0.3	-0.1	0.3	3.0	6.2	9.6	12.2	8.7	3.0	0.3	-0.3
s	0.1	0.0	0.2	0.7	1.8	2.2	2.0	0.8	1.7	1.8	2.1	0.5
N	31.0	124.0	186.0	182.0	81.0	122.0	132.0	243.0	290.0	95.0	118.0	154.0

djup 7.5m												
mv	NaN	-0.2	0.2	1.6	6.0	9.7	10.6	NaN	NaN	NaN	NaN	0.4
max	NaN	-0.1	0.7	3.2	8.1	12.8	11.3	NaN	NaN	NaN	NaN	1.4
min	NaN	-0.3	-0.1	0.3	2.9	6.4	10.2	NaN	NaN	NaN	NaN	-0.3
s	NaN	0.0	0.2	0.7	1.4	1.8	0.4	NaN	NaN	NaN	NaN	0.4
N	0.0	196.0	248.0	236.0	128.0	120.0	16.0	0.0	0.0	0.0	0.0	184.0

Tabell alkalinitet station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	1.1	1.0	1.2	1.3	1.3	1.3	1.2	1.2	1.2	1.1	1.2	1.3
		max	=	1.1	1.0	1.3	1.4	1.4	1.3	1.2	1.4	1.3	1.2	1.3	1.3
		min	=	1.1	1.0	1.1	1.3	1.2	1.2	1.2	1.0	1.1	1.1	0.8	1.2
		s	=	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0
		N	=	1.0	1.0	2.0	3.0	12.0	8.0	2.0	5.0	3.0	3.0	16.0	5.0
djup=	5														
		mv	=	NaN	NaN	NaN	NaN	1.3	1.3	NaN	1.1	1.2	1.3	1.2	1.3
		max	=	NaN	NaN	NaN	NaN	1.4	1.3	NaN	1.2	1.2	1.3	1.4	1.3
		min	=	NaN	NaN	NaN	NaN	1.2	1.2	NaN	0.8	1.2	1.3	0.9	1.2
		s	=	NaN	NaN	NaN	NaN	0.1	0.1	NaN	0.2	0.0	0.0	0.1	0.0
		N	=	0.0	0.0	0.0	0.0	9.0	6.0	0.0	3.0	1.0	1.0	14.0	4.0
djup=	10														
		mv	=	NaN	NaN	1.3	NaN	1.3	1.3	1.3	1.2	1.3	1.3	1.2	1.3
		max	=	NaN	NaN	1.3	NaN	1.3	1.3	1.3	1.2	1.3	1.3	1.3	1.3
		min	=	NaN	NaN	1.3	NaN	1.2	1.2	1.3	1.1	1.2	1.3	1.0	1.2
		s	=	NaN	NaN	0.0	NaN	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0.0
		N	=	0.0	0.0	1.0	0.0	9.0	7.0	1.0	3.0	2.0	1.0	14.0	5.0
djup=	15														
		mv	=	NaN	NaN	NaN	NaN	1.3	1.3	NaN	1.2	1.2	1.2	1.2	1.3
		max	=	NaN	NaN	NaN	NaN	1.3	1.3	NaN	1.2	1.2	1.2	1.3	1.3
		min	=	NaN	NaN	NaN	NaN	1.2	1.2	NaN	1.2	1.2	1.2	0.9	1.2
		s	=	NaN	NaN	NaN	NaN	0.1	0.1	NaN	0.0	0.0	0.0	0.1	0.0
		N	=	0.0	0.0	0.0	0.0	9.0	6.0	0.0	2.0	1.0	1.0	14.0	5.0
djup=	20														
		mv	=	1.3	1.0	1.3	1.4	1.3	1.3	1.2	1.2	1.2	1.2	1.2	1.3
		max	=	1.3	1.0	1.3	1.6	1.4	1.3	1.3	1.3	1.3	1.2	1.4	1.3
		min	=	1.3	1.0	1.3	1.3	1.1	1.2	1.1	1.1	1.2	1.1	0.8	1.2
		s	=	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0
		N	=	1.0	1.0	2.0	3.0	13.0	9.0	3.0	6.0	3.0	3.0	17.0	5.0

Tabell klorofyll station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	NaN	NaN	NaN	NaN	5.8	4.1	NaN	NaN	2.2	2.0	1.2	1.1
		max	=	NaN	NaN	NaN	NaN	10.8	6.5	NaN	NaN	2.2	2.0	1.7	1.1
		min	=	NaN	NaN	NaN	NaN	2.8	1.4	NaN	NaN	2.2	2.0	0.9	1.1
		s	=	NaN	NaN	NaN	NaN	2.4	1.9	NaN	NaN	0.0	0.0	0.2	0.0
		N	=	0.0	0.0	0.0	0.0	11.0	5.0	0.0	0.0	1.0	1.0	12.0	1.0
djup=	5														
		mv	=	NaN	NaN	NaN	NaN	5.6	4.2	NaN	NaN	2.3	2.2	1.2	1.1
		max	=	NaN	NaN	NaN	NaN	8.9	6.9	NaN	NaN	2.3	2.2	1.8	1.1
		min	=	NaN	NaN	NaN	NaN	3.7	1.8	NaN	NaN	2.3	2.2	0.8	1.1
		s	=	NaN	NaN	NaN	NaN	1.6	1.9	NaN	NaN	0.0	0.0	0.3	0.0
		N	=	0.0	0.0	0.0	0.0	10.0	5.0	0.0	0.0	1.0	1.0	12.0	1.0
djup=	10														
		mv	=	NaN	NaN	NaN	NaN	5.6	4.3	NaN	NaN	2.3	1.9	1.2	1.1
		max	=	NaN	NaN	NaN	NaN	9.0	7.2	NaN	NaN	2.3	1.9	1.4	1.1
		min	=	NaN	NaN	NaN	NaN	3.1	1.8	NaN	NaN	2.3	1.9	0.9	1.1
		s	=	NaN	NaN	NaN	NaN	1.8	2.1	NaN	NaN	0.0	0.0	0.1	0.0
		N	=	0.0	0.0	0.0	0.0	11.0	5.0	0.0	0.0	1.0	1.0	13.0	1.0
djup=	15														
		mv	=	NaN	NaN	NaN	NaN	5.0	3.5	NaN	NaN	2.3	1.6	1.1	1.1
		max	=	NaN	NaN	NaN	NaN	7.8	5.2	NaN	NaN	2.3	1.6	1.4	1.1
		min	=	NaN	NaN	NaN	NaN	2.6	1.8	NaN	NaN	2.3	1.6	0.8	1.1
		s	=	NaN	NaN	NaN	NaN	1.4	1.4	NaN	NaN	0.0	0.0	0.2	0.0
		N	=	0.0	0.0	0.0	0.0	10.0	5.0	0.0	0.0	1.0	1.0	13.0	1.0
djup=	20														
		mv	=	NaN	NaN	NaN	NaN	5.3	3.3	NaN	NaN	1.2	1.9	1.2	1.1
		max	=	NaN	NaN	NaN	NaN	8.7	4.9	NaN	NaN	1.2	1.9	1.3	1.1
		min	=	NaN	NaN	NaN	NaN	2.3	1.8	NaN	NaN	1.2	1.9	0.8	1.1
		s	=	NaN	NaN	NaN	NaN	1.8	1.1	NaN	NaN	0.0	0.0	0.2	0.0
		N	=	0.0	0.0	0.0	0.0	11.0	5.0	0.0	0.0	1.0	1.0	13.0	1.0

Tabell NH4 station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	0.2	0.2	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.3	0.3	0.2
		max	=	0.3	0.2	0.3	0.3	0.5	1.2	0.3	1.0	0.4	0.5	1.5	0.3
		min	=	0.1	0.2	0.1	0.1	0.1	0.1	0.3	0.0	0.1	0.1	0.1	0.1
		s	=	0.1	0.0	0.1	0.1	0.1	0.3	0.0	0.3	0.1	0.1	0.3	0.1
		N	=	6.0	2.0	11.0	6.0	18.0	14.0	2.0	17.0	8.0	5.0	21.0	6.0
djup=	5														
		mv	=	NaN	0.1	0.1	NaN	0.2	0.4	0.1	0.3	0.2	0.6	0.4	0.2
		max	=	NaN	0.1	0.2	NaN	0.4	0.8	0.1	1.0	0.2	0.6	2.8	0.3
		min	=	NaN	0.1	0.1	NaN	0.1	0.2	0.1	0.0	0.2	0.6	0.1	0.1
		s	=	NaN	0.0	0.1	NaN	0.1	0.2	0.0	0.4	0.0	0.0	0.7	0.1
		N	=	0.0	1.0	6.0	0.0	10.0	6.0	1.0	10.0	3.0	1.0	14.0	5.0
djup=	10														
		mv	=	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.3	0.2
		max	=	0.3	0.3	0.4	0.5	0.6	1.0	0.3	3.4	0.2	0.3	0.9	0.4
		min	=	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1
		s	=	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.8	0.1	0.1	0.2	0.1
		N	=	6.0	2.0	11.0	6.0	18.0	14.0	3.0	18.0	8.0	5.0	22.0	7.0
djup=	15														
		mv	=	NaN	0.1	0.1	NaN	0.3	0.3	0.1	0.3	0.2	0.3	0.4	0.1
		max	=	NaN	0.1	0.2	NaN	0.6	0.6	0.1	1.0	0.3	0.3	2.4	0.3
		min	=	NaN	0.1	0.1	NaN	0.1	0.2	0.1	0.0	0.1	0.3	0.1	0.1
		s	=	NaN	0.0	0.1	NaN	0.1	0.1	0.0	0.4	0.1	0.0	0.6	0.1
		N	=	0.0	1.0	6.0	0.0	10.0	6.0	1.0	10.0	3.0	1.0	14.0	5.0
djup=	20														
		mv	=	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.2
		max	=	0.3	0.2	0.3	0.5	0.4	1.2	0.4	1.7	0.4	0.5	0.8	0.2
		min	=	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.0	0.1	0.3	0.1	0.1
		s	=	0.1	0.0	0.1	0.1	0.1	0.3	0.1	0.4	0.1	0.1	0.2	0.1
		N	=	6.0	2.0	11.0	6.0	19.0	14.0	3.0	18.0	8.0	4.0	22.0	7.0

Tabell no23 station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	3.6	4.5	4.3	3.3	0.4	0.2	0.1	0.1	0.2	0.8	1.8	2.6
		max	=	4.8	4.5	5.1	4.8	1.9	0.3	0.1	0.2	0.5	1.5	3.1	3.8
		min	=	1.5	4.5	3.0	1.4	0.1	0.1	0.1	0.1	0.1	0.1	0.9	1.9
		s	=	1.2	0.0	0.6	1.1	0.5	0.1	0.0	0.0	0.1	0.6	0.5	0.6
		N	=	6.0	2.0	12.0	6.0	19.0	14.0	2.0	17.0	8.0	5.0	23.0	8.0
djup=	5														
		mv	=	NaN	4.4	4.1	NaN	0.1	0.2	0.1	0.1	0.1	1.4	1.7	2.4
		max	=	NaN	4.4	4.8	NaN	0.2	0.3	0.1	0.2	0.2	1.4	2.6	2.9
		min	=	NaN	4.4	3.1	NaN	0.1	0.1	0.1	0.1	0.1	1.4	0.9	2.0
		s	=	NaN	0.0	0.5	NaN	0.0	0.1	0.0	0.0	0.0	0.0	0.5	0.3
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	6.0
djup=	10														
		mv	=	3.7	4.6	4.2	3.3	0.5	0.1	0.1	0.1	0.1	0.8	1.8	2.6
		max	=	4.8	4.6	5.1	4.8	2.9	0.3	0.1	0.4	0.2	1.5	3.0	3.6
		min	=	1.5	4.5	3.1	1.5	0.1	0.1	0.1	0.1	0.1	0.1	0.9	1.9
		s	=	1.2	0.1	0.5	1.1	0.8	0.1	0.0	0.1	0.0	0.6	0.6	0.5
		N	=	6.0	3.0	12.0	6.0	21.0	14.0	3.0	19.0	8.0	5.0	24.0	8.0
djup=	15														
		mv	=	NaN	4.5	4.1	NaN	0.1	0.1	0.1	0.2	0.1	1.5	1.8	2.4
		max	=	NaN	4.5	4.8	NaN	0.1	0.1	0.1	0.4	0.2	1.5	2.7	2.8
		min	=	NaN	4.5	3.1	NaN	0.1	0.1	0.1	0.1	0.1	1.5	0.9	2.0
		s	=	NaN	0.0	0.5	NaN	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.3
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	6.0
djup=	20														
		mv	=	3.7	4.5	4.2	3.4	0.5	0.1	0.1	0.2	0.1	1.0	1.8	2.6
		max	=	4.9	4.5	5.0	4.8	2.9	0.3	0.1	0.8	0.2	1.4	3.3	3.6
		min	=	1.5	4.5	3.1	2.0	0.1	0.1	0.1	0.1	0.1	0.4	0.9	2.0
		s	=	1.2	0.0	0.5	0.9	0.8	0.1	0.0	0.2	0.0	0.4	0.6	0.5
		N	=	6.0	3.0	12.0	6.0	21.0	15.0	3.0	19.0	8.0	4.0	24.0	8.0

Tabell o2 station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	9.4	9.4	9.5	NaN	10.2	9.9	7.5	6.9	7.0	7.2	8.2	8.5
		max	=	10.2	9.4	10.5	NaN	10.7	10.4	7.5	7.9	7.3	7.2	8.6	9.0
		min	=	8.7	9.4	8.9	NaN	9.7	9.3	7.5	6.4	6.7	7.2	7.7	8.3
		s	=	1.1	0.0	0.6	NaN	0.3	0.3	0.0	0.6	0.4	0.0	0.3	0.2
		N	=	2.0	1.0	8.0	0.0	14.0	8.0	1.0	8.0	2.0	1.0	18.0	8.0
djup=	5														
		mv	=	NaN	9.4	9.7	NaN	10.3	9.9	7.2	6.8	6.7	7.8	8.3	8.5
		max	=	NaN	9.4	10.5	NaN	10.8	10.2	7.2	7.7	6.7	7.8	8.6	9.0
		min	=	NaN	9.4	9.0	NaN	9.6	9.7	7.2	6.4	6.7	7.8	7.8	8.3
		s	=	NaN	0.0	0.7	NaN	0.3	0.2	0.0	0.4	0.0	0.0	0.2	0.2
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	10.0	1.0	1.0	16.0	6.0
djup=	10														
		mv	=	9.5	9.2	9.4	NaN	10.2	10.0	7.2	6.9	7.0	7.8	8.2	8.6
		max	=	10.3	9.5	10.5	NaN	10.8	10.4	7.2	8.4	7.3	7.8	9.3	9.0
		min	=	8.7	8.8	8.9	NaN	9.3	9.3	7.2	6.4	6.7	7.8	7.7	8.3
		s	=	1.1	0.5	0.6	NaN	0.4	0.4	0.0	0.7	0.4	0.0	0.4	0.2
		N	=	2.0	2.0	9.0	0.0	18.0	8.0	1.0	11.0	2.0	1.0	19.0	9.0
djup=	15														
		mv	=	NaN	9.4	9.6	NaN	10.2	10.0	7.2	7.1	6.7	7.9	8.3	8.5
		max	=	NaN	9.4	10.6	NaN	10.7	10.4	7.2	8.5	6.7	7.9	8.6	9.0
		min	=	NaN	9.4	9.1	NaN	9.8	9.6	7.2	6.3	6.7	7.9	7.8	8.3
		s	=	NaN	0.0	0.6	NaN	0.3	0.3	0.0	0.8	0.0	0.0	0.2	0.2
		N	=	0.0	1.0	7.0	0.0	9.0	6.0	1.0	10.0	1.0	1.0	17.0	6.0
djup=	20														
		mv	=	9.5	9.1	9.4	NaN	10.1	9.9	8.1	7.6	7.0	7.8	8.3	8.6
		max	=	10.3	9.5	10.6	NaN	10.9	10.5	8.2	8.9	7.3	7.8	9.3	9.0
		min	=	8.7	8.8	8.9	NaN	9.4	9.4	8.1	6.4	6.8	7.8	7.7	8.3
		s	=	1.1	0.5	0.6	NaN	0.4	0.4	0.0	1.0	0.4	0.0	0.4	0.2
		N	=	2.0	2.0	9.0	0.0	18.0	9.0	2.0	10.0	2.0	1.0	21.0	9.0

Tabell ph station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	8.0	7.8	7.9	7.9	8.3	8.3	8.5	8.3	8.2	7.9	8.0	8.0
		max	=	8.1	8.1	8.1	8.2	8.5	8.7	8.5	8.6	8.3	8.1	8.3	8.3
		min	=	8.0	7.5	7.5	7.5	8.0	7.3	8.5	8.0	7.8	7.5	7.7	7.8
		s	=	0.1	0.4	0.2	0.3	0.2	0.4	0.0	0.2	0.2	0.3	0.2	0.1
		N	=	4.0	2.0	6.0	5.0	10.0	10.0	2.0	14.0	6.0	4.0	21.0	7.0
djup=	5														
		mv	=	NaN	8.2	8.1	NaN	8.4	8.5	8.6	8.4	8.3	8.1	8.1	8.0
		max	=	NaN	8.2	8.1	NaN	8.5	8.7	8.6	8.6	8.3	8.1	8.3	8.1
		min	=	NaN	8.2	8.0	NaN	8.3	8.3	8.6	8.1	8.3	8.1	7.9	8.0
		s	=	NaN	0.0	0.1	NaN	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0
		N	=	0.0	1.0	2.0	0.0	7.0	6.0	1.0	11.0	3.0	1.0	16.0	5.0
djup=	10														
		mv	=	8.0	7.8	7.9	8.0	8.3	8.4	8.5	8.4	8.2	7.9	8.0	8.0
		max	=	8.1	8.1	8.1	8.2	8.5	8.7	8.6	8.6	8.3	8.1	8.3	8.2
		min	=	8.0	7.5	7.5	7.6	7.9	8.1	8.4	8.1	7.9	7.6	7.8	7.8
		s	=	0.1	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.2	0.1	0.1
		N	=	4.0	3.0	6.0	5.0	12.0	10.0	3.0	16.0	6.0	4.0	21.0	7.0
djup=	15														
		mv	=	NaN	8.1	8.1	NaN	8.4	8.5	8.6	8.4	8.3	8.1	8.1	8.0
		max	=	NaN	8.1	8.1	NaN	8.5	8.7	8.6	8.6	8.3	8.1	8.3	8.1
		min	=	NaN	8.1	8.1	NaN	8.3	8.3	8.6	8.2	8.3	8.1	7.8	8.0
		s	=	NaN	0.0	0.0	NaN	0.1	0.1	0.0	0.2	0.0	0.0	0.1	0.0
		N	=	0.0	1.0	2.0	0.0	7.0	6.0	1.0	11.0	3.0	1.0	16.0	5.0
djup=	20														
		mv	=	8.0	7.8	7.9	8.0	8.3	8.4	8.4	8.2	8.1	7.9	8.0	8.0
		max	=	8.1	8.1	8.1	8.2	8.5	8.7	8.5	8.6	8.3	8.1	8.3	8.0
		min	=	8.0	7.5	7.5	7.6	7.9	8.1	8.3	7.9	7.7	7.6	7.7	7.8
		s	=	0.1	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.2	0.1	0.1
		N	=	4.0	3.0	6.0	5.0	12.0	10.0	3.0	16.0	6.0	4.0	21.0	7.0

Tabell po4 station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.2
		max	=	0.3	0.3	0.4	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.3
		min	=	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		s	=	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1
		N	=	6.0	2.0	12.0	6.0	20.0	14.0	2.0	17.0	8.0	5.0	24.0	10.0
djup=	5														
		mv	=	NaN	0.2	0.2	NaN	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2
		max	=	NaN	0.2	0.3	NaN	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.2
		min	=	NaN	0.2	0.2	NaN	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1
		s	=	NaN	0.0	0.0	NaN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		N	=	0.0	1.0	7.0	0.0	9.0	6.0	1.0	11.0	3.0	1.0	17.0	6.0
djup=	10														
		mv	=	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2
		max	=	0.3	0.3	0.4	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.2	0.5
		min	=	0.1	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		s	=	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		N	=	6.0	3.0	12.0	6.0	26.0	14.0	3.0	19.0	8.0	5.0	26.0	11.0
djup=	15														
		mv	=	NaN	0.2	0.2	NaN	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2
		max	=	NaN	0.2	0.3	NaN	0.1	0.1	0.0	0.1	0.0	0.1	0.2	0.2
		min	=	NaN	0.2	0.1	NaN	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1
		s	=	NaN	0.0	0.0	NaN	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		N	=	0.0	1.0	7.0	0.0	9.0	6.0	1.0	11.0	3.0	1.0	17.0	6.0
djup=	20														
		mv	=	0.2	0.3	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.2
		max	=	0.3	0.3	0.5	0.3	0.2	0.1	0.0	0.1	0.1	0.1	0.2	0.3
		min	=	0.1	0.2	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		s	=	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
		N	=	6.0	3.0	12.0	5.0	22.0	13.0	3.0	19.0	8.0	4.0	25.0	8.0

Tabell salt station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	5.6	5.7	5.8	5.6	5.8	5.7	5.8	5.6	5.6	5.6	5.7	5.6
		max	=	6.0	5.8	6.1	6.1	6.2	6.1	5.8	6.0	5.7	6.0	6.2	5.9
		min	=	5.3	5.5	5.5	5.5	5.3	5.4	5.8	5.4	5.4	5.3	5.2	5.3
		s	=	0.3	0.2	0.2	0.2	0.3	0.2	0.0	0.2	0.1	0.2	0.2	0.2
		N	=	5.0	2.0	12.0	7.0	22.0	18.0	1.0	18.0	8.0	9.0	23.0	12.0
djup=	5														
		mv	=	5.9	5.8	5.8	6.0	5.9	5.8	5.8	5.7	5.7	5.7	5.8	5.5
		max	=	5.9	5.8	6.1	6.0	6.2	6.1	5.8	6.0	5.8	6.0	6.1	5.9
		min	=	5.9	5.8	5.7	6.0	5.7	5.6	5.8	5.4	5.7	5.5	5.3	5.3
		s	=	0.0	0.0	0.1	0.0	0.2	0.1	0.0	0.2	0.0	0.2	0.2	0.2
		N	=	1.0	1.0	8.0	1.0	13.0	13.0	2.0	13.0	5.0	6.0	17.0	8.0
djup=	10														
		mv	=	5.6	5.6	5.8	5.6	5.8	5.8	5.8	5.6	5.6	5.6	5.7	5.6
		max	=	5.9	5.9	6.0	6.0	6.2	6.2	5.8	6.0	5.8	6.0	6.1	6.1
		min	=	5.4	5.5	5.5	5.5	5.5	5.5	5.8	5.4	5.4	5.3	5.3	5.3
		s	=	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.2	0.1	0.2	0.2	0.3
		N	=	5.0	3.0	12.0	7.0	28.0	18.0	2.0	21.0	8.0	9.0	25.0	13.0
djup=	15														
		mv	=	5.9	5.9	5.8	6.0	5.9	5.9	5.8	5.7	5.7	5.7	5.8	5.5
		max	=	5.9	5.9	6.1	6.0	6.2	6.2	5.8	6.0	5.8	6.0	6.1	5.9
		min	=	5.9	5.9	5.7	6.0	5.7	5.6	5.8	5.4	5.7	5.5	5.3	5.3
		s	=	0.0	0.0	0.1	0.0	0.2	0.1	0.0	0.2	0.0	0.2	0.2	0.2
		N	=	1.0	1.0	8.0	1.0	13.0	12.0	2.0	13.0	5.0	6.0	18.0	8.0
djup=	20														
		mv	=	5.6	5.7	5.8	5.6	5.8	5.8	5.8	5.7	5.7	5.6	5.7	5.6
		max	=	5.9	5.9	6.0	6.0	6.2	6.2	5.8	6.1	5.9	6.0	6.1	6.0
		min	=	5.4	5.5	5.5	5.5	5.5	5.5	5.7	5.4	5.5	5.3	5.3	5.3
		s	=	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.3
		N	=	5.0	3.0	12.0	7.0	28.0	19.0	2.0	19.0	8.0	9.0	25.0	13.0

datum	siktd
1980-06-11	10
1980-11-03	15
1981-05-25	8
1981-11-13	9
1982-05-25	7.5
1982-11-12	8
1983-06-01	5.5
1983-11-10	7.5
1984-05-14	6
1984-10-29	7
1985-06-03	6
1985-11-11	9
1986-05-26	7
1986-11-03	9
1987-05-30	6
1988-06-01	6.5
1988-11-07	8
1989-05-29	7
1989-11-06	7
1990-05-21	4
1990-11-06	7
1991-05-28	7
1991-05-28	7.5
1991-06-13	8
1991-09-02	6
1991-11-12	7
1992-05-24	7
1992-11-16	8
1992-11-17	8.1
1993-06-07	7
1993-03-24	5
1993-05-06	7
1993-05-20	5
1993-06-17	6.6
1993-11-16	6.3
1994-05-07	8
1994-01-10	10
1994-04-12	8.1
1994-06-15	4.7
1994-08-08	4.5
1995-04-05	6.9
1996-11-11	9
1996-01-11	5.5
1996-06-06	6.5
1997-08-21	6.2
1998-03-25	5.5
1998-05-07	5.7
1998-08-05	6
1998-09-17	5
1999-04-14	5.5
1999-06-29	7.3
1999-08-24	6.7
1999-10-06	4

Tabell sio3 station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	16.5	20.1	18.4	17.1	8.3	5.3	3.0	5.6	5.5	7.2	10.3	11.6
		max	=	22.7	21.7	23.9	23.5	15.5	15.0	3.9	10.0	9.1	12.2	16.3	15.8
		min	=	12.6	18.5	11.9	13.9	3.6	1.9	2.0	0.3	3.2	4.0	4.5	6.5
		s	=	4.1	2.3	3.8	3.5	3.6	4.1	1.3	2.5	1.9	3.5	3.3	2.6
		N	=	6.0	2.0	12.0	6.0	21.0	14.0	2.0	17.0	8.0	4.0	23.0	8.0
djup=	5														
		mv	=	NaN	21.7	19.6	NaN	8.9	7.3	2.3	6.3	6.5	12.3	11.5	10.7
		max	=	NaN	21.7	23.9	NaN	14.7	14.5	2.3	9.4	9.1	12.3	16.4	12.5
		min	=	NaN	21.7	11.9	NaN	3.5	1.7	2.3	2.0	4.7	12.3	5.5	6.9
		s	=	NaN	0.0	4.6	NaN	3.7	5.5	0.0	2.2	2.3	0.0	2.9	2.0
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	6.0
djup=	10														
		mv	=	16.3	19.8	18.6	18.1	8.4	5.1	3.3	5.4	5.4	7.0	10.5	11.5
		max	=	22.7	22.0	24.2	29.3	15.6	14.5	3.9	10.0	9.1	12.2	16.7	15.5
		min	=	12.6	18.6	11.9	13.9	3.7	1.5	2.3	0.3	3.1	3.8	4.5	6.9
		s	=	3.9	1.9	4.0	5.7	3.6	3.9	0.9	2.6	1.8	3.6	3.4	2.4
		N	=	6.0	3.0	12.0	6.0	21.0	14.0	3.0	19.0	8.0	4.0	23.0	8.0
djup=	15														
		mv	=	NaN	22.0	19.8	NaN	8.8	7.1	2.3	6.5	6.5	12.1	11.4	10.7
		max	=	NaN	22.0	24.2	NaN	15.5	14.4	2.3	10.0	9.1	12.1	16.2	12.5
		min	=	NaN	22.0	11.9	NaN	3.8	1.6	2.3	2.0	4.9	12.1	5.0	7.1
		s	=	NaN	0.0	4.7	NaN	3.8	5.5	0.0	2.6	2.3	0.0	2.9	1.9
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	6.0
djup=	20														
		mv	=	16.2	19.8	18.6	14.9	8.3	5.0	2.5	5.7	5.7	7.2	10.6	11.6
		max	=	23.1	22.0	24.2	18.2	15.5	14.1	3.5	10.8	9.4	11.9	16.6	15.7
		min	=	12.8	18.7	11.9	9.7	3.6	1.4	1.9	1.9	3.1	3.8	4.4	7.2
		s	=	3.9	1.9	4.0	3.0	3.7	4.0	0.9	2.8	2.2	4.2	3.4	2.3
		N	=	6.0	3.0	12.0	6.0	21.0	14.0	3.0	19.0	8.0	3.0	23.0	8.0

Tabell temp station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	1.2	0.8	0.4	0.6	3.5	6.8	15.9	15.3	13.0	8.5	5.3	3.8
		max	=	2.3	1.3	1.3	1.3	10.1	11.9	18.8	18.8	16.4	13.7	7.6	5.7
		min	=	-0.4	0.3	-0.2	-0.8	1.5	2.2	13.8	10.7	10.0	6.3	4.1	2.6
		s	=	1.0	0.7	0.6	0.8	2.0	2.5	2.6	2.1	2.5	2.4	0.8	0.8
		N	=	5.0	2.0	10.0	7.0	23.0	20.0	3.0	19.0	9.0	10.0	25.0	12.0
djup=	5														
		mv	=	1.8	0.3	0.3	-0.2	4.1	5.9	16.5	15.1	12.1	8.2	5.4	4.2
		max	=	1.8	0.3	1.2	-0.2	9.4	11.4	18.8	18.4	16.2	11.3	7.6	5.7
		min	=	1.8	0.3	-0.2	-0.2	1.9	2.6	14.3	10.7	10.0	6.4	4.1	3.3
		s	=	0.0	0.0	0.6	0.0	2.1	2.6	3.2	2.3	2.7	1.9	0.9	0.7
		N	=	1.0	1.0	7.0	1.0	13.0	13.0	2.0	13.0	5.0	6.0	18.0	8.0
djup=	10														
		mv	=	1.3	1.2	0.4	0.7	3.0	5.5	13.8	15.1	12.9	8.7	5.2	3.8
		max	=	2.4	1.6	1.2	1.3	6.0	9.2	18.6	18.5	16.4	13.7	7.6	5.7
		min	=	-0.4	0.6	-0.2	-0.2	1.2	2.5	8.4	8.9	10.0	6.3	3.4	2.7
		s	=	1.0	0.5	0.6	0.6	1.4	2.0	4.2	2.5	2.5	2.4	0.9	0.8
		N	=	5.0	3.0	10.0	7.0	29.0	18.0	4.0	22.0	9.0	10.0	27.0	13.0
djup=	15														
		mv	=	1.8	0.7	0.3	-0.2	3.3	4.3	10.8	12.6	11.5	8.2	5.4	4.2
		max	=	1.8	0.7	1.2	-0.2	4.9	6.4	14.0	16.6	15.5	11.3	7.6	5.7
		min	=	1.8	0.7	-0.2	-0.2	1.6	2.5	7.6	3.1	8.8	6.4	4.1	3.3
		s	=	0.0	0.0	0.6	0.0	1.1	1.4	4.5	3.9	2.8	1.9	0.9	0.7
		N	=	1.0	1.0	7.0	1.0	13.0	12.0	2.0	13.0	5.0	6.0	18.0	8.0
djup=	20														
		mv	=	1.4	1.3	0.4	0.7	2.7	4.5	8.2	9.4	10.7	8.6	5.3	3.9
		max	=	2.4	1.7	1.2	1.4	4.9	8.7	9.7	16.1	15.1	13.7	7.6	5.7
		min	=	-0.3	0.8	-0.2	-0.2	1.2	2.4	6.3	3.1	7.0	6.2	4.1	2.8
		s	=	1.0	0.5	0.6	0.6	1.1	1.6	1.7	4.2	2.4	2.4	0.8	0.8
		N	=	5.0	3.0	10.0	7.0	28.0	20.0	4.0	21.0	9.0	10.0	27.0	13.0

Tabell totn station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	17.2	18.2	19.3	18.0	17.6	17.8	15.3	17.8	16.5	15.3	16.2	18.4
		max	=	18.5	18.7	24.1	21.5	30.5	26.2	15.8	27.5	18.3	16.9	18.8	22.8
		min	=	14.6	17.7	15.6	15.7	13.8	13.3	14.8	14.5	14.1	14.1	13.0	13.0
		s	=	1.5	0.7	2.7	1.9	3.6	3.7	0.7	3.5	1.2	1.1	1.6	2.8
		N	=	6.0	2.0	12.0	6.0	21.0	14.0	2.0	16.0	8.0	5.0	23.0	10.0
djup=	5														
		mv	=	NaN	19.0	19.5	NaN	18.1	19.4	19.2	18.8	16.6	16.1	16.6	19.2
		max	=	NaN	19.0	23.7	NaN	35.5	27.5	19.2	23.4	17.9	16.1	18.5	22.0
		min	=	NaN	19.0	16.7	NaN	12.2	16.6	19.2	15.9	15.4	16.1	13.4	16.4
		s	=	NaN	0.0	2.2	NaN	6.5	4.1	0.0	2.6	1.3	0.0	1.6	2.0
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	6.0
djup=	10														
		mv	=	18.6	19.7	19.6	18.1	17.1	17.5	16.6	18.2	16.5	15.0	16.4	18.2
		max	=	28.9	19.8	23.6	21.0	28.1	23.7	19.0	25.7	17.4	16.1	22.9	22.7
		min	=	13.1	19.6	16.8	15.8	11.6	14.4	15.1	13.9	15.0	14.2	13.3	13.0
		s	=	5.4	0.1	2.5	1.7	3.5	2.6	2.1	3.0	0.9	0.8	2.1	2.8
		N	=	6.0	3.0	12.0	6.0	26.0	14.0	3.0	18.0	8.0	5.0	24.0	11.0
djup=	15														
		mv	=	NaN	20.8	19.8	NaN	16.4	18.6	20.3	18.4	21.8	15.1	16.4	18.2
		max	=	NaN	20.8	22.9	NaN	19.3	22.0	20.3	24.7	29.1	15.1	19.9	20.2
		min	=	NaN	20.8	15.8	NaN	11.6	16.4	20.3	14.3	17.5	15.1	13.6	16.1
		s	=	NaN	0.0	2.4	NaN	2.6	2.3	0.0	3.2	6.3	0.0	1.9	1.8
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	5.0
djup=	20														
		mv	=	18.9	19.6	19.8	18.0	16.6	16.9	15.4	16.9	16.6	14.8	16.2	18.5
		max	=	29.4	20.0	26.0	20.7	21.9	21.9	18.3	22.3	20.7	16.3	20.1	22.4
		min	=	13.5	18.8	15.6	16.1	10.4	13.2	13.8	13.3	13.5	14.0	12.6	15.5
		s	=	5.5	0.7	3.0	1.6	2.6	2.4	2.5	2.8	2.5	1.0	1.8	2.2
		N	=	6.0	3.0	12.0	6.0	23.0	14.0	3.0	18.0	8.0	4.0	23.0	8.0

Tabell totp station Forsmark Sr5. Medelvärde, månadsmax, månadsmin, standardavvikelse och antal observationer

månad				1	2	3	4	5	6	7	8	9	10	11	12
djup=	0.0														
		mv	=	0.4	0.5	0.5	0.4	0.5	0.4	0.2	0.4	0.3	0.3	0.3	0.3
		max	=	0.5	0.5	1.0	0.5	1.0	0.7	0.3	1.4	0.3	0.4	0.5	0.4
		min	=	0.3	0.4	0.4	0.3	0.2	0.1	0.2	0.1	0.2	0.2	0.2	0.2
		s	=	0.1	0.1	0.2	0.1	0.2	0.1	0.0	0.3	0.0	0.1	0.1	0.1
		N	=	6.0	2.0	12.0	6.0	21.0	14.0	2.0	16.0	8.0	5.0	23.0	10.0
djup=	5														
		mv	=	NaN	0.4	0.5	NaN	0.5	0.5	0.4	0.3	0.3	0.4	0.3	0.3
		max	=	NaN	0.4	0.6	NaN	1.4	0.9	0.4	0.6	0.4	0.4	0.5	0.4
		min	=	NaN	0.4	0.4	NaN	0.3	0.4	0.4	0.2	0.3	0.4	0.2	0.3
		s	=	NaN	0.0	0.1	NaN	0.3	0.2	0.0	0.1	0.1	0.0	0.1	0.1
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	15.0	6.0
djup=	10														
		mv	=	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.4
		max	=	0.5	0.6	0.6	0.7	1.0	0.7	0.5	0.6	0.4	0.3	0.5	0.6
		min	=	0.3	0.4	0.3	0.4	0.1	0.1	0.3	0.1	0.2	0.2	0.2	0.2
		s	=	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		N	=	6.0	3.0	12.0	6.0	26.0	14.0	3.0	18.0	8.0	5.0	23.0	11.0
djup=	15														
		mv	=	NaN	0.4	0.5	NaN	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
		max	=	NaN	0.4	0.5	NaN	0.6	0.5	0.4	0.5	0.4	0.3	0.5	0.3
		min	=	NaN	0.4	0.4	NaN	0.2	0.3	0.4	0.1	0.3	0.3	0.2	0.2
		s	=	NaN	0.0	0.0	NaN	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0
		N	=	0.0	1.0	7.0	0.0	10.0	6.0	1.0	11.0	3.0	1.0	16.0	5.0
djup=	20														
		mv	=	0.5	0.4	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		max	=	0.6	0.5	0.7	0.5	0.7	0.5	0.5	0.4	0.4	0.3	0.5	0.4
		min	=	0.3	0.4	0.4	0.4	0.3	0.1	0.2	0.1	0.2	0.2	0.2	0.2
		s	=	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
		N	=	6.0	3.0	12.0	6.0	23.0	14.0	3.0	18.0	8.0	4.0	23.0	8.0

Meteorological Observations at the Nuclear Power Plant in Forsmark

Measurements

At the nuclear power plant Forsmark there is a 100 m tall mast instrument for registration of wind (direction and speed) and temperature at several levels. Measurements started in 1975 and are still going on. Registrations on paper are kept in the archives at Forsmark. Until February 1998 data were collected by SMHI but have never been included in any easily accessed database. However, data was stored on magnetic tapes and data for the period 1992 - 1997 have been retrieved.

About 2 km further to the East from Forsmark at the so called ”Biotest-lake” (biological monitoring) on a small island there is another site for wind measurements at a level of 10 m above ground and temperature at 2 m. The measurements at the Biotest-lake are performed by SMHI on behalf of The Swedish National Board of Fisheries (Fiskeriverket). Data have been collected in digital form since about 1982, but are now available from 1992-1999 only. The collection of wind and air temperature from this site will probably cease in 2002. The temperature measured there has however an influence by the warm cooling-water from the power plant and not representative of the climate in the area.

Table App4-1a Meteorological parameters measured in the 100-m mast in Forsmark

Parameter	Level	Average time
Wind direction	100 m	10-min
Wind speed	100 m	10-min
Wind direction	100 m and 25 m	2-min
Wind speed	100 m and 25 m	2-min
Temperature	12 m and 2 m	10-min
Temperature difference	100 - 2 m 50 - 2 m 25 - 2 m	

Table App4-1b Meteorological parameters measured at ”Biotest Lake”

Parameter	Level	Average time
Wind direction	10 m	10-min
Wind speed	10 m	10-min
Temperature	2 m	10-min

Temperature

The temperature measured at 2 m in Forsmark has been evaluated. Monthly averages for the period 1992 - 1994 and 1997 are shown in table App4-2 together with corresponding data from Risinge and Örskär. Data are mainly in good agreement with temperature measured in Risinge some km inland. However, most of the years 1995-1996 temperature measured in Forsmark are unreasonably low and have been excluded. In general, it is a little warmer in

Forsmark than in Risinge in the winter and a little cooler in the summer. Temperature in Forsmark reveals more coastal influence than Risinge but less than Örskär.

Table App4-2 Monthly mean temperature in Forsmark, Risinge and Örskär

Year	Month	Forsmark	Risinge	Örskär
1992	Jan	0.8	-0.6	0.9
1992	Feb	-0.2	-1.2	0.1
1992	Mar	1.5	2.0	2.0
1992	Apr	1.5	2.2	2.0
1992	May	11.4	12.7	10.9
1992	Jun	15.0	16.2	15.5
1992	Jul	15.4	16.1	16.0
1992	Aug	14.5	15.1	15.2
1992	Sep	10.7	10.5	11.8
1992	Oct	3.1	2.2	4.6
1992	Nov	1.0	1.0	2.4
1992	Dec	0.7	-0.1	1.8
1993	Jan	-0.4	-0.8	0.5
1993	Feb	-0.5	-1.0	-0.1
1993	Mar	0.7	0.7	1.1
1993	Apr	4.1	5.0	4.5
1993	May	10.5	11.8	10.2
1993	Jun		11.3	10.7
1993	Jul	14.8	16.0	15.6
1993	Aug	12.6	13.4	14.0
1993	Sep	8.3	7.4	9.5
1993	Oct	4.9	4.1	6.3
1993	Nov	0.1	-0.7	1.1
1993	Dec	-1.1	-1.5	-0.1
1994	Jan	-3.2	-3.5	-1.7
1994	Feb	-8.0	-8.9	-7.2
1994	Mar	-0.7	-1.0	-0.7
1994	Apr	5.3	6.1	5.0
1994	May	7.7	8.4	7.2
1994	Jun	12.8	13.1	12.5
1994	Jul	19.2	19.4	19.1
1994	Aug	16.0	15.6	16.7
1994	Sep	10.8	10.8	11.8
1994	Oct	5.4	4.9	6.8
1994	Nov	1.8	1.0	3.2
1994	Dec	1.1	0.4	2.3
1997	Jan	-1.1	-2.6	-0.7
1997	Feb	-0.4	-1.2	-0.3
1997	Mar	1.7	1.1	1.5
1997	Apr	3.2	2.8	2.3
1997	May	8.3	8.2	6.9
1997	Jun	15.3	15.2	13.7
1997	Jul	18.4	17.9	17.8
1997	Aug	18.8	19.1	19.6
1997	Sep	11.2	11.4	12.8
1997	Oct	4.5	3.6	5.8
1997	Nov	1.6	0.9	2.5
1997	Dec	-0.4	-1.0	0.0

Daily mean temperature has been calculated. The difference between daily mean temperature in Risinge and Forsmark is shown in Figure App4-1. A running mean over 60 days is also calculated and from this it is clearly seen that this difference has an annual variation as is mentioned above.

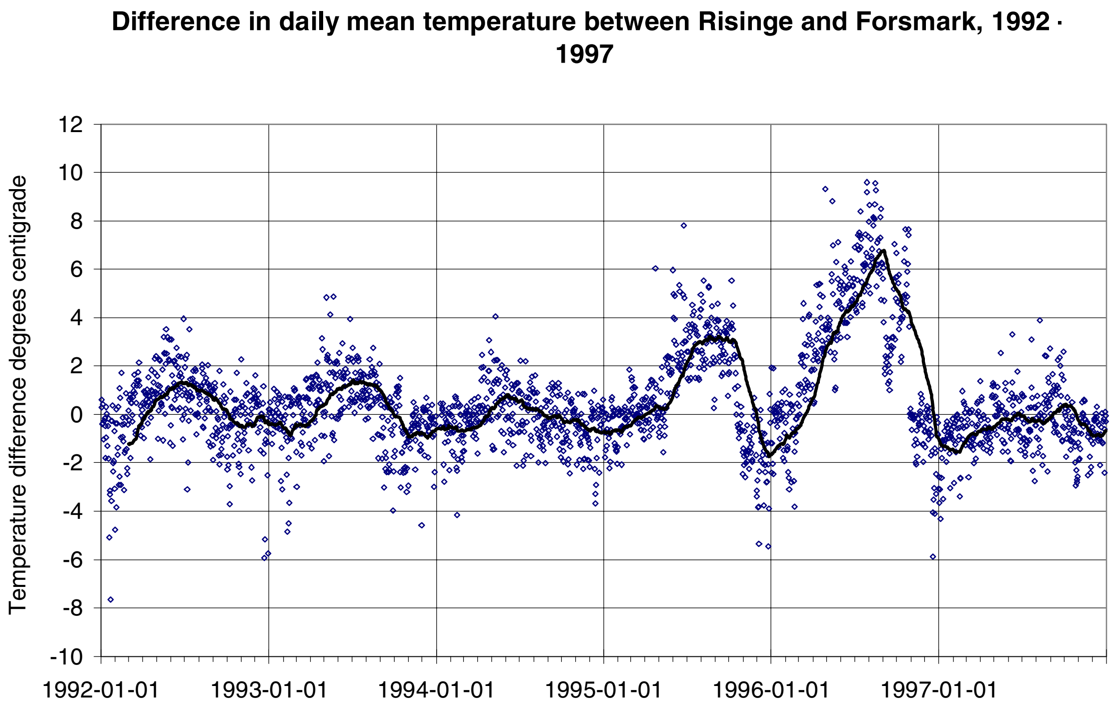

Figure App4-1 Difference between the daily mean temperature in Risinge and Forsmark (diamond) and running 60-day-mean (solid line) for the period 1992 - 1997. Temperature data from Forsmark is not reliable from spring 1995 till the end of 1996.

Wind

All data on wind speed and direction for the period 1992 - 1997 (25-m level) in Forsmark are used to calculate frequencies of simultaneous wind speed and direction, table App4-3 and figure App4-2. Corresponding data for Örskär are shown in table App4-4 and figure App4-3. The frequency distribution of wind directions is similar in Forsmark and at Örskär. The wind speed is lower in Forsmark than at Örskär specially for winds from SW - W where there is inland. The different height of the anemometers above the ground at the two sites is another reason for lower wind speeds in Forsmark.

Table App4-3 Frequencies (%) of simultaneous wind speed (m/s) and direction for the 25 m level in Forsmark, 1992–1997.

	Wind direction									
Wind speed	Calm	N	NE	E	SE	S	SW	W	NW	Total
22.5 - 24.4		0.00								0.00
20.5 - 22.4		0.00	0.00							0.00
18.5 - 20.4		0.00	0.00							0.00
16.5 - 18.4		0.00	0.00							0.00
14.5 - 16.4		0.10	0.00							0.10
12.5 - 14.4		0.20	0.10				0.00	0.00	0.00	0.30
10.5 - 12.4		0.40	0.30	0.00		0.00	0.00	0.00	0.00	0.80
8.5 - 10.4		1.00	0.70	0.00	0.00	0.10	0.40	0.10	0.30	2.50
6.5 - 8.4		2.00	1.10	0.20	0.20	0.90	2.10	0.50	1.10	8.10
4.5 - 6.4		3.60	1.80	1.20	1.00	3.30	6.40	2.50	2.20	21.80
2.5 - 4.4		3.80	3.10	3.70	3.70	9.50	11.60	5.50	2.80	43.70
0.5 - 2.4		1.40	2.10	3.60	3.00	4.00	3.40	2.20	1.90	21.50
< 0.5	1.10									1.10
Total	1.10	12.50	9.20	8.70	7.90	17.80	23.80	10.80	8.20	100.00

Table App4-4 Frequencies (%) of simultaneous wind speed and direction at Örskär (about 40 m a g), 1992 – 1997.

Wind speed	Calm	N	NE	E	SE	S	SW	W	NW	Total
24.5 -		0.01								0.01
22.5 - 24.4		0.05							0.00	0.05
20.5 - 22.4		0.08	0.02			0.00	0.01	0.02	0.00	0.15
18.5 - 20.4		0.18	0.05	0.00		0.01	0.10	0.05	0.10	0.48
16.5 - 18.4		0.24	0.12	0.03	0.00	0.02	0.19	0.10	0.24	0.94
14.5 - 16.4		0.61	0.39	0.04		0.08	0.53	0.28	0.48	2.42
12.5 - 14.4		1.43	0.62	0.12	0.02	0.35	1.20	0.88	0.71	5.33
10.5 - 12.4		2.16	0.83	0.37	0.19	1.18	2.45	1.78	1.14	10.12
8.5 - 10.4		2.36	1.08	0.64	0.60	2.35	3.31	2.58	1.38	14.30
6.5 - 8.4		2.62	1.39	1.42	2.08	4.10	3.69	2.48	1.42	19.22
4.5 - 6.4		2.39	1.76	2.54	3.32	5.11	3.03	2.33	1.40	21.87
2.5 - 4.4		2.33	1.62	2.32	2.37	3.11	1.97	1.74	1.21	16.68
0.5 - 2.4		1.07	0.94	1.01	0.73	1.21	0.86	0.87	0.58	7.66
< 0.4	1.23									0.78
Total	1.23	15.52	8.82	8.49	9.32	17.53	17.33	13.12	8.65	100.00

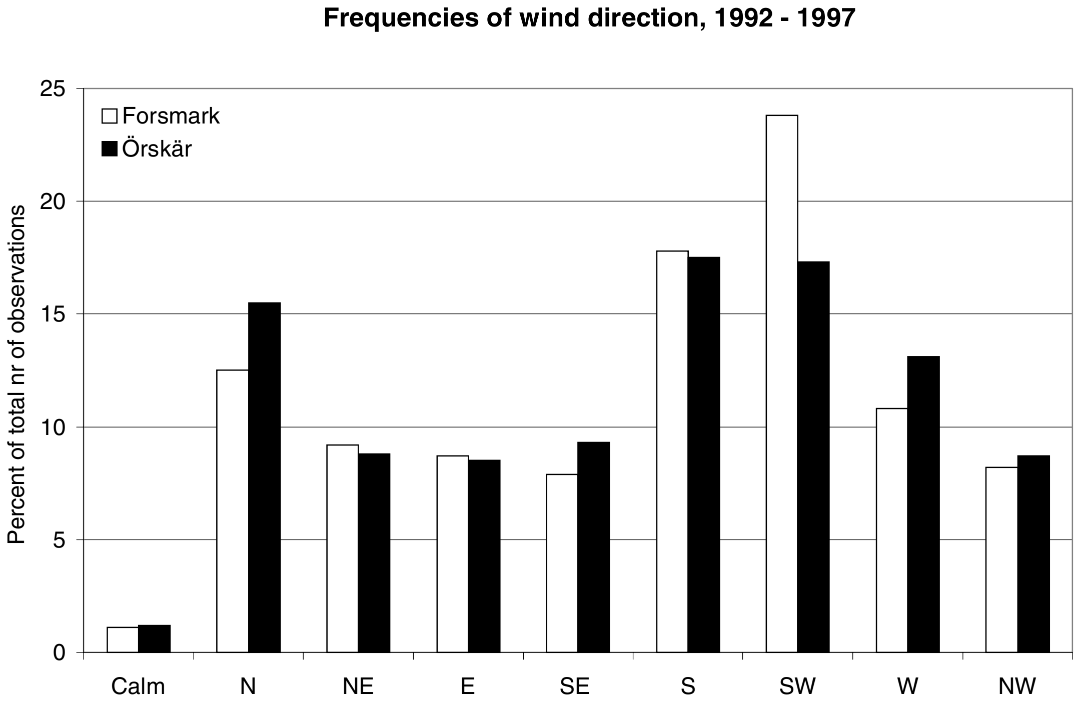

Figure App4-2 Relative frequencies of wind direction (45 degree sectors) in Forsmark and at Örskär for the period 1992 - 1997. Percentage of all observations.

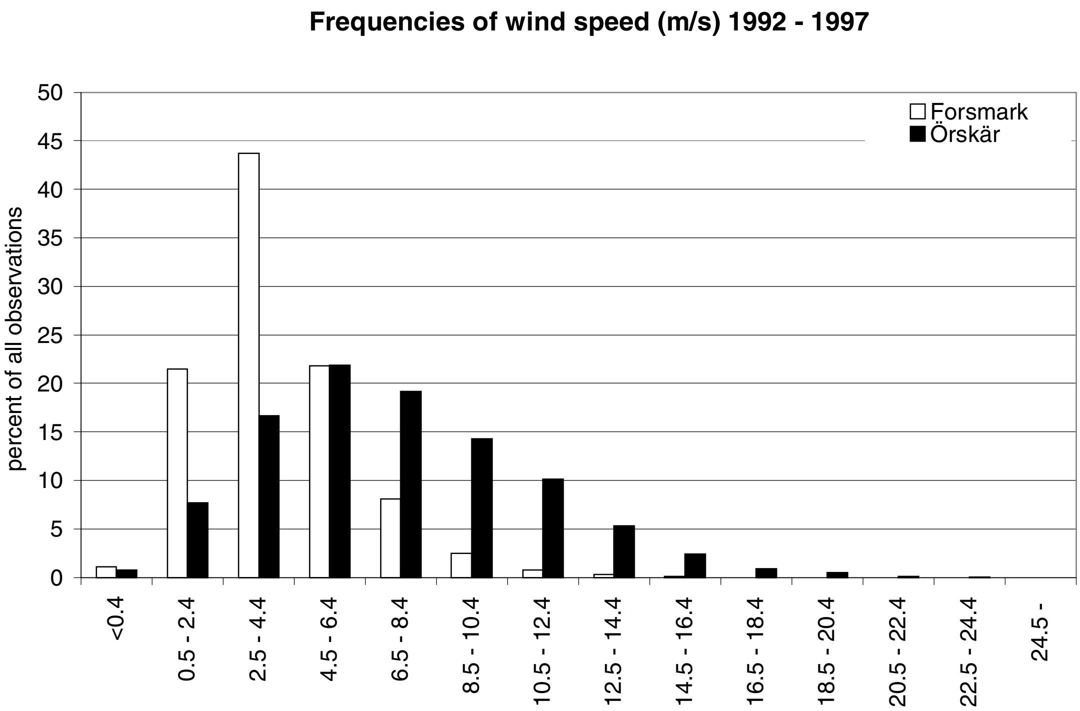

Figure App4-3 Relative frequencies of wind speed (intervals of 2 m/s) in Forsmark and at Örskär for the period 1992 - 1997. Percentage of all observations.