

Swedish National Seismic Network (SNSN)

A short report on recorded earthquakes during the first quarter of the year 2003

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Keywords: seismic network, earthquakes.

This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the author and do not necessarily coincide with those of the client.

A pdf version of this document can be downloaded from www.skb.se

Abstract

According to an agreement with Swedish Nuclear Fuel and Waste Management Company (SKB) and Uppsala University, the Department of Earth Sciences has continued to carry out observation and additional construction of new seismic stations within the Swedish National Seismic Network (SNSN). This report gives some information about the recorded seismicity during January through March 2003.

At present 38 stations are in operation and seven additional stations will be put into operation during May or June 2003. During the period January through March 2003, there were 68 located events whereof 1 with magnitude of 3.0, 1 with magnitude above 2.0 and additional 13 larger than 1.0. The range of the depth to the location to the center of the generated earthquakes varies between between 0.8 and 31.3 km.

The largest earthquake $ML=3.0$ occurred on February 25th between Svenljunga and Tranemo south of Borås. The second largest earthquake during this period occurred close to Delsbo west of Hudiksvall on January 4th with magnitude $ML=2.6$. The third largest earthquake was located close to Falköping with magnitude $ML=1.9$. These three earthquakes were felt by people.

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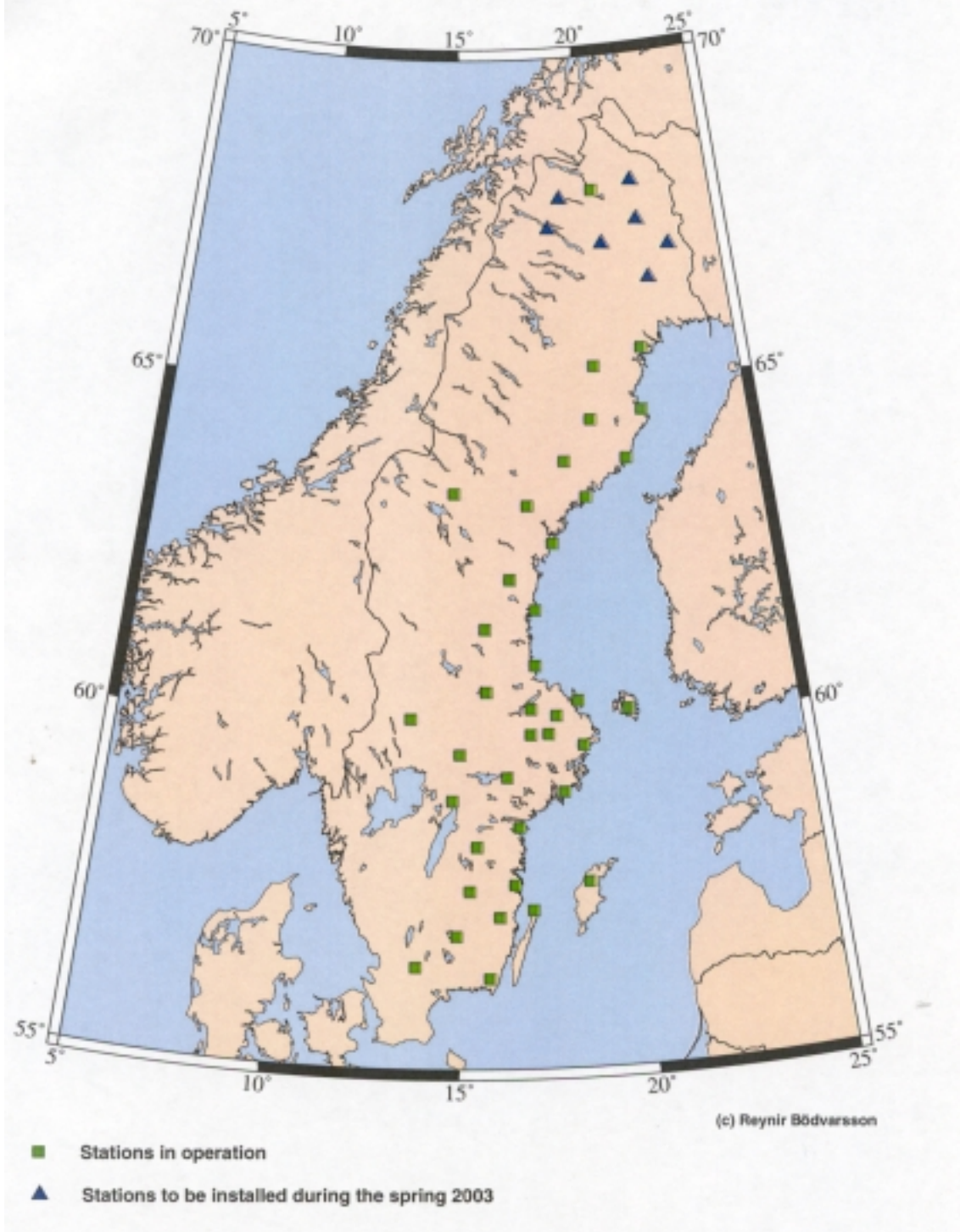
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1 Introduction

This is the first quarterly report on seismic events recorded by the Swedish National Seismic Network (SNSN) for the year 2003. At present 38 stations are in operation and seven additional stations will be put into operation during May or June 2003, Figure 1-1.

The report includes fundamental information about the seismic events, including origin time and hypocenter location. Information about the source parameters is not included in the present report but is delivered as a separate ASCII- text. This report is a preliminary report including only the automatic and the brief interactive analysis done on the routine bases at SNSN.

Swedish National Seismic Network Apr 2003



Figur 1-1. The present Swedish National Seismic Network (SNSN).

2 Objective and scope

According to an agreement with Swedish Nuclear Fuel and Waste Management Company (SKB) and Uppsala University, the Department of Earth Sciences continues to carry out observation and additional construction of new seismic stations within the Swedish National Seismic Network (SNSN).

The goal is to complement the existing regional seismic network to establish a local seismic network that also permits registration of small earthquakes in order to obtain relatively long time series and thereby gain a better understanding of the causes of seismic events in the site investigation areas.

Fundamental information about the seismic events, including origin time, hypocenter location and information about the source parameters will be given after every three month period.

Expected results are to obtain information on location, magnitude and source parameters of small earthquakes down to a magnitude of 0,0 near the investigation sites.

3 Recorded earthquakes during the first quarter of 2003

Figure 3-1 shows earthquake activity in Sweden during January through March 2003. During this period there were more than 1.3 million detections resulting in 493 located events. Out of these 380 are explosions, 68 sure earthquakes and 45 are still uncertain but these are mainly outside the network.

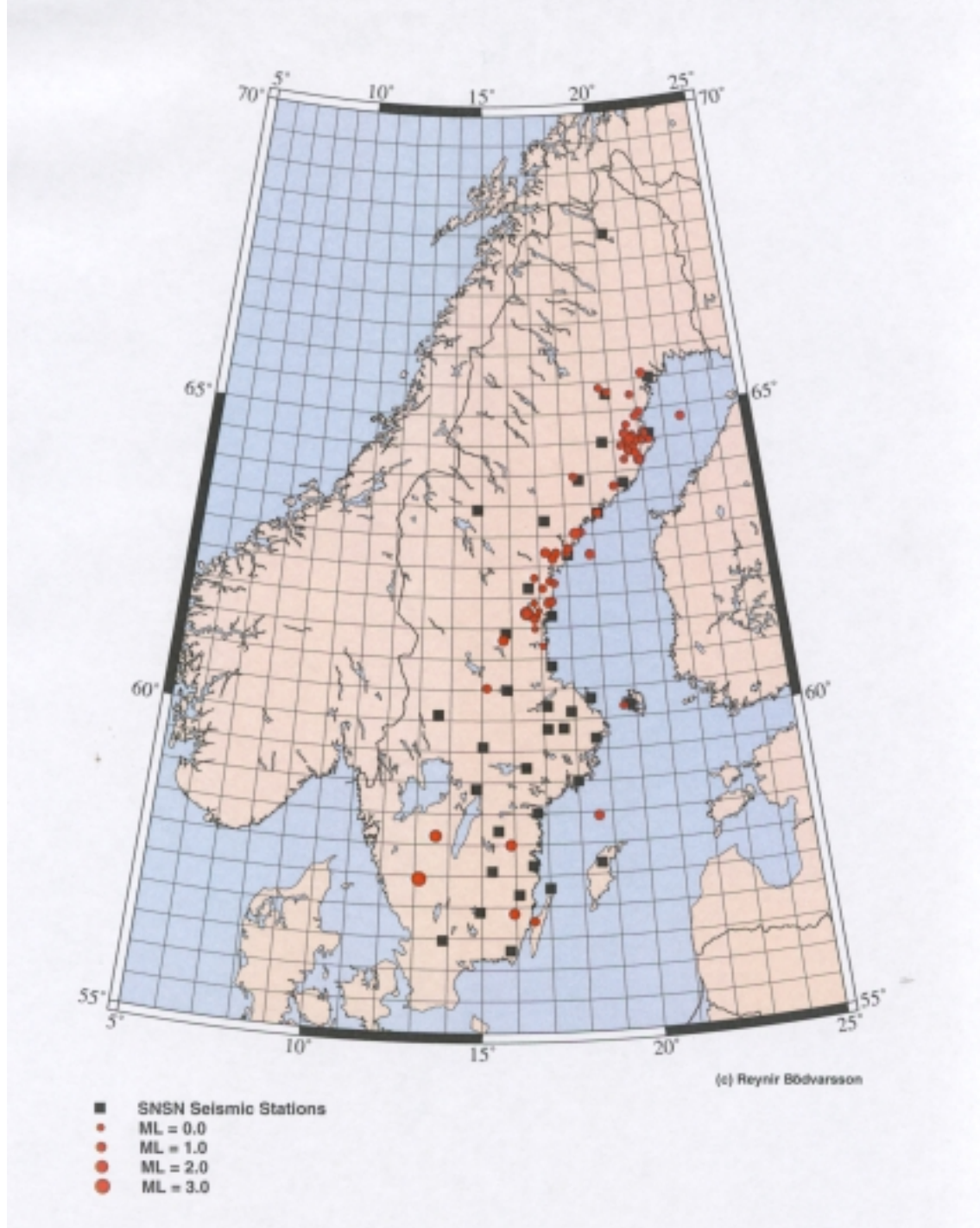
The largest earthquake of $ML=3.0$ occurred on February 25th between Svenljunga and Tranemo south of Borås. The second largest earthquake during this period occurred close to Delsbo west of Hudiksvall on January 4th with a magnitude of $ML=2.6$. The third largest earthquake was located close to Falköping with a magnitude of $ML=1.9$. These three earthquakes were felt by people.

During the winter there have been many observations by the population in the south-east of Sweden, including Öland and Gotland which was thought to be earthquakes. Several of these observations were investigated and we could exclude that this was due to earthquakes. We found two main explanations:

- a) In the Stockholm area this was due to large temperature variations that made the ice strike in some kind of ice-quakes.
- b) In the area around Öland and Oskarshamn we could explain that these events were coming from above through the air and not from the earth crust. Later the explanation was found to be tests of the air plain Jas 39 Gripen and this has been confirmed by the Saab company.

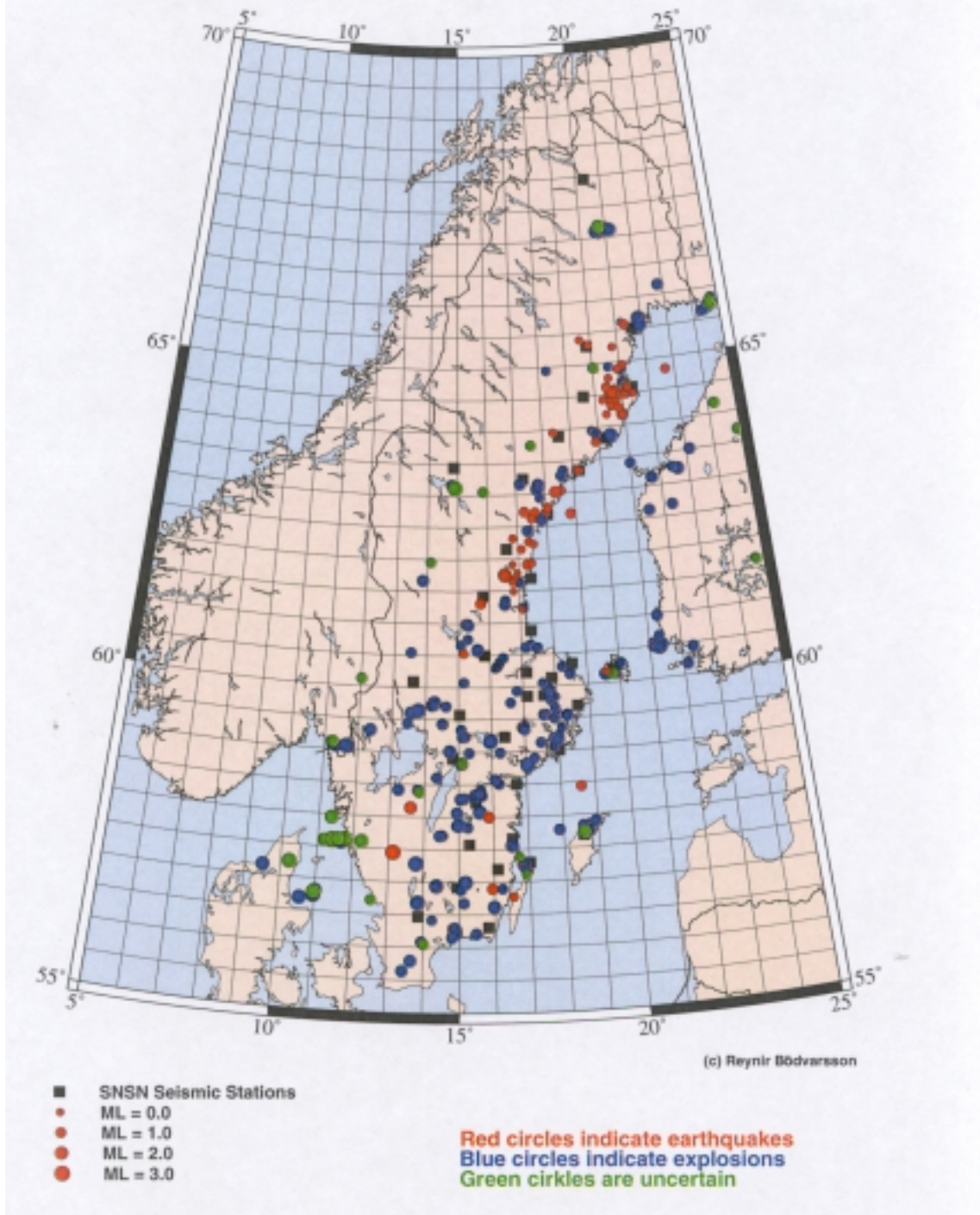
The event lists for January until March 2003 are given in sections 3.1 through 3.3. Events including explosions during the period are shown on Figure 3-2.

SNSN recorded earthquakes January through March 2003



Figur 3-1. Recorded events in the SNSN network during the period January to March 2003.

SNSN recorded events January through March 2003



Figur 3-2. Recorded events including explosions in the SNSN network during the period January to March 2003.

3.1 January

Event list for January is given in Table 3-1 with date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In January 17 events were located whereof 1 with magnitude above 2.0 and additional 4 larger than 1.0. The depth range varies between 5.1 and 31.3 km.

Table 3-1. Date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML) of recorded earthquakes in January.

Date	Time	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth Km	ML Local Magnitude
20030102	051653.4	62.715	17.629	6957.2	1593.1	17.1	0.9
20030103	041534.6	61.205	17.067	6788.3	1567.7	20.8	-0.1
20030103	110639.5	62.257	17.366	6905.9	1580.9	12.1	0.4
20030103	195807.3	61.779	16.957	6852.1	1560.6	5.1	-0.3
20030104	003545.9	61.701	16.876	6843.3	1556.5	6.9	-0.3
20030104	174759.0	61.745	16.540	6848.1	1538.7	10.9	2.6
20030105	063155.1	64.811	22.670	7207.2	1825.4	13.9	0.7
20030107	031541.8	62.618	17.501	6946.2	1586.9	22.3	0.7
20030109	162301.3	63.041	18.554	6995.2	1638.9	13.5	0.6
20030109	214636.5	61.748	16.541	6848.3	1538.7	6.8	1.0
20030112	104125.6	62.219	17.520	6901.7	1589.1	7.4	0.2
20030114	222323.4	61.905	17.304	6866.5	1578.6	13.4	1.2
20030115	214736.4	62.145	17.105	6893.0	1567.6	25.2	0.4
20030118	112810.2	58.436	18.587	6482.5	1662.3	5.8	1.0
20030123	113559.4	60.529	15.169	6712.4	1464.9	31.3	0.7
20030125	032622.8	60.175	19.598	6678.9	1710.2	18.7	0.3
20030130	080525.3	62.728	17.259	6958.2	1574.2	18.7	1.1

3.2 February

Event list for February is given in Table 3-2 with date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In February 22 events were located whereof 1 with magnitude of 3.0 and additional 4 larger than 1.0. The depth range varies between 0.8 and 28.0 km.

Table 3-2. Date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML) of recorded earthquakes in February.

Date	Time	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth Km	ML Local Magnitude
20030201	045705.5	56.895	15.943	6307.5	1508.2	0.8	1.4
20030203	175247.2	61.639	16.799	6836.4	1552.5	23.8	0.4
20030205	112855.9	61.923	17.440	6868.7	1585.7	25.3	0.2
20030206	141043.9	64.167	20.924	7127.7	1748.6	28.0	1.6
20030206	142530.5	64.169	20.922	7127.9	1748.5	26.1	0.4
20030208	030021.3	57.996	15.876	6430.1	1504.0	5.6	1.5
20030208	074609.3	64.420	20.768	7155.3	1738.8	18.5	0.4
20030208	180122.1	65.243	20.805	7246.9	1733.4	16.1	0.3
20030209	142333.2	62.706	18.012	6956.8	1612.7	19.2	0.0
20030209	150651.2	62.315	16.835	6911.7	1553.2	27.4	0.2
20030211	083322.5	63.955	18.397	7096.7	1626.8	14.9	0.4
20030212	065803.6	61.306	15.729	6798.9	1495.7	6.4	1.2
20030214	053325.3	64.501	20.994	7165.2	1748.9	21.8	0.6
20030214	201959.5	64.299	20.559	7141.0	1729.8	18.5	0.0
20030217	051507.6	64.360	20.677	7148.3	1735.0	19.7	0.1
20030217	201817.3	64.482	21.358	7164.5	1766.6	23.5	0.3
20030218	204823.1	64.497	20.896	7164.3	1744.3	18.8	0.1
20030220	005016.2	63.762	19.883	7079.0	1701.0	16.9	0.5
20030222	072023.5	65.587	21.338	7287.3	1754.9	2.8	0.7
20030225	024601.8	64.467	21.124	7161.9	1755.5	19.4	-0.1
20030225	090937.5	57.446	13.136	6372.1	1339.6	5.9	3.0
20030228	174715.4	61.490	16.803	6819.8	1553.0	3.6	-0.2

3.3 March

Event list for March is given in Table 3-3 with date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In March 29 events were located whereof 5 with magnitude above or of 1.0. The depth range varies between 3.1 and 24.8 km.

Table 3-3. Date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML) of recorded earthquakes in March.

Date	Time	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth Km	ML Local Magnitude
20030301	084149.7	64.536	21.136	7169.6	1755.4	3.1	0.3
20030301	161646.0	64.605	21.181	7177.5	1756.9	15.6	0.7
20030301	162805.2	64.417	20.597	7154.3	1730.6	18.3	1.1
20030303	111259.0	64.329	20.534	7144.2	1728.3	5.2	0.1
20030303	230411.3	61.911	16.808	6866.7	1552.5	18.6	-0.2
20030304	190836.7	63.339	19.193	7030.0	1669.4	9.8	0.6
20030305	003019.7	64.406	20.738	7153.6	1737.5	18.0	0.1
20030306	090249.8	64.287	20.801	7140.6	1741.6	24.8	0.5
20030307	043060.0	64.186	20.365	7127.7	1721.3	19.6	0.2
20030307	135344.6	64.576	20.748	7172.5	1736.5	23.6	0.5
20030308	230826.9	64.517	20.520	7165.1	1726.1	19.7	0.7
20030309	094858.4	62.669	18.837	6954.4	1655.1	3.1	1.0
20030309	134908.0	64.949	21.094	7215.4	1749.6	3.1	0.6
20030311	082218.6	64.537	20.651	7167.8	1732.2	13.5	1.5
20030312	224149.3	64.487	20.877	7163.1	1743.5	18.5	-0.1
20030318	132713.8	64.617	20.439	7175.9	1721.4	8.6	0.8
20030318	142423.1	64.885	20.915	7207.5	1741.7	19.8	0.4
20030319	013636.0	56.769	16.530	6293.8	1544.1	4.3	0.7
20030319	052045.9	64.611	20.442	7175.4	1721.6	7.8	0.7
20030320	181946.5	64.415	20.272	7152.9	1715.0	3.1	0.2
20030327	000856.9	65.314	19.901	7251.7	1690.7	9.0	0.2
20030327	153602.3	64.514	20.604	7165.1	1730.1	17.8	0.5
20030327	200347.1	65.394	19.598	7259.8	1676.0	16.3	0.2
20030327	200715.4	58.140	13.604	6448.3	1370.2	4.5	1.9
20030328	205525.5	63.022	18.357	6992.6	1629.0	4.9	1.6
20030329	193155.7	62.785	18.058	6965.7	1614.8	17.8	0.5
20030329	224234.1	64.479	21.067	7163.0	1752.6	14.4	0.0
20030330	041828.4	64.755	20.549	7191.7	1725.5	20.6	0.2
20030331	172151.7	64.598	21.200	7176.8	1757.9	3.3	-0.0