

Swedish National Seismic Network (SNSN)

A short report on recorded earthquakes during the third 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 July through September 2003.

At present 40 stations are in operation and five additional stations will be put into operation during October or November 2003. During the period July through September 2003, there were 47 located events whereof 2 with magnitude above 2.0 and additional 10 above or of 1.0. The range of the hypocentral depth varies between 0.1 and 37.6 km.

The largest earthquake $M_L=2.4$ occurred on September 2, 8.7 km North-East of Sunne in Värmland. The second largest earthquake during this period occurred on August 22 in Kattegatt, 68 km West of Kullen.

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1 Introduction

This is the third quarterly report on seismic events recorded by the Swedish National Seismic Network (SNSN) for the year 2003. At present 40 stations are in operation and five additional stations will be put into operation during October or November 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.

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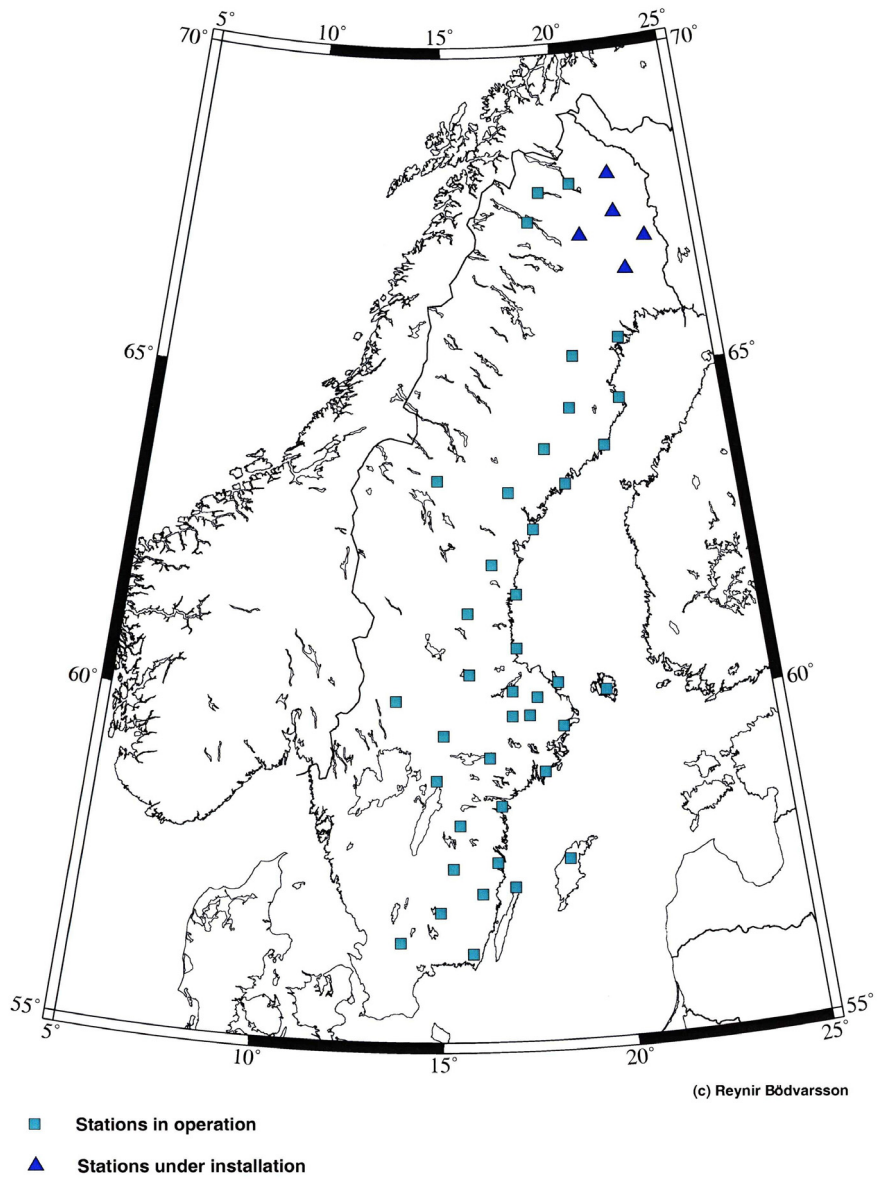


Figure 1-1. The present Swedish National Seismic Network (SNSN).

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 third quarter of 2003

Figure 3-1 shows earthquake activity in Sweden during July through September 2003. During this period there were 539 located events, Figure 3-2. Out of these 437 are explosions, 47 are true earthquakes and 55 are still uncertain but most of these are mainly outside the network.

The largest earthquake $ML=2.4$ occurred on September 2, 8.7 km North-East of Sunne in Värmland. The second largest earthquake during this period occurred on August 22 in Kattegatt 68 km West of Kullen.

Event lists for July through September 2003 are given in sections 3.1 to 3.3.

SNSN recorded earthquakes July through September 2003

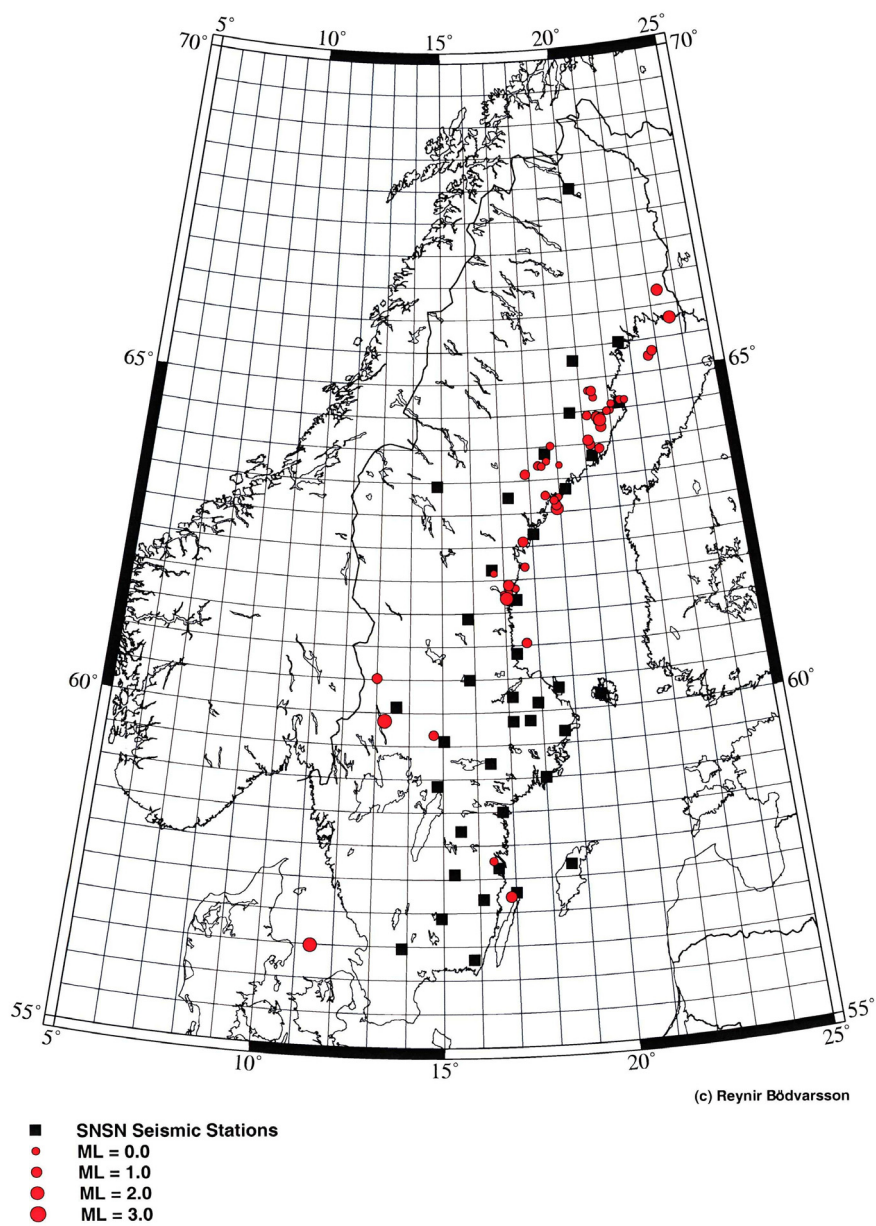


Figure 3-1. Earthquake activity in Sweden during July through September 2003.

SNSN recorded events July through September 2003

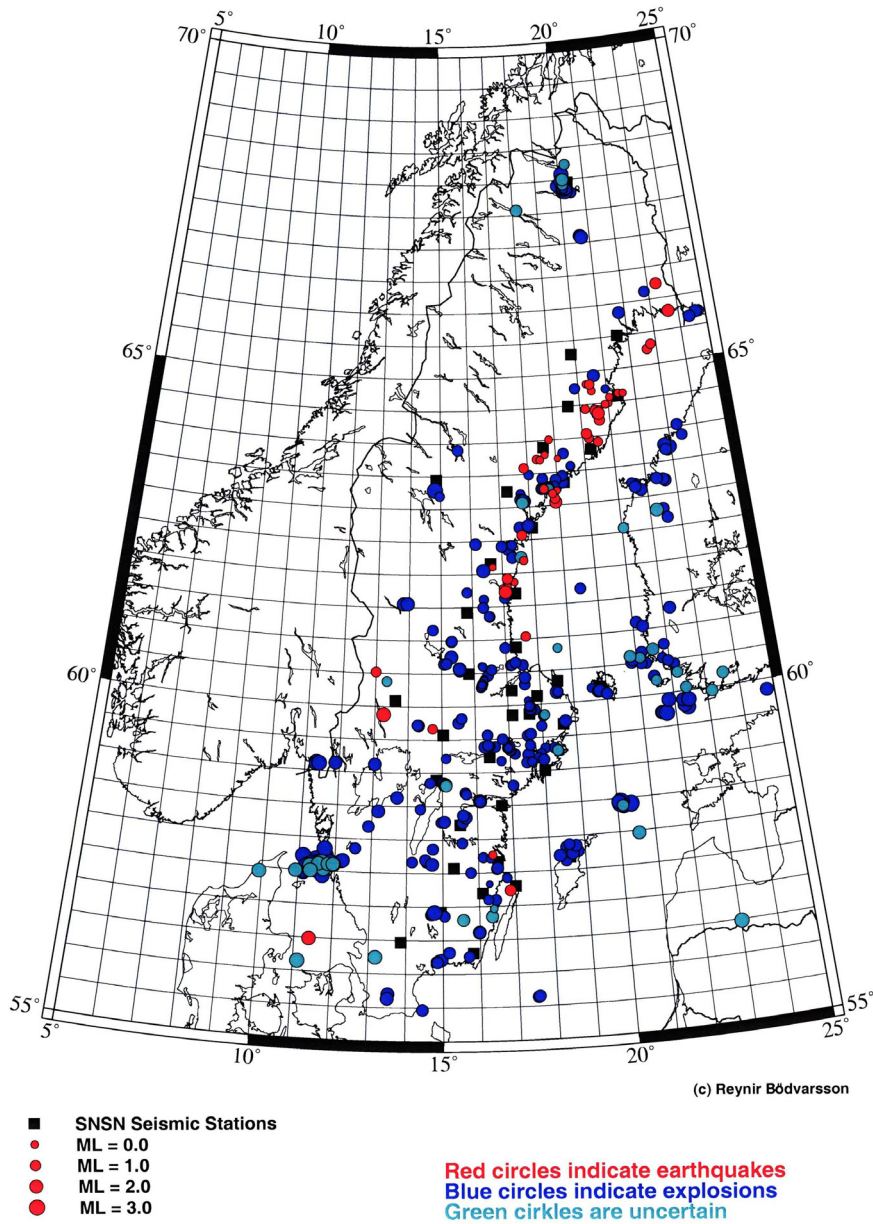


Figure 3-2. Recorded events including explosions in the SNSN network during the period July through September 2003.

3.1 July

Event list for July is given in Table 3-1 with date, time (UTC), latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In July 23 events were located whereof 3 with magnitude above 1.0. The depth range of the events varies between 5.0 to 31.7 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 km	Y RT90 km	Depth km	ML local magnitude
20030702	174522.9	64.393	20.534	7151.4	1727.8	10.9	1.2
20030704	130650.5	62.572	17.690	6941.3	1596.7	23.1	0.9
20030705	182804.5	59.668	14.729	6616.9	1439.2	8.3	0.7
20030705	204604.2	65.240	22.641	7254.7	1818.9	12.6	0.7
20030705	215332.0	63.046	18.889	6996.5	1655.8	5.3	1.7
20030706	194248.9	63.719	18.330	7070.3	1624.6	31.7	0.4
20030706	222731.0	64.328	20.532	7144.1	1728.2	19.0	0.1
20030707	083712.8	61.797	17.128	6854.3	1569.6	17.8	0.3
20030707	114017.5	64.009	18.805	7103.6	1646.5	6.0	0.0
20030708	064502.2	64.482	21.027	7163.1	1750.7	16.3	-0.3
20030709	035928.8	64.811	20.287	7197.0	1712.6	20.7	-0.2
20030710	155352.2	64.408	20.665	7153.5	1734.0	18.0	-0.2
20030711	011146.0	64.626	21.402	7180.7	1767.3	27.7	-0.0
20030711	015128.2	62.103	16.685	6888.0	1545.8	14.2	-0.3
20030712	021716.7	61.867	17.373	6862.3	1582.3	12.1	-0.2
20030713	151410.9	62.186	17.702	6898.4	1598.6	15.4	0.2
20030714	184548.0	64.476	20.895	7162.0	1744.4	19.0	0.1
20030715	003513.9	63.224	18.964	7016.6	1658.6	17.8	-0.3
20030716	144715.9	63.980	20.210	7104.3	1715.4	16.6	0.5
20030717	173338.1	61.778	16.988	6852.0	1562.2	16.3	-0.2
20030719	163617.7	57.766	16.404	6404.7	1535.4	19.0	0.3
20030727	203014.9	64.052	20.142	7112.1	1711.5	13.6	1.1
20030728	105537.2	63.100	18.874	7002.5	1654.8	5.0	0.8

3.2 August

Event list for August is given in Table 3-2 with date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In August only 10 events were located whereof one had a magnitude above 2 and 4 had a magnitude above 1.0. The largest event (ML=2.3) was located in Kattegatt 68 km West of Kullen. The depth range of the events varies between 4.0 and 37.6 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 km	Y RT90 km	Depth km	ML local magnitude
20030802	143910.5	63.711	19.061	7071.0	1660.7	10.4	-0.4
20030805	084954.1	66.227	23.319	7367.6	1837.3	4.0	1.4
20030810	180048.7	61.035	17.642	6770.1	1599.1	16.4	0.7
20030817	034538.0	64.701	20.462	7185.4	1721.8	16.6	0.0
20030817	231542.8	60.519	12.994	6714.5	1345.5	5.7	0.9
20030820	010202.4	64.581	21.071	7174.4	1751.9	8.0	-0.2
20030820	112307.1	64.244	20.641	7135.2	1734.2	18.4	1.1
20030822	034939.7	56.486	11.395	6270.8	1228.2	37.6	2.3
20030824	034231.0	61.719	17.066	6845.5	1566.5	10.4	1.9
20030825	223023.0	61.921	17.151	6868.2	1570.5	5.9	1.0

3.3 September

Event list for September is given in Table 3-3 with date, time, latitude, longitude, X (RT90), Y (RT90), depth and local magnitude (ML). In September only 14 earthquakes were located whereof one had a magnitude above 2 and additional 3 had a magnitude above 1.0. The largest event (ML=2.4) was located 8.7 km North-East of Sunne in Värmland. The depth range of the events varies between 0.1 to 19.3 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 km	Y RT90 km	Depth km	ML local magnitude
20030902	122058.3	59.875	13.262	6642.1	1357.4	5.0	2.4
20030903	212726.8	63.259	18.522	7019.4	1636.3	16.4	0.4
20030905	041959.7	64.432	20.180	7154.5	1710.5	19.3	0.4
20030906	154415.7	63.776	18.624	7077.1	1638.8	0.1	-0.1
20030906	154416.4	63.706	18.448	7069.0	1630.5	13.6	0.0
20030910	132858.5	63.596	17.872	7055.8	1602.4	0.1	0.7
20030910	201616.1	63.913	20.514	7097.9	1730.8	17.0	0.5
20030910	212013.5	57.231	16.862	6345.5	1563.6	17.2	1.2
20030912	042006.4	65.785	23.633	7320.4	1857.5	18.1	1.8
20030914	112245.6	63.180	18.806	7011.2	1650.9	12.9	0.2
20030914	123622.3	64.621	21.562	7180.9	1774.9	5.4	-0.2
20030924	235116.1	64.348	20.621	7146.7	1732.4	13.4	1.7
20030928	050842.7	65.314	22.800	7263.6	1825.4	11.5	0.8
20030928	081240.4	64.802	20.408	7196.5	1718.4	3.4	0.7