P-05-243

Swedish National Seismic Network (SNSN)

A short report on recorded earthquakes during the third quarter of the year 2005

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October 2005

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ISSN 1651-4416
SKB P-05-243

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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.

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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 short report gives some information about the recorded seismicity during July through September 2005.

The Swedish National Seismic Network consists of 48 stations in operation and additional 12 under construction. During July through September, 720 events were located whereof 91 are estimated as real earthquakes, 527 are estimated as explosions and 101 events are still considered as uncertain but these are mainly outside the network.

The largest earthquake M_L = 3.2 occurred on July 25th located in Norway 188 km NW of Östersund. Additionally two earthquakes reached magnitude M_L = 2.0 during the period.

Sammanfattning

Enligt avtal mellan Svensk Kärnbränslehantering AB (SKB) och Uppsala Universitet, Institutionen för Geovetenskaper, fortsätter Uppsala Universitet att driva och bygga ut seismiska mätstationer i det svenska seismiska nätet (SNSN). Denna rapport ger information om registrerade händelser under tidsperioden juli till september 2005.

Det seismiska nätet består av 48 stationer som är nu i drift. Ytterligare 12 stationer är under uppbyggnad. Under perioden juli till september, 2005 var det 720 registrerade händelser varav 91 bedömdes som äkta jordskalv, 527 bedömdes vara förorsakade av explosioner eller sprängningar samt 101 var osäkra händelser, men dessa var i huvudsak lokaliserade utanför det seismiska nätet.

Det största jordskalvet med en magnitud på 3,2 inträffade den 25 juli i Norge 188 km nordväst om Östersund. Ytterligare två skalv nådde magnitud 2,0 under perioden.

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1 Introduction

This document reports the seismic events recorded by the Swedish National Seismic Network (SNSN) for the third quarter of the year 2005. The work was carried out in accordance with activity plan AP TD F73-01-013. In Table 1-1 controlling document for performing this activity is listed. The activity plan is an SKB internal controlling document.

At present 48 stations are in operation. Additional 12 stations are under construction, 10 in the SW of Sweden and two in the north.

The report includes fundamental information about the seismic events, including origin time, hypocenter location. Information about the source parameters is not included in the present report but is delivered as 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.

Table 1-1. Controlling documents for the performance of the activity.

Activity plan	Number	Version
Drift av seismologiskt nät längs Östersjöns kust	AP TD F73-01-013	

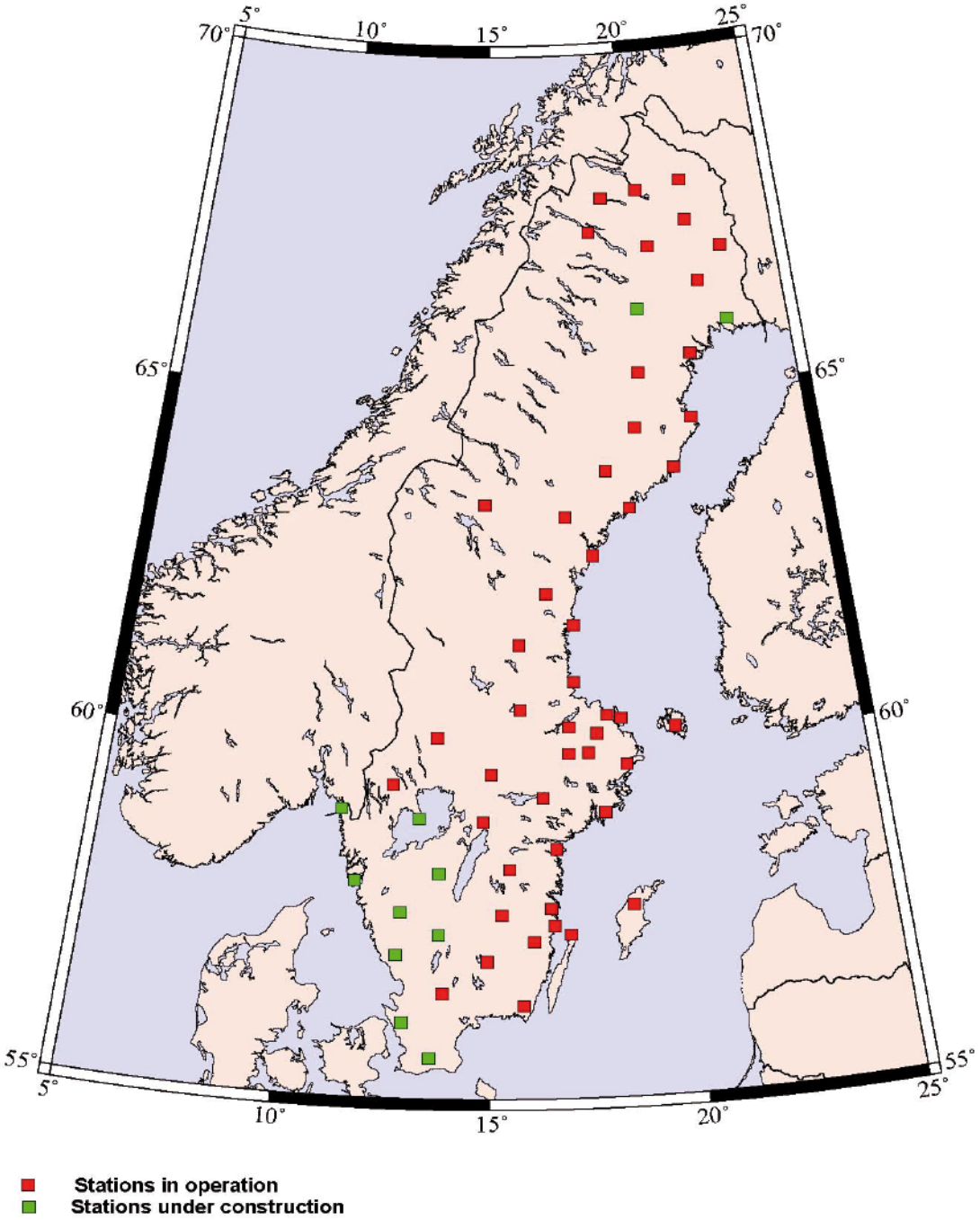

Figure 1-1. *The present Swedish National Seismic Network (SNSN).*

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 observations 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 are given after every three month period.

The sensitivity of the network allows for complete recording of all earthquakes down to a magnitude of lower than 0.5 within the network and down to magnitude 0.0 near the proposed nuclear waste deposit sites.

3 Recorded earthquakes during the third quarter of 2005

Figure 3-1 shows the recorded events in Sweden during July through September. During the period, 720 events were located whereof 91 are estimated as real earthquakes (which are shown in Figure 3-2). 527 are estimated as explosions and 101 events are still considered as uncertain but these are mainly outside the network.

The largest earthquake M_L = 3.2 occurred on July 25th located in Norway 188 km NW of Östersund. Additionally two earthquakes reached magnitude M_L = 2.0 during the period.

Event lists for July through September 2005 are given in Sections 3.1 through 3.3.

3.1 July

Event list for July is given in Table 3-1 with date, time (UTC), latitude, longitude, X (RT90 km), Y (RT90 km), depth and local magnitude (M_L).

In July 37 events were located whereof one with magnitude 3.2 located in Norway, 188 km NW of Östersund in Jämtland. One earthquake with magnitude 1.7 was located 3.2 km W of Jock i Norrbotten and one with magnitude 1.6 close to Varnhem 12.8 km W of Skövde. Additional 6 earthquakes had magnitude equal or larger than 1.0. The depth ranges of the events varies between 0.1 and 28.2 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth Km	M_L Local magnitude
20050701	024519.2	63.891	21.059	7,097.6	1,757.7	18.2	1.3
20050701	025112.5	63.879	21.081	7,096.3	1,758.8	18.3	–0.1
20050702	202908.9	61.851	17.248	6,860.5	1,575.8	16.8	–0.2
20050703	000635.3	64.469	20.899	7,161.2	1,744.7	23.9	0.7
20050705	082324.9	64.724	21.090	7,190.3	1,751.5	16.8	1.4
20050705	103249.3	64.531	20.699	7,167.3	1,734.5	17.6	1.0
20050706	200747.4	58.927	13.156	6,536.9	1,347.3	19.1	0.2
20050708	123755.5	64.912	20.647	7,209.5	1,728.8	16.2	–0.1
20050708	143136.8	68.107	22.957	7,574.3	1,797.0	12.5	0.4
20050709	015836.2	64.264	20.669	7,137.6	1,735.4	12.0	–0.4
20050709	025357.6	60.783	16.617	6,740.9	1,544.0	21.4	–0.3
20050710	000302.7	67.002	23.979	7,457.1	1,855.5	7.8	0.7
20050710	01160.1	58.549	13.155	6,494.8	1,345.6	16.3	1.1
20050710	020258.2	64.849	20.749	7,202.9	1,734.2	16.8	–0.0
20050710	084037.2	61.363	16.239	6,805.3	1,523.0	18.6	–0.0
20050712	213625.5	64.405	20.411	7,152.3	1,721.8	19.0	–0.1

Date	Time (UTC)	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth Km	M_L Local magnitude
20050716	193952.5	59.305	18.966	6,580.3	1,679.8	5.6	0.5
20050717	014224.2	58.396	13.665	6,476.7	1,374.7	18.1	1.6
20050717	060303.9	61.629	16.784	6,835.3	1,551.7	16.7	0.3
20050717	060602.2	61.623	16.773	6,834.6	1,551.2	19.7	–0.3
20050718	192959.2	62.535	17.654	6,937.2	1,595.0	14.6	0.6
20050721	094126.0	64.835	18.963	7,196.0	1,649.7	19.9	–0.2
20050722	121617.1	66.663	22.653	7,412.5	1,802.2	8.8	1.7
20050723	134941.9	67.324	22.624	7,485.8	1,792.8	5.4	–0.2
20050724	150029.8	64.350	20.899	7,148.0	1,745.8	17.7	–0.1
20050725	160419.7	64.291	11.873	7,137.4	1,309.5	0.1	3.2
20050725	203604.4	64.606	21.229	7,177.8	1,759.2	5.3	0.5
20050727	182604.3	63.185	18.473	7,011.1	1,634.1	16.9	1.5
20050728	015921.9	64.372	20.615	7,149.4	1,731.9	18.1	0.2
20050728	060143.5	64.727	20.479	7,188.3	1,722.4	28.2	1.0
20050728	090441.2	61.591	15.704	6,830.6	1,494.5	5.3	–0.5
20050729	150727.4	68.091	22.986	7,572.5	1,798.4	12.7	0.9
20050729	155802.6	64.310	20.613	7,142.5	1,732.3	16.6	–0.3
20050730	031045.7	64.513	20.702	7,165.3	1,734.8	16.4	0.4
20050730	045508.5	62.907	17.404	6,978.3	1,581.1	27.0	0.3
20050731	063425.3	63.186	17.930	7,010.2	1,606.8	21.5	0.1
20050731	093616.8	62.606	17.372	6,944.7	1,580.3	8.0	0.0

3.2 August

Event list for August is given in Table 3-2 with date, time (UTC), latitude, longitude, X (RT90 km), Y (RT90 km), depth and local magnitude (M_L). In August 30 events were located whereof one magnitude with 2.1, 25.8 km NE of Orsa i Dalarna, one with magnitude 1.9 37.7 km north of Kiruna and one with magnitude 1.8, 12.3 km SW of Överhogdal in Härjedalen. Additional 5 earthquakes had magnitudes larger or equal to 1.0. The depth ranges of the events varies between 0.1 and 28.0 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth km	M_L Local magnitude
20050801	004016.1	62.926	18.441	6,982.1	1,633.7	5.6	1.4
20050801	135738.6	64.527	21.342	7,169.5	1,765.4	21.5	1.4
20050801	210603.8	64.552	21.289	7,172.0	1,762.6	11.5	0.2
20050801	230720.9	62.215	14.62	6,900.7	1,438.2	11.8	1.8
20050802	002345.7	68.076	22.954	7,570.8	1,797.3	7.9	1.1
20050805	014411.3	64.317	20.618	7,143.2	1,732.5	18.0	0.0
20050805	202330.8	67.978	19.068	7,546.2	1,636.4	5.3	–0.3
20050806	054309.8	64.401	20.531	7,152.3	1,727.6	20.0	–0.1

Date	Time (UTC)	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth km	M_L Local magnitude
20050807	009592.4	63.749	18.381	7,073.7	1,626.9	21.8	0.8
20050810	164340.9	65.199	22.943	7,251.7	1,833.5	11.5	1.0
20050810	184757.7	64.356	20.502	7,147.2	1,726.5	16.1	0.2
20050812	024659.5	67.662	19.724	7,512.6	1,666.0	17.7	0.8
20050812	024910.6	67.615	22.177	7,516.0	1,770.3	17.2	0.7
20050814	133008.4	67.402	22.467	7,493.7	1,785.2	19.3	0.4
20050814	174310.8	60.353	16.947	6,693.3	1,562.8	18.9	–0.1
20050815	065913.8	65.149	22.404	7,243.3	1,808.9	20.5	0.3
20050818	022121.5	57.604	15.129	6,386.8	1,459.4	18.1	0.4
20050820	111947.9	64.573	20.818	7,172.4	1,739.9	17.4	–0.4
20050820	211638.3	59.424	14.976	6,589.5	1,452.7	17.8	0.0
20050821	023856.6	63.709	18.254	7,069.0	1,620.9	28.0	0.9
20050822	024647.5	59.889	14.952	6,641.3	1,452.0	21.0	0.3
20050823	174850.8	68.070	20.131	7,559.2	1,680.1	0.1	–0.2
20050824	144316.6	68.008	20.04	7,552.0	1,676.8	17.8	0.3
20050828	102236.2	64.516	20.902	7,166.5	1,744.4	14.0	–0.2
20050829	023956.2	67.952	21.853	7,552.1	1,753.0	16.2	0.0
20050830	090018.1	68.190	20.405	7,573.4	1,690.5	8.8	1.9
20050830	175837.6	65.072	22.588	7,235.7	1,818.5	20.6	0.4
20050831	003327.8	61.357	15.046	6,804.8	1,459.2	22.7	2.1
20050831	073323.2	64.418	20.281	7,153.3	1,715.4	17.8	–0.1
20050831	154843.3	59.815	15.51	6,632.8	1,483.3	16.6	1.7

3.3 September

Event list for September is given in Table 3-3 with date, time (UTC), latitude, longitude, X (RT90 km), Y (RT90 km), depth and local magnitude (M_L). In September 24 events were located whereof one with magnitude 3.0 in Norwegian sea 463 km west of the Swedish-Norwegian border. One earthquake with magnitude 1.8 was located 192.9 km NW of Kiruna and another with magnitude 1.6 120 km north of Kiruna. Additional 10 earthquakes had magnitudes equal or above 1.0. The depth range was between 0.0 and 35.6 km.

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

Date	Time (UTC)	Latitude	Longitude	X RT90 Km	Y RT90 Km	Depth km	M_L Local magnitude
20050901	002340.3	63.506	22.06	7,059.3	1,810.9	14.6	1.0
20050901	224026.9	68.018	22.748	7,563.4	1,789.4	14.5	0.3
20050902	181024.8	59.900	15.126	6,642.4	1,461.8	2.9	0.5
20050903	000709.1	62.774	17.67	6,963.8	1,595.0	11.0	0.6
20050905	230828.8	65.664	22.528	7,301.1	1,808.6	15.6	0.1
20050907	120144.5	67.856	19.585	7,533.9	1,658.8	8.9	0.4
20050908	144154.3	67.943	20.706	7,546.8	1,705.1	35.6	0.2

20050910	111214.1	69.421	18.166	7,705.3	1,592.5	0.0	1.8
20050911	001301.9	65.910	22.176	7,326.8	1,789.7	2.1	1.1
20050911	015533.8	63.009	19.34	6,993.6	1,678.8	12.3	0.7
20050913	025208.6	69.796	7.093	7,769.3	1,165.0	10.9	3.0
20050914	075818.9	67.500	19.337	7,493.6	1,650.7	21.0	1.3
20050914	012392.4	57.936	15.403	6,423.5	1,476.0	19.2	0.9
20050914	155315.4	67.972	20.012	7,547.9	1,675.9	13.8	0.4
20050917	044721.7	61.946	17.472	6,871.3	1,587.3	15.5	0.4
20050919	060534.7	63.938	20.537	7,100.8	1,731.7	8.9	0.0
20050919	225402.5	64.542	21.404	7,171.4	1,768.2	18.8	0.3
20050921	125645.4	62.750	17.897	6,961.6	1,606.7	0.1	1.4
20050923	101902.3	63.672	19.778	7,068.7	1,696.4	12.7	1.0
20050925	104653.7	64.395	20.671	7,152.1	1,734.4	6.7	1.0
20050925	191418.1	63.820	18.247	7,081.3	1,620.0	23.7	0.2
20050927	035539.6	57.318	18.193	6,357.1	1,643.6	2.1	1.3
20050927	103135.5	68.876	21.184	7,652.2	1,716.1	14.4	1.6
20050930	084934.9	62.739	17.675	6,959.9	1,595.4	10.2	1.3

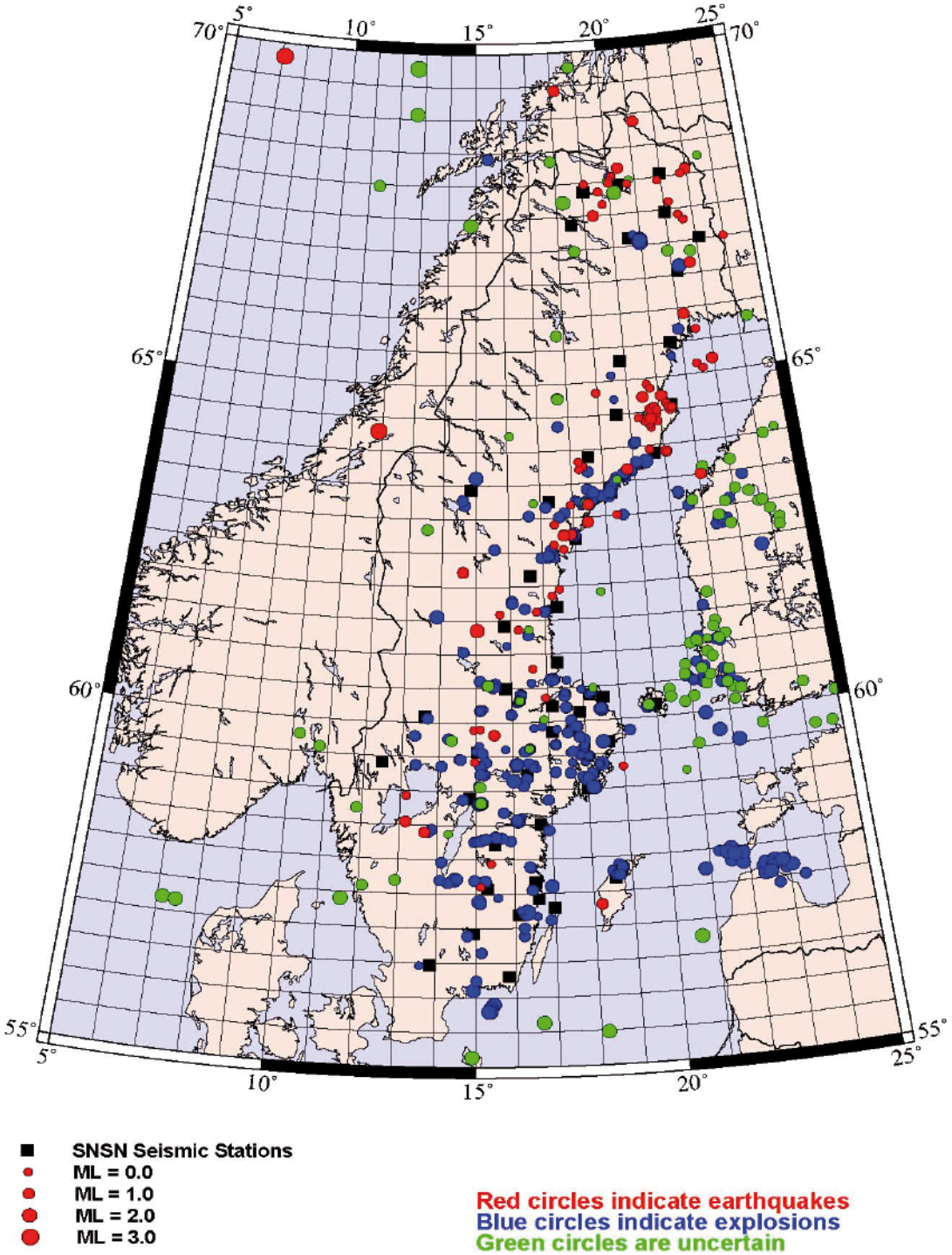

Figure 3-1. *Recorded events including explosions in the SNSN network during the period July through September 2005.*

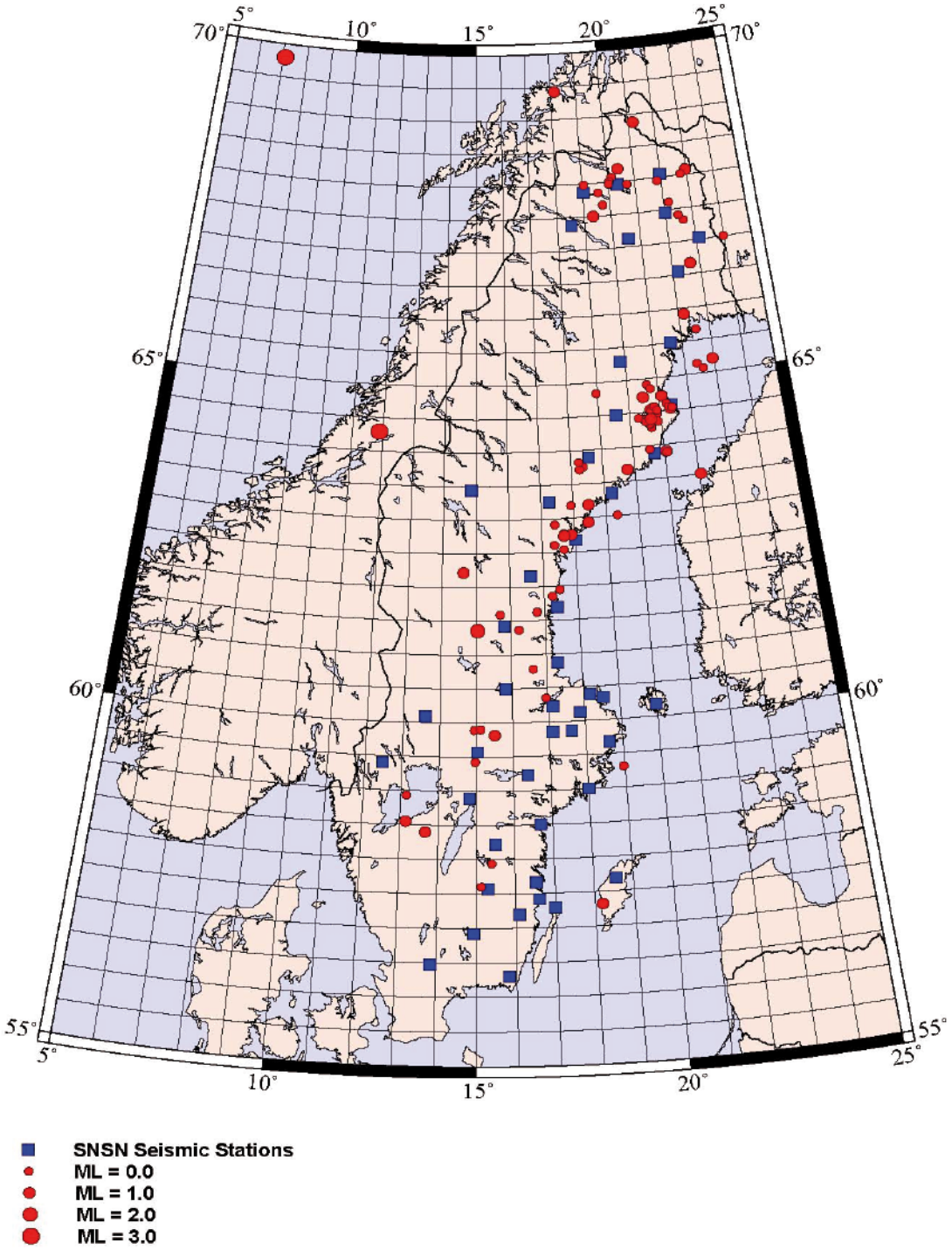

Figure 3-2. *Earthquake activity in Sweden during July through September 2005.*