

NORSAR

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

Scientific Report No. 2-77/78

SEMIANNUAL TECHNICAL SUMMARY

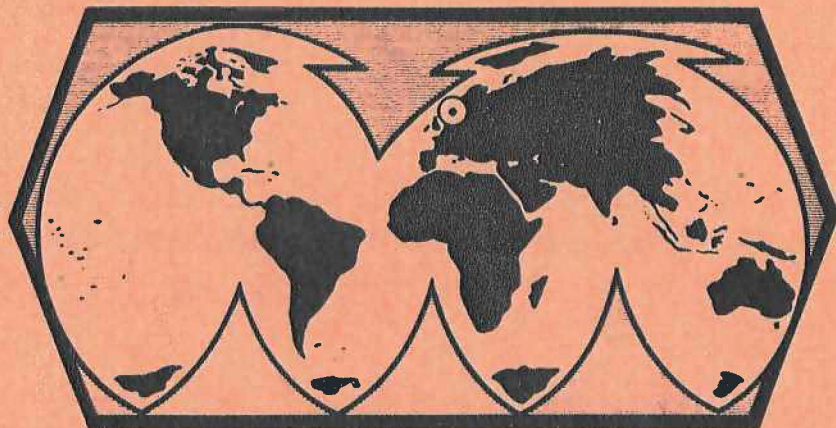
1 October 1977 - 30 April 1978

Edited by

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Kjeller, May 1978

Sponsored by
Advanced Research Projects Agency
ARPA Order No. 2551



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VI.8 Precisely Located Earthquakes in the Vicinity of NORSAR

Even though local earthquakes in the siting area of NORSAR are quite rare (Husebye et al, 1978), there occurred between 1970 and 1978 four such events that could be subjected to a detailed hypocentral investigation using the NORSAR recordings.

The locations were performed using the program HYPO71 (Lee and Lahr, 1975), and the essential part of the experiment was concentrated on the estimation of a useful crustal model. For this purpose, three local explosions for which the locations were precisely known were used, and we thereby came up with the following model:

<u>Depth (km)</u>	<u>Velocity (km/s)</u>
0-16	6.25
16-32	6.65
>32	8.15

Using this model and the above-mentioned location program, the hypocenters given in Table VI.8.1 were estimated. The estimated standard epicentral error for all four events was around or less than one kilometer.

Table VI.8.1

Estimated hypocentral coordinates for four earthquakes in the NORSAR area.

No.	Date	Time of Day	Lat (N)	Long (E)	Depth (km)
1	71.07.19	00.59.11.5	60°43.1'	10°43.6'	31
2	73.10.01	16.44.14.3	59°55.1'	11°25.4'	6
3	73.11.23	06.49.36.9	60°33.2'	11°28.2'	23
4	77.12.11	21.46.12.1	60°56.7'	10°53.1'	22

In order to investigate the resolution of the depth estimation, an experiment was performed in which the hypocenter was constrained at given depths between 0 and 40 km and the associated RMS error in seconds was computed. The results are shown in Fig. VI.8.1, where it is seen that the resolution is fairly good for all of the events.

The hypocentral solutions presented here are the most accurate ones so far published for earthquakes in Fennoscandia, and this applies in particular to the focal depths. It is therefore interesting to note that our results are consistent with those of Husebye et al (1978), who found from macroseismic data that most of the depths should be in the range 15-30 km.

H. Bungum

References

- Husebye, E.S., H. Bungum, J. Fyen and H. Gjøystdal (1978): Earthquake activity in Fennoscandia between 1497 and 1975 and intraplate tectonics. Norsk Geologisk Tidsskrift, 58, 51-68.
- Lee, W.K.L., and J.G. Lahr (1975): HYPO71 (revised): A computer program for determining hypocenter, magnitude and first motion of local earthquakes. U.S. Geol. Survey Open-File Report 75-311, 113 pp.

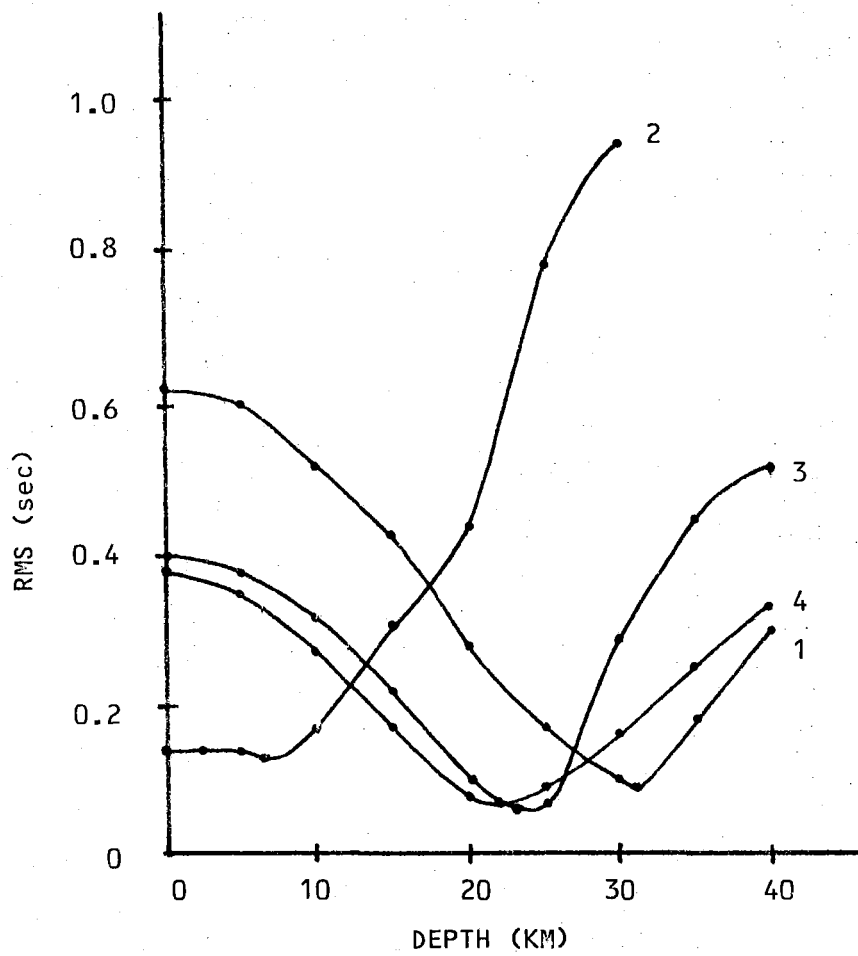


Fig. VI.8.1