NORSAR

ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

Scientific Report No. 4-73/74

SEMIANNUAL TECHNICAL REPORT

NORSAR PHASE 3

1 July–31 December 1973

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(Editor)

Kjeller, 11 January 1974

A. EVENT DETECTION AND LOCATION CAPABILITIES AT NORSAR

A fairly extensive study has recently been completed on the operating capability of NORSAR to detect and locate seismic events (Bungum & Husebye 1974). This is based on one year of data, from April 1972 through March 1973. Before this period, several important changes had been introduced to the processing system, improving the performance considerably.

The detectability was investigated through the estimation of 50% and 90% detectability thresholds as derived from frequency-magnitude distributions. The basic results are given in Table A1, which shows that the best results are found for events in Central Asia and adjacent regions, where the 90% cumulative detectability values are in the range 3.6-3.8 NORSAR m_b values. The most difficult areas to cover are the Mid-Atlantic ridge and America. A fairly extensive analysis of the relationship between NORSAR and NOAA m_b values was also undertaken, and some results for the distance ranges 30°-90° and 110°-180° are given in Fig. A1. The relationship should be viewed first of all as a prognosis model, showing that given an event with NORSAR m_b below 4.0, NOAA will most likely have a smaller magnitude. For events above 4.0, NORSAR reports in average a smaller magnitude than NOAA.

The location accuracy has also been investigated, and Table A1 here shows that the best location capability is generally found in areas with the best detectability. The best results are obtained for Japan and Central Asia, where the median location accuracy is 95 and 105 km, respectively. Further improvements are hardly possible, as biased errors in the location estimates are now insignificant (see Chapter B).

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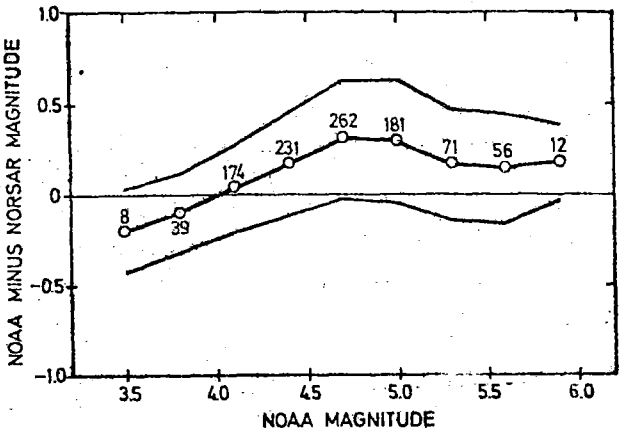
TABLE A1

Estimates of NORSAR event detectability and location capability based on data from one year of regular operation. A dash indicates that not enough data was available.

Region	Area of Coverage	Detectability (m_b)		Location Diff. (km)	
		50%	90%	50%	90%
1	Aleutians-Alaska	-	-	135	330
2	Western North America	-	-	185	310
3	Central America	3.7	4.1	430	830
4	Mid-Atlantic Ridge	-	-	360	790
5	Mediterranean-Middle East	3.1	3.7	220	650
6	Iran-Western Russia	3.4	3.8	150	580
7	Central Asia	3.2	3.6	105	270
8	Southern-Eastern Asia	-	-	130	340
9	Ryukuo-Philippines	3.7	4.2	195	610
10	Japan-Kamchatka	3.4	3.8	95	260
11	New Guinea-Hebrides	-	-	380	1330
12	Fiji-Kermadec	3.4	3.9	310	910
13	South America	-	-	390	680
14	Distance Range 30°-90°	3.4	3.8	145	490
15	Distance Range 110°-180°	4.0	4.5	320	1020

(a)



(b)

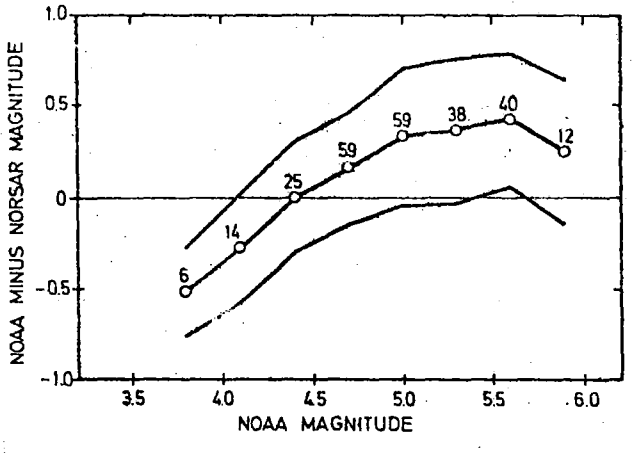


Fig. A1 Average difference between NOAA and NORSAR m_b values as a function of NOAA m_b for the distance range 30°-90° (a) and 110°-180° (b). Number of events and standard deviations are indicated.

REFERENCES

Bungum, H., and E.S. Husebye: Analysis of the operational capabilities for detection and location of seismic events at NORSAR, Bull. Seism. Soc. Am., in press, (June 1974).