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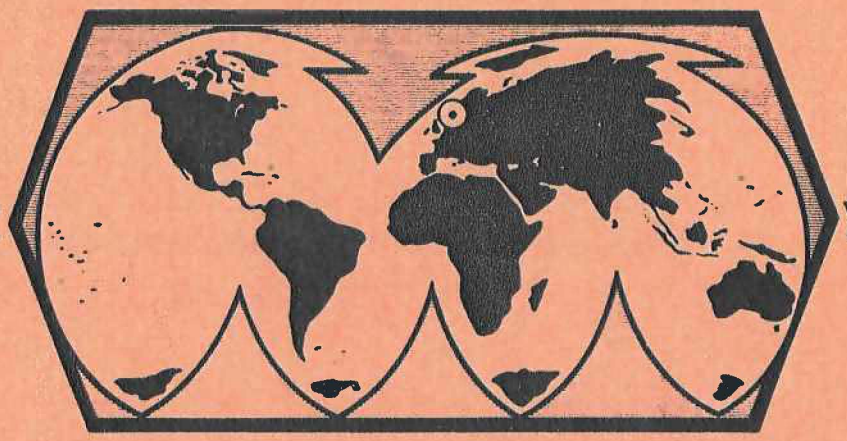

VI.6 Teleseismic Detectability of the Svalbard Microearthquake Network

As discussed in Section VI.5, the primary purpose of the seismograph network installed on Svalbard north of Norway has been to survey the local seismic activity. Nonetheless, we have also investigated the teleseismic performance of each station, and preliminary results are encouraging. Table VI.6.1 lists the geographical coordinates of the four seismograph stations presently in operation on Svalbard, and Table VI.6.2 shows their relative detection performance over a 2½-month period. Not unexpectedly, each of the three microearthquake stations detect considerably more events than the WWSSN station at Kings Bay (KBS). More interesting is that this appears to hold true not only for local earthquakes, but also with regard to teleseismic events. (Averages of 2.2, 2.1 and 1.5 teleseismic events/day versus 1.4 at KBS).

Because of the short time interval available, and the lack of complete overlap of the periods under consideration, these numbers should be considered only to give tentative indications. We plan to conduct a more comprehensive detectability study at a later stage, using more complete data. Meanwhile, we note that the high sensitivity of the microearthquake seismographs to high frequency signals make these instruments particularly suitable to detect underground explosions. As an example, Fig. VI.6.1 shows the P-wave recorded at station PRD from a presumed explosion in Eastern Kazakh, 26 March 1978, with m_b(NORSAR)=5.2. Another Eastern Kazakh presumed explosion from 19 March (m_b(NORSAR)=5.1) was also detected, although the signal-to-noise ratio was considerably lower than in the former case. The epicentral distance to Eastern Kazakh is about 40 degrees; in comparison, the distance from Svalbard to Novaya Zemlya is only 10 degrees. We plan to expand the study of teleseismic and near-field detectability of the Svalbard network as more data become available.

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Table VI.6.1

Names and coordinates of the seismic stations used in this study. In the last column is given the percentage of the time between 8 December 1977 and 24 February 1978, during which each of the stations has been in operation (or data available in case of KBS).

Site	Code	Lat	Long	Data Availabilty (%)	Operated by
Barentsburg	BBG	78.073	14.240	89.5	Norwegian Polar Institute & NTNF/NORSAR
Pyramiden	PRD	78.659	16.303	58.7	
Longyearbyen	LYR	78.189	15.578	63.8	
Kings Bay	KBS	78.918	11.924	69.6	Univ. of Bergen

Table VI.6.2

Detectability statistics for the four stations used in this study. Data for the stations BBG, PRD and LYR cover the time period between 8 December 1977 and 24 February 1978, whereas data from KBS have been available only for December 1977 and January 1978. The daily averages have been corrected for station down-time.

	BBG	PRD	LYR	KBS	Total
Detected events, total	449	303	482	185	687
- Average, per day	6.3	6.5	9.6	3.4	
Detected events, local	336	199	376	111	514
- Average per day	4.8	4.3	7.5	2.0	
Detected events, teleseismic	113	104	106	74	173
- Average per day	1.5	2.2	2.1	1.4	

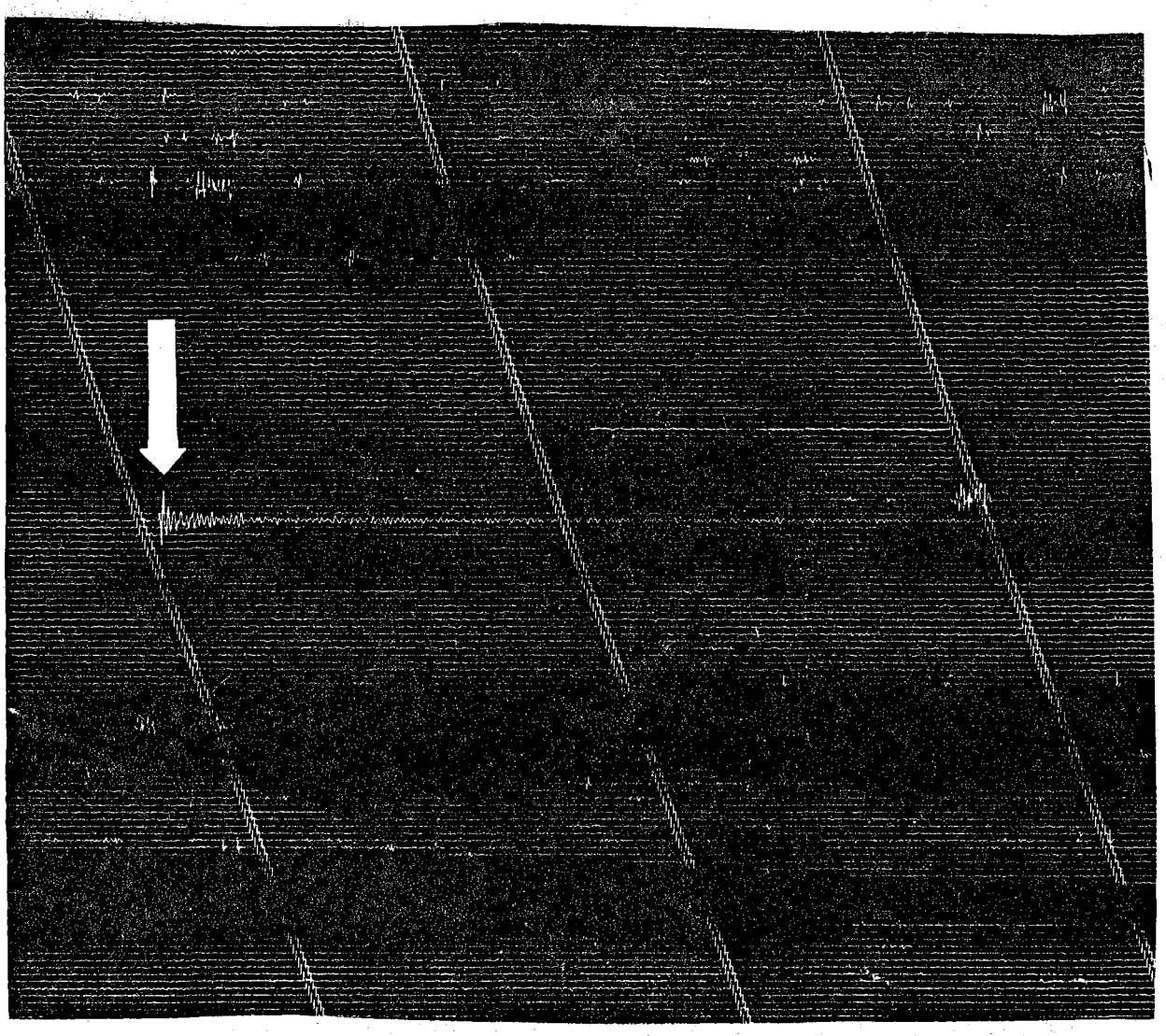

Fig. VI.6.1 P-wave recording at PRD, Svalbard, of a presumed explosion from Eastern Kazakh, 26 March 1978. Signal onset is shown by an arrow.