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NORSAR

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VI.7 Investigation of signal focusing effects at NORSAR for events near the Caspian Sea

A major feature of seismic signals recorded at the NORSAR array is the large amplitude variations seen between individual instruments for any given event (Berteussen and Husebye, 1974). The amplitudes typically differ by about a factor of 10 between the 'best' and 'worst' instrument, corresponding to about 1.0 m_b unit variation across the 100 km NORSAR aperture. The amplitude patterns are repeatable for any given source regions, but may change considerably with only a few hundred kilometers shift in epicenter. Thus, any one of the 22 original NORSAR subarrays is the 'best' one for at least one source region, and the 'worst' one for at least one other region.

For the Caspian Sea region, subarray 02B has the highest signal amplitudes. Even within this subarray, which has an aperture of only 10 km, there is a considerable variability in amplitudes, as seen in Fig. VI.7.1 for an event near Azgir, USSR. A project has been undertaken to investigate these signal focusing effects in more detail, using an experimental set of six sensors deployed near the instrument 02B05, which has the highest amplitudes for this source area (Fig. VI.7.2). The aims of this deployment are the following:

- Take advantage of the focusing effects to improve event detectability for this region
- Investigate signal spectra at high frequencies (the data will be sampled at 40 Hz with an analog cutoff filter at 12.5 Hz, thus giving improved spectral recordings at high frequencies compared to standard NORSAR SP channels)
- Monitor low magnitude earthquake activity in the Caspian Sea area.

The experimental array is expected to become operational early 1982.

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Reference

Berteussen, K.-A. & E.S. Husebye, 1974: Amplitude pattern effects on NORSAR P-wave detectability. NORSAR Sci. Rep. No. 1-74/75, NTN/NORSAR, Kjeller, Norway.

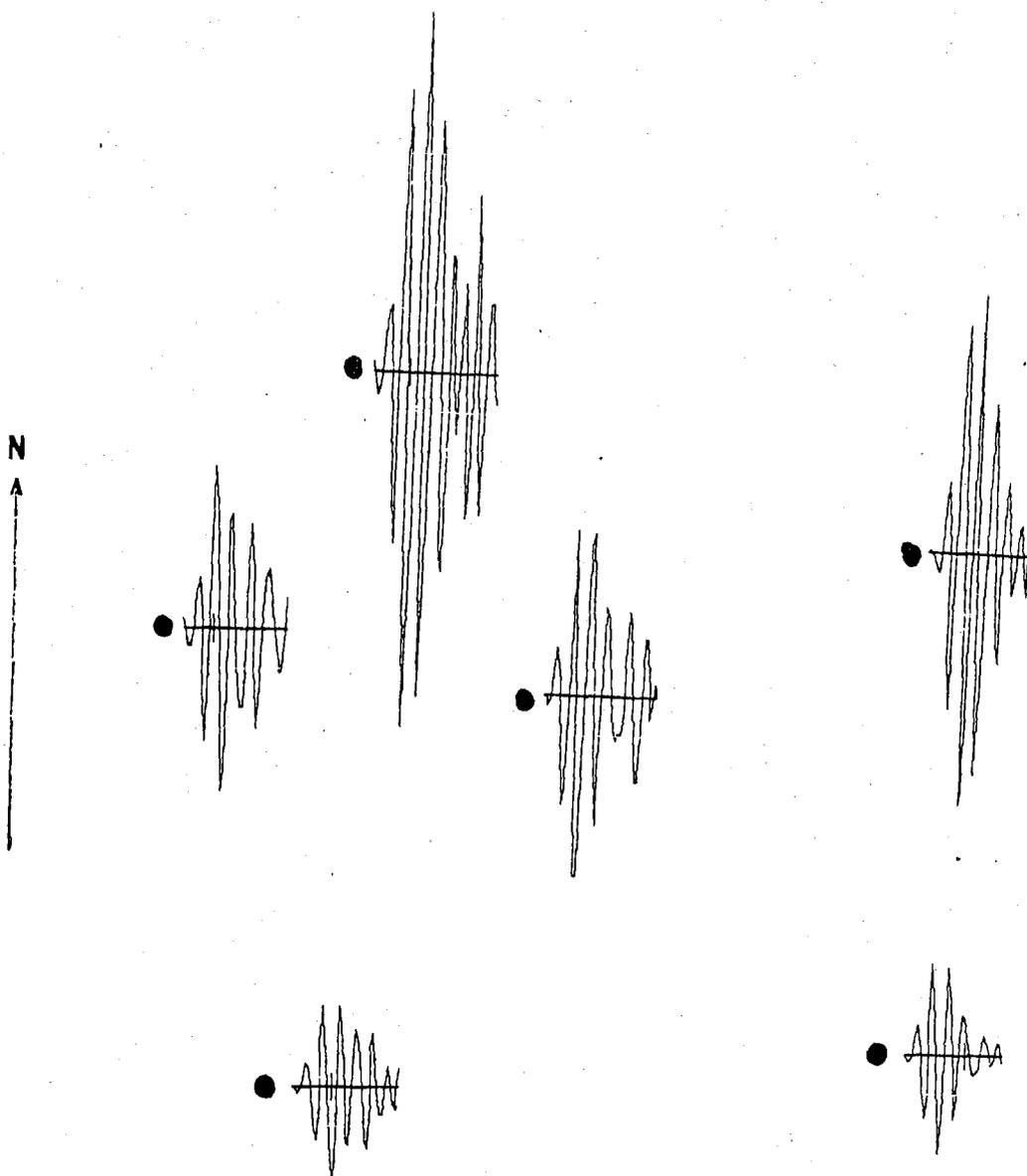


Fig. VI.7.1 Illustration of the amplitude variability within NORSAR subarray 02B for the P phase from an event near Azgir, USSR, Oct 14, 1977. The traces have been filtered with a 2.4-4.4 Hz bandpass filter, and the dots represent the positions of the 6 SP instruments in the subarray. (Subarray diameter is about 10 km.) There is a general trend of increasing amplitudes from south to north, with the amplitude at the northernmost instrument (02B05) being larger by a factor of 4 compared to the instruments furthest south.

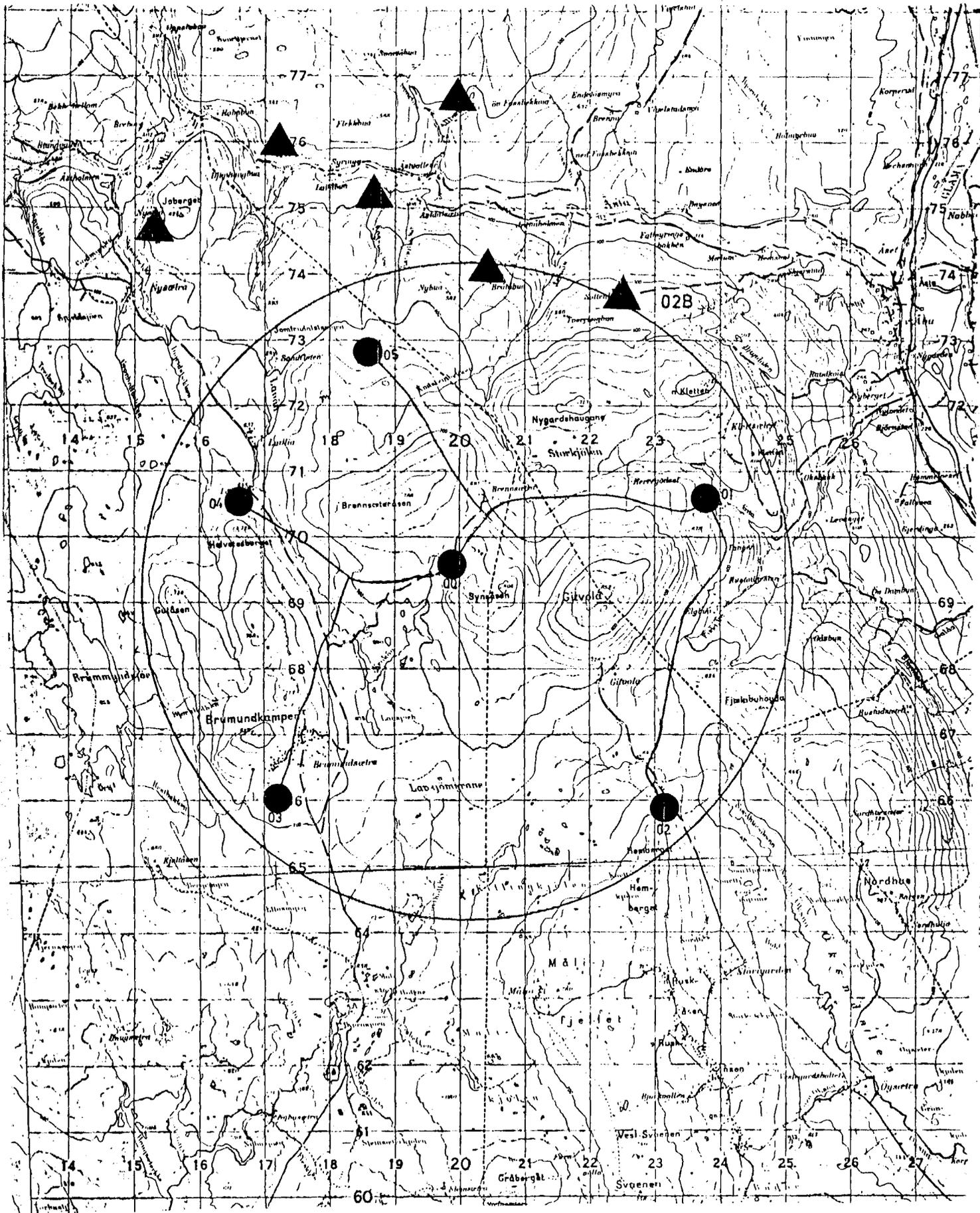


Fig. VI.7.2 NORSAR subarray 02B. Circles denote current NORSAR SP instruments, while triangles show the locations of six planned experimental SP sensors.