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### VI.3 Microearthquake Monitoring of the Nansen Ridge during the FRAM I Experiment

As part of a long term effort to improve our knowledge of the Eurasian part of the Arctic, US station FRAM I was deployed on an ice floe in the Arctic Ocean north of Greenland from 11 March - 15 May 1979. The geophysics program on FRAM I encompassed besides microearthquake monitoring bathymetry, gravity, seismic reflection profiling, refraction measurements, and underwater acoustics.

Six slightly modified AN-SSW/41A sonobuoys were deployed on ice floes out to 4 km away from the FRAM I main camp in the beginning of April 1979. The sonobuoy array was operational for 6 weeks, and during the final days of manned operation FRAM I drifted along the northwestern crest of Nansen Ridge to within 25 km of the median valley, and 69 events were recorded. 21 of these could be located (Fig. VI.3.1), with location errors estimated to be about 1-2 km in the radial direction and 4-10 km in the tangential direction from the array. The majority of epicenters appear to lineup closely with the location of the median valley as outlined from spot soundings. It is interesting to note that several events with significantly shorter epicenter distances occurred on the northwestern flank of the rift valley.

The microearthquake locations on the Nansen Ridge show two parallel linear trends separated by about 10 km (Fig. VI.3.1). Assuming a focal depth of 1 km for all events, one epicenter trend appears to coincide with the median valley and the other as a sequence of events located along the northwestern rift valley wall. If however the hypocenters of the trend aligned with the median valley were 5 km or deeper, their locations would be closer to the southeastern rift valley wall. The seismic activity can in the case of shallow events be attributed to movement of a fault block about 10 km wide being uplifted from the median valley to the rift valley wall. The greater number of events occurring in the median valley may indicate differential movement between the two sides of the block or be related to intrusive and/or extrusive events in the median valley. If however the events occurred at a greater depth (5 km), they would have been associated with motion on fault systems on both sides of the median valley (Kristoffersen et al, 1981).

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References

Kristoffersen, Y., E.S. Husebye, H. Bungum and S. Gregersen: Seismic investigations of the Nansen Ridge during the FRAM I experiment. Tectonophysics, in press.

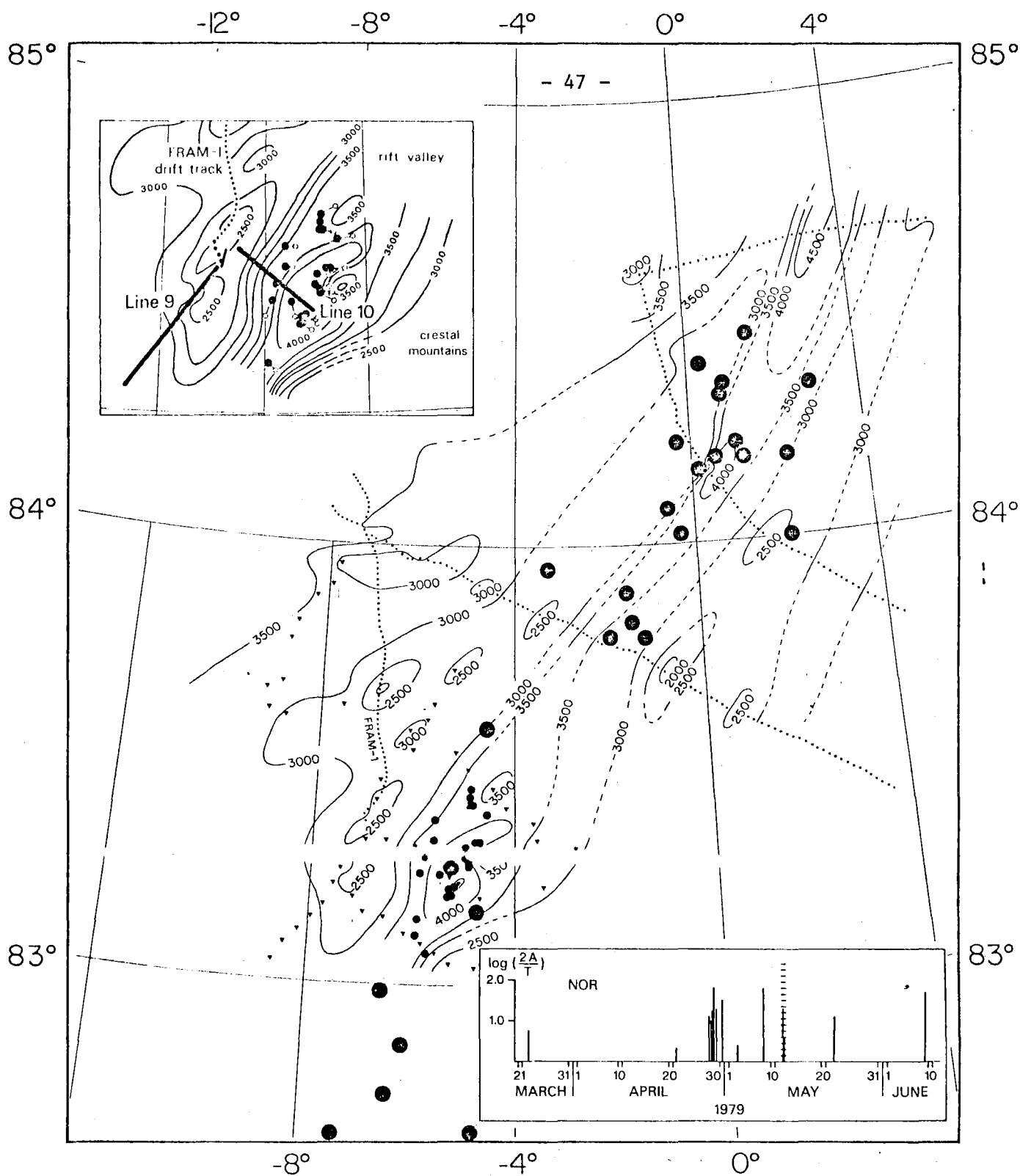


Fig. VI.3.1 Locations of microearthquakes recorded by FRAM I sonobuoy array (small dots) and teleseismically located earthquakes 1961-1979 (large dots).

Upper Left: Microearthquake locations for two assumed focal depths, 1 km (dots) and 5 km (open circles). The drift of the array during the recording interval is indicated by heavier dots, and the line at the end of the track indicates the array dimension. Heavy lines show locations of seismic refraction lines and triangles mark points where spot soundings were made.

Lower Right: Time sequence of earthquakes occurring in the southern part of the Nansen Ridge with signal amplitude (A) recorded at NOR, northeastern Greenland illustrated by vertical bars. Shaded area indicates 36 hour recording interval at the ridge crest by sonobuoy array.