Investigations of the sediment thickness in Søndre Strømfjord, West Greenland

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Søndre Strømfjord, approximately 170 km long, is a very clear example of a fjord formed by glacial processes. The bottom of the outer part of the fjord is U-shaped and situated only a few tens of metres below sea level. In the inner half of the fjord, north-east of Sarfartôq, the fjord is about 280 m deep and the sea bottom nearly horizontal for at least 40 km. In the innermost part the bottom rises towards the large glacial river near the air base (data from Danish nautical charts nos. 1410, 1411, 1412).

Field work

In 1974 a four-man team assisted by the crew of *M/S Tycho Brahe* completed a seismic section from off Angujârtorfik about 45 km from the air base to the mouth of the fjord (fig. 13). The equipment and interpretation techniques are as described by Denham (1974). Positions were determined by radar and sight to landmarks.

Results

The sedimentary cover on the Precambrian crystalline basement varies in thickness along the fjord. In the outer, shallow part of the fjord the cover is thin – mostly less than 20 m or in places absent. In the inner, deeper part of the fjord a 300–400 m thick sequence of sediments occurs (fig. 13).

The lowermost, uneven reflector is probably the surface of the basement. The rather thin, almost conformable cover on it is interpreted as moraine. This layer is unconformably covered by a thick sequence of horizontally stratified sediments, which form the recent sea bottom in the deepest parts of the fjord. This material is interpreted as muds deposited from the milky melt water which emerges into the fjord at several places (Frost, 1957). The velocity of sound in the sediments was not measured, but it is likely that the true thickness of the sediments is not more than indicated in fig. 13 and could be up to 25 per cent less.

The deep part of the fjord was deglaciated 8800–8000 B.P. (Ten Brink & Weidick, 1974). Assuming the above interpretation of the sequence is correct the 350 ± 50 m thickness of sediments have been deposited in about 8400 years with an average rate of accumulation of 25 mm/year – approximately 25 per cent more if compaction of the mud is taken into account. This is in agreement with the high rate of silting observed in the dredged channel to Camp Lloyd, i.e. the port of Søndre Strømfjord airport (Frost, 1957).

According to Ten Brink & Weidick (1974) the rate of retreat of the margin of the Inland Ice increased from an average of 2.5–3 km/100 years west of Sarfartôq (the shallow part of the fjord) to 5–10 km/100 years between Sarfartôq and Angujârtorfik (the deep part of the fjord). At the time of deglaciation the sea level was about 110 m above the present level. The sea in front of the ice was about 150 m deep in the shallow part of the fjord and some 700–800 m deep

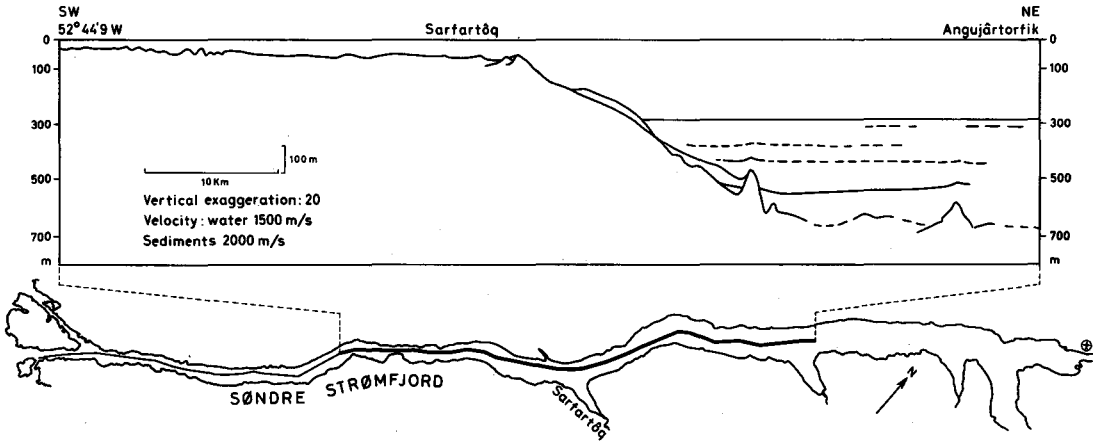

Fig. 13. Seismic section from the central part of Søndre Strømfjord, West Greenland.

in the deep part. It is likely that the deep water in front of the ice increased the rate of calving. This could possibly partly explain the observed high rate of glacial retreat in the deep part of the fjord.

References

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