Reconnaissance of glaciogenic bathymetry in the fjords and on the shelves of Spitsbergen

YOSHIHIDE OHTA

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Yoshihide Ohta, Norsk Polarinstitutt, P.O. Box 158, N-1330 Oslo lufthavn, Norway.

Detailed bathymetric maps have been prepared from the data made by the hydrographers of Norsk Polarinstitutt in the last 35 years. Many probable glaciogenic bathymetric features appear on the maps, and possible side- and end-moraines and U-shaped valleys can be recognized. Since the seismic and drilling data from these areas are limited, the interpretations from the morphologies are at present merely tentative. However, these maps will be useful for the planning of future research on the submarine glacial geology.

The bathymetric maps of the shelf north of Hinlopenstredet, of Kongsfjorden, of the area from Kongsfjorden to Isfjorden and of Sørkapp-Bjørnøya have already been published by Ohta (1982) with the lineament interpretation and some submarine moraine distributions.

Small end-moraines are clearly recognized some hundred metres in front of the present glaciers, and they have been considered to be the products of glacial advances in the last century (Liestøl 1972). The depressions and sills inside fjords are essentially controlled by bedrock geology, but it seems that the sills are covered by tills and the depressions accumulate glacio-marine sediments.

Distinct submarine, arc-shaped banks occur around the outlets of the fjords in the northwestern corner of Spitsbergen (Woodfjorden: Fig. 1 and Magdalenefjorden), and they have been considered to be younger than the shore terrace sediments c. 28,000 years old at the northern end of Amsterdamøya (Liestøl 1972; Salvigsen 1977). It is expected that the U-shaped depressions inside these moraines may have good continuous sediments deposited after the formation of the moraines. Such sediments have been reported by Elverhøi et al. (1983) to be 20–30 m thick in the fjords of NW Spitsbergen.

Large U-shaped depressions on the northern and western shelves of Spitsbergen extend from major fjords. They reach to the shelf-edges, at c. 250–300 m depth. Off Woodfjorden, the submarine depression does not extend to the north, but turns northwest, a similar direction to that of Hinlopenstredet. This direction is roughly parallel to the transform fault system of the southern Nansen-Gakkel Ridge in the Arctic Ocean.

The depressions on the western shelf, off Kongsfjorden, Isfjorden, Bellsund, Orvindalen, Hornsund (Fig. 2), western Storfjorden and Kveitehola northwest of Bjørnøya, show steep side walls with distinct banks along the sides; the latter are most certainly the side-moraines. Three or four incomplete banks occur across the depressions, and they are considered to be end-moraines formed at different stages of glacial retreat. The outermost ones are located at c. 250 m depth. These depressions on the shelves were probably made at the repeated glaciation during the late Cenozoic period. They are deepest on the landward-side of the end-moraines, and these parts certainly should have good continuous records of glacio-marine and moraine-dammed lake deposits from before the Weichselian glaciation (Miller 1982; Mangerud et al. 1987).

Storfjorden between Spitsbergen and Barentsøya-Edgeøya shows some linear sills in the eastern half, which probably reveal resistant Mesozoic dolerites. A glacier-excavated depression occurs in the western half. In addition to the youngest moraines of the last century, two or more end-moraine banks can be recognized. These moraines are possibly younger than the Weichselian.

All bathymetric maps presented at the symposium have been stored in the computer base of Norsk Polarinstitutt, and are ready for distribution to those who wish to use them for the planning of future submarine research.

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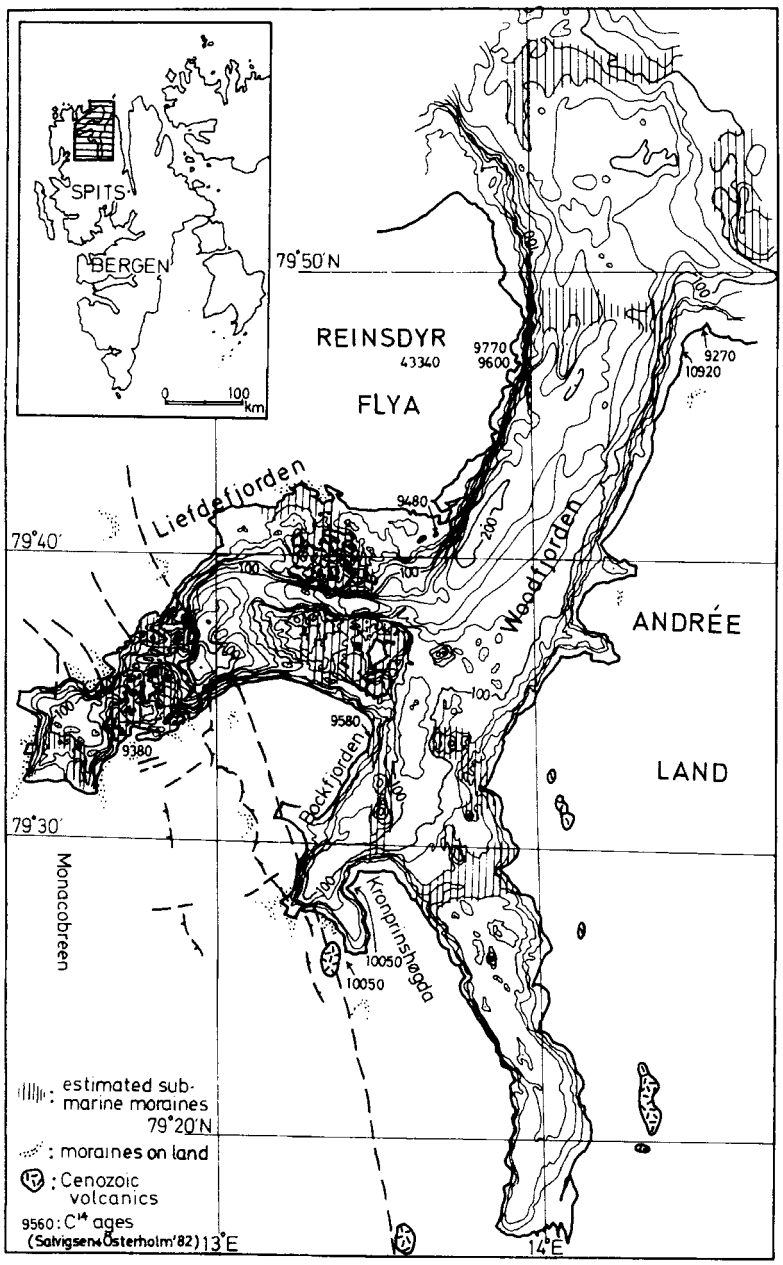

Fig. 1. Bathymetric map of Woodfjorden.

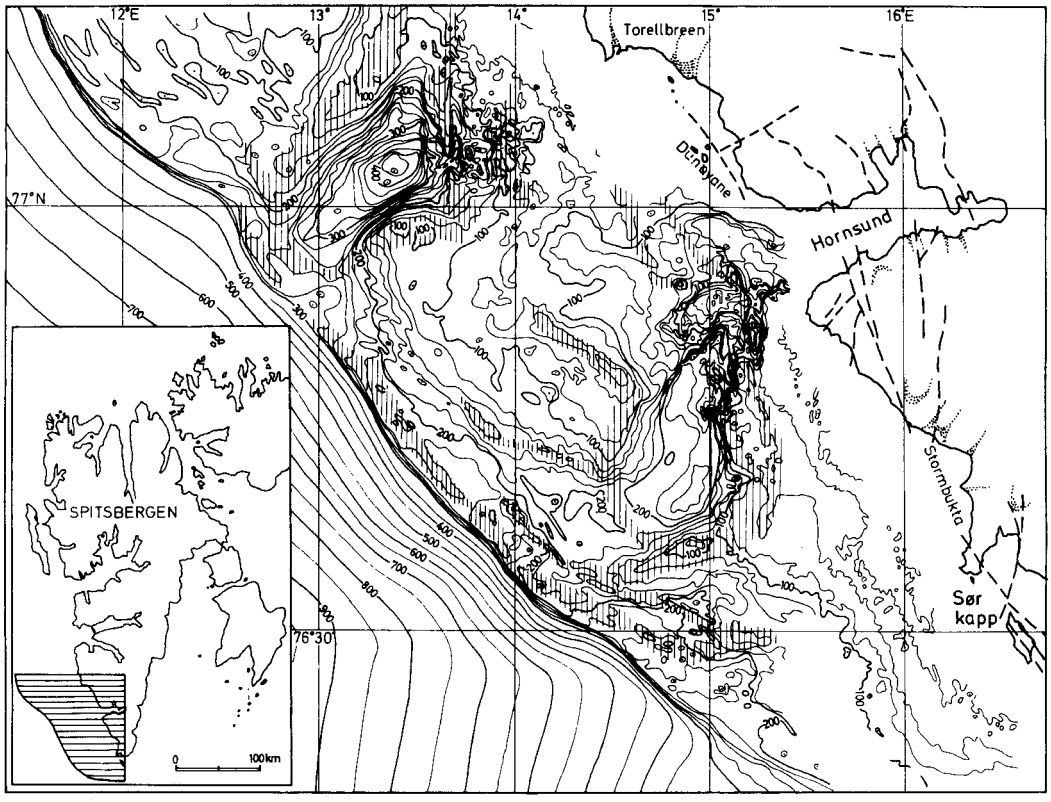

Fig. 2. Bathymetric map off W of Hornsund.