

The last stages of Trolltunga drift in the Weddell Sea, Antarctica *)

Large tabular icebergs, sometimes of giant dimensions, are typical for the Weddell Sea, Antarctica. The largest one so far reported was spotted by a Norwegian whaler Odd I on 7th January, 1927, some 50 nautical miles north-east of Clarence Island (South Shetland Islands). It was about 90 miles long and about 35 m high above the sea (Antarctic Pilot, 1974). Swithinbank (1969), basing on analysis of the ESSA-3 satellite imageries, reports that in 1967—68 two giant icebergs were seen in the eastern part of the Weddell Sea, measuring 70 by 100 km, and 45 by 100 km respectively, with total area of about 11.000 km². The second of these icebergs has been identified as the Trolltunga iceberg (Swithinbank McClain and Little 1977) — see below.

Tracking drift paths of particular tabular icebergs on aerial photographs and satellite imageries is facilitated by their usually characteristic shapes stable over long periods of years. One of the best known examples is the drift of the Trolltunga iceberg reconstructed from the U.S. satellite imageries by Vinje (1977) for the period 16.XII.1967 to 23.IX.1976 (Fig. 1) and, independently, by Swithinbank, McClain and Little (1977). Before 1967, the Trolltunga was an ice peninsula in Dronning Maud Land, stretching northward close to 0° meridian between 69° and 70° south latitude. It broke off from the ice shelf probably in the second half of July, 1967, as a giant tabular iceberg with dimensions about 100 by 50 km (area of about 5,000 km²), probably 300 m thick, and has started to drift westwards across the Weddell Sea with mean speed of about 4.4 km per day (in 1967—68). In 1969—70 the iceberg grounded on shoals in the southernmost part of the Weddell Sea where it remained until 1975. Then it resumed its drift with coast-parallel clockwise current (northwards) with a mean speed of about 3 km per day in 1975—76 and about 3.5 km per day in 1976. During its long voyage across the Weddell Sea the Trolltunga berg kept its characteristic shape (Fig. 2A) but its area had been reduced by about 10 per cent to about 4,500 km² (Vinje 1977).

*) The satellite imageries discussed here have been obtained at The Arctowski Station during the Polish Expeditions of 1977—78 (leader Dr. S. M. Zalewski) and 1978—79 (leader Doc. Dr. S. Rakusa-Suszczewski).

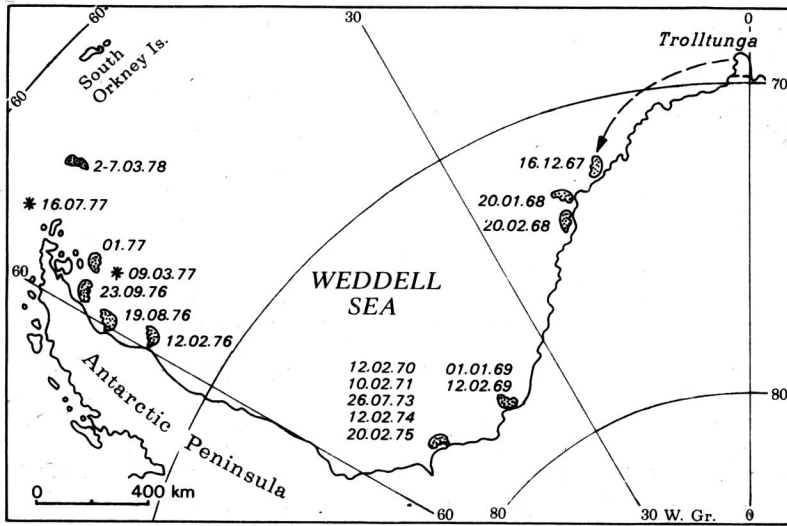


Fig. 1. Drift of the Trolltunga tabular iceberg in the Weddell Sea (after Vinje 1977, supplemented by the authors for the years 1977—1978)

A large tabular iceberg measuring about 35 by 65 km shown on an ERTS satellite imagery taken in late-January, 1977 (Antarctic Journal, 1977) ¹⁾ off Snow Hill Island near Antarctic Peninsula (57°12' W, 64°27' S) may be identified as the Trolltunga berg reduced by about one third with respect to its original area (Fig. 2B). On 9th March the berg's position was more to the south-east (57°10' W, 65°12' S); there it was caught by a fast current which had displaced the berg towards the Bransfield Strait (position 56° W, 65° S on 16th June, 1977 — Fig. 1).

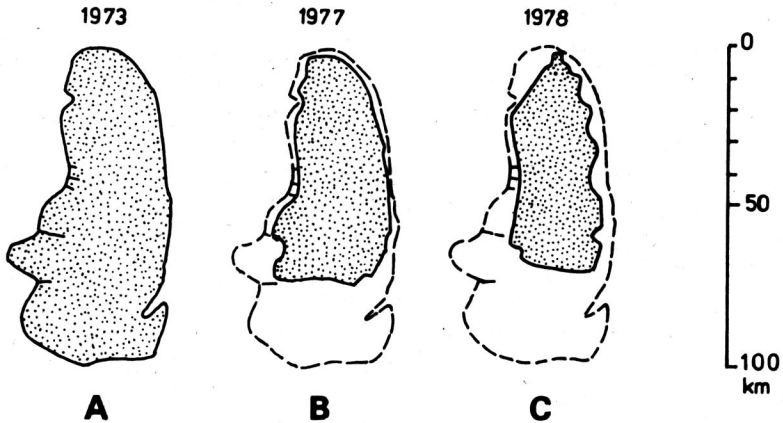


Fig. 2. Shape changes of the Trolltunga tabular iceberg during its drift across the Weddell Sea (based on satellite imageries — data in Vinje 1977, Antarctic J.U.S. 1977, and Birkenmajer and Zubek 1979)

¹⁾ Antarctic Journal U.S. 1977, 12, no 3, p. 3 (photo).

The last positions of the Trolltunga berg have been noted on the Meteor satellite imageries (Birkenmajer and Zubek 1979) received at Arctowski Station (King George Island, South Shetland Islands). From 2nd to 7th March, 1978, the berg drifted north-east with a mean speed of about 2 km per day. On 7th March, 1978 its position was about 52°W and $62^{\circ}15'\text{S}$ (Fig. 1). According to our observations the length of the iceberg was about 68 km, and its width had been further reduced to 29 km (Fig. 2C). Its area was about 1850 km^2 , i.e. about 37 per cent of original area of Trolltunga (about $5,000\text{ km}^2$). The shape of the iceberg underwent further changes, the berg became more slender, indented on one side.

This was the last observation of Trolltunga before it has entered rough seas of the Southern Ocean. Due to fast fragmentation of the berg on high seas causing rapid changes in its shape, the berg's further drift path will be difficult to track. It may be noted that the Meteor imageries taken at Arctowski Station during the austrian summer of 1978—79 have revealed the presence of a large tabular iceberg measuring about 60 by 25 km, thus comparable with the last sizes (1978) of Trolltunga, north-east of South Georgia:

4. I.1979 — $33^{\circ}00'\text{W}$, $53^{\circ}06'\text{S}$

15. II.1979 — $32^{\circ}05'\text{W}$, $51^{\circ}25'\text{S}$

1.III.1979 — $26^{\circ}00'\text{W}$, $49^{\circ}00'\text{S}$.

The shape of this iceberg resembled an elongated rhomboid, however it lacked diagnostic features which would allow to identify it with certainty as the Trolltunga.

References

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