

A Gigantic Iceberg in Lützow-Holm Bay, Antarctica

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リュツォ・ホルム湾の大冰山

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要 旨

1967年2月上旬の氷状偵察においてリュツォ・ホルム湾北西部に大冰山(約50×70 km)を認めたと、その北部と西部の限界は視界不良の

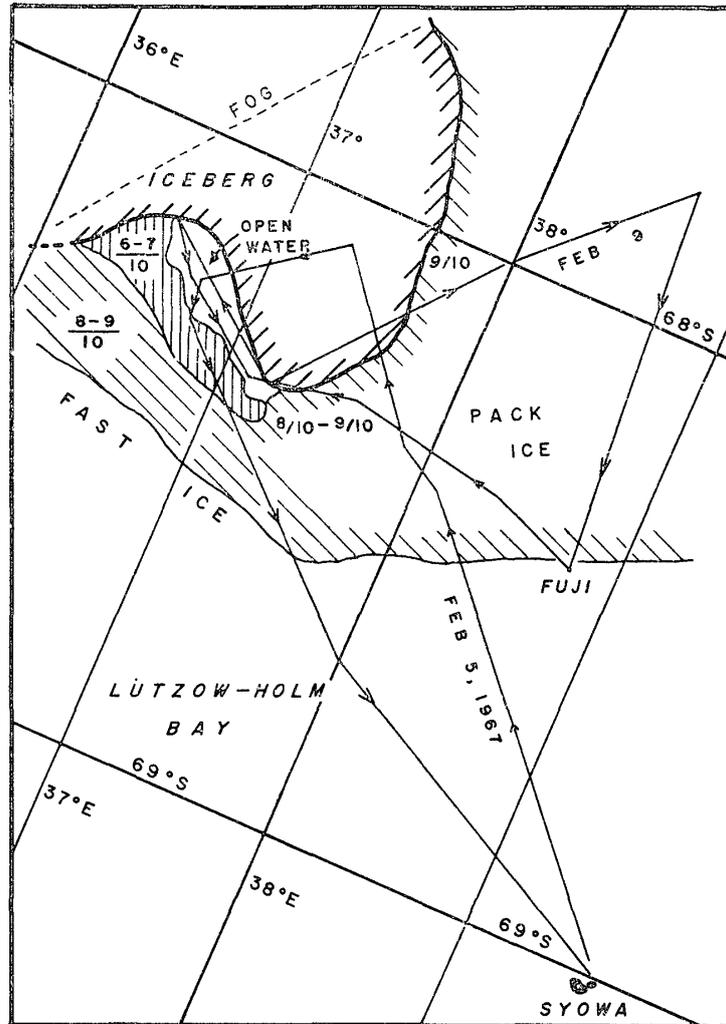
ため不明であった。これは Amery Ice Shelf から発したものと思われ、外国隊の報告や人工衛星の撮影した写真などから漂流状況や形態などについて二三の考察を試みた。

At the beginning of February 1967, when the relief operation of the 8th Japanese Antarctic Research Expedition was nearing completion, an ice reconnaissance flight of Sikorsky S-61A from icebreaker FUJI was carried out on the 5th. At this time the FUJI was at anchor in Lützow-Holm Bay within one kilometre from Syowa Station. The helicopter headed at first to the northwest and reached the southeastern part of a gigantic tabular iceberg which was located roughly in lat 68° S, long 37° E. The iceberg's height above the sea level was estimated to be about 30 m and the snow-covered surface was very flat. The southernmost extremity of the iceberg was in about lat 68°20'S, long 37°15'E. Due to the limited visibility, the northern and western parts of this iceberg were not observed. The size of this iceberg within the visual range of this flight was roughly 50×70 km. It was, however, conjectured that the iceberg should be more than 70 km, presumably extending to the west. The route of flight is shown in Fig. 1, including the results of the second flight made on the 9th.

The next day, February 6th, the FUJI left Syowa Station, and on the 8th reached the edge of fast ice where she remained until the 10th when the final evacuation flights were executed between the ship and the station. During this period the ship stayed at lat 68° 25.4' S, long 38° 46.1' E. On the 9th, the second flight was carried out to the western part of Lützow-Holm Bay expecting to find a navigable route to the open ocean. The writer joined this ice reconnaissance flight. The helicopter reached the southeastern corner of the same gigantic iceberg but could not proceed further because of the occurrence of low ceiling fog. Incidentally, the western part of this iceberg and the sea ice conditions were

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not observed. Open water with a size of 9×18 km was found along the iceberg, as is shown in Fig. 1. Since there was no apparent change in ice conditions, including the position of the gigantic iceberg, between these two flights, the result was summarized and illustrated in Fig. 1.

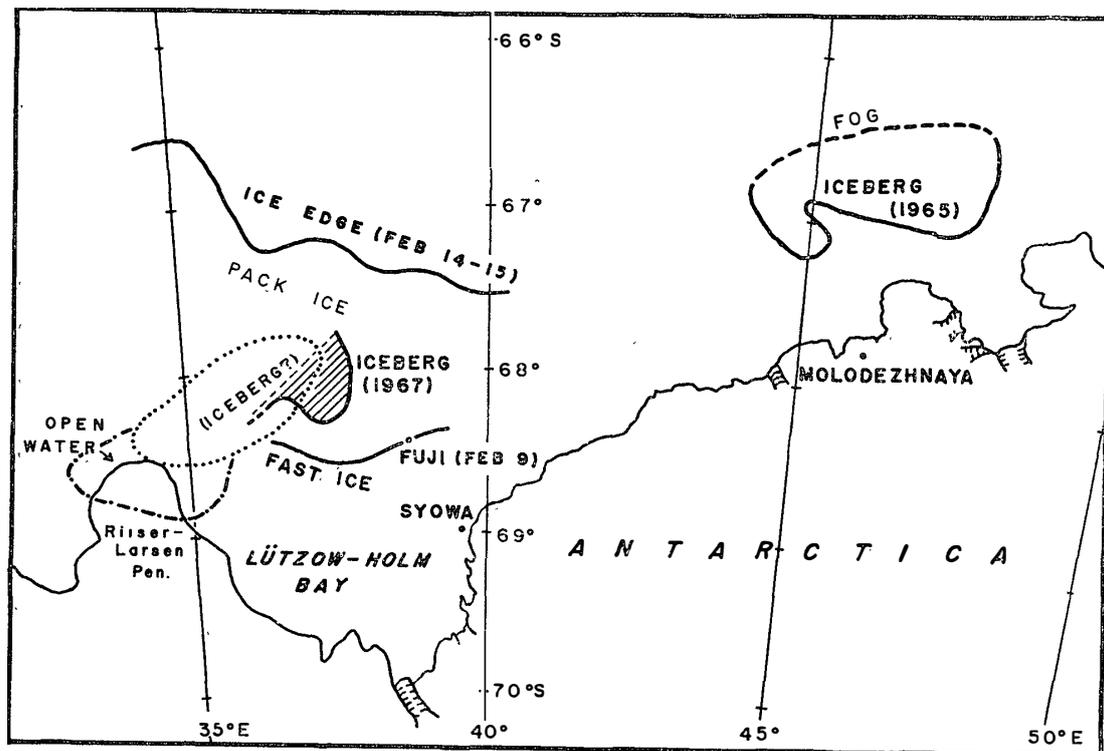


On the 14th the ship escaped from the close pack ice at the meridian of 40° E, detouring to the east along the edge of fast ice and then to the north. Thenceforth she navigated to the northwest along the ice edge and encountered the northernmost extension of pack ice at lat $66^{\circ} 40' S$, long 35° E. Owing to the adverse weather, no more ice reconnaissance flight was made in the western part of Lützow-Holm Bay.

Fig. 1 indicates that the most part of Lützow-Holm Bay was covered with fast ice and the pack ice was blocked by the gigantic iceberg. Actually, less concentrated pack ice was encountered in the eastern part of the Bay when the ship escaped from the pack ice. As mentioned before, no apparent movement of the iceberg was recognized between these two flights, it appears that a part of the

iceberg, possibly the unobserved western portion, was grounded on the shallow bottom. The depth of water around the iceberg in Fig. 1 was in the range of 2000 to 3000 m. However, if one considers the existence of the Riiser-Larsen Peninsula and its extension to the north, the Gunnerus Bank, it may be reasonable to presume the grounding of the iceberg, providing that the iceberg is large enough to occupy the area in long 35° E. The water depth of 254 m was measured at the northern margin of the Peninsula, and the depth at lat $68^{\circ}10'S$, long 35° E was about 300 m. The latter value was obtained by the past Japanese expeditions.

It is worthy of note that a huge iceberg was observed on December 13 and 14th, 1965 by the crew of a Soviet aircraft in the offing of Molodezhnaya Station (KOBLENTS and BUDRETSKIY, 1967). This iceberg is shown in Fig. 2. They estimated that the area of the iceberg was about 7000 km^2 and the thickness was about 250 m. It was deduced that the iceberg was originated from the Amery Ice Shelf and reached the present site in the autumn of 1965, drifting a distance of 1600 km at an average speed of 0.1 knot. A southwestern portion of this iceberg was presumed to be grounded on the shallow bottom with water depth of 160 m. During the ice reconnaissance flight in January 1966, this huge iceberg was separated into two parts with a large crack 18 km long, floating on the sea 500 to 2000 m deep. In the succeeding ice reconnaissance flight made on March 8th, the iceberg was found at a site about 20 km northwest of the previous site where a piece of



iceberg with an area of 300–400 km² remained on the water with a depth of 160–300 m. KOBLENTS and BUDRETSKIY deduced that a piece of this huge iceberg would be found near the Princess Astrid Coast after one year.

LAW (1967) mentioned that the calving of the Amery Ice Shelf started apparently during 1963, and referred to the Soviet observations in this area in 1964–65 austral summer. Comparing the ice front of the Amery Ice Shelf measured in 1963 and 1965, he noted that a huge piece of the ice shelf, approximately 145 km long and 50 km wide, had been broken off and drifted westward.

These papers suggest that the gigantic iceberg sighted in Lützow-Holm Bay was a fragment of the Amery Ice Shelf, possibly a part of the huge iceberg found in 1965 in the offing of Molodezhnaya Station. If one again uses the average drift speed of 0.1 knot, the iceberg in Lützow-Holm Bay must have arrived there in the middle of 1966.

In order to confirm that the gigantic iceberg in Lützow-Holm Bay was large enough to extend to the area of about 35° E, six photographs of the Antarctic area taken by satellite ESSA were examined. Grid lines of latitudes and longitudes and the coastline were given on the photographs. The scale of the photographs was about 1:18,000,000. They were taken on February 5, 13, 17, 18, 19, and 28, 1967, among which the photographs of the 5th and 28th were not well-produced, being partly obscured by clouds.

It was found that a comparatively bright area in the western part of Lützow-Holm Bay was photographed almost at the same locality in these pictures. This seems to suggest the presence of a grounded huge iceberg or very consolidated pack ice. The southwestern margin of this bright area was contrasted with dark open water area with a size of 40×100 km. Even the photographs of the 5th showed this open water under thin clouds. The location of this bright area and open water is illustrated in Fig. 2, in which the observed portion of the gigantic iceberg is also shown. Figure 2 reveals the discrepancy in the position of iceberg and the bright area, supposedly an iceberg. It is also striking that the open water deciphered from the photographs encroached on the northern part of the Riiser-Larsen Peninsula. Actually, the coastline drawn on the photographs runs in the middle of the open water. Even if one takes the errors in the position of grid lines and coastline into consideration, the southern part of the open water barely reaches the northern margin of the Peninsula. Disagreement in the positions of icebergs will be partly attributed to the satellite photographs of a large reduction scale. Photographs taken after February will undoubtedly give more information concerning ice conditions in Lützow-Holm Bay. Of course, the photographs taken between March 1966 and February 1967 will give valuable information of the drift

of iceberg from long 45° E to long 35° E.

As mentioned before, the huge iceberg in the offing of Molodezhnaya Station was broken into two parts. This will give an idea that each piece should be about 3000 km², or roughly 50×60 km, which is equivalent in area to the gigantic iceberg found in Lützow-Holm Bay. There remains a question whether the bright spot in satellite photographs was a single huge mass of iceberg or the unobserved western part of the gigantic iceberg. In January and February 1967, many flights were made by the Soviet aircraft over Syowa Station to the west. They have probably noticed this gigantic iceberg, but the writer has not yet seen any report. The ice conditions in Lützow-Holm Bay in the next season (1967–1968), especially the blocking action of the iceberg upon the pack ice, might give an important effect upon the summer operation of the next Japanese Antarctic Research Expedition.

Acknowledgement: I wish to express my thanks to Mr. W. I. WITTMANN, U. S. Oceanographic Office, who provided me with ESSA satellite photographs.

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(Received October 2, 1967)