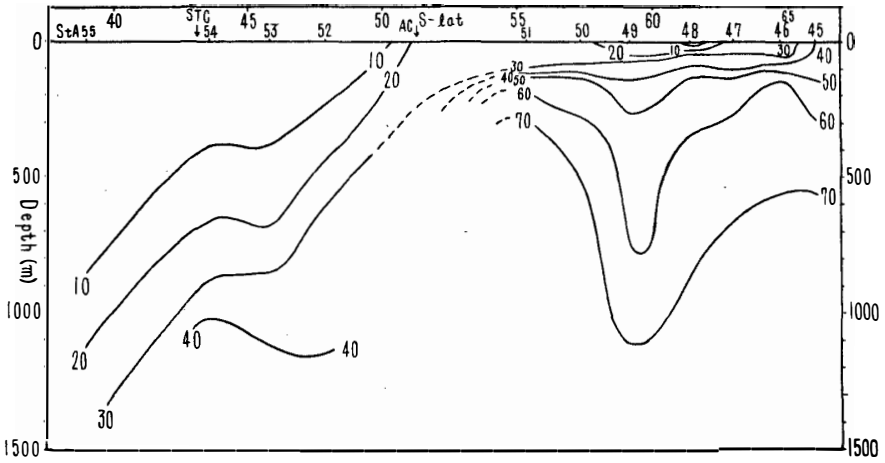

Fig. 4-4. Distribution of silicate-Si (μgA/l) in the vertical section in the Southern Ocean.

RECURVATURE CURRENT IN THE SOUTHERN OCEAN CURRENT*

Takeharu KUMAGORI**, Keijiro OZAWA***
and Saburo YANAGAWA***

南極洋における循環転流

熊凝武晴**・小沢敬次郎***・柳川三郎***

Introduction By the influence of the strongest westerly wind in the southern ocean, the eastward flowing current has been streamed the greater part of this area along the Antarctic continent. In the near part of the Antarctic continent of the Southern Ocean there is the area of the eastward wind blowing. By it's wind, westward flowing current has been streamed along the Antarctic continent. The north part of the eastward flowing current caused by the westerly wind streamed into the south side current of the equator and the south limit of the current is Lat. 60°S. on the average.

This current is interrupted by the Grahamland projecting the Antarctic continent and south point of South America.

It's current advanced to the narrow Drake passage and then streamed toward the east to northward. In this passage there is filled by the easterly current to the bottom and the strongest drift has been continued to Long. 60°W. We observed the south limit of the eastward flowing current is Lat. 60°S. and the north limit of the current is Lat. 40°S. in Long. 20°E. to 50°E. in the Antarctic expedition, 1957 (January to March).

At the same time we discovered the recurvature current to southward at the southern parts (Lat. 55°S.-60°S.) of the eastward flowing current and then found streamed into the westward flowing current.

The Antarctic stormy region in this year ranges from Lat. 43°S. to 51°S. early in January

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and from Lat. 49°S. to 56°S. in March. Area of the Antarctic stormy region almost equal to that of the eastward flowing current, and the drift of the current is caused by this strong westerly wind. In the Indian side of the southern ocean, we measured the drift of the eastward current 5-10 miles per 24 hours and the drift of recurvature current indicated 10 miles per 24hours from January to March in 1957.

Westward flowing current along the Antarctic continent Westward flowing current exists on the southern region out of Antarctic lower barometic preassure and streamed toward the westward along the Antarctic continent by the easterly wind. The direction of the current is settled by the influence of the wind, earth rotation,

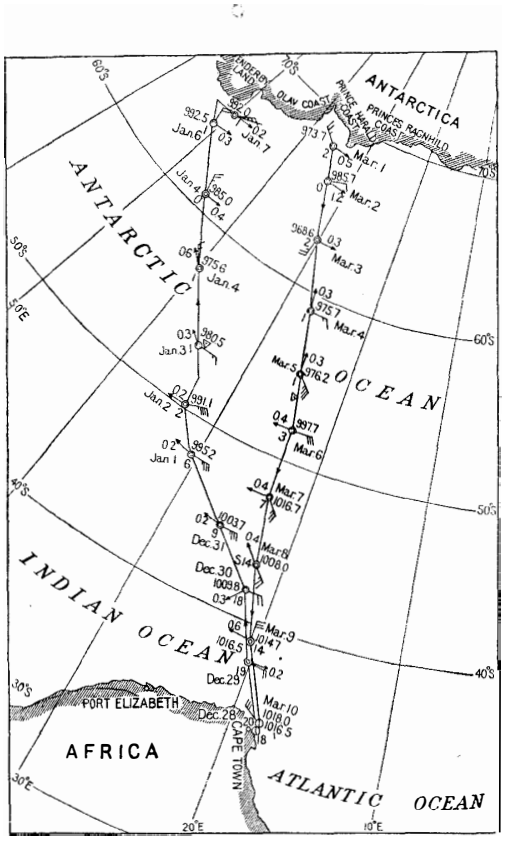

Fig. 1. Chart of the Antarctic Ocean showing the ship's noon positions and tracks.

Noon simbol indicates weather, barometric height, wind direction and force in Beaufort scale, the number beneath the position shows air temperature, the arrow shows current set and the number above the arrow shows current rate.

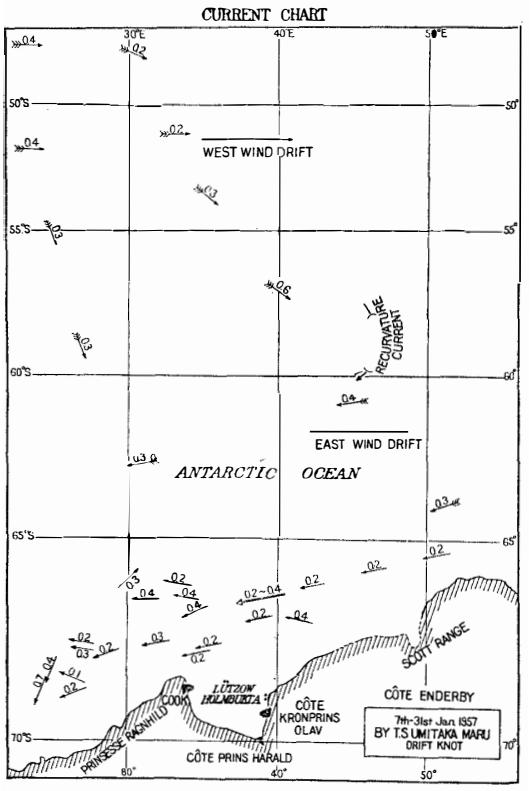

Fig. 2-1. Chart showing west wind drift, east wind drift, and recurvature current in the Antarctic Ocean during January 1957.

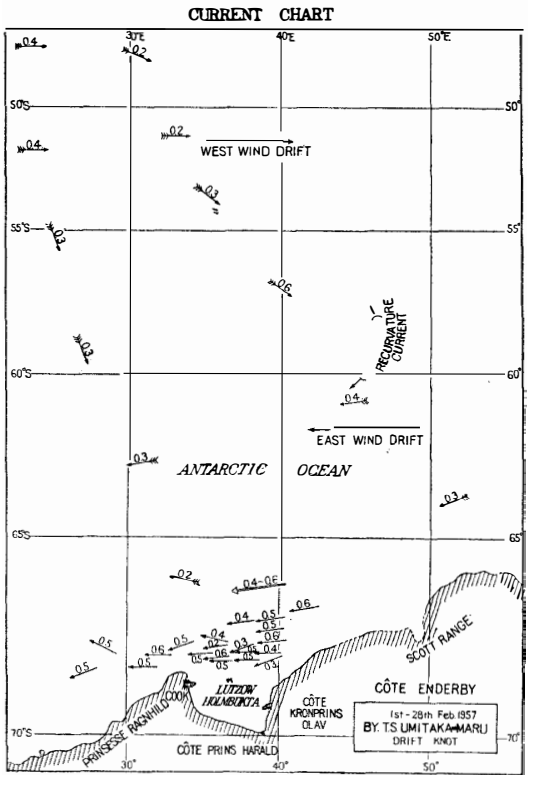

Fig. 2-2. Chart showing west wind drift, east wind drift, and recurvature current in the Antarctic Ocean during February 1957.

the shape of the coast and the state of pack-ice. The circulation of the current is not perfect, but almost continuously round along the Antarctic continent.

According to the observation early in January to March in 1957, westerly current appears in the southern area over Lat. 60°S. The south end of the eastward flowing current has been curved clockwise and becomes recurvature current at Lat. 55°S. to 60°S.; and then streamed into the westward flowing current on the near Lat. 60°S. We measured the drift of the current 7–10 miles per 24 hours.

Dr. EKMAN reported that polar current streamed toward 30° left off the direction of the wind by earth rotation in Antarctica, but we found 20° left off the direction of the wind in this expedition. The direction of the current is variable by the shape of shelf ice and pack-ice. The drift of the westward flowing current from Long. 20°E to 50°E is comparatively strong in January and indicated 5–10 miles per 24 hours (W/S). On February the drift is so much strong as to indicate 10–15 miles per 24 hours (W/S) in summer 1957.

The velocity of this current depends on the easterly wind. The accumulated wind velocity (NE−E/S) in January is 12346.7 miles; in February in 1957. The ratio of the accumulated wind velocity of both months was 1:3.

Conclusion The velocity of this current depend on the easterly wind. The accumulated wind velocity (NE−E/S) in January is 12346.7 miles, and 34100.5 miles in February in 1957. The ratio of the accumulated wind velocity of both in January to February was 1:3.

THE EFFECT OF THE WIND ON VERY CLOSE PACK ICE*

Nobuo ONO**

氷野の漂流と圧縮疎化現象*

小野延雄**

The m/s "Soya" of the 3rd Japanese Antarctic Research Expedition 1958–59 was caught in very close pack-ice between January 14 (at 67°33′S, 40°27′E) and February 1, 1959 (at 67°49′S, 37°18′E).

Wind observations were carried out every hour on the ship at a height of about 18 m above sea level. The east by north-east wind was most frequent in this period.

Wind factors of the pack ice were calculated from data of the wind velocity, the wind direction and the positions of the ship. The effects of the ocean currents were not corrected, for the currents in the Lützow-Holm Bay were not observed. The velocity of the drift of the pack-ice was about 2% of that of the wind. This value was the same magnitude as was obtained in the Central Arctic Ocean free from the coasts. It seemed that the direction of the drift was influenced by the Antarctic coasts and the ocean currents, when the wind velocity was not large.

Several icebergs were seen in the very close pack ice around the ship. Relative positions of icebergs to the ship were observed by the use of the marine radar in every day.

* Printed in the Antarctic Record, No. 10, 23-31 (1960).

** The Institute of Low Temperature Science. Member of the Japanese Antarctic Research Expedition, 1958-59.