Proc. NIPR Symp. Polar Biol., 1, 217–218, 1987

VERTICAL DISTRIBUTIONS OF TEMPERATURE, SALINITY AND GEOSTROPHIC FLOW ALONG 155°E AND 170°W IN THE SOUTHERN OCEAN IN DECEMBER 1968–FEBRUARY 1969 (EXTENDED ABSTRACT)

Mikio NAGANOBU

Tokyo University of Fisheries, 5–7, Konan 4-chome, Minato-ku, Tokyo 108

There are large differences in macro-scale oceanic environments among sectors of Atlantic, Indian and Pacific in the Southern Ocean. The HAKUHO MARU worked on oceanographic sections along 155°E and 170°W in the Pacific sector of the Southern Ocean in December 1968–February 1969 (Ocean Research Institute, University of Tokyo (1970): Oceanographic Data of KH-68-4 "Southern Cross Cruise" of the HAKUHO MARU) (Fig. 1). This paper describes vertical distributions of temperature, salinity and geostrophic flow, almost to the sea bottom, from 35°S to near the Continental shelf of Antarctica along 155°E and 170°W.

Along 155°E: The Antarctic Surface Water occupies between 63 and 59°S. The temperature minimum was −0.88°C at 53 m in the Antarctic Surface Water. The temperature maximum was more than 1.75°C at the layer between 200 and 300 m in the Warm Deep Water. There was a sharp drop in surface temperature from 7.8°C at 54°S to 1.3°C at 62°S. Between 200 and 1000 m, there was also a sharp drop of temperature from 8.0°C at 51°S to 2.5°C at 56°S. In the area having the sharp drop of temperature, a salinity minimum layer of 34.50‰ and under drops from the surface to 1000 m. On the other hand, a salinity maximum layer of 34.72‰ and up rises from 3000 m at 38°S to 500 m at 63°S. Geostrophic flow was calculated referring to the near bottom level. Along 155°E, the water generally flows eastward with a maximum speed of 14.9 cm/s at the surface between 51 and 57°S (Fig. 2). The geostrophic volume transport through 155°E was 163×10^6 m^3/s (eastward flow) between 38 and 63°S.

Along 170°W: The Antarctic Surface Water occupies between 70 and 63°S. The temperature minimum was −1.78°C at 44 m in the Antarctic Surface Water. The temperature maximum was more than 1.25°C at the layer between 200 and 500 m in the Warm Deep Water. A salinity minimum layer of 34.50‰ and under drops from the surface at 59°S to 1000 m at 38°S. On the other hand, a salinity maximum layer of 34.72‰ and up rises from 3500 m at 38°S to 500 m at 70°S. Geostrophic flow along 170°W generally was eastward with a maximum speed of 12.4 cm/s at the surface between 60 and 62°S (Fig. 3). The geostrophic volume transport through 170°W was 158×10^6 m^3/s (eastward flow) between 38 and 70°S.

(Received April 28, 1987; Revised manuscript received July 3, 1987)

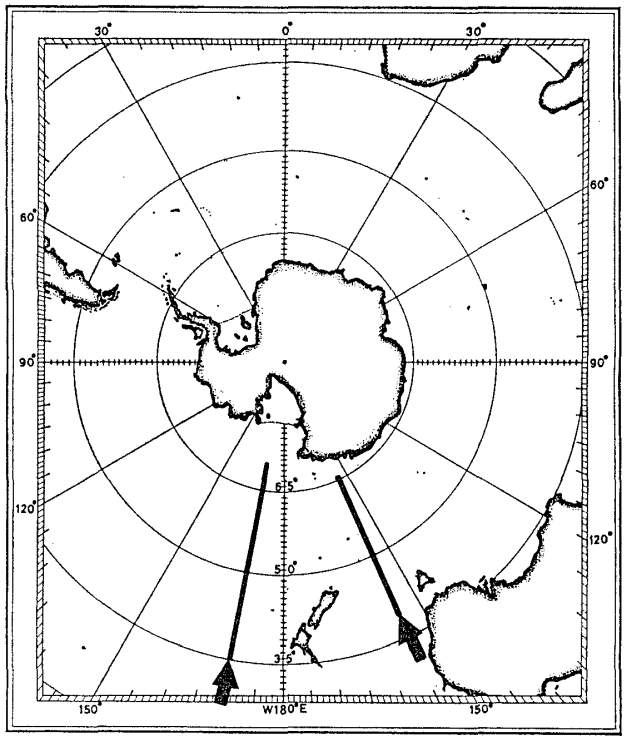

Fig. 1. Oceanographic sections along 155°E and 170°W in the Southern Ocean surveyed by the HAKUHO MARU in December 1968–February 1969.

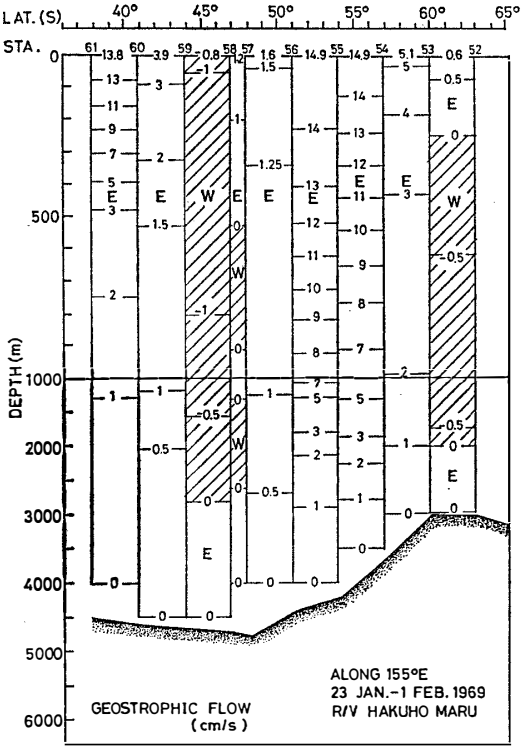

Fig. 2. Vertical distribution of geostrophic flow along 155°E in January–February 1969.

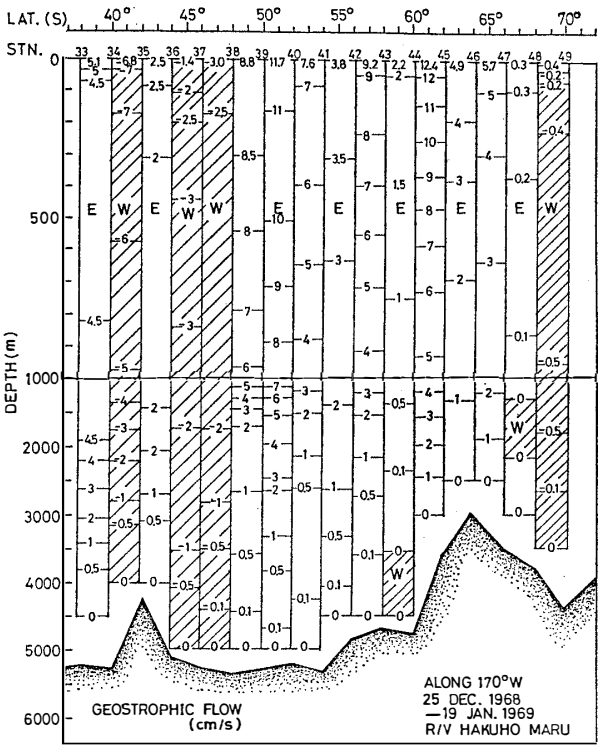

Fig. 3. Vertical distribution of geostrophic flow along 170°W in December 1968–January 1969.