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TEMPERATURE AND GEOSTROPHIC FLOW DISTRIBUTIONS ALONG 90°W, THE DRAKE PASSAGE AND 30°W IN THE SOUTHERN OCEAN IN DECEMBER 1984–JANUARY 1985 (ABSTRACT)

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There are large differences in macro-scale oceanic environments among sectors of Atlantic, Indian and Pacific in the Southern Ocean. The KAIYO MARU worked on oceanographic sections along 90°W in the Pacific, about 60°W in the Drake Passage and 30°W (partly 20°W) in the Atlantic sector in December 1984–January 1985, making Nansen casts almost to the sea bottom from the Subtropical Convergence to the continental shelf. The distribution of the Antarctic Surface Water is discussed; along 90°W, the Antarctic Surface Water occupies between the pack-ice edge at about 68° and 65°S. In the Drake Passage, the Antarctic Surface Water occupies the pack-ice edge around 61° up to 57°S. The layer of the Antarctic Surface Water less than 200 m occupied the continental shelf. Along 30°W, the northward extension of the Antarctic Surface Water is wide from the pack-ice edge around 67° up to 58°S.

Geostrophic flow was calculated along each section, referring to the near-bottom level. Along 90°W, the water generally flows eastward with a speed of 7.5 cm/s at the surface around the Polar Front at 65°S. The maximum surface speed of 9.1 cm/s to the east was computed at a point between the pack-ice and 40 nautical miles north, and in the area 80 miles north of the pack-ice, there was a weak westward flow (less than 0.9 cm/s) from the surface to the reference level near the sea bottom. In the Drake Passage, there exists a fast eastward surface flow with a maximum speed of 56.7 cm/s near the Polar Front at 57°S. Along 30°W, the westward surface flow dominates within 240 miles north of the pack-ice, which is the western part of the Weddell gyre. The strongest eastward surface flow with a maximum speed of 14.4 cm/s was found at 49°S near the Polar Front. Geostrophic volume transport through 30°W was calculated; the transport of strongest eastward flow with a maximum speed of 14.4 cm/s between 46°59′S and 51°00′S was 71×10^6 m^3.

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