Proc. NIPR Symp. Polar Biol., 2, 213-215, 1989

VERTICAL DISTRIBUTIONS OF TEMPERATURE, SALINITY AND GEOSTROPHIC FLOW ALONG 37°E IN THE SOUTHERN OCEAN IN JANUARY–APRIL 1974 (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 R.D. CONRAD of Lamont-Doherty Geological Observatory, Columbia University worked on oceanographic sections along 37°E between the African Continent and Antarctica in the Southern Ocean in January–April 1974 (S. JACOBS *et al.*: CONRAD 17, Hydrographic Stations Sea Floor Photographs Nephelometer Profiles in the Southwest Indian–Antarctic Ocean, Jan.–Apr. 1974, New York, LDGO, 1980) (Fig. 1). This paper describes vertical distributions of temperature, salinity and geostrophic flow, almost to the sea bottom, from

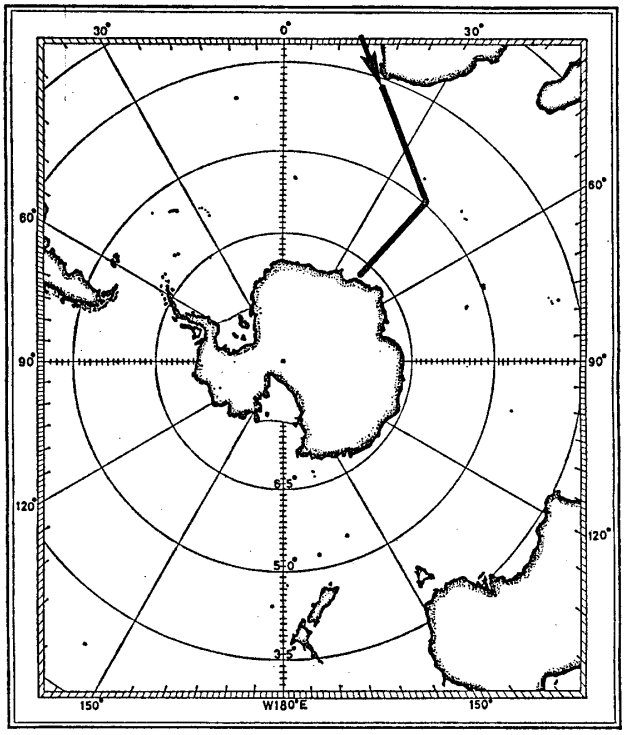

Fig. 1. Oceanographic sections along 37°E in the Southern Ocean surveyed by the R.D. CONRAD in January–April 1974.

* Present address: Japan Marine Fishery Resource Research Center, 3-27, Kioi-cho, Chiyoda-ku, Tokyo 102.

35°S to 68°S near the continental shelf of Antarctica along 37°E.

The Antarctic surface water along this longitude occupies between 68°20'S and 55°30'S (Fig. 2). The temperature minimum was −1.75°C at the depth of 125 m in the Antarctic surface water. The temperature maximum was from 1.23°C to 1.96°C at the layer between 300 m and 600 m in the warm deep water. There was a sharp drop

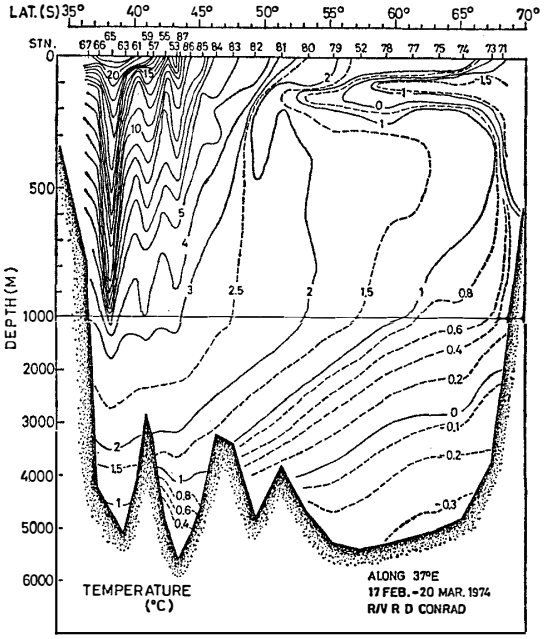

Fig. 2. Vertical distribution of temperature along 37° E in January–April 1974.

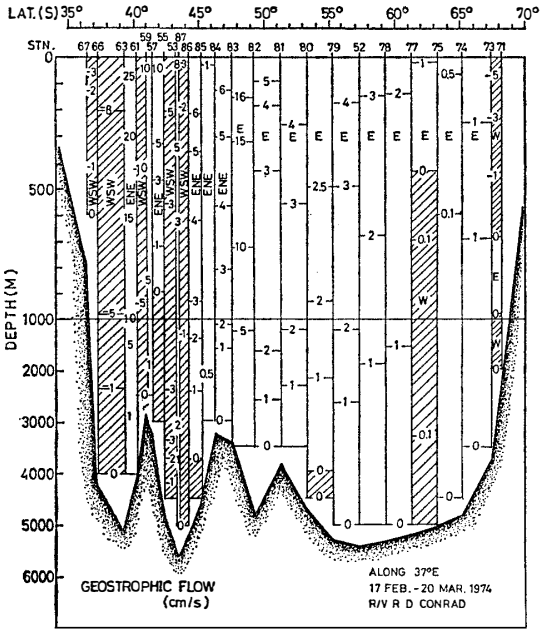

Fig. 3. Vertical distribution of geostrophic flow along 37° E in January–April 1974.

Table 1. Geostrophic volume transport through 37°E in January–April 1974.

Depth (km)	Station 67	66	63	61	59	57	55	53	87
0–1	−0.55	−21.56	21.47	−11.96	8.12	4.40	−4.30	5.37	
1–2		−9.55	7.47	−2.87	2.28	−0.83	−2.70	2.77	
2–3		−2.92	2.11	−0.19	0.16	−0.33	−3.53	3.21	
3–4		−0.94	0.51				−3.22	1.89	
4–5							−0.55	0.23	
Total	−0.55	−34.97	31.56	−15.02	10.56	3.24	−14.30	13.47	

Depth (km)	Station 87	86	85	84	83	82	81	80	79
0–1	−2.25	9.41	1.62	8.55	20.54	7.39	7.75	5.49	
1–2	−1.36	4.05	1.55	2.59	6.52	4.99	4.06	3.37	
2–3	−1.16	1.97	0.59	0.70	1.92	2.69	2.02	1.67	
3–4	−0.76	0.31			0.26	0.33	0.23	0.36	
4–5	−0.26	−0.10						−0.01	
Total	−5.79	15.64	3.76	11.84	29.24	15.40	14.06	10.88	

Depth	Station 79	52	78	77	75	74	73	71	Total 67–71
0–1	6.83	5.32	3.51	0.17	0.37	2.52	−1.01		77.20
1–2	3.83	2.91	2.30	−0.61	0.13	2.08	−0.04		32.94
2–3	2.39	1.59	1.50	−0.64	0.09	0.87			14.71
3–4	1.15	0.69	0.52	−0.24	0.09	0.07			1.25
4–5	0.28	0.17	0.14	−0.09	0.02				−0.17
Total	14.48	10.68	7.97	−1.41	0.70	5.54	−1.05		125.93

+: Eastward component. −: Westward component. (10^6 m^3/s)

in surface temperature from 6.2°C at 48°S to 2.0°C at 55°30′S. Between 100 m and 500 m, there was also a sharp drop of temperature from 4°C at 48°S to 2°C at 51°S. In the area having the sharp drop of temperature, a salinity minimum layer of 34.40‰ drops from the surface to 1000 m. On the other hand, a salinity maximum layer of 34.70‰ rises up from 3000 m at 36°30′S to 500 m at 65°S. Geostrophic flow was calculated referring to the near bottom level. The water generally flows eastward with a maximum speed of 16.4 cm/s at the surface between 48°S and 49°30′S (Fig. 3). The geostrophic volume transport through 37°E was 106.5×10^6 m^3/s (eastward flow) between the Polar Frontal Zone at 48°S and 63°S (Table 1).

(Received March 25, 1988; Revised manuscript received October 1, 1988)