

VERTICAL DISTRIBUTIONS OF TEMPERATURE, SALINITY AND
GEOSTROPHIC FLOW ALONG 175°E IN THE ROSS SEA SECTOR
OF THE SOUTHERN OCEAN IN JANUARY 1967
(EXTENDED ABSTRACT)

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There are large differences in macro-scale oceanic environments among sectors of Atlantic, India and Pacific in the Southern Ocean. We have ever been taking the oceanographic analysis along the meridian sections of each sector (12.5°E/37°E/75°E/114°E/170°W/90°W east Drake Passage/30°W). This paper describes vertical distributions of temperature, salinity geostrophic flow, almost to the sea bottom from 63°03'S to 77°14'S near the continental shelf of Antarctica along 175°E in the Ross Sea area of the Pacific sector using the ELTANIN's data. The ELTANIN worked on oceanographic section by STD in January 1967 (JACOBS and AMOS, 1967) (Fig. 1).

The temperature value of 0°C or less indicating the Antarctic Surface Water was observed from the southernmost part of the Ross Sea as far as 65°S except the surface layer south of 73°S (Fig. 2). The minimum temperature layer was between -1.70°C at 75 m and -1.03°C at 100 m from 66°S to 71°S where the depth of sea bottom was between 2500 m and 3500 m, and between -1.80°C and -1.94°C at 300-400 m from 72°S to 77°S where the depth was between 300 m and 900 m in the Ross Sea. In the surface water from 71°S to 72°S, the lower temperature (-0.17°C) and higher salinity (34.420‰) were recognized as compared with the waters of adjacent area (Fig. 3). In the deep layer near the bottom in the Ross Sea, there was the lowest water temperature (-1.94°C) and the highest salinity (34.935‰).

On the whole the geostrophic flow across this section had the eastward component except the westward flow south of 74°30'S (Fig. 4). The maximum speed of the geostrophic flow was 10.7 cm/s (eastward flow) between 63°30'S and 66°S, where there were steep gradients from north to south in the distributions of the temperature, the salinity and the density. The total volume of transport by geostrophic calculation was $34.04 \times 10^6 \text{ m}^3/\text{s}$ (eastward flow) between Stn. 620 and 627 in the waters off the Ross sea, and $43.79 \times 10^4 \text{ m}^3/\text{s}$ between Stn. 627 and 643 in the Ross sea (eastward flow) (Table 1), respectively. The westward flow south of 74°30'S was regarded as part of the clockwise current in the Ross Sea.

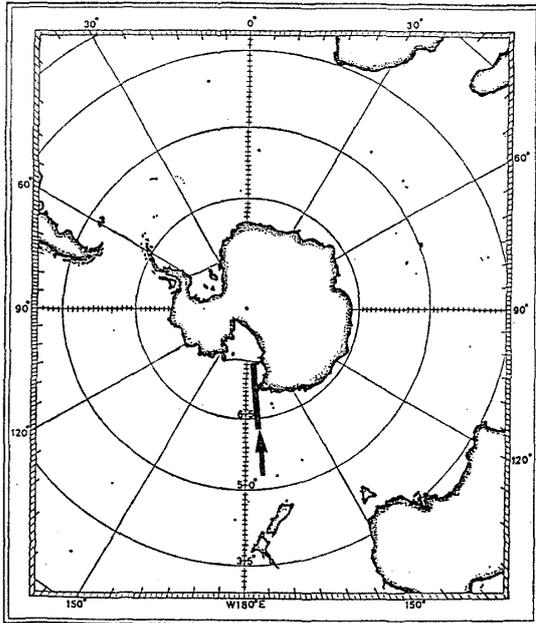


Fig. 1. Oceanographic section along 175°E between 63°S and Antarctica in the Southern Ocean surveyed by the ELTANIN in January 7-23, 1967.

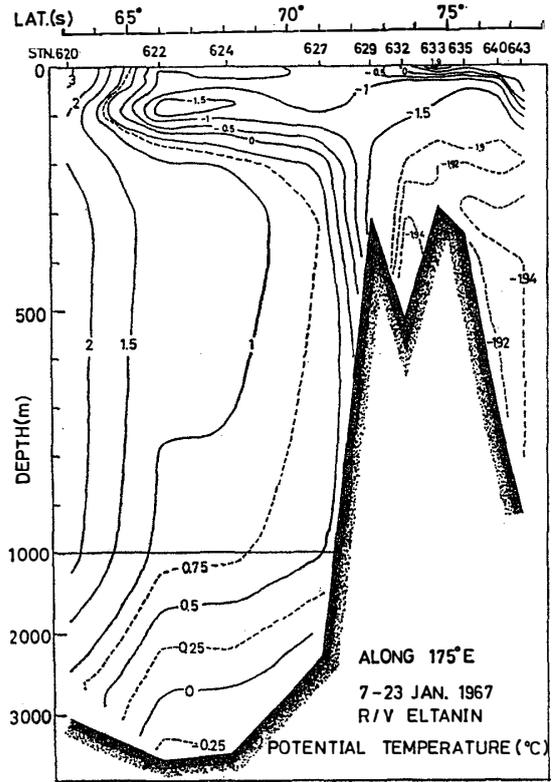


Fig. 2. Vertical distribution of potential temperature along 175°E.

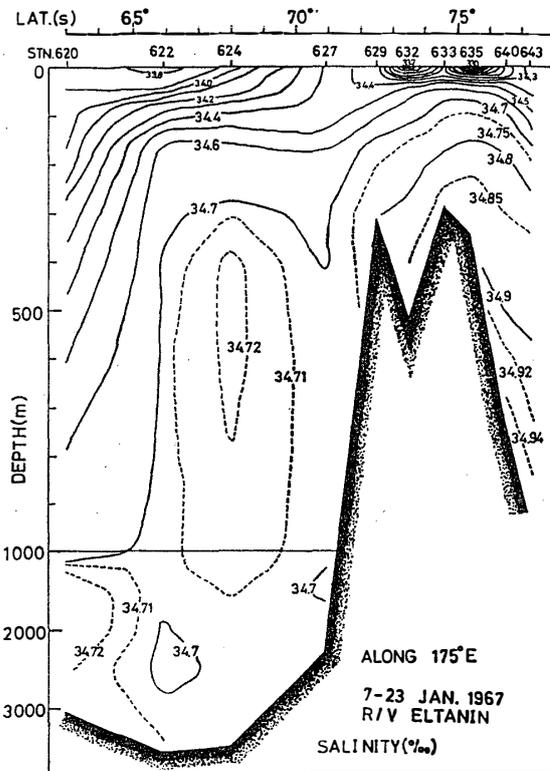


Fig. 3. Vertical distribution of salinity along 175°E.

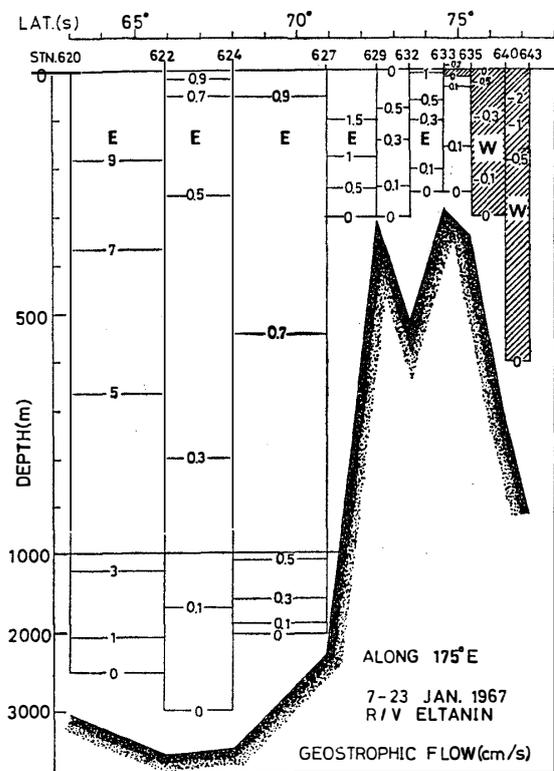


Fig. 4. Vertical distribution of geostrophic flow along 175°E.

Table 1. Geostrophic volume transport through 175°E

Depth (m)	Station				(10 ⁶ m ³ /s)			
	620	622	624	627	Total			
0-500	15.49	0.73	1.60		17.82			
500-1000	5.72	0.29	0.80		6.81			
1000-1500	4.60	0.21	0.72		5.53			
1500-2000	2.60	0.11	0.28		2.99			
2000-2500	0.84	0.04			0.88			
2500-3000		0.01			0.01			
Total	29.25	1.39	3.40		34.04			

Depth (m)	Station							(10 ⁴ m ³ /s)	
	627	629	632	633	635	640	643	Total	
0-100	28.84	5.79	7.55	0.53	-4.21	-15.82		22.68	
100-200	20.26	3.13	2.40	1.01	-2.46	-5.78		18.56	
200-300	7.05	0.84	0.32	0.11	-0.89	-2.33		-5.10	
300-400						-1.25		-1.25	
400-500						-0.93		-0.93	
500-600						-0.37		-0.37	
Total	56.15	9.76	10.27	1.65	-7.56	-26.48		43.79	

+ : Eastward component. - : Westward component.

Reference

JACOBS, S.S. and AMOS, A.F. (1967): Physical and chemical oceanographic observations in the Southern Oceans. USNS ELTANIN Cruises 22-27, 1966-1967. Lamont Geol. Obs. Columbia Univ., Tech. Rep., 1-CU-1-67, NSF GA-894.

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