Polar Front zone in the western Scotia Sea, winter 1977

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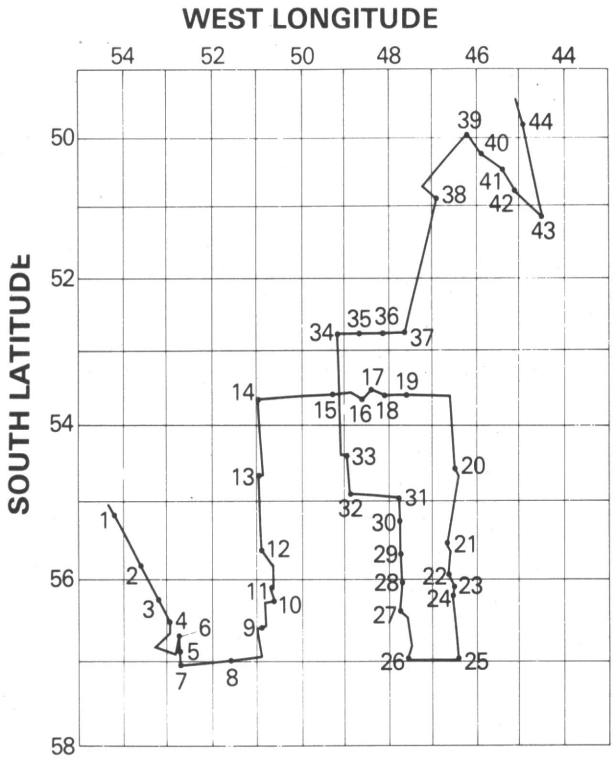
As an Argentine contribution to ISOS (International Southern Ocean Studies), I participated in the July 1977 *Islas Orcadas* cruise 13-14, whose primary objective was to determine the Polar Front on the Scotia Sea in winter.

Field operations. The physical oceanography started on 8 July. On 16 July a main engine failed, and the ship returned to Buenos Aires for repairs. Nevertheless, in 14 days of work, 44 salinity-temperature-depth stations were made (see figure) using a 12-bottle Rosette to standardize the salinity-temperature-depth data and to gather chemical information.



STD station and cruise track, *Islas Orcadas* cruise 13/14.

To determine temperature deviations, thermometers were used in 6 of the 12 bottles, and the salinities were corrected using one Autosal with which the salinity was measured for comparison with the salinity-temperature-depth information.

Definition of Polar Front zone. For the determination of the Polar Front position, the temperature gradient was considered as the Polar Front zone in its surface condition (see Gordon, 1971, table 1), this value being supported in the surface silicates value. The subsurface condition was defined as the position at which the minimum-temperature layer ends or shows an abrupt depth change (Gordon, 1967).

The surface front axis position coincided with the 2°C isotherm. The terms cold limit and hot limit are introduced instead of antarctic limit and subantarctic limit.

Dynamic topography. The relative geostrophic flow axis is observed crossing the two legs of the more westerly bearing. It then turns to the north, passing through the opening that leaves the north part of the Scotia Ridge, and makes a cyclonic turn towards the east passing between the northern Scotia Ridge and the Malvinas Plateau elevated body.

Near station 22 there remains uncovered a small anticyclonic turbulence. This is also noted in the surface temperature as a hot meander of 0°C in colder antarctic water.

The temperature and salinity surface gradient compensation occurs in the same manner as in summer, as shown by the small surface density gradients.

Surface water. Surface temperature, salinity, and silicates were measured in each expendable bathythermograph and salinity-temperature-depth, and the geographical distribution of the properties has been plotted.

The front's surface axis would be the 2°C isotherm and the 15 micromoles per liter silicates isoline; the salinity is not well defined due to the presence of the subsurface front on the Malvinas Plateau elevated body.

The cold limit of the frontal zone is the 1°C isoline, 20 micromoles per liter of silicates, and 33.85 per mill salinity. The hot limit would be near the 3°C isotherm, 10 micromoles per liter silicates, and 34 per mill salinity.

Position of the Polar Front zone. This is defined by surface and subsurface expressions until station 38 and by its subsurface expression from that point to station 44, where I could see clearly the subsurface condition of the front zone, separated from the axis of the surface front by 60 nautical miles.

No meanders as large as those appearing in summer were observed.

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Interaction of the Antarctic Circumpolar Current with topography south of New Zealand

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The cruise southeast of New Zealand by the R/V *Tangaroa* from 4 to 24 April 1978 (figure 1) marked the start of concentrated International Southern Ocean Studies (ISOS) designed to investigate the interaction of the Antarctic Circumpolar Current with the topography of the Macquarie Ridge/Campbell Plateau region south of New Zealand and the formation of subantarctic mode water on the Campbell Plateau. The purpose of this initial experiment was to study the spatial and temporal variability of low frequency motions

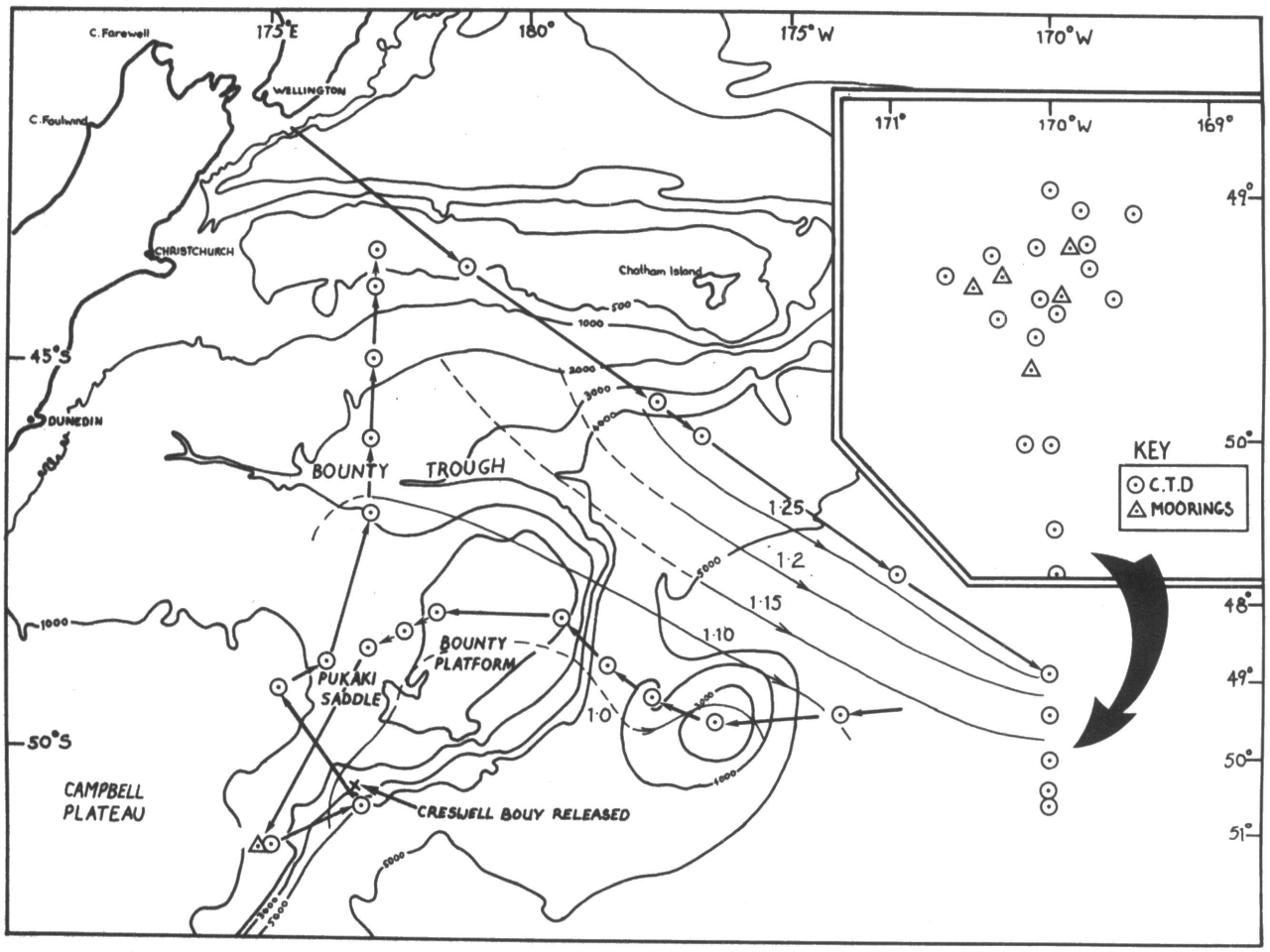

Figure 1. Cruise track of R/V *Tangaroa* 4–24 April 1978, shown on a bathymetric chart of the region southeast of New Zealand. Also shown are CTD station and mooring positions and dynamic height (0–1,000 meters) contours drawn from the CTD data.