

MARINE METEOROLOGICAL AND PHYSICAL OCEANOGRAPHIC STUDIES DURING SIXTH SCIENTIFIC ANTARCTIC EXPEDITION

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Air-sea fluxes of momentum, latent heat and sensible heat fluxes were computed using the bulk aerodynamic formulae from the surface meteorological observations during the onward and return journey of 'MS Thuleland'. The surface fluxes were also computed over polynya. Latent and sensible heat flux values showed large variations with high values occurring around 34°S (of the order of 100 w/m² and 40 w/m² respectively and low values (even negative values in the case of sensible heat) occurred south of 50°S (of the order of 10 w/m² and -10 w/m² respectively). Over the polynya in general there is not much variation in the surface fluxes.

Table-1 gives the variation of air temperature, seasurface temperature, wind speed, vapour pressure gradient and total cloud amount along different latitude belts. From the table it is obvious that the air temperatures were in general lower than the sea surface temperature till 40°S and were higher after 40°S. The maximum wind speeds were observed in the 40°-50°S belt. The maximum vapour pressure gradients were observed in the equator to 10°S latitude belt. The total cloud amount shows us steady increase from equator to antarctic continent. The momentum flux shows very large variations (from 1.86 X 10³ N/m² to 745.3 X 10³ N/m²). The maximum values of momentum flux were observed in the 40°-50°S latitude belt.

Heat and salt budgets of subsurface layers at selected stations over the southern ocean were computed using the temperature and salinity data collected using Nansen bottles at standard depths.

The structure and variability of the temperature in the upper layers (0-450 m) of the southern ocean at selected stations have been studied. The data collected using Expendable bathythermograph from 12°N to 46°S. The mixed layer depth varies from 25 m to 75 m. The mixed layer depth in general increases as we go towards the southern latitudes.

TABLE 1

Latitudinal distribution of air temperature (Ta), Sea Surface temperature (SW), Wind Speed (W), Vapour pressure gradient (eW-ca) and total cloud amount (C).

Latitude	Ta (°C)	TW (⇌)W (Kts.)	eW-ca (mo)	C (Oktas)	
0°-20°S	27.8	28.7	5.33	10.88	2.8
10°-20°S	26.2	27.2	9.73	8.07	5.1
20°-30°S	24.1	24.3	10.89	4.65	4.6
30°-40°S	8.0	19.9	15.09	6.34	6. 3
40°-50°S	7.6	7.2	27.00	2.17	6. 5
50°-60°S	3.3	1.5	14.07	0.97	7. 1
60°-70°S	0.8	1.2	14.00	0.36	7. 7