M.S.108. BENNY N. PETER–Circulation and zonal mass transport in the Indian Ocean region off the Antarctica–1989– Dr. G.S. Sharma

The thesis is a modest attempt to partially enhance the knowledge of circulation

of the Indian Ocean region off Antarctica by carrying oceanography of the region. The aim of the thesis is achieved by working out zonal mass transport any by presenting the distribution of properties on isopycnal surfaces and vertical sections.

The estimation of zonal flux following the method introduced by Montgomery and Strop (1962), is a special technique which gives the characteristics of the water flowing in addition to quantitative estimate. The isopycnal analyses selected for studying the circulation has the advantage that the pressure effects are compensated by choosing appropriate pressure levels to determine the density.

Considering the inter-oceanic exchanges, the Indian Ocean is lossing an additional amount of 48.33 Sv into the Pacific Ocean than it gains from the Atlantic Ocean. The zonal eastward flowing Antarctic Circumpolar Current is found to be influenced by bottom topographic features as well as continental boundaries but it does not show significant variation with season. The latitudinal distribution of zonal flux reveals the multistream structure of the Antarctic Circumpolar Current. The core of the current is associated with the Polar Front and major part of the current is taking place north of the Polar Front, compared to the south.

The bivariate distribution of zonal flux denotes that a major part of the flow is taking place in the deeper levels, compared to surface layers. The 50% limit frequencies reveal a considerable contribution of the Circumpolar Deep Water in the Circumpolar Current. In general, the flux is more homogenous in the eastern side compared to the west. The westward flux near the Antarctic coast is prominent in the Weddell Sea while it is not observed in the eastern side.

The southward spreading of the ascending deep water is traced upto the shelf in the central region (20°E to 55°E). The denser Antarctic Bottom Water flow is restricted by the topography of the Mid-Ocean Ridge, though traces of this water are noticed along 20°E and 40°E upto lower latitudes. A little amount of Antarctic Bottom Water is produced in the region off Enderby Land.

Zonal fronts in the Southern Ocean are the important vertical structures that differentiate the water masses. The Subtropical Front is stronger south of Africa than south of Australia. The Antarctic Polar Front is strong in the west and central regions. But in the east, south of Australia, the Subantarctic Front is much stronger. The Antarctic Polar Front is at about 50°S south of Africa while it is further south (at about °S), south of Australia and a slight southward shift is noticed during summer.

The Antarctic Divergence, a transition between the eastwind and westwind drifts, is well developed in the west. A dicothermal layer is present in the west during summer. The eastward arm of the Weddell Sea Cyclonic Gyre is found to terminate somewhere west of 40°E.

More reliable estimates of the Antarctic Circumpolar Current system are essential for constructing numerical models of general ocean circulation. The heat flux from one ocean to another as well as the loss to atmosphere is invariably related to the transport of Circumpolar Current. The improved investigations in the fields of atmosphere-ocean exchanges of momentum, heat and moisture are needed to enrich our understanding of the circulation and heat budget of the Southern Ocean.