THE AGULHAS CURRENT

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ABSTRACT

The Agulhas Current, which is the western boundary current of the South Indian Ocean, is here considered as an integral part of the subtropical gyre whose circulation and water masses are influenced by seasonal variations in the meteorology unique to the Indian Ocean. In this study 3400 hydrological stations in the southwestern Indian Ocean were used. The depth to which motion in the Agulhas Current may be traced is so great that 2500 decibars was chosen as a primary reference level for geostrophic calculations. The vertical distribution of velocity in the current is so constant, however, that geostrophic transports and velocities to 2500 decibars may be accurately estimated by reference to the 1000 decibar level, and accurate surface flow patterns may be obtained with any choice of reference level.

Changes in the pressure field in the current are strongly reflected in changes in the temperature field. Accurate estimates of geostrophic transports may therefore be made from temperature observations.

Maps of dynamic topography reveal the dependence of the Agulhas Current on the South Equatorial Current as affected by changing meteorological conditions, variations

system depends on seasonal variations in the South Equatorial Current. Tropical Surface Water flows mainly into the northern end of the Madagascar Channel, in greatest quantities in the southern winter, while Subtropical Surface Water enters the Agulhas Current system only past the southern tip of Madagascar, in greatest quantities in the same season. Antarctic Intermediate Water enters the system only from the east. A high-salinity ($34.7°/_{oo}$) water mass of Red Sea origin flows south down the Madagascar Channel, being observed as far as 38°S. The flow of high-salinity water may play a major role in the salt budget of the northern Indian Ocean.