Abstract View

Volume 9, Issue 3 (May 1979)

Journal of Physical Oceanography
Article: pp. 456–468 | Abstract | PDF (803K)

Modal Properties of Antarctic Intermediate Water in the Southeast Pacific and the South Atlantic

Daniel T. Georgi

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

(Manuscript received August 7, 1978, in final form October 30, 1978)

DOI: 10.1175/1520-0485(1979)009<0456:MPOAIW>2.0.CO;2

ABSTRACT

Modal properties of Antarctic Intermediate Water (AAIW) are determined from bivariate distribution diagrams for two regions in the southeast Pacific and two regions in the South Atlantic. The volumetric potential temperature-salinity diagrams reveal distinct differences between the intermediate waters of the southeast Pacific and the South Atlantic. The intermediate waters of the, southeast Pacific are more homogeneous than their counterpart in the South Atlantic. The potential temperature and salinity properties of the large volume mode intermediate water in the southeast Pacific are identical to those of the coldest variety of McCartney's (1977) Subantarctic Mode Water (SAMW). It is evident from volumetrically weighted-average properties that the intermediate water of the South Atlantic is primarily colder (~ 1°C), denser (~ 0.1 mg cm^{-3}) and oxygen poorer(O.5 ml ℓ^{-1}) than the intermediate water of the southeast Pacific.

If it is assumed that no AAIW formation takes place in the South Atlantic outside of the Drake Passage and Scotia Sea, then this temperature difference implies that a substantial heat loss takes place during the transit from the southeast Pacific to the southwest Atlantic. This heat loss can be the result of a horizontal heat flux divergence and/or a vertical heat flux divergence. Assuming that the poleward heat flux at the northern boundary as compared to the southern boundary of the SAMW is small and that the heat flux to the atmosphere is large compared to the heat flux from the deep waters, then a heat loss for the SAMW can be calculated which is the result of a poleward heat flux at the southern boundary and/or a heat flux to the atmosphere. As such, these heat fluxes are compared with recently calculated poleward and cross sea surface heat fluxes. The poleward heat flux due to temperature finestructure, interleaving or intrusions is found to be inadequate to account for the difference in temperature, while the poleward heat flux due to low-frequency motions and the estimated heat flux to the atmosphere are both found to be of the right order of magnitude but a factor of 2 too small. However, these results must be considered preliminary because of the uncertainties in the winter hydrographic conditions and the lack of heat flux divergence measurements.

top

Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718