Meridional Heat transport in the South Atlantic Ocean

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Data from the existing NOAA/AOML high density (HD) XBT line AX18 are currently being used to obtain estimates of the heat transport (HT) across the nominal latitude of 35°S in the South Atlantic, until a more comprehensive plan is formulated.

In collaboration with the Argentine National Hydrographic Service, AOML has been maintaining this line between Cape Town (South Africa) and Buenos Aires (Argentina) since 2002. Through December 2004, a total of eight transects have been completed. Four transects are being planned for each year.

A methodology similar to that used in the North Atlantic with data obtained from AX07 has been developed to estimate the HT across AX18. Salinity profile data obtained from ARGO profiling floats launched along this transect are used in combination with historical T/S relationships, to compute the mass transport in the region. The first estimates of the HT range between 0.5 and 1.0 ± 0.3 PW.

This HD line has the ideal location to capture the heat and mass exchanges between the Indian Ocean and the South Atlantic. However, its western end crosses the highly variable and energetic region of the Brazil/Malvinas Confluence, making it difficult to estimate the barotropic component of the mass transport. Although this problem could potentially be avoided by choosing an alternate western port near 20°S, far from the Confluence region, there are several logistical problems that would need to be resolved.

Additionally, sea heights derived from altimetry fields are being used to aid in identifying the ocean features, such as fronts, eddies and rings, crossed by each transect. These fields will be also used to investigate the surface signature produced by the variability of the HT.

Proposed plans:

A. Improve the estimates by measuring the Malvinas Current at the end of the line.

- 1. Deploy two bottom current meters, one on the continental shelf and the other on the continental slope. Advantage: time series of the current. Disadvantages: time delay between availability of XBT and current data.
- 2. Launch expandable current profilers on the west end of the XBT line.

B. Change the route of the line from Cape Town to the more northern city of Santos, instead of Buenos Aires.

Advantage: the west end of the transect does not cross the highly variable Confluence region, as the Brazil Current is less variable and could be monitored more easily. In collaboration with AOML, Mauricio Matta (FURG, Brazil) is running an XBT line between Rio and the island of Trindade to monitor the Brazil Current. These observations could be used to improve the mass transports on the west end of the alternate HD XBT line.

Disadvantage: It could be difficult to find container ship line that follows this route.