

High density XBT/XCTD lines in the tropical Atlantic

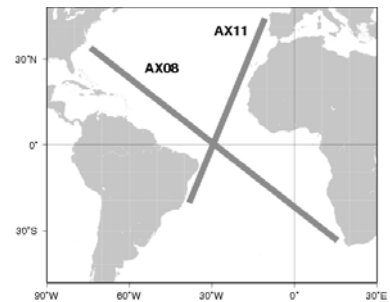
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The upper ocean dynamics in the equatorial Atlantic is dominated by the presence of westward surface currents, eastward countercurrents and undercurrents. In support of the CLIVAR Program and with focus on the ocean-atmospheric interactions in the tropical Atlantic, two high density lines designated as AX08 (XBT) and AX11 (XBT+XCTD) have been implemented in order to improve the current observing system by measuring long term spatial-temporal variability of mesoscale oceanic features, including vertical temperature structure. Given the importance of the tropical Atlantic in climate variability, and the scarcity of observations in this region, data obtained from the measurements along these lines are key to improving the climate forecast by increasing the subsurface coverage. The objective of these high density XBT/XCTD lines is to characterize both the mean and the time-dependent upper ocean properties of the tropical portion of the Meridional Overturning Circulation and of the shallow Subtropical Cell in the Tropical Atlantic, with particular emphasis in sampling between 30°N and 30°S (AX08) and 20°S and 35°N (AX11) and improve our understanding of the role of the oceans in climate. The goals of these projects include implementing a methodology derived from altimetry to monitor the zonal currents to investigate the role of heat advection in SST fields, and determining subsurface climate signals.

Implementation:

NOAA's Office of Global Programs sponsors line AX08. Line AX08 has been operating since December 2000, since 2002 there are four transects scheduled per year and there has been 14 transects completed as of December 2005. Profiling floats are deployed in selected transects. Additional information and data on AX08 can be found at http://www.aoml.noaa.gov/phod/hdenxbt/ax8_home.html

The Institut de Recherche pour le Développement (IRD) and the Centre National d'Etudes Spatiales (CNES) sponsor the French Altimétrie sur un Rail Atlantique et Mesures In Situ (ARAMIS) Project that maintains AX11. A total of 5 transects have been carried since his line was implemented in 2002, with 2 transects done every year during spring and fall. XBT and XCTD are deployed, together with thermosalinograph acquisition and chemical measurements. More information can be found at <http://www.lodyc.jussieu.fr/arnault/ARAMIS>



Methodology:

These lines are being used to compute the mass transport of the zonal surface current and subsurface undercurrent system in the region and to determine near surface temperature variability. The dynamic heights are estimated using the XCTD temperature-salinity profiles or T-S profiles from adjacent XCTD stations (AX11) or the XBT temperature profiles with salinity derived from historical T-S relationships (AX08). The errors introduced by using this approximation are being investigated in both lines using actual salinity profiles derived from profiling float observations. The dynamic height fields are used to investigate the surface signature of surface and subsurface currents. Dynamic height estimates using altimetric fields are also obtained and compared against those derived from XCTD/XBTs.

Future Work:

AX08: Four transects are expected to be carried every year with approximately 1200 XBTs deployed.

AX11: Two transects will be done during 2005, the next one will be in April 2005.