related to a forced anomalous upper level anticyclone couplet straddling the equator. The SST anomalies produce the SO signal of sea level pressure.

The extratropical results are not nearly so clear. There is a strong extratropical response, although it varies greatly with both time and initial conditions. The first couple of weeks of the 1982-83 experiment did show a PNA-like pattern in the 300 mb geopotential height difference field. The lack of recognition of much of the difference patterns is perhaps not unexpected, as the 1982-83 tropical heating anomaly is of unprecedented magnitude and extent.

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Michael J. Fennessy
Lawrence Marx
M/A-COM Sigma Data, Inc.
Code 911
NASA Goddard Space Flight Center
Greenbelt, MD 20771

Jagadish Shukla
Laboratory for Atmospheric Sciences
NASA Goddard Space Flight Center
Greenbelt, MD 20771

On the Seasonal Variations of the Atlantic North Equatorial Countercurrent

The seasonal variations of the North Equatorial Countercurrent (NECC) have been extensively studied. Garzoli and Katz (1983) recently inferred the NECC seasonal variations from the depth of the thermocline, defined as the depth of the maximum vertical temperature gradient.

Using a composite data set formed by combining Nansen, MBT, and XBT temperature measurements, and deriving the dynamic height from an extended temperature field through a temperature-salinity relation, we describe the seasonal variability of the surface dynamic topography of the tropical Atlantic Ocean from 16°S to 30°N and from the west African coast to 80°W (Merle and Arnault, 1983). Our result concerning the NECC differs slightly from that obtained by Garzoli and Katz (1983). The two estimates of the geostrophic NECC are in phase and vary with a similar amplitude, but with a different mean value.

The slope of the thermocline, which integrates the NECC from the depth of the thermocline to the surface, indicates a large reversal of the current from March to June (Garzoli and Katz, 1983). Direct estimates of the variability of the NECC obtained recently from ship drift observations (Garzoli and Richardson, 1983) confirm this result. We did not observe such a large reversal in the surface meridional pressure gradient.

Figure 1 shows the time-longitude variation of the surface dynamic height difference between the northern trough at about 10-12°N and the north equatorial crest at about 2-4°N. In May-June the geostrophic current is at its minimum everywhere from Africa to Brazil. Between 40 and 44°W it slightly reverses direction. The NECC intensity peaks in September-October between 30 and 40°W. East of 30°W a secondary maximum with a bimodal seasonal signal appears in January, but this amplitude of variation is smaller than in the west.

Busalacchi and Picaut (1983), using a numerical model with a single baroclinic mode and a realistic coastline geometry, analyzed the dynamic response of the pycnocline to the seasonal wind field. They found a surprisingly good agreement with our result. In particular, their theoretical model result contained a seasonal variation of the NECC with a maximum intensity in July-October and a near-zero value in April. In contrast to the Garzoli and Katz (1983) result determined from the thermocline topography, Busalacchi and Picaut (1983) did not find a reversal of the NECC.

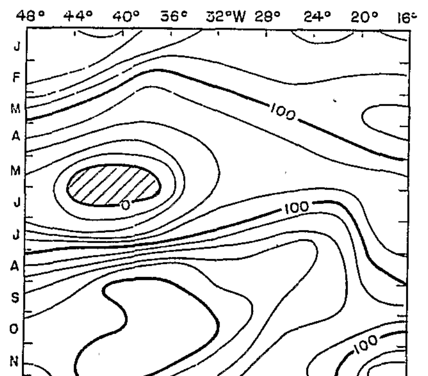

FIGURE 1 (*Arnault and Merle*)
Time-longitude diagram of the dynamic height difference (relative to 500 db) between 10-12°N and 2-4°N. This difference is proportional to the geostrophic zonal velocity of the North Equatorial Countercurrent.

The question remains why the meridional slope of the thermocline seems to better represent the observed NECC than the meridional dynamic slope of the sea surface. Further studies comparing dynamic height, heat content, and depth of the thermocline (defined either as the depth of maximum vertical temperature gradient or as the depth of the 20°C isotherm) will help solve this problem.

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Sabine Arnault
Jacques Merle
ORSTOM
Laboratoire d'Océanographie Physique
43-45 Rue Cuvier
75231 Paris Cedex 05
France