

TACE: Diapycnal mixing processes in the upwelling regions of the tropical Atlantic.

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Objectives

There are severe gaps in our understanding of mixing processes and diapycnal transport in the upper tropical Atlantic, although these mechanisms are known to be important for the mean state and variability of SST and thus strongly contribute to the variability of the tropical Atlantic climate system. The overarching goal of this project is to quantify the impact of diapycnal mixing processes on the variability of sea surface temperature from observations that will be collected during a microstructure measurement program in the central and eastern tropical Atlantic between 2005 and 2008. Primary objectives are:

- to observe and understand the spatial and temporal variability of mixing processes within the upwelling regions.
- to improve mixing parameterizations through analysis of oceanic and meteorological conditions for mixing mechanisms.
- to improve estimates of diapycnal fluxes of heat, salt and biogeochemical tracers across the base of the oceanic mixed layer.

Measurement program

The measurement program is designed to capture the temporal and spatial variability of mixing processes associated with the variability of ocean circulation and meteorological forcing. Observations will focus on the region of the Gulf of Guinea during the seasons of strongest temporal SST variability, but will also include measurements in the areas of the upwelling regions in the Guinea and Angola domes.

To resolve the different background conditions during the dominant annual cycle in the Gulf of Guinea, microstructure surveys will be carried out on 5 French (coordinator B. Boulès) and 3 German research cruises. Two cruises each are scheduled for boreal spring and for boreal fall. In boreal summer, surveys will be carried out on 3 cruises to analyze diapycnal processes acting to maintain the cold tongue and to study the modulation of mixing due to the presents of instability waves.

Additionally, one summer survey is planned in the region of the Guinea Dome. Enhanced microstructure observations will be performed at the locations of the PIRATA moorings in the Gulf of Guinea, that will be surveyed during 7 of the 8 cruises. At these locations continuous time series of several days will be collected to resolve the diurnal cycle.

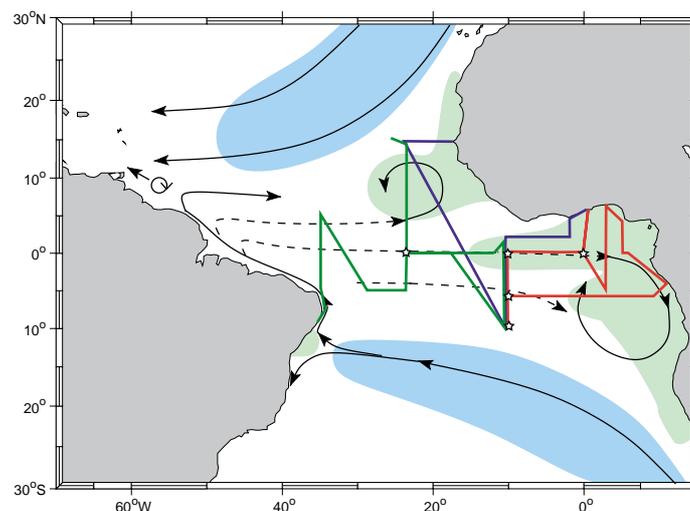


Figure: Approximate cruise tracks of six cruises of the measurement program (green, blue and red lines). Stars indicate positions of PIRATA moorings.

The project was proposed to Deutsche Forschungsgemeinschaft (DFG) in December 2004