

TACE : Study of the upper layers and of the air-sea exchanges in the Gulf of Guinea

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Objectives :

Mostly due to the presence of equatorial and coastal upwellings and of the “cold tongue” in boreal summer, the Gulf of Guinea (GG) is an area of prior interest for climatic studies in the Tropical Atlantic and for the West African Monsoon (WAM). The prior goal of the program EGEE, French oceanic component of AMMA (African Monsoon Multidisciplinary Analysis) and contribution to TACE, lies in the comprehension of the oceanic processes that control key parameters as the Sea Surface Temperature -SST- and salinity -SSS-, the mixed layer depth -MLD- and heat content, and thus that control the energy exchanges at the ocean-atmosphere interface in the GG, and their variability mainly from seasonal to interannual time scales. Through the use of numerical models and experiments, of in situ and satellite measurements or products analysis, of process studies etc, this program aims to improve the knowledge and the simulation of the boundary oceanic and atmospheric layers that control the air-sea exchanges in this particular area.

Measurements program :

The measurements program is principally dedicated to the GG area, and mostly consists in research cruises during the whole Extended Observation Period (EOP) of AMMA, ie from 2005 to 2007, at the rate of two cruises per year that will be carried out in May-June and September-October of each year, ie during the onset and late phases of the WAM (roughly corresponding to the ones of the equatorial upwelling and cold tongue).

During these six cruises, the measurement of classical hydrological parameters (through CTD-O₂, XBT and XCTD profiles, TSgraph, sea water samplings and analysis...) and current (S&L-ADCP) will be achieved. The maintenance of the ATLAS buoys of the PIRATA program will also be ensured in the GG. SVP drifters equipped with barometric pressure and wind sensors (resp. GDP/AOML/NOAA) and ARGO profilers will be deployed. pCO₂ will also be measured all along the tracklines from 2006 (resp. IRD/LODYC).

Additional microstructure measurements will be carried out (resp. IFM-GEOMAR; see 1-pager by M.Dengler) and Helium measurements in the upper layer (resp. Univ. Bremen; see 1-pager by M.Rhein) during five of the cruises, for mixing and upwelling rates studies respectively.

During the June-July 2006 cruise, corresponding to the AMMA SOP-1 observation period, turbulent flux measurement will also be carried out thanks to a turbulent flux measurement system of INSU/Météo-France, similar to the instrumented mast used during EQUALANT 1999 (see picture A). The meridional section south of Cotonou (Benin), at 2°50'E, will be occupied twice at 3 weeks interval, and this section will also be simultaneously covered from aircraft in order to sample both atmospheric and oceanic boundary layers.

The measurements program also consists in a) the installation and maintenance of a meteorological station at São Tomé island, located at 6°E-Equator in the far east of the GG (see picture B); b) the contribution for maintenance of coastal stations along the GG coasts, c) short specific cruises between Dakar and Cape-Vert Island during the 2006 SOP for the ocean surface layer survey, in collaboration with the Senegal-AMMA program, and d) the validation (XBT, ARGO profiler deployments...) of research or merchant vessels transits in the area.

