

## **TACE: Tropical Atlantic Climate Experiment**

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The ocean has a major influence on tropical Atlantic variability mainly through the influence of tropical Atlantic SST on variations of the Atlantic marine ITCZ complex. The most notable climate impacts involve the variability of rainfall over northeast Brazil and the coastal regions surrounding the Gulf of Guinea, and the fluctuations in rainfall and dustiness in sub-Saharan Africa (Sahel). Many studies indicate a high degree of potential predictability for climate variations in the tropical Atlantic region. However, progress in tropical Atlantic climate prediction has been slow to come due to insufficient understanding of ocean-atmosphere processes that determine climate variability, lack of adequate data to initialise forecasts, and systematic errors in the models used for prediction (Figure 1).

Understanding tropical Atlantic climate variability, with the goal of improving its predictability and identifying and quantifying its societal impacts, are important research goals recognized by CLIVAR. Concerted international effort is needed to improve the understanding of the regions' climate variability and the mechanisms that underlie its observed behaviour. A "Tropical Atlantic Climate Experiment" (TACE) has been proposed to address these issues. TACE is envisioned as a program of enhanced observations and process studies in the tropical Atlantic spanning a period of approximately 6 years (2006-2011). Its goal is to provide a focused observational and modelling effort to advance climate predictability in the surrounding region and to provide a basis for assessment and improvement of coupled models. The results of TACE are expected to contribute to the final design of a sustained observing system for the tropical Atlantic (Figure 2).

A TACE "White Paper" (<http://www.clivar.org/science/atlantic.htm>) provides an overview of the physical processes affecting climate variability in the tropical Atlantic and priorities for further study. An abbreviated synopsis of TACE (<http://www.clivar.org/science/atlantic.htm#NEWS>) outlines its major scientific thrusts and provides recommendations for new and/or continuing observations and modeling studies that are thought to be essential for TACE. These recommendations represent the culmination of planning efforts that have been carried out between 1999-2004 at several workshops, including the recent Tropical Atlantic Workshop in de Bilt, Netherlands (June 2004). Details of implementation were discussed at these meetings and represent the current consensus on the required observational and modeling components of the program.

To further develop TACE, a one-day "TACE Implementation Workshop" was held in Miami, Florida on February 3, 2005. The participants endorsed the TACE initiative as timely and relevant to CLIVAR goals, and supported its unified observational, modeling and synthesis concept. Many of the observational elements of the TACE plan are currently in place or proposed. TACE will encourage and perform further enhancements to observations in the tropical Atlantic, promote model intercomparison studies to identify model biases and their causes, and set up a data archive to facilitate synthesis studies. As an outcome of the workshop, two working groups will be established: (i) a TACE "Observations Working Group" to coordinate observational logistics and develop needed enhancements, and (ii) a TACE "Modeling and Synthesis Working Group" to coordinate modeling efforts and encourage collaboration between research modelers and operational centers. These activities are expected to significantly speed progress toward improved seasonal and interannual prediction in the tropical Atlantic, and to begin to advance understanding of possible impacts of global change on the tropical Atlantic and its global teleconnection patterns.

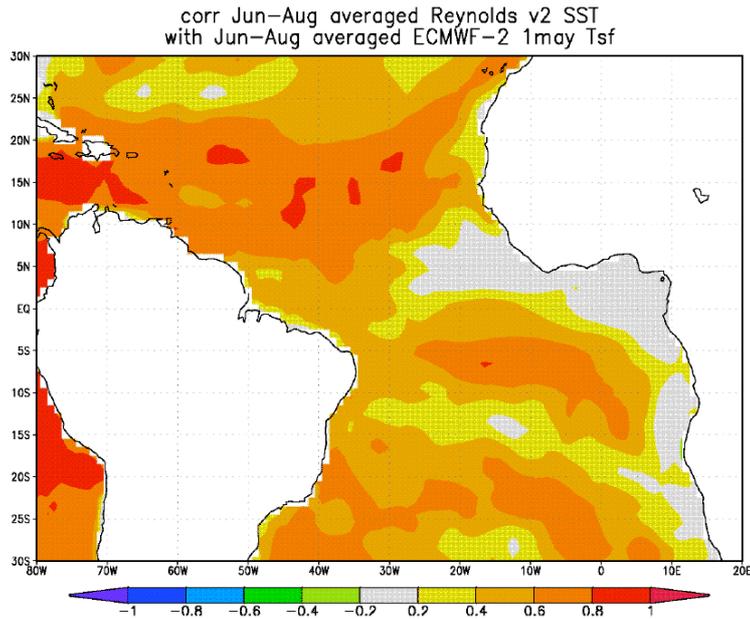


FIGURE 1. Correlation between observed sea surface temperature in June, July, August and sea surface temperature that is predicted at May 1st using ECMWFs seasonal forecasting system over the years 1987-2001. Note the lack of skill in the eastern tropical Atlantic (Hazeleger and van Oldenborgh, in preparation).

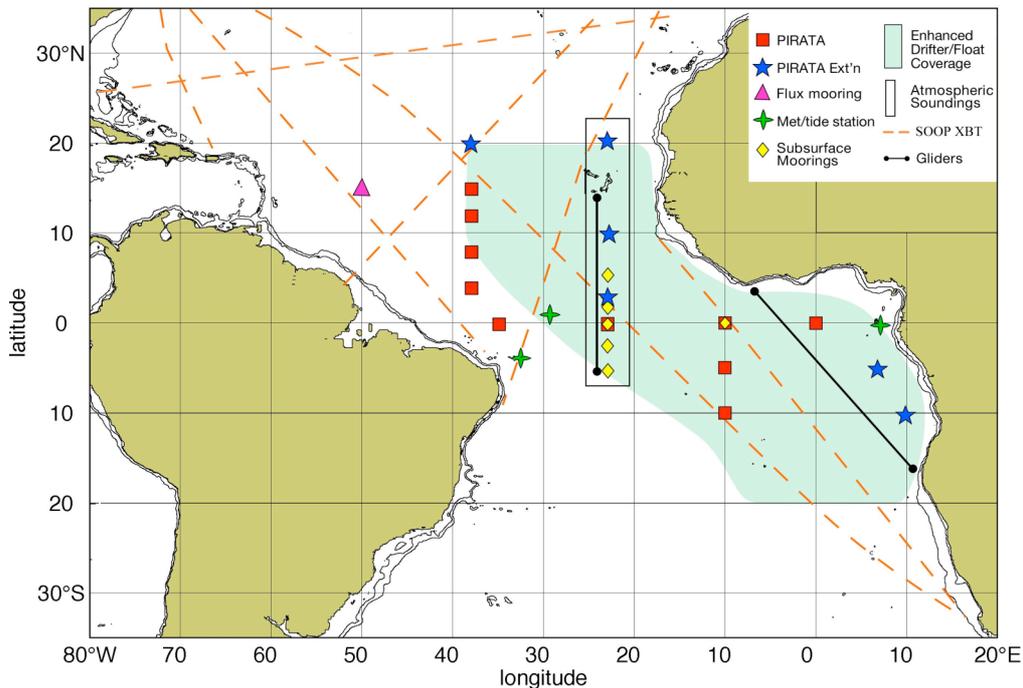


FIGURE 2. TACE Observational Strategy. The proposed observing system components include (see legend): Continuation of PIRATA moorings, PIRATA extensions along  $23^{\circ}W$  and  $5-10^{\circ}E$ , equatorial subsurface (non-realtime) moorings along  $23^{\circ}E$  and at  $10^{\circ}W$ , island meteorological and tide gauge stations, enhanced float/drifter coverage in the eastern TA, repeated atmospheric soundings along  $23^{\circ}W$ , ship-of-opportunity XBT lines, and selected glider transects (see the "TACE Synopsis" for more details).