Enhanced Monitoring for the Eastern Pacific Investigation of Climate Processes (EPIC)

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As part of enhanced monitoring for the Eastern Pacific Investigation of Climate Processes (EPIC), an IMET mooring was deployed at 20S, 85W in the stratus deck region, and the easternmost (95W) Tropical Atmosphere and Ocean (TAO) line of moorings was enhanced with additional sensors and moorings. In addition, the biannual TAO maintenance cruises were specially equipped to monitor air-sea fluxes and boundary layer properties.

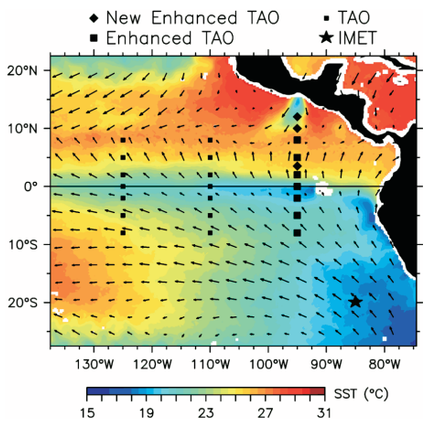

Figure 1. EPIC mooring array shown in relation to the November 1999 averaged TMI SST and QuickSCAT wind stress fields.

Fall Sections (~November)

- **Low-level southerlies from cool southern region to warm ITCZ near 7-8N.**
- **Southern hemispheric atmospheric boundary layer (ABL) near neutrally stable, with small air-sea temperature differences and strong inversion layer capping.**
- **Fall 2000 northerly winds aloft extended from ITCZ region only to ~1-2N, southern hemispheric air above ABL was relatively dry, and ABL was capped by a strong inversion layer.**

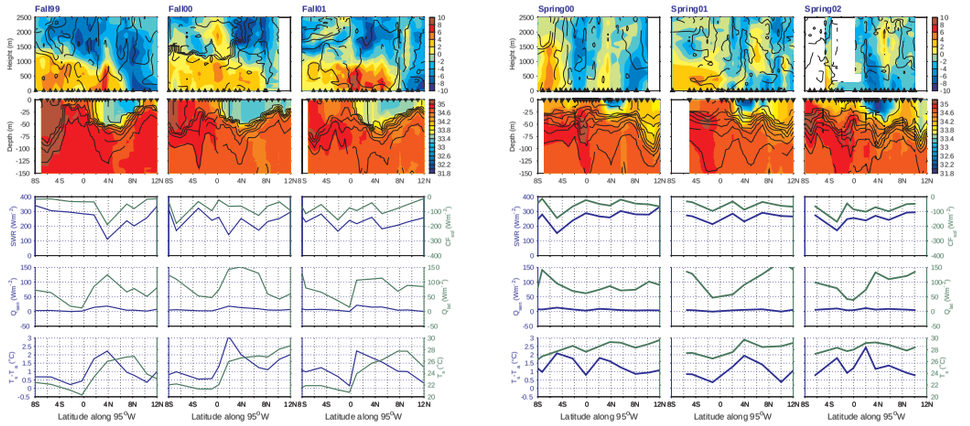

Figure 2. Boundary layer measurements along 95W from NOAA ships Ron Brown (fall sections) and Ka'imimoana (spring sections). Top two panel: meridional winds (shade) and relative humidity (contours); salinity (shade) and potential temperature (contours). Bottom three panels show incoming solar radiation and cloud forcing; sensible and latent heat loss; sea minus air temperature difference and SST.

Spring Sections (~March)

- **Striking seasonal and year-to-year differences!**
- **No equatorial cold tongue, large air-sea temperature differences, and an ABL that lacked a well-defined stable layer as a cap.**
- **Double ITCZ in Spring 2000.**
- **Rainfall from southern hemispheric ITCZs caused surface water to be anomalously fresh.**

- **Steady annual cycle in southern hemisphere.**
- **Fall / Spring ship sections capture annual cycle extremes.**
- **Warm season southern hemispheric ITCZ associated with weak winds, reduced solar radiation, and increased longwave radiation.**

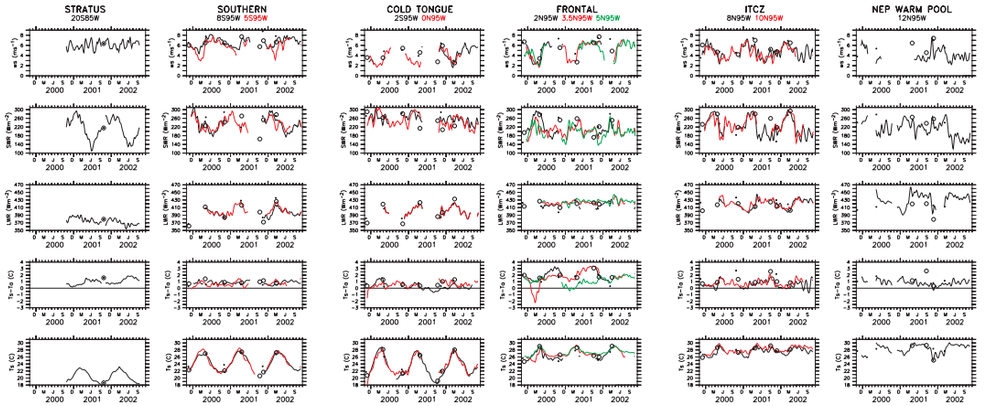

Figure 3. Monthly averaged buoy time series with corresponding ship measurements along 95W ('o') and 110W ('x').

- **Annual cycle less pronounced in north. Synoptic variability contributed to differences between ship and monthly-averaged buoy measurements.**
- **Effects of Tehuantepec gap winds (e.g. Fig 1) evident in 12N ship and buoy data.**
- **ITCZ and northeastern Pacific warm pool regions were remarkably dark and cloudy during September 2001 (EPIC2001 survey) and September 2002.**

Ship transect measurements combined with moored time series show the structure and evolution of the cold tongue / ITCZ complex, and meridional extent of the cold season stratiform. These data provide large-scale context for intensive observations made during EPIC2001 (September-October 2001). Likewise, data from the most recent Fall 2002 section will be used to investigate developing El Nino.

For more information see: http://www.pmel.noaa.gov/tao/epic/

Cronin, M. F., N. Bond, C. Fairall, J. Hare, M. J. McPhaden, R. A. Weller. Enhanced oceanic and atmospheric monitoring underway in eastern Pacific. EOS, Transactions, AGU, 83(19), pages 205, 210-211.