

Regional Stratification and Shear of the Various Streams Feeding the Philippine Straits – ESR Component

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LONG-TERM GOALS

To determine the impact of the time-varying larger-scale regional oceanographic and atmospheric conditions on the Philippine Archipelago strait dynamics, as well as on the basin-wide archipelago ocean mixing and ocean-atmosphere interaction processes.

OBJECTIVES

To identify the oceanographic stratification and shear conditions during different monsoon and inter-annual time periods within the Philippine Archipelago region in order to assess the potential impact on the smaller-scale dynamical processes.

APPROACH

Regional CTD and Lowered ADCP [CTD/LADCP] observations analyzed within the context of global data sets.

WORK COMPLETED

Background data analysis on the Philippine Archipelago region is continuing using global satellite and tide gauge data sets. Analysis of the June-July 2007 Philippine Exploratory Cruise CTD and LADCP observations has begun.

RESULTS

Sea Surface Temperature: Analysis of the OI Infrared Satellite SST reveals that the June 2007 SSTs during the Exploratory Cruise in the Philippine Archipelago region were exceptionally warm, even for the typically warm June time-period (Figure 1 and Figure 2).

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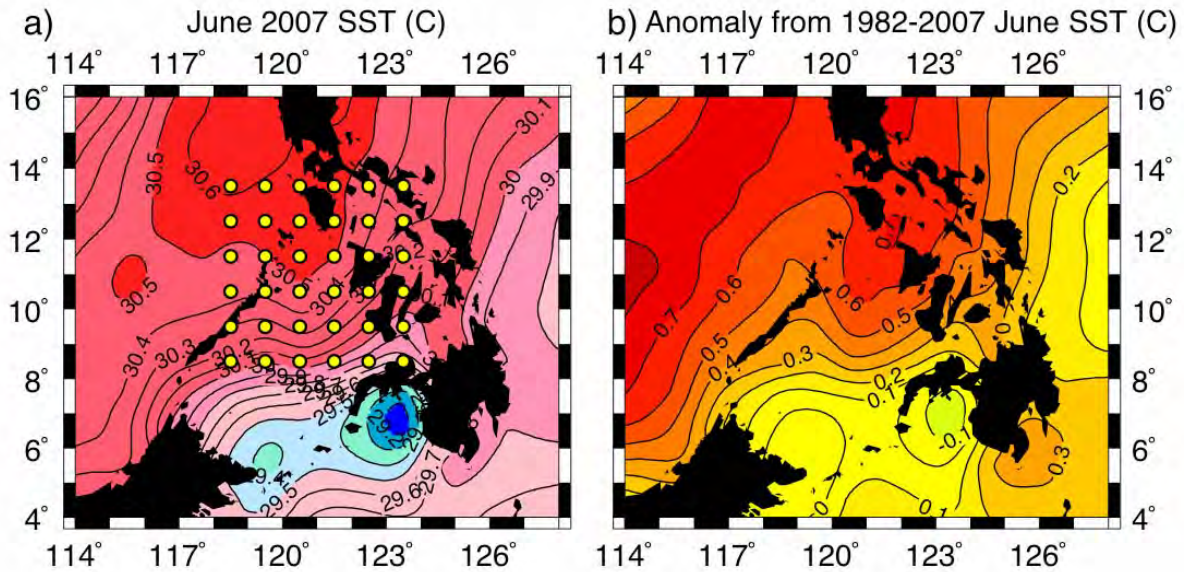


Figure 1. The OI satellite SST data product showing the June SST (a) and the anomaly from the 1982 to 2007 mean June SST (b) in the Philippine region. The yellow circles in (a) show the data locations used for the time series plot in the next figure.

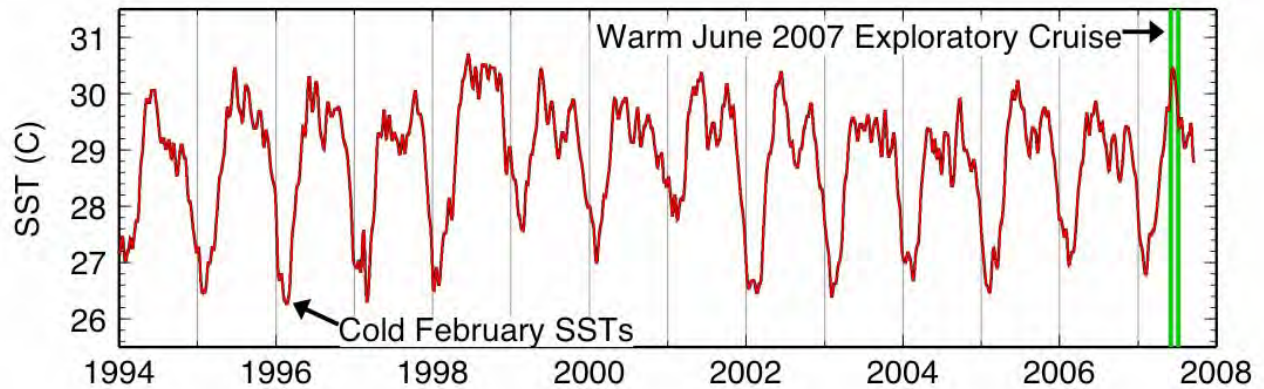


Figure 2. SST time series for the Mindoro Strait / northern Sulu Sea region in the Philippine Archipelago revealing the very warm SST conditions during the June 2007 Exploratory Cruise (data locations are shown in Figure 1 by yellow circles).

June 2007 Exploratory Cruise CTD Data: The 142 CTD/LADCP stations obtained during the Exploratory Cruise (Figure 3) throughout the Philippines region reveal the unique deep density differences between basins (Figure 4), as well as the influence of buoyant surface freshwater and warm June-July surface ocean temperatures. Tentative calculations of the surface salinity minimums (Figure 5), isothermal depths (Figure 6), mixed layer depths (Figure 6), and barrier layer thicknesses (Figure 7) reveal the geographic variability in the parameters defining the June-July 2007 upper ocean conditions throughout the archipelago.

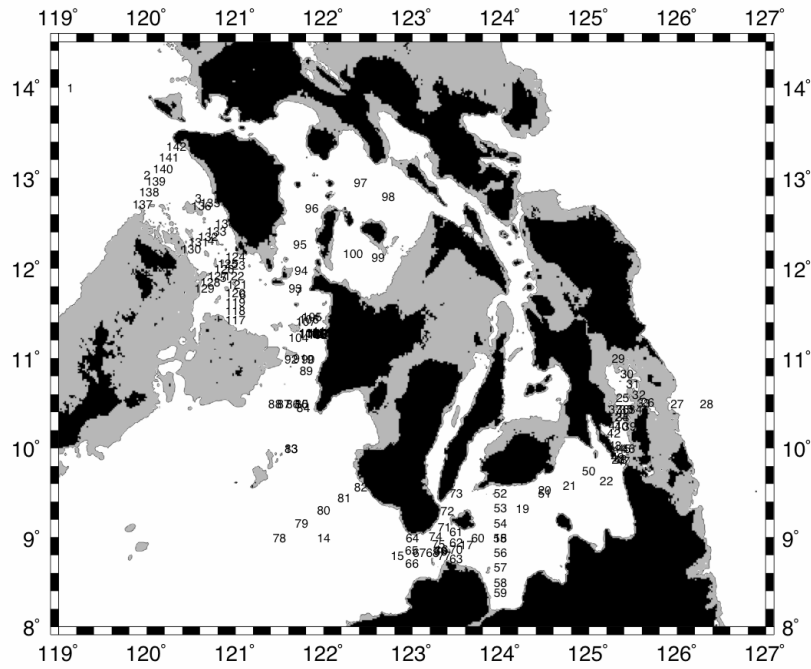


Figure 3. CTD/LADCP station map for the June-July 2007 Philippines Exploratory cruise with the 100 m bathymetry shade in grey.

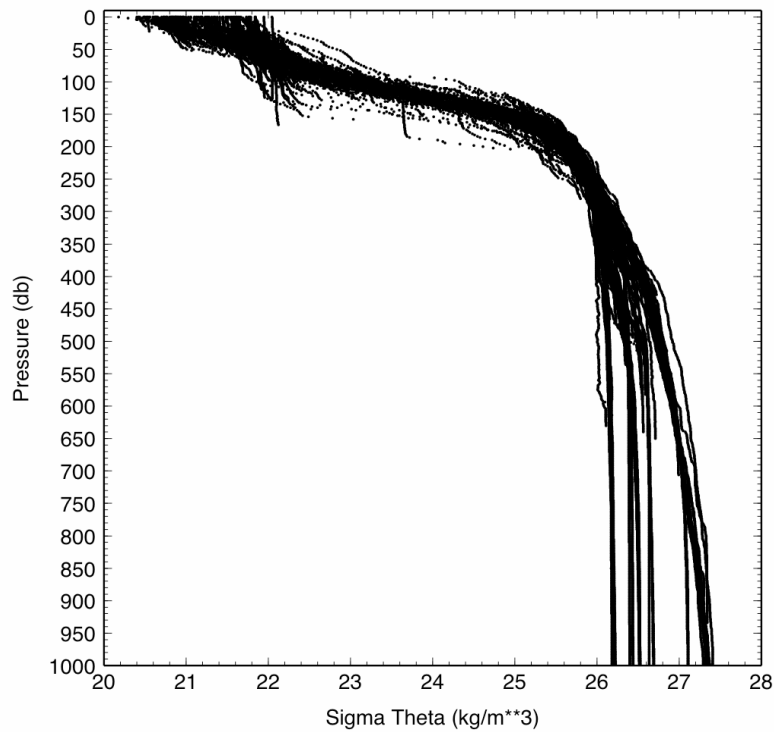


Figure 4. The density (sigma theta) profiles of the 142 Philippines CTD stations revealing the buoyant upper layer due to freshwater and June-July surface warming, and in the depths the isolation of the various basins resulting in distinguishing deep density profiles.

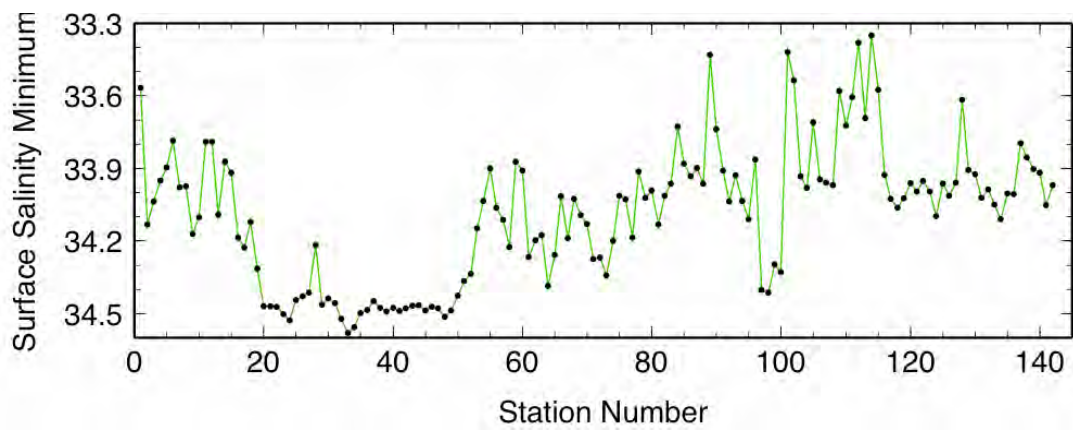


Figure 5. Tentative calculation of the upper salinity minimum by station number.

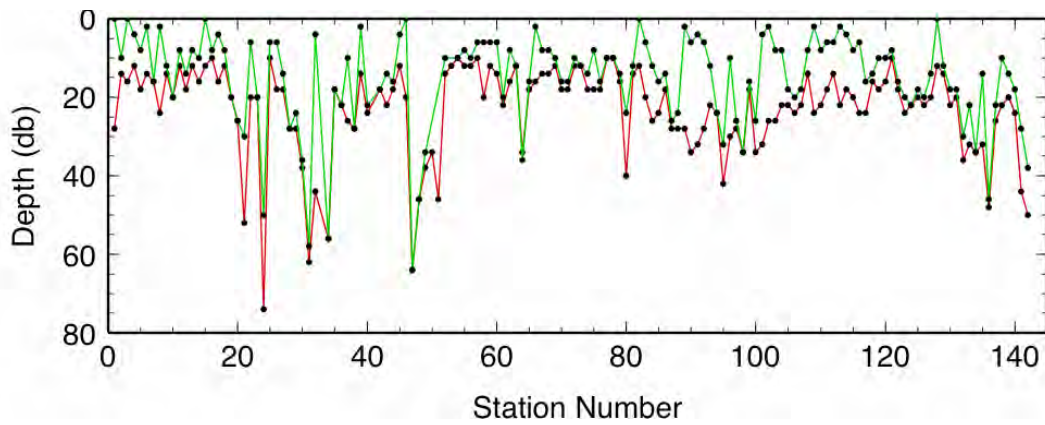


Figure 6. Tentative calculations of the upper isothermal layer depth (red) and the mixed layer depth (green) by station number.

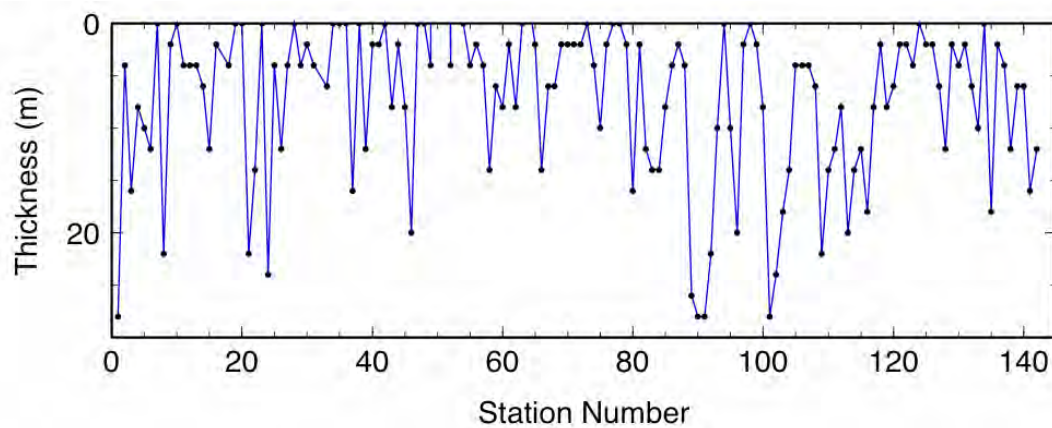


Figure 7. Tentative calculation of the barrier layer thickness (blue) by station number.

IMPACT/APPLICATIONS

The larger-scale stratification and shear of the water column throughout the Philippine region reveal the boundary conditions that can impact strait dynamics. The exceptionally warm ocean surface conditions observed during the June-July 2007 Exploratory Cruise may be important in understanding the full range in variability, yet to be observed, throughout the region.