Monthly and Interannual Variability of the Eastern Pacific Warm Pool

Luis Zamudio\textsuperscript{1}, Pat Hogan\textsuperscript{2}, Joe Metzger\textsuperscript{2}, & Jorge Zavala\textsuperscript{3}

\textsuperscript{1}Center for Ocean-Atmospheric Prediction Studies, Florida State University

\textsuperscript{2}Naval Research Laboratory, Stennis Space Center, Mississippi

\textsuperscript{3}Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México

HYCOM NOPP GODAE meeting, (Nov. 7-9, 2006) COAPS, Florida State University, FL.
Results indicate:

- The Eastern Pacific Warm Pool (EPWP) strengthens and weakens, but remains throughout the year.

- The monthly variability of the EPWP is forced by the surface heat fluxes.

- The interannual variability of the EPWP is modulated by the warm water advected poleward by interannual coastally trapped waves.
Tools

- 25 year non-assimilative simulation (1979-2003) of a Pacific configuration of HYCOM.

1/12° Pacific HYCOM Basin-scale Temperature
SST Climatological Mean (1979-2003) for May
SST Climatological Mean (1979-2003) for May
The eastern Tropical Pacific area of cyclone formation accounts for ~17% of the global total of tropical storm development (Amador et al., 2006).
Why does the EPWP reach its maximum during May?

Why does the EPWP weaken during mid summer?
EPWP’s May maximum of ~4,000,000 km²

EPWP’s January minimum of ~30,000 km²

EPWP’s July mid-summer minimum of ~2,300,000 km²

EPWP gains heat through the surface from February to October

EPWP loses heat from November to January.
SST > 28.5°C

Area coverage with SST > 28.5 °C

MODAS is blue
HYCOM is red

\[ r = 0.85 \]
The monthly variability of the EPWP is forced by the surface heat fluxes.

If the surface heat fluxes are the main forcing of the EPWP, then the surface heat fluxes should include an interannual variability, since the EPWP includes interannual variability in extension and strength.
Surface heat fluxes
Sea surface height anomaly time series from 1/16° Pacific NLOM, first along the equator (starting in the western Pacific and propagating eastward until arrival at the Americas West Coast), and second along the coast to the 20°N.
The EPWP includes maximums and minimums of \(~4,000,000\) km\(^2\), and \(~30,000\) km\(^2\) during May and January, respectively and a mid-summer relative minimum of \(~2,300,000\) km\(^2\) during July. Those maximums and minimums are partially explained by the corresponding one month lagged maximums and minimums in the Surface heat fluxes.

The extension of the EPWP has a strong interannual variability increasing (decreasing) during El Niño (La Niña) years. That is due to the interannual variability in the generation of Equatorial Pacific Kelvin waves.
Research in Progress

HYCOM-GLB-053 SSH and Currents for 2004-154-00

HYCOM-GLB-053 SSH and Currents for 2004-214-00