A new look at ocean heat content as a diagnostic for monitoring El Nino with
implications for prediction and impacts

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The linkage between changes in subsurface ocean conditions in the equatorial Pacific and
the evolution of ENSO events is well known. Observations of the subsurface are made
routinely and ocean heat storage is a commonly used variable in the operational
monitoring of ENSO. Here we report on the diagnostic utility of focusing on ocean heat
storage in the east-central Pacific where the horizontal subsurface temperature gradient
(slope of the thermocline) is climatologically a maximum.   Observations of anomalous
heat storage in this region are found to be a very good leading indicator (6-9 months in
advance) for the onset and demise of both El Nino and La Nina events, including heat
storage observations made during the boreal spring, traditionally representing a period of
limited predictability.

In addition, observations of anomalous heat storage for a limited domain in the eastern
Pacific are found to be linearly correlated as high as 0.95 at 3 months lead with NINO 3
sea surface temperatures. Given the well-known relationship between SST in the eastern
Pacific and rainfall in Peru, the index for this region of the Pacific is shown to have utility
for advance warning of anomalous rainfall there.