

# Correlation of palaeo-El Niño archives across the Pacific Ocean from LGM to present

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Drought in the western Pacific and failure of the Asian monsoon have been strongly correlated with El Niño warm current and the atmospheric Southern Oscillation events for the period of instrumental recording, ~140 years. Base cyclicity is quasi-periodic over that time with events recurring between 2-10 years and lasting ~18 months. Recently Tudhope et al. (2001) have correlated the  $\delta^{18}\text{O}$  record from seasonally banded corals in PNG with instrumental data to show that geochemical proxies can be used to track past activity of ENSO. Their data also hint at a lower-frequency cyclicity with a repeat period of ~80 years. Other recent papers (e.g. , Douglass et al. 2002, Moy et al. 2002; Stott et al. 2002) have argued for lower-frequency cyclicity ranging between 15 and 2000 years over the period of the Holocene and beyond. Without exception studies of longer term variation are either restricted in the length of the record or cannot resolve the base level cyclicity in El Niño.

We have been studying Holocene-Late Pleistocene sediments in several estuaries along the temperate central NSW coast for the past several years, *inter alia* to investigate decadal-millennial scale cyclicity and to identify controlling mechanisms. Although ENSO is commonly invoked as a long-term cause of variation in eastern and central Australia, actual evidence remains elusive. We have used a number of proxies for variations in clastic sedimentation rate and organic productivity that have been shown elsewhere to be indirectly related to drought-non-drought (“normal rainfall”) cycles. Spectral analyses of downhole variation in these parameters have yielded cross-correlated cyclicities at ~360 years, ~500-530 years, ~270-290 years, 420-450 years and ~210 years, and subordinate periods of ~650 years, 1200-1400 years and ~1800-2100 years, but our data are currently limited to the range 200-3000 years.

Another approach is to examine a record of palaeo-El Niño variability from a location where it is known to occur, where base-level (at least semi annual) resolution is available and where a continuous, long-term (at least 20,000 years) record is available so that El Niño base variation can be directly tied to longer-term cyclicity. Accordingly, through participation in Leg 201 of the ODP, we have accessed a finely laminated Holocene-Late Pleistocene sequence from three drill sites on the Peru continental margin, the home of the El Niño, and one of the locations where a local base-level alternation of upwelling (cold-water) and tropical (warm water) conditions is present and can be directly linked to longer-term variation. Preliminary analysis of our records suggests that the laminations are annual to semi annual in resolution and that the decadal (~15 year) - centennial (we estimate 112 year) variability present in instrumental data, can also be identified in palaeo-El Niño archives.

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## **References:**

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