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# HAS GLOBAL WARMING CHANGED THE NATURE OF ENSO? - NEW INSIGHTS FROM RECONSTRUCTED SEA LEVEL

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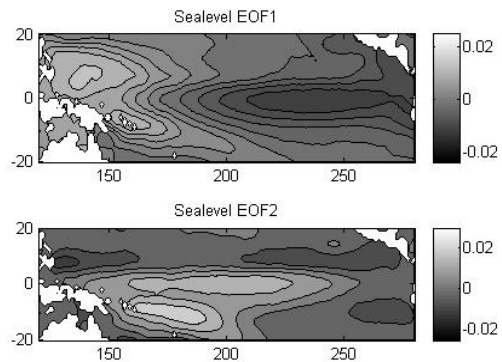
Previous studies have used warm water volume in the Pacific Ocean to predict ENSO with a seven month lead time. Warm water volume data however is only available back to 1980. Sea level shows a similar performance to warm water volume in predicting ENSO and now a reconstructed data set of sea level is available back to 1950 and earlier (Church and White et al. 2004).

Warm water volume is used to understand the recharge/discharge mechanism of ENSO (Meinen and McPhaden 2000). Sea level can be used in the same way, see figure. Studying this recharge/discharge mechanism back to 1950 in sea level shows that the formation of El Niño events altered around the time of the climate regime shift in 1975, when El Niño events became more intense. It appears that the recharge/discharge mechanism was less important during this earlier period and El Niño events began their development in the east of the basin rather than the central Pacific.

The question then is, has ENSO changed due to natural decadal variability or has global warming changed the background state on which ENSO lies? If global warming is responsible for the change in ENSO, we may continue to see the intense El Niño events that have dominated the last twenty years.

## References

- Church, J. A., White, N. J., Coleman, R., Lambeck, K. and Mitrovica, J.X. 2004 'Estimates of the Regional Distribution of Sea Level Rise over the 1950-2000 Period.' *Journal of Climate*, **17**, 2609-2625.
- Meinen, C.S. and McPhaden, M.J. 2000 'Observations of Warm Water Volume Changes in the Equatorial Pacific and Their Relationship to El Niño and La Niña.' *Journal of Climate* **13**, 3551-3559.



First and Second EOF modes of sea level in the equatorial Pacific for the period 1950 to 2001. The first mode represents ENSO variability and the second, the recharge and discharge of the ocean. The two modes occur approximately ninety degrees out of phase.