

**Simulations of El Niño and La Niña events since 1980 using Cane and Zebiak's model and satellite observations.**

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The Zebiak and Cane (1987) model is first run in its "uncoupled mode", e.g. the oceanic part of the model is driven by FSU wind stress anomalies over 1980-1994 to simulate sea surface temperature anomalies and those are used in the atmospheric part of the model to generate wind anomalies. Simulated thermocline depths, baroclinic currents, sea surface temperature and wind anomalies are first compared with satellite or *in situ* observations. The model does not simulate the cold SST in 1988 and this can be corrected by a new parametrization of subsurface temperature changes.

With this new parametrization, the model data misfit is reduced, but not enough and the model run in its coupled mode predicts Niño events with less skill than in the standard parametrization. This is partly due to the role of air-sea fluxes and partly to the role of the zonal surface currents. Solar radiation anomalies and latent heat anomalies derived from satellite data (Liu et al, 1993) show that air-sea fluxes have a strong role in the SST changes over the central and western Pacific. The net flux has a positive feedback, especially during cold events when the easterlies are stronger than usual and the ocean evaporates more than usual. Zonal current anomalies derived from altimetric data show low-frequency reversals between eastward during Niño and westward during Niña events whereas the model simulates current oscillations at a 9 month frequency due to wave reflection at the meridional boundaries.

The model is then run in a coupled mode starting from initial conditions where satellite data have been assimilated. Results indicate that starting from more realistic initial conditions have a strong impact on predictions. The model predictive skill depends on the subsurface parametrization. This is discussed by examining the role of zonal advection, vertical advection and air-sea fluxes in the model or in the satellite data.

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