Coastal trapped waves off the west coast of South America during El Niño Times

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Evidence of coastal trapped waves off the west coast of South America, during the Niño 1991-92 and 1997-98, is examined by applying Wavelet Analysis over sea level and alongshore wind stress time series. Wavelet Transform reveals the existence of intraseasonal variability and Cross Wavelet Transform allows us to discriminate the sources in terms of remote and local forcings. . Observed temperature and salinity profiles were used d to compute phase speed of theoretical coastal trapped waves and to compare with estimated phase speed from wavelet spectra.

For the studied El Niños years (1992, 1997), we found the existence of intraseasonal oscillations with periods between 20-90 days along the coastal region from 2ºS to 27ºS. We detected oscillations with strong correlation between sea level and local wind, with periods of around 10 days and 50 days, wich could be associated with "coastal lows", that are one type of atmospheric trapped waves. We found that in more intense periods of the 1991-92 and 1997-98 Niño (onset of 1992 and 1998), between 6ºS and 15ºS, there were oscillations probably associated with remotely forced internal kelvin waves, with periods between 6 and 50 days, with phase speeds between 180 and 340 km/day. In the region comprised between 12ºS and 15ºS, we also identified perturbations probably associated with barotropic shelf waves propagating southward with velocities between 110 and 150 km/day and periods between 30 and 40 days.

These poleward propagating intraseasonal perturbations off the west coast of South America probably are linked with equatorial wave dynamics, especially during El Niño events, and can have a significant influence in modulating the upwelling system and primary productivity in the region, which is one of the most productive all around the world.