BIOLOGICAL EVIDENCE FOR AN ANOMALOUS CALIFORNIA NINO OF 2009/10

Mark D. Ohman, Scripps Institution of Oceanography

mohman@ucsd.edu

We have excellent records of some of the biological consequences of ENSO off the California coast, thanks to the systematic sampling by CalCOFI, a space-resolving time series in the Southern-Central California Current System that was initiated in 1949. CalCOFI shipboard sampling is now augmented by a *Spray* glider observational program, the interdisciplinary CCE moorings, quasi-Lagrangian experimental studies of plankton growth and loss rates, and an active modeling program. Of the zooplankton taxa collected by CalCOFI, certain species show clear responses to ENSO forcing, notably the euphausiids (krill). Most of the moderate-to-strong El Niño events of the past 6 decades have been accompanied by a predictable response in the abundance of particular krill species. For each of these events prior to 2009, a reproducible pattern was observed of elevated abundance of an assemblage of warm water, tropical/subtropical krill species. Conversely, in each of these same events, a cool water assemblage with more northern/Transition Zone affinities showed consistent reductions in abundance. These results, combined with evidence of the stage structure of the krill populations, suggest that anomalous horizontal oceanic advection has historically been an important, if not dominant, mechanism of El Niño propagation through the southern California region. However, the recent moderate Niño of 2009/10 showed a markedly different response. *Spray* glider surveys in the southern California region revealed that at the onset of the Niño event, there was nearly simultaneous arrival of physical anomalies in mid-latitudes and along the equator (Todd et al. 2011. GRL. 38, L03609, doi:10.1029/2010GL046376). This synchrony suggested initial propagation via atmospheric teleconnections rather than oceanic advection. The results of analysis of the krill species are consistent with this interpretation, as neither the warm water affinity nor the cooler water affinity krill species showed the changes expected from previous El Niño's. The unusual biological responses of the krill corroborate the interpretation that the 2009/10 event did not initially propagate through the ocean off California. Krill and other zooplankton can be excellent indicators of ENSO variations and help resolve time-dependent changes in modes of propagation.