



Lluch-Cota, S.E., A. Parés-Sierra, V.O. Magaña-Rueda, **F. Arreguín Sánchez**, G. Bazzino, H. Herrera-Cervantes & **D. Lluch Belda** (2010). Changing climate in the Gulf of California. *Progress in Oceanography*, 87(1-4): 114-126. DOI: 10.1016/j.pocean.2010.09.007

Changing climate in the Gulf of California

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We conducted a four year interdisciplinary collaborative project focused in the Gulf of California, the most important fishing region for Mexico. We reviewed published reports, collected and analyzed physical, chemical and ecological data sets, and developed models for the physical (atmosphere and ocean) and ecological components of this large marine ecosystem, to examine prevalent scientific questions regarding climate variability and change in the region, covering three time scales (ENSO, decadal-to-interdecadal, and long-term trend). We were able to describe how the Gulf of California influences the northward propagation of coastal trapped Kelvin waves associated with El Niño (ENSO) events, and how this signal, together with changes in the atmospheric forcing, results in a ENSO signature inside the Gulf. For the decadal-to-multidecadal scales, we found coherent trends among series, and with the Pacific Decadal Oscillation (PDO). The long-term temperature signal for the Gulf of California shows a warming that occurred in the mid 20th century, approximately a decade before that in the California Current. This signal is coherent with fluctuations in the industrial fisheries catch records (sardine and shrimps). For the recent decades we found no significant sustained long-term trend in any of the time series of physical and ecological variables that we considered. Instead, variability seems to be fully dominated by the interaction of PDO and ENSO. We stress the urgent need for more modeling efforts and the establishment of interdisciplinary (physical and biological) observation platforms for the marine environment in the Gulf of California.

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