

Oceanography Seminar

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“Conflicting hypotheses regarding the response of the California Current Ecosystem to future climate change”

Relationships among various atmospheric, oceanic, and biological processes in the California Current continue to attract the attention of oceanographers from all disciplines. High rates of nutrient supply stimulate substantial primary production, and massive populations of small pelagic fishes have supported marine mammals, seabirds, and commercial harvests. However, interannual variability in the upwelling process and in biological productivity has highlighted the sensitivity of the ecosystem to climate conditions and raised concerns about future responses to anthropogenic change. A number of hypotheses have been offered to describe future trends in upwelling ecosystems, and at least three key components of the upwelling process must be considered: changes in upwelling-favorable winds (including intensification, poleward shifts, and altered seasonality), changes in water-column stratification, and modified characteristics of source waters supplied to the upwelling system. Testing hypotheses through examination of observational records is hampered by our ability to distinguish the impacts of anthropogenic climate change from those of natural variability, but numerical model projections can offer some insight to changes in the upwelling process over the coming century. Results from these models suggest that our previous hypotheses regarding changes in upwelling require substantial revision. Despite decades of focused research, we remain uncertain about the sign of future changes in upwelling ecosystems. Improving abilities to quantitatively represent these various factors in dynamical models should clarify the future of the California Current and other eastern boundary current ecosystems.

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