



Research Brief

California Multivariate Ocean Climate Indicator (MOCI) and marine ecosystem dynamics



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What is a climate index?

A climate index is a calculated measurement that denotes environmental variation over a period of time. Indices have set parameters that take into account the interacting scales of temporality as well as physical and biological processes. Many climate indices have already been developed, including the Pacific Decadal Oscillation (PDO; the state of the northeast Pacific in relation to El Niño over multiple decades).

What are our goals in developing MOCI?

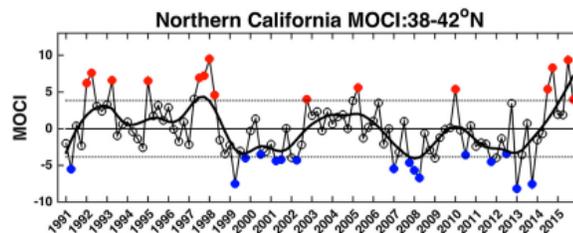
MOCI, or Multivariate Ocean Climate Indicator, synthesizes multiple existing climate indices and data into a single quantity that represents the state of the ocean in terms of those variables. The MOCI presented in this paper is an update of MOCI developed in Sydeman et al. (2014); it expands beyond the scope of Northern California and uses data that are readily available online, allowing for automatic updates.

What is the geographical and temporal reach of this data?

In order to improve the ability of MOCI to represent the present state of the ocean, we divided ~1600 miles of coastline into three regions: Southern California, Central California, and Northern California. These regions are based around well-established biogeographical boundaries, or transitional points between distinct areas of physical dynamics.

What variables go into the development of MOCIv.2?

Ten parameters were synthesized to create the MOCIv.2: the Multivariate ENSO Index, PDO, North Pacific Gyre Oscillation, Northern Oscillation Index, Bakun upwelling Index, sea level, alongshore wind stress, sea surface temperature, sea air temperature, and sea level pressure.



What does the MOCI represent?

MOCI captures the physical processes that are most important in California coastal environments while denoting differences between regions. MOCI will remain relevant over time. A high MOCI value is associated with warm water temperatures and weak upwelling, while a low MOCI value represents cool temperatures and strong upwelling. This correlation is particularly robust during El Niño and other warm events, such as the North Pacific “Blob” of 2013-2016.

What is “nowcasting” and its relevance to ecosystem management?

“Nowcasting” refers to the practice of predicting the present, the very near future, and the very recent past. MOCIv.2 essentially aims to nowcast the current state of marine ecosystem dynamics in California and help to place those conditions in a historical context. MOCI establishes variable biophysical relationships within a specific area, which is of the utmost importance to strategic management of fisheries and wildlife.

-Brief by Marie M. Sydeman

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