Climatic signals in the California Current System in the context of North Pacific and planetary variability

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Abstract

By studying the changes in distribution and abundance of various commercial species, fisheries science has contributed to explain part of the functioning of the Earth's climate system. Pacific sardine populations, for example, exhibit expansion and contraction processes on multiple time scales that are associated with warming and cooling episodes of the California Current System. Various techniques of numerical analysis have been used in the identification and extraction of the climatic signals underlaying the warming/cooling ocean surface: linear transformations, periodic regressions, and wavelet analysis, among others. Significant associations have been detected between climatic signals and macro-scale oceanic processes (e.g. the great Pacific gyre), geophysical (e.g. rotation) and astrophysical phenomena (e.g. solar activity). The identified climatic signals contain a predictive potential that has been scarcely evaluated. This work shows the results of predictive models applied to: 1) sea surface temperature; 2) the upwelling activity and; 3) the sardine catches between Mexico and Canada. New research projects are needed to evaluate the potential of the knowledge generated in other fields, looking the strength of management skills and decision-making processes in fundamental sectors for humanity such as fishing, agriculture or the anticipation of climate risks.

Keywords: Ocean Climate, North Pacific, climate forecast, fisheries forecast, climate dynamics

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