Geophysical Research Abstracts
Vol. 21, EGU2019-16229, 2019
EGU General Assembly 2019

Biological production and zooplankton hotspots in Eastern Boundary Upwelling Systems

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Eastern Boundary Upwelling Systems (EBUS) are highly dynamic environments that support elevated levels of primary, secondary, and fish production. This presentation will review and contrast nutrient supply, primary production, and zooplankton hotspots in four major EBUS (California, Peru, Northwest Africa and Benguela). Wind-driven nutrient supply and primary production, computed from satellite data, provide a synoptic and textbook view of how phytoplankton production is coupled to upwelling. In contrast, the coupling between upwelling and zooplankton or higher trophic level species, for which observations are scarce, is poorly understood. We use a satellite-based Lagrangian method where outputs from a plankton model (forced by wind-driven nutrient supply) are advected by surface currents following upwelling. The modeled zooplankton distribution simulates published reports of krill hotspots and highlights the importance of the upwelling process and surface currents in shaping the mesoscale distribution of zooplankton aggregations in EBUS. A more detailed analysis of the California Current Ecosystem, using a combinations of shipboard surveys and a high-resolution coupled biophysical model, provides insights into hotspot drivers and the coupling between zooplankton and predator hotspots.