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Marine Ecosystem Responses to Ongoing Environmental Changes in the Arctic

Jacqueline M. Grebmeier
Chesapeake Biological Laboratory, University of Maryland Center for Environmental Science, Solomons, Maryland 20688, USA

Abstract

Seasonal and interannual changes in sea ice extent, duration and seawater temperature influence biological processes and ecosystem dynamics in the Arctic. I focus here on evaluation of biological patterns and responses at persistent high benthic biomass patches that can be termed “hotspots.” These biological concentrations respond to physical forcing and can provide insights on how ecosystems are responding to ongoing environmental change in the Arctic. We are now relating distribution shifts of organisms, from small benthic prey to migrating seabird and marine mammal benthivores, to changes in sea ice conditions, warming seawater, and the changing phenology of key ecosystem processes. Observations on a decadal scale are providing insights on the status of biological marine systems as they respond to advective shifts on the Arctic shelves and we are also significantly improving our understanding of the connectivity of trophic components within the food web. Repeated sampling on both temporal and spatial scales is facilitating the evaluation of the seasonality of ecosystem status and trends. The Distributed Biological Observatory (DBO), an internationally developed marine observing system, is currently focused in the Pacific Arctic, but is being used as a model for expansion to the pan-Arctic scale, and it is endorsed by multiple international science organizations. My presentation will highlight key findings that are arising from the study of biological responses to environmental change across the Arctic, with a focus on cases studies from the Pacific Arctic region.