

Changes in the Western Arctic Biogeochemistry over the Last Three Decades: a Modeling Perspective.

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Over the last three decades, the Western Arctic Ocean (WAO) seasonal and permanent sea ice have experienced significant changes, with the summer sea ice extent still shrinking to record low levels and the permanent ice thickness being greatly reduced. Thus, the WAO circulation (e.g. intensification of the Beaufort Gyre), the oceanic heat content and biogeochemistry are directly impacted. We use the coupled pan-arctic Biology/Ice/Ocean Modeling and Assimilation System (BIOMAS) to investigate changes in the physical system, nutrient fluxes and productivity of the planktonic ecosystem between 1988 and 2011. Model simulations show that an earlier phytoplankton bloom and a slight increase in its biomass in general characterize the WAO. The largest response in the secondary producers is seen as an increase in the magnitude of the microzooplankton biomass as well as in the duration of its growing season. Primary productivity while increasing on average over the WAO shows some decrease in the Beaufort Gyre due to its intensification. Under ice blooms such as the one observed during the ICESCAPE (NASA funded program) in July 2011 are also intensified. This research was done in collaboration with colleagues from University of Washington (Dr M. Steele and Dr. J. Zhang), Woods Hole Oceanographic Institution (Dr. C. Ashjian) and University of Rhode Island (Dr. R. Campbell).

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