

# Recent changes in diatom production and sea-surface conditions in the North Water polynya, northern Baffin Bay, Canada\*

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Environmental conditions at polar latitudes are uniquely governed by the interaction of oceans, atmosphere, and ice. Changes in these parameters can occur rapidly and induce pronounced shifts across environments and food webs. The sensitivity of marine food webs provides an initial basis to examine environmental flux through time; a series of biogenic tracers (e.g., microfossils, biomarkers, etc.) preserved in the seafloor sediment can reflect changes in conditions at the sea-surface. This project investigates the features of this biological signature through the lens of (sub) fossil diatoms in the largest and most biologically productive coastal Arctic polynya, namely the North Water (NOW) polynya (77°16.756'N, 74°21.428'W), a recurrently icebound, open-water region located between Greenland and Ellesmere Island (Canada). The NOW has functioned as a natural refuge for diverse biological communities, including human populations (e.g., Dorset, Thule, Inuit), for millennia. Diatoms dominate seasonal phytoplankton blooms in the NOW and represent the most important contributor to marine primary productivity in this region. Additionally, diatoms are highly sensitive to sea-surface conditions (e.g., sea ice, temperature) and are generally well preserved in marine sediments. A decline in overall primary production has been observed in the NOW over the last two decades. Here, we examine the impact of climate-driven changes in environmental conditions on sea-surface conditions, diatom abundance, and assemblage composition using a sediment core covering the last ca. 80 years collected from the North Water polynya. This project will estimate temporal change in diatom diversity and infer the drivers of such change, contributing to our understanding of how modern climate change affects high Arctic phytoplankton communities.

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