"Primary Production along the Atlantic Water Inflow into the Arctic Ocean"

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Abstract

Differences in the balance of *in situ* and advected primary production along the Atlantic Water Inflow explain two contrasting domains in phytoplankton and zooplankton production in waters west and north of the Svalbard Archipelago. As Atlantic waters move north in the eastern Greenland Sea, they bring heat, nutrients and organic carbon in the form of phytoplankton and zooplankton. When this Atlantic water meets with sea ice, a strong bloom develops early in the season. Further south, productivity in ice-free waters starts later, and a weak stratification sustains production throughout the growth season by providing nutrients from depth. However, primary production along the Atlantic Water Inflow is dominated by advection of phytoplankton biomass. Export of phytoplankton from the Norwegian Sea combined with *in situ* processes maintains phytoplankton productivity in the Barents Sea Opening and the West Spitsbergen Current, from 71°N to 80°N. When entering the Arctic Ocean, annual productivity decreases as stratification restricts access to nutrients after the spring bloom. This contrast in productivity drivers between seasonally ice-covered and ice-free waters is also observed in other polar regions, the Barents Sea, Labrador Sea and Antarctica. Thus, although the sea-ice edge blooms are legendary, sea ice acts as a deterrent to annual primary production in Atlantic waters. As the Arctic sea ice reduces its annual extension, an increase in annual production is expected north of Svalbard if the characteristics of ice-free Atlantic Water Inflow are extended into the Arctic Ocean.

References

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