

ID: W3016649766

TITLE: Seasonal and latitudinal variations in sea ice algae deposition in the Northern Bering and Chukchi Seas determined by algal biomarkers

AUTHOR: ['Chelsea Wegner Koch', 'Lee W. Cooper', 'Catherine Lalande', 'Thomas A. Brown', 'Karen E. Frey', 'Jacqueline M. Grebmeier']

ABSTRACT:

An assessment of the production, distribution and fate of highly branched isoprenoid (HBI) biomarkers produced by sea ice and pelagic diatoms is necessary to interpret their detection and proportions in the northern Bering and Chukchi Seas. HBIs measured in surface sediments collected from 2012 to 2017 were used to determine the distribution and seasonality of the biomarkers relative to sea ice patterns. A northward gradient of increasing ice algae deposition was observed with localized occurrences of elevated IP25 (sympagic HBI) concentrations from 68°70°N and consistently strong sympagic signatures from 71°72.5°N. A declining sympagic signature was observed from 2012 to 2017 in the northeast Chukchi Sea, coincident with declining sea ice concentrations. HBI fluxes were investigated on the northeast Chukchi shelf with a moored sediment trap deployed from August 2015 to July 2016. Fluxes of sea ice exclusive diatoms (*Nitzschia frigida* and *Melosira arctica*) and HBI-producing taxa (*Pleurosigma*, *Haslea* and *Rhizosolenia* spp.) were measured to confirm HBI sources and ice associations. IP25 was detected year-round, increasing in March 2016 (10 ng m<sup>-2</sup> d<sup>-1</sup>) and reaching a maximum in July 2016 (1331 ng m<sup>-2</sup> d<sup>-1</sup>). Snowmelt triggered the release of sea ice algae into the water column in May 2016, while under-ice pelagic production contributed to the diatom export in June and July 2016. Sea ice diatom fluxes were strongly correlated with the IP25 flux, however associations between pelagic diatoms and HBI fluxes were inconclusive. Bioturbation likely facilitates sustained burial of sympagic organic matter on the shelf despite the occurrence of pelagic diatom blooms. These results suggest that sympagic diatoms may sustain the food web through winter on the northeast Chukchi shelf. The reduced relative proportions of sympagic HBIs in the northern Bering Sea are likely driven by sea ice persistence in the region.

SOURCE: PloS one

PDF URL: <https://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0231178&type=printable>

CITED BY COUNT: 27

PUBLICATION YEAR: 2020

TYPE: article

CONCEPTS: ['Pelagic zone', 'Oceanography', 'Sea ice', 'Diatom', 'Water column', 'Algae', 'Sediment trap', 'Phytoplankton', 'Arctic ice pack', 'Deposition (geology)', 'Environmental science', 'Geology', 'Sediment', 'Biology', 'Ecology', 'Nutrient', 'Paleontology']