

Effects of an Arctic under-ice phytoplankton bloom on bio-optical properties of surface waters during the Norwegian Young Sea Ice Cruise (N-ICE2015)

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A thinner and younger Arctic sea-ice cover has led to an increase in solar light transmission into the surface ocean, especially during late spring and summer. A description of the seasonal evolution of polar surface water optical properties is essential, in order to understand how changes are affecting light availability for photosynthetic organisms and the surface ocean energy budget.

The development of the bio-optical properties of Arctic surface waters under predominantly first-year sea ice in the southern Nansen Basin were studied from January to June 2015 during the Norwegian Young Sea Ice Cruise (N-ICE2015). Observations included inherent optical properties, absorption by colored dissolved organic matter and particles, as well as radiometric measurements. We documented a rapid transition from relatively clear and transparent waters in winter to turbid waters in late May and June. This transition was associated with a strong under-ice phytoplankton bloom detected first under the compact ice pack and then monitored during drift across the marginal ice zone. We discuss potential implications of underwater light availability for photosynthesis, heat redistribution in the upper ocean layer, and energy budget of the sea-ice – ocean system.

This work has been supported by the Norwegian Polar Institute's Centre for Ice, Climate and Ecosystems (ICE) through the N-ICE project and the Polish–Norwegian Research Programme operated by the National Centre for Research and Development under the Norwegian Financial Mechanism 2009–2014 in the frame of Project Contract Pol-Nor/197511/40/2013, CDOM-HEAT.