Dinoflagellate cysts as a sea-ice proxy – new insights from the Hudson Bay system

M. Heikkilä[1*], V. Pospelova[2], Z.Z. Kuzyk[3], G.A. Stern[3], R.W. Macdonald[3,4]

[1] *Environmental Change Research Unit (ECRU), Department of Environmental Sciences, University of Helsinki, Helsinki, Finland (*correspondence: maija.heikkila@helsinki.fi)*

[2] *School of Earth and Ocean Sciences, University of Victoria, Victoria, British Columbia, V8W 2Y2*

[3] *Centre for Earth Observation Science (CEOS), Department of Geography and Environment, University of Manitoba, Winnipeg, Manitoba, R3T 2N2*

[4] *Institute of Ocean Sciences, Department of Fisheries and Oceans, Sidney, British Columbia, V8L 4B2*

Dinoflagellates are single-celled marine plankton organisms, whose cyst (resting cell) assemblages are one of the most widely applied proxy for late Quaternary sea-ice reconstruction. The reconstructions provide much needed quantitative estimates for comparison with modern and predicted sea-ice trends, and for climate modeling purposes. However, sea-ice reconstructions based on dinoflagellate cysts do not always corroborate with commonly observed large-scale temperature trends inferred from other proxies. This stimulates questions related to the limited explicit knowledge of underlying ecological, tempral and spatial factors that link the proxy distribution to sea ice.

This presentation introduces a viewpoint to sediment-core cyst assemblages that is based on continuous year-round series of in situ cyst production. A compilation of species-specific cyst flux data from seasonal (trap) and spatial (surface-sediment) components is used to define seasonal and environmental fingerprints of dinoflagellate cyst production within the Hudson Bay system. The results demonstrate that contrary to the hypothesis of sea-ice governed light regime being the overarching control of cyst production, in the Hudson Bay system the trophic composition and its seasonal patterns are not related to sea-ice, even though species-specific seasonal fingerprints are. In an attempt to elucidate the trends and variability evident in dinoflagellate-cyst based climate and sea-ice reconstructions, it is important that future research attempts to investigate dinoflagellate life-cycle patterns over several annual cycles and across different sea-ice covered systems.