



## **Characterization of elevated methane in a long seawater transect on the outer East Siberian Sea**

Angelina Wenger (1), Örjan Gustafsson (1), Henry Holmstrand (1), Julia Steinbach (1), Igor Semiletov (2,3), Kseniya Shcherbakova (3), Denis Kosmach (3), and Natalia Shakhova (2)

(1) Stockholm University, ACES, Stockholm, Sweden ([angelina.wenger@aces.su.se](mailto:angelina.wenger@aces.su.se)), (2) National Tomsk Research Polytechnic University, (3) Pacific Oceanological Institute (POI) Far Eastern Branch of Russian Academy of Sciences Russian Academy of Sciences

The East Siberian Arctic Shelf (ESAS) has a large inventory of buried carbon and methane (CH<sub>4</sub>) as part of and below subsea permafrost. Warming of this system by geothermal heat and by overlying seawater throughout the Holocene, recently amended by Anthropocene warming, has brought subsea permafrost towards the point of thaw. There have been extensive observations of strongly elevated CH<sub>4</sub> concentrations in ESAS seawater over the recent decade. However, there are still large uncertainties from what part of the subsea system the released methane originates, and also about the large-scale geographical variations.

This study presents methane observations from the 2014 SWERUS-C3 cruise along an east-west transect of the outer East Siberian Sea (ESS). Surface ocean methane concentrations were regularly above the atmospheric equilibrium concentration, with seawater concentrations in a ESS hotspot region reaching up to 460 nM. The observations include <sup>13</sup>C stable isotope observation in an active ebullition site. Understanding the sources and spatial distribution of the methane releases will aid in understanding the composition and functioning of the subsea permafrost/methane system and help us move toward predictive capacity of how the methane evasions will develop into the future.