Biogeochemical signature of elevated methane in water column of the outer East Siberian Arctic Shelf

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East Siberian Sea (ESS) of the Arctic

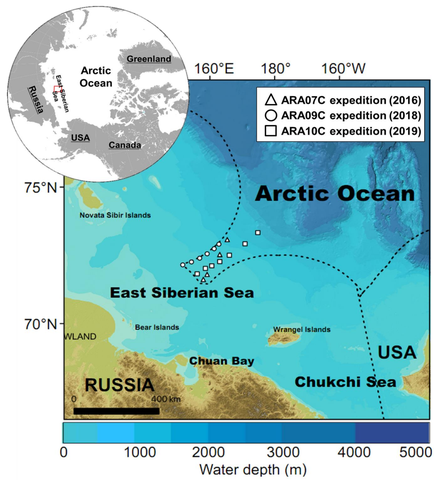

Fig. 1. Sampling locations during ARA07C (triangle), ARA 09C (square) and ARA10C (circle) expedition on 2016, 2018 and 2019

Dissolved CH_4 distributions in the water column

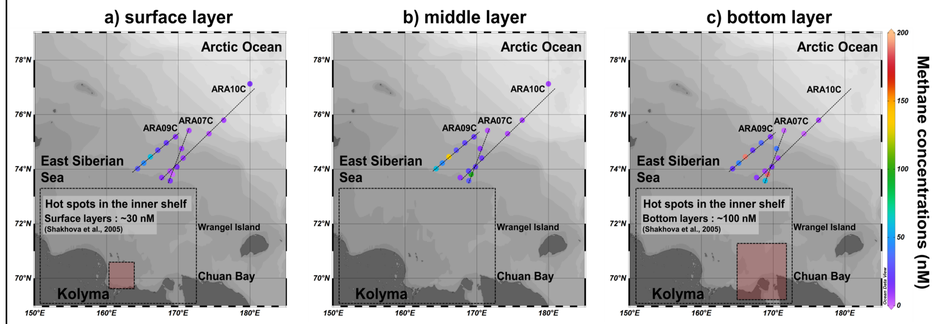

Fig. 3. Spatial distribution of dissolved methane in the outer shelf of the East Siberian Sea: a) surface, b) middle and c) bottom layer. Previous studies (hot spots in the inner shelves) are shown in the black dot square (Shakhova et al., 2005).

CH_4 origin in the water column

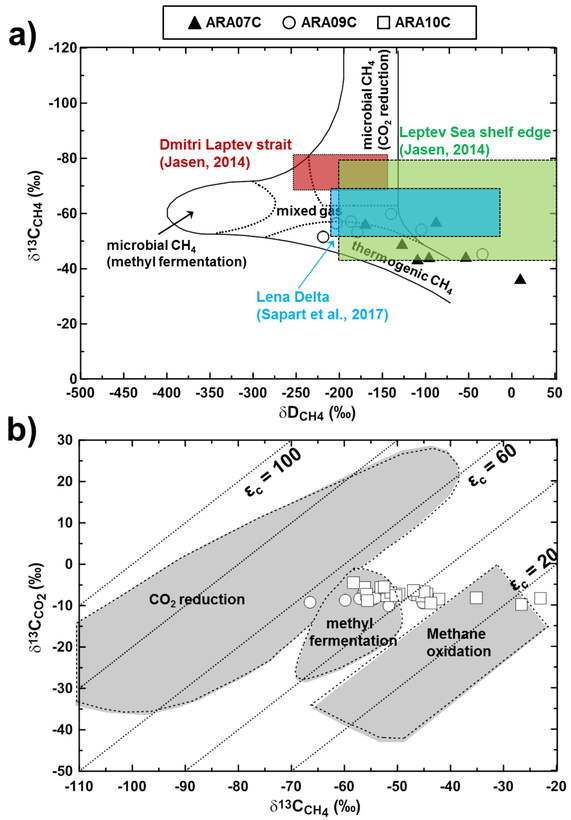

Fig. 5. (a) Dual isotope ($\delta^{13}C$ and δD) of methane plot and (b) paired values of $\delta^{13}C_{CH4}$ and $\delta^{13}C_{CO2}$ with isotopic fractionation lines ($\delta^{13}C_{CO2}$ - $\delta^{13}C_{CH4}$). Areas delimited by black and grey line correspond to the three main methane formation processes and their isotopic signatures (Whiticar, 1999). Previous studies (hot spots in the inner shelves) are shown in the red, green and blue square, respectively (Jasen, 2014; Sapart et al., 2017).

CTD profiles in the outer shelf of the ESS

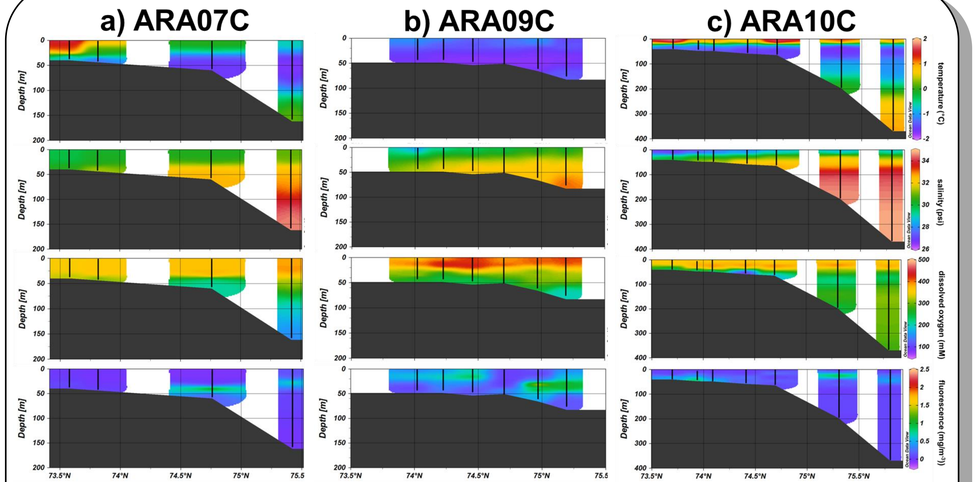

Fig. 2. Vertical distribution of CTD profiles (temperature, salinity, dissolved oxygen and fluorescence during a) ARA07C, b) ARA09C and c) ARA10C expedition

Statistical analysis

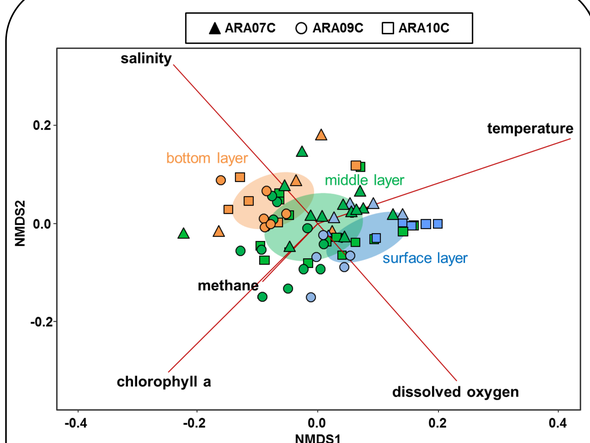

Fig. 4. Non-metric multidimensional scaling plots of CTD and methane data. Confidence ellipses for the sampling sites (surface, middle and bottom) are based on the 95%.

Reference

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Acknowledgements

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