

Methane fluxes at the water–atmosphere boundary in the waters of the Russian sector of the Eastern Arctic

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Abstract. The average value of methane fluxes from the sea surface in the Chukchi Sea (4 ± 4 mol/(km²·day)) and parameters of methane supersaturation of the surface water layer (78 ± 39 %) were lower than in the East Siberian Sea (32 ± 24 mol/(km²·day) and 346 ± 247 %, respectively). In 50 % of cases, the concentrations of dissolved methane in the surface layer of sea waters were two times higher than the equilibrium values with the atmosphere. The heterogeneous distribution of methane in seawater causes a change in the direction and magnitude of methane fluxes at the water–atmosphere boundary under given experimental hydrometeorological conditions. Data analysis showed that the flux was predominantly determined by wind speed (correlation coefficient $Q = 0.8$), concentration of dissolved methane ($Q = 0.6$), parameter of methane supersaturation of waters ($Q = 0.6$), and temperature of the surface water layer ($Q = -0.6$). A negative correlation coefficient with temperature indicates that as the temperature decreases, the solubility of methane in water increases, the difference in concentrations with the atmosphere decreases, and the intensity of methane flux decreases.

Ключевые слова:

methane fluxes, East Siberian Sea, Chukchi Sea, Arctic

For citation: Mishukova G.I. Methane fluxes at the water–atmosphere boundary in the waters of the Russian sector of the Eastern Arctic. *Geosistemy perednykh zon = Geosystems of Transition Zones*, 2024, vol. 8, no. 1, pp. 5–12. <https://doi.org/10.30730/gtr.2024.8.1.005-012>; <https://www.elibrary.ru/wgcapo>

Для цитирования: Мишукова Г.И. Поток метана на границе вода–атмосфера на акватории российского сектора Восточной Арктики [Электронный ресурс]. *Геосистемы переходных зон*, 2024, т. 8, № 1. <https://doi.org/10.30730/gtr.2023.8.1.005-012>; <http://journal.imgg.ru/web/full/f2024-1-1.pdf>

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