



The spatial distribution of the methane fluxes on the water-atmosphere boundary in the Sea of Okhotsk

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Abstract

The spatial distribution of the methane fluxes on the water-atmosphere interface in the Sea of Okhotsk, which is the region of the most active hydrocarbon degasation in Asia Pacific transitional zone, was studied. Analysis of CH₄ fluxes, which were calculated according to the experimental data of expeditional researches in 1991–2016, revealed the reasons of their variability which accords with the features of the structures of gasgeochemical provinces in the Sea of Okhotsk. The characteristics of distribution of methane fluxes on the surface of the sea area, supersaturation of surface water with methane relative to its equilibrium atmospheric contents, the distributions of methane in the water column and in the upper sea water layer, composition and the content of hydrocarbon gases in the bottom sediments are controlled by of the gases which migrate from the lithospheric sources (oil and gas deposits, gas hydrates, gas-saturated sediments). The high changeability of methane fluxes on the water-atmosphere border which increased from the absorption to the emission (more than 300 mole/(km²·day)) had the pulsating nature triggered by seismic events both on the area of sea and in the time in the western part of Sea of Okhotsk (West-Okhotsk Sea gasgeochemical province). The increased methane emission into the atmosphere was observed in the region being investigated on the big sea area, whereas methane fluxes have been increased by the effect of high wind speeds and higher temperature of water. Tectonic faults and the distribution of oil and gas-bearing structures are the basic factors, which cause the formation of the flows of hydrocarbon gases in the region of studies.

Keywords

methane flux, methane distribution, the Sea of Okhotsk, gasgeochemical provinces

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