



First isotopic data on methane from the East Siberian Arctic Shelf.

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Our multi-year data obtained while studying the East Siberian Arctic Shelf (ESAS) revealed that this extensive shallow area of the Arctic Ocean emits methane to the atmosphere. Understanding the sources which fuel these emissions is crucially important because contribution of different sources can alter emission mode significantly. All possible sources could be divided in two major parts: internal and external. To eliminate (or at least to significantly minimize) contribution of the external sources, which are mostly related to summer riverine and groundwater runoff, we sampled sea water in the near-shore area of the Laptev Sea from the fast ice in winter (April, 2007). For the purpose of comparison we also sampled water from the lake located on the coastal plain in the close proximity to the coast. Gas extracted from 25 samples (16 from sea water and 9 from lake) was diluted to reach a concentration of about 2000 ppb and analyzed with high precision isotope ratios mass spectrometer system. Analysis revealed that δD signature of methane from the sea water cardinally differs from that of lake. While δD values of methane from lake ranged from (-259.1‰) to (-364.7‰) , δD values of methane from sea water exhibited vast diversity: from (-47.5‰) to (-196.1‰) that points contribution of different internal sources. Among possible internal sources three groups of sources could be considered: 1) modern microbial methane, produced from both modern and old organic matter; 2) hydrate-derived biogenic methane from within and beneath the sub-sea permafrost; and 3) thermogenic methane, escaping from deep seabed reservoirs, such as natural gas and methane-bearing fluids. Based on obtained results we can suggest predominant contribution of two latter sources.