



Helicopter survey of methane and carbon dioxide sources on the Laptev Sea shelf near the Lena River Delta

A. Salyuk (1), I. Semiletov (1,2), V. Nesterov (3), N. Shakhova (2,3)

(1) Pacific Oceanological Institute (POI) FEB RAS, 43 Baltic Street, Vladivostok, 690041, Russian Federation (san@poi.dvo.ru), (2) International Arctic Research Center (IARC), University Alaska Fairbanks (UAF), Akasofu Building, Fairbanks, 99775, United States, (3) Pacific Institute of Geography FEBRAS, 7 Radio Street, Vladivostok, 690041, Russian Federation

Carbon dioxide and methane have recently been recognized not only as key sources but also as great tracers of global climate change.

The release of CH₄ and CO₂ from geological and biological sources on the Laptev Sea shelf was investigated during a flight on the helicopter Mi-8 20 September 2006 organized by POI FEB RAS. Gas concentrations were measured on the height of about 100 m over sea surface on the route more than 1200 km long and area over 40 000 km² using Fast CH₄ analyzer LosGatos DLT-100 and CO₂ and H₂O analyzer Li-8100 (LiCor). Vertical structure of atmosphere were investigated in 5 points with different air-sea interaction environment with maximal height up to 2 000 m in northernmost point.

Our data reveal that Arctic air-sea exchange processes have a substantial impact on overlying atmospheric CH₄ and CO₂ composition. Enhanced concentrations of CH₄ were measured along the entire helicopter route (>1.85 ppm Latitudinal mean average), reaching up to 1.97 ppm (6.5% increase) in particular areas. Some anomalies in air CH₄ were spatially correlated with anomalies in distribution of dissolved CH₄ in water which could be associated with fault zones and Lena River discharge. Vertical profiles of methane and carbon dioxide exhibit a significant increase near the sea surface, what prove later as a source of CH₄ and CO₂ into the atmosphere. Possibly massive escape both of these gases may be related additionally with already intensified autumn ocean convection.

Offshore helicopter survey near the Lena River Delta show that the Laptev Sea surface is a strong source of carbon dioxide and methane into the atmosphere. Aircraft survey may be used for mapping of the methane anomalies on the shelf.