Geophysical Research Abstracts
Vol. 19, EGU2017-4946-1, 2017
EGU General Assembly 2017

Observations of atmospheric methane and its stable isotope ratio (δ13C) over the East Arctic seas from the ship cruises in the autumn of 2016

Natalia Pankratova (1), Andrey Skorokhod (1), Igor Belikov (1), Igor Semiletov (2,3), and Elena Berezina (1)

(1) A.M.Obukhov Institute of atmospheric physics, Atmospheric chemistry, Moscow, Russian Federation (n_pankratova@list.ru), (2) V.I.Il'ichev Pacific Oceanological Institute RAS, Vladivostok, Russian Federation, (3) Tomsk Polytechnic University, 30 Prospect Lenina, Tomsk, Russia

Methane (CH4) is the third most important greenhouse gas after water vapor and carbon dioxide (CO_2) which has an integral radiative effect on the contemporary terrestrial climatic system. The methane radiative effect is 20 times as strong as carbon dioxide per unit mole. Taking into account the characteristic life time of the greenhouse gases molecules in the atmosphere, the methane global warming potential at the 100-year time interval is 20 times higher than the CO_2 potential. Atmospheric CH4 mixing ratio and the changes in the methane 13C:12C ratio (reported the changes relative to a reference ratio and denoted as δ13C-CH4 and reported , in units of per mil) were measured from aboard the research vessel Akademik M.A. Lavrentiev from September to November 2016 in the Laptev, East Siberian and Chukchi Seas and as well as the North Pacific and the Sea of Japan. The measurements were made performed using a Cavity-Ring-Down Spectrometer (CRDS) from Picarro^{TM} (model G2132-i). Together with methane concentrations of other trace gases (CO_2, NO, NO_2, O_3) were measured. Air was sampled from an inlet at the front of the deck at 11 meters above sea level.
A significant increase in methane concentration over the shelf areas of the Arctic seas and in the deltas of the large Siberian rivers is revealed in the expeditions. The measurements have confirmed the possibility of the formation of extreme methane concentrations (above 3 ppm) in the air over the areas of methane seeps of the Eastern shelf of the Arctic Ocean. The present study allowed to identify the sources of atmospheric methane in the Arctic. The measurements were compared with the surface methane data from the NOAA/ESRL arctic sites and the Tiksi station located on the shore of the Laptev Sea.