

EGU21-6892

<https://doi.org/10.5194/egusphere-egu21-6892>

EGU General Assembly 2021

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Vertical distribution of trace gases and aerosols over the Russian Arctic in September 2020

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In 2020, a unique experiment, which had ever been implemented either in the former USSR or in modern-day Russia, was carried out in the Russian Arctic by means of the Optik Tu-134 aircraft laboratory operated by IAO SB RAS. The airborne measurement campaign was conducted on September 4-17 over all seas and coastal regions of the Russian sector of the Arctic, including northern part of the Bering Sea.

During the flights, in situ measurements of CO, CO₂, CH₄, NO, NO₂, SO₂, O₃, aerosols, and black carbon (BC) were performed. Air samples were taken to determine organic and inorganic compounds and biological material in aerosol particles. A remote sensing of the water turbidity in the upper sea layers was conducted by means of the LOZA-2 lidar that allowed a concentration of plankton to be derived there. Spectral characteristics of the water and underlying coastal surfaces were measured using a spectroradiometer.

The primary analysis of the obtained data showed that concentrations of CO, NO, NO₂, SO₂, O₃, aerosols, and BC during the experiment were low that is typical for background regions. CO₂ mixing ratios in the lowest part of the troposphere above seas were lower than aloft. As compared with coastal areas, concentration of methane over all the seas of the Arctic sector and the Bering Sea was higher.

We would like to acknowledge our colleagues from the following organizations for their assistance in organizing and conducting this campaign, and in particular, Laboratoire des sciences du climat et de l'environnement and Laboratoire atmosphères, milieux, observations spatiales (France); Finnish Meteorological Institute and Institute for Atmospheric and Earth System Research, University of Helsinki (Finland); Center for Global Environmental Research at the National Institute for Environmental Studies (Japan); the National Oceanic and Atmospheric Administration, US Department of Commerce (USA); Max-Planck-Institute for Biochemistry (Germany); and University of Reading (UK).

