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Title: BLACK CARBON IN THE SURFACE ATMOSPHERE OF THE RUSSIAN ARCTIC

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Black carbon (BC) or soot in the atmospheric aerosol is the component of climate importance. Arctic snow/ice surfaces have albedo values, and annual (atmosphere+surface) BC radiation forcing is positive [1]. Thus, BC moves the regional Arctic climate to warming. For example, the Arctic ice covering had been decreasing during the last 20 years, and reached minimal value in 2012 [2]. The Russian Arctic, including approximately a half of the Arctic and its coasts, is likely to give an important contribution to this climatic effect. Unfortunately, there have been only few short campaigns with experimental BC aerosol measurements in the Russian Arctic. Also, there is lack of modeling estimates of BC transport to the Russian Arctic and BC air concentrations.

This work gives the first rough estimates of possible average level of anthropogenic BC aerosol in the surface air, as well as review of atmospheric BC measurements in the Russian Arctic.

The model part is based on 10-year (2001-2010) arrays of everyday backward trajectories of air mass transport to the point in the area of Nenetsky Nature Reserve (in the Pechora River Delta - NE Europe) from NCEP/NCAR HYSPLIT4 model calculations [3]. The 10-year mean BC concentration in air and BC flux onto the surface near the Reserve from Russian anthropogenic BC sources (with emission data from [4]) were estimated with their seasonal variations.

The experimental part presents the results of air BC concentration measurements in different expeditions to the Russian Arctic Seas, islands, and coasts from the early 1990s till 2011. Also, we compare these data with BC concentrations measured regularly in the Arctic - at Barrow and Alert stations. The comparison of our estimates with measured data shows valuable results.

1. AMAP, 2011. The Impact of Black Carbon on Arctic Climate (2011), Dy P.R. Quinn et al. AMAP, Oslo. 72 pp.

2. <http://www.ijis.iarc.uaf.edu>

3. <http://arl.noaa.gov/ready>



4. http://www.ecosakh.ru/data/15_ezh2008.pdf