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Measurements of Elemental and Organic Carbon in Atmospheric Aerosols: Kandalaksha Bay of the White Sea

Vladimir Shevchenko, P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences

vshevch@ocean.ru

Moscow, 1 March 2018

iCUPE Collaborators Datasets

DS on elemental and organic carbon over the northwestern coast of the Kandalaksha Bay of the White Sea

Document version number: 1

Atmospheric transport of airborne particles is the fastest channel for supplying of various chemical species (including black carbon, BC) to far-distant regions. This mechanism of matter transfer is of special importance for the Arctic environment. BC is the product of incomplete combustion of various fuels (coal and diesel oil), biomass (wood, grass, agricultural wastes), and biofuel. Aerosol BC is a component of the atmosphere making a significant contribution to climate change in the Arctic region. The main component of black carbon is the elemental carbon (EC). Resulting from the burning of various fuels and from several biological and physicochemical processes, organic carbon (OC) is also supplied into the atmosphere.

Our dataset (DS) presents results of long-term studies performed during 2010-2012 in the area of the White Sea Biological Station under Moscow State University, situated on the Cape Kindo on the northwestern coast of the Kandalaksha Bay (66.55°N, 33.1°E) of the White Sea. The DS contains measurements on spatio-temporal distribution of the elemental and organic carbon in the surface layer of the atmosphere on the area of interest. The atmospheric aerosols were sampled using an UAS-310 air sampler pumping air through Pall A/E glass-fiber filters. The filter retaining the particles finer than 2.5 μm (PM 2.5) was of 225 × 172 mm dimensions, and the speed of air pumping was equal to 270 L/min. The collecting of one sample took about a week. The filters after sampling were kept in sterile packs in a refrigerator. Sampling was discontinued for the winter. The amount of EC and OC on the filters was determined by the technique of reactive gas chromatography.

EC, being a primary component of BC, is responsible for a considerable contribution to climate change in the Arctic region. The concentrations of EC are at the background level for the Arctic and are characterized by minor seasonal and annual variability. A significant source of EC is the western transport from industrial regions of the Northern Europe, including the gas flares of the oil fields in the North Sea. Forest fires during summer months are additional sources.

References

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