



## Long-term measurements (2010–2019) of carbonaceous aerosol at the Zotino Tall Tower Observatory (ZOTTO) in central Siberia

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The Siberian forests cover about 70% of the total area of the Eurasian boreal forest and are an important factor controlling global and regional climate. Forest fires and biogenic emissions from coniferous trees and forest litter are the main sources of carbonaceous aerosols emitted into the atmosphere over boreal forests. Typically, two classes of carbonaceous aerosol are commonly present in ambient air – elemental carbon (EC) (often referred to as black carbon or soot) and organic carbon (OC). Both OC and EC are important agents in the climate system, which affect the optical characteristics and thermal balance of the atmosphere both directly, by absorbing and scattering incoming solar radiation, and indirectly, by modifying cloud properties.

In 2010, a filter-based sampler was mounted at the background ZOTTO station (60.8° N and 89.4 ° E; 114 m a.s.l.) for aerosol chemical analysis. We present here the time series of carbonaceous aerosol data measurements for 10 years (2010 -2019). We investigate the seasonal variations in PM, EC, and OC. These data are supplemented by measurements of aerosol absorption (PSAP) and scattering (TSI 3563) coefficients. We analyze polluted, background and near-pristine periods, as well as the most pronounced pollution events and their sources, observed over the entire sampling campaign.

We also present ground-based measurements of aerosol-cloud condensation nuclear (CCN) properties and hygroscopicity parameter values obtained from the CCN dataset. A method for assessing the condensation properties of aerosols from satellite measurements based on the data of the VIIRS multichannel radiometer installed on the polar satellite Suomi (USA) has been implemented. The CCN parameters of aerosol particles determined from satellite datasets have been compared with those obtained from ground-based measurements.

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