

Peculiarities of the vertical and geographical distribution of particulate organic matter over West Siberia

*Sergey Borisovich Belan¹, Mikhail Arshinov¹, Boris Belan¹, Natalia Voronetskaya², Galina Pevneva², Anatolii Golovko², Alexander Kozlov³, Denis Simonenkov¹, Denis Davydov¹

1. V.E. Zuev Institute of Atmospheric Optics Russian Academy of Sciences, Siberian Branch, 2. Institute of Petroleum Chemistry, SB RAS, 3. Institute of Chemical Kinetics and Combustion, SB RAS

In recent years, we have performed aerosol sampling in the atmospheric surface layer (ASL) over different regions of West Siberia in order to reveal peculiarities of the geographical distribution of particulate organic matter. Investigation of the vertical distribution in the troposphere was undertaken by means of aerosol sampling from Optik TU-134 aircraft laboratory in the atmospheric layer from 2 to 8 km during three YAK-AEROSIB campaigns (2012, 2013, and 2014). Aerosol samples were collected onto Teflon filters (PTFE membranes, GRIMM). Hydrocarbons were identified using mass spectral library databases NIST, Wiley, as well as by comparing retention times of reference compounds in model mixtures (Alkane Standard Solutions by Sigma –aldrich).

Total organic matter varied from 244.56 ng m³ in aerosol samples collected in the ASL to 0.08 ng m³ in the free troposphere (FT) over the Kara Sea. Significant differences were also found in the geographical distribution of POM due to different volatile organic compounds emitted by vegetation in specific regions. Differences between concentrations of POM sampled in the free troposphere over the continent and ocean can exceed an order of magnitude. Average concentration of organic compounds in the ASL is close to 30 ng m³ and it decreases exponentially with height down to 14 ng m³ at the top of the atmospheric boundary layer and 5 ng m³ in the FT.

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