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Formation and growth of aerosol particles in boreal forest of Siberia

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New Particle Formation (NPF) is a process in which a large number of particles is formed in the atmosphere via gas-to-particle conversion. Previous research shows the important role of formation of new particles for atmosphere, clouds and climate (Kerminen, V.-M. et al. 2018).

There exist measurements from different parts of the world which show that NPF is happening worldwide (Kerminen, V.-M. et al. 2018). Measurements at SMEAR II station in Hyytiälä, Finland (Hari P. and Kulmala M., 2005), show that NPF is a common process in Finland's boreal forests. However, measurements at Zotto station in Siberia, Russia, show that NPF events are very rare in that area (Wiedensohler A. et al., 2018). Measurements in Siberian boreal forests are sparse. We have conducted new measurements at Fonovaya station near Tomsk (Siberia, Russia) using Neutral cluster Air Ion Spectrometer (NAIS), Particle Size Magnifier (PSM), Differential Mobility Particle Sizer (DMPS) and the Atmospheric Pressure interface Time-Of-Flight mass spectrometer (APi-TOF). Those instruments measure aerosol particle number size distribution (NAIS, DMPS), ion number size distribution (NAIS), size distribution of small particles (PSM) and chemical composition of aerosol particles (APi-TOF). The novelty of this work is that such complex measurements have not been done in Siberia before.

Here we report the first results of our research on NPF phenomenon in Siberian boreal forest. We present detailed statistics of NPF events, as well as formation rates (J) and growth rates (GR) of aerosol particles. The results from Fonovaya station are compared with those from SMEAR II station and from SMEAR Estonia station in Järvelja, Estonia.

Literature

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