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Chemical composition of background aerosols sampled in Siberia

Mikhail Yu. Arshinov (1,2), Denis V. Simonenkov (1), Boris D. Belan (1), Gennadii N Tolmachev (1), Tatyana M Rasskazchikova (1), Tatyana K Sklyadneva (1), and Nina V. Uzhegova (1)

(1) V.E. Zuev Institute of Atmospheric Optics, SB RAS, Tomsk, Russian Federation (michael@iao.ru, +73822492086), (2) Tomsk State University, Tomsk, Russian Federation

The IAO SB RAS has the background measurement site "Fonovaya" located in rural area 60 km west of Tomsk. The aerosol sampling was performed in the framework of field measurement campaign carried out in July 2010. Two types AFA-HP-20 filters were used for sampling. Filters of both types were places in one and the same filter holder to separate particles of two size ranges. The filters of NEL type were used to collect particles bigger than 0.3 μm, and FPP filters to catch particles less than 0.3 μm. Filter packs were changed daily in the morning. The mean air volume aspirated through each filter pack was 350 m^3. Thus, 20 aerosol samples had been collected. Then they were analyzed at the Laboratory of Environmental Monitoring of Tomsk State University. Physico-chemical techniques of quantitative analysis are used to analyze the chemical composition of the aerosols (Si, Al, Fe, Mg, Ca, Ti, Cu, Mn, Cr, Ag, Pb, Ni, Ba, Sn, V, Mo, Co, B, Be, K^+, Na^+, Cl^-, SO_4^{2-}, NO_3^-).

It was found that under background conditions a number of heavy and toxic metals, such as Pb, Cr, Ni, Mo have a tendency to accumulate on fine particles. Their average relative content in particulate matter collected onto second stage filters were 61, 74, 81 and 50 %, respectively. Also one third of Cu is accumulated on fine particles. The mean ratio of total inorganic mass in fine and course particles equals 0.1 (M = 0.3 $\mu g/m^3$ for particles less than 0.3 μ and M = 3 $\mu g/m^3$ for particles more than 0.3 μ). The total concentrations of above elements lie in the range from 1 to 5 ng/m^3. Moreover, ratios of their standard deviations to average values were minimal, especially for fine particles. It means that their content in background aerosol matter is very stable. Evidently, a significant part of these elements are of natural origin.

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