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Ozone and nitrogen oxides in surface air in Russia: TROICA experiments.

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The results of measurements of surface ozone and nitrogen oxides concentrations over the continental regions of Russia are discussed. The measurements were done during 10 TROICA experiments (Transcontinental Observations Into the Chemistry of the Atmosphere).
The TROICA experiment started in 1995. By the present moment ten expeditions along the Trans-Siberian railroad from Moscow to Vladivostok (around 9300 km) are carried out.
We separate data sets into unpolluted and polluted areas to study temporal and spatial features. Moreover we analyzed cities (more then 100 cities). About 50% of all data corresponds to unpolluted conditions. The data collected are used in an analysis of the physical and chemical processes occurring over continental Russia.
In this work the estimations of seasonal and daily ozone and NOx distribution were made. The seasonal distribution of ozone for TROICA experiments concentration considerably differs from ozone distribution at Mace Head (Ireland) and Hohenpeissenberg (Germany) stations and well agrees with the ozone distribution at Zotino (Russia, East Siberia). The same concerns also a daily variability.
The ozone concentration gradient is presented. Ozone concentration gradually increases in the eastward direction. Its result of the air transport from polluted regions of Europe and ozone depletions, oxidations of CH4 in Siberia, forest fires in Siberia and around Baikal Lake, regional transport of burning products from Northern China. Significant factor of ozone increasing is stratospheric-tropospheric exchange. It appears in TROICA-3 experiment. During several hours ozone concentration was more then 60 ppbv.
The areas of photochemical ozone generation in polluted air are also detected. We estimate anthropogenic and natural factors, which are responsible for sharp ozone concentration increasing.
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