



## **Seasonal and long-term variability of key tropospheric species across Russia: the TROICA campaigns**

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Measurements of key species of the troposphere (ozone, nitrogen oxides, carbon monoxide, methane and some others) carried out using an environmental carriage-laboratory moving along the Trans-Siberian railway (TROICA project) are presented. Train-based platform provides a snap-shot of the species distribution over a wide territory what allows analysing boundary layer composition under different pollution condition. Expeditions are carried out since 1995 and in different seasons highlighting both long-term changes and seasonality. Results of 8 expeditions are discussed. To evaluate the variability for certain regions whole transect is divided into more uniform zones namely European part of Russia, Western Siberia, Central Siberia, and Eastern Siberia and the Far East. Ozone concentration in most of expeditions grows to the East, while the reasons of this increase are different in different seasons. Under unpolluted conditions ozone seasonality is characterized by high spring maximum and minimum in autumn. Opposite seasonal cycle is observed for NO<sub>x</sub>. As these compounds (NO and NO<sub>2</sub>) are closely connected to anthropogenic activity seasonal maximum is observed during the cold part of the year. The highest methane concentrations occur over Western Siberia in summer. This region is characterized by the highest non-uniformity and pronounced seasonality due to wetlands emissions. The most spatially and temporally uniform region is the Far East, where the difference between typically measured methane concentrations for the whole measurements period does not exceed 50 ppbv. CO concentration has a seasonal maximum in spring and seasonal minimum in summer. The most uncertain seasonality is observed over Central and Eastern Siberia and the Far East. Typical measured concentrations are about 20-30

ppbv higher than in remote locations (ex., Spitsbergen) and vary in the range between 160 ppb and 260 ppb in spring and between 60 ppb and 160 ppb in summer. There are no any consistent long term changes registered for different zones. The work is carried out under the support of INTAS Young Scientist Fellowship (03-55-662), Russian Foundation for Basic Research (grant 03-05-64712 and 04-05-64587) and grant of International Scientific and Technology Center (N 2773).