



## Meteorological and atmospheric composition trends in Moscow region

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Analysis of the long-term CO total column (TC) measurements, AOD and meteorological data in Moscow and surrounding provinces for different time-periods and seasons from 1998 to 2016 years is presented. The atmospheric composition trends estimates based on spectroscopic ground-based datasets of OIAP, SPSU, IAP CAS, RPA “Typhoon” and NDACC were compared with similar ones obtained with use of orbital data (MOPITT v6J and AIRS v6) and with changes in wind speed and temperature trends obtained by use of Obninsk meteorological mast (OMM) data and datasets of sounding station no. 27612 (Dolgoprudny). Total decrease of CO TC in urban (Moscow) and background regions (Zvenigorod Scientific Station, Obninsk) in 1998-2016 years has changed to increase of CO in summer and autumn months in Moscow and Kaluga regions as well as in background regions of Northern Eurasia after 2007. Decrease in CO TC in Moscow city center is partially connected with increase of car engines, progress in fuel quality, and improvement of pollutant removal conditions in Moscow and surrounding regions.

Positive trends (0,2-1.2 %/y depending on site, level, season and time-period) of wind speed in boundary layer (levels 8, 121 m at OMM and layers 0-500 m for sounding station no. 27612) as well as increase in temperature gradient were obtained for 1998-2016; maximal value of trends were found after 2007.

Trends of CO TC in Moscow and in surrounding regions differ in their sign after 2007: there was found a decrease with rate 0,7-1,0 %/y for Moscow for different seasons of 2007-2016 and increase in Zvenigorod and Obninsk with the rate 0,5-1,0%/y for summer and autumn months.

Analysis of measurements at other stations (Peterhof, NDACC European stations), and MOPITT and AIRS satellite data confirmed the transition of CO to the stage of accumulation over majority of European regions after 2007. AOD trends had been found as negative for Moscow and Zvenigorod (AERONET measurements) and for all Europe (MODIS observations) for the same time-periods and seasons.

The authors thank to the team of the SPSU Laboratory of Remote Sensing of the Atmosphere (Headed by Prof. Yu. Timofeev) for providing the results of CO content spectroscopic measurements in Peterhof. The authors also thank to the scientific teams of NDACC and AERONET stations for possibility of using their measurement data.

This work was supported by the Russian Scientific Foundation under grant №16-17- 10275 and partially by the Russian Foundation for Basic Research (grant № 16-05-00287 in part of providing ground-based CO spectroscopic measurements in Moscow and Zvenigorod sites).