



Comparison of Orbital CO Total Column and AOD Data in urban regions

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In connection with the development of the largest metropolitan cities and the rising anthropogenic burden on nearby regions, monitoring of the composition of the atmosphere in these cities or their surroundings is important. In addition, to assess precisely the anthropogenic impact, such estimates are required for uncontaminated, background areas.

This work presents the results of comparing of satellite (Level 3 of orbital spectrometers MOPITT V6J, AIRS V6 and MODIS/Terra/Aqua) and ground-based (sites OIAP RAS, SPbSU, and AERONET) spectroscopic measurements of CO total columns (TC) and aerosol optical depth (AOD) for Moscow and Saint-Petersburg and their outskirts (Zvenigorod - ZSS, Peterhof). Data of time-period of 2010–2016 are analyzed. Statistical parameters of transition relationships for diurnal means are presented too. As a result we show a decreasing in yearly averaged means of the total CO content in background site (ZSS), as well as in Moscow and the vicinity of St. Petersburg. The emissions of CO for the two largest megacities are counted; for Moscow (for an area of 1850 km²) received 715 Gg / year, for St. Petersburg (for an area of 1439 km²) - 130 Gg / year. We identify a good correspondence between the average annual values of the OC of the ZSSspectrometers and Peterhof (a systematic divergence of less than 3%, both for different seasons and for annual average values). In the work we obtain a significant correlation ($R^2 = 0.43-0.84$, averaging of $1^\circ \times 1^\circ$) of satellite and terrestrial TC CO data for the satellite products MOPITT v6Joint and AIRS v6. Obtained transition relationships could be able to refine the CO, CH₄ and aerosol emission estimates.

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