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Recent changes of atmospheric composition in background and urban Eurasian regions

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An analysis of the CO and CH₄ total column (TC) as well as aerosol optical depth (AOD) data in background and urban Eurasian regions for different time-periods and seasons from 1998 to 2018 years is presented. Trend estimates based on long-term spectroscopic datasets of OIAP RAS for Moscow, Zvenigorod (ZSS, Moscow province), Beijing (joint site of OIAP RAS and IAP CAS) and NDACC stations located in Eurasia are compared between themselves and with similar assessments obtained from satellite data. The comparison of satellite and ground-based trend estimates was provided for the days of synchronous measurements only. Analysis results of the satellite observations of AIRS v6 of CO and CH₄ TC and MODIS AOD data are confirmed by ground-based trend estimates. Significant decrease of anthropogenic CO in the megacities Moscow ($2.9\pm 0.6\%/yr$) and Beijing ($1.2\pm 0.2\%/yr$) for autumn months of 1998–2018 was found according to ground-based spectroscopic observations. In spite of total anthropogenic CO emission decrease (for Europe and China) and the decrease of wild-fires emissions in Central North Eurasia (0–90° E, 42–75° N) in 2008–2018 we found CO TC stabilization or even its increase in background regions of Northern Eurasia in summer and autumn months of 2008–2018. Decrease of AOD over Central and Southern Europe as well as over China (1–5%/yr) was observed since 2007. Since 2007–2008 an increase in CH₄ TC positive trend values over Northern Europe as well as for tropical belt of Eurasia was obtained.

Additionally some results of comparison of orbital (AIRS, MODIS, TROPOMI) and ground-based spectroscopic diurnal and 10-days averaged data are presented.

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