

EGU21-8351

<https://doi.org/10.5194/egusphere-egu21-8351>

EGU General Assembly 2021

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Carbon monoxide variability in the atmosphere of Moscow region.

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Complex analysis of CO total content measurements in Moscow (site OIAP, city center) and Moscow province (site ZSS, Zvenigorod Scientific Station) using OIAP RAS spectroscopic data, MosEcoMonitoring automatic network station (MEM) data and satellite monitoring results. Analysis of meteorological information on parameters of atmospheric boundary layer (ABL) in Moscow and surrounding regions is performed. Long-term variability and trends of CO total column (TC) and meteorological parameters was explored, pollutant accumulation characteristics of carbon monoxide in calm days in ABL were obtained. ZSS data as regional background characteristics were used. It was revealed that transports from Moscow don't lead to a significant increase in CO TC in the ZSS. The decrease of CO TC averaged annual values for 2000–2018 in Moscow ($-2.56 \pm 0.52\%/yr$) and ZSS ($-1.15 \pm 0.37\%/yr$) is established. After approximately 2007–2008 the rate of CO TC decrease declined at both sites. In the summer and autumn months of 2008–2018 CO TC increase with the rate of about $0.7\%/yr$ is found at the ZSS. Increase of wind velocity in Moscow ABL in different periods of 2000–2018 (0.4 – $1.6\%/yr$) is established. In contrast with Moscow, statistically significant changes of wind velocity in Kaluga province were not detected. Repeatability of calm days in Moscow for 2006–2017 time-period was decreased ($-7.06 \pm 3.96\%/yr$) with the diminution of anthropogenic part of the CO content in the same period ($-6.72 \pm 3.48\%/yr$). Obtained results indicate not only urban anthropogenic emissions reduction but also the influence of climatic (meteorological) factor on Moscow air quality.