Geophysical Research Abstracts
Vol. 19, EGU2017-778-1, 2017
EGU General Assembly 2017

Natural and anthropogenic factors of tropospheric ozone variability in the Northern Eurasia

Yury Shtabkin, Konstantin Moiseenko, Andrey Skorokhod, and Igor Belikov

A.M. Obukhov Institute of Atmospheric Physics RAS, Department of Atmospheric Chemistry, Moscow, Russian Federation (yuryshtabkin@gmail.com)

Effects of climatically significant natural and anthropogenic sources of atmospheric pollution are commonly accepted to be non-local and can be traced in many cases at regional to continental scales. Particularly, transport of polluted air from industrial regions in North Eurasia (e.g. Europe and southern Siberia) draws attention due to its persistent impact on tropospheric chemistry in remote areas of Siberia and Arctic. Such impact is evidenced, for example, through continuous observations on remote atmospheric monitoring sites like ZOTTO in Central Siberia (beginning from 2007) and TROICA measurement campaigns along the Trans-Siberian railroad in 1996 – 2010.
We use GEOS-Chem chemical transport model to make numerical assessments of the lower tropospheric chemical system sensitivity to anthropogenic NO_x and biogenic volatile organic compounds (VOC) emissions using reduction approach for primary anthropogenic and biogenic regional emission sources. Emissions from both type of sources were reduced to 50% and then to 100%. It is shown that increasing of ozone production rate due to regional anthropogenic emissions of NO_x leads to substantial (up to 20 ppbv) increase of near-surface ozone concentrations in mid-latitudes traced as far as $\sim$120° E. The predominant role of long-range air transport against regional sources of photochemical ozone production was determined for the most part of European Russia and Siberia. We also compare the results of ZOTTO and TROICA measurements against GEOS-Chem model predictions which are found to be in a good agreement.
This work was supported by the Russian Scientific Fund under grant 14-47-00049.