

Lightning impact on surface ozone in urban and rural environment

Session: Lightning Occurrence Relative to Meteorology

Savka Petrova (Faculty of Physics, University of Sofia, Sofia 1164, Bulgaria, asavita@phys.uni-sofia.bg), Ventsislav Danchevski, Rumjana Mitzeva.

The tropospheric ozone is a secondary atmospheric pollutant produced by stratosphere-troposphere exchange and photochemical reactions involving NO_x and VOCs. Various, unevenly distributed manmade and natural sources of O_3 precursors coexist. In urban regions traffic induced NO_x concentrations are high as opposed to rural areas where there is lack of NO_x . Therefore lightning production of nitrogen oxides in troposphere can lead to local influences on ozone concentration. It is expected that this effect will be most evident in rural areas where ozone formation is NO_x limited.

The results from the analysis of lightning data and surface ozone concentration for two different areas (urban and rural) in Bulgaria will be presented. Ozone concentrations at 1.5 m above ground were measured at two stations with TECO 49 UV photometric ozone instrument. One of station is a typical urban ecosystem, located in Sofia city (577m ASL), while the other - rural station is located in the central part of Plana Mountain (1234m ASL). Information of number of lightning during thunderstorms development is taken from the ZEUS network operated by the National Observatory of Athens (NOA).

The present study is focused on the impact of lightning activity on surface ozone concentrations in the summer. The summer period is chosen both for having higher lightning NO_x production and high ozone levels, thus maximizing the likelihood that such emissions could impact peak surface ozone concentration. The average and maximum concentration of surface ozone in days with thunderstorms (lightning) and cloudless days will be compared separately for urban and rural station.