Geophysical Research Abstracts
Vol. 21, EGU2019-17045, 2019
EGU General Assembly 2019

High summer ozone levels in the Eastern Mediterranean and the associated synoptic meteorological conditions

Pavlos Kalabokas (1), John Kapsomenakis (1), Nikos Mihalopoulos (2), Christos Zerefos (1,3)

(1) Academy of Athens, Research Center for Atmospheric Physics and Climatology, Athens, Greece (pkalabokas@academyofathens.gr), (2) Environmental Chemical Processes Laboratory, Department of Chemistry, University o Crete, Heraklion, Greece, (3) Navarino Environmental Observatory (N.E.O.), Greece

For the better understanding of the atmospheric processes leading to ozone episodes over the Eastern Mediterranean, which is one of the major global tropospheric ozone hotspots (Gaudel et al., 2018), 4-year daily rural afternoon ozone measurements from the station of Finokalia in Crete have been analyzed. For the 7% highest ozone (12:00–18:00) episodes during spring the composite NOAA/ESRL and ECMWF ERA-Interim reanalysis maps of geopotential height, specific humidity, vertical wind velocity omega and vector wind speed have been plotted and compared with the climatic seasonal averages and the corresponding HYSPLIT back trajectories.

The results show that the summertime synoptic conditions corresponding to the highest surface ozone days at Finokalia are comparable with the conditions encountered during lower troposphere highest ozone episodes following the analysis of MOZAIC vertical profiles over the Aegean Sea and the Eastern Mediterranean (Kalabokas et al., 2015). During the highest ozone episodes, the transport of tropospheric ozone-rich air masses through atmospheric subsidence influences significantly the boundary layer and surface ozone concentrations. In particular, the geographic areas with observed tropospheric subsidence seem to be the transition regions between high and low pressure synoptic meteorological systems. During the highest ozone episodes, the air masses originate almost always from northern directions. The results also show that the strongest tropospheric subsidence conditions observed at the station during the highest ozone days are linked with air masses originating from the lower troposphere of the north-western sector. Strong atmospheric subsidence is also observed under the north-eastern circulation, linked to the characteristic “etesian” winds, which prevail over the Aegean Sea and the Eastern Mediterranean area during summer months.