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Synoptic meteorological conditions associated with high spring and summer ozone levels at a rural site in the Eastern Mediterranean

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For the identification of the nature of spring and summertime ozone episodes, rural ozone measurements from the Eastern Mediterranean station of Finokalia-Crete, Greece during the first 4-year period of its record (1998-2001) have been analyzed with emphasis on periods of high ozone concentrations, according to the daily variation of the afternoon (12:00 – 18:00) ozone values. For the 7% highest spring and summertime ozone episodes composite NOAA/ESRL reanalysis maps of various meteorological parameters and/or their anomalies (geopotential height, specific humidity, vertical wind velocity omega, vector wind speed and temperature) have been examined together with their corresponding HYSPLIT back trajectories. This work is a continuation of a previous first approach regarding summer highest and lowest surface ozone episodes in Finokalia and other Central and Eastern Mediterranean stations (Kalabokas et al., 2008), which is now extended to more meteorological parameters and higher pressure levels.

The results show that the examined synoptic meteorological condition during springtime ozone episodes over the Eastern Mediterranean station of Finokalia are quite similar with those conditions during high ozone springtime episodes observed at rural stations over the Western Mediterranean (Kalabokas et al., 2016). On the other hand the summer time synoptic conditions corresponding to highest surface ozone episodes at Finokalia are comparable with the conditions encountered during highest ozone episodes in the lower troposphere following analysis of MOZAIC vertical profiles over the Aegean Sea and the Eastern Mediterranean (Kalabokas et al., 2015 and references therein). During the highest ozone episodes, for both examined seasons, 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.

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