Geophysical Research Abstracts
Vol. 21, EGU2019-9910-1, 2019
EGU General Assembly 2019

Investigation of long-term interannual variability of near-surface O_3 at the Mt. Cimone WMO/GAW global station (Italy, 2165 m a.s.l.)

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Significant differences of near-surface O_3 values occurred during 2004 – 2008 between the two WMO/GAW global stations of Mt. Cimone (2165 m a.s.l., Italian northern Apennines) and Jungfraujoch (3580 m a.s.l., Swiss Alps) which is considered a reference for the background conditions of continental Europe. Recorded positive anomalies at Mt. Cimone strongly influence the ozone timeseries in the 1996-2016 , resulting both in a stronger negative trend with respect to the consolidated result at Jungfraujoch and in different decadal variability.
So our study stress that the interannual variability in the atmospheric transport regime must be considered when long-term trend are discussed in the Mediterranean basin. We made use of air-mass transport simulation by the Lagrangian particle dispersion model FLEXPART for interpreting the underlying mechanisms potentially driving the occurrence of the elevated ozone periods at Mt Cimone. Average diurnal ozone variability observed at Mt Cimone and a reference station (Febbio, 1121 m a.s.l. and closer to the sources in the polluted Po-Valley region) indicates that processes occurring at diurnal scale such as thermal transport of air-masses or local photochemistry appeared to have played only a minor role on the occurrence of the positive summertime anomalies. Rather, this study reveals that positive ozone anomalies, observed in different seasons with different intensity can be partly explained by transport regimes favouring transport of elevated near-surface ozone values over European source regions.