

Aerosol – ozone correlations for long-range aerosol transport over Austria

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The presence of aerosols in the atmosphere has an important contribution to climatic variations, influencing the behavior of reactive trace gases and changing therefore the oxidizing capacity of the atmosphere.

The purpose of this analysis is to determine the correlations between the long-range transport of aerosols and the tropospheric ozone over Austria, using selected transport events recorded over Central and South-Eastern Europe in the period March – August 2014.

The study has been performed for Illmitz, Austria ($47^{\circ}46'N$, $16^{\circ}48'E$) which is an EMEP regional background site for reactive gases and aerosols. The concentrations of ozone measured here using in-situ instruments for the period considered have three peaks over the allowed limits ($120 \mu g$) for time intervals larger than 48 hours.

For the same period, three major cases of long-range transport of aerosols over Austria were identified using measurements from the EARLINET remote sensing stations close to Austria (Munich, Leipzig and Bucharest).

Starting from the aerosol concentrations measured at Illmitz for each peak interval, the trajectories of the aerosols and the source-receptor sensitivity were computed using the aerosol transport models FLEXTTRA and FLEXPART, run in backward mode for a period of ten days. A back-trajectory analysis was performed for Illmitz, correlating the trajectories with the remote sensing stations. Two of the cases have as potential source wildfires from Canada, while the third one has as potential source fires from the Scandinavian boreal forests.

The ozone peak from beginning of May (1 – 2 May, 2014) is correlated with aerosols originating from Scandinavian boreal fires, while the peak from June (10 – 13 June, 2014) and the peak from July (16 – 18 July, 2014) are correlated with aerosols originating from Canadian forest fires transported over Germany towards Eastern Europe.

In conclusion, the surface ozone concentrations in Austria are strongly influenced not only by local, anthropogenic aerosols but also by long-range transported aerosols: air pollution is a global problem, requiring global solutions.

Supported by Austrian Science Fund FWF, Project M 2031, Meitner-Programm.