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Analysis of Recent European Surface Ozone Trends Considering Site Representativeness and Mete-orology

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Recent trends of surface ozone (O_3) within Europe vary substantially depending on the location and surroundings of a measurement site. The influence of long-range transport from North America and Asia, changes in stratosphere-troposphere exchange, increase in lower stratospheric O_3 and changes in advection patterns are possible drivers for the observed O_3 trends. O_3 concentrations greatly depend on meteorology (temperature and radiation) and local to regional emissions of precursor gases and therefore on the representativeness of a site (e.g. background vs. urban site) and regional emission trends.

We investigated the representativeness of 1264 "rural" and "suburban" background sites (as available through the European Environment Agency (EEA)Airbase database) by analysing population density, land cover and topography in the surrounding of the sites. A hierarchical clustering method was applied to derive an independent site categorization. The two area types as specified by EEA are split into 7 categories: elevated, lowered, remote, rural, rural/coastal, rural/polluted, suburban.

Furthermore, we analysed the trend of surface O_3 and O_x (O_3+NO_2) for the mentioned sites based on the above site categorization, local meteorology and precursor emission trends. Of the 1264 sites 161 possess sufficiently long and complete O_3 data series suitable for robust trend estimation, while for 100 sites both O_3 and NO_2 data are available. We present a strategy for further data exclusion based on available data quality information and a break detection algorithm. First results of the trend analysis applying different statistical approaches are discussed.