



Significant weekly periodicities in meteorological variables in Germany – Evidence of an anthropogenic aerosol effect?

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Statistical analyses of data from 12 German meteorological stations meeting WMO standards in the period 1991-2005 are presented. These stations represent different local climate conditions in terms of both meteorology and pollution situation. For the average over data of all stations, we identified significant weekly periodicities in many variables such as temperature, daily temperature range, sunshine duration, cloud amount, precipitation, and precipitation frequency. Not only data of stations situated in congested urban areas, but also data of remote stations as e.g. on Mount Zugspitze 2960 m above sea level in the Alps showed significant in-phase weekly temperature cycles. These weekly periodicities cannot be explained completely by local pollution effects or local heat emissions. We tend towards the hypothesis that the anthropogenic weekly emission cycle and the subsequent aerosol cycle interact with the atmospheric dynamics on a larger scale which leads to a forcing of a naturally existing 7-day period among the spectrum of atmospheric periods. We can support this hypothesis by an analysis of both near-surface PM10 concentrations and AERONET sun photometer aerosol optical thickness measurements. Both of the data sets show significant weekly periodicities. These results are also reflected by in-phase weekly periodicities of the visibility, which is a useful proxy for the horizontally averaged aerosol load in the atmosphere.