A statistical approach to discern local and background portions of PM10

A. Spekat (1), W. Enke (1) and F. Kreienkamp (1)

Climate and Environment Consulting Potsdam GmbH (arne.spekat@cec-potsdam.de)

When studying PM10 concentrations, measured locally, it becomes evident that two main portions need to be quantified: The concentration produced by sources in the vicinity of the station and the long range transports. The traditional approaches include (i) analyses of the components of PM10, (ii) comparisons between luff and lee of a station, (iii) investigation of trajectories and (iv) complex chemical transport modelling.

The development of a completely indepent strategy which makes use of statistical methods, including regression and correlation analysis, was funded by a research grant of the German Federal Environmental Agency (UBA). The method does not apply the concept of PM10 *sources*, but, rather analyzes the relations between times series of PM10 measurements (*immisions*) exclusively. It is applied to identify the shares of the local portion and the large-scale background plus a portion that cannot be attributed to these two.

Using regression analysis, a set of objectively chosen meteorological parameters is used to reconstruct the local PM10 measurement series. This weather-dependent part of the series is then removed and the residuum, which contains the PM10 background and a statistically unexplainable portion is analyzed further with correlations.

Results are shown for a three-year set of data which includes well over 250 PM10 stations in Germany. The data is analyzed according to different stratifications, such as the PM10 load, the wind direction or the station types as well as for the data set as a whole. In a further, advanced development of the method, a study of PM10 transports across several border sections is possible. Results with respect to these transports as well as a comparison with results from other, dynamical models will be shown.