# Simulation of High PM10-Concentrations and Meteorology

**A. Kerschbaumer** (1), R. Stern (1), T. Schartner (1), E. Reimer (1)

(1) Institut für Meteorologie, Freie Universität Berlin, Germany (kerschba@zedat.fu-berlin.de)

The simulation of PM10 is a difficult task because PM10 is not a single species but a conglomerate of many particles with different physical and chemical properties. These particles are only partly emitted directly from a large variety of anthropogenic, biogenic and natural sources, but also formed in the atmosphere by chemical and physical processes from gas-phase precursors as NO2, SO2 and NH3. Thus, also the transport characteristics and residence times in the atmosphere are dependent on the aerosol component. Most Aerosol chemistry transport models tend to underestimate observed annual mean values of PM10, and in particular the observed number of days with a daily mean PM10 concentration greater than 50 $\mu$g/m3 which is the short term limit value of the EU directive. In this study a regional scale model simulation is presented that focuses on the ability to simulate periods with observed elevated PM10 concentrations. Such PM10 episodes, which occur under particular weather conditions, contribute considerably to the annual mean value and are responsible for the annual number of exceeding days. The period from January 15th until April 5th 2003 was selected in which the PM10 short term limit value was exceeded during three distinct episodes in large parts of Northern Germany due to long-lasting favoured stable meteorological conditions and low wind speeds with easterly wind directions. Observed PM10 daily mean concentrations reached at several days concentration levels well above 100 $\mu$g/m3. The chemistry transport model REM_Calgrid (RCG) was employed to simulate the temporal and spatial PM concentration and its chemical composition during the selected time period with 3 different meteorological drivers. The gridded Meteorological analysis based on an optimum interpolation scheme developed at the Freie Universitaet Berlin is used as a reference driver. The PM10 simulatiotions carried out with two different meteorological model inputs, GME of the German Weather Service and MM5, were compared with the reference scheme. While all three model set-ups showed a comparable and reasonable PM simulation with a 50% confidence level, the importance of representing and/or simulating correctly meteorological features as the right position of frontal systems determine the ability of simulate correctly the increase and the high values of PM10. Nevertheless, there is still an underestimation of the absolute peak values which is imputable to other reasons than meteorology.