Geophysical Research Abstracts,
Vol. 11, EGU2009-4290, 2009
EGU General Assembly 2009

Implementation of a new aerosol module HAM within the community Weather Research and Forecasting (WRF) model

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Realistic simulation of direct and indirect effects of aerosols requires models where aerosols, meteorology, radiation and chemistry are coupled in a fully interactive manner. The design of the Community Weather Research and Forecasting/Chemistry model (WRF/Chem) permit such an interactive coupling. Over the last few years, various aerosol modules have been implemented into the chemistry version of the WRF model.
In this study, a new aerosol module HAM has been incorporated into the WRF/Chem modeling system. The aerosol HAM model embedded into the global ECHAM5 model was developed by Stier et al. in 2005 at the Max Planck Institute for Meteorology. HAM differs from the previous WRF aerosol modules in terms of the size representation, chemical composition and numerical algorithms used. It is based on a pseudo-modal approach for representation of the particle size distribution by grouping aerosols into four geometrical size classes and two types of particles mixed and insoluble.
In the current implementation, aerosol HAM is coupled to the Regional Acid Deposition model version 2 (RADM2 chemical mechanism). We also used a flux-resistance method for dry deposition of particles.
A high concentration episode for PM10 particles in Tehran from 23 to 29 January 2007 has been chosen and has been compared to observed near surface measurements to test the performance of the coupled HAM/WRF model. We applied a horizontal spacing of 30-km. Preliminary results show that the model captures reasonably both magnitude and diurnal variation of measured PM10 mass concentration during this episode.