Geophysical Research Abstracts
Vol. 14, EGU2012-4271, 2012
EGU General Assembly 2012


# AeroSol Cloud Interactions in UK weather (ASCI)

C. Planche (1), J. H. Marsham (2), D. J. Parker (1), K. Carslaw (1), G. Mann (2), A. M. Blyth (2), P. Field (3), B. Shipway (3), A. Hill (3), M. Salvi (3), and J. Wilkinson (3)

(1) University of Leeds, UK, (2) National Centre for Atmospheric Science (NCAS), University of Leeds, UK (jmarsham@env.leeds.ac.uk), (3) The Met Office, Exeter, UK

The interaction of aerosols with clouds is known to significantly affect cloud dynamics and the patterns and intensity of precipitation. However, aerosol-cloud interactions are very poorly handled in low resolution climate models and the processes are not included at all in operational NWP models (beyond set land-sea contrasts). The ASCI project explores the interactions between the atmospheric aerosol particles, the cloud microphysics and the weather-system dynamics over UK. To investigate the aerosol influences on the microphysics and dynamics fields, the Met Office Unified Model with a new multi-moment bulk microphysics scheme is coupled with the GLOMAP-mode aerosol representation.

The new multi-moment bulk microphysics scheme considers 5 phases (cloud water, rain, ice, snow and graupel) and the aerosol mass inside the liquid or ice phase hydrometeors. The cloud and ice phases are represented according to two moments (number and mass) whereas the rain, snow and graupel are represented with an additional moment (reflectivity). The GLOMAP-mode scheme simulates in a sized resolved manner the gas phase chemistry and the aerosol processes (primary emissions, nucleation scavenging, coagulation, condensation, dry deposition, sedimentation etc). The scheme can represent seven modes in carrying aerosol component masses and number concentrations. Nevertheless, to couple the new microphysics and the aerosol schemes, the number of the aerosol modes is simplified and there was a special attention to the cloud/rain evaporation and aerosol nucleation processes.

The simulation results are compared to observations from the Convective Storm Initiation Project (CSIP) field campaign, which took place in southern England in 2005. The initial case-study selected is characterised by moderately intense convective showers forming throughout the day in a north-westerly airstream below an upper-level PV anomaly. The model fields are compared with radar observations and other data.