



New Particle Formation in the ECHAM/MESSy Atmospheric Chemistry model

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New Particle Formation (NPF) events in the planetary boundary layer are an important source of atmospheric aerosols. Various experiments showed the importance of a variety of chemical species in the nucleation and growth of new aerosol particles. These species include the sulphuric acid water system as well as base stabilised nucleation and oxidised organic species. Additionally ionising radiation is known to enhance nucleation under certain circumstances.

NPF events need to be simulated in general circulation models (GCM), in order to understand the effects of particle formation events on climate. Simulating new particle formation in Earth's atmosphere on a global scale requires a relatively detailed description of the emission of precursor gases and their subsequent oxidation. Two new submodels for the Modular Earth Submodel System (MESSy) were recently developed. Firstly, the new aerosol nucleation (NAN) submodel includes the most recent nucleation parameterisations for inorganic and organic nucleation. Secondly, the IONS submodel, which calculates the ion pair production rate in the atmosphere for a time period from 1600 to present day.

The new submodels were used in the ECHAM/MESSy Atmospheric Chemistry (EMAC) GCM and compared to observations at various measurement sites. Good agreement with measured particle concentrations was achieved for a chemical mechanism that used lumped monoterpene species. Results from the most recent EMAC simulations, which use the Mainz Organics Mechanism (MOM), will be presented. Nucleation rates for each pathway (organic, inorganic, ion induced or neutral) are individually recorded and allow to study the relative importance of each nucleation mechanism at various locations.