

Modelling multiphase aerosol-cloud processing with the 3-D CTM COSMO-MUSCAT: application for cloud events during HCCT-2010R.

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The online-coupled 3-D chemistry transport model COSMO-MUSCAT was enhanced by a detailed description of aqueous phase chemical processes. The aqueous phase chemistry is represented by the detailed chemical mechanism CAPRAM 3.0i reduced (C3.0RED). In addition, the deposition schemes were improved in order to account for the deposition of matter incorporated in cloud droplets of ground layer clouds and fogs. The extended model system was applied for real 3-D case studies connected to the field experiment HCCT-2010 (Hill Cap Cloud Thuringia, 2010). Process and sensitivity studies were conducted and the results were compared to the available measurements during HCCT-2010. The studies indicate the requirement to consider chemical cloud effects in regional CTMs because of their key impacts on e.g., oxidation capacity in the gas and aqueous phase, formation of organic and inorganic particulate matter, and droplet acidity.

International Technical Meeting on Air Pollution Modelling and its Application

2018