MODELLING MULTIPHASE CHEMISTRY OCCURING IN AN OROGRAPHIC HILL CAP CLOUD

Z. Majdik, A. Tilgner, H. Herrmann
Leibniz-Institut für Troposphärenforschung e. V.

herrmann@tropos.de/Fax: +49 341 235-2325

The complex aqueous phase chemical radical mechanism CAPRAM 2.4 (MODAC mechanism, Ervens et al., 2003) together with the gas phase mechanism RACM (Stockwell et al., 1997) were coupled to a detailed microphysical model to describe physico-chemical processes occurring in a cloud passage experiment in the Thuringian forest. By means of SPACCIM (Spectral Aerosol Cloud Chemistry Interaction Model) simulations were carried out with an air parcel moving from the village of Goldlauter (luff site) to Schmücke (top of the mountain). The aerosol chemical composition in Goldlauter is initialized according to measurements made in Goldlauter within the joint project FEBUKO. Simulation results have been compared to measured data at the summit station. The simulated LWC of 0.4385 g/m^3 considering a wind speed in Goldlauter of 4 m/s on the 27-th October 2001 is about 11% higher than the measured LWC of 0.3985 g/m^3. For the cloud event on the 27-th October 2001 a nitrate concentration of 2.05E-4 mol/l and a sulfate concentration of 5.1E-5 mol/l was measured at Schmücke. For the respective cloud event the calculated nitrate and sulfate concentration is 2.50E-4 mol/l and 5.77E-5 mol/l, respectively. While for some organics, e.g. acetic acid, the difference between the measured and calculated concentration is relatively small, under a factor of two, for other organics, e.g. oxalate, bigger differences were found. The calculated oxalate concentration is with a factor of six smaller then the measured concentration. For a better description of organic chemistry the CAPRAM organic extension treating higher organics with up to four carbon atoms will be added to the aqueous chemical scheme. In the future simulations with the air parcel moving downhill the mountain to the lee station will be made to evaluate the effect of cloud processing on aerosol particles.