Hill Cap Cloud Thuringia 2010 – A ground-based field study on aerosol cloud interaction

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Hill Cap Cloud Thuringia 2010 (HCCT-2010) was a Lagrangian-type field experiment on aerosol cloud interaction, performed at the Schmücke mountain ridge, Germany, in September and October 2010. Three measurement sites were installed: An upwind site, which served for the characterisation of incoming air masses, an in-cloud site on the Schmücke summit, and a downwind site, where under appropriate meteorological conditions air masses could be studied after their passage through a hill cap cloud.

A large pool of instruments was installed at the sites, with a focus on online-samplers to allow for a time-resolved physical and chemical characterisation of the different aerosol and cloud phases. At the valley sites, gas monitors, VOC and OVOC samplers, PTR-MS, FAGE, SMPS, APS, HTDMA, CCNC, MAAP, CPC, mist chambers, filter samplers, impactors, MARGA, PILS, AMS, and a ceilometer were applied. At the in-cloud site the cloud droplets were sampled using bulk and multi-stage cloud water collectors. The HOx budget was determined by a FAGE and the interstitial and residual droplet phase were sampled behind an interstitial inlet and two CVIs, applying SMPS, OPC, PSAP, aerosol mass spectrometry (AMS, ALABAMA), filters and OVOC samplers.

The comprehensive dataset is used to study various topics related to aerosol cloud interactions under natural conditions, such as CCN activation, chemical aerosol processing through clouds, chemical composition of clouds, or the radical oxidants budget within clouds. In addition to a general project overview, selected results, especially from the chemical measurements, are presented.