Highlight results from the HCCT-2010 hill cap cloud experiment

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Clouds represent an important medium for chemical reactions in the atmosphere, where a multitude of reactions can take place and modify the chemical composition and thus ultimately the physical properties of aerosol particles after cloud dissipation.

The Lagrange-type cloud experiment "Hill Cap Cloud Thuringia 2010" (HCCT-2010) was performed in 2010 at Mt. Schmücke, Germany, to study physical and chemical aerosol cloud interactions. A hill cap cloud served as a natural flow-through reactor (Fig. 1) and air masses were characterized at an upwind, an in-cloud, and a downwind site by various offline- and online-instruments.

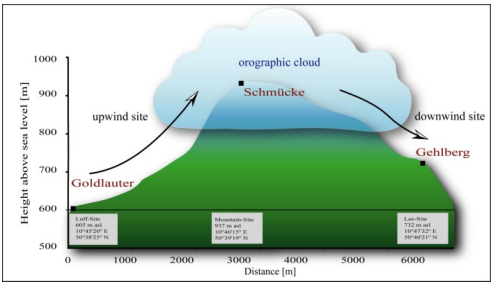

Figure 1: Scheme of the campaign area

A comprehensive analysis of meteorological parameters and inert tracers allowed for the identification of several cloud events where the air flow along the measurement sites was fully connected and representative air masses were sampled before, during, and after their passage through the hill-cap cloud.

In this presentation some of the main results will be presented. These include indications of aerosol processing by chemical in-cloud mass production of sulfate and organics during cloud events, an increased hygroscopicity of aerosol particles after cloud passage, a direct observation of HO_2 depletion in cloud through heterogeneous loss processes, as well as an unexpectedly high importance of transition metal ion catalysed oxidation of SO_2 during some events.