



Mass spectrometric analysis of ice and supercooled cloud residuals during CLACE-3

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During the 3rd Cloud and Aerosol Characterization Experiment (CLACE-3), a novel Ice-CVI (Counterflow Virtual Impactor) was coupled to an Aerodyne Aerosol Mass Spectrometer (AMS). The experiment was performed in February/March 2004 at the High Alpine Research Station Jungfraujoch (Switzerland), located on a mountain col at 3580 m asl.

The combination of CVI and AMS allowed to analyze the residuals of ice nuclei as well as of supercooled cloud droplets, depending on cloud type and CVI operation mode. Alternatively, the interstitial aerosol was sampled and compared to the residual particles. Besides long episodes of free tropospheric aerosol, several cloud events were sampled, both mixed-phase and pure supercooled clouds.

SMPS measurements showed that the mass distribution of residual particles is remarkably different from the mass distribution of background/interstitial aerosol. The interstitial and background aerosol is dominated by accumulation mode particles with a modal diameter of about 200 nm (mass distribution). This fraction is missing in the residuals, a finding that suggests that only larger particles (> 200 nm) are activated as ice nuclei.

Comparison of SMPS and AMS data indicates that the background aerosol was com-

posed to about 95% of non-refractive material. The interstitial aerosol was found to contain more refractory compounds. The ice cloud residuals sampled by the CVI show negligible mass concentration in the AMS compared to SMPS data, indicating that preferably refractory particles act as ice nuclei.