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The microphysics of mixed phase cloud at Jungraujoch during CLACE

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During the winter of 2005 a comprehensive experiment was performed on the summit of Jungraujoch to investigate the microphysics and cloud aerosol interactions of mixed phase cloud at the site.

Comprehensive measurements were made, at high frequency to investigate the cloud microphysics. A Cloud Particle Imager (CPI) probe was used to look at the habit and size distribution of the ice particles. The results from this instrument were compared with a Knollenberg 2D-G probe. A PDPA airborne droplet analyzer (ADA), which is able to distinguish small ice particles and supercooled liquid droplets, was used along with a Knollenberg Forward Scattering Spectrometer Probe (FSSP) to study the liquid phase microphysics. Measurements of the size resolved chemical composition of the aerosol were made using an Aerodyne Aerosol Mass Spectrometer.

The data from the microphysical instruments was used to obtain measurements of ice and liquid water content of the cloud along with the size distribution, number concentration and habit of the ice crystals and the size distribution of liquid droplets. It was found that on some occasions that cloud regions that were largely glaciated were separated, with a rapid transition, from regions containing supercooled liquid water. It is suggested that this represents regions of cloud of different age and the presence of secondary ice particle multiplication processes in some favoured cloud regions. At other times it was observed that truly mixed phase cloud was present with water droplets and ice crystals co-existing. It is suggested that these are regions of older cloud in which secondary ice particle production had occurred with reduced

efficiency.

The paper will explore the implications of these two types of mixed phase cloud for the radiative properties and stability of the cloud.