



Droplet freezing and signs of small scale particle clustering in mountain wave clouds

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Measurements have been made in mountain wave clouds with the Cloud, Aerosol and Precipitation Spectrometer (CAPS) in November, 2007 as part of the Ice in Clouds Experiment - Layer (ICE-L). The objective of ICE-L is to study the formation of water droplets and their transition to ice in layer clouds that form over the Rocky Mountains. The integrated sensors on the CAPS provide the means to study the very small scale structure of these clouds because the scattering and imaging sections measure the angular scattering characteristics of individual droplets and ice crystals in the size range from 0.5 to 50 μm and record the gray scale images of particles from 15 μm and larger. In addition, the hot-wire liquid water sensor, that is part of the system, measures principally the liquid phase and excludes the solid phase.

Six flights have been evaluated to look for the transition regions where water droplets are freezing and to analyze the relative fraction of frozen to liquid droplets as a function of the temperature and the distance from the leading edge of the cloud. In addition, the spatial structure of these particles is evaluated on a particle by particle basis to assess the homogeneity of mixing in these laminar clouds.