



Mixed Phase Boundary Layer Clouds Observed from a Tethered Balloon Platform in the Arctic

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Microphysical and radiative measurements in boundary-layer mixed-phase clouds, consisting of ice crystals and liquid droplets, have been analyzed. These cloud measurements were collected during a May-June 2008 tethered balloon campaign in Ny-Ålesund, Norway, located at 78.9 degrees N and 11.9 degrees E in the high Arctic. The instruments deployed on the tethered balloon platform included a radiometer, a cloud particle imager, and a meteorological package. The mean intensities estimated from the radiometer measurements on the balloon were used to quantify the vertical structure of the mixed phase cloud system, while the downward irradiances measured by an upward looking ground-based radiometer were used to constrain the total cloud optical depth. The time evolution of the liquid water and ice particle cloud optical depths was estimated by using a comprehensive radiative transfer model with two embedded cloud layers consistent with the cloud particle imager data.