



## Properties of Ice Cloud and Melting Layer from GPM Validation Projects

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This study characterizes the properties of ice clouds and through the melting layer from observations during three field programs: LPVEX (Finland, 2010), MC3E (Oklahoma, 2011) and GCPEX (Canada, 2012). A combination of level-flight passes and Lagrangian spiral descents by aircraft, together with co-located radar observations, are used in the analysis. Excellent detail of the microphysics from 10 microns to more than 1 cm and direct measurements of the condensed water content were obtained in stratiform through convectively-generated clouds. We report on the ice cloud properties, fine details of the melting processes through the melting layer, and the development of multi-wavelength radar reflectivity-snowfall(rainfall) rate relationships that express these properties with this complete set of observations in a range of cloud types and geographical locations.