Snowfall validation for the NASA Global Precipitation Measurement mission

Stephen Nesbitt
University of Illinois at Urbana-Champaign, USA

Gleicher, Kirstin (University of Illinois at Urbana-Champaign)
Duffy, George (University of Illinois at Urbana-Champaign)
Reed, Kim (University of Illinois at Urbana-Champaign)
Chandrasekar, V. (Colorado State University)
Petersen, Walt (NASA Wallops Flight Facility)
Hudak, David (Environment Canada)

E-mail: snesbitt@illinois.edu

Detecting and estimating the rate of snowfall from satellite active and passive remote sensors remains one of the most challenging areas of satellite precipitation research. Given the important applications of snowfall retrievals for weather, climate, and hydrological applications, quantitative estimates of remotely sensed snowfall rate are desired across many research and operational communities. The Global Precipitation Measurement (GPM) measurement mission, launched in February 2014, will advance snowfall measurement science with its high inclination orbit, its dual-frequency Ku-Ka band radar (enabling measurements of Dual Frequency ratio or DFR), and high frequency radiometer. Radar retrievals in snow using DFR and dual-polarization radar measurements have shown promise in retrieval of snow parameters that can constrain snowfall retrievals. During the GPM Cold Season Precipitation Experiment (GCPEx), conducted in January and February 2012 near Egbert, Ontario, Canada, simultaneous airborne and ground-based microphysics and airborne and ground-based dual-frequency dual-polarization radar measurements were collected for a variety of snowfall events and intensities. In this presentation, using this unique in situ and remote sensing dataset, we will show (1) statistical variations in the observed ice particle size distributions can be used to constrain snowfall retrievals and scattering models, (2) the degree to which forward models of snow particles at Ku-Ka band can be approximated by simple scattering models and assumptions, and (3) the variation in scattering properties among different snowfall types and their impacts on snowfall retrievals.