Effects of orographic convection on cloud and precipitation development in winter storms

Katja Friedrich
Dept. of Atmospheric and Oceanic Sciences, U of Colorado, USA
Aikins, Josh (Dept. of Atmospheric and Oceanic Sciences, U. of Colorado)
Geerts, Bart (Dept. of Atmospheric Sciences, U. of Wyoming)
Wurman, Josh (Center for Severe Weather Research, Boulder, CO)

E-mail: Katja.Friedrich@colorado.edu

Convection in orographic clouds can occur locally due to orographic lift or over a larger area due to synoptic forcing. Producing more vigorous ascent and supercooled water will lead to more riming growth and strongly affects cloud and precipitation development as well as spatial and temporal variability of snowfall. During the 2012 Silver Iodide (AgI) Seeding of Clouds Impact Investigation (ASCII) experiment in Wyoming, orographic convection due to synoptic forcing and local effects was observed in four snowstorms. We investigate the 3-dimensional structure of clouds, precipitation, and wind using the dual-polarization Doppler on Wheels (DOW) radar and the University of Wyoming Cloud Radar and Lidar in combination with in-situ surface observations (disdrometers, snow gauges). The study is supported by a vertically-pointing Ku-band micro rain radar and a microwave radiometer monitoring the vertical profiles of liquid water content, humidity, and temperature. The study focuses on the interaction between dynamics, microphysics, and thermodynamics and their effects on spatial organization of convection, the variation in polarimetric signature, and the growth by riming. First results indicate that convective events occurred in conjunction with seeder-feeder mechanisms producing snowfall primarily at the leeside of the mountains. Areas of enhancement reflectivity with large vertical extend most likely a result of orographic lift occurred on the windward side of the mountains and close to the mountain top.