I. Introduction

To study the impacts of wind speed and direction on orographic precipitation structure between the valley floor and mountain peak.

Methodology

Ground-Based radar profiles and in situ observations were collected as part of the inhibition of snowfall by Orographic Aerials (ISPA 2010) study centered at the Desert Research Institute’s Storm Peak laboratory (SPL) during January and February of 2010. Observations were taken using two vertically pointing Metek Microwave-Rain Radars (MRRs) and surface meteorology sensors. The NCSU MRR was deployed atop Mt. Werner at SPL, and the UC MRR was deployed in the valley near the town of Steamboat Springs. This is the first time vertical reflectivity profiles have been sampled at SPL.

II. Environment: Jan-Feb 2010

A. Wind Speeds

- Highest wind speeds coincided with “Along-barrier” cases.

B. Reflectivity

- Fall streaks are observed in both cases, primarily over the valley.

C. Cross-Barrier

- Complicated, multi-layer flow is observed in the Cross-Barrier case.

D. Along-Barrier

- Clear evidence of generating cells is seen in the Along-Barrier case.

E. Oscillations

- Oscillations in the Derived Velocity field at mountain crest altitude are observed over the valley in the Along-Barrier case.

III. Cross-Barrier: 17 UTC 26 Jan 2010 to 08 UTC 27 Jan 2010

IV. Along-Barrier: 14 UTC 28 Feb 2010 to 00 UTC 1 Mar 2010

V. Conclusions

Investigation of the observed vertical structures of two snow events reveals complicated interactions with the local Park Range mountains.

- Orographic enhancement is observed in both flow direction cases. Other cases (not shown) reveal similar results. Enhancement is manifested in a widening distribution to include higher reflectivity values, and higher echo tops over the mountain (peak).
- Fall streaks are observed in both cases, primarily over the valley.

Additional cases will be examined to determine the generality of the preliminary conclusions.

Conceptual Model

- Clear evidence of generating cells is seen in the Along-Barrier case.
- Oscillations in the Derived Velocity field at mountain crest altitude are observed over the valley in the Along-Barrier case.

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