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**Mesoscale controls on mountain climate –
from snowy peaks to tropical islands**

Hosted by Richard Johnson

Thursday, March 1, 2012

**ATS room 101; Discussion will begin at 3:30pm
Refreshments will be served at 3:00pm in the coffee lounge**

We still largely lack a process-based understanding of how mesoscale terrain-related forcings and feedbacks act to shape the response of mesoscale climate to large-scale forcings. However, such an understanding must be central in any attempt to assess the regional impacts of climate change. I will describe how I am working to build such an understanding with examples from two current research projects.

First, observations from several major mountain ranges reveal that the height of the transition from snowfall to rainfall, the snowline, often intersects the terrain at an elevation hundreds of meters below its elevation in the free air upwind. This mesoscale lowering of the snowline may have major implications for both the accumulation of mountain snowpack and the generation of storm runoff. I will explain and quantify the mechanisms responsible for this behavior using results from semi-idealized numerical experiments and a case study of a major storm over the Northern Sierra Nevada. The dependence of this behavior on atmospheric conditions, and its potential to act as a mesoscale buffer on regional climate impacts will also be discussed.

Second, orographic lifting can have dramatic effects on the intensity of convection and precipitation in the tropics, although the mechanisms have not been well studied. The DOMEX-2011 field campaign examined tropical orographic rainfall using the mountainous Caribbean island of Dominica as a natural laboratory. Observations from radars, surface stations, and an instrumented aircraft are synthesized with basic theory and numerical experiments to reveal the dynamical processes responsible for Dominica's impressive rainfall. Relationships between these processes and upwind conditions show promise as a tool for interpreting how large-scale changes in tropical climate will affect mesoscale mountain rainfall.

Link to colloquium videos and announcement page: <http://www.atmos.colostate.edu/dept/colloquia.php>