
MMM **SEMINAR** *NCAR*

***On the Nature of Severe Orographic Thunderstorms near the Andes
in Subtropical South America***

Kristen L. Rasmussen^{1,2} and Robert A. Houze, Jr.¹

*1. Department of Atmospheric Sciences, University of Washington, Seattle, WA**

Only Kristen will be presenting

2. National Center for Atmospheric Research, Boulder, CO

Extreme convection tends to form in the vicinity of mountain ranges, and the Andes in subtropical South America help spawn some of the most intense convection in the world. An investigation of the most intense storms for 11 years of Tropical Rainfall Measuring Mission (TRMM) Precipitation Radar (PR) data shows a tendency for squall lines to initiate and develop in this region with the canonical leading convective line/trailing stratiform structure. The synoptic environment and structures of the extreme convection and MCSs in subtropical South America are similar to those found in other regions of the world, especially the United States. In subtropical South America, however, the topographical influence on the convection initiation and maintenance of the MCSs is unique. A capping inversion in the lee of the Andes is important in preventing premature triggering. The Andes and other mountainous terrain of Argentina focus deep convection initiation in the foothills of western Argentina. Subsequent to initiation, the convection often evolves into propagating mesoscale convective systems similar to those seen over the U.S. Great Plains and produces damaging tornadoes, hail, and floods across a wide agricultural region.

Numerical simulations conducted with the NCAR Weather Research and Forecasting (WRF) Model extend the observational analysis and provide an objective evaluation of storm initiation, terrain effects, and development mechanisms. The simulated mesoscale systems closely resemble the storm structures seen by the TRMM Precipitation Radar as well as the overall shape and character of the storms shown in GOES satellite data. A sensitivity experiment with different configurations of topography, including both decreasing and increasing the height of the Andes Mountains, provides insight into the significant influence of orography in focusing convection initiation in this region. Lee cyclogenesis and a strong low-level jet are modulated by the height of the Andes Mountains and directly affect the character, intensity, and spatial distribution of the convective systems. A conceptual model for convection initiation in subtropical South America that integrates the results of the topographic sensitivity experiments will be presented. Additional research on these storms including lightning, climatological rain contribution, and severe storm impacts will also be presented.

This seminar will be webcast live at:

<http://www.fin.ucar.edu/it/mms/fl-live.htm>

Recorded seminar link can be viewed here:

<https://www.mmm.ucar.edu/events/seminars>

Thursday, 23 April 2015, 3:30 PM

Refreshments 3:15 PM

NCAR-Foothills Laboratory

3450 Mitchell Lane

Bldg 2 Main Auditorium, Room 1022

MMM SEMINAR COORDINATOR

Morris Weisman, 303.497.8901, weisman@ucar.edu

<http://www.mmm.ucar.edu/events/seminars>