

**ATS/CIRA Colloquium**

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**Convective initiation and hydrometeorological influence  
of extreme storms in subtropical South America**

**Hosted by Libby Barnes**

**Friday, September 5, 2014**

**ATS room 101; Discussion will begin at 11:15am  
Refreshments will be served at 10:45am in the weather lab**

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 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 convective 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 convective initiation in a narrow region. Subsequent to initiation, the convection often evolves into propagating mesoscale convective systems similar to those seen over the Great Plains of the U. S. 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 convective 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 new conceptual model for convective 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 be presented.

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