Please note the special date and time

ATS/CIRA Colloquium

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The Global Nature of Convection:

Perspectives from the TRMM satellite

Monday, February 15, 2016

ATS room 101; Discussion will begin at 3:30 pm
Refreshments will be served at 3:00 pm in the weather lab

For over 16 years, the Precipitation Radar of the Tropical Rainfall Measuring Mission (TRMM) satellite detected the three-dimensional structure of significantly precipitating clouds in the tropics and subtropics. The multi-year dataset shows convection varying not only in amount but also in its very nature across the oceans, continents, islands, and mountain ranges of the tropics and subtropics. 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 deep convection in the world. The synoptic environment and structures of the convection and mesoscale convective systems (MCSs) in subtropical South America are similar to those found in other regions of the world, including the United States. In subtropical South America, however, the topographical influence on the convective initiation and maintenance of the MCSs is unique. The Andes and other mountainous terrain focus deep convective initiation in the foothills of western Argentina. Subsequent to initiation, the convection often evolves into propagating MCSs similar to those seen over the U.S. Great Plains sometimes producing damaging tornadoes, hail, and floods across a wide agricultural region.

In recent years, studies on the nature of convection in subtropical South America using spaceborne radar data have elucidated key processes responsible for their extreme characteristics, including a strong relationship between the Andes topography and convective initiation. Sensitivity studies with the WRF model that removed and/or reduced various topographic features demonstrated the profound influence of the terrain on the initiation and subsequent upscale growth of the MCSs in this region. A conceptual model for convective storm environments leading to convection initiation that was developed for subtropical South America will be presented. Building on this previous work, an investigation of the thermodynamic environment supporting some of the deepest convection in the world will also be presented. Additional comparisons between the nocturnal nature and related diurnal cycle of MCSs in subtropical South America the U.S. Great Plains will provide insights into the physical processes controlling MCS initiation and upscale growth. In summary, a combination of observations and numerical modeling has advanced our understanding of the cloud and mesoscale processes controlling some of the deepest convection in the world. Future research on processes controlling the global nature of clouds will provide critical information for the intersection of weather and climate, with implications for the global hydrologic and energy cycles.

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