Addendum to the Abstract Volume

The Operational Value of the Ground-Based Atmospheric Emitted Radiance Interferometer (AERI) for Nowcasting Convective Initiation. Case Analysis: The 3 May 1999 Oklahoma Tornado Outbreak

W. F. Feltz (waynef@ssec.wisc.edu) and J. R. Mecikalski
Cooperative Institute of Meteorological Satellite Studies (CIMSS)
University of Wisconsin - Madison

The Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) program has funded the development and installation of five Atmospheric Emitted Radiance Interferometer (AERI) systems around the Southern Great Plains Cloud And Radiation Testbed (SGP CART). The AERI instruments measured highly calibrated atmospheric emitted radiance at one wavenumber resolution from 3-20 um at ten minute temporal resolution. This high spectral resolution radiance information can be inverted through a form of the infrared radiative transfer equation to produce temperature and water vapor profiles within the planetary boundary layer (to three kilometers), effectively mapping the thermodynamic state of the lower troposphere. The operational meteorological nowcasting value of the AERI instruments are explored through the diagnosis of AERI retrieved profiles of temperature and moisture. Taking advantage of the ten minute temporal resolution of the AERI profiles, the 3 May 1999 Oklahoma tornado outbreak is analyzed. It is shown that tropospheric changes related to the rapid (on the order of 1-2 hours) dissipation of a capping temperature inversion within the planetary boundary layer, caused by the passage of a middle and upper level short wave and embedded jet streak, lead to the systematic development of severe convection on this day.