Storm morphology and electrification from CHUVA-GLM Vale do Paraiba field campaign

Intended for Cloud Electrification Processes

Rachel I. Albrecht (CPTEC/INPE, Rod. Presidente Dutra, km 40, Cachoeira Paulista, SP Brazil 12630-000, rachel.albrecht@cptec.inpe.br), Wagner F. A. Lima, Carlos A. Morales, Thiago S. Biscaro

CHUVA [Cloud processes of tHe main precipitation systems in Brazil: A contribUtion to cloud resolVing modeling and to the GPM (GlobAl Precipitation Measurement)] Project is a series of itinerant field campaigns with the objective of characterizing the main precipitating systems observed in Brazil as a support for Global Precipitation Measurement (GPM) mission. The fourth field campaign was conducted at Vale do Paraiba in São Paulo, Brazil, from 1 November 2011 to 31 March 2012. For this specific field experiment, several lightning location systems (LLS) were deployed as part of GOES-R Geostationary Lightning Mapper (GLM) and MTG Lightning Imager (LI) pre-launch activities. Four of these networks detect total (intra-cloud and cloud-to-ground) lightning, including a Lightning Mapping Array (LMA), allowing a detailed description of the cloud electrification.

To depict precipitating systems, CHUVA uses a mobile XPOL Doppler Radar, micro-rain radars, disdrometers, rain gauges, microwave radiometer, Lidar, and a GPS network for water vapor retrievals. Also, Vale do Paraíba and São Paulo are covered by 3 operational S-band radars. The precipitation data collected by these radars and the lightning detected by the LLS were grouped in a structure of storm features built by tracking the precipitating systems and its associated lightning. This storm feature database makes it easier to group similar convective systems and compare them in terms of area, lifetime, rainfall and convection intensity, lightning activity, and more.

During this field experiment a large variety of cloud systems were sampled: cold fronts, squall lines, the South Atlantic Convergence Zone (SACZ) and local convective systems. Microphysical characteristics (such as hydrometeor identification and ice/water mass) of these summer 2011-2012 precipitating systems can be inferred from the X-Pol and the 3 operational S-band radars, while the LLS provide detailed information about the storms electrical activity (such as charge centers and lighting propagation processes). We will summarize the results from this experiment characterizing the relationship between the storm type and its microphysical-electrical characteristics by presenting the role of storm morphology on cloud electrification, rainfall and severe weather (hail and damaging winds) production.