Intercomparison of Lighting Location Systems during CHUVA-GLM field campaign and thunderstorm characteristics

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The third CHUVA (*Cloud processes of tHe main precipitation systems in Brazil: A contribUtion to cloud resolVing modeling and to the GPM (GlobAl Precipitation Measurement)* field campaign was conducted at Vale do Paraiba in São Paulo, Brazil, from 1 November 2011 to 31 March 2012. The CHUVA project aims to detail the different precipitation regimes found in Brazil and the associated physical processes in support of the GPM program. This specific field experiment has deployed lightning location systems (LLS) as part of the GOES-R Geostationary Lightning Mapper (GLM) and MTG Lightning Imager (LI) pre-launch activities. This is a joint project of INPE, USP, NOAA, NASA, EUMETSAT and several vendors of operational lightning detection networks. This experiment collected lightning proxy data for the GLM and LI under the coincident coverage of MSG SEVIRI (proxy for GOES-R ABI) using four total lightning networks, high-speed cameras, field-mills, and the Lightning Imaging Sensor (LIS) onboard the TRMM satellite.

Therefore, CHUVA-GLM provides data for the most comprehensive performance assessment of almost all lightning networks available today that might be used for developing GLM proxy data and
on-orbit performance validation. Different lightning locating systems use different frequency bands and measurements (electric or magnetic fields), detect different

aspects of lightning discharges (cloud lightning or cloud-to-ground lightning, ground waves or sky waves), and use different methodologies for locating lightning. Thus taking the opportunity that LMA measures most of the lightning sources associated with all lightning discharges, this study concentrates on describing what each technology measures/detects in comparison to the Sao Paulo Lighting Mapping Array (SPLMA) sources to be used as ground-truth. Most systems have poorly known or poorly documented performance characteristics. This will help us understand the performance characteristics of various lightning locating systems which is essential for the usage of these networks in providing proxy data, post-calibration for GLM and better data for GOES-R R3 products.