



Nowcasting of Thunderstorm and Intense Rainfall events using dual Pol Radar and IWV-GPS

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Three instruments are used in this study for nowcasting, dual pol radar, Lightning mapping array and GPS to derive the Integrated Water Vapor (IWV). These results were obtained from the CHUVA-Vale campaign held during the Brazilian Spring-Summer (from November 2011 to March 2012) in São José dos Campos, as part of CHUVA project (Cloud Processes of the Main Precipitation Systems in Brazil: A Contribution to Cloud Resolving Modeling and to the Global Precipitation Measurement) [see further details in Machado et al., 2014, : <http://dx.doi.org/10.1175/BAMS-D-13-00084.1>]. During this period an X band dual polarization radar, performing a volume scan each 6 minutes, was co-located with a Very Low Frequency (VHF) sources collected by Lightning Mapper Array (LMA, this network was conceived to provide a high fidelity total lightning proxy data set for the NOAA GOES-R and MTG program). Additionally, a GNSS network was installed in the region providing IWV in high time resolution. Three nowcasting studies were performed combining this dataset as following: a) A study about the evolution of the cloud life cycle before the first Intra-cloud (IC) and cloud-ground (CG) lightning. The analysis provided a conceptual model of the evolution of the storm to thunderstorm, the reflectivity differential presented a great potential for lightning initiation, a dramatic decreased in Zdr in the mixed phase region was observed before the first CG flash. b) A probabilistic nowcasting model based on Lagrangian tracking of convective cells was developed as the probability behavior of 8 parameters in the last 24 to 6 minutes. These parameters were computed based on the lagrangian trend of the volume of specified range of dual variables and Vertically Integrated Liquid. C) Finally, a IWV- jump behavior was observed to occur before intense rainfall events. The GPS-IWV jumps are generated by pulse succession associated with conversion of water vapor in liquid water.