

Characteristics of the X-Band Polarimetric Radar Associated With the Lightning Electrical Activity

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This work have the objective of the evaluate the impact of cloud microphysics on the intensity of lightning electrical activity. As part of the fourth field campaign from CHUVA project called CHUVA-Geostationary Lightning Mapper-Paraíba Valley (CHUVA-GLM-Vale) has been used data from November 2011 to March 2012 on the Paraíba Valley in the Sao Paulo state, Brazil. Data of the horizontal reflectivity factor (Z_h) and vertical (Z_v), differential reflectivity (Z_{dr}), specific differential phase (K_{dp}) and the correlation coefficient (ρ_{hv}) from X-pol Radar; VHF sources from Lightning Mapper Array (LMA) and intra-cloud and cloud-to-ground lightning from Brasildat have been used. We have applied for all period data the correction of attenuation (for dBZ and Z_{dr} variables), correction when has precipitation over of the radar (for dBZ, case called correction of wet radome) and correction of Z_{dr} for the bias that exists when the radar points vertically. Analysis of the vertical profile from polarimetric variables was combined with different classes of electrical intensity of VHF sources like: (i) Weak, (ii) Moderate and (iii) Higher occurrence. An higher LMA occurrence was associated with an homogeny reflectivity vertical distribution, with higher values of reflectivity both inside of cloud warm and cold region. To differential reflectivity higher the intensity of electrical activity the distribution shifts for negative values of Z_{dr} and close the height of the 7 Km. The variable K_{dp} showed the same behavior of Z_{dr} and for correlation factor distribution there was many events inside of warm cloud region. Analysis of mean profile also showed that higher electrical activity is correlated with existence of vertically oriented ice or conical graupel inside cold cloud region (Z_{dr} more negative) and associated with fewer variability of hydrometeors kind (higher correlation factor). Furthermore the vertical distribution of VHF source has showed an classic electrical bipolar structure found in typical cloud for all the class of VHF sources. So in this way, this currently being determined the distribution pattern of polarimetrics variable for both centers of electrical charge. The same analysis has been done for negative and positive cloud-to-ground strokes and intra-cloud lightning.