

# The Cloud and Rain Liquid Water Characteristics of Different Precipitation Regimes in Brazil

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## ABSTRACT

Between 2010 and 2012, the CHUVA project collected information regarding cloud and rain trends in different precipitation regimes in Brazil. CHUVA had four field campaigns, located in the North, Northeast and Southeast regions of Brazil, covering the semi-arid, Amazonas, coastal and mountain regions. The purpose of this study is to present statistics related to the integration of cloud and rain liquid water and the profiles for different cloud types and regimes. The synergy of several instruments allows us to describe the cloud process characteristics and to classify rain events. Microwave radiometer, LiDAR, radar, and disdrometer were employed in this study. The rain type classification was made using vertical profiles of reflectivity (VPR) and polarimetric variables from dual-polarization radar (XPOL). The profiles and integrated cloud liquid water ( $ILW_C$ ) was retrieved with a microwave ground-based radiometer using a neural network. For rainy conditions, the profiles from the liquid water content ( $LWC_R$ ) and their integrated ( $ILW_R$ ) properties were estimated by Micro Rain Radar (MRR) and XPOL VPRs. For non-precipitating clouds, the  $ILW_C$  values were larger for the sites in Northeast Brazil near the coast than for the other regions. For rainy cases, distinct  $LWC_R$  profiles and  $ILW_R$  were observed for different rain classifications and regions with a distinctive rainfall regime. The  $ILW_R$  for the convective systems show the highest values, followed by stratiform and warm systems. The clouds in the Vale do Paraíba and Belem showed the largest reflectivity in the mixed and glaciated layers, respectively. In contrast, the coastal sites show larger values of cloud and rain liquid water content for non-precipitating and warm clouds. The Vale and Belem clouds present the deepest clouds and larger convective cloud liquid water. Several analyses are presented, describing the cloud process and the differences among the regions.