



Characteristics of storm cells observed by the first polarimetric C-band radar in Minas Gerais

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Extreme events of precipitation over or near large urban areas can cause flooding, often resulting in inundation of floodplains when the flow exceeds the capacity of the natural drainage channel. The occupation of land within cities and changes made in the catchments aggravate the situation. The occurrence of heavy rains and subsequent flooding in the hydrological basin that affects Belo Horizonte and its surroundings during the annual rainy season, was one of the main reasons that prompted the installation of a Doppler weather radar with polarimetric capability for monitoring, forecasting and warning of storms in this region. The TITAN software was implemented for the processing of data collected by the C-band polarimetric Doppler radar from December 2013 to February 2014. A Cell, which is the basis for identifying the areas of severe storm precipitation by TITAN, was defined by a reflectivity threshold exceeding 40 dBZ and volume $>16 \text{ km}^3$, with a minimum duration of >15 minutes. Based on the selected threshold, the storm cells were then identified and tracked during the duration of a precipitation event which occurred within the aforementioned period. The majority of storm cells observed by the radar were of convective nature, with volumes of less than 200 km^3 . Only less than 10% of the observed echoes reached larger extensions, associated with fusion processes observed during the duration of the events. The storm cells were mostly of relative short duration, but intense convective activity, with maximum reflectivities exceeding 55 dBZ. Preliminary statistics indicated that most storms during the three-month period were less than 100 km^3 on average and had a duration of less than one hour, indicating a predominantly isolated convective activity. An analysis of the diurnal variability of convection confirms the afternoon as the preferred time for intensification, with a maximum at around 17UT (14 LT), when a larger number of storms is identified by TITAN. Earlier studies of the diurnal cycle of heavy rains in the Metropolitan Region of Belo Horizonte, using data from a conventional gauge network, confirm these results. The average maximum echo tops for the threshold of 40 dBZ were around 7 km or less, with a frequency of 65% of the time.