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The use of a radar network to determine the characteristics of mesoscale convective systems in the State of São Paulo

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The Meteorological Research Institute (IPMet) of the São Paulo State University (UNESP) has been monitoring the three-dimensional structure of thunderstorms, including the radial velocities inside and near these storms, since 1992 and 1994, respectively, using two S-band Doppler radars in the central and western part of the State of São Paulo. One of the tools used presently for monitoring and warning of storm systems is the latest version of NCAR's (National Center for Atmospheric Research) TITAN (Thunderstorm Identification Tracking Analysis and Nowcasting) Software, which had been implemented at IPMet and adapted for local requirements in 2006.

In the present work the morphological characteristics of mesoscale convective systems (MCS) in the State of São Paulo are presented considering storm parameters such as the area, the duration, their observed convective portion and its temporal evolution, as well as their initiation, intensification and decaying phases. The analysis is based on the rainy season of 2003-2004. The TITAN system is used to identify and track the MCS by setting a minimum area threshold of 1250 km^2, with a reflectivity threshold of 20 dBZ, lasting at least 1 hour and observed in 3,5 km CAPPIs.

During the selected period 470 MCS were identified. Approximately one-third of these systems were initiated during the late afternoon and early evening, between 17:00 and 20:00 LT (Local Time; LT = UT-3h), with the majority having been observed during the months of December and February. Their duration was on average 2 hours, with 86% lasting less than 4 hours. From all observed MCS during the analysis period, 67 of these had a lifetime of between 4 and 15 hours. The observed mean area was between 3 and 25x103 km^2 with maxima between 5 and 75x103 km^2. So far, one event was analyzed taking into account the temporal distribution of the percentage of the 40 and 50 dBZ areas embedded in the MCS. The results, although preliminary, have shown that during the intensification phase, observed between 13:00 and 15:00 LT, the MCS had 25% of its total area composed by 40 and 50 dBZ reflectivity areas, with 5% of these during the decaying phase. These results are part of an ongoing study and should contribute to gain more knowledge of the detailed spatial and temporal structure of the MCS within the State of São Paulo.