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Vertical structure of radar reflectivity in deep intense convective clouds over the tropics

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This study is based on 10 years of radar reflectivity factor (Z) data derived from the TRMM Precipitation Radar (PR) measurements. We define two types of convective cells, namely, cumulonimbus towers (CbTs) and intense convective clouds (ICCs), essentially following the methodology used in deriving the vertical profiles of radar reflectivity (VPRR). CbT contains Z$\geq$ 20 dBZ at 12 km height with its base height below 3 km. ICCs belong to the top 5% reflectivity population at 3 km and 8 km altitude. Regional differences in the vertical structure of convective cells have been explored for two periods, namely, JJAS (June, July, August and September) and JFM (January, February and March) months. Frequency of occurrences of CbTs and ICCs depend on the region. Africa and Latin America are the most productive regions for the CbTs while the foothills of Western Himalaya contain the most intense profiles. Among the oceanic areas, the Bay of Bengal has the strongest vertical profile, whereas Atlantic Ocean has the weakest profile during JJAS. During JFM months, maritime continent has the strongest vertical profile whereas western equatorial Indian Ocean has the weakest. Monsoon clouds lie between the continental and oceanic cases. The maximum heights of 30 and 40 dBZ reflectivities (denoted by MH30 and MH40, respectively) are also studied. MH40 shows a single mode and peaks around 5.5 km during both JJAS and JFM months. MH30 shows two modes, around 5 km and between 8 km and 10 km, respectively. It is also shown that certain conclusions such as the area/region with the most intense convective cells, depend of the reference height used in defining a convective cell.