



Case studies of MCS characteristics in West Africa from the AMMA SOP1 campaign

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Within the framework of the international project AMMA, atmospheric soundings and surface-based measurements were performed at Dano, Burkina Faso, during the pre-onset phase of the monsoon (SOP1). Three MCCs of similar structure passed Dano and were investigated in detail. The main findings are: The pre-MCC environment is characterised by high convective instability, represented by e.g. CAPE values of about 3000 J kg^{-1} . The MCCs develop in the afternoon in front of AEJs propagating westwards. A moderate south-westerly wind is present in the PBL and a strong AEJ prevails between 2 and 5.5-6 km ASL, i.e. wind shear and wind veering between the PBL and the AEJ layer are considerable. Humidity is high in the PBL and significantly lower in the layer of the AEJ. PBL and AEJ layers are capped by inversions. The MCCs consist of a convective and a stratiform region. A gust front of 2 km depth precedes the convective region with a maximum wind speed of about 20 m s^{-1} from south-east. During the passage of the convective region, the temperature in the PBL decreases by about 10 K, whereas the relative humidity increases by about 40%. In the AEJ layer the horizontal wind is reduced and turns to northerly direction, while vertical motion becomes strong. More than 80% of the total precipitation of an MCC are restricted to the convective period, which lasts about 2 hours. In the stratiform region, which takes about 6-7 hours, the wind in the PBL is moderate. The AEJ has strengthened again and the humidity distribution is characterised by low humidity in the PBL and high values near the surface and in the midtroposphere, resulting in the typical 'onion'-shaped temperature and moisture structure in a skew*T*-log*p* diagram. Some hours after an MCC event, the pre-MCC wind profile has re-established and about 2 days later, the complete pre-MCC environment is present again.