



## **Dry cyclogenesis in the Inter Tropical Discontinuity of the West African Monsoon: a case study**

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Three-dimensional mesoscale numerical simulations were performed over Niger in order to investigate dry cyclogenesis in the West African Inter Tropical Discontinuity (ITD) during the summer, when it is located over the Sahel. The study focuses on the case of 7-8 July 2006, during the African Monsoon Multidisciplinary Analysis (AMMA) Special Observing Period 2a1. Model results show the formation of three dry cyclones in the ITD during a 24-hour period. Simulations are used to investigate the formation and the development of one of these cyclones over Niger in the lee of the Hoggar-Aïr Mountains. They show the development of the vortex to be associated with (a) strong horizontal shear and low-level convergence existing along the monsoon shearline and (b) enhanced northeasterly winds associated with orographic blocking of air masses from the Mediterranean Sea. The dry cyclone was apparent between 0700 and 1300 UTC in the simulation and it was approximately 400 km wide and 1500 m deep. Potential vorticity in the centre of vortex reached nearly 6 PVU at the end of the cyclogenesis period (1000 UTC).

The role of the orography on cyclogenesis along the ITD over the study area was evaluated through model simulations without orography. The comparison of the characteristics of the vortex in the simulations with and without orography suggests that the orography plays a secondary but still important role in the formation of the cyclone. Orography and related flow splitting tend to create low-level jets in the lee of the Hoggar and Aïr mountains which, in turn, create conditions favorable for the onset of a better defined and more intense vortex in the ITD region. Moreover, orography blocking appears to favor the occurrence of a longer-lived cyclone.

Key Word: AMMA, cyclones, MesoNH, ECMWF.