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Analysis of the impact of soil moisture patterns on atmospheric dynamics on 1 August 2006 AMMA case based on high resolution numerical simulations performed with Meso-NH.

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The impact of soil moisture patterns on mesoscale circulations has been evidenced by Taylor et al. (2007) on august 1, 2006, using aircraft data and satellite observations collected during the AMMA Special Observing Period. They show that the soil moisture patterns generated by rainfall on July 31 over a initially dry soil induced circulations with convergence over dry patterns and divergence over cool and moist areas. To complete the BA-e 146 aircraft observations at 170 m above ground and the dropsondes data launched along the same flight track, we performed simulations of August 1 case using the non-hydrostatic french mesoscale model MESO-NH, coupled to the ISBA Land surface model. We used 2 domains with 12 and 3 km resolutions respectively. The first simulation, here after called REF simulation, was initialised at 00 UTC the 1^{st} of august 2006 by ECMWF analyses. We compared the observed and simulated PBL temperature, PBL height, wind and surface fluxes along the BAe-146 flight track. The results are not good and we can easily identify one reason: the initial soil forcing of ECMWF analyses is bad, since the soil moisture pattern, responsible for the PBL structure along the flight track according to Taylor et al. (2007) is not represented and therefore, the latent heat flux in the REF simulation is very homogeneous throughout domain #2.

To improve the soil forcing, a new simulation is performed, using the same do-

main limits and resolutions, initialized at 00 UTC on August, 1 but by replacing the ECMWF soil moisture and temperature by the products of the AMMA Land Surface Model Intercomparison Project (ALMIP) that are available with a 50 km resolution. These products result from the assimilation of a high number of high quality data in the ISBA land surface model running in offline mode (without atmospheric feedbacks). From the comparison between the new simulation, REF simulation and observations, we are able to investigate the impact of soil moisture, in particular its spatial and temporal influence, and the interactions between the soil forcing and the atmosphere.

Taylor, C.M., Parker, D.J., Harris, P.P, 2007 : An observational study of mesoscale atmospheric circulations induced by soil moisture. *Geophys. Res. Let.*, **34**, L15801, doi:10.1029/2007GL030572