Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04134, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04134
EGU General Assembly 2008

Observing soil moisture - precipitation feedbacks: a case study from the AMMA field campaign

C. M. Taylor (1), M. Garvert (2), P. P. Harris (1) and D. J. Parker (3)

(1) Centre for Ecology and Hydrology, Wallingford, U.K., (2) Simon Fraser University, Vancouver, Canada, (3) University of Leeds, U.K.

Numerical models have been used extensively to explore the impact of soil moisture on rainfall. However, the multi-model study by Koster et al (2004) indicated a wide range of sensitivities of simulated precipitation to soil moisture. They also identified the Sahel as a region where such feedbacks are relatively strong. Previous observational studies in the Sahel have provided somewhat contradictory results: at the convective scale, measurements suggest there is an enhancement of rain over wet soil within well-developed mesoscale convective systems, whilst satellite data at larger scales indicate a strong preference for afternoon convection to develop over drier soil. One of the objectives of the African Monsoon Multidisciplinary Analyses (AMMA) project is to better understand the coupling of the land and atmosphere. As part of the AMMA Special Observing Period, the UK BAe 146 aircraft undertook a series of flights over heterogeneous soil moisture features in order to document the associated atmospheric variability. On one such flight, a major convective system developed on the flight path. Subsequent data analysis indicates clear links between this storm and the underlying surface features. The storm initiated along a sharp gradient in soil moisture and, in its early stages, remained within a dry surface slot created by storms the previous day. Once established, however, the storm intensified over recently wetted soils associated with high values of equivalent potential temperature. Simulations using the WRF model have been performed for this case using high resolution soil moisture initialisation based on satellite-derived land surface temperature data. The model depicts a soil moisture-forced mesoscale circulation in the location of the storm initiation. This finding suggests that in the early stages of development, it is the mesoscale gradients

in soil moisture which produce a relative enhancement of convection over dry soils.