Water vapour budget and its spatial scale decomposition over West Africa during summer 2006 from NCEP analyses.

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Understanding the water cycle in the tropics during the monsoon is a key scientific question of the African Monsoon Multidisciplinary Analysis (AMMA) programme. Indeed, water plays an important role in the energetics of the climate and a better understanding of its cycle is necessary to better understand climate change. Precipitation is greatly influenced by topographic and small scale regional features as well as regional mesoscale circulation. Thus, precipitation and more generally water budget fields are very good candidates for scale decomposition. Using recently developed spatial filtering techniques, precipitation and moisture flux divergence have been decomposed in large scale and small scale terms for the entire summer period. The spatial scale decomposition is performed using the discrete cosine transform, which allows a computationally effective way of achieving the scale decomposition in limited-area domain. Moreover, to take into account the vertical structure of the atmosphere in this region, the moisture flux is also decomposed into 3 layers: the first layer corresponds to the Monsoon layer, the second layer to the African Easterly Jet layer and the third layer to the Tropical Easterly Jet layer. The analysis is based on precipitation, wind and water vapour fields from the NCEP GFS model analyses for the period June 1 – September 30 2006. The water budget over West Africa is investigated through

seasonal and monthly analysis of precipitation and vertically integrated moisture flux divergence along with their large-scale and small-scale contributions. The non-linear interactions between the large-scale and the small scale are also examined.