



Evaluation of remote-sensed data products for precipitation estimation in Uganda

A. Asadullah, N. McIntyre, M. Kigobe

Department of Civil and Environmental Engineering, Imperial College London, UK

The precipitation gauging network in equatorial Africa is not sufficient to provide reliable estimates of precipitation. This limits the applicability of hydrological modelling, and hence hinders research into climate change and land use change effects on flood risk and water resources. An obvious alternative to relying on ground-gauged data is the use of precipitation estimation products which are based wholly or partly on remote sensing from satellites. Previous research worldwide has evaluated the accuracy of satellite-based products for precipitation estimation, illustrating their significant limitations and the need for further technological and methodological developments, but also that existing products can be very useful for precipitation estimation for some applications. Previous research has also illustrated the wide differences in estimates between different products. While there have been a few investigations into the reliability of satellite-based precipitation estimation products in Africa as a whole, there seems to have been no case studies published for equatorial Africa. We tested five satellite-based products (TRMM 3B42, CMORPH, TAMSAT, RFE 2.0 and PERSIANN) for application in four different climatic regions in Uganda, with the objectives of identifying deficiencies which spanned all products, identifying differences between products, and recommending the best products for regional-scale monthly and daily rainfall estimation for input to hydrological models. The assessment is based on comparing historical statistics of rainfall measured by ground gauges (from 1960-1990, when a good rain gauge network existed) with the recent (2003-2007) satellite-based estimates. Therefore the assessment has some limitations associated with comparability of the two periods; nevertheless it is informative about whether the general long-term spatial and temporal patterns of rainfall in Uganda are successfully repli-

cated by the satellite-based products. Results show that there is no single best product because each product was stronger for replicating a particular statistic, although in general TRMM 3B42, CMORPH and TAMSAT were considered better in this application.