



evaluation of satellite rainfall products used for hydrological applications in West Africa

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Title : Evaluation of several rainfall products used for hydrological applications over West Africa using two high resolution gages network .

There is an increasing number of users and usages of available satellite based rainfall products over the West African region. The applications range from understanding the large scale dynamics of the WA Monsoon System, to analyzing the hydrological/land surface processes and feedbacks. Accordingly the user requirements for resolutions may vary from large ($2^{\circ}5$; monthly) to much smaller scales (less than $0^{\circ}5$, half-hourly). The main reason for that interest in satellite products is that West Africa is one of the regions of the world where the vulnerability of the people and the local economy to rainfall variability is the highest. The region is famous for the extreme droughts it has suffered since the 70s as well as for damaging floods. To understand and monitor this phenomena, access to quality rainfall data is needed, while in this region, the available operational ground based networks of rain gages are generally sparse and their quality unreliable.

In this paper, the densified research gages networks from the West African AMMA-CATCH observatory, in Niger and in Benin (and to a lesser extend in Mali) are presented and are used to evaluate several currently available global and regional satellite-based rainfall products. The analysis is carried out at the daily time step and 1° resolution (the size of our densified networks). Several statistical scores are derived (bias, rmse, Nash, FAR, NDR, etc.) by comparison to the ground reference. We also focus on the ability of the various products to reproduce salient features of rainfall that impacts the hydrological response, such as the probability distribution of the rain intensities, or the distribution of the rainy days within the season. Simplified hydrological modeling is used to illustrate the effect of various distorsions of the rain forcing, on the hydrological response. The analysis is carried over several years, showing a strong interannual variability of the results and pointing out the necessity to monitor products over the years. It is shown also that the products behave differently and don't exhibit the same skills for our two sites : one in Sahel and the other one further south in a sudanese climate.