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Importance of remote sensing to estimate rainfall over a scarce data basin in Morocco

Hamza Ouatiki (1), Abdelghani Boudhar (1), Aziz Ouhinou (2), Mohamed Hssaisoune (1), Abdelkrim Arioua (1), and Tarik Benabdelouahab (3)

(1) Sultan Moulay Slimane, Faculty of Sciences and Techniques, Earth science Departement, Morocco, (2) Sultan Moulay Slimane, Faculty of Sciences and Techniques, Mathematics Department, Morocco, (3) National Institute of Agricultural Research, Morocco

The arid and semi-arid regions are often characterized by a strong spatiotemporal variability of rainfall. Hence, the water supplies are usually heterogeneous, and their assessment constitute a great challenge in a context of water scarcity and droughts. This issue is compounded by the sparse ground measurement network and associated in some cases with a total absence of rain gauges, especially in mountainous areas. However, in recent decades several precipitation datasets derived from various remote sensing data have become available, such as TRMM (Tropical Rainfall Measurement Mission) and PERSIANN (Precipitation Estimation from Remote Sensing Information using Artificial Neural Network). These latter, may constitute an important source of information, as they provide estimations of rainfall over a global spatial scale with a high temporal resolution.
In this work, we assessed the performance of the TRMM 3B42 V7 and PERSIANN-CDR rainfall products, as compared with measures from 14 rain gauges. Due to the varying topography over the upstream part of the Oum Er Rbia River basin, the relevance of these products was tested by direct comparison against ground measurements at different time scales from 1998 to 2011. Results show that the two products exhibit a quite similar performance. Both products provide poor estimations of rainfall at the daily time scale with an average Pearson correlation coefficient “r” lower than 0.46 (0.4) for TRMM (PERSIANN) and average Root Mean Square Error “RMSE” of 5.11 mm (4.56 mm). However, the accuracy of rainfall products is improved when temporally averaged to larger time scales (r of 0.77 (0.78) and RMSE of 27.35 mm (28 mm) for monthly data). Yet, the rainfall products experience some difficulties in retrieving rainfall amounts over regions of accidental rugged topography and regions that receives snowfall.