**Evaluation of multiple satellite-derived rainfall products over Morocco**

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**Abstract:** The Mediterranean region is a hot spot of climate variability but the relative paucity of long term surface rain-gauges measurements in its southern part makes obstacle to hydro-climate studies. In an attempt to overcome this lack, the focus of this study is to assess the accuracy and reliability of three high resolution satellite-derived rainfall products over Morocco. Tropical Rainfall Measuring Mission, version 7 (TRMM3B42V7), African Rainfall Climatology, version 2 (ARC2) and African Rainfall Estimation Algrorithm, version 2 (RFE2.0) are evaluated against 18 rain-gauges in Morocco, at daily, monthly and yearly time scales for the period 2001-2014. Results show that, ARC2 and RFE2.0 globally perform well at identifying rainfall days in coastal and northern stations but with less satisfactory skills in some southern stations. In contrast TRMM3B42V7 produces more false alarms than hits in several stations. However, this product performs better at monthly time scale. All products manifest a slight underestimation of rainfall amount in the majority of stations. The largest bias between products and surface rain-gauges measurements is recorded in the southern region, which points out the need for applying bias adjustments before their use. The good performance of ARC2 which extends back to 1983 highlights the importance of its usefulness in different fields of application over Morocco. The low ability of TRMM3B42v7 at detecting rainfall days reflects a necessity to review the calibration time step of this product with surface rain-gauges .

Key words: satellite rainfall products, TRMM, ARC2, RFE2, rainfall in Morocco