

Figure S1. Performances of satellite rainfall during the validation period in terms of POD (first row), FAR (second row) and TS (third row) for three rainfall thresholds over the study basins, for
the three products TMPA (first boxplot), CMOR (second boxplot) and SM2R_{ASCAT} (third boxplot).
Numbers at the top of each plot represent the median score value obtained by considering the
original spatial coverage of each product.

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Figure S2. Performances of discharge in terms of KGE against a, b, c) probability of detection (POD), d, e, f) false alarm ratio (FAR) and g, h, i) threat score (TS) of rainfall. The scores are evaluated for the validation period (2013-2016) for all the 1318 basins.





Figure S3. Hydrological performances in terms of KGE values that can be obtained during the validation period by the three satellite rainfall products for all the basins whose outlet section is located below the TMPA area (889), a) without any constrain on the rainfall scores; b, c, d) fixing a constrain on continuous scores; d, e, f) fixing a constrain on categorical scores; and a', b', c', d', e', f') constraining a combination of two scores.