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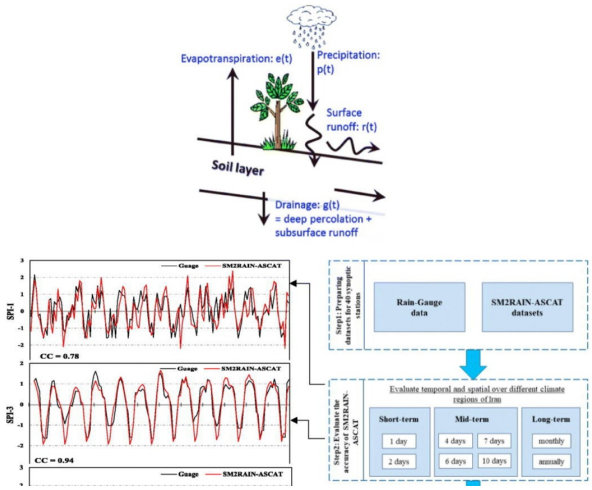

Spatiotemporal drought monitoring using bottom-up precipitation dataset (SM2RAIN-ASCAT) over different regions of Iran

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Abstract

Drought is a natural phenomenon that can significantly impacts on water resources studies, agricultural and environmental societies around the world, hence, accurate spatio-temporal monitoring of drought is very important. In this research, a comparative analysis of a newly developed precipitation dataset, SM2RAIN-ASCAT (which is based on bottom-up approach), with 40 ground-measured Iranian Meteorological Organization (IMO) precipitation data are performed to estimate the precipitation and monitor the drought events over diverse climate regions of Iran. The SPI index, as a widely used drought index, at the temporal resolution ranging from one month to one year is used to this aim, and the outputs are analyzed based on the statistical and categorical metrics. Results indicated that the highest correlation coefficient (CC) and lowest root mean square error (RMSE) between SM2RAIN-ASCAT and in situ observations are found at 10-day and monthly time scales. Analyzing both datasets using FAR and POD indices in the mid and long-term time scales indicated that the SM2RAIN-ASCAT has a good performance in detecting rainy days. This product overestimate the precipitation values in extra-arid regions, while in humid and per-humid climate areas it tends to underestimation. Moreover, assessing the reliability of this product for drought monitoring showed that the SPI at 1, 3 and 6 month time scales are in good agreement with ground-based observations over different climate regions of Iran. At these temporal resolutions, the CC value between SPIs calculated based on in situ observations and

SM2RAIN-ASCAT is higher than 0.7 in more than 75% of the meteorological stations. The efficiency of SM2RAIN-ASCAT in detecting drought periods in extra-arid and arid zones is relatively better than that of in humid and per-humid climates. In addition, the performance of this product for capturing wet periods in extra-arid to semi-arid regions is better than that of in Mediterranean and humid zones. Overall, the outcomes of this study demonstrated that SM2RAIN-ASCAT, despite poor performance in estimating precipitation in some regions, can be considered as a complementary to ground-gauge observations or an appropriate alternative dataset for drought analysis, especially in arid and semi-arid regions which include most parts of the world.

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