



Uncertainty Assessment of Satellite- and Model-based Precipitation Products over Complex Terrain of Turkey

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This study evaluates satellite-based (TMPA 3B42V7 and GPM IMERGv5) and model-based (ECMWF ERA-Interim) precipitation products by using ground-based gauge stations as reference over Turkey, characterized by complex topography. Assessments of the products are performed over the nearest grids to the gauge stations (a total of 851) at daily, monthly and annual time scales. The accuracy assessments, categorical performance indices, and intensity-frequency related comparisons are performed over each station between 2014 and 2018. Analyses are conducted separately for stations classified on the bases of wetness and elevation. The results show that IMERG performs better in capturing the patterns of observed precipitation over relatively wetter regions. All three products consistently follow the observed precipitation patterns during summer, while errors increase in other seasons. All products overestimate the observed precipitation over dry regions and underestimate over wet regions, implying that the products are less sensitive to the variability in precipitation compared to the stations. Overall, the products show wet bias (overestimation) relative to station-based values; among them TMPA shows the least monthly bias (8.3 mm/month) while IMERG shows the least monthly RMSE (23.4 mm/month). The products show less errors over regions where topography is less complex, and climate is moderately dry to moderately wet. Compared to the satellite-based products, ERA-Interim bias increases with increasing elevation and shows the worst monthly bias (34.5 mm/month) at highest elevation regions. Overall, the product RMSE increases and correlation decreases in regions represented by higher elevations. Model- and satellite-based products can be a supplement to each other.