

## **Rainfall Estimation over Northern Tunisia by Combining Meteosat Second Generation Cloud Top Temperature and Tropical Rainfall Measuring Mission Microwave Imager Rain Rates**

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**Abstract :** In this study, a new method to delineate rain areas in northern Tunisia is presented. The proposed approach is based on the blending of the geostationary Meteosat Second Generation (MSG) infrared channel (IR) with the low-earth orbiting passive Tropical Rainfall Measuring Mission (TRMM) Microwave Imager (TMI). To blend these two products, we need to apply two main steps. Firstly, we have to identify the rainy pixels. This step is achieved based on a classification using MSG channel IR 10.8 and the water vapor WV 0.62, applying a threshold on the temperature difference of less than 11 Kelvin which is an approximation of the clouds that have a high likelihood of precipitation. The second step consists on fitting the relation between IR cloud top temperature with the TMI rain rates. The correlation coefficient of these two variables has a negative tendency, meaning that with decreasing temperature there is an increase in rainfall intensity. The fitting equation will be applied for the whole day of MSG 15 minutes interval images which will be summed. To validate this combined product, daily extreme rainfall events occurred during the period 2007-2009 were selected, using a threshold criterion for large rainfall depth (> 50 mm/day) occurring at least at one rainfall station. Inverse distance interpolation method was applied to generate rainfall maps for the drier summer season (from May to October) and the wet winter season (from November to April). The evaluation results of the estimated rainfall combining MSG and TMI was very encouraging where all the events were detected rainy and the correlation coefficients were much better than previous evaluated products over the study area such as MSGMPE and PERSIANN products. The combined product showed a better performance during wet season. We notice also an overestimation of the maximal estimated rain for many events.

**Keywords :** combination, extreme, rainfall, TMI-MSG, Tunisia

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