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Evaluation of the Performance of Remotely Sensed Rainfall Datasets for Flood Monitoring in the Transboundary Mono River Catchment, Togo and Benin

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The variability and changes noted in the climate over the past decades emphasizes the importance of climate information such as precipitation datasets in the management of flood risks in Benin and Togo. The lack of extensive and functional ground observation networks, introduces satellite-based rainfall datasets as a better alternative which needs however to be evaluated beforehand. This study investigated the performance of four satellite and gauge-based rainfall products –Climate Hazards Group Infrared Precipitation with Station data version v2.0 (CHIRPS), Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks-Climate Data Record (PERSIANN), Tropical Applications of Meteorology using Satellite data and ground-based observations (TAMSAT) and the Global Precipitation Climatology Centre full daily data (GPCC) – at gauge point level over the Mono River basin which is stretched over Benin and Togo territories. Three synoptic stations located in Tabligbo, Atakpamé and Sokodé were considered because of the completeness of their time series during the study period 1983-2012. The assessments were conducted at daily, dekadal (10-day period), seasonal and annual scale using both continuous and categorical statistics. Results show poor performances at daily and annual temporal scales while the seasonal cycles were well reproduced with Nash-Sutcliffe efficiency equal or higher than 0.94, and correlation coefficient above 0.9. At Tabligbo, CHIRPS and GPCC showed the best statistical results whereas the performance of PERSIANN and TAMSAT varies with the temporal scale and the station. The probability of rainfall detection (POD) and the capability of reproducing extreme daily maxima indicate GPCC as the best product for flood monitoring purposes at daily scale. However, all assessed products exhibited high POD and low false alarm ratio (FAR) at dekadal scale.