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Bias reduction for Satellite Based Precipitation Estimates using statistical transformations in Guiana Shield

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Currently satellite-based precipitation estimates exhibit considerable biases, and there have been many efforts to reduce these biases by merging surface gauge measurements with satellite-based estimates.
In Guiana Shield all products exhibited better performances during the dry season (August– December). All products greatly overestimate very low intensities (<4 mm) and underestimate very high intensities (>50 mm). Moreover the responses of each product are different according to hydro climatic regimes. The aim of this study is to correct spatially the bias of precipitation, and compare various correction methods to define the best methods depending on the rainfall characteristic correcting (intensity, frequency).
Four satellites products are used: Tropical Rainfall Measuring Mission (TRMM) Multisatellite Precipitation Analysis (TMPA) research product (3B42V7) and real time product (3B42RT), the Precipitation Estimation from Remotely-Sensed Information using Artificial Neural Network (PERSIANN) and the NOAA Climate Prediction Center (CPC) Morphing technique (CMORPH), for six hydro climatic regimes between 2001 and 2012.
Several statistical transformations are used to correct the bias. Statistical transformations attempt to find a function h that maps a simulated variable Ps such that its new distribution equals the distribution of the observed variable Po. The first is the use of a distribution derived transformations which is a mixture of the Bernoulli and the Gamma distribution, where the Bernoulli distribution is used to model the probability of precipitation occurrence and the Gamma distribution used to model precipitation intensities. The second a quantile-quantile relation using parametric transformation, and the last one is a common approach using the empirical CDF of observed and modelled values instead of assuming parametric distributions. For each correction 30% of both, simulated and observed data sets, are used to calibrate and the other part used to validate. The validation are test with statistical skill like Root Mean Square Error (RMSE).
Initially the results show that all methods improve bias in satellite-based precipitation estimates. However, the study is only a preliminary attempt to address this important issue. Other methods of corrections will be tested to better correct the bias.