H34F-08: A parametric and non-parametric metamodeling approach for the bias-correction of Satellite Rainfall Estimates using rain gauge measurements. Cases of study: Magdalena Basin (Colombia), Imperial Basin (Chile) and Paraiba do Sul (Brazil).

Wednesday, 13 December 2017
17:45 - 18:00
New Orleans Ernest N. Morial Convention Center - 291-292

Rainfall measurement plays an important role on the understanding and modeling of the water cycle. However, the assessment of scarce data regions using common rain gauge information, cannot be done using a straightforward approach. Some of the main problems concerning rainfall assessment are; the lack of a sufficiently dense grid of ground stations in extensive areas and the unstable spatial accuracy of the Satellite Rainfall Estimates (SREs). Following previous works on SREs analysis and bias-correction, we generate an ensemble model that corrects the bias error on a seasonal and yearly basis using six different state-of-the-art SREs (TRMM 3B42RT, TRMM 3B42v7, PERSIANN-CDR, CHIRPSv2, CMORPH and MSWEPv1.2) in a point-to-pixel approach for the studied period (2003-2015). Three different basins; Magdalena in Colombia, Imperial in Chile and Paraiba do Sul in Brazil are evaluated. Using Gaussian process regression and Bayesian robust regression we model the behavior of the ground stations and evaluate its goodness-of-fit by using the modified Kling-Gupta efficiency (KGE'). Following this evaluation, the models are re-fitted by taking into account the error distribution in each point and the corresponding KGE' is evaluated again. Both models were specified using the probabilistic language STAN. To improve the efficiency of the Gaussian model a clustering of the data was implemented. We also compared the performance of both models in term of uncertainty and stability against the raw input concluding that both models represent better the study areas.

The results show that the error displays an exponential behavior for days where precipitation was present, this allows the models to be corrected according to the observed rainfall values. The seasonal evaluations also show improved performance in relation to the yearly evaluations.

The use of bias-corrected SREs for hydrologic purposes in scarce data regions is highly recommended in order to merge the punctual values from the ground measurements and the spatial distribution of rainfall from the satellite estimates.

Plain Language Summary

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