IMPROVING RAINFALL FIELDS IN DATA SCARCE BASINS: A COMPARISON OF DOWNSCALING, INTERPOLATION AND MERGING SCHEMES

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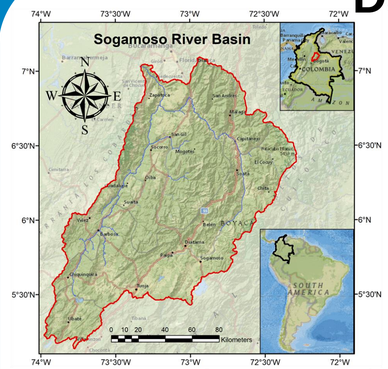
Abstract Reduction of in situ precipitation measurements increases the uncertainty of rainfall fields. To tackle this problem we use alternative data sources, but not only remote sensed rainfall. We performed rain gauge interpolations, downscaling of the MSWEP dataset based on vegetation data, simple linear downscaling, and a merging between MSWEP and rain gauge data. We present a comparison of the performance of rainfall fields produced with different network densities, which mimics precipitation data availability in a basin. We found that interpolation methods highly deteriorate their performance when the network density is artificially reduced. Using vegetation indices with a simple approach can reduce the error of the MSWEP, yet the highest reduction is achieved by blending the MSWEP with the rain gauge data. A combination of downscaling and merging methods can further reduce the error in low network densities.

Keywords: MSWEP, Kernel Smoothing, Enhanced Vegetation Index, Rain gauge density, Satellite Precipitation

Data & Methods



Random sampling of 156 rain gauges

5 different densities

3 networks with different config. per density

Remaining gauges used for validation

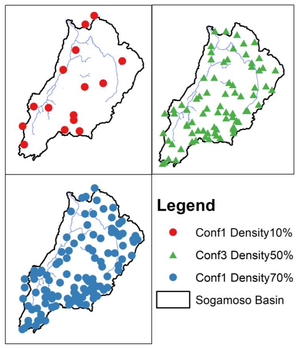


Figure 1: Location and rain gauge networks

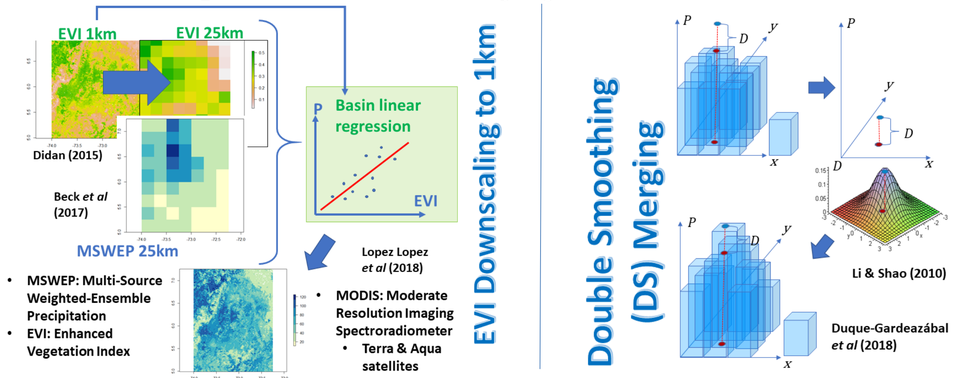


Figure 2: Downscaling and DS merging methodologies

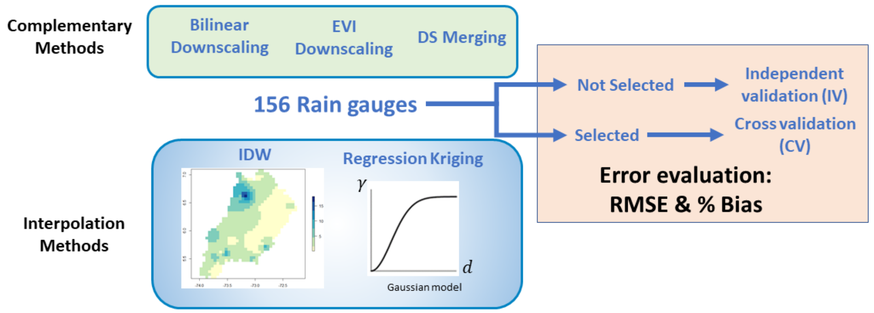


Figure 3: Interpolation methods and error evaluation methodology

Results

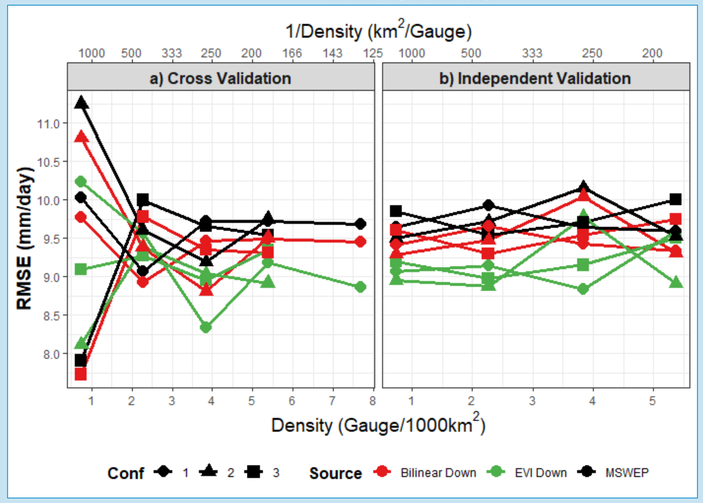


Figure 4: Performance of MSWEP and its downscalings, against the rain gauge networks configurations

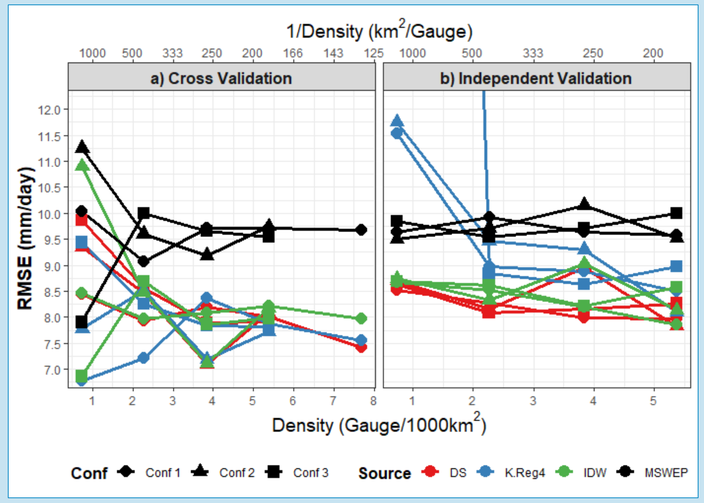


Figure 5: Performance of MSWEP, interpolations and DS merging method

Bilinear downscaling slightly reduces the original MSWEP error

Downscaling using linear regression between P and EVI reduces even more the error

In both, cross validation and against the independent rain gauges

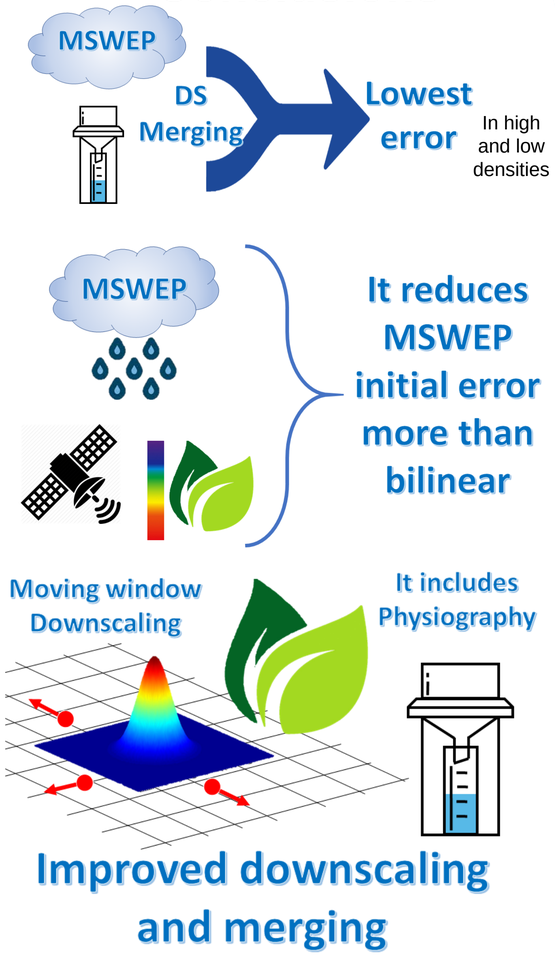
Interpolation and merging methods reported a lower error than the downscalings

However, the regression kriging highly suffers when a reduction in density is simulated

Even in the lowest density, the smallest error is produced by the merging of MSWEP and raingauges using DS

IDW and DS do not require a preprocessing such as variograms

Conclusions



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