Using historical raingage data to adjust a global rainfall reanalysis over Africa

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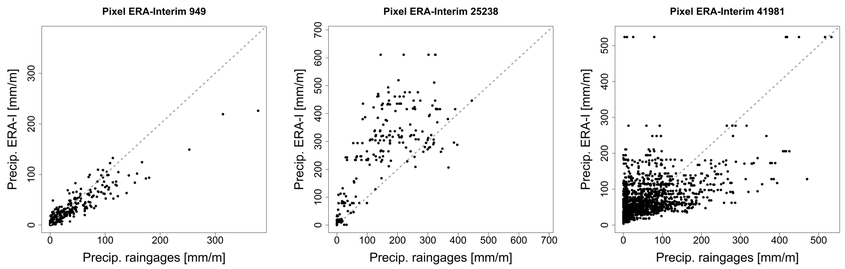
1. Introduction & Objective

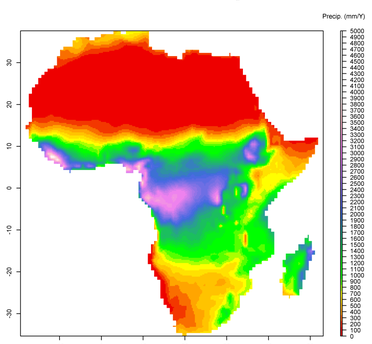
- In raingage-poor regions, global rainfall reanalysis products can constitute a valuable source of precipitation information for hydrological applications. Indeed, the spatial and time scales of reanalysis data sets are compatible with those of hydrological models.
- Unfortunately, global rainfall reanalyses often present large biases which limit their use without a preliminary adjustment :



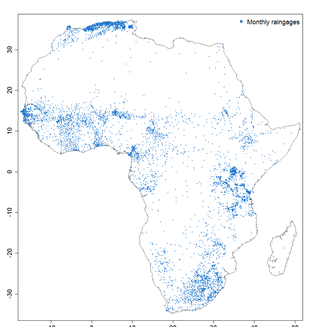
This work aims to propose a climatic adjustment of the ERA-interim rainfall reanalysis based on Tractebel's historical raingage dataset over Africa at the monthly time scale. The method consists in building a seasonal intensity-dependent error correction curve using all data points where ground measurements are available.

2. Study area and data

ERA-Interim reanalysis rainfall



Tractebel monthly raingage dataset

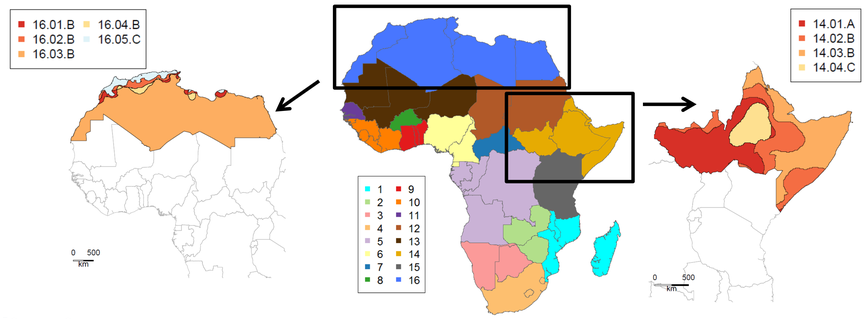


The ECMWF ERA-Interim reanalysis provides long rainfall time series from 1979. Over Africa, there is enough overlap with monthly ground measurements to allow for calibrating an error-adjustment model.

3. Methodology of the climatic adjustment of the ERA-Interim rainfall reanalysis

- An essential hypothesis of the method is that the reanalysis error relative to rainfall intensity is stable in time.
- To have enough data to build the climatic adjustment, one correction curve is estimated for each month and each region. **16 groups** of country and a totally of **58 "climate zones"** are created (based on world map of Köppen-Geiger climate classification (Peel et al., 2007)).

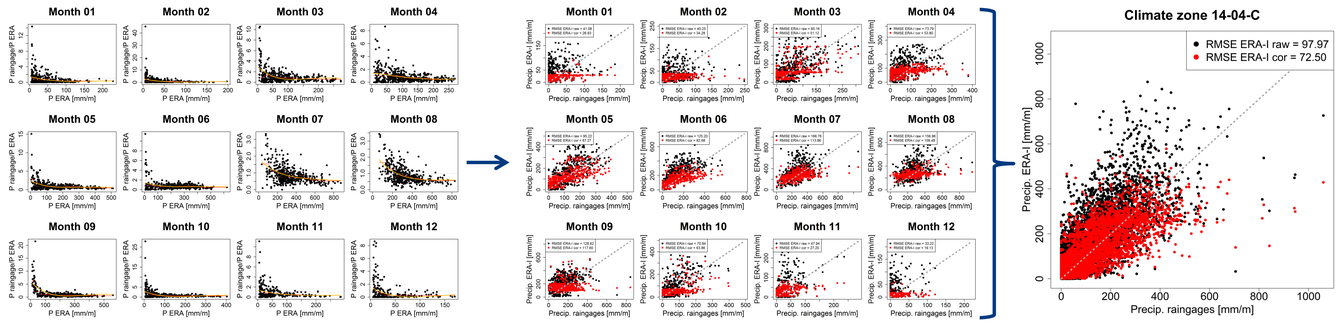
Peel, M. C., B. L. Finlayson, et T. A. McMahon (2007), Updated world map of the Köppen-Geiger climate classification, *Hydrol. Earth Syst. Sci.*, *11*(5), 1633-1644, doi: 10.5194/hess-11-1633-2007.



4. Seasonal correction curve estimation and application

Climate zone 14.04.C

Correction curve:
P.raingage/P.era = f(P.era)

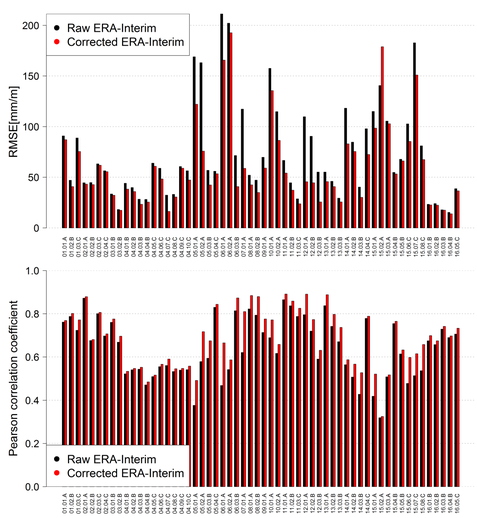


Estimation of the correction curve for each month

Application of the correction curve for each month

Global Performance

- Root mean square error values of ERA-Interim reanalysis rainfall are reduced with the climatic adjustment method (except for climate zone 15.02.A).
- For some climate zones, the reduction of errors is large (especially for climate zones 12.01.A and B).
- Pearson correlation coefficients are also improved with the climatic adjustment for all climate zones.



5. Conclusion & Perspectives

- The climatic adjustment of the ERA-Interim reanalysis improves the correlation between ground measurements and reanalysis.
- The method of climatic adjustment of the rainfall ERA-Interim reanalysis will now be extended at the daily time step.
- This method will be validated at catchment scale with GR4J hydrological model.

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EGU General Assembly 2018 – Vienna – 8–13 April 2018