

Interactive comment on “Spatial and temporal variability of rainfall in the Nile Basin” by C. Onyutha and P. Willems

Anonymous Referee #2

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The manuscript analyzes the temporal variability of annual and seasonal rainfall over the Nile river basin based on the quantile perturbation method (QPM). A spatial analysis is also carried out by comparing rainfall statistics among three sub-regions showing different patterns of the long term mean of monthly rainfall. Finally a correlation analysis is made using SLP, SST and related climate indices series, in order to identify drivers for rainfall variability over the study area.

Major comments

Although the topic is very interesting and the paper is well written and structured, I believe that it does not present any novel idea with respect to previous authors' works in terms of methodology (Ntegeka and Willems, 2008; Nyeko-Ogiramoi et al., 2012;

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Moges et al., 2014, Onyutha and Willems, 2014a and 2014b), investigated variable and applications (Mbungu et al., 2012; Taye and Willems, 2011 and 2012; Nyeko-Ogiramoi et al., 2013), albeit with some variations (in previous studies applications were limited to specific catchments within the Nile river basin, whereas in the present study the whole basin is considered). The authors should explain in details the innovating aspects of this study compared to previous publications.

With reference to the methodology, the QPM is based on a comparison between quantiles with similar return periods derived from the complete time series of length n and subseries of fixed length D . Return periods are computed as n/j or D/j , with j the rank of each value of the series sorted in descending order. For small sample series (i.e. $n < 100$) the latter represents a biased estimator of return periods for all distributions, thus in principle it would not be recommended. The authors should demonstrate that the use of an unbiased estimator does not change the results significantly.

Minor comments

Lines 7-8 p. 11959: "Correlations for groups A to C are obtained over the periods in which each station had data records i.e. 1935–1970 (36 years?), 1954–1992 (39 years?) and 1945–1985 respectively." This is apparently in contrast with lines 20-22 at p. 11949: "To enhance the acceptability of the research findings, long-term rainfall series of length not less than 40 years and missing data points not more than 10% were used." and Table 1. Please check.

Lines 21-23 p. 11960. "Although for brevity, spatial maps for correlations between HadSLP2 or HadSST2 and annual rainfall are presented Figs. 5 and 6, for those with the rainfall in the main wet seasons of the different groups, see Figs. A1 and B1.". Please rephrase.

References Jury (2010) is not in the text. Some references are not in alphabetical order (e.g Grist and Nicholson, 2001 is before Goovaerts, 2000 and Gleick and Adams, 2000). Please check.

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