

Interactive comment on “Identification of the main attribute of river flow temporal variations in the Nile Basin” by C. Onyutha and P. Willems

Anonymous Referee #1

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GENERAL

This is potentially an interesting case study. However, I find the structure of the manuscript most unhelpful in trying to explain the scientific goals, the methodology used and interpretation of the result. In many places, the authors are assuming too much prior knowledge on behalf of the reader which makes it very difficult to follow the descriptions. In addition, several sections such as the methodology read more like an internal working paper, where steps are reported in the order the analysis was made without first clarifying why these steps are necessary or what they hoped to achieve. As such I think the methodology needs a much better justification and introduction before leaping into detailed analysis. For example, why is it necessary to group the stations in section 3.1? This is only made clear much later, so it is difficult/impossible to assess if

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this is a reasonable thing to do when reading the description, which is very distracting (potentially irritating).

In the same vein, I think the introduction is inadequate. It should clearly set-up the current state-of-the art knowledge, identify gaps in this knowledge, and define the objective of this study and how it might close this knowledge gaps. For example, in the literature review in the introduction, I would like to see a more detailed discussion and criticism of the findings of previous studies regarding the effects of land-use change on flow in the basin – especially given that the major finding of this study is that these factors have a negligible influence on basin runoff characteristics.

I cannot follow the description in Section 3.4. It jumps between references to previous studies by the authors and some very detailed statistical characteristics of a Brownian bridge, ending up with a description of a non-parametric scaling method. I find this all very confusing, and perhaps a more considered explanation, including a schematic figure trying to convey the essence of the CRD methodology would be helpful?

It is disappointing to see that a study of trend and change does not try to embrace the issue of attribution. For example, Merz et al. (2012) have argued that trend studies without careful consideration of attribution does not add much to our scientific understanding of the hydrological systems. Perhaps the authors could also discuss the excellent paper by Harrigan et al (2014) on attribution and trend detection.

Overall, the case study is probably interesting, but the reporting and structure of the paper is at present not sufficient to adequately judge the scientific quality of the contribution in my opinion. If the authors are prepared to make a concerted effort to improve the presentation, then I would recommend major revision, but anything less and I would have to recommend rejection.

TECHNICAL CORRECTIONS:

Page 12168, line 25: remove ‘etc.’

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Page 12168: 'sufficient planning' I wonder if sufficient is the right word? I think it suggests something like just crossing the lower threshold of acceptance. Maybe 'careful planning' would be more appropriate?

Page 12170, line 4: What is the meaning of 'restively' here?

Page 12170, line 17: 'These' what? Maybe the impact of these factors result in lower runoff coefficients than might be expected from its vast drainage area. However, I am not sure catchment area is an altogether good predictor of runoff coefficients, if you mean runoff volume divided by rainfall volume – why should area have much control over this? For example, the SCS method does not include considerations of area when calculating excess rainfall.

Page 12172, top: Is it sensible to use monthly average flow as an indicator, when there is clear intra-annual variation based on wet/dry seasons?

Page 12171, line 6: What does '4 (6)' mean? Is it 4 or 6? Table 2 and 3: Please make sure to report station details in the same format. Table 3 should be formatted to look like Table 2, and why not merge the two tables into a single table containing information on all the rainfall data used in the study?

Page 12172, line 16-onwards: Merge (i) and (ii) and say take each of the 18 stations in turn, and define the selected station as a master station (iii) for what aspect of the flow series is the correlation computed? (iv) this seems overly complicated, presumably you form a group of stations that are correlated positively with the master station? Is step (v) necessary? Seems like a repeat of (iv)? Section 3.3: Why three rainfall-runoff models? Why these three models?

Page 12175 line 26: Why suddenly introduce the extreme high/low flows? The previous analysis has focussed on seasonal and annual flow, but this is much more detailed.

Page 12176, line 23: what is a 'sub-trend analysis'?

Table 4-5: Some of the correlations are very high (>0.9); was the connectivity between C6506

stations via the river network considered at any stage in the analysis? Also, I don't understand if the 100s of numbers dumped in Tables 4, 5, 6 & 7 are the same as what is shown in Figure 2? But again, I am not sure I understand what is the significance of this result?

Section 4.2: I think the discussion in this section is rather speculative and based solely on a visual inspection of the scaled flow series.

Page 12182, line 20: 'two and three' what?

Page 12181, line 28: What is a 'variation pattern'?

Page 12182, line 1-2: Is this not obvious, as most of the catchment is upstream of Egypt, and the rainfall in Egypt is very low?

REFERENCES Merz, B., Vorogushyn, S., Uhlemann, S., Delgado, J., and Hunderdeck, Y. (2012) HESS Opinions "More efforts and scientific rigour are needed to attribute trends in flood time series", *Hydrol. Earth Syst. Sci.*, 16, 1379-1387

Harrigan, S., Murphy, C., Hall, J., Wilby, R. L., and Sweeney, J. (2014) Attribution of detected changes in streamflow using multiple working hypotheses, *Hydrol. Earth Syst. Sci.*, 18, 1935-1952

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 12, 12167, 2015.