

## ***Interactive comment on “Hydrologic calibration of paired watersheds using a MOSUM approach” by H. Ssegane et al.***

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**General Comments** This manuscript presents a statistical approach that allows interpretation of paired watershed data without a lengthy calibration period or exclusion of external factors influencing the watersheds. The approach is demonstrated for 3 small and adjacent watersheds in the southeastern US. The moving sums of recursive residuals (MOSUM) statistical change detection technique predicted the structural change in regression coefficients at the time of different forest management manipulations. The use of MOSUM provided less uncertainty in calibration relationships by choosing calibration periods with minimal external influences, suggesting a more sensitive calibration of paired watersheds than using an entire calibration time period. This

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manuscript represents an important case study, a practical and novel use of MOSUM for paired plot studies of short duration with external influences. I believe it is appropriate for publication in HESS. The following are concerns to be addressed.

It was not clear that the water tables of the side by side plots/watersheds were independent of each other. For example Figure 1 shows each study plot/watershed in rectangular shape of small size (approximately 300 m x 600 m) and directly next to each other. The authors need to either disclose the potential for water table responses from adjacent plots or better communicate how the water tables for each of the small study plots are indeed independent of each other.

The linear regression used daily water table values. It is doubtful daily water table values are independent measurements, a requirement for regression analysis. The authors state the use of a non-parametric bootstrap geometric mean regression was used. The authors should clarify in the manuscript if this approach addresses the likely serial correlation of daily water tables or 30-day moving sums used in MOSUM. This reviewer is not a statistical expert, like some HESS readers, and did not understand if the serial correlation issue was accounted for. If serial correlation is not accounted for then this must be tested for and the interval between daily water table values identified that make the observations independent. Then run the regression with only daily values at intervals where serial correlation does not exist.

The manuscript began with a problem statement regarding the importance of techniques to determine impacts to aggressive biofuel production. Data and results from study on biofuel management, e.g. use of switch grass amongst plantation trees, was used to demonstrate the effectiveness of the MOSUM approach. The authors were silent in the discussion about interpreting their treatment effects. I was interested in an additional sub-section in the discussion on the interpretation of the use of the different treatments and switch grass.

Specific comments Pg 247, line 13: Coastal should not be capitalized

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Pg 247, line 19: change “raised bed” to “raised beds”

Pg 248, line 13: use a more general citation on paired watershed study instead of (Zegre, 2010). Perhaps (US EPA, 1993) see article at this link: [http://www.in.gov/idem/nps/files/iwpg\\_paired\\_watersheds.pdf](http://www.in.gov/idem/nps/files/iwpg_paired_watersheds.pdf)

Pg 250, line 16: delete “Therefore” start sentence with “The specific objectives. . .”

Pg 250, line 18: I am not sure what is meant by “structural stability”, if this is a common statistical term then leave it, else a brief explanation would be helpful.

Pg 251, line 7: Please explain exactly what “artificially drained” means. The phrase is vague and could mean many things.

Pg 251, line 8: suggest a change to the sentence “The D1-D3 watersheds have long been established and used for previous studies while watershed Do was established in 2009.” to “The D1-D3 watersheds have been used for previous studies while watershed Do was established in 2009.”

Pg 257, line 2: spelling error “similar”

Pg 258, line 15: add space between “D1” and “depicted”

Pg 262, line 24: delete comma after “Although”

Pg 262, line 25: end sentence after (Fig 8). Delete “because” and start new sentence with “ The uncertainty bounds. . .”

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