

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

### **Anonymous Referee #1**

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The study reported in this manuscript addresses the hydrologic impact of land use practices associated with the production of bio-fuel crops in a commercial pine plantation. The effects of land use practices on hydrology, particularly those associated with agriculture and forestry, have been an enduring and important focus of hydrologic research for many decades. Despite the significant body of studies on the topic, there is a continuing need for ongoing research given that land use practices are continually evolving in response to socio-economic changes: results from past studies (e.g., commercial forestry) may not be entirely applicable to new practices. Therefore, the topic of this study is highly appropriate for publication in HESSD.

The authors have an interesting data set that includes water table elevations, climate and discharge from four catchments, one designated as a control and the other three

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as treatment catchments. The authors employ an interesting approach to change detection, MOSUM, which has only recently begun to be applied in hydrologic research.

The entire study period (2009-2012) is considered a calibration period (p. 250, lines 18-19), yet two of the treatment catchments were harvested in the first four months of the study, followed by a range of other treatments. The third treatment catchment was 85% harvested after nine months. The authors acknowledge that these treatments have the potential to influence the relation between the hydrologic responses for treatment/control pairs, and employ the MOSUM technique to identify periods during the study in which the treatment/control relation is unaffected by the treatments. The authors also indicate that the MOSUM technique minimizes the effect of autocorrelation, which would certainly be present for hydrologic variables at a daily time step.

Unfortunately, I have difficulty following the logic of the analysis. It seems to me that one would have to have at least one annual cycle of data prior to any treatment to assess the temporal stability of a paired-catchment calibration. In my experience (granted, in quite different geographic settings than the current study), paired-catchment calibration relations can vary seasonally (e.g., relations during a wet season typically differ from those in the dry season). Perhaps I am simply not understanding the analysis, but the study design seems so fundamentally compromised by the lack of true pre-treatment calibration period that I cannot see how the effects of any treatments can be detected with confidence. Unless the authors can demonstrate that their approach is robust, I cannot recommend publication of this work in HESS. I invite the authors to respond if I have fundamentally misinterpreted the analysis.

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