Anonymous Referee #1

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 HESS. 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 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.

>> *Refer to the response to the editor's comment on calibration periods. Below is an excerpt.*

>> *The water table elevation and flow calibration period identified by the MOSUM approach from the longer January 01, 2009 to March 31, 2012 period was only from March 1, 2010 – March 31, 2012, just over two years. This period of minimal disturbance was between pine planting in January 2010 and the final site preparation for switchgrass sowing (in May 2012) on the intercropped site. This period spanned the very wet periods of September 2010 and August 2011 to very dry periods of spring-summer of 2010 and 2011 and average rainfall in 2010. Recently, Bren and Lane (2014) demonstrated that good calibration (Nash-Sutcliffe efficiency > 0.8) by simple linear models could be achieved after 100 days of data. So this length of the calibration period defined by the MOSUM method should be adequate. Below* *are the total numbers of days for each pair of watersheds for the stable periods as estimated by the MOSUM approach.*

1. *D0 vs. D2: 01 January 2011 to 31 March 2012: 456 days (over one annual cycle: MOSUM did not detect any structural break or significant instability in the regression coefficients). Monitoring on D0 started in late 2010*
2. *D1 vs. D2: 01 March 2010 to 31 March 2012: 762 days (over 2 annual cycles)*
3. *D3 vs. D2: 01 December 2009 to 31 July 2011: 608 days (≈ 1 ½ annual cycles)*

Field monitoring on watersheds D1, D2, and D3 at the study site started in 1987 and the data was reported in several studies (e.g., McCarthy et al., 1991; Amatya et al., 1996; 1998; 2000; 2003; 2006; 2007; Amatya and Skaggs, 2011) while watershed D0 was established in 2009 at the onset of this study. The above listed studies provide the chronology of management activities at the three watersheds over the past 25 years. Therefore, there are two "true-calibration" periods (1988-1990 and 2007-2008) for watersheds D1 and D2 where both watersheds were under mature pine. The 1988 - 1990 calibration period has previously been used to quantify effects of controlled drainage and silvicultural operations using a paired watershed approach (refer to above references). Therefore, for purposes of quantifying treatment effects under switchgrass intercropping, the MOSUM based calibration relationships in addition to these historical calibration relationships will be compared to quantify treatment effects and associated uncertainty.

The uniqueness of the MOSUM based calibration relationships is the use of most recent watershed response data close to the treatment period by eliminating periods where the calibration relationships between e.g., D1 and D2 may be influenced by external factors. The value of "true calibration" period spanning wet and dry seasons is the fact that the assumption of "a consistent" relationship between control and treatment watersheds is probably often met.   The MOSUM approach provides a statistical technique to test this assumption incase external factors may shift this consistent relationship.

Clausen and Spooner (1993) state that the paired watershed design assumes a consistent, quantifiable, and predictable relationship between watershed response variables while Loftis et al. (2001) illustrate that moderate correlation coefficients ($r \geq 0.6$) are adequate to detect treatment effects for paired watershed studies. For this study all developed coefficients of determination (R^2) are greater than 0.8 (or $r > 0.89$). The choice of data under a stable regression period meets the requirement of the relationship to be consistent by eliminating data that shifts this relationship and thus increase model uncertainty, while the high R^2 meets the requirements for quantifiable and predictable relationships. The robustness of the MOSUM approach to detect temporal shifts in model coefficients of time series (significant structural instability of a regression relationship or a model) is documented elsewhere (de Jong et al 2013; Verbesselt and Herold, 2012' Chu et al., 1995). These references were provided in the original manuscript.

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