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Interactive comment on "Human amplified changes in precipitation-runoff patterns in large river basins of the Midwestern United States" *by* Sara A. Kelly et al.

Anonymous Referee #3

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The authors use a variety of methods to characterize the changes in hydrology in four large Upper Midwest USA watersheds due to precipitation and land cover change. The focus of the work is relevant to the region and deserving of publication. The paper is well-written but several points are worthy of additional attention: 1. Page 2, Lines 15-30- The authors insist that the main issue associated with increased flows and base-flows is increasing sediment loads. This is an issue very close to their working group in Minnesota. However, for the rest of the Midwest, the issue is increasing nutrient loads, specifically nitrate and phosphorus. Tile drainage is the main source of nitrate to rivers and it is barely mentioned in the paper. Outside of the Minnesota River, tile drainage is rarely mentioned along with bank erosion but the issue of tile drainage is universally

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considered a dominating factor in nitrate and dissolved phosphorus transport. The authors should change their focus to include more discussion of the relevance of increasing flows on nutrient export and Gulf Hypoxia. There is a wealth of papers on this topic that can be considered and they are largely ignored in the paper. 2.Likewise the authors ignore research conducted on this issue previously including: Xu, Xianli, et al. "Relative importance of climate and land surface changes on hydrologic changes in the US Midwest since the 1930s: Implications for biofuel production." Journal of Hydrology 497 (2013): 110-120. This paper used some different methods to derive some assessment of the topic. There are other papers where this came from. The topic is not new and the authors should compare their results to the body of literature reporting on the same topic. 3. Page 5, lines 7-23 - The authors again ignore a body of research on the extent of tile drainage in the US Midwest (search for papers from Mark David in JEQ). There are much better estimates of tile drainage extent available than NASS. What is the source of the percentages in line 19? 4. Page 5 line 3 - PRISM used without definition; Page 7 lines 13 and 27 it is defined twice. 5. Page 8 CWT methods - there is a lot of method text devoted to this method but it did not prove add much to the results and discussion. In fact it is largely ignored later in the paper in a single short paragraph. I would suggest dropping this method or simply mentioning that it was done and moving to supplemental text. It adds nothing to your argument. 6. Page 9, line 12-19 - the rationale for the breakpoint based on plastic pipe is purely speculative and it gives this idea credence. Just simply break the record up in two equal periods consistent with previous work. 7. Where did the ET data for crops come from? The water balance method is hugely sensitive to ET and it seems rather arbitrary to reduce it by 17% because of a literature citation. This needs to be verified independently by the authors. Maybe its 25% or 10%, who knows, and yet it is retained in the results and discussion like there is true meaning behind it. 8. Section 4.1 - this seems like background material to me. You didn't really do anything new here except compile some data available in databases. Again, the NASS data is pretty weak for these trends, especially trends reported as if they are completely accurate. This is qualitative data at best, 9.Page 6, lines 16-21 - it is a stretch to cite Figure 5 to discuss cyclicity. It is not obvious in the figure. suggest that the authors find a way to make it visible or drop from the text. 10. I found the data is Figure 6 to be the most compelling in the paper. Are the deviations consistent with the imposed breakpoints? 11. Section 4.2.3 - the use of daily scale in this multi-year analysis is inappropriate. The results are very weak and do not really add to your argument. What about the "flashiness index"? There is no real link of this section to your main issues and I would suggest dropping this section.

Overall, the paper adds to the body of research that already exists on the topic. The topic is not new and it has been evaluated by many authors previously but there are some methods and techniques used and the issue of worthy of attention. I am recommending the paper be accepted with major revisions.

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