

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.

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Overview

The authors address the interesting problem of disentangling anthropogenic versus climate impacts on hydrology in agricultural catchments in the mid-western US. They propose that storage has decreased dramatically in drained (tile) watersheds and discuss other aspects of the water budget, as well as conduct a break-point analysis to understand drivers of LCLUC changes. Overall, this is a wonderful analysis and the most interesting paper I've read in a while, so I'd like to commend the authors on a clearly articulated and thoughtful manuscript. A few points need to be clarified. However, I find the manuscript to be suitable for publication after minor revisions.

Major points

INTRO, P2 second paragraph: do the widely reported systematic increases in peak, mean, total, and base flows from the literature attribute these to decreases in ET, or solely from increases in precipitation? This point needs to be clarified and discussed further.

P3L20: studies report reductions in early season ET—presumably these are because replacing mature grasslands with fledgling crops reduces ET early in the season. However, what occurs later in the season, when the crops mature—will the ET be greater than grasslands?

What is the spatial resolution of the census drainage data? For which 5 years are drainage data available at the county-level?

The use of the Livneh et al. hydrometeorology data allows for calculation of the water balance at scales that are appropriate for the analysis. Although the authors acknowledge that the derived hydrologic outputs, e.g. ET, were generated using a modeling framework that considered static vegetation cover, they should report (if possible), which vegetation cover was used in VIC, e.g. was it natural vegetation or crop land cover? This would bolster the authors acknowledgement of the limitation.

Would the use of static land cover of Livneh et al. (2013) mean that the authors results are a conservative estimate of LCLUC impacts, or would this mean that the authors findings would overestimate impacts?

It would be useful to see a figure that shows historical land-cover change, precipitation change, and streamflow through time, if it is straightforward to show these together, as this would be very informative.

Would it be possible to test the interpretation hypothesis (2) in the discussion, that precipitation intensity may be influencing runoff efficiency? This could be something for future work, but would be an interesting experiment.

Minor points

I don't think "Midwestern" is a technical term, rather the Northeast Great Plains is probably more apt and the authors should consider revising the references and title accordingly.

How did the authors reach the number of 286 for the t-test and KS-tests? This needs to be clarified as it is presently unclear.

All figures – it is unacceptable to include acronyms in the figure and then not define them in the caption. The figures should be readable as standalones. Hence, the authors need to define all acronyms in each figure in the respective captions.

Figure 5, explain briefly how the flow was normalized in the caption.

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