Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., referee comment RC5
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Comment on hess-2020-613

Anonymous Referee #5

Referee comment on "The spatial extent of hydrological and landscape changes across the mountains and prairies of Canada in the Mackenzie and Nelson River basins based on data from a warm-season time window" by Paul H. Whitfield et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2020-613-RC5, 2021

Review of "The Spatial Extent of Hydrological and Landscape Changes across the Mountains and Prairies of Canada in the Mackenzie and Nelson River Basins Based on Data from a Warm Season Time Window" by Whitfield et al.

The manuscript investigated seasonal trend in streamflow observations over the Mackenzie and Nelson River basins. The authors maximized the number of observations to analyze in the study by using a warm season time window instead of common period of years. They identified 12 streamflow regime types using the dynamic time warping, six trend patterns, and three particular areas of change relating to the trends in the satellite indices. They showed that the clustering method can organize similar hydrographs that vary in magnitude and timing due to different timing of snow accumulation and melt by latitude and elevation. The streamflow trends were explained w.r.t. the changes in NDVI, NDWI, and NDSI that exhibited complex spatial variation and connection. I think that the analyses method is innovative and promising in studying seasonal trends that can shed lights on localized and shorter time scale phenomena that do not appear in annual trend analyses. The manuscript is highly relevant and worth a publication, however it is a bit difficult to follow in its current form and reorganization and modification of presentation are desirable as most of the concerns raised by referees. My specific comments are below.

Major concern

While figures are illustrative in showing different nature of data availability, hydrograph, and trends across the stations, some figures seem better suited in the Supplement section (Fig 5, 8, & 9). I concur with a referee's suggestion on focusing on the main findings (Streamflow Regime Types, Trend patterns, and three areas of changes) and separating/expanding figures related to them (Fig 7, and 12). Fig 6 is one of the main findings but claimed it's difficult to see and Fig 8 is the simplified version that is referred more in the text. While Fig 6 lines are color-coded for different stations, no corresponding map of color-coded station is provided, and the centroid is washed out. I recommend combining Fig 6 and 8 by using lighter colors for the stations (or make them less opaque) and using black thick line for centroid to make them stand out. Figure 7 and 12 are the main findings as well but it's difficult to distinguish stations because they overlap, and also the color shading for ecosystems clash with the markers. I think that it's worth separating into several maps showing a few Regime Types and Patterns per map like maps of S16-21. I also recommend using gradient shading for the ecosystems. I did not find Fig 9 to be significant.

Minor corrections

Ln#71: hydrological repeated

Ln#294: “having than three years of data”=> having more than three..
Ln#342: what is bfast? R function name?
Ln#446: typo “bsin”