

Interactive comment on “Historical drought patterns over Canada and their relation to teleconnections” by Zilefac Elvis Asong et al.

Anonymous Referee #2

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Summary

The authors identify the distinctive patterns of drought in space and time over Canada. They characterize drought using SPEI at different time scales and calculated from two different data sets. The authors find two major patters of spatial coherence of drought using REOFs and evaluate trends in drought incidence. They also do several analyses using wavelet coherence to identify the relationship between relevant climate oscillations and drought occurrence over Canada.

The paper is well-written, and the work is interesting and relevant to the journal. I recommend this paper for publication upon performing a few revisions outlined below.

Comments

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- Lines 173-194: Given that the authors raise the issue of sparse monitoring stations as an uncertainty source, it would be good if they included a map in the supplementary material showing the location of the stations.
- Lines 222-223: These data exist from reanalysis and hybrid products over Canada. I recommend that the authors write a more convincing argument for not using these other approaches to calculate PET that are more robust.
- Lines 223-225: It is worth discussing the uncertainty that the use of this method introduces. A review of the literature could help. For example, Sheffield et al. (2012): Sheffield, J., Wood, E. F. & Roderick, M. L. Little change in global drought over the past 60 years. *Nature* 491, 435–438 (2012).
- Lines 316-329 and Lines 367-375: These results should be placed in the context of results from, for example, Sheffield et al. (2012) cited above. They find that false trends may appear when using oversimplified characterizations of PET.
- Lines 384-386: The range stated in Line 384 is between 8-32 months, which seems to mix intra- and inter-annual variability. How can this be? And how does this translate to the 2-6 year frequencies? Do the authors mean that this 0.67-2.67 years period is similar to that of ENSO? This seems like a weak argument since this period is on the lower end. Similar case in Line 391 and for the conclusions drawn in Lines 505-521.
- Figures 8-11 and Figures S1-S3: Need to label the colorbars.

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