

Interactive comment on “A generic method for hydrological drought identification across different climate regions” by M. H. J. van Huijgevoort et al.

Anonymous Referee #2

Received and published: 15 April 2012

This ms seeks to present a method to identify drought in a consistent manner across climate regimes. More specifically, it tries to develop a drought metric that can be used in conditions where runoff ceases for extended periods, and where the duration of no-flow is instead used as a metric.

I do not see a strong scientific merit in this manuscript: it does not introduce new theory or make new inferences from observations. That is not to say that it could not have practical merit that might make it suitable for publication, depending on the journals publication criteria. I can see some practical merit in the thought that has been put in the suitability or otherwise of alternative hydrological drought metrics in

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arid regions, and the attempt to develop a ‘fix’ for it. However I see some problems with the approach.

[1] The authors claim to provide a single metric, but I interpret the approach as simply using a second metric where the first one fails. I would think that is different; it does not make the two indices consistent or make for a ‘generic’ overall approach.

[2] Ephemeral river systems will obviously be more resilient to lack of flow than would be perennial river systems. That is not to say that there are no hydrological drought impacts in such systems; they can be related to the drying out of water holes, floodplain storage dams or tanks and the lowering of floodplain aquifer groundwater tables, for example. It seems reasonable to assume that the time since last flow has some value in predicting such impacts I suppose. The approach proposed here might work for monsoonal rivers, where the river falls dry in most years for variable durations of time. However it is not clear to me if this approach works if there are typically several years in between flow events. As a secondary related comment, I strongly suspect that 10 or even 32 years (Table 2) will be too short to establish a reasonable baseline for such systems.

[3] The index proposed here seems to be intended to be used in combination with spatial hydrological models. I am not familiar with the models used here, but am familiar with the generally poor hydrological performance of land surface schemes in arid regions, particularly in predicting no flow conditions (in the absence of river evaporative losses they tend to predict continuing infinitesimally small flows, for example). This may be attributable to the representation (or lack thereof) of the large river losses that typically occur in arid regions. (As an aside, it is also not always straightforward to identify ‘no flow’ conditions in measured streamflow records). This leads me to doubt that there is value in attempting to provide hydrological drought information in arid regions on the basis of such models. Some evidence that the model(s) used have skill in reproducing observed no-flow durations may alleviate this concern.

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