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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Technical note: Long-term memory loss of urban streams as a metric for catchment classification" *by* Dusan Jovanovic et al.

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We thank Dr Dimitriadis for the very thorough review and the suggestions, which will help largely improve the manuscript. We have summarised below the major comments that were raised and have indicated how we plan to address them.

1) The urbanization is quantified through the catchment imperviousness which is certainly an effect of urbanization but not exclusively, and thus, it may be useful to include additional metrics for the classification of the catchments (e.g. land-use).

For the Australian catchments, the percentage of impervious area were taken from

Hamel et al. (2015) and were calculated using the methods in Kunapo et al. (2005). Buildings and paved areas (i.e., roads and carparks) were mapped using a geographical information system software, and the percentage of impervious areas, U, was calculated as the ratio between total impervious area and catchment area. The land use of the catchments with larger U is residential, while those with low U are mostly covered by natural forests. For the US catchments, information about impervious data can be found in Mejia et al. (2015). Imperviousness was calculated using a combination of tax map information and areal imagery. In terms of land use, pervious land is mainly agricultural and urban green spaces, including lawns, parks and other grassed areas. Riparian corridors, if present, are likely to be forested. The majority of imperviousness consist of residential, commercial and transportation land use areas.

Existence of catchments with small imperviousness metric, but having civil works (e.g. dams) which can influence the H exponent.

The catchments selected were not affected by large civil works such as dams. We will specify this in the text.

Investigate precipitation and imperviousness correlation to see if the same pattern will emerge with precipitation which will strengthen the robustness of the analysis.

As specified in the reply to Dr Rao and Mr Bertassello, the links between rainfall and streamflow in catchments with different levels or urbanization were analysed by Jovanovic et al. (2016), who found that the scaling properties of streamflow records for highly urbanized catchments were similar to those of the rainfall records. The focus of the present technical note is to show that a relationship between the H-exponent of streamflow series and percentage of impervious area can be found in different climatic conditions (i.e., humid climate for the catchment in the USA and semi-arid for those in Australia). This relationship identifies levels of urbanization, defined in terms of percentage of impervious area of a catchment, U, that are associated with different degrees of long-term memory of streamflow series, estimated using the H-exponent.

We will expand the discussion to direct readers to Jovanovic et al. (2016) in relation to the H-exponent of rainfall series in catchment with different degrees of urbanization.

2) Examine the lag-1 correlation function relationship to H exponent, which may strengthen the robustness of the analysis.

As replied to Dr Montanari, we will conduct the lag-1 analysis and possibly include the results in the manuscript.

Issue of H>1.

This issue, which was also raised by Dr Montanari, will be addressed by expanding the discussion and analysing the uncertainty of the H-exponent estimation.

3) Assign a climatic regime metric (e.g. just the five basic classifications of Koppen-Geiger; http://koeppen-geiger.vu-wien.ac.at/) to each catchment and add a discussion about how (or whether) this has an effect on the H of streamflows and precipitations.

We will insert the Koppen-Geiger classification for our catchments and provide a discussion about the impact of different climates on H-exponent estimation.

All minor comments will be addressed in the manuscript and the suggested references will be appropriately included in the revised manuscript.

References:

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