

Interactive comment on “Variability of low flow magnitudes in the Upper Colorado River Basin: identifying trends and relative role of large-scale climate dynamics” by M. Pournasiri Poshtiri and I. Pal

Anonymous Referee #3

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A General comments:

This paper aims to explore cross-correlations, trends and correlations to climate variables (total precipitation, global surface temperature anomalies and mean sea level pressure anomalies) at the Colorado river basin. The analysis are based on 17 stream gauges, and are conducted on a monthly and seasonal basis. Although the topic is indeed interesting, I feel that the paper has several weaknesses. First, it uses rather simple, descriptive methods, and presents a rather superficial, descriptive analyses.

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Second, it is also weak in the interpretations of the results. The impression I got is that there are hardly new findings deduced from thorough interpretations of analyses. Rather, commonly known statements about low flow drivers are concluded, from rather simple analyses. My overall impression is that the paper lacks the necessary depth concerning both, study design and style of presentation that would be necessary for being published. I therefor cannot recommend it for publication.

B Specific comments:

Abstract: The abstract is not very informative. Shorten the existing to less than the half, and add description of exact methods used, and the main results (as quantitative as possible).

Introduction: Lengthy, and not at the point what the reader would need to understand local hydrological setting. P 8782, second paragraph: “There is complexity and heterogeneity of low flow dynamics in a river basin...” The reader will know about low flow processes in general, so will hardly find any new information in this paragraph. However, the specific processes of the Colorado River should be presented here. I learned that between 85 and 90 percent of the Colorado River’s discharge originates in snowmelt, so we have a very specific hydrologic situation. Snow accumulation and delay of discharge will be important processes which determine the low flow regime and this should be explicitly assessed. For instance, by analysing the effect of previous winter precipitation on the summer low flows. Or the influence of summer drought in combination with precedent winter conditions... Same paragraph: “Therefore, we conjecture that climate is linked with low flow characteristics and those links vary for different locations because of variable physiographic parameters.” This has already been shown in a number of studies, for a summary statement of low flow driving processes see Chapter 8 of the PUB report, or Tallaksen & van Lanen (2004). REF: Runoff Prediction in Ungauged Basins: Synthesis across Processes, Places and Scale, edited by G. Bloeschl et al., pp. 163–189, Cambridge Univ. Press, New York. Next line: “This leads to the science questions: How heterogeneous are the variability of low flow con-

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ditions in the headwater basin of Colorado River? ...” This is not a consequence of what is said before. Introduction – last paragraph: You show the paper outline, but reference to a Methods Section is missing.

Section 3: Is not informative at all. Why only about low flow characteristics – the complete methods could be presented here. Last sentence, stating that analysing q7 low flows in seasons is largely non-existent in the literature is not true. There are numerous examples, e.g. Haslinger et al. 2014. REF: Haslinger, K., Koffler, D., Schöner, W. and Laaha, G.: Exploring the link between meteorological drought and streamflow: Effects of climate-catchment interaction, *Water Resour. Res.*, 50(3), 2468–2487, doi:10.1002/2013WR015051, 2014.

Section 4: Section 4.1. Here I learn the first time about the methods, what is too late in the paper.

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