

## ***Interactive comment on “Statistical downscaling of climate data to estimate streamflow in a semi-arid catchment” by S. Samadi et al.***

**Anonymous Referee #2**

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This paper presents an assessment of the effects of climate change on streamflow for a catchment in northern Iran. The authors have used two statistical downscaling methods to provide current and future climate estimates of daily temperature and precipitation time series. These have been used in the Ihares hydrologic model to assess changes in streamflow in the catchment. Unfortunately the paper provides very little in the way of a novel contribution to the literature. The downscaling methods used in the paper are routine as is the application of the downscaled time series to a rainfall-runoff model. The authors have discussed the importance of their work in that context of examining a semi-arid catchment but I see no evidence in the results or discussions of the problem that indicate how the downscaling is affected by the type of catchment to which it is applied. The paper may be of more interest if published

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in a regional journal where the results for this particular catchment may be useful for researchers/practioners/policy makers dealing with the Karkheh catchment.

I'm a bit concerned by some of the results in the paper - specifically Figures 11 and 12 which show almost identical sequencing for the annual streamflow series for the current climate and future climate even though the magnitudes are different. I don't see how you could get these results from downscaled future temperature and precipitation series. It doesn't seem right that the inter-annual variations are the same for the current climate and future climate.

My other major concern with the paper is the structure and written style which are not of an appropriate standard for publication in HESS. It would require extensive revision to turn the manuscript into a clear and concise paper. I would suggest that the authors have a native English speaker review the paper. Based on the current version of the paper, I can only recommend that the paper is rejected.

Specific comments

page 4873- it's not clear what you want the reader to take away from this list of previous studies on downscaling and hydrological assessments.

Page 4874 - I think both your proposed research questions are already answered in the literature. It's clear that downscaling can be used to look at climate effects on hydrological systems and also that the downscaling can be used to look at future climate effects on streamflow. This is why I struggle to see any novelty or contribution in this paper.

Page 4875-4876 - It's not clear why you've adopted SDSM and an ANN for your downscaling methods.

Page 4893 - you can't assume that the time sequencing of the GCM runs (for the current or future climate) is correct. They are not \*predictions\* of future change. So it isn't appropriate to report that the biggest changes will occur in 2042 for example. This

is why in most climate change impacts literature the results are aggregated into 20-30 year windows.

Figure 2 - I don't think this figure is necessary

Figure 5 and 6 - the changes that you are reporting for the future climate seem pretty small compared to the bias in the downscaled results for the current climate

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