

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

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Dear Reviewer, Many thanks for your kind revision on my paper, with respect to your commands, my feedbacks are as below: Two station-based downscaled approaches were applied to project future climate variables and their impacts on streamflow in a semi-arid catchment. Downscaling from global climate model (HadCM3) used to meteorological station sites in current (1961-1990) and future period (2040-2069) and then Results applied for modelling of climate change impacts on streamflow in the future. Results showed increasing and decreasing of annual temperature and precipitation using both SDSM and ANN models respectively (increase up to +0.58°C (+3.90%) and +0.48°C (+3.48%) by SDSM and ANN models). So this means climate will be warmer

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in the future not cooler! (However I hope you misunderstood here). The figure which you provided is exhibited the annual surface air temperature changes between 0-5°C as global scale (not at a climate / weather station). Our results is also showing a warmer climate in the future, however we should note that here we predicted future climate at a weather/climate station where can reasonably use for hydrology and water resource impacts. Abstract: Too much detail. Do not use high precision numbers (e.g. -2.82%) in a climate change context. Some Hydro-climate specialist revised this paper before submitting to this journal, they suggested indicating the rate of climate change by both deg and percent. Note: if Chief Editor is recommending to remove it then I can revise it accordingly. 4871, 24: The use of 'SDSM' as a general term is incorrect. I referred you to this paper (Vrac and Naveau, 2007a). 4872, 27: “voluminous” with 5 references and “few studies” with 8 references. I revised it TO: Recent scientific literature on the impact of climate variability and change on river flow is appropriate both in the context of observations and projections (see e.g. Wilby et al., 1997, 2002, 2003; Dibike and Coulibaly, 2006; Semenov, 2007). 4874, 11: How exactly does Samadi et al., 2010 relate to this study? I can refer you to one of my paper: Samadi, S. Z., Gummeneni Sagareswar, and Tajiki, M.: Comparison of General Circulation Models: Methodology for Selecting the Best GCM in Kermanshah Synoptic Station, Iran. Int. J. Global Warm., 2,347–365. 2010. 4875, 4: “few studies” is not true. I revised it. Some studies have specifically focused on assessing future streamflow due to the different statistical downscaling methods. 4876, 23: The model description (this entire chapter) is incomprehensible for outsiders. I revised it again, Can you please identify which part is incomprehensible, because I got most of this chapter from other references which I referred them in the text. 4878, 7: What is 'lhacres_v'? It means lhacres_ version 4879, 8: That statement is so general that it requires a reference. I added this reference. K.J. Beven.1989.Changing ideas in hydrology—the case of physically-based models Journal of Hydrology, 105 (1989), pp. 157–172 4879, 14: What are the 'calibration parameter thresholds'? It mostly means Stress Threshold (d). 4880, 2: 'independent and dependent data' is a somewhat awkward characterization. I revised it. o and M

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indexes are showed observed and model data respectively. 4881, 6: the part 'varying from ... in this month' does not make sense to me. This general information about the present climate of the study area and this means annual mean temperature of the study area is 14.6 C, varying from 1.1 C (minimum temperature) in February to 27.3 C (maximum temperature) in August. 4881, 16: How can one simulate streamflow of a 5793 m2 nival catchment with a single meteorological station? We needed to have daily climate data from 1961 for this research which had the least missing data (we wanted to reduce the uncertainty of observed data), so we found Kermanshah data is only the best choose for this research. 4882, 5ff: This should be moved to section 2. If Chief Editor recommends, then I can move it to chapter 2? 4882, 21ff: This statement is there twice. I revised it as following: The predictor variables should be (1) reliably simulated by the GCM under consideration, (2) readily available from (in this case, daily) archives of GCM output and (3) strongly correlated with the surface variable(s) of interest. It is also recommended that the candidate predictor suite contain variables describing atmospheric circulation, thickness, stability and moisture content. Large-scale relevant predictors are selected by using correlation analysis, partial correlation analysis and scatter plots in the SDSM and by sensitivity analysis in the ANN model as well. 4883, 12ff: This also needs to go to section 2. If Chief Editor recommends, then I can move it to chapter 2? 4883, 17: This paragraph should either be removed or, if not redundant, moved to section 2. If Chief Editor recommends, then I can remove or move it to chapter 2? 4883, 26: if no transformation is applied to temperature, is there one applied to precipitation, and if so, which? No transformation applied to precipitation. 4884, 5: How does one 'downscale equivalent regional predictor variables'? We selected 3 regional predictors for daily temperature and 4 predictors for daily precipitation according to their correlation and p value in SDSM approach and Sensitivity analysis in ANN modeling. 4884, 15ff: From Fig. 5 I conclude that the downscaling performance is quite bad. There seems to be hardly any skill left other than reproducing seasonality. Apparently the GCM was applied without any bias correction. Downscaling model (particularly SDSM) has a large stochastic component so we would not expect the model

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to replicate the exact daily sequences found in observations particularly in semi-arid catchment where data are too sparse. Also the level of predictability of site-level precipitation from regional-scale predictors is invariably low. Hence, the missing variance is replicated using the stochastic properties of the model. Likewise we got good correlation and least p_value in this research. However HadCM3 daily data was available for this study when we started this research. 4884, 20ff: This is a good example of the rather awkward flow of argument: 'The model shows increasing precipitation...' starts with describing the climate change signal, but then continues with 'HadCM3 model under the SDSM projections...', so that the reader is left to wonder what he has just read. Unfortunately, these kind of stumbling blocks are found across all paragraphs, which makes the paper really hard to review. We overly compared the stramflow changes by the relatively comparison of monthly streamflow in the current and future simulations. It is more appropriate to compare seasonal results which I have done it in the summery chapter. Seasonal model could be used in situations where data are too sparse, at the monthly level. For example, in a low incidences of precipitation in semi-arid area (Wilby and Dawson, 2007), is a typical case for this study. 4885, 2: What is an annual increase for autumn and winter? - Here the results are interpreted GCM (future) vs. OBS, neglecting the (absolutely crucial) information from GCM (present). But even when including GCM (present), temperature is decreasing. This doesn't make sense. I concluded annual and seasonal comparisons. Please kindly re-read this part. Thanks. Again Thanks you very much for your feedback. Best Regards, SAMADI

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