

Interactive comment on “Climate change impacts on hydroclimatic regimes and extremes over Andean basins in central Chile” by Deniz Bozkurt et al.

Anonymous Referee #1

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The manuscript is devoted to a study of climate change impacts on hydroclimatic regime in the Andean medium-scale basins. This regional study is important, but the applied methods have several serious deficiencies, and therefore the obtained results are questionable.

The study should be re-done, by substantially improving the model performance, and only after that applying climate scenarios for impact assessment.

(The second part of the manuscript describing simulated climate change impacts was not checked yet.)

1. The model evaluation and its satisfactory performance are prerequisites for impact

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assessment. However, it was not done properly in this study. The authors refer to another study, by Demaria et al. (2013), where "reasonable agreement of VIC model" for this region was shown (from the manuscript is not clear - was it done for one basin, or for all 4 basins). However, the paper by Demaria et al. used 12 GCMs from CMIP3 "to evaluate climate-attributed changes in the hydrology of the Mataquito river basin in central Chile, South America", and not all four catchments. That is why this reference is not fully eligible. Besides, it is not clear, whether the authors used the model setup and parametrization from the former study, or not.

2. The demonstrated results of model evaluation (Figs. 4, S2, S3) are not convincing: - discharge with the monthly time step: results not clear from the graphs, please add criteria of fit, e.g. NSE, PBIAS, RMSE, - seasonal dynamics (Fig. 4 and Fig. S3): runoff is notably overestimated for two catchments of four, ET is underestimated in all four, criteria of fit are missing. For the seasonal dynamics please use Pierson coef. of correlation and bias in standard deviation (see Gudmundsson et al., (2012). Such model evaluation in a regional-scale study with quite weak performance cannot serve as a basis for climate impact assessment, and should be improved.

3. The accepted spatial resolution of 0.25 degrees for catchments from 6.300 to 21.100 km² seems to be too rough for setting up the model and checking its performance. Besides, it is not clear from the manuscript, whether the sub-grid parametrization was done and how. Such a rough spatial resolution could be also a reason for poor model performance. It is recommended to apply a finer disaggregation scheme for the model calibration (despite that the GCM data for further application is available at 0.25 degrees resolution).

4. The ignored river routing could be also a reason for poor model performance. It is recommended to add it.

5. Description of how the bias-correction of GCMs was done is missing.

6. Language should be checked by/with a native speaker.

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