

## ***Interactive comment on “Intercomparison of different uncertainty sources in hydrological climate change projections for an alpine catchment (Clutha River, New Zealand)” by Andreas M. Jobst et al.***

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Review of “Intercomparison of different uncertainty sources in hydrological climate change projections for an alpine catchment (Clutha River, New Zealand)” by Jobst et al.

This paper is an exploration of the potential impacts of climate change on precipitation, snowpack and river flow in a sub-catchment of the Clutha River in New Zealand. The paper is well written and comprehensive, and I recommend it for publication after the

C1

minor revisions outlined below.

1. The start of the paper makes much of the large size and representativeness of the Clutha catchment. Given that the study is actually only carried out on a sub catchment (less than one quarter area) of the Clutha, which does not include any of the drier Otago climate described, I suggest this section be revised for relevance.
2. p5 L15 The authors should define in the text what they mean by the “observed regime” (i.e. monthly flow values averaged across all years) so that the readers are clear what is being evaluated. Similarly the meaning of “summer climate change signal” should be defined.
3. Section 2.2. The largest comment that I have on the paper is that there is insufficient information/discussion to convince the reader that the WaSim hydrology model does a good job of representing the catchment. Trust in this model is essential for the uncertainty analysis and conclusions of the paper. There is a brief mention of Nash Sutcliffe values at p4 L20, but the addition of a hydrograph plot showing modelled/observed values for some suitable period would make this more convincing. Especially given that Fig 3 shows significant under prediction of winter flow, and it is unclear what causes this problem. The range of simulations in the paper do not envelope the observed flow – so there is some uncertainty that is unaccounted for in the paper and I am left wondering where it is? Some additional discussion is warranted here, including discussion of potential uncertainty in hydrologic model parameters.
4. Section 2.3. Worth noting that the climate scenarios used for New Zealand have now been superseded by 6 RCM\*4 RCP Scenarios with CMIP-5 GCMs and a new bias correction that improves on quantile correction. See: <http://ccii.org.nz/wp-content/uploads/2016/10/RA1-Synthesis-report.pdf> For the next paper perhaps!
5. Fig 6. I don't understand the comment about different y-axes.
6. Fig 9. Please include an explanation of what a radar chart shows.

C2

7. p9 It would be useful to reference this paper:

Hendrikx, J., Hreinsson, E.Ö., Clark, M.P. and Mullan, A.B., 2012. The potential impact of climate change on seasonal snow in New Zealand: part I – an analysis using 12 GCMs. *Theoretical and Applied Climatology*, 110(4), pp.607-618.

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