Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2017-598-RC1, 2017

Hydrology and Earth System Sciences
Discussions

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.

Anonymous Referee #1

Received and published: 29 November 2017

> General comments:

The study evaluates different sources of uncertainty in hydrological projections with focus on the impact of the snow model. The experiments were carried out for a sub-catchment of the Clutha River, New Zealand. It is nicely demonstrated that the snow model contributes to the uncertainty of seasonal variations and high inter-annual variability. Despite that the choices of the global climate model, emission scenario, and bias correction method generally have more impact on the total uncertainty, the results show that the uncertainty linked to the snow model should not be neglected in alpine

catchments. It is a compact study with a good structure. The manuscript is clearly written, and I enjoyed reading it. Some minor comments might be considered to clarify a few parts. Including:

> Specific comments:

(1) Study area:

The studied area is called the "Clutha catchment" and is introduced as a "major" and "large-scale New Zealand catchment". But – according to Chapter 2.1 – the analysis was carried out only for the most north-western sub-catchment (outlet Chards Rd). To clarify the whole study, the authors should please rephrase those parts of the manuscript (see also technical corrections) which lead to the misunderstanding that the results represent the whole Clutha catchment.

(2) Catchment characteristics:

Please provide some information about i.e. elevation range, glacier extent, vegetation of the sub-catchment (outlet Chards Rd).

(3) Snow models:

The study focusses on snowmelt uncertainty for hydrological projections and should therefore give more details about the two types of snow models used here. For example, it would be helpful to know if all snow is gone after the summer (except for glaciers) or if snow accumulates from year to year.

(4) Baseline:

Please introduce the baseline model in "Data and methods". How has it been calibrated?

(5) Results – Baseline simulations:

Apart from the graphs, values of model efficiency would strengthen the results.

(6) The climate change signals:

Please clarify in the text (and legends) “temperature signal” / “change in Tmean”.

(7) Streamflow signal:

Some parts could better be included in the discussion.

> Technical corrections:

(8) P.3, l. 4 : makes it

(9) P.5, l. 13 : runoff regime

(10) P.6, l. 11 : Clutha catchment or north-western sub-catchment?

(11) P.6, l. 30 : most striking transformation for the 2090s

(12) P.7, l. 18 : Clutha catchment or north-western sub-catchment?

(13) P.8, l. 28 – 32 : see (7)

(14) Table 1 : provide units to the reader

(15) Figure 1b : increase the size of the coordinates and the catchment border

(16) Figure 1c : show the sub-catchments used for the calibration of the snow model

(17) Figure 3 : rescaling of the y-axis (2 to 6mm/d) and different colors for the single lines would help the reader

(18) Figure 5 : see point (6)

(19) Figure 8 : provide a legend for the different shapes

(20) Figure 9 : Please increase the size of the circles and/or change the colors since it is really hard to distinguish between the colors.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2017-

598, 2017.