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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Climate change impacts on the seasonality and generation processes of floods in catchments with mixed snowmelt/rainfall regimes: projections and uncertainties" *by* K. Vormoor et al.

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General Comments

This paper covers a highly important topic: The potential impacts of climate change on floods in regions with significant contributions of snowmelt. Given the economic relevance that floods and inundations have for society, reliable projections are required at the regional scale, e. g. for risk assessments or dimensioning hydraulic structures. While addressing this topic for selected regions of Norway, the diversity of the six catch-

ments studied is high enough to be comparable to other mountain regions of the world. With the inclusion of uncertainties, the authors also provide valuable insights into the model chain used. The paper is well-structured, written clearly, and relevant for a broad audience within the scope of HESS.

Specific Comments

* The one major point where more insight would have been desirable is the model's predictive skill under changed conditions – e. g. by applying a differential split-sample test (see Andréassian et al., 2011; Klemeš, 1986; Refsgaard and Henriksen, 2004) –, although the problem of time (in)stability of model parameters (Merz et al., 2011) is mentioned, and the uncertainties of the hydrological parameter sets are analysed. If not by extending the study with specific modelling experiments for the reference period 1961–1990, the topic should at least be addressed with a brief discussion.

* With reference to Gudmundsson et al. (2012), the authors consider non-parametric methods as most suitable for bias correction of precipitation (P6281, L26 ff.). In the following, they use these methods also for temperature correction – can they state something about the respective suitability?

* The approach to flood generating processes (FGP) is rather straightforward, but appropriate. Still, I suggest putting the approach into the context of more detailed methods, in particular the one described by Merz and Blöschl (2003).

* Since the extraction of extreme events is based on a Peak-Over-Threshold (POT) approach, did the authors consider POT-specific skill scores (e. g., Lamb, 1999; Viviroli et al., 2009) to evaluate their model?

* How was the catchment-specific normal flood duration (P6284, L 12) determined, i. e. how did the authors define beginning and end of a flood event? Does "normal" flood duration refer to "average" flood duration over all POT events sampled?

* I recommend adding a note on the recent study by Köplin et al. (2014) which treats a

very similar topic.

Minor Remarks

P6274, Abstract: I suggest adding the number of catchments studied and the daily time-step used.

P6274, L12: . . . in flood regimes *result* . . .

P6276, L25: Readability: . . . related to changes in the magnitude vs. *changes* in the frequency of events?

P6278, L16: Mention the time period also in the main text, not only in the Figure.

P6278, L24: The main text discusses *mean* elevation, Table 1 however lists *median* elevation.

P6280, L15: Maybe mention here already why the two time periods are almost (but not completely) identical.

P6288, L07: . . . least *pronounced*. . .

P6304, Figure 2: The ordinate's point of origin is not 0. This is perfectly OK, but I would mention it (either in the main text or in the caption) as it makes the differences between the various series appear larger.

ibid.: My interpretation of the NSEw value indicated here is that refers to series (i), and that it refers to the entire series (and not to the POT values which constitute the main content of the Figure). Consider clarifying this.

P6306, Figure 4: The vertical gridlines could be improved to aid the figure's interpretation, i. e. for easier comparison of the number of events within each group (box width). Also, since visually interpreting box width via square-root as number of events is not straightforward, I suggest adding a scale for box width.

ibid.: Point of origin for ordinate not 0: see above.

ibid.: How was the maximum value of the ordinate determined? It does not seem to correspond to the maximum values displayed (i. e., the whiskers).

P6307, Figure 5: Like for Figure 4, I suggest adding a scale for linking the pie diameter to the total number of events, as this is visually not straightforward.

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