

Interactive comment on “Quantifying projected changes in runoff variability and flow regimes of the Fraser River Basin, British Columbia” by Siraj UI Islam et al.

Anonymous Referee #3

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My first assessment was similar to that of the previous reviewers: what has been modelled for the Fraser River has been modelled and reported many times before: changes in mean flow, regime, snow-rain ratio, etc. Abstract and conclusion provide little new information and the international reader doesn't know what knowledge gain to transfer to other regions. In this context we should remember that HESS has the same requirements for special issue papers as for regular contributions. Manuscripts submitted as type 'research articles' should 'clearly advance our understanding', ms type 'cutting-edge-case study' needs to provide all data to serve others as testbed e.g. for models (from the HESS website). The current manuscript is perhaps in-between. A symptomatic indicator is the start of Section 5 "...overall question...how...precipitation phase

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and variability will modulate the FRB's runoff variability and flow regimes". Instead of this case study view, the science question should be how cold climate hydrology transitions to temperate climate hydrology - the FRM just happens to be considered the case that is used for illustration.

However, with the running model at hand and gauging from the responses given already there is potential to focus on a particular process or phenomenon that is not yet well understood and is still specific to cold regions transitioning to temperate climate. Some of the analyses on the variability and pulses etc. that are presented here stand out and may provide a nice starting point. They are the ones that could be made the sole focus, analysed more specifically and quantitatively to make this an original contribution specifically dealing with features of the transition from seasonal snow to more rainfall-runoff dominated flow dynamics. It would have been very interesting, for example, to see the analysis on the daily to weekly variability expanded more systematically to scale and quantities - e.g. will this cause more floods? The rather abstract mm values could be interpreted within exceedance probabilities or so to make sense of them. This should not only be discussed as a by-product but analysed and demonstrated. Such a focus would require a thorough analysis and discussion of how the downscaling and bias-correction affect the results - are they able to reproduce and project daily to weekly joint warm and moist events in winter such as for example the atmospheric rivers that are mentioned? I am a little skeptic how an analogues procedure will still be concurrent with the climate model projection trends at daily scale then. But this could be analysed.

Another option may indeed be to focus on key features of river flow variability that are important for salmon. In any case, a clear focus and message will be required that will make readers remember more than 'again a general shift from snow to more rain-dominated regime in winter'. The necessary revisions may be too substantial to be considered the same paper, but it could perhaps be resubmitted with a more focused title and content to the same Special Issue.

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Overall nice figures. Small comments: Figure 7 - good start of this and illustrative, but is the absolute amount of the variability (scale) really so relevant? For readers who don't know the river... Figure 6 - right panels should perhaps use another color scheme. I found the same to be confusing.

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