

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

### **Anonymous Referee #1**

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In this study, the authors examined the influence of future climate scenarios on streamflow in the Fraser River basin in British Columbia, Canada. They used statistically downscaled output from 21 GCMs for the RCP 8.5 emissions scenario, using one realization from each GCM. The authors used the VIC hydrologic model, which has been applied in previous studies to look at the effects of climate and land-cover change on streamflow. Key results are that the basin will transition from a snow-dominated regime to a more rain-dominated regime, and that flow variability will increase in winter, with an increase in the magnitude of cold-season peak flows.

Overall, the study appears to have been conducted in a competent manner using up-

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to-date approaches for generating the future climate scenarios. I expect that the results will be of great interest to the agencies involved in managing water-related resources and hazards in the Fraser basin. However, the manuscript reads like a regional case study, and I struggled to discern how this work contributes novel and significant knowledge in the context of the international readership of HESS. The shift from snow- to rain-dominated regimes in mountainous mid-latitude catchments has been identified in dozens, if not hundreds, of earlier climate-impact studies published in the international literature.

Based on descriptions of the model set-up in earlier work by the authors, I infer that land cover was held constant through the simulations. In reality, however, land-cover will evolve, particularly in response to widespread forest disturbance related to the Mountain Pine Beetle outbreak that began in the 1990s, and the salvage logging that followed. In addition, glacier retreat will undoubtedly influence the hydrology of some of the mountainous headwaters. An important question is the extent to which these land-cover changes would amplify or diminish the effects of climatic change.

On balance, I am not fundamentally opposed to the publication of this work, but I believe the authors need to make a more convincing case that this study represents an internationally significant contribution to the literature and is not just a regional case study. The authors need to highlight what is novel about this work when considered within the broader context of the international literature. I should note that I have not kept up with the climate-impacts literature for a few years, and I may not have the background to appreciate the novelty of this work without it being spelled out more explicitly.

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