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Interactive comment on "Projected impacts of climate change on hydropower potential in China" *by* Xingcai Liu et al.

Anonymous Referee #1

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Review summary:

This manuscript uses multiple global hydrological models driven by multiple climate model data for two representative concentration pathways (RCPs) to estimate China's hydropower generation potential and the projected future changes based on the river flow estimated by these hydrological models. The study finds that the estimated present-day gross hydropower potential of China is comparable to previous estimates, and suggests that the hydropower potential will decrease in the short-term but will increase by the late 21st century. The study also suggests that these changes vary significantly across different regions. The results presented are of high interest to the scientific community and beyond as the global society today is increasingly concerned about the use of carbon-intensive energy sources to meet the rising energy demands and hydropower could potentially play an important role in future energy mix toward

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reducing emissions and mitigating climate change, particularly in the rising economies such as China. Therefore, there is no doubt that the paper addresses an important topic but I feel that the study could be driven more by a central scientific finding with important socio-economic implications, rather than just presenting the changes in hydropower potential across different regions.

Specific comments:

(1) I suggest the authors to revise the introduction. The first paragraph doesn't read very well. Also, it is important to highlight the objectives of the study and the key questions addressed at the end of introduction.

(2) While the gross generation potential provides useful information on the potential future changes, it is not an indicator of actual power generation potential. So, it will be important to consider whether the available flows can be utilized to the fullest as well as various locational and technological constraints. The study doesn't provide any information on this aspect.

(3) Moreover, the analysis low flows would provide further insights on how the run-off-the-river hydropower generation capacity would be affected in the future. The annual mean and seasonal changes do not necessarily reflect such effects unless all runoff will be captured in reservoirs.

(4) In page 4, line 2 it is noted the reservoir module is similar to the one in van Vliet et al. (2016). What are the differences in the findings? It may be worthwhile highlighting the differences.

(5) Page 5, Line 25: Do all models use the same reservoir operation module?

(6) Page 6, Line 24: Change "great" to "high".

(7) Page 6, Line 12: Why and how were these 447 reservoirs selected?

(8) Page 7, Line 19: Expand this section or delete this line.

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(9) Section 3: I see that a lot of information is provided as supplementary material. For completeness, I suggest the authors to bring some of these tables to the manuscript itself.

(10) Page 7, Line 27: change "is" to "are"

(11) Page 12, Line 11: Change "great" to "large"

(12) What is the rationale behind the use of different alpha, beta, and K values? This needs to be discussed in relation to the implications on results.

(13) Evaporation from water retention behind large dams could increase largely under warmer future climate which can reduce runoff. Is this considered in the present study?

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