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Discussions

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Interactive comment on "Accelerated hydrological cycle over the Sanjiangyuan region induces more streamflow extremes at different global warming levels" *by* Peng Ji et al.
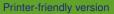
Anonymous Referee #1

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General Comments: The paper presents an analysis of the impacts of climate change and two ecological factors (CO_2 physiological forcing and land cover change) for the streamflow extremes of the Sanjiangyuan region. The methodology used and the conclusions drawn are sound, and the manuscript is well structured. However, some questions needed to be explained clearly and the English writing of this manuscript needs improvement.

Specific comments: Lin17 on page 2: '∼700' change to '700'

Lin40 on page 4: 'Global temperature has been increasing' change to 'Global temperature has increased'

Lin 61-62 on page 5: The statement by the authors that 'Thus, it is necessary to assess their combined impacts on the projection of streamflow extremes at different warming levels' is confusing. This sentence needs to be clarified with more evidence to prove the veracity of the statements. In addition, the entire paragraph can be rephrase.

Lin 63-66 on page 5: The reasoning behind the choice of the streamflow extremes over the Sanjiangyuan regions needs to be explained. If historical changes in climate and ecology have significantly altered the terrestrial hydrology over the regions, the terrestrial hydrology also need analysis. At the same time, the characteristics of basin of the headwaters of the Yellow river and Yangtze river should be provided, such as area and discharge.

Lin 67-72 on page 5: Does CO_2 physiological forcing has a significant influence on the terrestrial hydrology and its extremes in Sanjiangyuan or other high-land areas? It would be better to add some related literature.

Lin 91-94 on page 6: Streamflow observations are daily or monthly streamflow observations? It seem monthly streamflow in this work.

Lin 107-109 on page 7: In this study, 11 models in CMIP6 that can reproduce the increased precipitation over the Sanjiangyuan, were chosen for the analysis. Please give more explanation why only precipitation was considered. In addition, can those models correctly simulate the temperature, specific humidity, etc.?

Lin 143-148 on page 7: It is important to show the structure of the model and how it handles the various hydrological processes as mentioned in this part. Maybe you can insert a figure of the structure of the eco-hydrological model.

Lin 196-198 on page 11: 'the ensemble means of CMIP6 simulations can reproduce the historical increasing trends of temperature, precipitation, and LAI reasonably well.' As shown in the figure.1(d), the ensemble means of CMIP6 seem to hardly simulate the trend of the precipitation. Please give more explanations for this.

Lin 207-218 on page 11: In this paragraph, the author used different indices to measure the performance of models including ling-Gupta efficiencies, correlation coefficient, and root mean squared error (RMSE). A simple introduction of those indices can be added in section 2. In addition, the statistical results of the indices in this study can be presented in a table.

Lin 254-255 on page 13: No significant changes? As shown in Figure 4b, the frequency of wet extremes tends to increase by 25%. Please give more explanation.

Lin 261-264 on page 14: 'Moreover, the frequency of dry extremes tends to decrease significantly ..' It seem that the dry extremes over the Yangtze river also need further analysis at different global warming levels. Please clarify.

Lin 298-300 on page 15: Please clarify this sentence.

Lin 321-323 on page 11: A section on uncertainties should be included. Climate model and eco-hydrological model are sources of uncertainties. For example, according to Fig 2, the simulations tend to underestimate the high flow, which will inevitably affect the results.

Figure 1.(d) 'growthing season leaf area index' , while Line 483 'growing season leaf area index'?

Figure 4.(1) 'Simulated monthly streamflow climatology' change 'Simulated monthly streamflow'