

Earth Syst. Dynam. Discuss., referee comment RC2
<https://doi.org/10.5194/esd-2021-43-RC2>, 2021
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Comment on esd-2021-43

Anonymous Referee #2

Referee comment on "Climate change in the High Mountain Asia in CMIP6" by Mickaël Lalande et al., Earth Syst. Dynam. Discuss., <https://doi.org/10.5194/esd-2021-43-RC2>, 2021

Review of "Climate change in the High Mountain Asia in CMIP6" by Lalande et al.

General comments:

In this paper, the authors present their analyses of historical and future scenario simulations of CMIP6 models over High Mountain Asia (HMA). A major limitation of such studies in the region is the sparsity of long observational records. However, it is important to understand the regional climate change over HMA regions as the glaciers and snow over the region and how they change in the future will play a major role in regional hydrology. The authors attempt to understand the historical biases and how they are related to the historical and future trends in CMIP6 model simulations. The work is interesting, and the paper is well written. I have a few comments that need to be addressed before accepting the paper.

Specific comments:

- Introduction, L35: "As a large mid-tropospheric heat source..." The role of the Tibetan Plateau as a heat source for monsoon is a debated topic. Authors may refer to Boos and Kuang (2010; Dominant control of the South Asian monsoon by orographic insulation versus plateau heating. *Nature* 463, 218–222 (2010). <https://doi.org/10.1038/nature08707>)
- Taylor diagram is a useful tool in multi-model inter-comparison, especially when the models are compared with respect to the observations. I suggest that the authors use Taylor diagrams to compare temperature, precipitation, snow cover, etc. simulated by the models.
- Figure 6.: I suggest that the authors can try showing the agreement among the models in the sign of the trend in this figure. The hatching is often used to show statistically

significant trends and not otherwise. Authors may try using contours for not significant trends, shading for significant trends, and hatching for points where > 60 % of the models agree on the sign of the trend.

- Figure 9: "2081-2010" in the caption should be 2081-2100".