In this work, the authors present global climatic and hydrologic models to simulate the extremes and their impacts on the water-energy balance over California. The paper is well written and with high relevance to the hess journal. Please see some suggestions I kindly ask the authors to address:

1) The title of the paper is "Projecting the impacts of end of century climate extremes on the hydrology in California.". The title of the paper is a bit strong since it recommends that the whole hydrological-cycle has been modeled for the State of California and also for a time-window reaching the end of the century. Many authors struggle to simulate only one part of the hydrological-cycle of California (e.g., rainfall-runoff model, as for example in Yin et al., 2021; while many similar studies exist in literature). For such a promising title, a strong literature review should be performed to include similar studies for all hydrological-cycle variables and to show how the proposed model is more advanced.

2) There is a lack of calibration, validation, and verification of the proposed model. When a forecast is performed, one should use a part of the timeseries to calibrate-validate-verify their model, and then perform a forecast for the near future. I suggest the authors see/discuss this procedure concerning their own model. Also, the End of Century (EoC) forecast for such a large area is very optimistic in my opinion. Since climate dynamics is highly complex, I imagine that a forecast of only a few steps ahead is possible. If one is studying, for example, runoff on an annual scale, then after a couple of years, the variability of the forecast would be very wide, thus, reducing the credibility of the result (e.g., see Han et al., 2021). Also, the credibility of the outcome should depend on the available length of records. Here, the authors perform a forecast of 80 years ahead, which is double the length of records the authors use to construct the climatic and hydrologic model. I suggest to test/discuss how the variability/probability of the forecasts change as we move away from the present/historic data.

3) It is shown that due to long-range dependence effect to key hydrological-cycle processes (e.g., Dimitriadis et al., 2021) such as the ones the authors use, the variability of each climatic process would be even higher than, for example, under the assumption of zero auto- and cross- correlation (i.e., white noise). Please show/discuss whether the proposed model assumes a correlation function for the input variables. I also suggest the authors see/discuss whether their model forecasts also capture (and verify) the stochastic characteristics of the historical timeseries including the effects from climate change (such as marginal distribution function, auto-correlation function, etc.).

4) There are many equations in the text. Please consider creating a Table with all the inputs variables, output variables, boundary conditions, model assumptions, model limitations, simulation times, discretization method, etc., in order to help the readers identify the complexity/strength of the proposed model.

5) Please include more details on the water-energy balance equation and show whether is preserved in historical and forecasts. Also, have the authors included in the mass-energy balance analysis groundwater depletion in California (e.g., Badiuzzaman et al., 2017) and effects from sea level rise and ocean dynamics (e.g., Katsman et al., 2008)?

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