Natural Hazards and Earth System Sciences Discussions

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/nhess-2021-150-RC2, 2021

Comment on nhess-2021-150

Anonymous Referee #2

Referee comment on "Adaptation and application of the large LAERTES-EU regional climate model ensemble for modeling hydrological extremes: a pilot study for the Rhine basin" by Florian Ehmele et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-150-RC2, 2021

The manuscript by Ehmele et al. investigates the use of a large ensemble of RCM simulations instead of very long observational times series (of precipitation and river discharge) in estimation of return periods. This is very interesting, esp. because of the possibility to use a consistent meteorological dataset in forcing a hydrological model for discharge calculations. Still, I have questions which are detailed below.

The approach is successful only after bias correction of the RCM output as is shown in literature and by the authors. The bias correction of precipitation relies on a quantile method applying the Gamma distribution. Does this imply some statistical behavior of the return period derived? It follows quite nicely the observation-based return periods extrapolated assuming the Gamma distribution (in Fig. 7). Asked differently: is there an added value of LAERTES-EU in return period estimation as it must rely on bias-correction using observational data and some statistical assumption?

Why is there some precipitation bias in the Alpine area after bias correction (Fig. 2)?

The intensity-probability curve of the uncorrected RCM precipitation follows nicely the HYRAS near-observation curve and less the E-Obs curve in Fig. 3. If we assume that HYRAS is better in Germany than E-OBs, why can we not conclude that bias-correction deteriorates the probabilities?

LAERTES-EU downscales different MPI-ESM GCM versions and ensembles. Still, how important is the imprint of MPI-ESM on the representation on extremes? Can we expect substantially different return periods fi using a different GCM?

Line 8: What means “fixed” here?

Tab. 1: block 3: EMS -> ESM, block 4 is given two times, and why not using the new CMIP6 ensemble?