

***Interactive comment on “A large-scale, high-resolution hydrological model parameter dataset for climate change impact assessment for the conterminous United States” by A. A. Oubeidillah et al.***

**Anonymous Referee #4**

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General comments:

This is a rather technical paper on the implementation of hydrological simulations at a continental scale and at a daily time step. A number of model parameters are tuned in order to fit river discharge observations. The overall impression is that the optimization of the parameters is rather crude (only three parameter values are tested). From a scientific point of view, is there anything new? Is the impact of the progress in spatial resolution really meaningful? Moreover, the analysis of the results is rather superficial

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(only mean annual scores are considered). What about seasonal effects ? Finally, I found no indication in the manuscript on the availability of the simulations or of the parameter database resulting from this work.

Recommendation: Major revisions.

Particular comments:

- P. 9580, L. 11:  $3 * 3 = 9$
- P. 9580, L. 14: is the 4 km resolution grid of the PRISM atmospheric analysis the result of an interpolation or do we have actual observations of surface atmospheric variables every 4 km ?
- P. 9581, L. 16: is the 1 km resolution grid of the DAYMET atmospheric analysis the result of an interpolation or do we have actual observations of surface atmospheric variables every km ?
- P. 9582, L. 6: at the end of Sect. 2.2, it would be good to mention, for the sake of clarity, what is the objective for the final meteorological dataset (4 km, daily ?).
- P. 9582, L. 15-16: "commonly used soil characteristics", please detail.
- P. 9583, L. 22: LAI values available on a 8-day basis are degraded to a monthly basis. Why ? It seems that valuable information is lost.
- P. 9588, L. 23-25: Testing 3 parameter values sounds imprecise, especially for soil depth, a critical, very sensitive parameter in hydrological models.
- P. 9589, L. 18: " a one-layer elevation band was used", has the impact of this approximation been quantified ?
- P. 9589, L. 20 and below: "matrices" ? Do you mean "metrics" ?
- P. 9590 (Sect. 3): it seems that a presentation/discussion of the obtained spatial distribution of the model parameters is lacking.

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- P. 9590, L. 11: "NARR seems to be warmer", more than 10°C for the last percentiles of the distribution. This is more than "warmer" !
- P. 9591, L. 11-12: "the annual variability is not significant at the conterminous US scale". Such a conclusion may be valid considering average monthly values over all the US. This cannot be true at finer spatial/temporal scales.
- P. 9592, L. 27 (Fig. 7): "model performance" cannot be completely quantified using yearly means only
- P. 9593, L. 11 (Table 3): it should be noted that for the validation period, more than half of the basins present inadequate simulations (Nash < 0.5).
- P. 9612 (Fig. 9): Fig. 9c color scale is not readable, Fig. 9b is not precise enough (the 0.05 binning is a bit crude, use a log10 scale ?).

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