

Interactive comment on “A model–data intercomparison of simulated runoff in the contiguous United States: results from the North America Carbon Regional and Continental Interim-Synthesis” by C. R. Schwalm et al.

Anonymous Referee #1

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General comments

This paper presents an evaluation of runoff simulations across the US, comparing a number of datasets which is a valuable approach and contribution. This highlights the uncertainties inherent to the different products, and possible factors are discussed that may be responsible for these, at least in some regions (i.e. anthropogenic interventions). Here follows a list of (minor) recommendations for improvement.

Specific comments

C53

Page 1804 around line 15: You could also mention here that even the long-term averages of runoff exhibit a very large spread among global (hydrological) models, even if forced with the same climate dataset, as found by Haddeland et al. 2011, Journal of Hydrometeorology. Also, I think there have been studies comparing the hydrological simulations of TBMs that should be cited here (Gordon & Famiglietti comes to my mind, apart from papers on individual TBMs' performances).

It is somewhat problematic that the simulation protocol is not standardized, i.e. that each water model used data from another climate dataset, and that the study period differ among simulations (or is it 2001-2005 for all simulations?). I acknowledge that you use the opportunity of available simulations, but to increase transparency Table 1 could be extended by information on the simulation period, and some indicator of how particularly precipitation varies among the different products should be given (such as a map of mean precipitation and variance across NARR, CRU etc.). This should be a bit more extensively discussed, i.e. to what degree may the missing standardization influence the conclusions about differences among TBMs (which appears to be your focus).

Page 1806 line 21: “adjust the total precipitation...” needs more explanation; is this related to the normalization of runoff mentioned in line 1808 line 21?

Page 1811 last paragraph: Human management is here considered to be irrigation only, but what about land use change which usually changes runoff in the opposite direction? In general, irrigation does not happen in so many places in the US; you often stress human “management of the water cycle” but your results do not show a big effect, so I think that this discussion should be toned down somewhat – especially since there may be many more factors that you do not (and cannot) quantify here. This also refers to page 183 from line 20: It is true that there shouldn't be “right answers for the wrong reasons”, but here, it is not convincingly shown that not including water cycle management is the main reason for biases and model differences.

C54

The Conclusions should end with a statement on what the current findings mean for vegetation and carbon models in the context of NACP, relating back to the final paragraph of the Introduction. For instance, is there any indication that runoff differences are larger than differences in e.g. carbon fluxes, and again, is it the main recommendation to better represent human interventions into the water cycle?

Technical corrections

Table 1, LPJ-wsl model: I am aware of the LPJ model, but LPJ-wsl is unbeknownst to me, is this a version of LPJ and is there a reference?

Fig. 3: Why is the red scale only between 0 and -1 (1 colour code) while the blue scale is between 0 and 7 (7 different colour codes)? Please balance in case there is no particular reason.

Fig. 5: Better use lines (rather than dots) to plot the time series, which makes it much easier to follow interannual variations.

Fig. 6: Would be nice to also see maps for the individual TBMs (in an appendix).

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