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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Predicting future US water yield and ecosystem productivity by linking an ecohydrological model to WRF dynamically downscaled climate projections" *by* S. Sun et al.

Anonymous Referee #2

Received and published: 5 January 2016

General Comments: In general the paper is well written and the subject matter represents a useful contribution to the journal. However, in my opinion the manuscript needs some significant revisions to make it a valuable contribution to the scientific literature. The following are the key problems with the manuscript.

The representation of climate change is too simplistic to be useful from a policy guidance perspective. Specifically, the fact that the study only uses output from one GCM is problematic. There is a large degree of variability and uncertainty in GCM predictions particularly with respect to projections of precipitation patterns. Further, evidence to date suggests that inter-annual variability in precipitation is increasing with climate

change. Such changes in variability are far more important with respect to their potential impacts on ecosystem productivity, forest health and water flow than trends in 30-year means. The analysis would be much improved by including additional scenarios using different GCMs and different assumptions with respect to annual variation in precipitation patterns. Accordingly, if this approach were to be followed, the results should focus on more than just changes in 30-year means.

In addition, the authors need to provide more detail with respect to the dynamic downscaling method employed. This method is highlighted as being a key objective yet little information is provided beyond citing Gao et al. (2011). As mentioned above, it would be helpful if they provided more detail about how they are addressing inter-annual variation in precipitation patterns and temperature.

My recommendation is that the paper would only be acceptable if they were to adequately address these issues in a revised version.

Specific Comments:

The repetition of the phrase "82,773 12-digit HUC watersheds' throughout is tedious. I would suggest using a more descriptive name.

Not sure why the Authors used the SRES scenarios as they were generated for the 3rd Assessment Report. We are now on AR5 and have new emissions scenarios and associated GCM runs. The authors need to justify why these were used instead of the newer ones from AR5.

Technical Comments:

Page Line 3 70 In comparison to the period between 1986-2005, the . . .

3 78 During what period of time?

3 85 "greenness phenology" is vague, "timing of bud burst" or something more specific would be better.

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4 96 remove “the”

4 97 “was the warmest on record”

4 99 Remove “The”

4 103 remove “consequently”

4 111 remove both “the”

4 112 sentence is inverted, consider revising to start with “Tools are..”

5 130 “This approach..” instead of “this type of methods”

5 136 Need to come up with a more clear description of the resolution to be explored. 12 digit HUC watershed will be meaningless to most

5 138 how can you examine future changes in the past (1979-2007). Please clarify

5 139 “using dynamically downscaled climate projections from the WRF model”

5 140 “changes of Q, ET, and GPP for the study area by..”

5 147 “The research area includes the conterminous continental US with a representation of 82,773 . . .”

6 158 remove “The” from the start of the sentence

6 161 the percentages don’t provide much information eg. > 33% or < 33%

6 176 It makes more sense to describe the GCM you selected before going into details about downscaling. Also need to specify which emission scenarios were run with HadCM3 (only A2?)

7 192 It’s not clear what the authors mean by “six-hour HadCM3 input”

7 201 RCM is never defined

8 212 include

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10 279 Would make more sense to list the units going from large to small (12 digit HUC < WRR) 10 289 Section 3.1 could be removed. Nothing new here, just a summary of historical climate data. At least reduce in length.

10 293 (with the exception of the Pacific Northwest)

10 296 Sentence beginning with “Q with” needs a beginning statement

17 483 There are many better references for this

Figures

Fig. 5 Units in Fig 5 should be per month not per year.

Fig. 6 I don’t think this figure is useful. The same information is relayed more clearly in Figures 2 & 3.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 12703, 2015.