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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Sensitivity of future water availability projections to Global Climate Model, evapotranspiration estimation method, and greenhouse gas emission scenario" *by* S. Chang et al.

Anonymous Referee #1

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Summary

This is a well written and interesting paper that addresses a topical subject. Although there a few issues relating to structure & reference to related studies, I enjoyed reading this work and consider it generally suitable for publication in HESS, subject to the relatively minor issues mentioned below.

Major issues

1. Abstract, first sentence, and elsewhere. The authors need to clarify immediately that in this case, water availability refers to the meteorological water balance (i.e. P-PET).

Particularly in a hydrology-related journal such as HESS, water availability implies surface hydrological processes as well – in which case future water availability would depend on many other factors as well (e.g. irrigation abstractions, land use, water management strategies).

2. The Introduction section needs to better acknowledge that method-based PET uncertainty under climate change has been explored beyond just the meteorological water balance, to consider river flow as well (via hydrological models). Such studies include:

Bae, D.H., Jung, I.W. & Lettenmaier, D.P. 2011 Hydrologic uncertainties in climate change from IPCC AR4 GCM simulations of the Chungju Basin, Korea. Journal of Hydrology 401 90-105.

Kay, A.L. & Davies, H.N. 2008 Calculating potential evaporation from climate model data: A source of uncertainty for hydrological climate change impacts. Journal of Hydrology 358 221-239.

Koedyk, L.P. & Kingston, D.G. 2016, Potential evapotranspiration method influence on climate change impacts on river flow: a mid-latitude case study. Hydrology Research DOI: 10.2166/nh.2016.152.

Thompson, J.R., Green, A.J. & Kingston, D.G. 2014 Potential evapotranspiration-related uncertainty in climate change impacts on river flow: An assessment for the Mekong River basin. Journal of Hydrology 510 259-279.

3. The results and discussion are combined into a single section. Although I generally prefer these to be separated, the section is well written. At the very least, I would like to see the different aspects of the analysis divided into sub-sections, to help the reader follow the steps in the analysis.

4. P11, line 13: referring back to point 2 – yes, hydrological modelling studies that use only one PET method effectively ignore PET uncertainty, but there have been a series of studies that explicitly investigate this.

Minor/technical issues

5. According to the IPCC AR4 Glossary (http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_AnnexIV_FINAL.pdf), the acronym GCM stands for General Circulation Model. I suggest avoiding the term Global Climate Model and replacing with General Circulation Model.

6. P4, line 9: Priestley-Taylor is misspelt.

8. P5, line 27: Priestley-Taylor is a radiation based method – it only requires the slope of the vapour pressure curve (derived from temperature) and net radiation.

9. P6, line 3: RET is not defined in the paper. I presume RET means reference ET, but the commonly used abbreviation for this is ET0 (as used in the Table 1 caption).

10. P6. On line 3 precipitation is abbreviated to P; on line 5 it is abbreviated pr.

11. P7, line 11: spell out the number in this instance: nine, not 9 climate regions.

12. P10, line 15: typo: “sKingston”.

13. P11, line 11: the acronym GSA is undefined.

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