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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Comparison of uncertainty in multi-parameter and multi-model ensemble hydrologic analysis of climate change" *by* Younggu Her et al.

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Comments R1.1: p4 L16 please explain more why choosing the ABCD model and not a more process based model, as your investigation is aiming towards hydrological processes a process based simple hydrological model should be chosen Response to Comment R1.1: The objective of this study is to compare the impacts of climate model and hydrologic model parameter selections on the projections of hydrologic components. Considering the spatiotemporal extent (61 watersheds over the next 80 years) of hydrologic projections to be made for the study, we looked for a simulation model that is parsimonious while being capable of representing hydrologic components of interest, including direct runoff, soil water, evapotranspiration, and groundwater. The

ABCD model well satisfies our needs for this study, and the model has been successful in hydrological analyses such as Sankarasubramanian and Vogel (2002), Kirshen et al. (2005), and Martinez and Gupta (2010). For the purpose of clarification to this comment, we will add a description and reasoning on the model selection process in the section "2.3 Hydrologic model", which reads "The ABCD model was selected due to its parsimonious structure requiring only five parameters and allowing computationally affordable simulation of hydrologic components of interest including direct runoff, soil water, evapotranspiration, and groundwater". References Sankarasubramanian, A. and Vogel, R.M., 2002. Annual hydroclimatology of the United States. Water Resources Research, 38(6), WR000619.1-12. Kirshen, P., McCluskey, M., Vogel, R. and Strzepek, K., 2005. Global analysis of changes in water supply yields and costs under climate change: a case study in China. Climatic Change, 68(3), pp.303-330. Martinez, G.F. and Gupta, H.V., 2010. Toward improved identification of hydrological models: A diagnostic evaluation of the "abcd" monthly water balance model for the conterminous United States. Water Resources Research, 46(8), W08507.1-21.

Comments R1.2: p4 L23 Typo should be removed Response to Comment R1.2: The typo of "Speical" will be fixed to "Special".

Comments R1.3: p12 L31 enhance the section of possible uncertainties if hydrological models and ensemble prediction. for me it becomes not clear what has essential influences in your research and how you estimate that Response to Comment R1.3: As suggested, we will further describe how the proposed uncertainty analysis strategy helps the selection of climate models, which reads "The GCM uncertainty contributions quantified using the proposed analysis strategy would be a useful information and indicator to screen GCMs in creating improved ensemble hydrologic projections". In addition, the last sentence of the paragraph will be modified to "Some of the GCMs produced more uncertainty in the hydrologic projections than did others, but an investigation on the relationship between the characteristics of climate models and their contributions to the overall uncertainty was beyond of the scope of this

study." To further clarify the method used to estimate uncertainty, we will add the following sentence at the end of "2.5 Quantification of uncertainty in multi-parameter and multi-GCM ensemble": "The equation calculates the overall variation ranges (UˆQ (ãĂŰGCMãĂŮ_(âĹĂx âĹĹ S))) of climate variable and hydrologic component projections made using all climate models (âĹĂx âĹĹ S) then subtracts the variation ranges (UˆQ (ãĂŰGCMãĂŮ_(x âĹĽ S))) of the projections made excluding a specific climate model (x âĹĽ S) from the overall variation ranges to quantify the uncertainty contribution of the specific model." (See equations in an attached pdf file)

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/hess-2016-160/hess-2016-160-AC1-supplement.pdf

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