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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Uncertainty in runoff based on Global Climate Model precipitation and temperature data – Part 1: Assessment of Global Climate Models" *by* T. A. McMahon et al.

Anonymous Referee #2

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This manuscript and its companion paper attempts to quantify the of impact internal climate variability (as simulated by GCMs) on runoff risk assessments. This (the first paper) focus on selecting a subset of GCMs to focus on for further analysis in the companion paper.

I have three comments on Part 1 that the authors may want to address.

1) Typically one would see uncertainty in climate change simulation to arise from three types of uncertainty: a) emission scenario uncertainty, b) model structural uncertainty (between GCMs) and c) internal climate variability (as represented by running an en-

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semble using one GCM changing only the initial conditions). In this paper the authors only discuss the latter two sources, though it could well be the case that emission scenario is the one with the largest uncertainty (particularly in the far future and for variables with strong direct relationship to global warming, i.e. temperature). It would be useful for the authors to provide some details on all sources of uncertainty and maybe comment on what sources are more dominant at what time horisons (see e.g. papers cited at http://climate.ncas.ac.uk/research/uncertainty/ as a starting point).

2) In Part 1, the focus lies on selecting a sub-set of GCMs from the CMIP3 archive. However, given that the methods that the researchers are using are statistical, would it not be possible to conduct experiments on all possible GCMs bar those that are outright bad (e.g. use metrics to remove poor models rather than selecting a few good ones?). The reason for keeping more models in would be that a) you could well imagine that some models perform better in some regions than others but overall isn't one of the high scorers b) others have shown that models that do well in current climate do not necessarily agree on a future pathway, thus would you not want to be inclusive rather than exclusive? At the very least it would be good to see where the models you selected fall within the spectra of CMIP3 models, do they simulate an overall wet future/dry future/ relative to the CMIP3 ensemble?

3) The metrics is based on absolute data for rainfall, could this be an issue? All models have a bias but are we note more interested in the relative change? Since you bias correct before you use the data for the impact work, should bias really be equally important in selecting models as the other metrics used?

Finally just on a structural comment, the content in Appendix A doesn't really sit comfortably within this paper. It would probably sit better in Part 2.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 4531, 2014.