

Interactive comment on “Derivation of RCM-driven potential evapotranspiration for hydrological climate change impact analysis in Great Britain: a comparison of methods and associated uncertainty in future projections” by C. Prudhomme and J. Williamson

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Reply to comments from J-P Vidal.

We would like to thank the reviewer for his positive comments on the manuscript.

General comments

We have edited the manuscript to address the general comments as follow:

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- Present day comparison. We agree that MORECS is a PET model and that any conclusion regarding the best PET method for hydrological modelling will depend on the reference PET chosen. We have edited the conclusion accordingly.

- Bias correction. We agree this is an important issue in climate change impact assessment on hydrology. Our results showed that the simplification used (only bias-correcting temperature) produced realistic estimates of PET for present day. Based on this result we have made the assumption that this simplification would not introduce large physical inconsistencies in future projections. We have added a comment in the conclusion to emphasise that this is only an assumption.

- Sources of uncertainties. We are pleased that the reviewer agrees with the challenge posed by PET estimate in the context of climate change impact assessment on the hydrology. We have added a comment in the conclusion reminding that the results are valid for one particular Regional Climate Model variant and could be different for other climate model structures or variants.

Specific comments

- Recalibration of conceptual hydrological models. Some of the models used have a set of regionalised parameter, and are semi-distributed which makes the calibration more difficult than some lumped conceptual hydrological models. We have however toned down our statement.

- Other studies of PET and climate change. We thank the reviewer to having pointed out another study of climate change impact on the UK hydrology. We have added the suggested reference.

- Inclusion of results for all months. We originally restricted the number of months presented for brevity of the manuscript, but we agree that results for the whole year provide valuable information. We have therefore edited Table 3 and Fig. 1 to add results for all months, and changed the text in the results section to incorporate this

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new information.

- Time step of equations in supplementary material. This has been added.
- Formulation of MORECS equations: because MORECS estimates are only provided for GB, we believe that providing the equation is not necessary and that the reader could access the reference literature if they wanted more detail.
- Use of HadRM3-Q0 variables. They are listed in table 2 with a comment in the text.
- Equation to estimate radiation. A comment referring to table 1 of supplementary material has been added to the main manuscript.
- UKCP09 CF context. We have added a sentence to clarify.
- Fig2 and 3: Because the two other reviewers have commented that the original size of the maps was too small, we have increased the resolution of Fig.2 and Fig. 3 but restricted the maps to the four original months. We hope this is an acceptable compromise with the assessment of PET across space and time being shown through Fig. 1. We leave it to the editor to decide whether it is necessary to include extra maps showing the estimation of PET for GB for all months.

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