

Interactive comment on “Multimodel assessment of climate change-induced hydrologic impacts for a Mediterranean catchment” by Enrica Perra et al.

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We thank Reviewer 3 for her/his comments on our manuscript. In the following, the specific comments by Reviewer 3 are copied, followed by our replies to each point.

1) Lines 187-190: Since the climate models ensemble adopted in the study is limited to four members, I believe that a deeper discussion of the criteria adopted in this selection could be beneficial.

When assessing a climate model's skills, it is important to examine its ability to reproduce the annual averages and seasonal variability of precipitation and surface temperature. This is stated in the revised manuscript as follows (lines 210-214): “Deidda et al. (2013) analyzed the open-access outputs of fourteen GCM-RCM combinations from

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the ENSEMBLES project to identify those exhibiting the best performance in terms of representing the intra-annual variability of precipitation and temperature in the present climate for the seven study sites of the precursor European project. For each study site, the selected set of climate model data was validated using the E-OBS dataset, a high quality pan-European gridded observational dataset of daily precipitation and temperature (Haylock et al., 2008).”

2) I think that the paper could benefit from the inclusion of a sub-section (or Supplementary Material) in which the calibration methods, metrics, and observations adopted are shortly described for each hydrological model setup.

We have added at the end of Section 3.1 further details on the calibration and validation procedures for the five hydrological models (lines 192-208).

3) Since a robust calibration and validation of each hydrological model is required for addressing the research questions here proposed, I feel that the manuscript could benefit of a more detailed discussion of the differences between simulated and observed streamflow time series.

See the additional paragraph on model calibration mentioned above.

4) Section 4.3. In line with the previous comment, I also think that the performances of the different models in reproducing soil water content and ET should be presented (even in a concise way or as Supplementary Material).

The only model that used soil water content was WASIM, while tRIBS and SWAT were calibrated against discharge observations. See again the new paragraph on model calibration.

5) Finally, I feel that the discussion section could be improved trying to understand if the discrepancies between the models are epistemic in their nature (i.e., related to the different representation of the various hydrological processes) or may be related to other factors, like e.g. calibration methods and type of observational data used for

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evaluating model performances.

In our study epistemic differences are important since the models are structurally quite different from each other, representing critical processes (subsurface flow, evapotranspiration, etc) in very different ways and to varying levels of complexity. The possible contribution of these structural factors in explaining the performance results obtained is highlighted in the paper. The comparative performance between models will also depend on the response variables or observation data being examined, in part because of the structural differences just mentioned, but also for other reasons not explored in our study. The important issue of the role of calibration methods is also not explored, given that the five models were independently calibrated and that the paper is mainly focused on assessing possible hydrologic response impacts to climate change based on a multimodel platform.

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