

Interactive comment on “Potential evaporation estimation through an unstressed surface energy balance and its sensitivity to climate change” by A. Barella-Ortiz et al.

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We would like to thank the reviewers for their comments. There are 2 general issues which appear in them and are fundamental for understanding the paper. We would like to comment on them now before going into the details of the reviews:

1. When dealing with FAO's equation, there might be a misunderstanding between the potential evaporation and reference evaporation.

The FAO equation provides a reference evaporation. This is the evaporation for a reference crop with a height of 0.12 m, an albedo of 0.23 and a surface resistance

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of 70 s/m. In our study we use the potential evaporation underlying FAO's reference evaporation, which is obtained by setting the surface resistance to zero. The albedo and surface roughness are the only surface parameters that remain as they determine ETP. Even though it is said in the text that the surface resistance is set to zero (page 8206, line 24), we see the need to better explain it. Therefore, the manuscript will be modified in the Abstract, Introduction, Methodology and Summary and Conclusions sections, in order to clarify this point.

It has to be remarked that our study deals only with potential evaporation (ETP). This is clear for the LSM based methods (Bulk, Milly and USEB) and the empirical approximations (Hargreaves, Priestley – Taylor and Rohwer). Contrary to FAO's equation, these do not provide a reference evaporation and only compute potential evaporation.

2. The difference in the number of ETP methods used to study their estimates under current climate conditions and sensitivity to climate change

The paper aims at determining how the various methods differ in their estimated ETP trends for a warming climate. In order to be able to trust any of these predicted trends, the methods also need to agree on their estimates for the current climate conditions.

Thus we have used the full diversity of methods for the trend comparison. But for the current climate some of the estimates are known to be inaccurate or not applicable at the global scale. Thus they were not used in the first part of the study.

In the paper we explicitly state that the Bulk formula is known to overestimate ETP and thus its analysis for the current climate does not bring any new information (page 8203 lines 23 to 24).

For the empirical methods we explain that they contain site specific parameter (page 8207, lines 23 to 24) that would need to be calibrated on all grid points of the forcing data used. This is out of the scope of our study and thus was not done. As stated on page 8207, lines 25 to 27, we assume that these site specific parameters do not affect

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the sensitivity of these empirical methods.

We will state this more explicitly in the introduction of the revised manuscript.

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