

Interactive comment on “How over 100 years of climate variability may affect estimates of potential evaporation” by R. P. Bartholomeus et al.

Anonymous Referee #3

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This paper evaluates the sensitivity of the two step approach to calculate evaporation to the length of the calibration period and the chosen reference years. It compares four different two step evaporation methods with the Penman-Monteith method and compares these five methods with potential evaporation obtained with the process based SWAP model for four vegetation classes. The analysis shows that the empirical equations are highly sensitive to the length of the calibration period and the timing of the selected period and are therefore hard to transfer in time to use for example in climate impact assessments.

General comments: The paper is written very clearly, especially the introduction that provides a very good setting for the paper. To my opinion the description of methods and results misses some background information which I will further detail below. The

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lengthy dataset used is very valuable for this demonstration, yet this is also an ideal situation where all atmospheric variables are available. The authors could maybe elaborate a little more on what one could do when this information is not available, i.e. the Makkink and Priestley-Taylor methods seem to be doing relatively well. Moreover, this paper only discusses a Dutch site, can this information be transferred to other locations on the globe or would the results be different for other climate zones? The discussion of SPEI values is very good, interesting to see the influence of the calculated evaporation on a relevant indicator. Overall the only drawback is that the results and conclusions are not really novel information.

Specific comments:

- The paper provides figures and information of the newly calibrated two step approaches. It is unclear how the results compare to the un-calibrated equations with default values from literature.
- The same applies for the calibration of crop factors. How do these compare to crop factors from literature and how does the calculated evaporation compare to evaporation calculated using these standard values?
- The variables involved in calibration are very briefly mentioned in section 2.3 for the reader it is hard to see to which equation these apply. Maybe also mark the variables bold in the equations in Table 1.
- In the introduction the authors mention a multiplication factor of 1.1 – 1.3 if interception is involved – has this factor been considered in the remainder of the study? Could the (non)-use of this factor influence the results?
- Can the calibration or set-up of the SWAP model be considered stationary over time and does this influence the analysis?
- Section 4 is structured in a non-logical order. I would suggest to either add section 4.2 and 4.3 to the results section or move 4.1 to the end of section 4.

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Corrections:

- Both data sets and datasets are used
- Section 3.1 Deviation deceases should read Deviation decreases

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