Geoscientific Model Development Discussions

Geosci. Model Dev. Discuss., referee comment RC2
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Comment on gmd-2021-275

Anonymous Referee #2

Referee comment on "A new snow module improves predictions of the isotope-enabled MAIDENiso forest growth model" by Ignacio Hermoso de Mendoza et al., Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2021-275-RC2, 2021

General

This paper is about the modification of the MAIDENiso model to incorporate a new physical based snow module, including a pool of ice in each soil layer. The paper is well structured and written, considers earlier work quite well, and clearly shows improvements of hydrological simulations and stable oxygen isotopes in tree-ring cellulose.

The topic is interesting for the journal audience, however, the results and thus conclusions are solely based on a calibration strategy without including a validation of the calibrated model (also pointed out by Anonymous Referee #1). I also recommend, to include a validation period to check the calibrated model (the considered time series lengths are long enough to support this kind of analysis).

Specific comments:

- Page 4, lines 91-94: what type of mixing of soil water is incorporated in the model (for example between mobile and immobile soil water domains)?
- Page 8, line 226 and 229: the GPP data from stations seems quite far from the study sites (1023 km and 650 km), with the assumption that obtained parameters were similar at the studied sites. Could you please elaborate a bit more why this assumption is (probably) valid?
- Page 8, line 245: besides NSE, the Kling-Gupta efficiency (KGE), that is increasingly used as an alternative metric in hydrology, could provide useful additional information.
- Page 12, paragraph 4.1: for the Discussion, but also for the results section, a nice addition is to provide delta18O for the hydrological outputs of the model. Many studies have reported that groundwater or streamwater does not show an evaporation fractionation signal compared to (top) soil or trees. Adding this to the analysis would

make this study even more attractive to the more hydrological oriented readers of this journal.

- Page 12, paragraph 4.4: The current study could also be extended to sites that are snow dominated in the winter, but do have a Mediterranean climate, where trees are more dependent on water derived from snow melt, as this was not the case for the study sites as part of this study.