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Hydrology and Earth System Sciences Discussions

Interactive comment on "Sensitivity of the West African hydrological cycle in ORCHIDEE to infiltration processes" *by* T. d'Orgeval et al.

Anonymous Referee #2

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Major Remarks

The authors present an interesting study on the effect of different processes in the ORCHIDEE land surface model. The paper is well structured, and the English is generally adequate. I recommend acceptance of the manuscript for publication as only minor revisions are suggested.

In the paper, the sensitivity of the ORCHIDEE to infiltration processes is tested. If all sensitivities are very specific to ORCHIDEE, then the results would not really justify a publication. Well, in my opinion, this is not the case as several results of the present study seem to be of general importance. But such general results should be clearly

pointed out. And it also should become clear how much of the sensitivities found depend on the model structure of ORCHIDEE. The separation of ORCHIDEE specific and more generally applicable results should be made much clearer in the text. Currently the manuscript is partially oriented too much towards ORCHIDEE, thereby missing a broader scope in the implication of its results.

Is ORCHIDEE always newly calibrated for each sensitivity experiment? Calibration is only mentioned in the abstract and the conclusions. Please clarify for which experiments ORCHIDEE is calibrated, and whether this affects the results or not.

I was somewhat confused by the use of two different forcing datasets in the sections 3 and 4. I suggest including a common section on used data before Sect. 3 and 4 instead of a few sentences on data in each of these sections.

Minor Remarks

In the following suggestions for editorial corrections are marked in *Italic*.

Abstract – par. 1 – p. 2251 - line 2-4

It is written:
The aim of this article is to test the sensitivity of the Land Surface Model (LSM) ORCHIDEE . . . This aim sounds rather technical. I would prefer a rephrasing of the aim according to scientific questions to be addressed.

Sect. 1 – p. 2254 - line 27

. . . the *conclusions* in . . .

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Sect. 3 – p. 2262 - line 16

These two features . . .

Sect. 4.1 – p. 2263 - line 4-15

I don't understand why only 2*2 years are used for the validation. Shouldn't one use as much observations of adequate quality as possible for this purpose?

It is written in line 14-15:
. . . . does not allow for the identification of errors in the annual cycle. I don't understand this statement as information on the annual cycle is available from observations, thus its validation should possible.

Sect. 4.1 – p. 2263 - line 20-21

It is written:
. . . or if ORCHIDEE's error on the catchment area exceeds 20%.

Why this is occurring? Couldn't you correct this error before applying ORCHIDEE? Please clarify.

Sect. 4.3 – p. 2267 - line 14-15

. . . fraction *of more than 1.5% of the catchment area* for . . . .

Sect. 5 – p. 2269 - line 14

. . . similar to the *classification* of . . .

Sect. 5 – p. 2270 - line 8

. . . infiltration *has* a . . .

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Sect. 6 – p. 2273 - line 4

So, *the AMMA* project . . .

Table 6 caption – p. 2284 - line 3

It is written:
R mean total runoff (runoff plus discharge) . . . Runoff plus discharge does not make sense. Usually total runoff refers to the amount of water that may flow laterally off (i.e. before it is routed), and discharge refers to the amount of water after it is routed and that can be directly compared to measured streamflow.

Fig.4 – p. 2288

Why do you not just plot the anomaly relative to evapotranspiration from the control simulation? I don't understand this figure (without carefully reading the text).

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