

## ***Interactive comment on “Two soil hydrology formulations of ORCHIDEE (version Trunk.rev1311) tested for the Amazon basin” by M. Guimberteau et al.***

### **Anonymous Referee #1**

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This paper compares two versions of the ORCHIDEE land surface model over the Amazon basin, focusing on the hydrological and to phenological impacts. These two versions do not differs only by the use of two different soil hydrology, as the title would have us believe, but also in the parameterization of the river routing module (page 83, line 25-27). It is therefore difficult to clearly attribute the very very slight difference between the two versions only to soil module. In addition, this paper is very long and very descriptive. This article would be clearer if the sections 3 and 4 were reduced or if only the ORCHIDEE 11LAY was used. Finally, I regret that there is no direct comparison with time-series of observed discharge. Principally for all these reasons, I propose that this article should be in major review.

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### Major comments:

As already mentioned, the two versions of ORCHIDEE do not differs only by the use of two different soil hydrology, but also in the parameterization of the river routing module. It is very surprising that the river routing module depends on the soil hydrology and then requires a specific tuning for the both versions. Why that ? Is it physical ? I don't think, these two module should be independents. Please clarify this fact and use the same river routing module (and the same tuning) to compare your simulation. If not, then you can change the title and the history of your paper because to focus only on soil module difference will not be justify, especially for seasonal TWS results.

This remark also leads me to wonder if this comparison between two soil modules in ORCHIDEE is not vein. It is now well know that multi-layer schemes are superior to old bucket schemes. In addition, because this paper is very long and generally very descriptive, it looks more like a report than a scientific article with a clear message. This reprot is certainly very interesting for your colleagues in your laboratory, but is it the case for the entire community ? Perhaps your work would benefit to focus only on the ORCHIDEE 11LAY. This would be an effective way to shorten this work. Whatever your choice, this article would be clearer if the sections 3 and 4 were reduced.

Another major comment is that there is no comparison between observed and simulated river discharges while daily observations exist over this bassin in the HYBAM database (Gimberteau et al. 2012). For me, annual comparison is not sufficient and some skill scores, like nash criterion and/or deseasonalized root mean square error, should be used as in Gimberteau et al. (2012).

### Minor comments:

Page 76, Line 15: Are you sure that TWS plays an important role in regulating the global climate ? TWS is it more or equally important than the ocean? Me, I am not sure. This sentance is not adequate. TWS plays a non negligible role in modulating (and not in regulating) the climate in some regions but certainly not the global climate.

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Page 77, Lines 23-25 : The paper of De Rosnay et al. (2002) can be applied to ORCHIDEE, but is it universal ? Please add more references to this affirmation or delete it.

Page 77-78, Lines 28-1 : According to previous remarks, this question is not addressed in this paper because the routing module is not the same according to soil module. So improve your article or delete this sentence. Page 81, Line 26: The fact that ORCHIDEE uses only a soil depth of 2m appears not realistic. Observations of root depth over tropical forest shows that this depth is much close to 6-8m (Canadell et al., 1996: Maximum rooting depth of vegetation types at the global scale, *Oecologia*, 108, 583-595). Please discuss about that in your paper. If you choose to rewrite this article in focusing only on ORCHIDEE 11 LAY, it should be interesting to test one version of your model with such sol depth. If not, please discuss about that in your paper even if it is difficult to justify that roots of tropical forest stop to only 2m depth.

Table 6 : a Taylor diagram could be used instead of this table.

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Interactive comment on Geosci. Model Dev. Discuss., 7, 73, 2014.