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Discussions

Interactive comment on "Evaluation of root water uptake in the ISBA-A-gs land surface model using agricultural yield statistics over France" *by* N. Canal et al.

Anonymous Referee #1

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This study reports on large-scale simulations of yield as a function of varying root water uptake models. The water uptake model is varied by adding soil layers below the roots to allow capillary rise. The simulations were carried out with the ISBA-A-gs model.

This study is of high interest for readers of HESS, as prediction of yield gaps caused by limited water resources is essential for safe food production. However, the presentation of the model and the results are too specific and mainly understandable only for users of the ISBA-A-gs model. This diminishes significantly the value of this modelling study and the manuscript could be rewritten and partly restructured. Here are some suggestions that may make the manuscript interesting for a broader audience.

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It is not clear why the study was carried out: where the results of Ca12 not satisfying (L. 25-29 page 5423)? Please justify better this study.

One of the difficulties is the abundant use of abbreviations that make difficult to follow the text. I recommend to add a list of symbols.

Additionally a large part of the model is not explained and it is difficult to judge on the quality of the simulations and the differences among the tests. How is the transpiration calculated and related to the leaf area index? What is the differences between eq.(2) and eq.(3)? Please explain.

I was surprised to see the assumption of a stress factor for root water uptake proportional to the normalized volumetric water content (eq. 2 and 3). Transpiration is usually constant till a critical water content and then it decreases till the wilting point. A commonly reduction function is the one introduced by Feddes et al. (1978). It is also well known that when the upper soil layers dry out, the transpiration rate is sustained by increased water uptake in the lower layers (Jarvis 2011). Maybe it's for this reason that the simplest model (FR-2L) performs as well as DIF1 and 3, and better than DIF2 (Lines 27-28page 5433)? I suggest to critically discuss the assumption of the model.

Specific comments: L.23 Page 5424: remove the two ",". L.16-18 Page 5426: remove the part in the parenthesis. As it is the sentence is confusing. Additionally, are these results of the model, or are they assumptions. In the latter case, how are they implemented in the model? L.9 page 5430: write "capillary" instead of "capillarity"

Bibliography

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Jarvis, N.J. Simple physics-based models of compensatory plant water uptake: concepts and eco-hydrological consequences. Hydrol. Earth Syst. Sci., 15, 3431-3446, 2011

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