Hydrology and Earth System Sciences Discussions

Interactive comment on "A comprehensive approach to analyze discrepancies between land surface models and in-situ measurements: a case study over US and Illinois with SECHIBA forced by NLDAS" *by* M. Guimberteau et al.

Anonymous Referee #3

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This paper investigates improvements in the Land Surface Model SECHIBA and it evaluates the ability of the model to accurately reproduce soil moisture and water fluxes. The study is based on an extensive set of numerical experiments conducted over US and Illinois were suitable validation data sets are available. The paper should be improved to better present the methodology (parameterisation, experiments design and validation approach) before a possible publication in HESS.

1   General Comments

1) The manuscript should be carefully re-read by a native English speaking scientific colleague. Many sentences are vague and unclear and make reading of the manuscript very uneasy. Section 2 should be rewritten. A large number of experiments are conducted and it is important that the experiments design is clearly exposed to ensure the results are clearly understood.

2) Section 2.2.3 is particularly unclear and difficult to understand. The English writing should be improved and the text should be re-organised to define the terms before the equations. It is confusing to use q_v for intercepted water fluxes ($kg m^{-2} s^{-1}$), q_v' for intercepted water ($kg.m^{-2}$), qvmax in ($kg.m^{-2}$) maximum interception reservoir, while the letter "q" is already used for soil water ($kg m^{-2}$). Using a range of subreview.docscripts and superscripts is just adding to the confusion since it is not used consistently. Different letters should be used for interception reservoir, water fluxes and soil moisture reservoir. The use of the superscript "old" for T and E should be explained in the text.

3) Section 2.3: This section also lacks of clarity. It is supposed to describe the experimental design, but it starts with a description of the Global Soil Moisture data base. Text from P5050 line 13 to P5051 line16, should be in a separate section dedicated to the validation data bases and validation approach. In this section the experiments description is not complete and it leaves the reader confused about the experimental design. The complete description of SECH 6 for example is provided much later in section 3.2.2 when the results are presented.

Providing a table that summaries the experiments in Section 2.3 would greatly clarify the paper.

2 Specific comments

P5046, line 12: The link between the soil texture maps and the soil hydrology parameterisation is not clear in the paper. Is the soil texture used in SECHIBA? If not this sentence should be removed.

P 5046: what does "version HEAD 2007-2008" means? Why is the initial version of SECHIBA associated to a version number 2007-2008 while the first reference of SECHIBA cited in the paper is dated 1993?

P5050 L9: Acronyms of the four models Noah, VIC, Mosaic and SAC must be defined. Since results from these four models are presented some information and at least a reference should be given for each model.

3 Technical comments

P5053: 'observations'

Figure 1: Please indicate axis names. The caption is not clear it should be rewritten. For example: "Monthly mean (a) and monthly (b) precipitation (mm/d) for NLDAS (black line) and in situ data (dashed line), for 1997-1999.

Figure 6: put (a) and (b) above each sub-figure (used in the caption).

Figure 7: "1997-1999 mean LAI seasonal cycle simulated from SECH1 and SECH2, averaged for the 8 validation grid cells (see section 2.3).

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