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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Parameter optimisation for a better representation of drought by LSMs: inverse modelling vs. sequential data assimilation" *by* Hélène Dewaele et al.

Anonymous Referee #2

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This study uses satellite-derived low resolution Leaf Area Index (LAI) to estimate Soil Maximum Available Water Content (MaxAWC) with the overarching goal of improving representation of drought. The optimal value of MaxAWC is estimated by using two different methods (i) a simple inverse modelling technique and (ii) a Land Data Assimilation System (LDAS). LDAS results in better and more realistic estimates of MaxAWC than the simpler inverse modeling technique. The study fits very well within the scope of the journal HESS. It is technically sound and well structured. I do have a few comments though which need to be addressed before I can recommend publication.

Major comment:

(1) As of now the authors validate the drought representation of the model by com-

paring the annual maximum above-ground biomass (Bag) and straw cereal grain yield (GY) values only. In my opinion for better drought representation, it is also important to see how the selection of MaxAWC influences drought representation in terms of water balance (ET, Runoff, Soil Moisture). This would also provide an independent criterion for model evaluation for drought representation. The authors may want to use observations such as streamflow, satellite based SM or ET for the evaluation purposes.

(2) The introduction section needs to be improved by ensuring a better connection between the focus of a paragraph with the one following it. For example, as of now the paragraph two (starting on line 5 page 2) seems out of place. The paragraphs before and after it discuss the influence of MaxAWC and this one discusses the influence of climate variability. Likewise, the discussion of data assimilation starting on line 30 page 2, also seems to be out of place.

Minor comments: (1) Line 23 (page 1): Not just due to climate change, but in the context of natural climate variability too. (2) Line 2 (page 2): Almost all regions are affected by drought, it's just some are more sensitive/vulnerable to drought risks exposure than the others. (3) Page 2, Line 5: "Assigning agricultural. . .. . ." rephrase this sentence for better clarity, please. (4) Page 2 Line 8: "Li et al. (2010) showed. . .." Please provide an estimate of the scales here. (5) Page 2 Line 12: Please change this sentence to: "Soil characteristic influence the vegetation response to. . ...". (6) Page 2 line 12: Please change "In the model benchmarking study of Eitzinger et al. (2004)," to "In a model benchmarking study, Etizinger et al., (2004) . . .." (7) Page 2, Line 14: Please change "differing" to "that differ". (8) Page 2, Line 17: Please change "taking into account soil type" to "taking into account of soil type". (9) Page 8, Line 2, "Of" is missing in "relevance the". (10) Page 8, Line 11: Please change "consists in" to "consists of". (11) Caption of Figure 4: "Dark" should be "black".

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