

Interactive comment on “Quantification of the impact of hydrology on agricultural production as a result of too dry, too wet or too saline conditions” by M. J. D. Hack-ten Broeke et al.

Anonymous Referee #1

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The quantitative assessment of management and hydrological measures on agricultural production is a very interesting topic for end users. Process-oriented modelling is a widely applied measure for such assessments. However, the transfer of model results to end users is a challenge due to the complex interactions in the soil-plant-atmosphere system. The authors describe a new way using meta-modelling as an easy-to-use tool for different end user groups to assess quantitatively the effects under current and future climate conditions. The approach has a sound scientific background and the objectives are clearly defined. The authors provide some examples of application to assess effects on crop production at different scales which documents the range of applicability of the method. For the assessment three main mechanisms of crop yield

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reduction were considered: drought, saline conditions and water logging induced oxygen shortage. Although the model approach for saline conditions is described for the process-oriented model there are no results presented for this stress condition. The paper is generally well written and clearly structured. The title and abstract are informative. In the introduction some references about the importance of the three stress conditions in NL, EU and world wide would be desirable (e.g., Jones et al., 2012 EEA State of Soil in Europe). In section 3.1 the SWAP-WOFOST model has been “evaluated” with five experimental data sets. From the paper it is not clear if the model was calibrated for each location separately or if the model was just applied using standardized values. This would be good to know to judge if the mean errors are acceptable. I suggest to add few sentences relating the mean errors to other findings in the literature for calibrated or “blind test” model applications (e.g. published model intercomparisons), respectively. In this section a few comments which stresses became relevant at each site would also be helpful, since the given reference (Kroes et al. 2015) is only available in Dutch. The section 3.3 would require a little more text, since presently the text more or less repeats the figure captions. For Fig. 9 some explanations regarding the area without colors would be useful. The position of the well could be added to the figure as well. Finally, it would be helpful to provide some comments about the reasons of the yield diversity within the circle (e.g. related to soil properties etc.) and how the groundwater distance varies across the circle. The reference of “Feddes et al., 1978” (page 5, line 19) needs to be added to the reference list. Please correct the name of “van Genuchten” on page 9, line 25, and add a corresponding reference here and in the list. On page 11, line 4: the term “development” is misleading, please replace with “growth”. In Fig. 6 the legend covers the first part of the upper graph. Since the legend is the same as in the graph below, it could be removed.

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