Ref: hess-2020-146
Title: Combined Simulation and Optimization Framework for Irrigation Scheduling in Agriculture Fields
Journal: Hydrology and Earth System Science

Response to Reviewer #2 Comments
####Authors' response in Blue####

Review on hess-2020-146 "Combined Simulation and Optimization Framework for Irrigation Scheduling in Agriculture Fields"

We are grateful to you for the time and effort spent on the review of our manuscript. Our detail response and comments raised by you is attached. We believe our responses and the revisions made to the manuscript fully address the issues raised by the review. These revisions have helped clarify some aspects of our work and improve its interpretation.

GENERAL COMMENTS

The authors present an interesting and generally well-written manuscript about optimizing irrigation scheduling by combining 1-dimensional simulation of soil water movement and crop yield optimization. The research question is relevant. The methods used for simulation are well established. The results are interesting and promising for further research building upon the described methods.

SPECIFIC COMMENTS

Line 59: The publication of Hanson et al. (1977) might be too old as a reference to 'recent developments.

We changed the reference by (Line 60):

"Eigenberg, R. A., Doran, J. W., Nienaber, J. A., Ferguson, R. B. and Woodbury, B. L.: Electrical conducivity monitoring of soil condition and available n with animal manure and a cover crop, Agric. Ecosyst. Environ., 88, 183–193, doi:10.1016/S0167-8809(01)00256-0, 2002."

Line 74: You write "several authors" – are there more sources than Srivastava and Yeh (1991)?

We added two more references (Line 75):

Martínez-Gimeno, M. A., Jiménez-Bello, M. A., Lidón, A., Manzano, J., Badal, E., Pérez-Pérez, J. G., Bonet, L., Intrigliolo, D. S. and Esteban, A.: Mandarin irrigation scheduling by means of frequency domain reflectometry soil moisture monitoring, Agric. Water Manag., 235(March), 106151, doi:10.1016/j.agwat.2020.106151, 2020.

Jones, H. G.: Irrigation scheduling: Advantages and pitfalls of plant-based methods, J. Exp. Bot., 55(407), 2427–2436, doi:10.1093/jxb/erh213, 2004.

Line 109: Please provide the units of qi at an earlier point than line 210.

We added the units [l·m⁻²·h⁻¹] (Line 114).

Line 147: The unit of h is not consistent with the rest of Richards' equation. Usually, the pressure head is given in units of length. Throughout the manuscript, please try to better distinguish 'pressure' from 'pressure heads.

We used pressure head denomination with hPa units because we followed the HYDRUS User Manual (Simunek and Sejna, 2014) indications. Based on our experience, soil pressure head in irrigation scheduling is usually expressed with hPa or kPa instead of units of length. That is the reason why we decided to express the pressure head in hPa.

Line 148: L is used as symbol for 'length unit' as well as for 'liter' (as in line 210, 287) in the manuscript. Please try to remove this ambiguity.

Thanks, we corrected this mistake and L is defined as length unit and l as liter volume of water units.

Line 256: Can you briefly indicate the method used for calibration?

We used a manual calibration. We added the information in the manuscript (Line 274).

Line 261: What is the distance between the study site and the nearest available weather station?

Thanks, we added the information and we modified the sentence as follows (Line 279):

"*Meteorological parameters were downloaded from the nearest available weather station, located at 15 kms from the site, to…*"

Line 335/336: 'Guarantee' is a strong word – maybe use a weaker one. I agree that the "optimal irrigation method" seems to ensure better conditions than the "traditional method".

Thanks, we changed "guarantee" by "assumed" (Line 364).

Line 401: The word 'factor' is misleading – maybe better write "increase with respect to the traditional method by 7%". Moreover: Are 7% significant, considering the uncertainties involved?
Agreed, we changed the sentence.

TECHNICAL COMMENTS
Line 33: promote
Agreed. (Line 33)

Line 34: designed
Agreed. (Line 34)

Line 77: Campbell (1982)
Agreed. (Line 78)

Line 83: stakeholders
Agreed. (Line 86)

Line 84/85: capable of assessing
Agreed. (Line 87)

Line 85: Siyal and Skaggs (2009)
Agreed. (Line 87)

Line 90: later
Agreed. (Line 92)

Line 90: irrigation scheduling
Agreed. (Line 90)

Line 97: as follows
Agreed. (Line 101)

Line 98: apply
Agreed. (Line 102)

Line 99/100: capable of simulating
Agreed. (Line 103)

Line 102: use
Agreed. (Line 105)

Line 128: Units of C_y should be [EUR.t-1].
Agreed. (Line131)

Line 169: the models presented
Agreed. (Line 173)

Line 289: constrained
Agreed. (Line 315)

Line 328/329: capable of increasing
Agreed. (Line 367)

Line 353: an increase
Agreed. (Line 380)

Line 376: It should be Fig. 10.
Agreed. (Line 404)

Line 381: It should be a panel of Fig. 10.
Agreed. (Line 409)

Line 414: through the root zone instead of
Agreed. (Line 448)

Line 482: Reference seems to be incomplete/broken.
Agreed

Table 2: Usually, the unit of α is [m-1] or [cm-1]. Units of Ks should be [cm.d-1].
Please be consistent with the symbol for the third shape parameter i/I.
Agreed

Table 4: Willmott
Agreed

Table 5: For consistency, maybe better use 'L' as symbol for 'liter'
Finally, we used L as length unit and l for liter unit.