Hydrol. Earth Syst. Sci. Discuss., 12, C3171–C3173, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C3171/2015/

Hydrology and Earth System Sciences
Open Access
Discussions

Interactive comment on "Green and blue water footprint reduction in irrigated agriculture: effect of irrigation techniques, irrigation strategies and mulching" *by* A. D. Chukalla et al.

Anonymous Referee #1

Received and published: 20 August 2015

General comments

The topic of the paper fits the scope of the journal and is relevant and interesting. The manuscript is well written and clearly structured. The methodology is solid and very well described. The authors made an extraordinary effort to explain the results clearly and in detail, not forgetting to extract general conclusions from them. It is very valuable that the authors were transparent in the limitations of the methodology.

However, I have two major comments and some smaller ones that might help to improve the analysis/manuscript:

1) The current interest on irrigation techniques and strategies is mainly (but not only) due to present and future water scarcity (including trade-offs with other uses). I found it a pity that the study does not refer to this in any sense. Why not trying? E.g. by looking how much more production could be achieved with the saved water. Or upscaling somehow the results for a whole country/region and assessing how much "extra" water per capita would be available for households if the right combination of mulching and irrigation techniques and strategies is chosen. I think you are one little step away from having some nice and very relevant implications of your results; it would be a pity not to try to get something in that direction. In any case, it would be good to add a subsection in the discussion referring to how appropriate is your model for studies under climate change, i.e. do you think that the relationships you discover would hold under altered climate and CO2 concentrations?

2) I found the differentiation between organic and synthetic mulching a bit problematic. As you mentioned, your model does not account for the soil biochemistry. But in reality organic mulching frequently changes this aspect, supplying extra carbon, increasing fertility, decreasing requirements of fertilizer inputs, etc. At the end these changes affect also percolation, runoff, evaporation, and thus, water intake by plants and transpiration. If I understood right, the difference between synthetic and organic mulching in your study affects only soil evaporation by means of an arbitrary parameter. I found this too simplistic and am afraid that this could affect the validity of your results regarding the mulching type. Isn't there any possibility of adding a bit of complexity to this?

Other comments:

3) Some parts of the methods need clarification:

a. Section 2.1. Please better explain how AQUACROP calculates yields.

b. Section 2.2. Please better explain how capillary rise works in the model.

HESSD

12, C3171–C3173, 2015

c. Section 2.3.1. How is interception loss (evaporation from leaves) accounted for in the case of Sprinkler?

d. Section 2.3.1 Does your model account for the influence of row spacing (planting density) in soil evaporation?

e. "It uses the conservative behaviour of biomass water productivity (WP) to simulate biomass and yield responses of crops". What does that mean?

f. P6954 L7. Please mention the source you used for adopting those values for fm.

4) I suggest adding a glossary of abbreviations.

5) Abstract: mention the countries and the crops that you will analyse.

6) Abstract: "Reduction in overall consumptive WF always goes together with an increasing ratio of green to blue WF". It is a very nice result, you may want to add that this is because of a reduction in BWFP (theoretically it could be also the result of an increase in GWF).

7) Fig. 2, you may want to split that in different panels, the range of the y-variable is very (maybe too) broad.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 6945, 2015.