Hydrology and Earth System Sciences Discussions

Interactive comment on "Influence of feedbacks from simulated crop growth on integrated regional hydrologic simulations under climate scenarios" *by* P. E. V. van Walsum

Anonymous Referee #4

Received and published: 3 January 2012

1. General comments

The manuscript by P. van Walsum addresses the important issue of performing simulations with coupled hydrologic and crop-growth modeling systems. In the study, the hydrologic modeling system SIMGRO is extended by incorporating the crop-growth model WOFOST. While SIMGRO provides information on altitude, day temperature, radiation, evaporation and maximum rooting depth, WOFOST calculates root zone depth, soil cover, LAI, and other crop characteristics. The simulations were performed under future climate scenarios for a study region in the Netherlands, with analyses for grass-

land and arable land. As highlighted in the paper, the coupled models project earlier development of LAI for both land classes, and short growth season and reduction of yearly potential transpiration for potatoes on arable land. In my view, the paper is well structured, presents methods and assumptions that are valid, provides good description of experiments and calculations, and gives proper credit to previous related work.

2. Specific comments

2.1 I believe that one assumption used in the paper might be presented with a different vision. In the Introduction, the author asserts that: "In hydrologic models, vegetation characteristics are usually defined by "exogenous" parameters that are based on averages of historic data; a fixed dependency on the days of a year is assumed. It means that feedbacks from the vegetation to the hydrologic system are then neglected. The resulting limitations of this approach have become more poignant with the advent of climate change impact modelling using scenarios (...)". In my view, large spatial- and temporal-scale relations between climate and vegetation characteristcs are valid for broad-scale analyses, and feedbacks between vegetation and hydrology are incorporated in the datasets in the long term. The scale for the analyses to be performed may however be a major issue in modeling these systems. For example, because intra-annual variability, the use of long-term climate-vegetation relations for short-term ($\sim$1 yr) studies will not be appropriate for most cases.

2.2 For clarity, it is important to show or describe in the paper the function by Feddes et al. 1978 mentioned on page 10158, lines 1-3.

2.3 It is also important to list in the paper the reasons given by De Bruin et al. 1987 mentioned on page 10158, line 7.

2.4 It would improve the paper if specific simulations results and variables mentioned in page 10161 lines 1-5 be compared with observed data.

2.5 Any support (from observations) for the results mentioned on lines 11-14 of page

10186 ?

2.6 The point raised in the sentence "One of the limitations in achieving that goal is ..." (lines 11-12 on page 10171) is interesting. I believe it is important to further discuss it in the paper. For example, what would be the potential impact on the results?

2.7 I suggest to include a summary from "Comparison to other studies" in the Conclusions section.

3. Technical corrections

3.1 On page 10162 line 21, correct "CO2-assimulation" to CO2-assimilation.

3.2 May remove word "of" in the sentence "... between of static/dynamic ..." in line 19 of page 10168.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 10151, 2011.

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