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Discussions

Interactive comment on "Crop-specific seasonal estimates of irrigation water demand in South Asia" *by* H. Biemans et al.

Anonymous Referee #2

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Dear Editor and Authors,

I have read the draft article by Biemans et al. closely. My comments are summarized below. Hope some of them are useful for making decision and further revisions.

General comments

The authors applied the LPJmL global hydrological model to four nations in South Asia. They added some new numerical schemes and data to express multiple cropping in LPJmL and quantified irrigation water consumption and withdrawal by season (the wet season called Kharif and the dry season called Rabi), type of crops, and source of water (surface or groundwater). They found the seasonality in irrigation water demand and abstraction is remarkable in the region.

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In the Asian Monsoon region, farmers drastically change the type of crops and application of irrigation for periodical wet and dry seasons. Although the practice is common for millennia in Asia, neither systematic datasets nor comprehensive macro-scale hydrological models are yet available, particularly on water use. The work presented here would potentially contribute to this field.

I found the draft is well prepared, but for further clarity, additional information is required at some points. The details are commented below.

Specific comments

Page 7850 Line 28 “Normal onset dates of the monsoon over South Asia are determined by the India Meteorological Department (IMD)...”: What is the primary factor to determine the onset? Is the factor (e.g. rainfall) consistent between WFDEI and IMD? In other words, is the discrepancy of data between WFDEI and IMD negligible? Another point is that the onset varies year by year. Did the authors use the year-specific onset date in the simulation period or fix throughout the period? If latter is the case, what would be the potential impacts to the results?

Page 7851 Line 21 “represented by three parameters: maximum leaf-area index, maximum harvest index and a parameter that scales leaf-level biomass production to plot level”: What is “plot level”? What does “scale” mean? What kind of “management” is represented by this parameter? Similarly, perhaps it might be informative for readers to note that the maximum LAI and harvest index represent cropping density and adoption of high-yield crop species respectively.

Page 7852 Line 5 “We used 5 year average yield statistics, for 2003-2004 till 2007-2008”: First, the calibration period seems overlapping with the simulation period (page 7848 line 24). If this is the case, note clearly that calibration and validation periods are same in this study, particularly where the performance of simulated crop yield is discussed. Second, “5 year average yield” indicates that the model performance on inter-annual variation of crop yield (i.e. the crop yield response to change in meteo-

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rological condition) was not validated. Without this, it should be difficult to justify the reliability of comparison of crop yield between with and without irrigation (e.g. Page 7855 Line 17).

Page 7856 Line 26 “Use of residual soil moisture from one season to the other was not incorporated in this way”: Another possible factor is abstraction of river water in upstream: simulations separating Kharif/Rabi exclude this factor, hence the estimated surface water availability could be overestimated.

Figure 5: Would it be possible to add a same graph for water source? It would be helpful (and hopefully interesting) to visualize the seasonal march of dominant water source from surface water to groundwater and vice versa.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7843, 2015.