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Hydrology and Earth System Sciences Discussions

Interactive comment on "Assessment of spatial and temporal patterns of green and blue water flows in inland river basins in Northwest China" *by* C. F. Zang et al.

Anonymous Referee #2

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General comments:

The study applied the SWAT model for the simulation of green and blue water flows in the Heihe river basin in the arid region in China. The model was run for the 'natural conditions', i.e., without consideration of the human interventions, e.g. land use, irrigation, field management, etc. The authors stated that the 'results are helpful for formulating reasonable water policies to improve water resources management in the river basin'. As the authors acknowledged at the end, however, the water resources distribution in time and space has been significantly altered by human activities in the basin. This has

led to significant deviations of the green and blue water flows and transformations from the natural conditions in the basin. Hence the 'natural status' simulated by the model would not reflect the reality. Given this situation, solely providing a simulation with a straightforward application of a well-established and widely used hydrological model in the Heihe river basin may have limited scientific and practical value as it neither advances the understanding of the hydrological process on the river basin scale, nor helps formulate the 'reality-based' measures to improve the water management of the basin. Having said that, I do think that the paper has a good potential for improvement by taking into consideration the 'reality' in the assessment. For this reason, I strongly suggest the authors to use this current study as the base, and go further to incorporate the human activities, particularly land use and irrigation, into the model simulation. By doing so, the extent of the impact of human activities on the hydrological cycle and the green and blue water flows can be quantitatively investigated on the spatial and temporal dimensions. The results would then have good policy relevance and are useful for the water planners to formulate the appropriate measures to meet the challenges.

Specific comments:

In the introduction, the authors need to state the major research gaps in the literature relating to their study. This is important to warrant a need for conducting such a study. It is particularly important to address the scientific significance of the study as the paper is seeking for publication in the reputable international scientific journal.

The objectives of the study relating to the research gaps need to be explicitly stated in the introduction.

Page 3333, Figure 3. The maps in the first and second rows are both total water flows, only the units are different. The authors should clearly indicate the differences by providing a sub-heading in Figure 3. Besides, the geographical units of the maps needs to be indicated clearly in the text and maps. I presume that the maps in the first row are HRU based and those in the second row are at the sub-basin level. If so, I think

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the legends should be better designed to reflect the contents. As it is, the meaning of the values in the legends is not clear. Furthermore, I assume that the values provided in the maps in the first and second rows are the annual average over the specified periods, and the maps in the third row are the changes between the starting and the end years. All these need to be clarified to allow the understanding of Figure 3.

Page 3323, lines 18-20. The authors pointed out the variations of green water flows in different sub-basins and gave reasons as that the upstream sub-basins have high precipitation and relatively low temperature and evapotranspiration, and the downstream sub-basins have the opposite features. However, I do not see much meaning to comment on the differences in the total quantity of the green water flows in the individual sub-basins from these aspects, when the sizes of the sub-basins vary largely which are the major reasons for the variations in the total quantity of green water flows across sub-basins.

Page 3321, lines 6-7. The authors stated 'Interestingly, the agreement between simulation results and observations was even better for the validation period than the calibration period'. The authors should give explanation on this better agreement. Is it just a coincidence? If so, it is not really interesting.

In a number of places, the authors referred to Monireh et al. (2009). But it should be Faramazi et al. (2009).

The entire manuscript should be checked for grammatical clarity.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 3311, 2012.