

Interactive comment on “Impacts of human activities and climate variability on green and blue water flows in the Heihe River Basin in Northwest China” by C. Zang et al.

Anonymous Referee #4

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The SWAT model was used to assess the impacts of human activities and climatic variability on green and blue water flows in the Heihe River basin. Although the main content and the title talk about climatic variability, the introduction section generally focuses on global climate change. Without careful attribution study, the climatic variability is hardly related to climate change. The introduction must be rewritten to fit the title and content. The experiment design seems problematic. The difference of climate condition between two 3-year periods (i.e. 2004–2006 and 1984–1986) was referred as climate variability. As a 3-year period is rather short, it is possible some year happens to be wet or dry. The difference is neither a reasonable index of climate variability nor

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the change of climate variability in the period of 1986-2005. The climate variability and its temporal scale must be defined in the manuscript. Overall, the climate or hydrology variability (inter-annual or inter-3-year) is very large and it is not surprising that the variability could be much larger than the impact of human activities. The proportion of human activities impact to long-term change is of great interest, but the comparison between human activities impact and dry-wet difference is less meaningful.

The authors quote the definition of blue water from Falkenmark (1995). Water in river, lakes, aquifers and wetlands are defined as blue water. They have also mentioned that water in aquifers (groundwater) provides over 90% in the downstream regions and human activities have changed distribution of lakes. However, the authors did not provide the information how they revised the SWAT model to handle the influences of human activities on groundwater and lakes. As the information is the key to understand the model results, it must be clarified in the method section.

One unsupported result is that land use change (mainly urbanization) would cause more blue water flow. This result fully relies on the model however the model is not validated by any observations. Urban area is also a possible water consumption area (e.g. domestic water use, green infrastructure). How the urban land cover was treated and validated in the modified SWAT simulations?

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