

# ***Interactive comment on “Water requirements of the oasis in the middle Heihe River Basin, China: Trends and causes” by Xingran Liu and Yanjun Shen***

## **Anonymous Referee #1**

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The authors have presented us their nice work on calculating the water requirements over the selected basin (middle Heihe River). The changes in the water requirement per area or in total amount over different crops and land types are discussed very clearly. The contribution from different factors (climate, planting area changes and changes in land structure) was also analyzed with a linear method. Therefore this paper is a very good case study and it is well written as well. However, the study is not suitable for ESD due to the limited contribution to large scale researches.

Strong points: 1. The regional water requirement calculation is reliable based on the detailed data they have collected.

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2. Attributing the increasing water requirement to different factors is a novel attempt to use the attribution methods.

I have no questions about the methods and results for the water requirement calculation or the attribution part.

Weak points: 1. I cannot see the points of comparing the simulation water requirement with the actual ET simulated by other models. Firstly, other models don't have the detailed data the authors have collected. Secondly, in an arid region, the actual ET is limited by the water available thus it can be largely different from the potential ET. Moreover, the reference data is too short to provide solid results, for example, in Figure 9, there are only three years and a few months samples.

2. A few questions on the water balance analysis. (1) In Table 3, what do you mean the "runoff for mainstream of the middle Heihe River"? Is it the river discharge flowing into the middle river basin (measured at Yingluo Gorge)? However, the value is not the same as you gave in the study area description. (2) In L106, you mentioned that there is more groundwater withdrawal in the basin recently. How much is the groundwater withdrawal compared to the surface water and to the water requirement? It will affect your water balance analysis in section 3.4 and Figure 10. (3) Is it possible to remove the water balance analysis since it is very close to the main topic.

3. The study area is very small with a catchment area of 8600 km<sup>2</sup>. It facilitates the water requirement calculation but it cannot reveal the general situation for large scales (i.e. basins, continents or globe), while it is the aim of journal ESD.

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