# Authors' Response to Comments by Anonymous Referee #3

**General Comments:**

The authors present an interesting case study of groundwater dynamics for the Tarim River Basin of Western China. The article is well written. The major concerns I have are that the article does not present some of the raw water balance data and reports only mean estimates of water balance terms with no uncertainty. It is difficult to trust conclusions drawn by the study without properly estimating uncertainty with the mass balance method used in the manuscript. With an inclusion of some of the raw data and basic uncertainty analysis I feel the article would be suitable for publication.

**Response:**

*Thank you for the comments. The raw data have been presented in Section 4.1. Also, the error analysis has been carried out and the results are shown in a separate section (Section 4.5).*

**Specific Comments:**

1. P1779 L22. An uncertainty of exchange flux should be reported with the mean.

**Response:**

*The error analysis has been carried out and the results are shown in a separate section (Section 4.5).*

2. P1786 L17. I am not sure what a phi20 evaporation pan is. Please explain more or provide reference.

**Response:**

*Φ20 evaporation pan is the circular evaporation pan with the diameter of 20 cm. It is widely used in Asia to determine the quantity of evaporation at a given location (Liu et al., 2009; Xu et al., 2006). More explanations about Φ20 evaporation pan have been added to the Section 3.1.*

3. P1786 L19. Please provide some detail about the soils? Type, %sand, %silt, %clay, bulk density, porosity, soil hydraulic parameters, etc. Difficult to assess rate of fluxes through soils without a qualitative or quantitative description.

**Response:**

*Thank you for the suggestion. Soil information has been presented in Section 3.1. The major soil type in experimental field is silt loam, and the sand, silt and clay contents are 32.8%, 62.4%, and 4.8%, respectively. The soil porosity is 0.42 which was directly determined in the laboratory using the known volume of undisturbed soil columns collected in the experimental field.*

4. P1787 L22. So what is the energy balance closure then, 10%? Please provide a graph documenting seasonal changes in LE, H, RN, G. Could also include monthly estimates of average diurnal cycle of energy balance terms. Hard to gain insight about how system works without seeing some basic data.

**Response:**

*The figure of energy closure has been presented in this paper (Fig. 5). Figures of seasonal changes in LE, H, $R_n$ and G have also been shown in Section 4.1 (Fig. 4).*

5. P1788 L5-10. Were the high changes in pore water conductivity due to brackish irrigation water accounted for in the estimates of volumetric water content using TDR methods? Please also present some of the raw data and report both the mean and uncertainty of the changes in water content with depth. Soil moisture is highly variable in space, how representative are the two profiles you instrumented to the larger study area? Difficult to trust EF value without first justifying changes in soil water content represent the entire field instead of 1 point in the 3.48 ha field.

**Response:**

*We agree with the referee that the soil moisture is highly variable in space. We compared the soil water content results measured by different methods (Fig. A). The figure shows that the SWC results by soil sensors and gravimetric method agree well. Moreover, in this study, we only considered the change of soil water storage ( $\Delta S$ ) during water balance analysis. Therefore, although there will be huge spatial heterogeneity in SWC, the SWC change at each measured location is relatively consistent and reliable. Moreover, the error analysis including SWC uncertainties has also been shown in Section 4.5.*

*In this study, the fresh water from the canals was used for irrigation rather than brackish water from the groundwater wells. Therefore, the effects of brackish water have not been considered.*

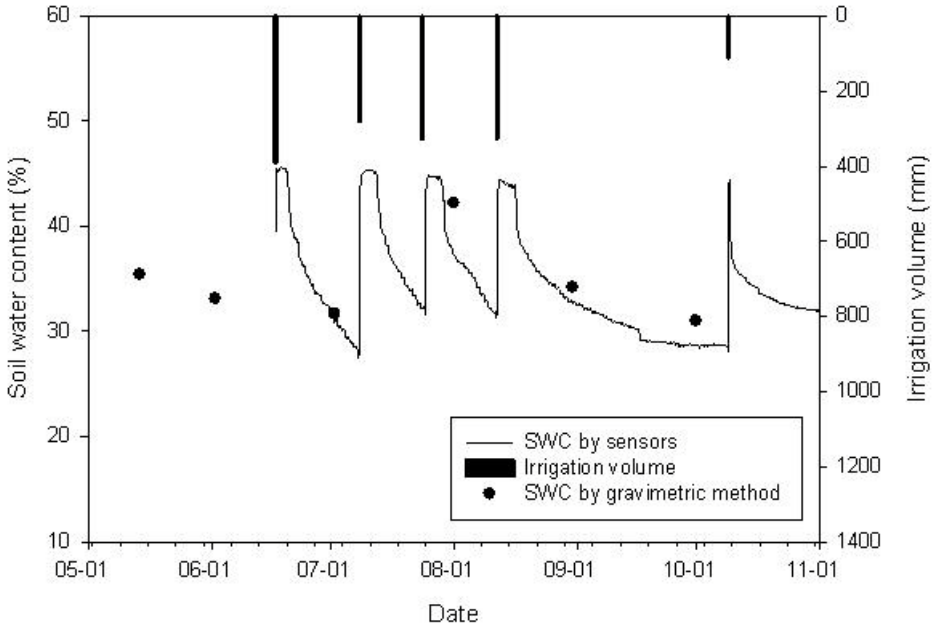


*Fig.A Soil water content measured by different methods in 2011*

6. P1790 L21. Porosity is not reported in manuscript, please provide with more description about the soil types.

**Response:**

*Thanks for the suggestion. Soil information has been added to the Section 3.1. The major soil type in experimental field is silt loam, and the contents of sand, silt and clay are 32.8%, 62.4%, and 4.8%, respectively. The soil porosity is*

*0.42 which was directly determined in the laboratory using the known volume of undisturbed soil columns collected in the experimental field.*

7. P1793 L10. “soil water storage”.

**Response:**

*Revised according to suggestions.*

8. P1799 L9. “which was common after previous flood irrigation events”.

**Response:**

*Revised according to suggestions.*

9. P1800 L18. “salinization is problematic”.

**Response:**

*Revised according to suggestions.*

10. Table 2. Please provide estimates of uncertainty as well.

**Response:**

*The error analysis has been carried out and the results are shown in a separate section (Section 4.5).*

*Reference*

*Liu, C., and Zeng, Y.: Changes of pan evaporation in the recent 40 years in the Yellow River Basin, Water international, 29(4), 510-516, 2004.*

*Xu, C., Gong, L., Jiang, T., Chen, D., and Singh, V. P.: Analysis of spatial distribution and temporal trend of reference evapotranspiration and pan evaporation in Changjiang (Yangtze River) catchment, Journal of Hydrology, 327(1), 81-93, 2006.*