

## ***Interactive comment on “Downstream ecosystem responses to middle reach regulation of river discharge in the Heihe River Basin, China” by Y. Zhao et al.***

**Y. Zhao et al.**

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Referee #1's comments 1: I'm not familiar with the Landsat images processing, but I think it should also be like some kind of model. I want to know if some calibration is done for the vegetation coverage using filed observations or measurements. How about the uncertainty of the calculation results?

Authors' response: Thanks for this valuable comment. A similar comment was given by Referee #2. We carried out several straight-forward processing when we prepared the Landsat: converting the original Digital Numbers into reflectance at top of atmosphere and then calibrating it into surface reflectance through an atmospheric correction. The algorithms applied during these procedures were based on either the pa-

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rameters provided within the metadata of the image or well-established methods in this field. We don't need to validate the band reflectance at this stage, but we do need to validate the parameters derived from the Landsat images. In the submitted version of the manuscript, we discussed our ways of validating the classification maps and FVC results, including comparing with high resolution satellite images (for validating classification maps) and checking FVC values in desert areas. In addition, as our response to Reviewer #2 shows, we will use existing land use and land cover maps to validate our results and use field measured FVC values to evaluate the accuracy of our FVC estimations. We will revise our manuscript accordingly.

Referee #1's comments 2: The authors found that none of hydrological variables has significant influence on vegetation distribution, but regional temperature has significant negative effects. Does this mean that the regional evapotranspiration has great effect? Why you did not analysis the ET variations?

Authors' response: Thanks for this comment. We agree with Referee #1 that increasing temperature indicated higher ET levels. However, landscape in areas away from river channel in the arid Ejina region was dominated with desert and Gobi, and annual ET in Ejina was extremely low, usually less than 50 mm (Lian et al., 2015), some studies even found that daily ET in Ejina was less than 1 mm/d in its surrounding areas during wet seasons (Luo et al., 2012). Only in cropping and natural vegetation regions show slight higher ET levels. Streamflow and streamflow recharged groundwater were the major water sources supporting vegetation development, therefore, we focused on these datasets and didn't analyze the impacts of ET variations.

Additional reference:

Luo, X., Wang, K., Jiang, H., Sun, J. and Zhu, Q. Estimation of land surface evapotranspiration over the Heihe River basin based on the revised three-temperature model, *Hydrological Processes*, 26, 1263-1269, 2012.

Lian, J. and Huang, M. Evapotranspiration Estimation for an Oasis Area in the Heihe

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Referee #1's comments 3: Some specific comments: (listed below (in bold))

Line 1 on Page 4: Where is the West Juyan Lake and East Juyan Lake, should be marked in Figure 1.

Authors' response: We will update figure 1 with the location of the West and East Juyan Lake.

Line 1 on Page 8: "(-0.33 to 0)", is it correct?

Authors' response: (-0.33 to 0) was a mistake in the current version, we will correct it as noted.

Line 13 on Page 13: As no groundwater depth and groundwater flow information was presented, the authors should provide more solid evidence that groundwater depth is disturbed only in <300 m area away from the rivers. How you determined the number of 300 m? If the river water discharge to groundwater, groundwater depth would increase away from the river.

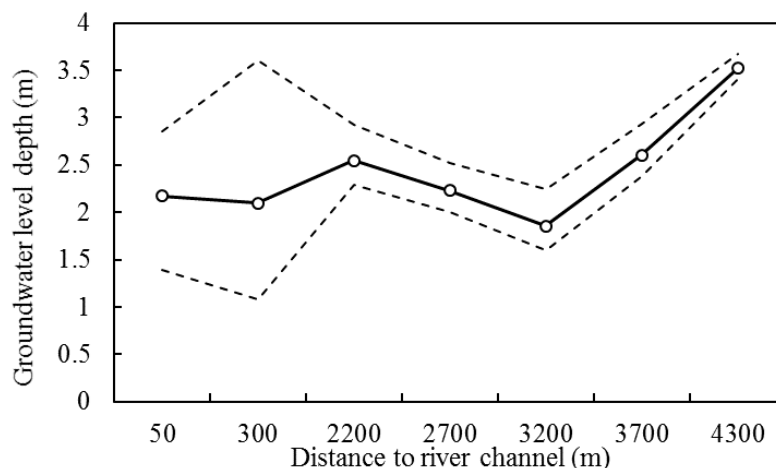
Authors' response: We collected groundwater observation data from the WestDC database in which groundwater levels were measured at 50 m, 300 m, 2,200 m, 2,700 m, 3,200 m and 4,300 m away from the river channel along a transection located in the study area as shown in the following figure (Fig.1). We will include this figure as well as some details of the sampling points (latitude and longitude, elevation, sampling periods.) in our revised manuscript.

Figures 4 and 5: The text size of the legend is too small.

Authors' response: we will modify the figures when we revise the manuscript.

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**Fig. 1.** Groundwater variations along a transection in Ejina Oasis. Solid line with circles indicates mean levels, dash lines indicate minimum and maximum water levels.

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