

## ***Interactive comment on “Vegetation response to upstream water yield in the Heihe river by time series analysis of MODIS data” by L. Jia et al.***

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Comments on “Vegetation response to upstream water yield in the Heihe River by time series analysis of MODIS data” by Jia et al., HESSD-7-4177-21-010

General comments:

This paper investigated the vegetation dynamics of the Ejina Oasis in Heihe basin, China, and revealed the correlation between the vegetation conditions and streamflow of Heihe River. It is an interesting study because the Ejina oasis is suffering serious ecological and environmental problems. However, I still have several concerns need to be stressed accordingly. Although the HANTS algorithm has been widely used for reconstructing NDVI time series, its performance still needs to be evaluated in the present

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study. Examples for comparing original and reconstructed NDVI series should be presented in the results. In addition, as presented in the introduction part (Page 4181, 1st para), other methods for NDVI reconstruction, such as Savitzky-Golay filtering, MVI, least-squares linear regression etc., have several limitations. Results for comparing these methods with HANTS is needed to show its superiority. The Temporal-similarity-statistical (TSS) method was developed to deal with the NDVI data with large gaps. Similar with the previous problem, validation of the proposed method is needed. My suggestion is using the cloud-free NDVI data, and then adding manual gaps. Since the NDVI was used to describe the vegetation conditions in this paper, it is crucial to derive accurate measurements of NDVI data. More discussion about the reliability of the MODIS-NDVI product should be included. For example, how much of the data was cloud-contaminated? To what extent the reconstructed NDVI is reliable? Discussion about the relationships among vegetation conditions, precipitation, groundwater, and streamflow should be clarified. Which is the essential factor determining the vegetation condition? The paper only tested the correlation between NDVI and streamflow. How about NDVI and precipitation? NDVI and groundwater? It would be helpful to make the paper significant.

Specific comments: 1. Throughout the paper, use of “ground water” and “groundwater” should be unified. 2. Page 4188, line 1. Which is the target year,  $a_{ki}$ , or  $A_{kj}$  in Eq. (2)? 3. Page 4188, line 8: ‘The year having . . . . .’. It was noted that CV is corresponding the two years,  $i$  and  $j$  in Eq. (2). “The year” refers to which one? 4. Page 4188, line 21 and 23, HIS should be HIS. 5. Page 4191, line 13, Zhengyixa should be Zhengyixia. 6. Page 4191, line 23, Eq. (2) should be Eq. (5). 7. Page 4194, line 2 and 5,  $p$ -value of the regression should be provided. 8. Page 4197, line 15: “The implication . . . . .”. More explanation about the implication is needed.

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