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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Mapping long-term evapotranspiration losses in the catchment of the shrinking Lake Poopó" *by* Juan Torres-Batlló et al.

Anonymous Referee #2

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This manuscript uses remotely sensed data products to help evaluate the role of evapotranspiration (ET) in the recession of Lake Poopo. The trends of precipitation, ET, and the normalized difference vegetation index (NDVI) were carefully analyzed, and it was found that ET was not the main contributor for this change. However, there is a lack of further analysis about the causes, while the vegetation trend has been given more attention than necessary.

1) Section 2: Although the manuscript is about evaluating whether ET has caused the shrinking of Lake Poopo, the text about Lake Poopo and its changes is minimal. The authors are strongly suggested to offer more info on this regard (such as time series of lake level or area).

2) Earlier in the manuscript, it was assumed that ET losses have increased due to

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increased cultivated crops. However, the analysis of ET changes in Figure 6 focuses on the ET rate for different crop types at given locations. In Figure 1, only representative ROIs of land cover types are indicated. Showing the land cover land use change (LCLUC) during the study period will help to justify the argument that the area of cultivated crops has increased. Otherwise one can argue that the increased ET is primarily due to increased precipitation, instead of LCLUC.

3) Results from Figure 4 suggest that the overall precipitation has increased more than that from the ET. Consequently, it was concluded that there is no clear link between agricultural intensification and the lake recession. Given these, I don't think the NDVI trend analyses (Figure 5 and Figure 6) are very relevant in this study. Rather, readers would likely be more interested in finding out the true driver for the depletion of the Lake.

4) From a water budget perspective, it is expected that the river discharge into the lake should have also increased. Therefore, the authors are suggested to show the observed river discharge, which directly affects the lake size. Has the river discharge increased? If so, why did the lake shrink? If not, how to explain its trend against the increasing trends from precipitation and ET?

5) Since the ET values in the cultivated agriculture areas have increased more than the other areas, it is conceivable that the irrigation withdraw has played an important role in the depletion. Some discussion on this would help to better understand the results from this study.

6) Page 3, Line 9: the acronym TDPS needs to be defined.

7) Page 6, Line 31: The '5,111 daily rainfall observations' doesn't match the number '5,113' in Table 1.

8) Page 6, Lines 32-33: change 'both' to 'the two'

9) Page 7, Lines 6-9: what is the basis of choosing the MODIS reflectance data on

5/16/2012 for the mask? How does the reflectance based mask differ from the ET based mask?

10) Page 12, first paragraph: As the authors pointed out, the results from Stage et al. (2017) and this study are different because different versions of MODIS ET at two temporal resolutions were used. To what degree would the results and conclusions be affected by the uncertainties associated with the MODIS NDVI and ET products? It would be interesting to add another set of results using MODIS monthly ET v6.

11) Page 12, section number '4.3.1' should be '4.3'.

12) Please discuss the errors and uncertainties associated with the datasets employed in this study.

13) Figure 5: It is unclear how the 'ET annual mean change' was calculated for the wet season and the dry season. Were they first calculated for two months and then scaled up to annual?

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