

## ***Interactive comment on “Monitoring the variations of evapotranspiration due to the land use/cover changes in a semiarid shrubland” by T. Gong et al.***

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Review HESS-2016-490 Overview This study assessed the relationships between evapotranspiration (ET) and change of land by analyzing the eddy-covariance measurements of actual ET together with data of a number of its potentially influencing factors including normalized vegetation index, soil water content as well as climate variables to estimate potential ET. Data are collected from a case study with different periods reflecting changes of land-use conditions, which provides further evidence to support the statistical analyses. The manuscript is well written and the knowledge promoted is a clear contribution to the understanding of how ET processes can potentially change with land-use in semiarid regions. I think this study is suitable for publication after moderate revision, with improved clarity and better flow especially for the Introduction and Methodology - please see my major comments below.

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Major comments: 1. The Introduction launched quite well with highlighting the importance of the assessing relationship between ET to vegetation conditions in arid/semiarid regions (L28-37), followed by a comprehensive literature review explaining relevant physical mechanisms (L38-61). However, the third paragraph (L62-79) seems to be a bit disjointed as the flow of ET/vegetation stops and shifts to the case study, whereas paragraph 4 (L80-98) returns to the ET/vegetation flow and paragraph 5 again introduces the study site. I think the easiest way to improve the flow is by swapping paragraph 3 and 4 (I found this can in fact fit better with your current connecting sentences between paragraphs i.e. L60-61, L96-98). So you would have:

Paragraph 1: importance of the assessing relationship between ET to vegetation conditions in arid/semiarid regions  
Paragraph 2: physical mechanisms on how vegetation can influence ET (finish with L60-61 which then leads to the method of assessing these impacts)  
Paragraph 3: method to assess the vegetation impact on ET (finish with L96-98 which then leads to the case study in a sparse shrubland)  
Paragraph 4: introducing the case study and how it can contribute to the above-mentioned knowledge gap. I'd also recommend combining this use some discussion from the current paragraph 5 (L99-101) to help justifying the choice of the case study.  
Paragraph 5: I'd recommend to leave this paragraph purely as a summary of the study (as current L102-104), and maybe elaborate a little bit with highlighting the significance of the study.

I think the above structure can allow the storyline about ET/vegetation relationship to complete before introducing the study site, which provides a smoother transition and also better justification on the use of Mu US sandland as the case study.

2. I appreciate the comprehensiveness of Section 2 which covers the details of data collections methods and models used to analyze different data variables. However, I found that Section 2.3.2 become a bit confusing with introducing models related to a number of variables. As this section describes the methods employed for the core analyses of the study, I think the clarity can be further improved by using further sub-sections for individual variables. In addition, I think the methods used for data analyses

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should be introduced as well. Currently the statistical methods used for data analyses are mainly described in the Results section (e.g. L325-327, L380-384, L386-L389). I think it can be clearer to summarize them in the Section 2.3.2 instead (probably as an overview in the start of this section). In this way you can better justify why these analyses are conducted and how they help to answer the research questions, while purely focusing on the results and interpretation in the Results section. And then the readers can get an overall understanding on the data analyses to be conducted and knowing what to expect in the Results section.

So I'd suggest the following structure for Section 2.3.2: Sub-section 1: overview - introducing the variables which are needed for analyzing the impact of ET and vegetation conditions (these will be detailed in the following sub-sections), and what analyses will be conducted with these variables (e.g. as those introduced in L325-327, L380-384 and L386-L389 etc.) Sub-section 2: estimating potential ET Sub-section 3: estimating soil water content Sub-section 4: estimating NDVI ...

3. I think the Section 2 (Material and Methods) is a bit too long trying to cover different aspects including case study, measurements of raw data, data processing and analyzing. In my opinion a better way to organize these is to break Section 2 into two sections, for example as: Section 2. Case study and data (note:I'd use 'data' to refer to the raw measurements here rather than in the next section, where you introduce data-processing and analyzing.) 2.1 site description 2.2 measurements ... Section 3. Methodology 3.1 flux data processing 3.2 footprint model 3.3 method of analyzing controlling factors of ET (and if you agree with my last comment, the sub-sections can go below:) 3.3.1 ... 3.3.2 ... ..

Minor comments: 1. L30: 'ET' - please define acronym when it first appears in the text, and please also check if all other acronyms are properly defined. 2. L101: '4' - please spell out numbers less than 10 i.e. as 'four-year'. 3. L111: please delete the repeated 'temperate'. Also, is there a better way to introduce the climate zone, as currently it seems like a 'noun train' ('temperate semiarid continen-

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tal monsoon climate'). You can find some examples on improving 'noun train' from <http://www.webwritingthatworks.com/DGuideCOG5b.htm>. 4. L194-195: Would there be any impact on the results from this data removal, and would this be a limitation of the study? This should be briefly discussed (Maybe in the Discussion or Conclusion section?). 5. L208-211: It would be clearer if these lines can be presented as individual formulae (i.e. in the format of L219). Also, according to L205, the 'n' in 'Rn' should be subscripted - please also check that the use of other symbols is consistent throughout the text. 6. L246: 'psychrometric constant' - what is the value of the constant? 7. L248: 'U2' - where is it in Equation (5)? 8. L337: 'Ds' - not defined as in Minor comment #1. Also, how are the data of Ds obtained? I couldn't seem to find it in Section 2.2.2 (other measurements). 9. L337: 'normal' - I think 'average monthly' would be a better description here. 10. L347: Figure 4 has not been introduced in the text yet, should it be mentioned somewhere between L336-337? 11. L380: 'relationships' - 'correlations' would be a more accurate description. 12. L389-390: the  $r^2$  only investigates linear relationships - are you expecting any non-linear relationships which are not covered here and would this be a limitation? This can be briefly discussed. 13. L464: The term 'BSC' has already been defined in L68. 14. L565: It should be worth highlighting some significance and contributions of this study towards the end of conclusion. 15. Fig. 6: I don't think the use of different shapes is necessary given that you are using multiple panels? 16. L884 (title of Fig. 6): 'r: Pearson's correlation significance' should be 'Pearson's correlation coefficient' instead?

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