

## ***Interactive comment on “Identification of catchment functional units by time series of thermal remote sensing images” by B. Müller et al.***

### **Anonymous Referee #1**

Received and published: 22 September 2014

Review of Müller et al. "Identification of catchment functional units by time series of thermal remote sensing images"

This paper uses information on land surface temperature derived from remote sensing to infer hydrological response units, i.e. areas with a similar land surface response to climate. This approach is useful as the definition of hydrological response units is crucial to increase the efficiency of existing hydrological models. The fact that widely available remotely-sensed land surface temperature data can be used in this context is especially appealing.

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General comments:

C3965

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The paper needs major revisions. I recommend to publish the paper after these revisions, because the results are interesting, relevant and well-structured, even though the methods seem somewhat cumbersome.

I have three main concerns: (1) Whereas the approach is useful as mentioned above, I am missing information on its novelty. Has anybody done this before? If not, why not outlining clearly that this is a novel approach. The introduction references studies by Anderson and Steenpass but differences and similarities to the present study remain unclear.

(2) The methods appear rather complicated, except for the PCA which is well established and applicable in this context. Are the other methods also established or are they applied for the first time here? I do not understand why and how these methods were chosen. Further, I do not understand the benefit of investigating the persistence; and the added value of the behavioral measure analysis over the PCA.

(3) Please improve the English language throughout the manuscript. I have seen worse papers, but some improvements would facilitate the readability and clarify the message in some places.

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Specific comments:

Title

Is "catchment functional unit" an established term? I would suggest to use hydrological response unit.

Abstract

line 8: what is ASTER? line 9: change "The application mathematical-statistical" to "The application of mathematical-statistical" line 14: "binary word" is not introduced before and hard to understand

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page 7021:

lines 22/23: also phenology and leaf area index may be impacted by hydrology, for example in dry regions.

page 7022:

line 1: change "atmospheric states" to "atmospheric state" lines 10/11: please elaborate on the results of the Anderson and Steenpass studies and how the present study complements these. lines 15/16: why do you think that LST is only relevant to derminded HRUs under radiation-limited conditions? line 21: what do you mean by "transformed images"? line 25: no comma after "surface characteristics"

page 7023:

line 8: replace "Research" with "research" line 19: explain "VNIR" and "SWIR", or remove

page 7024:

lines 1/2: please ensure that order of Figures is consistent with appearance in the text (also when referring to Figures 5 and 6, and 8 and 9 later on), or remove reference to Figure line 5: explain "L1A", or remove line 10: explain "digital numbers" line 11: explain "sensor decay" line 16: so you are assuming TOA=LST? under which circumstances can this be valid? please discuss line 22: I do not understand this ratio, please explain or remove

page 7025:

Please explain in more detail why you are investigating persistence here. And please clarify that you refer to spatial persistence (?). Further, you should elaborate on the choice of your methods; e.g. why not just correlating the images to infer spatial pattern similarity?

line 16: explain "co-referencing", or remove

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page 7027:

Please clarify that Fig 5 is using artificial data.

page 7028:

lines 10/12: I guess you mean row here instead of column

page 7030:

What is the added value of the behavioral measure analysis as compared to the PCA results?

line 21: I guess you mean Fig 11

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Figures 2,3,5,8,9,11 are hard to read, please enlarge captions and labels

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 7019, 2014.

**HESSD**

11, C3965–C3968, 2014

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Comment

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