

***Interactive comment on* “Technical note: Mapping surface saturation dynamics with thermal infrared imagery” by Barbara Glaser et al.**

Anonymous Referee #2

Received and published: 16 August 2018

Review of Glaser et al “Mapping Surface Saturation dynamics with thermal infrared imagery”

This technical note describes the opportunities, methodological considerations and challenges of applying thermal infrared imagery to map surface saturation. This technique shows great promise to understand the spatiotemporal dynamics of surface saturation and the hydrological processes that induce or are a result of these dynamics. Overall the manuscript is well written and articulates the challenges and opportunities well and is appropriate as a technical note for HESS. I would recommend publication with minor revisions with the main comments and technical edits provided below.

Main comments:

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1. Overall the manuscript conveys a lot of information, but I struggle with the overall organization. Technical notes obviously are not full research articles, but I would still expect a similar format. Intro/Methodology/Results/Discussion/Conclusions. In this work the methodology, results, and discussion seem to overlap in some cases. There is no specific results section, so the findings are not clear before a discussion section begins rather abruptly. I would suggest the following organization:

1. Introduction 2. Methodology

-in fundamental principles it would be good to see the full equation for how to relate what is seen with TIR to absolute temperature. Will help in the communication of the challenges of this method and why for example emissivity and environmental conditions are important.

-in image acquisition if the various challenges could have their own headings. I.e. Weather conditions, view obstruction, view angle. . . etc..

-“4. Building saturation maps” is still a lot of methodology. Could it be incorporated in this section?

3. Results/Application examples

4. Discussion

5. Conclusions

As is the combination of methodology, results and discussion throughout makes the article feel muddled and at time repetitive even though the information is all very relevant.

2. Generalize. Portions of the article are very specific to the software and camera that were selected for this study. To make this more relevant to a wider audience certain sections could be removed or be made to be more generalized. I.e(Page 5 line33-34, Page 6 line 15-24, and page 7 line 10-19).

3. The influence of difference of surface emissivity's were only very briefly mentioned.

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In TIR, depending on what is in the scene, the differences in emissivity's can be important to the reported temperatures- will have implications for absolute temperature values and gradients across the image. I would expect more of a discussion at least so, even if this article doesn't do it, others can incorporate these important corrections in their own work. An example for this in another paper can be found in: Aubry, Wake, Caroline, et al. "Measuring glacier surface temperatures with ground-based thermal infrared imaging." Geophysical Research Letters 42.20 (2015): 8489-8497.

Specific comments:

Throughout: please use an oxford comma

Page 2. Line 6-10. Unclear sentence structure

Page 2 Line 16. "up to now" -> to date

Page 2 Line 28-35. Paragraph is muddled. Please improve structure

Page 3 Line 1-2: sentence is awkward

Page 3 Line 13: "Yet," remove

Page 3 Line 18: "allow to obtain an areal picture"- please rewrite as this is awkward

Page 3 Line 29-30: please define surface saturation more clearly on its own as this is critical to the entire paper.

Page 4 Line 3-6. Long complex sentence. Breakup. "or" -> "of"

Page 4 Line 7: "as expressed from" -> relative to

Page 5 Line 14: clarify how one can still observe ground temperatures even if there is vegetation.

Page 6 Line 5. Define what image vignetting is in this situation and why it is a challenge

Page 6 Line 29-34: discussion of consistent temperature scale is redundant

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Page 7 Line 21-25. Georectification of terrestrial photos has also been extensively worked on by Corripio and Harer and should be cited here as well as examples:

Härer, S., M. Bernhardt, J. G. Corripio, and K. Schulz. 2013. "PRACTISE – Photo Rectification And ClassificaTlon SoftwarE (V.1.0)." *Geoscientific Model Development* 6 (3): 837–848. doi:10.5194/gmd-6-837-2013.

Corripio, J. G. 2004. "Snow Surface Albedo Estimation Using Terrestrial Photography." *International Journal of Remote Sensing* 25 (24): 5705–5729. doi:10.1080/01431160410001709002.

Page 8 Line 2-4. Can the usability of an image be related to any metrics that would be helpful for fieldwork planning? This would be very useful information from a practical fieldwork perspective- help improve fieldwork efficiency.

Page 9 Line 28-29: please clarify as I'm unclear what the 90% means.

Page 12 Line 21. What does the "(non)-" add to this statement. Confusing as is.

Figure 4. The b scene with snow makes me wonder about how much the snow on the ground combined with the low camera angle is obscuring saturated area. Perhaps discuss this as a challenge in the article.

Figure 7. Please use upper case on first characters of axis labels and put percentage into a unit. "percentage of saturated pixel" is unclear to me. Is this some sort of a cumulative distribution?

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, <https://doi.org/10.5194/hess-2018-334>, 2018.

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