

Interactive comment on “Combining continuous spatial and temporal scales for SGD investigations using UAV-based thermal infrared measurements” by Ulf Mallast and Christian Siebert

Anonymous Referee #1

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Does the paper address relevant scientific questions within the scope of HESS?

The paper addresses the role of physical, chemical and geological processes in the cycling of water along the Dead Sea. While the paper is largely a methods paper it does contribute to the knowledge on Submarine Groundwater Discharge.

Does the paper present novel concepts, ideas, tools, or data?

Yes. This manuscript addresses an important gap in the scientific publication record on Submarine Groundwater Discharge (SGD). Specifically, while SGD has been widely studied over the last decade, almost all studies lack data that can define temporal and spatial scales of SGD precisely. The reviewed presented manuscript successfully aims

at accomplishing this. The remote sensing data collected for this study is novel in its presentation and processing.

Are substantial conclusions reached and do the authors give proper credit to related work and clearly indicate their own new/original contribution?

Substantial conclusions are reached in the form of the methodology presented in this manuscript. A processing method is used that can lead to significant help for other studies in identifying SGD hotspots. That said, the authors fail to mention that the presented methodology, while new to thermal image processing, has been used by the Near Shore Imaging community such as the producers of Argus for a while. The authors should not only reference this work (e.g. Holman et al., 2017 and therein <https://ieeexplore.ieee.org/document/7809056/>) but also change the language of their manuscript to match the existing technical language used in the field.

Are the scientific methods and assumptions valid and clearly outlined? The scientific methods are clearly described and valid. They could be better backed up by above mentioned references. A comparison for example between existing Image products in Argus and those presented in this manuscript would be little effort but very effective.

Are the results sufficient to support the interpretations and conclusions? The results on SGD hotspot identification and current movement are sufficiently supported and deserve publication. That said, I find the conclusion on effects of geology on discharge pulses rather speculative.

There are three potentially minor problems with the conclusion of the manuscript: One: The authors should address the potential problem with utilizing only two reference reflectors (see Fig 1). A plane cannot be established with only two reference points, thereby potentially underestimating the distortion effect a changing plane can have on the recorded pixels. See above mentioned reference. This can easily be incorporated into the manuscript by including a section on "limitations and potential errors", which is already mostly written.

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Two: The authors must include a discussion of bathymetry and its potential effect on the data in a more comprehensive way. Is the substrate flat etc.

Three: In section 4.3 the authors write "In this context the question arise on the transferability of the presented approach" but they don't give a qualitative answer to this question. A short discussion on how the results may vary in SGD studies that don't have the extreme buoyancy differences should be included.

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes.

Does the title clearly reflect the contents of the paper? Yes, but it is a bit technical.

Does the abstract provide a concise and complete summary? Yes.

Is the overall presentation well structured and clear? The overall structure is clear and follows a clear structure. That said, there is a significant typo in the manuscript. What is labeled as Methods is actually Results.

Is the language fluent and precise? NO!! There are significant problems with the language. The manuscript is speckled with syntax and grammatical mistakes. While I have the utmost level of sympathy for this issue the authors should utilize the help of a professional editor. There are a number of logical problems in this manuscript that I believe are a result of the significant language problems displayed in this manuscript. Also, there are many subjective or judgmental adjectives in the manuscript (i.e. the use of the word "clear" or "clearly" is used 20 times alone in the manuscript). All of them should be eliminated. All this being said, in light of the very high value of the content of this manuscript I still consider this problem to be minor and easily fixed. I wanted to assist in this task and have attached a PDF where I have marked up some of the most obvious mistakes.

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? For the most part yes. There is an inconsistency in the use of the symbol

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"~". For example it says on Page 7 Section 2 (which is actually Section 3) "~20 to ~46 pixels (2.6m-6.0). If the pixels is inexact then the measure of meters must be to. The same applies for the rest of the manuscript. Consistency is lacking in the use of abbreviated unites and spelled out unites, i.e. seconds and m.

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? Yes, large sections of the Results should be summarized in Tables. This would make a comparison of SGD sites much easier for the reader. The descriptive nature of this portion of the paper is very tedious to read. Also, section 2.5 "Water Chemistry" is a major constituent of this study yet it only pops up in the results section. This section should be expanded and better introduced in the beginning of the manuscript. It is not clear to me how section 3.1 or Fig. 5 or 6. explain the "conditional nature" of each spot. Please expand and explain more clearly.

Are the number and quality of references appropriate? The presented references are fine but a large body of work by the above mentioned reference should be included. On page 3 section 2.1 the authors mention that the site this study was done at was the site previously studied by others. It is important to summarize these previous studies and put your study in their context. Simply referencing does not suffice in this case.

Is the amount and quality of supplementary material appropriate? Yes.

AGAIN, I want to make clear that I find this manuscript extremely valuable despite some significant language and syntax problems.

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-361/hess-2018-361-RC1-supplement.pdf>

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2018-361>, 2018.

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