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Discussions
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Interactive comment on "Applicability of Landsat 8 Thermal Infrared Sensor to Identify Submarine Groundwater Discharge Springs in the Mediterranean Sea Basin" *by* Sònia Jou-Claus et al.

Anonymous Referee #1

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The authors investigate the detection potential of submarine groundwater discharge (SGD) using thermal infrared (TIR) images acquired by the Landsat 8 satellite. Their approach's novelty is that they test the detection capability by looking at 50+ known SGD sites along the Mediterranean coastline. For each site, they checked whether or not the SGD was detectable through image interpretation, and they describe a list of factors that could be underlying any failure to detect the SGD. As such, the authors claim that they "analyze the appropriateness of satellite TIR-RS data for SGD research in a statistically robust manner."

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Discussion paper

The topic of this paper is promising and of important interest. However, the work that has been conducted is exploratory and present weaknesses that would need to be addressed before being ready for publication. I highlight here the most critical points of concern and have added comments in the manuscript (Supplement PDF) that would also have to be fully considered.

- I have no experience working with TIR products. Based on the text provided, it is difficult to judge whether the image processing that has been applied is robust. The references provided to back up do not seem to align with the application. They are also surprisingly old, while one would expect that robust algorithms would have been developed more recently? It would also be useful to present the accuracy and expected range of error on the final Sea surface temperature product. Another concern is about the atmospheric correction. The Landsat TIR products are initially developed for terrestrial applications. Was the atmospheric correction algorithm applied suited for such an aquatic study?

- The selection criteria for the SGD should be further detailed, and the specificities of each spring/cluster of springs described. A table could be an efficient way to do so. So far, statistics (average or range) are given for the ensemble of springs, which is not sufficient to understand the diversity of study sites. Such characterization would also be useful to help interpret the findings; see comment below in that regard.

- The success or failure in detecting an SGD point with TIR should be discussed in light of the given sites' characteristics. It's partly done, but not consistently. A more quantitative analysis would greatly help and add value to this work. On the other hand, the study conducted so far is not robust enough to state that you "analyze the appropriateness of satellite TIR-RS data for SGD research in a statistically robust manner."

- A major concern I have with this paper is that many limitations are presented as a result, while most are assumptions that this work has not allowed verifying. An example of this is the anthropogenic effect. While these assumptions can either be presented

as a problem statement in the introduction or used to discuss your results, they should not be presented as results per se.

- Following up on the previous comment, I do not think that this study offers any conceptual framework, as is stated. This study is an exploratory analysis of the capabilities to detect SDG in karstic systems with TIR. That alone could be enough for a paper once it is reworked.

- Overall, the text would benefit from rewriting in a more distilled and synthetic message. So far, the paragraphs are often long and convoluted.

I wish the best of luck to the authors and hope they can improve their paper that will then undoubtedly serve as a useful piece of work for the scientific community.

Please also note the supplement to this comment:
https://hess.copernicus.org/preprints/hess-2020-569/hess-2020-569-RC1-supplement.pdf

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