

Review of: "Thermal Remote Sensing: A tool to Determine Temporal Land Surface Temperature in Hawassa City, Ethiopia"

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Potential competing interests: No potential competing interests to declare.

The main focus of this paper is to determine the temporal dynamics of the land surface temperature in Hawassa city, Ethiopia by using Landsat imagery. I think the subject of the article would be of interest to the readership of the journal. However, this paper is fatally flawed and not ready for publication. It has no clear focus, it offers little new, needs a lot of development before it's publishable, and a lot of rewriting and reanalysis would be helpful in my opinion. It has multiple problems, both in its scientific approach and writing. The quality of English needs improvement by a native speaker. The description of some very important points was inadequate or completely missing and very necessary to be available in the manuscript. This makes it difficult to publish this paper in the current form. Mainly, the study provides results that are not carefully presented. The introduction fails to locate the study effectively within the recent international literature in the field, and doesn't highlight a gap or a need to extend knowledge in the field. The literature review is inadequate, appearing to miss many studies that have already produced the same kinds of results. In addition, the methods used are not given in enough detail to convince a reader of the credibility of the results. I've tried to point out where the author needs to make improvements. The discussion should place the results in the context of previous results. I would encourage the author to rewrite the paper accordingly. I am afraid, however, I am not able to recommend this submission for publication in Qeios Journal. I will provide my review in more detail below.

1. My main concern regarding the paper is with respect to section 1 "the introduction of the study", which does not present a clear and explicit description of the background for research. The purpose of the study is not presented. It is not clear to me what question this article addresses? What problem is it trying to solve or respond to? Please make these two points clear to the readers to help them follow your paper. The importance and contribution of this study needs clarifying. I feel it is the author's responsibility to make the reader confident in the design of the paper. Please fix this issue by explicitly specifying the main contribution and the importance of your studies as early as possible. The authors mainly argued that " Unplanned urbanization is the product of rapid growth in size and speed ". I felt confident that the author was trying to do his best to figure out the effects of urban development on the dynamics of the land surface temperature. However, the author needs to provide some sentences early to clarify the importance and contribution of this study. I did not find any gap that this study tries to fill. Some paragraphs serve nothing. For example, paragraph 5 is all about Landsat where I think it presents information that is not related to the research problem.

2. The introduction does not discuss enough previous studies on the subject of the study and its methods. What is known about the subject of the paper is very poor. I think this is because there is no in-depth literature review, so author needs to review and cite the latest published articles. I think the author needs to review more relevant studies to justify his study and make very clear to readers what is known and what is not known about the temporal dynamics of land surface temperature. This is one of the weaknesses of this paper. I suggest some recent and relevant studies that may help the author to improve his study:

- <https://doi.org/10.1080/17538947.2020.1813210>
- <https://doi:10.3390/su10051367>.
- <https://doi:10.3390/su10124433>.
- <https://doi:10.1016/j.buildenv.2018.03.041>.
- <https://doi:10.1016/j.scs.2019.101846>.
- <https://doi.org/10.1016/j.rse.2003.11.005>
- <https://doi.org/10.1016/j.rse.2005.09.023>

1. My related concern with the paper is that the methodology section does not provide enough information, particularly about the data used and methods for validating the results. It is not clear to me which spectral band was used to estimate the surface temperature. In Section 2.2, the author mentioned that spectral band No 10 was used for this. However, in Figure 2, spectral band No 11 was used. Are you using Landsat-8, Landsat-7, or both? There are discrepancies regarding this problem in the Abstract and Method sections. MODIS data are mentioned in the results section, but not in the methodology section. Not having candid detail on such points makes it difficult for the reader to follow your paper.
2. In the methods section, which type of GPS was used? What are the specifications of this GPS?
3. In the preprocessing steps: to determine the reflectance of each pixel, radiometric calibration and atmospheric correction should be used, not geometric correction. If the images were radiometrically calibrated and atmospherically corrected, this should be stated explicitly in the text.
4. In the method section, the author mentioned that Semi-Automatic Classification Plugin (in QGIS) was used for image classification, while in the abstract section, the on-screen classification technique (digitization) was used for land use/cover classification. Errors on points like these make it difficult for the reader to follow your paper. To make this point clear to readers, I think the author should clearly specify the type of image classification that was used. In addition, the author needs to evaluate the accuracy of the classification results using the filed data.
5. In section 2.3, paragraph 1, sentence 6: "A detailed description of the methodology is outlined here (Fig1). Image acquisition and pre-processing of cloud-free Landsat a scene....was download". This is an ambiguous sentence. I believe the author referred to Figure 2, not Figure 1, which is the location map of the study area. Such errors lead me to assume that this is a draft version of the paper that the author attempted to publish without in-depth copy editing and proofreading.
6. In the same paragraph, sentence 8: this technique. What method are you referring to? In sentence 9: this is confusing. What the author tries to convey here is not clear to me. Is the surface temperature calculated using band10 or band 4

and 5? By referring to this point, it means that I have very little confidence about this issue. I think band 4 and 5 were used to calculate NDVI as pre-step to calculate surface emissivity layer. If this is the case, it needs to be explicitly stated in the text.

7. All the equations need to be revised. They are not complete and confusing. For example, equation 5 is misleading and not very well written.
8. On page 7, in the same paragraph, I think the author mentioned that the land use/cover information was extracted using classification methods. However, how can the proportion of vegetation help estimate the area under each land cover type? The author can make this point clear by providing more explanation, or simply omitting it all together.
9. On Page 9, paragraph 1 is not useful, it is just a theoretical background about land surface emissivity.
10. How the land surface emissivity was calculated is not clear to me. Providing some theoretical explanation of this very important point can make this point clear in my opinion.
11. Additionally, information about build-up areas needs to be obtained from satellite imagery by using one of the various NDBI indices available in the literature as it relates to the dynamics of the land surface temperature.
12. On page 10, paragraph 1: this is confusing. It is not clear to me how the study findings were validated. The study largely ignored what would seem to be issues for a study of this type. Did you use any method of validation? If so, this should be stated explicitly in the text. The author mentioned that cross-validation was used. However, it is not helpful for the readers to follow and replicate your study.
13. I found the results and discussion section not very well presented and do not refer back to the objective and do not provide explicit explanations. It lacks in-depth analysis of the results obtained and was not compared to other relevant studies. I think for the author to make this section useful is to rewrite it completely. How does the decrease in agricultural lands and forested areas increase the vegetation and bare land? This is confusing. The potential implications of temporal dynamics in land surface temperature and its relationship to urban development should be discussed. If urban development analysis has not been conducted in this study, the rationale should be given. Authors should further discuss the implications of the lack of such analysis in the interpretation of the results.
14. On Page 13, paragraph 1, last sentence: this is not true as there is an increase in agricultural land. How can this increase be attributed to the change in the urban environment from natural to artificial?
15. On Page 14, paragraph 2: How this validation was carried out is not clear to me. If the results obtained are validated, this should be stated explicitly and clearly in the methodology section. Also, it is confusing when products such as land surface temperature are retrieved from 30 x 30 m spatial resolution data i.e. Landsat-8 compared to other products obtained from 1km x 1km spatial resolution data such as MODIS data without resampling.
16. On the same page, paragraph 2, sentence 5: How did the author come to this conclusion? In this study, the increase and decrease in land surface temperature was caused by urbanization, not by climate change.
17. The study does not has any limitations.
18. I found the conclusion rather unsatisfactory and provides no things new to the readers to know about temporal dynamics of land surface temperature in the study area. Conclusions must be supported by the data provided. It's bad when the conclusions are not directly related to the results.

