

Responses to Comments on the Manuscript:

“Estimating subpixel turbulent heat flux over leads from MODIS thermal infrared imagery with deep learning”

(ID: tc-2020-363)

We sincerely thank the anonymous referee #2 for his/her detailed and useful comments and suggestions during the whole review process. We have carefully studied these comments, and made corrections or changes according to the comments and suggestions to improve our paper, and we are now resubmitting a revised manuscript which we hope will meet with your approval. The major revised portions are marked in green in the revised manuscript. The item-by-item responses to the reviewers' comments are listed as follows:

The authors' revisions have substantially improved the rigor, clarity, and flow of the paper.

Comment 1: Lines 12-14: Long, wordy sentence is hard to follow. I suggest “THF over leads is often calculated from satellite-derived Ice Surface Temperature (IST) products, in which mixed pixels containing both ice and open water along lead boundaries reduce the accuracy of calculated THF.

Response: Thanks very much for your suggestion. It has been modified according to your suggestion in the revised manuscript.

Comment 2: Line 32: “Climate studying” sounds awkward. “studying the climate” would be better.

Response: Thanks for the valuable suggestion. It has been changed in the revised manuscript.

Comment 3: Lines 27 and 33: I apologize for being picky, but the way “denote” is used sounds incorrect to me and is therefore a bit distracting. Perhaps just replace with “are”.

Response: Thanks for the advice. They have been modified in the revised manuscript.

Comment 4: Line 34: “Delete “the” before “on-site measurement”. “in-situ” is a more standard term than “on-site”.

Response: Thanks for the advice. They have been modified in the revised manuscript.

Comment 5: Line 45: Replace “but” with “and”. “...has a spatial resolution of 1km and includes mixed pixels.”

Response: Thanks for the advice. It has been changed in the revised manuscript.

Comment 6: Line 46: Replace “the mixed pixel existence” with “mixed pixels”.

Response: Thanks for the advice. It has been changed in the revised manuscript.

Comment 7: Line 95: Replace “observation” with “observational”.

Response: Thanks for the advice. It has been changed in the revised manuscript.

Comment 8: Line 131: Delete “Aside from the lead surface temperature, the” and being the sentence with “Meteorological data included..”.

Response: Thanks for the advice. It has been deleted in the revised manuscript.

Comment 9: Lines 173-174: “in the following” should be replaced with “as follows:”.

Response: Thanks for the advice. It has been modified in the revised manuscript.

Comment 10: Line 300: Typo - Is “The simulated IST used the OriTHF” meant to say “the IST obtained by the OriTHF”?

Response: Yes, it is. It has been modified in the revised manuscript. Thanks for the suggestion.

Comment 11: Line 312: Could specify: “the diagonal line denoting a 1:1 relationship”.

Response: Yes. It has been added in the revised manuscript as “the diagonal line that denotes a 1:1 relationship” (Line 310). Thanks for the suggestion.

Comment 12: Line 523: Sentence is a bit awkward. Just a suggestion: “The THF over leads is an important parameter in the study of climate in the Arctic region. Fine spatial resolution satellite imagery is required...”.

Response: Thanks for the advice. It has been modified in the revised manuscript according to your suggestion.

Comment 13: Line 544: Typo -Should be “regardless of the fact that leads cover only...”.

Response: Thanks for the advice. It has been modified in the revised manuscript.

Comment 14: Line 628: Suggestion: “reality” instead of “the real case”.

Response: Thanks for the advice. Words “the real case” has been replaced by “reality” in the revised manuscript.

Comment 15: Conclusion section: Include sentence on the limitations of DeepSTHF?

Response: Thanks for the advice. In the conclusion section, we have added “Although DeepSTHF had limitations for very narrow leads and images contaminated by clouds or drifting snow” (Lines 653 and 654)