The Cryosphere

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Discussions

EGU

Interactive comment on "Estimation of turbulent heat flux over leads using satellite thermal images" *by* Meng Qu et al.

Anonymous Referee #1

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The authors present a study build upon widely used spaceborne thermal-infrared data from MODIS and Landsat-8 in combination with ECMWF ERA-Interim atmospheric reanalysis data to calculate turbulent heat fluxes. Based upon an almost perfectly co-located case study between the two sensors in the Beaufort Sea, the authors present a thorough analysis of the sensors capabilities for the detection of lead sizes and widths as well as a comparison between two different methodologies to calculate the turbulent heat fluxes. Overall, the manuscript is mostly well written and a good extension to existing work in the field.

General Comments:

Did the authors do anything about potentially present cloud cover? It looks to me that at least in some areas it could likely be a cloud artifact we are looking at.

Specific Comments

P1, L20: Does 'mainly due to its large area' refer to the area of small leads? Is that linked to a likelihood of rather being ice free than bigger leads?

P2, L44-45: Are Landsat-8 thermal bands really referred to as the 'split-window' bands?

P3, L15: Could the authors elaborate on their decision to not use the NSIDC MOD29 sea-ice surface temperature product directly but instead calculate it themselves using their parameters? Was it due to the applied cloud mask?

P6, L17: Could the authors discuss where this difference might originate from? From what I read this might simply be the difference between an optimized for sea-ice temperature scheme in comparison to a multi-purpose one?

P6, L21: I think I missed how exactly these iterative thresholds were calculated or estimated in the first place? In way to match the resulting lead sizes/distributions between the sensors? Iteratively implies for me that there is some kind of number/goal to reach.

P6, L25-26: Is this difference or rather the larger number for MODIS really simply just due to mixed pixels? Later on the authors discuss frequently how much of the total area comes from small leads, which MODIS cannot detect at all. From reading the manuscript, I would rather expect it to be different as there should not be any leads in MODIS that Landsat-8 cannot detect, but surely as the authors also stated, the other way around. Could clouds be a factor here?

P6, L30: Is the choice of lead-width thresholds arbitrary or is there a reference for that from another study?

P8, L16: Iterative thresholds are mentioned again but I think I still have not read an explanation yet.

P9, L19-20: Technically, MODIS cannot detect any leads in thermal infrared with a width below 1km? You compare numbers from below 1km width with numbers from

exactly 1km. I think that should be highlighted better or rephrased.

Technical Corrections

P1, L11: I think that should be 'scales'

P1, L20: 'flux over leads'

P1, L23: 'exposed to the atmosphere'

P7, L6-7: I suggest to rephrase this sentence(s): Table 2 reveals that the total heat flux over leadsn calculated using TIRS IST is 6.59[. . .] over the total area of [. . .]km^2. This is 42.33% larger [. . .]

P7, L14: Suggest to use 'difference' instead of 'increase'.

P7, L18/19: 'leads' and 'widths'. To my understanding, there are probably quite some more cases of that throughout the manuscript. The authors should double-check that.

P7, L33-35: I find this last sentence hard to comprehend. Please rephrase.

P7, L38: 'twice as' large?

P8, L8: 'to extract lead signatures from the background'

P8, L24: Second Key reference is not capitalized.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-262, 2019.

TCD

Interactive comment

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