

Author Response

We thank the both the reviewer for spending their time and effort reviewing our work. We have carefully considered all points and revised our manuscript.

Detailed responses to all points raised by the reviewers follow afterwards.

Our replies are marked in **blue** while reviewer comments are in **black**.

REV 1

We thank reviewer one for their time reviewing our manuscript and providing us with feedback that, we are sure, will improve our manuscript. Below find out replies to every point.

In Section 2.1, the authors insert a critical statement regarding the LakeSP product: “we found some issues for the small Danish lakes... assigning water to areas where no water is present.” While this observation is valid and important, its current location within the purely descriptive data section is disruptive. The reader is still being introduced to the datasets when suddenly confronted with a methodological justification for why the authors prefer PIXC over LakeSP. This argument belongs either to the Introduction.

Response: Thank you for raising that point. We have moved it to the introduction section where we describe which data we use.

Several acronyms and shorthand expressions are used without proper definition at first occurrence. For example:

In line 3, “2D” appears. Does this stand for “two-dimensional”? If so, please spell it out fully upon first use.

In line 100, “w.r.t.” is used. This is an abbreviation for “with respect to”?

Response: Thank you for pointing out this inconsistency, we spelled out 2D and w.r.t throughout the manuscript.

“09.12.2025” (line 72) and “26.07.23” (line 79). These are ambiguous: are they day-month-year? The use of two-digit years (23) and dots as separators is non-standard in international scientific writing. I strongly recommend adopting the YYYY-MM-DD throughout the manuscript to avoid any confusion, e.g., “2025-12-09” and “2023-07-26”.

Response: Thank you for pointing out a potential confusion from the date formatting. We have added a remark at the first instance we use a date in the text section of the manuscript

“(dd.mm.yyyy, used throughout this manuscript)”

And adopted it throughout the text.

Undefined term “so” vector layer – In line 85, the authors refer to the “‘so’ vector layer product of GeoDanmark”. The term “so” appears to be Danish for “lake”, but this is never explained. For an international readership, please either translate it to “lake” or add a parenthetical definition, e.g., “the ‘so’ (Danish for lake) vector layer”.

Response: thank you, we missed that. We changed it to “... selected from the lake (danish: 'sø') ...”

Incomplete definition of filtering criteria for LakeSP – In line 76, the authors state that LakeSP data were filtered using three criteria: “quality f = 0, xorr_cal_q = 0 or 1, and dark_frac $\lesssim$ 0.1”. However, none of these flags or thresholds are defined in the text. A reader unfamiliar with the SWOT product specifications will not understand what these parameters represent or why they were chosen. Please provide a brief explanation of each criterion

Response: thank you for this point. We have elaborated on our point to include non-SWOT experts.

“. The LakeSP is filtered on the summary quality indicator 'quality_f' = 0 (zero is best), the flag determining the cross-over calibration quality 'xovr_cal_q' = 0 or 1 (meaning good and suspect), and the fraction of the lake's total area covered by dark water 'dark_frac' ≤ 0.1 (JPL, 2023a). Where dark water is water with low backscatter typically representing lower quality measurements.”

REV 2

We thank reviewer two for their time reviewing our manuscript and providing us with feedback that, we are sure, will improve our manuscript. Below find out replies to every point.

Minor comments

l112: "are approximately normal-distributed" Is this statement an assumption or based on evidence? The roll-error findings of the paper, would actually argue that the errors are spatially correlated in space.

Response: Thank you raising this concern. You are right, that error over large spatial scales will be correlated in space. Especially when aggregated values are compared. What this statement refers to is the more or less local random distribution of individual SWOT measurements. We found that they are indeed approximately normal distributed, at least for lakes of the extent as Danish lakes.

We expanded on our statement to make it clearer.

l119: "geolocation flag" reformulate so that the value/meaning of the flag becomes unambiguous. e.g. -> "geolocation quality flag which is set to 1 for bad quality observations..."

Response: thank you for pointing this out. We have expanded on our description of the geolocation quality flag.

table 1 caption : standart -> standard

Response: thank you. Changed.

Table 1 "Criteria versus criterion" Criterion and criteria are used interchangeably in the manuscript. Suggestion to use "criterion" to remove ambiguity. The first search of the word "criterion" appears on pdf page 8, which created confusion as the table refers to them as "criteria".

Response: Thank you for bringing this to our attention. We use 'criteria' for plural references (such as the full set in Table 1) and 'criterion' when discussing an individual item (such as on page 8). To make this distinction immediately transparent to readers and prevent any confusion, we have added criterion to section 3.3 as well

"... filtered by the respective individual selection criterion ..."

Figure 2: use more contrasting colour between the markers of 3 and 4, They are very hard to distinguish on the plot.

Response: thank you for pointing this out. We have change marker 4 to be green instead of brown to make them more distinguishable. We also changed marker 6 to be red to be more consistent with following figures and improve contrast between 3 and 6.

Figure 4 (a): maybe use the word "retained Epochs" instead of "retained observations". Retained Observations could also be mis-interpreted in a spatial sense.

Response: thank you for making us aware of this. We changed 'Observations' to 'SWOT passes'. We didn't use retained Epochs as we haven't introduced Epochs anywhere in the manuscript. Therefore, we didn't want to introduce confusion from a word not introduced yet.

L282 and L138: As the sign of the slope varies across cycles. Be more transparent in section 3.4 and 5.4 about the assumptions made. As far as I understood the assumption, the assumption is that the roll-error remains constant within a cycle. But I don't see why the sign of the roll-error can not change within a cycle itself. This assumption has consequences for the roll-error findings. A better way would be to estimate roll-error from all reasonable points per acquisition (e.g. correlate Dh of all valid points within an acquisition with the cross-track distance). Seeing that this part is only an indicative part of the study, I understand to not go into depth, but the assumptions should be transparently communicated to the readers.

Response: Thank you for making us aware of this. We formulated this in a bad way. What we mean is that the sign of the slope can vary between SWOT acquisitions. So also, within a cycle as multiple passes observe Denmark. The analysis we present in Fig5 only looks at one pass, hence changes in the sign are changes from cycle to cycle. This caused our formulation in line 282.

We agree that this is misleading. We have tried to clarify this.

- "It could vary from pass to pass."
- "As the sign of the slope varies between passes"