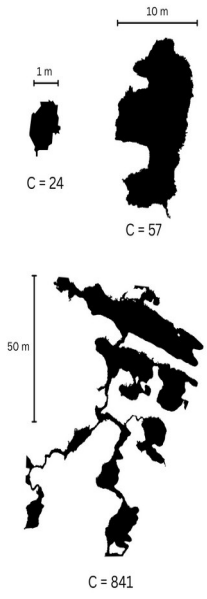
This manuscript presents a study of the relationship between the surface morphology of sea ice (due to presence/absence of ridges) and two characteristics of melt ponding (areal pond fraction and individual melt pond circularity). The data, analysis, and results are described in a way that is comprehensive, clear, organized, and easy to read. I have only one minor suggestion (not a requirement) and a short list of very minor technical points. In my opinion, this manuscript can be published upon the authors' attention to these points.

> Thank you for your thorough review of our manuscript. Your comments have helped us improve the study. We are please to read that you support its publication. In the following, we address your comments one by one. Our replies are in blue. Line numbers are always referring to the first submitted version of the manuscript.

Suggestion (not required for publication!): In my opinion, a nice addition to this manuscript would be a figure containing a selection of images of ponds spanning a range of circularities. The description of pond circularity (how it is computed and what it represents) exists and is clear, so I don't think this information is missing. It simply occurred to me while reading the manuscript that a menu of examples of ponds with different circularities would be a really nice addition.

> We like this suggestion and we agree that visualizing the pond circularity will help to improve intuition on what circularity actually means. We have included some example pond shapes along with their circularity value as a new panel c in Figure 6. The ponds have been chosen such that they can also serve as examples for the pond size bins shown in Figure 8d.



Minor technical points:

4: coincident (also line 445)

> Changed to "coincident"

107: histogram (only one m)

Changed to “histogram”

222: which on melt conditions (omit ‘on’)

Removed “on”

244: fewer melt? How about ‘less melt’?

Changed to “less melt”

248: “…mix of ice types, including landfast first-year ice, secondyear ice, and multi-year ice.” Would be helpful to know how it was discerned that all these types existed?

We changed the respective sentences to the following to make it clearer that also the information on sea ice age used here is derived from the satellite backtracking in Section 2.8:

“The Central flight (example shown in Fig. 4d) covered regions with a mix of ice types, including landfast first-year ice, second-year ice, and multi-year ice, as inferred from satellite backtracking of the ice drift (see Section 2.8 and Fig. A1). Much of this ice originated from the East Siberian Sea.”

250: ‘submerged ice’? Not sure exactly what this refers to? Rafted ice?

Indeed, we had not defined “submerged ice” in this context yet. We added:

“… submerged ice, here referring to parts of the ice floe that lie below the water surface, e.g. at floe edges, but are still visible in the nadir images”

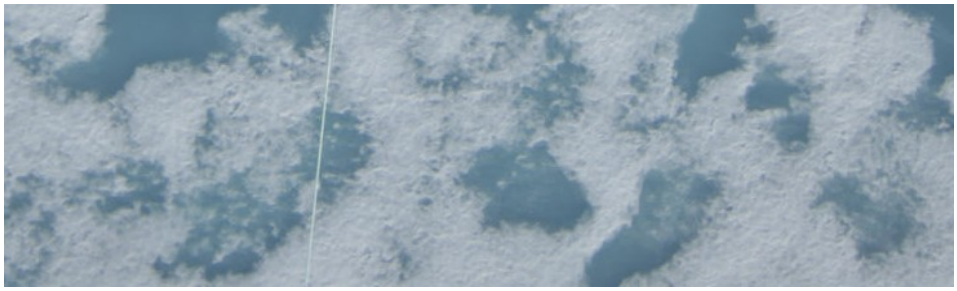
259: “coastal areas” which coasts?

We added: “…, in this case mostly the New Siberian Islands (see Fig. A1)”

261: “…slush-covered areas (example shown in Fig. 2g).” Am I supposed to be able to tell there is slush in the photo shown in Fig. 2g? If so, please help me know what to look for.

The main purpose of including the figure reference here was to refer to an example image of the Eastern flight, as already done for the Western and Central flights. However, in this example there is actually some of the slush visible in the lower part of the image, see the zoomed in version below. We now guide the reader better to these areas by writing “example shown in Fig. 2g, e.g. roughly one-third up from the bottom of the image”.

Please note that we rephrased all instances of “slush” to the more descriptive and better defined wording “water-saturated snow”, or in the case of “less slush” to “dryer snow”.



275: “was varied”, should just be “varied” (otherwise it sounds like it was manipulated)

Done

283: orange? More like gold on my screen

Changed to "gold" both in the text and in figure caption.

292: “very variable”? how about “highly variable”?

Changed to “highly variable”

391: “perimeter-area ratio” or perimeter:area ratio?

Changed to “perimeter-to-area ratio” to make it unambiguous and stay consistent throughout the text.

399: “previous subsection” how about “Section 3.3.1”?

Changed to “in Section 3.3.1”

423: “melt pond properties” how about stating it more specifically, as “melt pond geometry”? There are a lot of pond properties that are out of scope in this study. Here, “pressure ridges” are referred to, whereas the title says “surface morphology”. I think maybe the title would be more fitting if it referred to “sea ice ridging”? Or even “ice surface morphology”?

You are absolutely right, there are so many other melt pond properties that we do not cover here! Here we are referring to both melt pond geometry and melt pond fraction, so in order to include both, we now changed the wording to “spatial melt pond properties”.

We considered changing the title as you suggested, but we are hesitant because we would like to avoid double occurrence of the word “ice” in the title. Upon your and the editor’s approval, we would like to keep the title as it is.