

General comments:

This manuscript presents a scientifically interesting body of work, with great use of a variety of remote-sensing datasets and a modeling exercise together to make novel inferences about Nares Strait ice bridge structure and breakup. The authors have done a good job addressing reviewers' questions and concerns, and have produced a much clearer and polished revised manuscript. Assumptions and limitations of the results are much improved, and the storyline is a lot tighter. I am very impressed with the creativity in how these datasets were used and am looking forward to referencing it once published. I have a few comments and points of clarification (stated in the attached document) that should be addressed, but otherwise I recommend acceptance with minor revisions.

Specific comments:

121-125– Great addition so far. However, MODIS is thermal infrared not microwave, and brightness temperature is also impacted by cloud and atmospheric constituents/temperature.

444-450/Figure 10 – Apologies for the not-quite-complete comment on this during the first round of review. Your edits here improved this part of the discussion a lot despite a lack of complete info on what I was meaning. What I had meant to say is that when I looked at the timeseries of MODIS thermal images in WorldView, the image you show from 2019 seems like it may be a high wind event pushing ice away from the coast (maybe a latent heat polynya of sorts, which would not necessarily be indicative of high ocean temperatures and could cause high sea ice production) and not the best representation of the Tb for that month. It's an extreme and ephemeral event for the month. A few days earlier and later in Dec 2019 looked very different. A similarly "warm-looking" event occurred in the 2018/2019 season for just a day or two. However, looking at all of the images from Dec 2019, I would agree that Tb was generally higher. A monthly mean Tb or timeseries of clear-sky days for the area would be much more useful in supporting your statements here for this reason. I don't think that a change is required for publication here, although it would make for a stronger statement and it could give you more insight about the relationship between sea ice height and Tb, as well as understanding mechanisms impacting bridge formation and breakup. I also use this as a caution against using extreme synoptic event days (Dec 18, 2019) to represent a monthly/interannual difference. That said, in general this section of text is oversimplifying a lot about Tb and not accounting for the complex sea ice-ocean-atmosphere interactions that are taking place. These statements are not quite accurate to what you can say from the figures you show without further explanation:

444-446 – "The high Tb conditioned the ice-free area in Peabody Bay", "signatures of warmer water in Kennedy Channel can also be traced through leads within the mobile sea ice" – this ends up being a little misleading for the reader. Since the temperatures you are showing aren't sea surface temperature and sit below saltwater freezing temperatures, it isn't clear what is causing the high Tb in 2019 or in the leads. The high Tb may merely be arising from a lack of sea ice at the surface and cold ocean surface temperatures (ocean is warmer than sea ice). The high

Tb and lower sea ice concentrations could arise from low sea ice transport out of the Arctic and/or a windstorm blowing sea ice out of this area (which also could drive upwelling of warm water but doesn't necessarily need to do so to produce the Tb pattern you see). It may or may not also be from warmer ocean water coming to the surface, but I doubt that is happening in isolation from the other phenomena I mentioned. These comments also play into line 488-489.

447 - "may indicate reduced ocean heat transport towards the surface from below" – this is technically true with the use of "may", but it would be helpful to present the other alternatives so that the argument is balanced for the reader.

447-449 - "the difference in temperatures presented in these early winter snapshot images cannot explain the seasonally averaged elevation anomalies shown in Fig. 4" - The notion of high winds/low sea ice transport into the strait causing the high Tb can more easily explain why sea ice thicknesses aren't consistent with the high Tb in 2019 than higher ocean heat flux to the surface can. For instance, more sea ice cover on the surface early in the season could insulate and prevent ocean heat escape that impacts sea ice formation afterwards. This could be discussed a little more in the text.

605-608 – Since most of the iceberg discussion was removed from the paper, this no longer applies, correct?

Line comments:

29 – ", which" makes the sentence a little clearer here

50 – not sure it makes sense to include "the last bridgeless winter" here since it is the most recent winter. I would cut this.

51 – points

67 – spots based on evidence from nearby...?

85 – Cape

103 – Spell out FESTOM-2 acronym here for first use, rather than on L170

125 - "did not"

130-131 – the segment lengths are in reference to ATL07 specifically and not all ICESat-2 data, so I recommend moving this sentence down one line to come after ATL07 is introduced.

134-137 – Have "although" and "however" in same sentence so recommend removing "Although"

140 – into “a” 1.5...

145 – Compared to

150 – Spell out for the first use of acronym (DMSP/SSM/I-ISSMIS), slashes are in the wrong spot at the end also.

161, 162, 166 – Spell out acronyms for first use?

166 – “a” finer

178 – the model performs well in reproducing the shift...

181 – depth, which is in good...

196 – lower than ideal for resolving

198 – calculated using

199-201 – what is your evidence for this statement?

217 – presence of a sensible

218 – remove ‘sea surface’

220 – I think you don’t want “the latter” here

238 – central main seems redundant so maybe this should just be central

271 – corresponds

278 – compared to, also if you have it, it would be good to give a quantitative order of magnitude estimate for each of the gradients

292 – spell out SAR

303-304 – we will roughly estimate ... or even “will estimate”

331 – to the 19....

336 – would need to reach 70

338 – at some distance from the polynya

339-40 – is large enough () to keep it ice-free...

341 – to the 0.26 m mode

341-343 – A set of model experiments showed that the maximum...corresponds to ... and a snow accumulation rate...

From L343 to the end – stopped noting grammatical errors, but quite a few still exist beyond this point

365 – spell out first use of AO – but since it is the only use could remove the acronym

383 – how much shorter? Could give ranges or the average for each

Figure 10 – What is the vertical-ish line in (b) and (c)?

459 – what does “contrast of the latest” mean?

462 – away from Cape Jackson

491 – the “only” available source – this isn’t accurate based on your second sentence

527 – “ice elevation anomalies”

530-532 – “by the fact of forming the chain of polynyas” to “by the fact that chains of polynyas for...”

532 – Fig 11 should probably be referenced the sentence before.