

This is the second review of the manuscript entitled *Sea ice floe size: its impact on pan-Arctic and local ice mass, and required model complexity*.

I am overall satisfied with the answers to my previous review and the modifications to the manuscript. The work made by the authors has significantly improved the quality of the study in my opinion (congratulations to them), and I would be happy to recommend the paper for publication after some minor adjustments.

A general comment is that the paper is much clearer than it was, but also quite longer and with some repetitions between the results, the discussion and the conclusion. This is not a major problem, and the manuscript could be left as it is, but the authors should not hesitate to remove some comments that are repeated throughout the paper before publication (for instance the reasons behind the uptick).

P1L22: “We demonstrate that a parameterization of in-plane brittle fracture processes enables the prognostic model to achieve a reasonable match against the novel observations”.

I slightly disagree with this sentence. The study demonstrates that adding a term to the prognostic is needed to achieve a reasonable match against the novel observations, and that there are good reasons to believe that this term represents the effects of in-plane brittle fracture. Also, the manuscript spends some time discussing the effect of this parameterization and why it improves the results, so it might be worth summarizing these results in the abstract.

I would therefore suggest writing something like:

“We show that adding a term that relaxes the FSD towards a power-law enables the prognostic model to achieve a reasonable match against the novel observations in the summer. We suggest this term represents the effects of in-plane brittle fracture that break the larger floes (>2km) into mid-sized floes (100m-2km).”

P6L24: “Clearly, brittle fracture events...size.”

I agree that this is very likely the case for the larger floes (>100m), but more uncertain for smaller floe size. Maybe add a comment on that (if you agree)?

P7L18: “stronger regions of sea ice”

I am not sure of what you mean by this expression. Regions where the ice is thicker/stronger?

P8L17: “it marks...larger floes”: I find the sentence a bit confusing.

P15L35: “This is an important...models.” Yes, but I suspect the quantities you are looking at remain quite constrained by the ocean and atmosphere forcing. I am therefore not certain the conclusion you draw from a stand-alone simulation can be extended to fully coupled climate models. I am aware this is discussed a bit further in the text, but I think it should be mentioned here too.

P18L30: Same comment. Maybe replace “is” with “may”.

