

***Interactive comment on “Tsunamis unleashed by rapidly warming Arctic degrade coastal landscapes and communities – case study of Nuugaatsiaq, western Greenland” by Mateusz C. Strzelecki and Marek W. Jaskólski***

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The paper by Strzelcki and Kaskolski provides a useful contribution to efforts to understand large tsunamis triggered by landslides in high latitudes. These megatsunamis can be extremely destructive, but are rare enough that opportunities to study them are rare. The data and insights described in the paper stem from a field reconnaissance exercise two years after the event, and so it is likely that much of the more delicate evidence was eroded away prior to the authors' arrival on site. In general, the paper is well-written. My main issue is that I was underwhelmed by the level of detail presented

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and as a result, I can't recommend publication in its current state.

## GENERAL COMMENTS

The title should be changed. Warming is not actually addressed in the paper, and it is not clear whether warming would have had an effect. The landslide was triggered by an earthquake, and while permafrost thaw may have hastened collapse, these details are not known (at least not from this manuscript).

I was surprised by the lack of quantitative observations in the paper. For example, could the observed coastal erosion be quantified from field measurements, or satellite/DEM analyses?

As I said earlier, the paper is generally well-written but there are some grammatical issues and odd turns of phrase. I have elected not to mention them here, as I feel those are secondary issues and can be fixed later. More importantly, the issue of insufficient detail in the results needs to be addressed.

## SPECIFIC COMMENTS

L23 – The language about “shocking” the public is rather sensationalistic and I'm not sure is actually fair. Also, the use of the term “Arctic” is not really appropriate. While the 2017 landslide was north of the Arctic circle, many of the other events described in the text are subarctic.

L31 – For the Tyndall/Taan landslide, there are a few other papers that the authors may wish to familiarize themselves with:

1. Bloom and others wrote about the landscape modifications

<https://www.sciencedirect.com/science/article/abs/pii/S0169555X19305215> 2. George and friends did some modelling <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2017GL074341>

3. Haeussler and colleagues published a paper based on field data (mostly in submarine realm): <https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2018JF004608>

L69 - I find this “50% larger” an odd statement (and I realize it's more or less exactly

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what Gauthier said). The volume of Lituya 1958 was  $\sim 30 \times 10^6$  m<sup>3</sup>, and the reported volume of the Karrat 2017 landslide was  $35\text{--}58 \times 10^6$ , so a range of 17–93% larger.

L73 – No need to describe who led the expedition or where they are from.

L90 – Here (and elsewhere), I found the descriptions of the deposits lacking in detail to the point where they are not particularly useful for other studies.

L102 – As above, the description of “modified the relief of cliffs” is far too ambiguous. Modified how? Can you explain the changes via some maps perhaps?

L111 – I don’t understand what “modified by snow-melt flow tsunami deposits accumulations” means.

L120 – The idea that the finer deposits were trapped by vegetation and so didn’t travel as far as the coarser material is very interesting. Do you have any way to quantify (or even qualify) the vegetation prior to the tsunami? My understanding of your results are that they are limited to the post-tsunami landscape for the most part.

L130 – What are “point foundations”? Do you mean the building is set on top of (above-ground) boulders or concrete piers at the corners?

L144 – The section on waste is interesting but especially vague.

L159 – I am really surprised to see no mention of the Vajont disaster here. Yes, this was in a reservoir and not the ocean but the mechanisms are very similar.

L180 – This paragraph would benefit from some numbers describing the areas being described. So for example, you state that Benjamin mapped 20 rock avalanches along a “short section” of coast. What is short? 100m? 100km?

L185 – Why is this described as a “pilot study”?

L189 – If you are going to state that the “scientific community did not really believe. . .” you definitely need a citation or two to back up that claim.

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L195 – The conclusions raise several points that were not actually discussed specifically in the text. Similarly, Table 1 contains information that was not described in-text.

Fig 4 – I found that it was not easy to compare panels (a) and (b) since they are from slightly different vantages. Panel (c) is also confusing. The red buildings are damaged or destroyed? And the yellow buildings were moved from where?

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