

The Cryosphere Discuss., referee comment RC2
<https://doi.org/10.5194/tc-2021-318-RC2>, 2022
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Comment on tc-2021-318

Anonymous Referee #2

Referee comment on "Insensitivity of mass loss of Icelandic Vatnajökull ice cap to stratospheric aerosol injection" by Chao Yue et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-318-RC2>, 2022

The main idea seems to be that: (a) Geoengineering reduces the effect of global warming, somewhat, on the Iceland ice cap, and (b) this is different from how Greenland behaves for a variety of reasons: thinner, smaller, fewer marine terminating glaciers, high precipitation, high geothermal heat flow, etc. HOWEVER... the main ideas are repeatedly lost in a mountain of detail. Needs major rewrite to put the main ideas (whatever they might be) front and center, and use the details to support it.

Figures need major work. They are unnecessarily hard to interpret. Difficult / inappropriate color scales, lack of titles on axes, overall plot and color scale where they could have been used, Hard-to-distinguish lines with fine gradations in colors, large matching problems between lines and legends, lack of glacier labels (except in one figure), etc. This is making the reader work WAY too hard to understand the data in these figures.

The procedure seems pretty straightforward: run an ESM, use it to force PISM, see what happens. And before that, spinup for a certain period of time. Again, this section needs to be better organized around main ideas, rather than getting lost in the details.

See comments below; and also inline in the attached PDF.

38: How do you measure surface MASS balance in meters per year? Is this meters per year of ice? If so, what ice density do you assume? Or is it m/yr of "ice water equivalent?" In which case, why not just stick with mass units and call it 800 kg/m²? Or is it decrease in elevation with unknown density?

51: strike "ever" and "very". Don't use the word "very", ever.

52: How is behavior of North Atlantic atypical? Is it warmer or colder than "typical" and why? "because of the AMOC" is a bit of a mysterious reason.

54: What do words like "considerably" and "much less" mean??

55: "Furthermore, polar amplification leads to concerns on the stability..."; and add a reference for polar amplification.

57: Langue seems overly wordy

58: Not sure what effects are unwelcome? The descriptions of geoengineering effects earlier in the paragraph seem welcome. I'm confused...

58: "Effects" is a fine word, no reason to use "impacts." Impact is a verb when one body hits another and makes a crater... Turning that into a noun and using instead of an existing good word ("effects") is torturing our poor English language

60: strike "state-of-the-art." This is a science paper, not marketing material. Instead of "state-of-the-art," just state which version of PISM you used. eg; PISM 3.5 (or whatever).

63: Just say **"business as usual" scenario**. I understand it's a scenario we won't like. But it's an oxymoron to label "business-as-usual" as "extreme", especially if it's the most likely scenario. In other words, your use of the word "extreme" is poorly defined here.

63: Not sure of the word "branches off? Maybe use "depart" instead? Anyway, why are we using a scenario that started in 2020, when it's now 2022?

67: Did you really use PISM version 1.0? Please explain which version of PISM you ACTUALLY used. Also, please use correct PISM URL: <https://www.pism.io>

72: Are they "free parameters" or "hyperparameters"? Are the two terms different, and which is more appropriate here?

73-74: Do you have references for any of these schemes?

76-77: Where / how did you get all these datasets? Don't hide the references in the Figure captions.

83: What is $.025\text{deg}^2$ resolution, in km, for Iceland?

Figure 1:

i. (d) and (e) should be reversed; as generally things are laid out from left-to-right, not in circular or spiral patterns.

ii. Use standard terminology such as ELA, instead of "equilibrium line boundary."

iii. For (e), why is it so artificial?

iv. Use a better color scale, i.e. (a) one made for elevations, and (b) a scale with discrete segments, not continuous. It's hard to tell what's what with contiguous scales. See here for color schemes suitable for topography: <http://soliton.vm.bytemark.co.uk/pub/cpt-city/views/topo.html>
http://soliton.vm.bytemark.co.uk/pub/cpt-city/ncl/tn/topo_15lev.png.index.html

v. In caption, but the Berthier & Toutin reference AFTER "in summer 2010"

vi. For (d), use a +/- gradient color scale (again, with discrete colors not continuous). Blue/red is good; with blue as $\text{SMB} > 0$ and red as $\text{SMB} < 0$. This is a good one:
<http://soliton.vm.bytemark.co.uk/pub/cpt-city/gery/tn/seismic.png.index.html>
http://soliton.vm.bytemark.co.uk/pub/cpt-city/ncl/tn/temp_19lev.png.index.html

With a properly centered color palette, you won't need to draw the ELA as a dotted line.

93: Why spinup for 200 years? Figure 2 seems to suggest 400 is sufficient. Or why not 4000 years?

Please also note the supplement to this comment:

<https://tc.copernicus.org/preprints/tc-2021-318/tc-2021-318-RC2-supplement.pdf>