

Interactive comment on “GERALDINE (Google earth Engine supRaglAcial Debris INput dEtector) – A new Tool for Identifying and Monitoring Supraglacial Landslide Inputs” by William D. Smith et al.

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I enjoyed reading the paper "GERALDINE (Google earth Engine supRaglAcial Debris INputdEtector) - A new Tool for Identifying and Monitoring Supraglacial Landslide Inputs" and I recommend it for publication. The paper presents a new tool to exploit Landsat images in Google Earth Engine to map debris onto glaciers, therefore providing a semi-automatic tool to identify rock avalanches emplaced on to glaciers, and to track supraglacial debris movement. This tool can complement seismic analysis, and, if extensively applied, help developing F-M curves of rock avalanches onto glaciers in

C1

the past 37 years.

The following comments can help to further improve the paper.

I think a better overview of satellite spatial resolution and detectable landslide size is needed in introduction.

In the discussion section you could add some paragraphs:

- 1) A paragraph about development F-M curves, as it is a topic mentioned in introduction and conclusion but not directly addressed in the discussion
- 2) A paragraph about "eliminating the time-intensive process of manually downloading, processing and inspecting numerous satellite images" that is then mentioned in the conclusion. With considerations about transferability of the method to other satellites and data storage and processing platforms
- 3) and (eventually) how a similar approach may be used in other context (landslides in forested areas etc)

In line comments:

Line 14: Quantify? What's the size of the smallest detectable landslide?

Line 18: You can detect only the large landslides? This sounds in contrast with your earlier statement

Line 21: Ok cool. So large landslides that may not have been identified seismically. I don't think you need to try to "sell it" as alternative or better method than seismic identification, they can be used together. A tool like the one you have developed is cool by itself, seismic identification or not.

Line 24: Very cool! But you should expand the 37 year F-M topic in the discussions

Line 38: Can you method distinguish these 3 types of debris cover?

Line 40: How do you distinguish re-emerged debris vs supraglacially emplaced debris?

C2

Line 43: Ok, you should be clearer about the landslide size in the abstract too

Line 80: How small is "smaller landslides"

Line 82: It sounds like you are detecting large landslides that have no seismic signature rather than "small landslides".. maybe you can reword a bit to put emphasis on the combination of size, frictional melting etc.

Line 89: It may be worth expanding this paragraph/add new paragraph and give an overview of GEE and Landsat satellites. I see you discuss landsat satellites in method and validation sections but an overview of the satellites (different tiers, spatial resolution, accuracy, years of operation and revisiting time etc..) in the intro will help the reader.

Line 97: I think the resolution should be mention earlier in the paper too

Line 197: Would this still be usefull to assess some of the other supraglacial debris types presented in the introduction? Expand on this (see my comment of figure 5).

Line 217: maybe you could also briefly discuss how this method could be applied (maybe not in GEE but in some other environment) to other satellites

Line 276: In the intro you mentioned the possibility of the development of frequency-magnitude curves for landslides onto glaciers, but there is not discussion of that point here. Maybe you can add a short paragraph (with example?) to explore that potential.

Line 277 Something else that feels like may be missing in the discussion is the overview of the value of "eliminating the time-intensive process of manually downloading, processing and inspecting numerous satellite images" that is then mentioned in the conclusion

Line 287: I agree, but you should discuss this in the discussion. See my comment about frequency-magnitude

Figure 4: Can you can mark the collapse scar of these landslides? will help the reader

C3

Figure 5: Same, where is the landslide coming from? Can you discuss the origin of the other debris addition in the glacier on the top right of the picture? in relation to my comment at Line 197.

Very cool! Gio

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