The authors have proposed a simple method to detect surges at a global scale with an annual time scale. It is very well known that an active phase can significantly change the morphological features of a surge-type glacier and this study compares a sequence of radar backscatter images from the Sentinel-1 C-band mission in order to identify morphological changes corresponding to surge events. I really endorse the use of cloud based Sentinel-1 data inventory for glacier applications on a global scale, but this study missed many critical points that makes it eligible for publication at this stage. I was expecting a reasonable argument why such a framework is needed in addition to approaches based on continuous velocity observations, glacier area and surface elevation changes. Such approaches not only detect glacier surges but thoroughly quantify surge behaviors.

Major points are as follows:

1. The Method section is inadequately explained. Few questions remain unanswered. What is the rationale behind interpreting decrease in radar backscatter values as a surge activity? How does the algorithm detect surge automatically in three different scenarios? A surge activity was detected using data two years after the event, which means the timing of the surge activity cannot be detected using this technique. It is also not clear how the authors found out that the surge occurred two year prior to the technique applied in this particular case. Have you applied any thresholding?

2. The study claims that it has identified 18 new surge-type glaciers, which are not yet documented. Given the presented algorithm has been misinterpreted at many instances, more evidence (e.g. velocity changes, dh/dt) is required to further confirm the claim. I suggest making such comparisons in different regions, which is currently limited to two glacier locations.

3. Ice velocities of many ocean-terminating glaciers significantly vary due to ice frontal changes and do not correspond to a surge activity. However, the former scenario also results in heavy crevassing. It is not clear from the manuscript how the framework makes such a distinction.

4. 30: "*radar backscatter is increased during an active phase"* is contradictory to the three scenarios used for identifying glacier surges.

5. 130: It is also not clear how the study deals with misclassification and what needs to be done - manual intervention or thresholding? It means one needs to thoroughly check whether the glacier surged or not, which requires the use of optical images as well. In my view, this does not suit the purpose of proposing such a framework. It should have rather been proposed as a data fusion approach to detect glacier surges.

6. Limitation of the proposed framework to detect the surge of small glaciers should be discussed too.

Other comments

30: How did you check whether there was any influence due to rain or not - especially in HMA

30: How did the algorithm distinguish between existing and newly formed crevasses?

40: “*We create … winter periods*” should be better explained. I understood that you stacked all the images within 3 winter months and created a raster image with pixels containing the maximum values of the stacked images. What is the rationale to use the maximum of the image stack?

45 I was informed by the scientific community that the Sentinel-1 radar images available at GEE have georeferencing issues. This should be tested and clarified.

100: These classes must be explained earlier.

140: Another limitation is that the algorithm fails in cases where glacier surge does not change the geomorphology to an extent which can be detected using radar backscatter changes.

Lake drainage events abruptly result in elevated radar backscatter as water-filled lakes (specular reflection: low backscatter) empty and expose the icy lake bottom surfaces (high backscatter).