Surface elevation change on Taku Glacier in southeastern Alaska from 2014 to 2021

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Taku Glacier was the only advancing glacier in the Juneau Ice Field until 2015. However, the glacier's mass balance record has been in a decreasing trend since 2013, and recorded a mass loss of 0.8 km^2 between 2013 and 2018 (e.g. McNeil et al., 2020). In addition to the mass loss, ~20 m retreat has been observed between July 2015 and September 2018, and further retreat is expected in the future (e.g. Zechmann et al., 2020). Repeated observations near the glacier have been conducted by the group from University of Alaska Southeast, focusing on glacier-sediment interactions during the onset of the retreat. In this study, we studied the surface elevation change on Taku Glacier from 2014 to 2021, utilising satellite data (ArcticDEM, 2 m resolution). From June 27th to July 1st, we also performed UAV, GPR, GPS, and LiDAR surveys in the near-terminus area of the glacier. Here, we report data obtained in the field as well as the results of satellite data analysis (Figure 1).
Satellite data showed a glacierwide decline in the surface elevation of Taku Glacier from 2014 to 2021. The change was more pronounced in the near-terminus regions. UAV surveys were conducted on the western and eastern part of the glacier terminus. Images acquired by the survey was used to generate high-resolution DEMs and orthorectified mosaic images covering the studied region. A comparison of DEMs obtained by UAV surveys in May, 2023 and June 2023 indicates a generally decreasing trend in the surface elevation (Figure 2). In the presentation, we discuss the detail of the recent glacier change base on the study results.

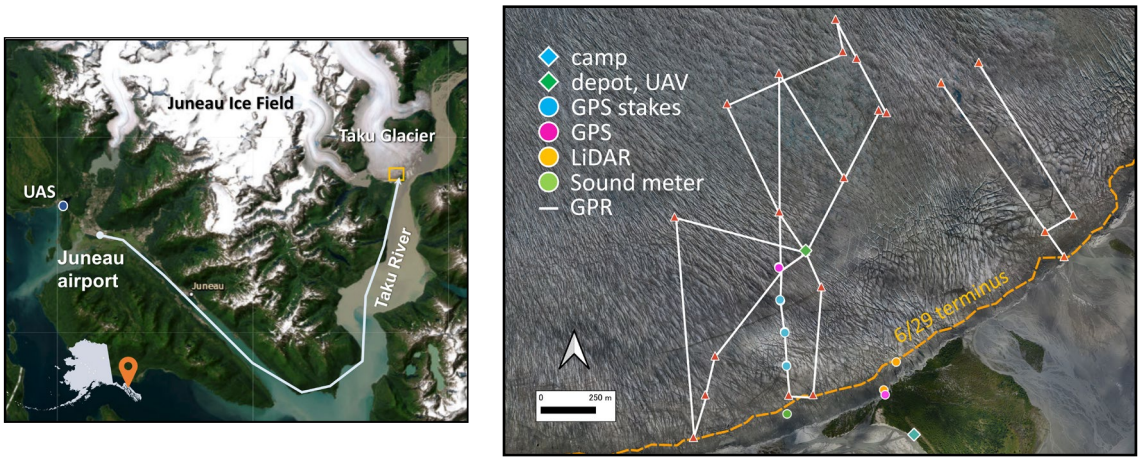

Figure 1. Location of the study site (Left) and field research methods conducted on the near-terminus area (Right). Indicated on the image are the locations of University of Alaska Southeast (circle), Juneau Airport (dot), flight route (solid line).

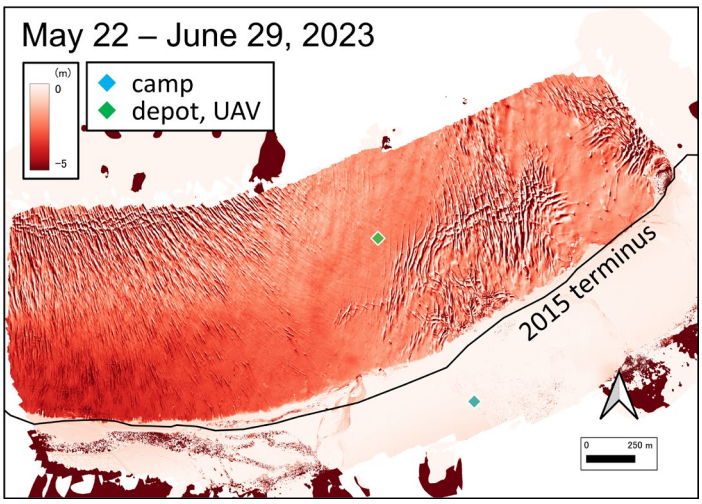

Figure 2. Surface elevation change of the near-terminus area on Taku Glacier from May 22nd to June 29th, 2023.

References

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