グリーンランド北西部における溢流氷河の末端位置と流動速度の季節変化

榊原大貴[1, 2]、杉山慎[2]
[1] *北海道大学大学院環境科学院*
[2] *北海道大学低温科学研究所*

Seasonal changes in ice front position and flow speed of marine terminating outlet glaciers in northwestern Greenland

Daiki Sakakibara[1, 2] and Shin Sugiyama[2]
[1]*Graduate School of Environmental Science, Hokkaido University*
[2] *Institute of Low Temperature Science, Hokkaido University*

Greenland ice sheet is losing mass as a result of increased melting and ice discharge through marine-terminating outlet glaciers (e.g. Enderlin et al., 2014). These mass losses significantly contribute to sea level rise. Therefore, it is critical to take mass loss of marine terminating outlet glaciers into account for future projection of the sea level rise. In order to include the contribution of outlet glaciers to the future projection, influences of atmosphere and the ocean on the glacier dynamics should be better understood. Thus, it is important to study variations of marine terminating outlet glaciers in connection with atmospheric and the ocean condtions. We analyzed satellite images to measure frontal positions, ice speeds, and conditions of sea ice / ice mélange in front of the termini of 19 marine terminating outlet glaciers in northwestren Greenland over the period from 2013 to 2015 (Figure 1). The results were utilized to investigate relationships between seasonal frontal position, flow speed, air temperature, and sea ice / ice mélange condition.

Bowdoin, Verhoeff, Morris Jesup, and Diebitsch Glaciers advanced from spring to early summer and retreated in mid summer. The retreated position continued through the fall. Magnitude of seasonal variation of these glaciers ranged between 100 and 150 m. Heilprin, Tracy, Farquhar, Melville and Sharp Glaciers often rapidly retreated follwoing gradual advance. The difference between maximum and minimum terminus positions is a range from 150 to 400 m. Summer retreat often began when sea ice / ice mélange in front of the glacier terminus dissapeared. These results sugget that sea ice / ice mélange in front of terminus suppress the retreat. Most of the studied glaciers indicated speedup in spring and slowdown in late summer. Magnitude of the speedups was a few 10% relative to the slowest speed. It is suggests that the spring speedup is driven by meltwater input to the bed.

References

Enderlin, E. M., I. M. Howat, S. Jeong, M. J. Noh, J. H. van Angelen, and M. R. van den Broeke, An improved mass budget for the Greenland ice sheet. Geophys. Res. Lett., 41, 866–872, 2014 .

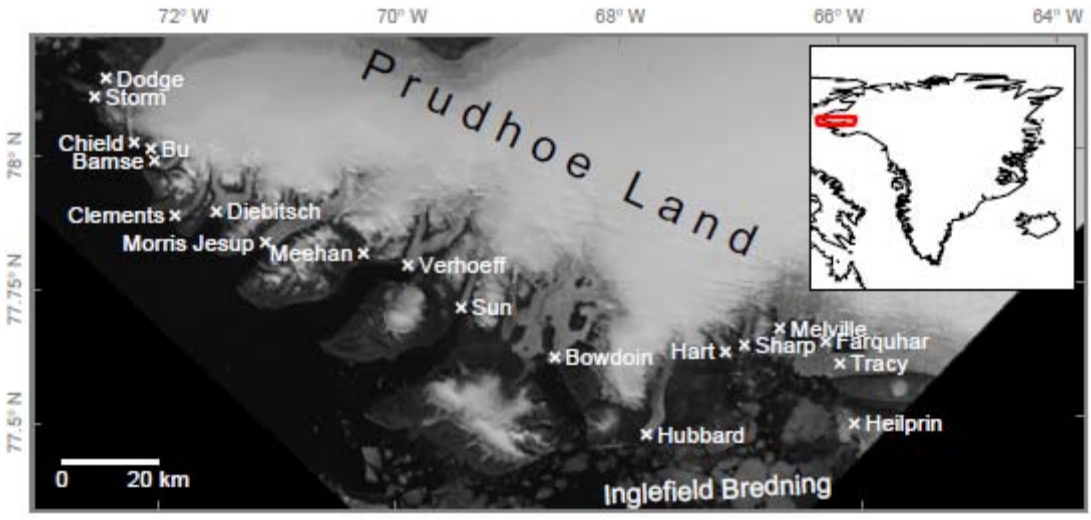

Figure 1. Studied 19 marine terminating outlet glaciers in northwest Greenland. Background is a Landsat 8 OLI band 8 image acquired on July 9 2014. The inset shows the location of study area in Greenland.