

グリーンランド北西部ボードイン氷河の近年の氷厚減少

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Recent thinning of Bowdoin Glacier, a marine-terminating outlet glacier in northwestern Greenland

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Ice discharge from marine-terminating outlet glaciers has increased in the Greenland ice sheet (GrIS), and this increase plays important roles in the volume change of GrIS and its contribution to sea level rise¹. Thinning of GrIS marine-terminating outlet glaciers has been studied by the differentiation of digital elevation models (DEMs) derived by satellite remote-sensing (RS)². Such studies rely on the accuracy of DEMs, but calibration of RS data with ground based data is difficult. This is because field data on GrIS marine-terminating outlet glaciers are few. In this study, we combined field and RS data to measure surface elevation change of Bowdoin Glacier, a marine-terminating outlet glacier in northwestern Greenland (77°41'18"N, 68°29'47"W). The fast flowing part of the glacier is approximately 3 km wide and 10 km long. Ice surface elevation within 6 km from the glacier terminus was surveyed in the field in July 2013 and 2014, by using the global positioning system. We also measured the surface elevation over the glacier on August 20, 2007 and September 4, 2010, by analyzing Advanced Land Observing Satellite (ALOS), Panchromatic remote-sensing Instrument for Stereo Mapping (PRISM) images. We calibrated the satellite derived elevation data with our field measurements, and generated DEM for each year with a 25 m grid mesh. The field data and DEMs were compared to calculate recent glacier elevation change. Mean surface elevation change along the field survey profiles was -16.3 ± 0.2 m (-5.3 ± 0.1 m yr⁻¹) in 2007–2010 and -10.8 ± 0.2 m (-3.8 ± 0.1 m yr⁻¹) in 2010–2013. These rates are significantly greater than those observed on non-calving ice caps in the region, and similar to those reported for other marine-terminating outlet glaciers in northwestern Greenland. Loss of ice was greater near the glacier terminus, suggesting the importance of ice dynamics and/or interaction with the ocean.

References

¹ van den Broeke, M. *et al.*, Partitioning recent Greenland mass loss. *Science*, 326, 984–986, 2009.

² Kjær, K. H. *et al.*, Aerial photographs reveal late–20th-century dynamic ice loss in northwestern Greenland. *Science*, 337, 569–573, 2012.