

SVARTISEN 2016: EXPEDITION REPORT

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Background

With the assistance of the QMUL Expeditions Fund, I was able to participate in a research expedition to Svartisen Østre icefield, Norway, with a team of researchers from the University of Portsmouth (Dr Clare Boston, Dr Harold Lovell and Paul Weber). The expedition forms part of a larger research project entitled “*Modelling plateau icefield stability under warming climate scenarios*”, which aims to use the glacial landforms left by the Little Ice Age (LIA) expansion of Svartisen Østre icefield to investigate past, present and future icefield behaviour over decadal to centennial timescales. Arctic ice masses – a large proportion of which are plateau icefields – are expected to make a relatively large contribution to sea-level rise over coming decades. The potential of plateau icefields for dynamic and non-linear behaviour in response to warming increases uncertainty and impedes accurate estimates of their future contributions. Their low altitudinal range makes them particularly susceptible to rapid recession. However, once an icefield’s outlet glaciers have receded onto the plateau, the ice is thin and slower moving with longer response times, which could contribute to stabilisation. Key research questions are: (1) will plateau icefields stabilise under warming climates, exhibiting non-linear recession rates? (2) What thresholds control their behaviour?



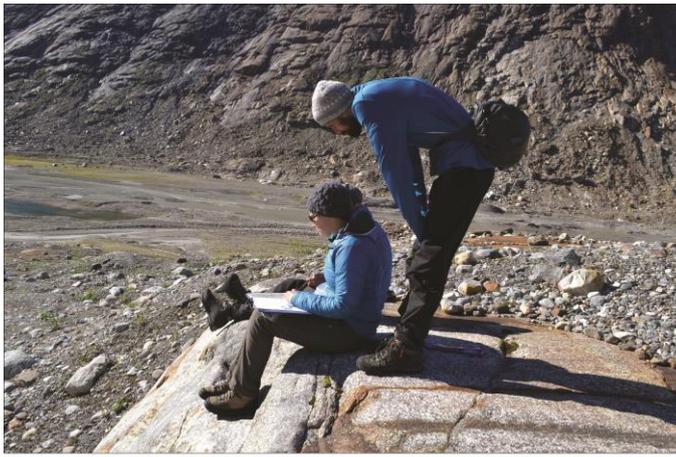
Top photo: View across Bogvatn towards Bogbreen. Bottom photo: View of Fingerbreen, a major outlet on the eastern side of Svartisen Østre icefield, where we spent most of the expedition.

Fieldwork

The research expedition involved field-based mapping of glacial landforms and sedimentological analyses. Field mapping involved systematic traverses of glacier forelands in the study area and recording pertinent landforms on topographic base maps, with the aid of a handheld GPS.

Sedimentological analyses involved excavating sections through moraines – mounds and ridges of debris deposited by the glacier – using a trenching tool to expose their internal composition and structure. A measured diagram of the exposed sediment (a section log) was then produced, from which the processes of formation can be established. Additionally, clast morphological analysis was performed, which involves measuring the axes of 50 clasts and determining their shape based on descriptive criteria (e.g. angular, rounded). These, in turn, can provide an indication about glacier dynamics and thermal regime (e.g. whether the ice-front was active and oscillating or behaving sluggishly).

Mapping and sedimentological analyses were undertaken at three glaciers during the trip: Fingerbreen, Bogbreen and Reinsdyrbreen. The latter glacier so-named after we saw a reindeer traversing the glacier surface on the final day of fieldwork (the glacier is unnamed on Norwegian topographic maps).



Photos from fieldwork at Fingerbreen. Top left: Discussing the geomorphological mapping. Top right: Excavating a section through a moraine near the ice-front. Bottom left: "These stones are your friends" (Doug Benn). Undertaking clast shape measurements, with the outlet in the background. Bottom right: All the members of the 2016 Svartisen Expedition (L-R: Harold Lovell; Clare Boston; myself; and Paul Weber).

Field experience

For the majority of the trip, we were based at Fingerbreen, a major outlet of the eastern side of the icefield. Access to the outlet involved a ~16 km walk in from the car – beginning with a ~3 hour climb – carrying large, heavy rucksacks (>15 kg). Throughout the trip we wild camped and therefore had to transport all our kit and food for 9 days in our rucksacks. To save weight, we opted to share tents, and so we spent the trip sharing rather cosy 2-man tents and getting to know each other pretty well! Wild camping for an extended period also meant living off a selection of some *delicious* dehydrated meals, supposedly endorsed by Sir Ranulph Fiennes. The dehydrated chocolate pudding, which we had every-other-night, was a particular highlight for all the team! Our daily routine involved waking up at ~0730 to have breakfast and prepare for the day's fieldwork, which can take a *long* time when wild camping. Fieldwork hours were between 0900 and 1800, before heading back to base camp for our evening meal. Downtime was spent reading books – I opted for *The Catcher in the Rye* and *Catch-22* – before heading to bed, usually before 2100... we got *lots* of sleep during the trip! Overall, it was a most enjoyable experience and it was great fun working with the other team members.

Acknowledgements

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