

Arctic expedition to Svalbard

In July and August 2010 an international team led by Birmingham's Ian Fairchild, Carl Stevenson and **Emily McMillan** (<file:///biops2/webteam/New%20website/School%20website%20backups/GEES/www.gees.bham.ac.uk/staff/mcmillane.shtml>) travelled to northern Svalbard (~79°N) as part of a NERC funded project which is testing certain aspects of the 'Snowball Earth' theory.

The project has the acronym GAINS (Glacial Activity in Neoproterozoic Svalbard). The field expedition focused on outcrops of ca. 750 Ma (Neoproterozoic) sediments that record glacial activity and have been correlated to other similar lithologies believed to have been deposited at the same time period in other parts of the world.

Professor Ian Fairchild (<file:///biops2/webteam/New%20website/School%20website%20backups/GEES/www.gees.bham.ac.uk/staff/fairchildij.shtml>) is overall lead for the project which builds on a Science publication¹ that showed geochemical evidence for an anomalous (CO₂-rich) atmosphere during glaciation. **Dr Carl Stevenson** (<file:///biops2/webteam/New%20website/School%20website%20backups/GEES/www.gees.bham.ac.uk/staff/stevensonct.shtml>) will lead palaeomagnetic studies of the glacial deposits, which are thought to have formed at low latitudes, and will be the principal supervisor of a PhD student examining magnetic fabrics.

The field party last summer included Ian, Carl, Emily, Doug Benn (University Centre, Svalbard UNIS), Mike Hambrey (University of Aberystwyth) and Mike Petronis (New Mexico Highlands University). Doug, Mike H and Ian were the seasoned arctic fieldworkers. Mike H and Ian had visited the Northern Svalbard localities in the 1980s with the Cambridge Arctic Shelf Programme (CASP). Doug, resident in Svalbard, spends his time studying glaciers from the inside, exploring ice caves. So for Carl, Mike P and Emily, this was a new experience.



Left to right: Ian Fairchild, Carl Stevenson, Emily MacMillan, Mike Petronis, Doug Benn, Mike Hambrey

Part of our preparation (coordinated by Emily) was to plan and purchase our rations, identify and purchase equipment (lots of winter gear), plan the logistics of Arctic field insertion. Next is getting to Svalbard, which isn't difficult with direct flights to Longyearbyen, but we did have to ship our rations and equipment separately, which were helicopter lifted to our field camp from a ship.



An entirely different experience from the previous Birmingham expedition to Svalbard in the 1950s before public transport reached so far north (see related article on these pages).

When we arrived in Longyearbyen, we based ourselves in what used to be miners' accommodation, now a tourist guesthouse, and took a logistical base in an office in the University Centre (UNIS). Planning the logistics of our insertion into the field by helicopter involved many phone calls to the Sysselman's office, who's helicopter we used, and nail biting while we gambled on what the weather would be like 100 miles to the north. Another part of our preparation for arctic field work once in Longyearbyen is safety training which includes firearms training in case of a polar bear attack. Between six of us, our armoury included three rifles, two flare guns with flash bang and signal flares, and trip wire kit with warning trip flares. We didn't encounter any bears or have any need to use our weapons, but the trip wire was accidentally set off a few times; the perpetrators will remain nameless.



Longyearbyen, late August around midnight, the sun is low but will not set for a few weeks yet. Pylons used to transport coal to the port by cable from the numerous mines around the valley can be seen.

We spent three and a half weeks in northern Svalbard, at about 80° north. This is quite remote, about one hundred miles north of Longyearbyen the capital of Svalbard where most visitors to the archipelago would arrive. Our field insertion was by helicopter (rented from the Sysselman) from



Longyearbyen and we struck a base camp at each location we visited.

Helicopter leaving us at least 100 miles from nearest civilisation at ~79°N

Conditions in camp were generally pretty comfortable. This was helped by unusually settled weather for most of our work. The twenty four hour sun light took a little getting used to, but certain colleagues' snoring was much more of a hindrance to uninterrupted sleep! Emily's meticulous planning and preparation meant our rations lasted very well, and Mike P's New Mexican hot sauces meant our palates were never bored.

Science wise, we have discovered some interesting new aspects about the changing environment during Snowball Earth glaciations. We currently plan to return to Svalbard next April (2011), this time using snow mobiles for transport. There are further planned helicopter supported expeditions planned later next year and possibly the following year (budget permitting). You can find out more about the GAINS project and follow our progress at:

www.gees2.bham.ac.uk/research/clusters/geosystems/gains2010.shtml
<http://www.gees2.bham.ac.uk/research/clusters/geosystems/gains2010.shtml>





View of the main Snowball Earth section visible to the right. The maroon-red sediments mark the main glacial layer, which are overlain by pale carbonate sediments which indicate a sudden change to tropical conditions. On top of the pale carbonates, the red then dark grey sediments were then deposited in deeper waters as sea level rose.

Bao, H., Fairchild, I.J., Wynn, P.M. and Spötl, C. 2009 Stretching the envelope of past surface environments: Neoproterozoic glacial lakes from Svalbard. *Science*, 323, 119-122

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