BAILLET LATOUR LAUREATE RECOUNTS HER FIRST FIELD SEASON IN ANTARCTICA

Dr. Kate Winter of Northumbria University in the UK is the 2018-2020 laureate of the prestigious Baillet Latour Antarctica Fellowship. During the 2018-2019 research season, she stayed at the Princess Elisabeth Antarctica research station to conduct the first of two field work seasons for the BioFe research project she's working on, thanks to the Fellowship's funding.

What is the BioFe research project about?

The BioFe (bio-available iron) project is examining the transport route of nutrients such as iron (which feed primary producers in the ocean such as phytoplankton) from inland areas of the Antarctic to the Southern Ocean.t

It is hypothesised that sediment that comes from landslides and hillslopes derived sediment from mountains that reach high above the East Antarctic Ice Sheet could contain essential nutrients like bio-available iron, which is transported to the Southern Ocean by glaciers that flow from the interior of the Antarctic Ice Sheet towards the coast.

What were the objectives of your field work during this season?

We used a variety of techniques to examine the mountains and ice flows near the Princess Elisabeth Station. Some days we would go out with the radar sled to investigate ice flows around the Sør Rondane Mountains. Radar allows us to peer beneath the surface of the ice and to examine the subglacial topography and layers in the ice, as well as other features in the ice, like sediments.

One of the field guides from the International Polar Foundation made a sled to carry our radar equipment. Each morning we would pack the radar and tow it on the sled behind our snowmobile. Once we reached the field site, we could quickly set up the radar system on the sled and tow the radar across glacier surface.

We took transects close to the base of the Sør Rondane Mountains, across the ice flow, or perpendicular to the sides of the base of the mountains. We went very slowly to get as much detail as possible. For some transects we moved 10 cm every 4 seconds!

While doing the radar soundings, we had to take very accurate GPS measurements of where we were doing the radar survey, and what the topography was like. We used a base station, as well as a roving unit, which we took with us on the sled when we went out into the field, so that we could take soundings down to millimetre accuracy.

I understand you were using a drone in your research as well?

Yes. We were using a Phantom 4 Pro drone to take images of the Sør Rondane Mountains so that we can create 3D models of different rock walls. During the 2019-2020 season, we'll repeat the measurements again to create another model. By comparing the models from one another, we will be able to see how much the mountains have changed over one year. By identifying gains of rock at the base of the cliff, and losses of rock above, we will be able to see how much sediments the mountains produce over the space of a year.

How often did you get to fly the drone?

We were able to fly the done over the mountains when it wasn't so windy, which was quite a few times, surprisingly.

Did you accomplish anything else during the season?

We installed a Raspberry Shake seismometer. We had to struggle to find the perfect site for it. But Alain helped us to find an ideal place to put it. Alain helped me put the seismometer inside a windproof shell and attach it to a bedrock surface. To keep it running until next year, the seismometer was hooked up to solar panels that we installed on the mountain, which will hopefully replenish the battery (when there is sunlight) and power the Raspberry Shake seismometer.

Why did you install a seismometer?

Primarily to detect when the rocks might be falling. Comparing drone models from the 2018-2019 season and the 2019-2020 season will allow us to see where the rocks have fallen. But taking seismic measurements will allow us to determine when the rocks move.

What is a Raspberry Shake seismometer?

It's made by a startup company that specialises in low-cost seismometers which stream seismic data live to the internet. Anyone who wants to be a citizen scientist can install one of their RaspberryPi powered devices to detect seismic activity where they live and contribute to the global seismic observation network. On their website, you can see where the seismometers in their global network are located.

Unfortunately, we can't link the one we installed on the Sør Rondane Mountains to the Internet, because it would consume too much battery power. But maybe next year we could try to link another unit, closer to the base, so that we could share real-time data with the world.

But in the meantime, our seismometer will still collect seismic data from the Sør Rondane Mountains for my project.

I think it's the first time a Raspberry Seismometer has been installed in Antarctica. I tweeted about installing it (@DrKateWinter) and I got an email from the company that makes it saying that they are very excited to now have seismometers on all seven continents.

You make an effort to do outreach and communication about the research you're doing. Did you do any activities along these lines while you were in Antarctica?

Yes. My research assistant James and I filmed some footage discussing the objectives of the project for Bloomberg News. They're doing a documentary on "Scientists at the cutting edge of climate change research", and our project will be featured in the promotion for the series.

We've also been doing experiments designed by children from a few different schools to help them learn about the scientific method. Now that we've carried out the experiments in Antarctica, we'll deliver them to the schools in the UK.

The children at the schools designed the experiments with my help. During my stay in Antarctica, I filmed the experiments. Now that I'm back in the UK, I'll show the children the results of the experiments, and they'll graph the results of the experiments and try to interpret the results and understand what's happening.

After they've done that, I'll show the students what the scientists at the station think happened to give them a scientific explanation for their results. We hope to get the students engaged in doing science and using the scientific method as much as possible.

How was it being in Antarctica over Christmas and New Year's?

It was a busy time at the station. The container ship had arrived at the coast and the station team had to do traverses to bring back the supplies and equipment.

Duck a l 'orange was served for Christmas Dinner on the 24th. It was a nice atmosphere to have everyone working at the station sat down together to celebrate. On Christmas Day, we went to do some work on a glacier! In Antarctica we have to make the most of the good weather, so I enjoyed being outside, doing what I love.

On New Year's Eve, we had some champagne on base, which was quite a treat. We stayed up until midnight to welcome the new year and enjoyed the midnight sun. Then we went to bed and got up again at 7 am to see Alain head off on one of the 18-hour long traverses he did to the coast to get supplies from the ship docked at Crown Bay.

Any final thoughts on your first season at the Princess Elisabeth Antarctica?

It’s been wonderful season. And very comfortable. The staff are very friendly and helpful, and the atmosphere was very warm.

Right before we left, there was a small ceremony at the station to celebrate 10 years since the station was inaugurated. In addition to all the Belgians, French and Canadians, there was also a large team of Japanese researchers, and some Canadian pilots there to witness it as well.

Alain wanted to have a small ceremony while a lot of the scientists, visitors and station crew were still there. His pre-dinner speech came from the heart - he is always very grateful to the team that helped to build and maintain the station – and so are we. We had a very enjoyable stay, and we look forward to returning next year!