

NASA IceBridge Mission

NASA IceBridge Mission; the combination of the words NASA and Mission certainly fills me with some expectations about astronauts, space and the Hubble Space telescope as I arrive at Kangerlussuaq Airport on April 13th.

I have been selected as one of two teachers from Greenland to spend a week with NASA's team of scientists and air crew forming IceBridge Mission. Shortly after my arrival the 2 Danish teachers, Peter Gross and Erik Jakobsen, and the second teacher from Greenland, Signe Madsen from Sisimiut, team up with me. The next day the last participant Tim Spuck, a high school teacher in Oil City, Pennsylvania arrives.

We are all accommodated in the Kiss-building (Kangerlussuaq International Science Support) along with the rest of the IceBridge Mission team. We have already completed extensive forms about our health and it is now followed up with a longer video about safety on the plane. At the 18.00's briefing we were briefed by the Science Manager Michael Studinger and the meteorologist John Sonntag gives a forecast pointing to the East Coast as the target for next day's flight.

It is confirmed next day when we at 07.15 board the plane and see the map of today's mission posted. The morning is hectic, the aircraft and the science instruments must be checked before take off at 08.15.

Up in the air a world of ice and snow opens up and soon we only see the ice-cap all around the horizon while we move eastwards towards Helheim Glacier on the east coast of Greenland. The ice cap shines completely barren and white, a desert of ice that rises from the coast to 3200 m above sea level at the Camp Summit which I visited in 2009. We fly at an altitude of 200-500 m above the ice-cap's surface, so it is possible to see the details in the snow and many crevasses and sure enough the pilots tell us that they occasionally have seen polar bears from the cockpit! Crossing the ice cap takes about 2 hours and when the scientists have settled we can move around and get detailed descriptions of the researchers' methods.

There is room for a crew of 24 onboard the aircraft, including a meteorologist and an aircraft mechanic (!) and NASA's in-house photographer. The plane, a P-3, is said to be very stable, and Mission Manager Allan says reassuringly that it has been used to fly through hurricanes!

IceBridge is a 6-year NASA mission and the most comprehensive study of the Arctic ice from an aircraft ever. These flights will provide the best-ever 3-dimensional view of the Arctic and Antarctic ice, icebergs and sea ice. IceBridge fills the survey gap left by NASA's ICESat satellite that stopped in 2009 until the new ICESat-2 satellite is active, ICESat-2 is scheduled to launch in 2016.

Photographs are continuously taken out through the bottom of the plane; gravity is measured with 7 decimals accuracy. Variations in the magnetic field is measured and can tell us about the content of iron in bedrock beneath the ice and thereby the possibility of finding other metals.

The distance to the ice is measured with laser and radar while the ice and sea ice thickness are measured with radar and all measurements are combined with GPS mapping. By measuring the ice thickness with a very high precision, the amount of ice has melted since last year can be calculated and used by researchers ex. in the climate debate.

We see mountains protrude on the horizon and are thus approaching the east coast of Greenland and the flat monotone ice landscape is now being superseded by mountains with peaks, deep crevices and huge glaciers that "flows" through the valleys towards the sea. It is truly a magnificent sight

that meets us here on the east coast of Greenland and immediately there is great activity among all of us watching out the windows and taking pictures. We fly several times along the east coast in order to cover the area with the planned measurements (mowing the lawn, as they said). The flight takes about 8 hours and we make three flights, Wednesday we talk to reporters from Sermitsiaq, (a Greenlandic newspaper) Danish media and NASA.

NASA's IceBridge Mission has been a great personal experience and has provided valuable examples of applied research in Greenland. One of the goals of the new Greenlandic reform of College Education (upper secondary) starting in August 2012 is that teaching should be more culture-based, which can be done using examples from Greenland in the classroom.

IceBridge fits nicely into the new subject Science, which is introduced in August 2012. Science is an introduction to science that combines chemistry, physics, geography and biology; it is taught by only one teacher and will be focussing on projects. One of these projects could be ice where IceBridge mission can be used as a basis and students can work with data from NASA's website.

I have made a PowerPoint presentation and showed it to the students in my chemistry classes and used it as a starting point to talk about the different measurement methods, ice motion and ablation. It was not meant to be part of a longer course, but worked well because the students knew that I was going to leave with NASA and was therefore very interested and curious. Next year, it must fit into a scenario where we work with isotopes, ice cores, density, CO₂ and climate, and in this context, I will also include my trip in 2009 to U.S. research station Camp Summit on middle of the ice sheet where the ice is thickest (ca.3200 m).

I have put the pictures on the school website which I edit and showed the presentation in a video-conference in a science course where the other science teachers from the four high schools participated in Greenland (14-16 May).

In connection with the new science subject, all teachers in Greenland have the opportunity to contribute with projects (modelled after a template to ensure uniformity). There I will try to put together a project on ice, where I will use my experience from NASA IceBridge and Camp Summit. Moreover it has incited me to raise funding to a training in science teaching as NASA offers (<http://www.us-satellite.net/endeavor/index.cfm>)

It is very possible that I can use it in my work with science talents that I am starting after summer.

I would like to thank the IceBridge team, the U.S. embassy in Copenhagen and IIN in Nuuk for this productive and inspiring opportunity.

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