

NASA's IceBridge finishing up successful Arctic campaign

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Saunders Island and Wolstenholme Fjord with Kap Atholl in the background seen during an IceBridge survey flight. Sea ice coverage in the fjord ranges from thicker, white ice seen in the background, to thinner grease ice and leads showing open ocean water in the foreground. Credit: NASA / Michael Studinger

With several weeks of science flights in the books, researchers with NASA's Operation IceBridge are on the way to completing another successful campaign to maintain and expand a dataset that started with NASA's ICESat in 2003, and gather additional Arctic ice measurements

that can improve computer models of sea and land ice. Since the start of the campaign in mid-March, the IceBridge team has measured sea ice, mapped sub-ice bedrock and gathered data on Greenland's glaciers by flying science missions out of Thule Air Base and Kangerlussuaq in Greenland, with a short deployment in Fairbanks, Alaska.

Operating out of these different locations allows IceBridge to gather data in a variety of areas throughout the Arctic. From Thule Air Base, researchers aboard NASA's P-3B airborne laboratory can measure land and [sea ice](#) in and around northern Greenland. More southerly areas, such as glaciers on Greenland's southeast coast, the scenic Geikie Peninsula and the Jakobshavn basin on Greenland's west coast are reachable from Kangerlussuaq, a small town and transportation hub in western Greenland. In addition, for a few days early in the campaign, researchers relocated to Fairbanks, affording views of the Beaufort and Chukchi seas north of Alaska and across the entire Arctic Ocean.

Seeing Sea Ice

Many in the scientific community are interested in the changing state of Arctic sea ice. This interest has been amplified by events that put a point on how Arctic sea ice area and thickness are decreasing, such as last year's record-breaking sea ice minimum. "I think the continued downward trend in Arctic sea ice volume speaks to the urgency to collect as much data on the condition of the ice pack as possible," said Sinead Farrell, a sea ice scientist at the University of Maryland and NASA's Goddard Space Flight Center, Greenbelt, Md.

IceBridge scientists will use their new measurements to build a collection of [sea ice thickness](#) data—known as the quick look product—aimed at use in computer models that forecast sea ice extent. This product was first released in 2012, and relies on new techniques to ensure the data are made available through the National Snow and Ice Data Center weeks

after collection.

While in Fairbanks, Farrell saw [Arctic sea ice](#) and IceBridge's data collection first hand when she took part in several survey flights. "Flying on the P-3 reminds you how complex the sea ice environment really is," said Farrell. "It's also a great opportunity to speak with the instrument teams and learn more about the measurement techniques."

Flying Over Glaciers

After a series of sea ice flights from Thule and Fairbanks, IceBridge flew to Kangerlussuaq for the campaign's second stage in early April. For about two weeks the IceBridge team flew out of Kangerlussuaq to survey portions of the Greenland ice sheet and various outlet glaciers. Some of these flights studied previously measured areas, helping to build the existing data record, while others improved existing coverage by surveying areas where there was little or no information.

One of the main areas of interest during the campaign was the Jakobshavn Glacier on Greenland's west coast, a site of IceBridge surveys each year since the mission's start in 2009. IceBridge conducted two surveys of the region—a north-south grid on Apr. 4 and an east-west flight on Apr. 10. Researchers aboard the P-3B discovered that at some point in the six days between these two missions a large segment of ice had calved, or broken off of the glacier's edge. The spot where the calving occurs becomes the glacier's new front edge, which in this case was 200 meters upstream.

Favorable conditions allowed IceBridge researchers to accomplish their goal of completing all high-priority surveys in the southern part of Greenland. "Consistently good weather at our science target locations and in Kangerlussuaq has allowed us to fly all high priority flight lines for this portion of the deployment," said Christy Hansen, IceBridge's

project manager at NASA Goddard.

On the Move

After two weeks in Kangerlussuaq the IceBridge team moved its base of operations back to Thule for more sea ice flights and surveys of northern Greenland glaciers. Changing locations during the campaign expands IceBridge's reach beyond what's possible from one location, but requires time for packing, unpacking and testing gear. "This means that we must effectively plan ahead, and that all instrument teams have a smart, efficient way of packing and unpacking their equipment," said Hansen. It also calls for coordination with personnel at three different locations. "We have established three sets of contacts at the various weather offices, established transportation for our team and must work within a varying set of airport requirements and operating hours," said Hansen.

In addition to the usual team of researchers and flight crew members, IceBridge was joined by several visitors including an American documentary film crew and high school science teachers from Greenland, Denmark and the United States. These teachers traveled to Kangerlussuaq with the help of the National Science Foundation funded PolarTREC (Teachers and Researchers Exploring and Collaborating) program, the U.S. Embassy in Copenhagen and the governments of Greenland and Denmark. As in the 2012 campaign, teachers participated in IceBridge flights to get a unique view of polar science and experiences they could then take back to the classroom to educate and inspire their students. During their time with IceBridge the teachers wrote online journal entries and communicated with students through online video chats, reaching more than 400 students.

As the campaign comes to a close, IceBridge mission planners are already looking ahead to this fall's Antarctic campaign, which will operate from one of two locations. As in previous years IceBridge has

the option to deploy to Punta Arenas, Chile, with NASA's DC-8, but the primary plan is to fly the P-3B out of Antarctica's McMurdo Station, conducting IceBridge surveys from the Antarctic continent itself for the first time. IceBridge has been working with the National Science Foundation toward getting approval for operations at McMurdo and the final decision will be made over the next few months. In the meantime, IceBridge's science team, instrument teams and project science office will focus on which areas in the Antarctic to study and start building flight plans.

More information: www.nasa.gov/icebridge

Provided by NASA's Goddard Space Flight Center

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