

NASA Airborne Science Campaign Begins Antarctic Sequel



Scientists returned this week to the Southern Hemisphere where NASA's Operation IceBridge mission is set to begin its second year of airborne surveys over Antarctica. The mission monitors the region's changing sea ice, ice sheets and glaciers. Researchers will make flights from Punta Arenas, Chile, on NASA's DC-8, a 157-foot airborne laboratory equipped with a suite of seven instruments. The focus is to re-survey areas that are undergoing rapid change and to embark on new lines of investigation.

Michael Studinger, IceBridge project scientist at NASA's Goddard Space Flight Center in Greenbelt, MD, USA, is excited to learn how the glaciers and sea ice have changed since last year's campaign. "We also are going to be mapping uncharted regions that will allow us to better assess future behavior of the Antarctic ice sheets and sea ice."

IceBridge science flights were scheduled to continue through mid-November. Flights will take off from Punta Arenas and cross the Southern Ocean to reach destinations including West Antarctica, the Antarctic Peninsula and coastal areas. Each flight lasts about eleven hours.

Instruments for the 2010 Antarctic campaign are the same as those flown in 2009. A laser instrument will map and identify surface changes. Radar instruments will penetrate the snow and ice to see below the surface, providing a profile of ice characteristics and also the shape of the bedrock supporting it. A gravity instrument will measure the shape of seawater-filled cavities at the edge of some major fast-moving glaciers.

Using these tools, researchers will survey targets of on-going and potential rapid change, including the West Antarctic Ice Sheet, which is the area that has the greatest potential to rapidly increase sea level. Another concern is that the ice sheet is below sea level, adding to its instability.

Revisiting previously flown areas, scientists can begin to quantify the magnitude of changes to land ice. Pine Island Glacier, the largest ice stream in West Antarctica with significant potential contribution to sea level rise, has long been a primary target for sustained observations.

Satellite data, most recently from NASA's Ice, Cloud and land Elevation Satellite (ICESat) have shown dramatic thinning there of up to 10 meters per year in places. Previous IceBridge flights mapped the surface of the glacier and unusual features beneath it, providing clues to the glacier's rapid retreat and ice loss.

In addition to flying previous lines over the glacier, the IceBridge team plans to fly a new horseshoe pattern to sample the tributaries feeding into Pine Island Glacier's main trunk. Other new flight lines will further explore the Antarctic Peninsula to map new targets, including the George VI Ice Shelf, above and below the ice.

Three high-priority flights are aimed at measuring sea ice, including a plan to map and measure sea ice across the Weddell Sea. Scientists want to know why sea ice in Antarctica is growing in extent, unlike sea ice in the Arctic, which is declining in extent. Current theories range from ozone depletion to changing ocean dynamics.

Other flights are being planned to be coordinated with existing space and ground-based missions, such as the European Space Agency's ice-observing Cryosat-2 satellite and European ship-based research. Overlapping measurements help researchers calibrate instruments and boost confidence in the resulting observations.