Researchers develop tool to improve NASA polar ice mission

October 2 2012

While at Dryden Flight Research Center, Rich Knepper sneaks into the DC-8 cockpit.

(Phys.org)—Data vital to understanding global climate change will benefit from more efficient and secure processing, thanks to a new tool created by members of Indiana University's Research Technologies Systems.

This month, NASA's IceBridge mission will debut the new, IU-designed in-flight data copy system for instantly processing and archiving polar ice sheet data collected by radar systems in its DC-8 aircraft. IceBridge, a six-year NASA mission, is the largest airborne survey of Earth's polar ice.

For the past four years, IU has provided IT support to the Center for Remote Sensing of Ice Sheets (CReSIS) at the University of Kansas. CReSIS is a major player in the IceBridge mission, providing the radar technology that measures the physical interactions of polar ice sheets in Greenland, Chile and Antarctica. IU's support of polar research with CReSIS helps scientists better understand the current state of polar ice sheets, in order to improve models of the physical interactions of glaciers, sea ice and ice sheets at both poles.

"IU is the only university that provides specialized IT for NASA's Operation IceBridge mission," said Rich Knepper, manager of the campus bridging and research infrastructure team within Research Technologies Systems, part of IU's Pervasive Technology Institute. "We are known for our innovative data management and storage solutions, and we are excited to use that knowledge to create a tool that supports research important to NASA, our nation and the world."

The IceBridge flights collect huge amounts of data—three to four terabytes per flight, and about 104 terabytes for an entire campaign (10 times the printed collection of the Library of Congress). IU provides field data storage and backups, as well as data management, processing and archival storage for the radar data. In the past, scientists collected the data in 10-hour flights over the polar ice sheets, and brought it back to IU computer scientists on the ground for duplication and preservation on disks—a time-consuming and dangerous process, as only one copy of the data existed during that time.

"The new in-flight data copy system changes all that," said Matt Standish, IU team lead for campus bridging and research infrastructure, and creator of the tool. "Now, CReSIS scientists will get real-time updates of their data, as well as two copies while still in flight," he said. "Essentially, the new in-flight data copy system takes a clustered computing system and high-speed network into the air."

With instant access to their data, CReSIS scientists can determine in-flight which polar ice sheets require a closer look—eliminating the need to land, wait for IU to duplicate and store the data and then schedule a new flight.

"The whole process is going to be more efficient, and we'll be able to get better results to NASA, faster," said Standish. "Before, CReSIS was limited by the space and speed of their disks—now they can go as fast as their computer will let them."

In late September, members of IU's Research Technologies Systems division headed to Dryden Flight Research Center in Palmdale, California, to prepare the field lab that will complete processing tasks in Punta Arenas, Chile. The mission will leave Dryden for Punta Arenas on October 8, with Standish along to accompany the new in-flight data copy system tool.

Provided by Indiana University