

Origin of Alps-size Antarctic mountain range unknown

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A U.S.-led, multinational team of scientists this month will investigate one of the Earth's last major unexplored places, using sophisticated airborne radar and ground-based seismologic tools to virtually peel away more than 2.5 miles of ice covering an Antarctic mountain range that rivals the Alps in elevation.

Researchers from Penn State and Washington University in St. Louis will contribute to the fieldwork by using seismic recordings of earthquakes to create images of the crust and mantle beneath the mountain range. Andrew Nyblade, professor of geosciences, Penn State, and Douglas Wiens, professor and chair, Earth and planetary sciences, Washington University, are principal investigators on the Gamburtsev Antarctic Mountains Seismic Experiment (GAMSEIS).

The seismic images they obtain will help determine how the mountain range formed. GAMSEIS will deploy an array of 23 stations spread over the mountain range that will gather seismic data.

Current scientific knowledge leads researchers to conclude that the Gamburtsev Mountain range "shouldn't be there" at all.

The researchers from six nations hope to find answers to questions about the nature of Antarctica and specifically the massive East Antarctic Ice Sheet. Researchers want to know how Antarctica became ice-covered and whether that process began millions of years ago in the enigmatic Gamburtsev Mountain range.

Working daily at extreme altitudes, in 24 hours of sunlight and temperatures as low as minus 40 Fahrenheit, the researchers of the Antarctic Gamburtsev Province (AGAP) team hope they can answer whether the Gamburtsevs were born of tectonic activity in Antarctica or date from a period millions of years ago, when Antarctica was the center of an enormous supercontinent located at far lower latitudes.

Robin Bell, Columbia University's Lamont-Doherty Earth Observatory, shares the leadership of the U.S. science effort and is in charge of the airborne work. She said AGAP will help scientists understand one of Antarctica's last major unexplored regions.

"Because the heart of East Antarctica is so difficult to get to we know very little about it," says Bell. "The Gamburtsev mountain range is fascinating-it defies all geological understanding of how mountains evolve-it really shouldn't be there.

"We think also that there's a strong possibility that the mountains are the birthplace of the East Antarctic Ice Sheet. Over 30 million years ago ice began to grow around the peaks, eventually burying the range and its surrounding lakes. I'm really excited that at last we have a chance to find out what happened," she said.

"For two and a half months our international teams will pool their resources and expertise to survey mountains the size of the Alps buried under the ice sheet that currently defy any reasonable geological explanation," added Fausto Ferraccioli, geophysicist, British Antarctic Survey, who is leading the United Kingdom's team. "At the same time, we will hunt for ice that is more than 1.2 million years old. Locked in this ancient ice is a detailed record of past climate change that may assist in making better predictions for our future."

AGAP, involving researchers and support personnel from Australia,

China, Germany, Japan, United Kingdom and United States, caps the global scientific deployment known as the International Polar Year (IPY), the largest coordinated international scientific effort in 50 years. The Gamburtsevs were discovered by a Soviet traverse during the last IPY in 1957-58 that was known as the International Geophysical Year.

Traveling deep into the Antarctic interior, roughly 394 miles from the South Pole, the science teams will spend two months at a pair of remote field camps while they complete the first major geophysical survey to map the mysterious landscape.

AGAP fieldwork is emblematic of the scientific goals of the current IPY and of the scientific advances made in the past 50 years because it will use tools and techniques that were simply unavailable in IGY. BAS and NSF aircraft, specially equipped with ice-penetrating radar technology, gravimeter and magnetic field sensors, will fly survey lines over an area more than twice the size of California.

"This project is possible almost uniquely at this point in time because of the international framework created by IPY, which gives researchers from many nations as single common conduit to pool their efforts for the greater scientific good," said AGAP researcher Detlef Damaske of Germany's Federal Institute for Geosciences and Natural Resources.

Source: Penn State

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