Scientists probe Antarctic glaciers for clues to past and future sea level

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Scientists from the U.S., U.K. and Australia have teamed up to explore two of the last uncharted regions of Earth, the Aurora and Wilkes Subglacial Basins, immense ice-buried lowlands in Antarctica with a combined area the size of Mexico. The research could show how Earth's climate changed in the past and how future climate change will affect global sea level.

Scientists believe the barely observed Aurora Subglacial Basin, which lies in East Antarctica, could represent the weak underbelly of the East Antarctic Ice Sheet, the largest remaining body of ice on Earth. Until recently the East Antarctic Ice Sheet, which covers the two basins, had been considered a stable ice reservoir unlikely to contribute to rising sea level in the near future.

Limited soundings of the ice upstream of Australia's Casey Station, however, reveal a vast basin with its base lying kilometers below sea level. The basin could make the East Antarctic Ice Sheet more vulnerable in a warming world. Satellite data show that Totten Glacier, which dominates the ice of the Aurora Subglacial Basin, appears to be losing ice at its downstream edge.

The University of Texas at Austin's Jackson School of Geosciences has teamed up with the University of Edinburgh and the Australian Antarctic Division as part of a major International Polar Year project to study this vast area using multiple airborne instruments.

Beginning this December, the ICECAP (Investigating the Cryospheric Evolution of the Central Antarctic Plate) team will fly an upgraded World War II-era DC-3 aircraft with a suite of geophysical instruments to map the thickness of the ice sheet and measure the texture, composition, density and topography of rocks below the ice.

In the past, scientists surveying the Antarctic ice sheets relied either on heavy cargo planes with poor fuel efficiency but long range, or lighter planes with better fuel efficiency but short range. To fly lighter planes far into the interior of the continent, support planes have to fly in additional fuel from a coastal port, multiplying fuel costs several times.

With the upgraded DC-3, the ICECAP team gets a combination of efficiency and range, minimizing the project's carbon footprint at a time when high oil prices have caused federal funding agencies to scale back scientific studies in the polar regions.

"We're getting much more science done with less oil using this old airframe with modern engines," said Don Blankenship, research scientist at the Jackson School's Institute for Geophysics and principal investigator for ICECAP.

Data from the project will help model East Antarctic ice stability, forecast how ice might react to climate change, and show its potential impact on global sea level.

The chemistry of the thick ice might also solve a mystery about past climate. Antarctic ice cores have already revealed aspects of Earth's climate dating back 800,000 years. Farther back, around one million years ago, Earth's climate changed in a way that caused ice ages to come and go much more rapidly than before. Scientists have long wondered what caused this shift. Australian researchers with ICECAP will search

for sites to drill new ice cores with the potential to extend the ice core record to beyond one million years.

Source: University of Texas at Austin