

Scientists Drill for First Time on Remote Antarctic Glacier



Teams from the US and the UK have successfully completed scientific fieldwork in one of the most remote and hostile areas of West Antarctica – coinciding with the 200th anniversary of the discovery of the continent. This research will help scientists determine whether Thwaites Glacier may collapse in the next few decades and affect future global sea-level rise.

Thwaites Glacier, covering 192,000 square kilometres (74,000 square miles) an area the size of Florida or Great Britain, is particularly susceptible to climate and ocean changes. Over the past 30 years, the amount of ice flowing out of Thwaites and its neighbouring glaciers has nearly doubled. Already, ice draining from Thwaites into the Amundsen Sea accounts for about 4% of global sea-level rise. A run-away collapse of the glacier would

lead to a significant increase in sea levels of around 65cm (25 inches) and scientists want to find out how quickly this could happen.

Below-freezing Temperatures and Extreme Winds

Five dedicated teams of scientists and engineers have been working on Thwaites Glacier for the last two months in below-freezing temperatures and extreme winds. Two of these teams have used hot water to drill between 300 and 700 metres through the ice to the ocean and sediment beneath. The MELT team drilled two places beneath the glacier using hot water, including within two kilometres of the grounding zone, the area where the glacier meets the sea. The TARSAN team drilled at two locations about 30 kilometres further out on the floating shelf to explore the oceanographic conditions beneath the ice and the GHC team drilled four bedrock cores using a Winkie drill.

At the grounding zone site, a series of instruments were fed through the borehole – including the small yellow under-ice robot, Icefin, which collected data on how the glacier interacts with the ocean and the underlying sediments. In mid-January, Icefin swam nearly two kilometres from the drill site, right up to the Thwaites grounding zone, to measure, image, and map the melting and dynamics at this critical part of the glacier. Another team (THOR) also extracted five metre-long cores of soft sediment by lowering a metal tube through the two holes in the ice and driving it into the muddy sediment below. This will reveal the past history of the glacier.

Grounding Zones of Glaciers

Lead scientist for Icefin, Dr Britney Schmidt from Georgia Institute of Technology in Atlanta, who's still working in Antarctica, says: "We designed Icefin to be able to access the grounding zones of glaciers, places where observations have been nearly impossible, but where rapid change is taking place. To have the chance to do this at Thwaites Glacier, which is such a critical hinge point in West Antarctica, is a dream come true for me and my team. The data couldn't be more exciting."

Dr Keith Nicholls, an oceanographer from British Antarctic Survey and the UK lead on the MELT team says: "We know that warmer ocean waters are eroding many of West Antarctica's glaciers, but we're particularly concerned about Thwaites. This new data will provide a new perspective of the processes taking place so we can predict future change with more certainty."

Thwaites Glacier Is Extremely Remote

Dr Paul Cutler, who manages the International Thwaites Glacier Collaboration (ITGC) at the US National Science Foundation, says: "Thwaites Glacier is extremely remote, with only a handful of people setting foot on it until this year. This has been our first season of land-based fieldwork to get a deeper understanding of this important yet under-studied glacier. It's amazing to think we've only now drilled in this remote region some 200 years after the continent was first sighted."

Over 100 scientists and support staff are participating in the 2019/20 field season on Thwaites Glacier, which is situated some 1600 kilometres from both the UK's Rothera Research Station and the US Antarctica Program's (USAP) station of McMurdo. The ITGC aims to improve future predictions of global sea-level rise from Thwaites Glacier in West Antarctica through a better understanding of the present and past context of ice-sheet dynamics. The project is a collaboration between the US and the UK over five years at a cost of \$50 million.

www.thwaitesglacier.org