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# NASA SET TO LAUNCH SPACE LASER TO TRACK EARTH'S MELTING ICE

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An iceberg floats in the sea near Qeqertarsuaq, Disko Island, Greenland. | Photo Credit: AP

NASA is set to launch the most advanced laser instrument of its kind in to the space next month, to measure the changes in the heights of Earth's polar ice in unprecedented detail.

The Ice, Cloud and land Elevation Satellite-2 (ICESat-2) will measure the average annual elevation change of land ice covering Greenland and Antarctica to within the width of a pencil, capturing 60,000 measurements every second.

"The new observational technologies of ICESat-2 — a top recommendation of the scientific community in NASA's first Earth science decadal survey — will advance our knowledge of how the ice sheets of Greenland and Antarctica contribute to sea level rise," said Michael Freilich, from NASA's Science Mission Directorate in the US.

ICESat-2 — which is scheduled to be launched on September 12 — represents a major technological leap in our ability to measure changes in ice height. Its Advanced Topographic Laser Altimeter System (ATLAS) measures height by timing how long it takes individual light photons to travel from the spacecraft to Earth and back.

"ATLAS required us to develop new technologies to get the measurements needed by scientists to advance the research," said Doug McLennan, ICESat-2 project manager at NASA's Goddard Space Flight Center. "That meant we had to engineer a satellite instrument that not only will collect incredibly precise data, but also will collect more than 250 times as many height measurements as its predecessor."

ATLAS will fire 10,000 times each second, sending hundreds of trillions of photons to the ground in six beams of green light. The roundtrip of individual laser photons from ICESat-2 to Earth's surface and back is timed to the billionth of a second to precisely measure elevation.

As it circles Earth from pole to pole, ICESat-2 will measure ice heights along the same path in the polar regions four times a year, providing seasonal and annual monitoring of ice elevation changes. Beyond the poles, ICESat-2 will measure the height of ocean and land surfaces, including forests.

ATLAS is designed to measure both the tops of trees and the ground below, which — combined with existing datasets on forest extent — will help researchers estimate the amount of carbon stored in the world's forests. Researchers also will investigate the height data collected on ocean waves, reservoir levels, and urban areas.

"Because ICESat-2 will provide measurements of unprecedented precision with global coverage, it will yield not only new insight into the polar regions, but also unanticipated findings across the globe," said Thorsten Markus, an ICESat-2 project scientist at Goddard.

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