Global ice sheet growing

A large open-water pool on the edge of the Helheim Glacier in eastern Greenland, seen from oceans melting greenland (OMG). The OMG team successfully dropped an ocean probe into this pool of water and measured the water temperature just off the surface of the glacier. In March, a NASA-led research team announced that Jakobshavn Isbrae, Greenland's fastest flowing and thinner glacier in the past two decades, is now flowing slower, thickening and moving toward the ocean instead of retreating further inland. At first glance, this sounds like great news. After all, if this icy behemoth, which flows seven percent of Greenland, slows down, it certainly has to mean that global warming is slowing down too, right? Wrong. The findings have been interpreted in this way by some, suggesting that the findings were evidence that global warming is slowing or stopping. However, the facts paint a different picture, as illustrated by a quick overview of the study's key findings. To sum up: Recent changes in Jakobshavn, On greenland's west coast, they are associated with the cooling in 2016 of the ocean current that transfers water to the surface of the glacier ocean, possibly due to a change in the North Atlantic Oscillation (NAO) that occurred in 2015. The dramatic glacier slowdown coincided with the arrival of colder waters near Jakobshavn this summer. Water temperatures near the glacier are now colder than they have been since the mid-1980s. Colder water does not melt ice at the front and under the glacier as fast as warmer water. Jakobshavn's changes are temporary. When the NAO reverses again, the glacier will most likely resume acceleration and thinning as warm waters return to continue melting from underneath. After the study was published, additional analysis shows that Jakobshavn was 22 and 33 yards (20 to 30 meters) thicker each year between 2016 and 2019. How ocean temperatures affect Greenland's glaciers Many factors can accelerate or slow the rate of ice loss on the glacier. These include the shape of the rock beneath it and along its sides, short-term changes in ocean temperature and circulation, air temperature and precipitation, and climate change. To better understand the role ocean temperatures play, NASA launched the Greenland Ocean Melting (OMG) campaign four years ago to measure ocean temperature and salinity around Greenland. While Greenland is an island, it is surrounded by a continental shelf beneath the ocean surface. The shelf creates a natural barrier that protects the deeper, warmer waters of the Atlantic from reaching parts of the Greenland coast. Near the coast, the average ocean depth is about 1,300 to 1,600 feet (400 to 500 meters), while in the deep ocean, 30 to 200 miles (50 to 320 kilometers) at sea, water reach a depth of about 13,100 feet (4,000 meters). meters). deep underwater canyons cross the continental shelf, allowing the faces of many Greenland glaciers to sit in warm, deep water. The key objective of OMG was to carry out the most comprehensive mapping of the seabed around Greenland to see where these canyons are located. As a result, we now know how many glaciers sit in deep water, how deep the water is and how the fjords around Greenland combine with warm coastal waters. We've filled huge gaps in our knowledge of the depth of the seabed around Greenland, said OMG Lead Researcher and study co-author Josh Willis of NASA's Jet Propulsion Laboratory in Pasadena, California. Some glaciers are located at a distance of about 1000 meters of water, which corresponds to 10 football pitches below the surface. Everything we found suggests that Greenland's glaciers are more threatened than we expected. Everything we found suggests that Greenland's glaciers are more threatened than we expected. - Oceans Melting Greenland (OMG) Principal Investigator Josh Willis Parsing Out facts about Jakobshavn While Jakobshavn's behavior may be confusing to some, there is no evidence that its growth indicates any slowdown in global warming. Global concentrations of carbon dioxide do not decrease, global atmospheric and ocean temperatures do not fall, and global sea levels do not fall. In fact, all the evidence points decisively in the opposite direction. The current events in Jakobshavn show us that, in addition to the long-term changes taking place on Earth due to man-made greenhouse gas emissions, natural processes, such as ocean oscillations, also play a key role in the short-term changes we see on our planet. The NAO is a cycle that has been going back and forth for centuries, said Willis. There is no evidence that this or other climate cycles, such as the Pacific-Decadal oscillation or El Niño, will be stopped. The last time the NAO went into the warm phase was in the mid-to-early 90s. So we expect it to change again, from now until the next 15 years. That's one of the reasons why studies like OMG are so important. By the end of the day, Greenland is still losing ice, other Greenland glaciers are still retreating and the oceans are warming. The bottom line for Jakobshavn is that it is still a major contributor to sea level rise and continues to lose more ice weight than it gains. What awaits OMG? OMG principal investigator Josh Willis of NASA's Jet Propulsion Laboratory is preparing to release the latest ocean probe for the OMG 2019 ocean test from inside the Airtec DC-3 Turbo aircraft. The OMG team deployed 285 such probes in the ocean around Greenland to measure how the water temperature changes from year to year. In early August, the OMG team arrived in Greenland to begin the fourth year of ocean research to see how water changes. Start of this year's survey after a record-breaking event melting at the end of the and early August. The team dropped the sensors again before Jakobshavn to see if the water was still cold and whether we could expect another year of growth or resume withdrawal. The investigation also examined whether the NAO change affected other glaciers. Over the next year and a half, the OMG team will complete a comprehensive categorization of all 200-plus Greenland glaciers to determine the role that the ocean plays in their seclusion and how much ice the island loses because of it. Willis says the team also plans to look at data from nasa/German Gravity Recovery and Climate Experiment (GRACE) Follow-On missions to see if the IMPACT of NAO is large enough to affect the overall weight balance of the ice sheet. If we're lucky, OMG could also catch a cooling signal reversal now affecting Jakobshavn, he said. This will show us what happens when the glaciers start retreating again when warm water comes back and how sensitive the whole thing is to water. Understanding these natural fluctuations will help us calibrate greenland's ice conservation in the long run. Together, Greenland and antarctic ice sheets contain more than 99 percent of freshwater ice on Earth. Credit: NSIDC Ice cover is a mass of glacial ice extending over 50,000 square kilometers (20,000 square miles). Two ice caps on Earth today cover most of Greenland and Antarctica. During the last Ice Age, ice sheets also covered much of North America and Scandinavia. Together, the ice sheets of Antarctica and Greenland contain more than 99 percent of the freshwater ice on Earth. The Antarctic ice sheet stretches nearly 14 million square kilometers (5.4 million square miles), roughly the area of the neighboring United States and Mexico combined. The Antarctic ice sheet contains 30 million cubic kilometers (7.2 million cubic miles) of ice. Greenland's ice sheet stretches for about 1.7 million square kilometers (656,000 square miles), covering most of greenland's island, three times the amount of Texas. How are ice caps created? Ice caps form in places where snow that falls in winter does not melt completely in the summer. For thousands of years, layers of snow have piled up in dense masses of ice, getting thicker and denser as the weight of new layers of snow and ice compresses older layers. Ice sheets are constantly moving, slowly flowing down under their own weight. Near the coast, most of the ice moves through relatively fast-moving outlets called ice streams, glaciers and ice shelves. As long as the ice cover accumulates the same mass of snow as it loses to the sea, it remains stable. The Antarctic ice cap covers an area larger than the U.S. and Mexico combined. This photo shows Mt. Erebus rising above an ice-covered continent. Credit: Ted Scambos & Rob Bauer, NSIDC Why are ice sheets important? Ice caps contain amount of frozen water. If Greenland's ice sheet melts, scientists estimate that sea level would rise about 6 meters. Sea level would rise about 6 meters (20 feet). If the Antarctic ice sheet had melted, sea levels would have risen by about 60 metres. The ice sheets of Greenland and Antarctica also affect the weather and climate. Large plateaus at high altitudes on ice sheets change storm tracks and create cold winds on the treasure near the ice surface. In addition, the ice layers covering Greenland and Antarctica contain a unique record of the Earth's climate history. Have climate change begun to affect The Earth's ice sheets? The ice mass in Greenland's ice sheet began to decline. From 1979 to 2006, summer melting on the ice sheet increased by 30 percent, reaching a new record in 2007. At higher altitudes, the increase in snow accumulation in winter partially offset the melting. However, this decline still exceeds the accumulation, as warmer temperatures have led to increased melting and faster glacier movement on the outskirts of the island. To learn more about greenland's ice cover research, visit the website of former CIRES Director Konrad Steffen (. Most of Antarctica has not yet seen dramatic warming. However, the Antarctic Peninsula, which protrudes into warmer waters north of Antarctica, has been heating 2.5 degrees Celsius (4.5 degrees Fahrenheit) since 1950. A large area of West Antarctic Ice Sheet is also losing mass, probably due to warmer water deep in the ocean off the Antarctic coast. There is no clear trend in East Antarctica, although some stations seem to cool slightly. In general, scientists believe that Antarctica is beginning to lose ice, but so far this process has not become as fast or as widespread as in Greenland. To learn more about how changes to antarctic ice cover can affect sea level, see Kriosphere State: Ice Caps and Cryosphere State: Sea Level. What can ice caps tell us about Earth's climate history? Scientists are extracting ice cores from ice sheets and ice sheets, studying them to learn about past Earth's climate change. Ice sheets are made of layers of snow and ice that have been gathering for millions of years. These layers contain trapped gases, dust and water molecules that scientists can use to study the climate of the past. How can I find out more? NSIDC ResourcesState from cryosphere: Ice caps. Find up-to-date information on greenland and Antarctic ice cover. Condition of the cryosphere: Sea level. Find up-to-date information on how ice caps can affect sea level. NSIDC Data NSIDC distributes scientific datasets related to ice sheets. See Advanced Data Mining to learn more about our data resources. Outside Resources Steffen Research Group: Read about former CIRES director Konrad Steffen's research Greenland Ice Cover (. National Ice Core Laboratory: Learn how scientists are using ice cores to discover Earth's history ( ). British Antarctic Survey: Find a wide range of educational and scientific science about Antarctica. Exploring Antarctica: An educational website in Antarctica from the British Antarctic Survey and the Royal Geographic Society ( ). ( ).