International Greenland Ice Coring Effort Sets New Drilling Record in 2009

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CU-Boulder is the lead U.S. institution for the international North Greenland Eemian Ice Drilling, or NEEM, project begun in 2009 to retrieve deep ice cores from the Earth's Eemian warm period 120,000 years ago. Atmospheric gases trapped in the ancient ice are expected to help scientists better assess the risks of abrupt climate change as Earth warms in the future. Image courtesy NEEM Ice Core Drilling Project, www.neem.ku.dk.

(PhysOrg.com) -- A new international research effort on the Greenland ice sheet with the University of Colorado at Boulder as the lead U.S. institution set a record for single-season deep ice-core drilling this summer, recovering more than a mile of ice core that is expected to help scientists better assess the risks of abrupt climate change in the future.

The project, known as the North Greenland Eemian Ice Drilling, or

NEEM, is being undertaken by 14 nations and is led by the University of Copenhagen. The goal is to retrieve ice from the last interglacial episode known as the Eemian Period that ended about 120,000 years ago. The period was warmer than today, with less ice in Greenland and 15-foot higher sea levels than present -- conditions similar to those Earth faces as it warms in the coming century and beyond, said CU-Boulder Professor Jim White, who is leading the U.S. research contingent.

While three previous Greenland ice cores drilled in the past 20 years covered the last ice age and the period of warming to the present, the deeper ice layers representing the warm Eemian and the period of transition to the ice age were compressed and folded, making them difficult to interpret, said White. Radar measurements taken through the ice sheet from above the NEEM site indicate the Eemian ice layers below are thicker, more intact and likely contain more accurate, specific information, he said.

"Every time we drill a new ice core, we learn a lot more about how Earth's climate functions," said White, "The Eemian period is the best analog we have for future warming on Earth."

Annual ice layers formed over millennia in Greenland by compressed snow reveal information on past temperatures and precipitation levels and the contents of ancient atmospheres, said White, who directs CU-Boulder's Institute of Arctic and Alpine Research. Ice cores exhumed during previous drilling efforts revealed abrupt temperature spikes of more than 20 degrees Fahrenheit in just 50 years in the Northern Hemisphere.

The NEEM team reached a depth of 5,767 feet in early August, where ice layers date to 38,500 years ago during a cold glacial period preceding the present interglacial, or warm period. The team hopes to hit bedrock at 8,350 feet at the end of next summer, reaching ice deposited during

the warm Eemian period that lasted from roughly 130,000 to 120,000 years ago before the planet began to cool and ice up once again.

The NEEM project began in 2008 with the construction of a state-of-the-art facility, including a large dome, the drilling rig for extracting 3-inch-diameter ice cores, drilling trenches, laboratories and living quarters. The official drilling started in June of this year. The United States is leading the laboratory analysis of atmospheric gases trapped in bubbles within the NEEM ice cores, including greenhouse gases like carbon dioxide and methane, said White.

The NEEM project is led by the University of Copenhagen's Centre of Ice and Climate directed by Professor Dorthe Dahl-Jensen. The United States and Denmark are the two leading partners in the project. The U.S. effort is funded by the National Science Foundation's Office of Polar Programs.

"Evidence from ancient ice cores tell us that when greenhouse gases increase in the atmosphere, the climate warms," said White. "And when the climate warms, ice sheets melt and sea levels rise. If we see comparable rises in sea level in the future like we have seen in the ice-core record, we can pretty much say good-bye to American coastal cities like Miami, Houston, Norfolk, New Orleans and Oakland."

Increased warming on Earth also has a host of other potentially deleterious effects, including changes in ecosystems, wildlife extinctions, the growing spread of disease, potentially catastrophic heat waves and increases in severe weather events, according to scientists.

While ice cores pinpoint abrupt climate change events as Earth has passed in and out of glacial periods, the warming trend during the present interglacial period is caused primarily by human activities like fossil fuel burning, White said. "What makes this warming trend

fundamentally different from past warming events is that this one is driven by human activity and involves human responsibility, morals and ethics."

More information: For more information on the NEEM project visit www.neem.ku.dk .

Source: University of Colorado at Boulder (news : web)