Tackling an Ice Age mystery

September 5 2013

In the northern hemisphere, ice sheets ebb and flow in 100,000-year cycles, driven by varying amounts of sunlight falling on Earth's surface as its orbit and orientation toward the sun changes. But astronomical variations alone cannot explain why ice ages develop gradually but end quickly, in a few thousand years. Though the last ice age saw several peak-periods of sunlight, it was the last one—about 10,000 years ago—that caused the ice to withdraw from much of Europe and North America.

In a new study in *Nature*, Maureen Raymo, a climate scientist at Lamont-Doherty Earth Observatory, and her colleagues show that variations in sunlight interact with Earth's topography and the size of ice sheets to control the 100,000 year cycles. One important finding: as ice sheets grow bigger, they also become more vulnerable to melting. "The larger the ice sheet, the colder the climate has to be to preserve it," says study coauthor Heinz Blatter, an emeritus professor at ETH Zurich. As ice sheets pushed as far south as New York during the last ice age, a brief warm spell was enough to trigger their catastrophic melting and retreat. "Sea level was rising at rates of four meters [13 feet] per century during the interval of most rapid melting," said Raymo. "It is a bit troubling to think about what a small amount of warming can do to the stability of polar ice sheets."

Watch the northern ice sheets grow and shrink over the last 400,000 years in an animation produced by the study's lead author, Ayako Abe-Ouchi, a climate scientist at the University of Tokyo. The ice gets bigger and smaller depending on the amount of carbon dioxide in the air, the

amount of sunlight falling on the northern hemisphere and the internal feedbacks described in the study.

Provided by Columbia University