Decoding Antarctica's Climate History - Antarctica's Climate Secrets

Thanks to NET television and ANDRILL Antarctic Geological drilling science team.

https://www.youtube.com/watch?v=oZHRwDHh4B0

https://www.youtube.com/watch?v=fbCJ3hdmxqM

Ice has covered Antarctica longer than people have been on earth. There is so much ice it is hard to imagine it not being here. But scientists want to know how long ice has existed in Antarctica. In a warming world if ice melts in Antarctica scientists worry that the seas will rise. Flooding coastal areas…

ANDRILL geologists are drilling to recover rock history under Antarctica. To detect the contents climate cycles. To predict future climate conditions based on history.

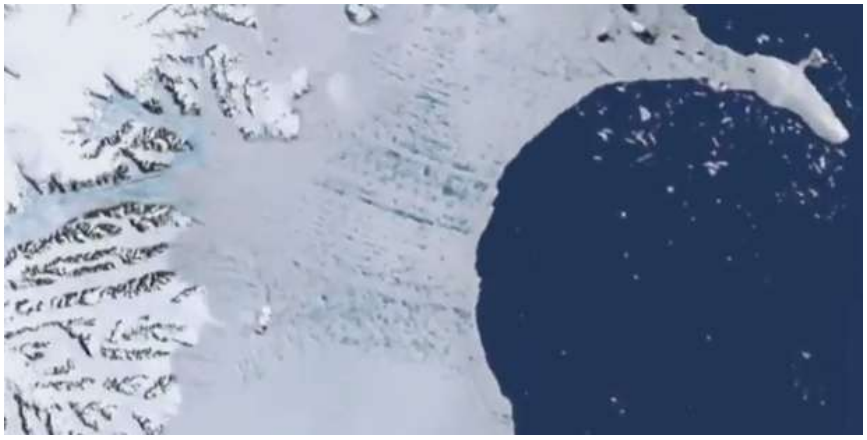
Antarctica has more ice than anywhere on earth. 90% of the world's ice is in Antarctica. The Ice is kept in place by shelves of ICE like the Ross Ice Shelf that ANDRILL is on.

The Ross Ice Shelf is the largest ice shelf and extends over the Ocean.

ANDRILL drills deep into the sea bottom to see the Antarctic's climate past.

So the big question is "How did this the largest Ice shelves behave when the atmospheric conditions were warmer than they are today?" We want to drill back to understand how the conditions were.

What's driving this effort today? Scientists question whether a warming world puts this ice at risk. Some fear it's already beginning. For more than a decade, rising temperatures have caused ice shelves along Antarctica's peninsula to break down at an alarming rate.



In 2002 in just a few weeks the Larson Ice shelf the size of Rhoad Island disintegrated.

In 2009 more than 200 square miles of Wilkins Ice Sheet has been splintering apart is now hanging by a thread.

If this is happing now has it happened before? That is what ANDRILL is investigating.

The Rock Cores ANDRILL recovers contain layers of sediments that trace changes in climate condition.

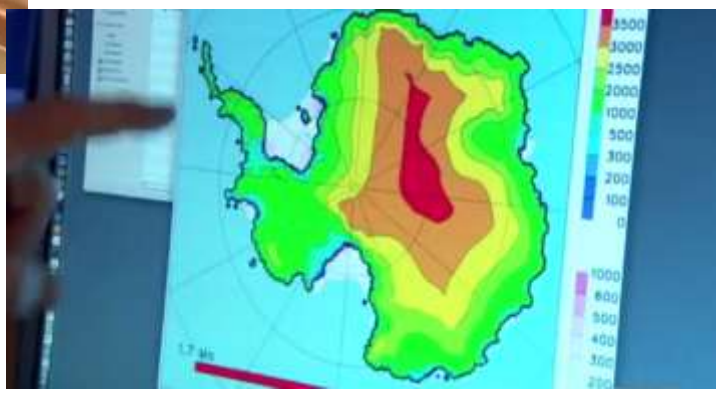
One reason changes occur is earth's orbit around the sun. Everyone knows the earth spins on an axis not straight up and down. That is why we have seasons, because half of the year more solar radiation hits the northern atmosphere and the other half more solar radiation hits the southern atmosphere. The amount of heat that warms Antarctica changes over time. Over long periods of time the earth's orbit shifts from oval close to the sun to elliptical far from the sun also the earth wobbles in its orbits creating seasons on shorter time scales. Altogether these create predictable changes in climate between warm periods and ice ages. ANDRILLs cores show the climate has changed over these cycles numerous times.

When you look at the cores you see this course rubbly deposits which are the products of the ice advancing in more than 50 or 60 advances. Then you see fine grained sandy muddy sediments that represent open water conditions when the ice had pulled away. The Ross Ice Sheet has been incredibly dynamic and sensitive to small temperature changes.

If you warm the oceans by half a degree you won't melt much of the sea ice. If you warm it by a degree you will.

If the sea ice is gone then you have changed the earth considerably.

Sea ice is very important because it creates a blanket reflecting much of the suns energy covering the ocean's surface. Without sea ice the sun can heat up the oceans.



Researches want to know how the cores fit into the larger picture. Computer models show Antarctica's ice has reacted to orbital cycles and levels of greenhouse gas in the atmosphere. The data in ANDRILL's cores identify specific events in Antarctica's climate history. Comparing the models against the geological record, what is clear is that there are times of expansion and retreat and that these can happen quickly. This is important because the changes in the ices sheet reflect several meters of sea level changes.

It is important to know the baseline of changes so that you can tell the additive effects of human involvement. Today with ice shelves along the peninsula of Antarctica breaking up, scientists point to one factor for raising global temperatures is greenhouse gasses. We know the greenhouse gasses increase as temperature increases and ice sheets melts and climate changes.

What is different right now is that we are seeing an unprecedented increase in greenhouse gases from what we have seen in the natural word.

By the end of the next century the carbon dioxide levels will be at the same level as it was 30-40 million years ago when no ice existed on earth.

The climates models and ANDRILL's data match but how can we confirm that sea level has risen across the planet?

In New Zeeland costal cliffs have a geological record. This is direct evidence from 1 million years ago show sea level change at a time predicted by the models.