

Ice Cores and Climate Change

Understanding global climate change is difficult because we have only been reliably measuring the temperature for a few hundred years. But this doesn't mean we don't know what the climate was like in the past. We can use the air bubbles trapped in glaciers to learn about the amount of greenhouse gasses in the atmosphere over the last 800 thousand years. We do this by taking cores of through the ice like the one in this picture.



Background Information

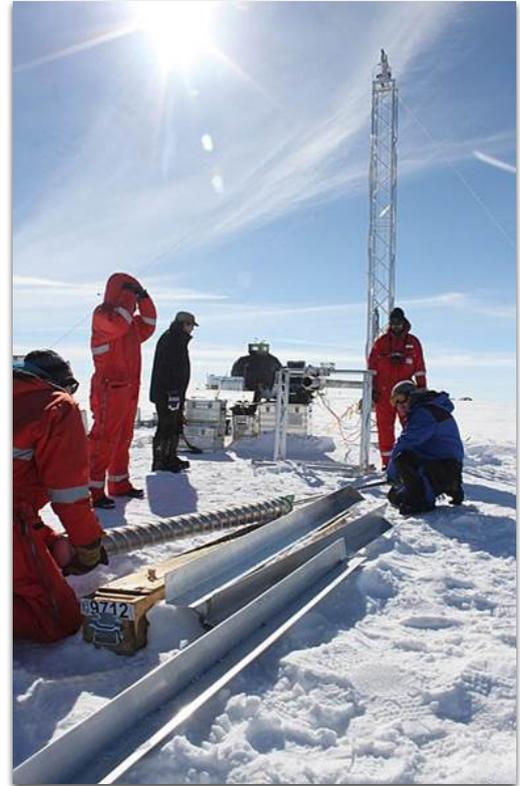
A glacier is a large mass of ice often shaped like a river that flows very slowly. As snow falls it builds up in layers, these layers build up and compact down turning into ice. Eventually the weight of this ice is pulled down the hill by gravity.

We get glacier all over the world, anywhere it is cold enough. So there are glaciers in the Arctic, the Antarctic and in lots of the big mountain ranges but we get the biggest concentrations in two places- Greenland and Antarctica.



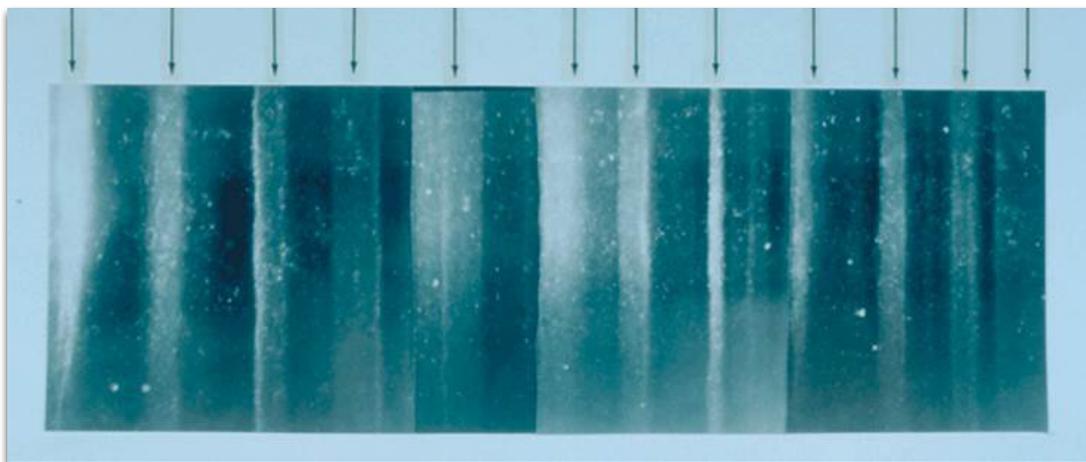
What is an ice core?

Ice cores are big cylinders of ice which are removed from the glaciers using drills like the one in these pictures. The biggest of these ice cores goes 3km deep and can tell us information about the atmosphere up to 800,000 years ago. These cores look like the picture at the beginning of this booklet when they are first removed but are quickly transferred to freezers. Scientists mainly work with photos and small samples.



How old is the ice?

Photos of ice cores look like this (below) and from the photos along we can learn a lot. Seasonally there is a different amount of snow fall and this shows up as lines or layers in the ice with each layer representing one. This means that just like with tree rings we can count the years back to know how old the ice is. This gets harder and harder as the deeper you go the more squeezed and deformed the layers get.



How does this help us learn about global temperature?

We work out global temperature from the gas bubbles trapped in the ice. These bubbles are trapped in the ice while the glacier is forming. As we said at the start of this booklet the glacier is made out of snow fall and as more and more snow falls the weight of the snow crushes the lower layers forming ice but as this happens a little bit of air also gets trapped. This air is like a time capsule of past atmosphere preserved in little bubbles. To catch this old atmosphere scientists melt the ice but they need to melt it in inside a vacuum (where there is no air) so that it is not contaminated by today's air.



Photo credit: Takuro Kobashi

We can then measure what gasses are in the past atmosphere to work out the global temperature. More carbon dioxide and other greenhouse gasses mean a warmer global temperature.

The amount of carbon dioxide in the atmosphere is much higher today than it ever has been in this huge 800,000 year record. This means that the temperature is hotter today than it ever has been too! To find out more about how this is effecting the planet and how to help the fight against climate change check out the Climate and Sustainability tab of [Dynamic Earth Online](https://www.dynamicearthonline.co.uk) and keep a look out for our #FridaysForFuture posts!

