



Exploring the science of climate

Climatic evidence from sediments

Narrator:

To go back even further you have to look elsewhere.

Dave Gunn:

This is a collection of sediment cores from the world's oceans. These cores are cored through the layers of mud and sediment, and the sediment type is very often controlled by climatic changes. Some of these sediments go back five hundred thousand years and this forms a geological record rather than a human archive record. Here's an example of a core that goes back some one hundred to two hundred thousand years, and the sediments within this show clear differences visually which have been caused by differences in climate, and you can see here a whiter carbonate ooze, and here a red-brown clay. These carbonate oozes have been laid down during interglacial periods, warmer periods, and these red clays have been laid down during the glacial periods, cooler periods. Now the sedimentation rate is about a centimetre per thousand years so we might be looking at, say, over 10, 15 centimetres, ten, fifteen thousand years.

Narrator:

The clays on the sea bed come from weathering and erosion of rocks on land. The white sediments consist mainly of calcium carbonate which comes from the tiny shells of billions of minute plankton that live near the surface of the ocean. When the plankton die their remains sink to the sea bed. Examining the mix of different plankton species, the assemblage can tell us a lot about surface temperatures where they lived.

Colin Summerhayes:

In any one area there is a mixture of different species in the plankton just as there is a mixture of species of trees in a wood, for example, and so we can measure that and we will know whether it's a tropical assemblage or a temperate assemblage, or a polar assemblage, just as we would with plants on land or animals on land. And now it turns out that in the case of the plankton there is a quantifiable relationship between the assemblage of the plankton and the temperature of the water in which they grew, so by taking the assemblage and analysing it we can then calculate what the temperature conditions were in which those organisms lived.

Narrator:

So, climate data are available from a wide range of sources. Detailed chemical and physical examination of natural sources, like tree rings and ocean sediments, are proving to be a powerful extension to the short-term human records of the last few hundred years. What does the analysis of these long-term records tell us? Is the change over the last few hundred years really significant? When seen in a longer-term context, it's clear there have been other periods of significant climatic variation. These larger scale variations over periods of tens of thousands of years are the glacial and interglacial periods of the last Ice Age. It turns out that the variations over the last few hundred years are really quite small compared to the massive changes that took place before.