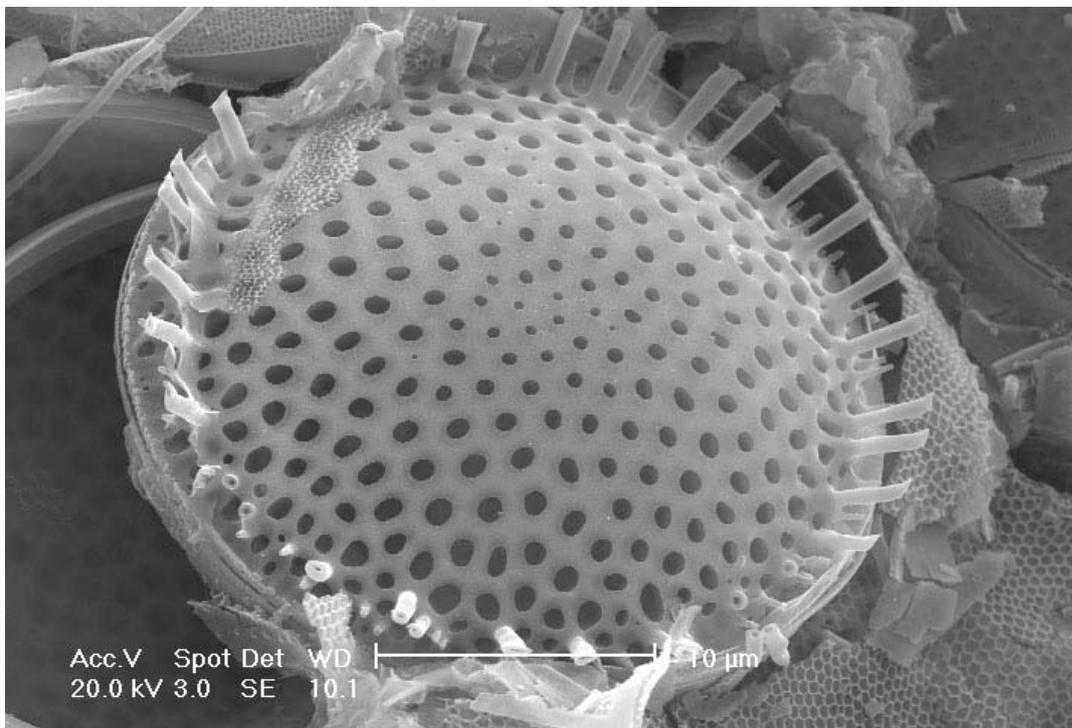


Tiny fossils hold answers to big questions on climate change

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Pioneering techniques used to analyse Antarctic fossils smaller than the width of a human hair could provide answers to the big question 'What caused climate change in the past?'

The Antarctic Peninsula Ice Sheet is one of the most rapidly warming areas of the planet. This is causing concern as it contains enough water to raise global sea levels by 5m. By analysing the chemistry of microscopic marine algae that lived in the ocean surrounding Antarctica, scientists have created a record of the amount of melting of the ice sheet that stretches back 12,000 years. This window through time has already unlocked hidden patterns in our past climate.



High resolution image of a microscopic marine algae (diatom) fossil (half the width of a human hair)

When there is increased melting of glaciers around Antarctica, more freshwater enters the ocean and the chemical composition (specifically the oxygen isotope ratio) of the ocean water is altered which is incorporated within the skeletons of marine algae (such as diatoms). The British Geological Survey (BGS) have pioneered techniques that can measure the oxygen isotope ratios locked in fossilised algae and can tell us what environmental conditions were like in the past from accumulations of diatom skeletons that have built up on the ocean bed.

The research, led by Cardiff University and the British Geological Survey, and published in *Nature Geoscience* (20 Jan 2013), used this record to determine whether the variations in warming and collapse of the ice sheet (along the western Antarctic Peninsula) were the result of changes in the oceanic or atmospheric environment.



The data show that there is an ancient pattern of atmospheric driven climate change. The scientists discovered that atmospheric warming had occurred over 400-500 year long cycles (between 3500 and 250 years ago) and this is linked to the increasing strength of the El Niño (a climate pattern centred in the low latitude Pacific Ocean). Overall, this research shows that changes in temperatures of the equatorial ocean can influence high latitude climate.

Dr Jennifer Pike, School of Earth and Ocean Sciences said: "Our research is helping to understand the past dynamic behaviour of the Antarctic Peninsula Ice Sheet. The implications of our findings are that the modern observations of ocean-driven warming along the western Antarctic Peninsula need to be considered as part of a natural centennial timescale cycle of climate variability, and that in order to understand climate change along the Antarctic Peninsula, we need to understand the broader climate connections with the rest of the planet."

This study has unlocked the last 12,000 years of climate change across the western Antarctic Peninsula thanks to passionate scientists, old oxygen, fossils and pioneering techniques. With more research like this scientists will better be able to predict major global climate changes in our future.

Professor Melanie Leng from the British Geological Survey and Leicester University said:

"Technologically the analysis of the oxygen isotope composition of diatom silica is extremely difficult, the British Geological Survey is one of a very few research organisations in the world that can undertake this type of analysis. For this research project the methodology has been developed over the last five years with the specific aim of investigating the different amounts of melting in the polar regions. It's fair to say we are world leading pioneers in this technique."

The research is co-authored with Cardiff University by the universities of Nottingham, Leicester and the British Geological Survey and was funded by the Natural Environment Research Council (NERC).

Ends

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- Professor Melanie Leng, NERC Isotope Geosciences Laboratory

Notes for Editors

Photographs are available from our ftp server: <ftp://ftp.bgs.ac.uk>

Username: BGSnews Password: geology4all

(Trouble accessing the images? Try accessing them using Filezilla: <http://filezilla-project.org>)

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The findings can be read in full in the *Nature Geoscience* paper "Glacial discharge along the west Antarctic Peninsula during the Holocene"



The British Geological Survey

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