Fossilised midges provide clues to future climate change

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The head of a fossilised midge. Credit: University of Liverpool

Fossilised midges have helped scientists at the University of Liverpool identify two episodes of abrupt climate change that suggest the UK climate is not as stable as previously thought.

The episodes were discovered at a study in Hawes Water in Northern Lancashire, where the team used a unique combination of isotope studies and analysis of fossilised midge heads. Together they indicated where the climate shifts occurred and the temperature of the atmosphere at the

time.

The first shift detected occurred around 9,000 years ago and the second around 8,000 years ago. Evidence suggests that these shifts were due to changes in the Gulf Stream, which normally keeps the UK climate warm and wet.

During each shift the North West climate cooled with an average summer temperature fall of 1.6 degrees – approximately three times the amount of temperature change currently attributed to global warming.

Scientists found that the atmosphere cooled rapidly and cold periods lasted up to 50 years for one event and 150 years for the other. The detection of these events will allow experts to understand more clearly what can happen when the climate system is disturbed.

Professor Jim Marshall, from the University's Department of Earth and Ocean Sciences, explains: "At Hawes Water mud has been deposited continuously without any gaps, which allows us to measure an accurate timeline of events. We have monitored the modern environment of the lake for the past eight years and this has shown us how to read the past climate record from the ancient mud in the lake.

"Isotope analysis helped us identify the episodes of climate change. We then used fossilised heads of non-biting midges, which are preserved in every spoonful of mud. They tell us the temperature at the time the mud was deposited. We compare the population of midge heads in each sediment sample with the population of midges in Scandinavian lakes, which span a wide range of modern day temperatures."

The team found the two abrupt climate changes correlated directly with two episodes of sharp climate deterioration in areas such as Greenland, suggesting that a change in the Gulf Stream had occurred.

Professor Marshall added: “People are worried that the melting of the polar ice caps could result in a slow-down of what we call the ‘Atlantic Conveyer’. This is where cold water that sinks in the far north is replaced by warmer water from the tropics in its circulation of the North Atlantic Ocean. A number of studies suggest that the conveyer may be unstable and may be able to slow down or switch off completely, making our climate suddenly colder. Our study provides evidence that the two climate shifts we detected were directly linked to a slow-down in the conveyer.”

Scientists believe that this new data will provided a unique test for the global climate computer models that are being used to simulate future climate change.

The research - in collaboration with University of Swansea; the Open University; University of Exeter; Edge Hill University and University College London - is published in *Geology*.

Source: University of Liverpool