Dispelling the myth of bipolar glaciation 41 million years ago

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Large continental ice sheets did not exist in both hemispheres around 41 million years ago during the warmer-than modern conditions of the time.

This is the finding of scientists from the University of Southampton's School of Ocean and Earth Science at the National Oceanography Centre, Southampton (NOCS), reported in *Nature*.

The Eocene epoch (55 to 34 million years ago) was the last interval of sustained global warmth in Earth's history, a likely consequence of atmospheric carbon dioxide levels much higher than today. It has been known for some time that, at the end of the Eocene, ice sheets on Antarctica first expanded to close their modern size. However, in a recent controversial move, it was proposed that, despite the high global temperatures of the time, very large ice sheets existed 8 million years earlier, not just on Antarctica but also in the Northern Hemisphere.

New findings from NOCS researchers show that, if ice sheets did exist during the controversial interval they must have been small and would have been easily accommodated on Antarctica with no need to invoke Northern Hemisphere glaciation. This result is more in keeping with other geological records and climate model results suggesting that the threshold for ice sheet inception would have been crossed earlier in the Southern Hemisphere than in the Northern Hemisphere because the South Pole has a continent sitting over it (Antarctica) while the North Pole has an ocean (the Arctic).

The NOCS group also identifies a short-lived event immediately preceding the controversial interval during which ocean temperatures briefly increased, the deep ocean became more acidic and the carbon cycle was perturbed by the contribution of isotopically light carbon to the ocean/atmosphere system. This finding hints at the operation of carbon cycle processes common to those thought responsible for the famous transient extreme warming events that occurred between 50 and 55 million years ago, providing a focus for future work aimed at better understanding climate-carbon cycle feedbacks.

Kirsty Edgar, Dr Paul Wilson and Philip Sexton of the University of Southampton's School of Ocean and Earth Science, based at NOCS, used stable isotope analysis of fossil shells of foraminifera (microscopic marine organisms) and bulk sediment from deep-sea sediments to generate a record of climate change and estimate potential global ice volumes in the Eocene. Sediment cores were taken in the tropical Atlantic Ocean by the Ocean Drilling Program (ODP).

Source: University of Southampton

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