Scientists identify freezing times for Cretaceous dinosaurs

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Scientists studying fossils and minerals from Arctic Svalbard, in Norway, have discovered evidence that the 'greenhouse' climate of the Cretaceous period was punctuated by a sudden drop in global temperatures.

The drop is estimated to have occurred some 137 million years ago during a time when dinosaurs roamed the Earth, and would have seen the islands fall from an average of 13 degrees centigrade (ocean temperature) to as low as four degrees.

The findings, which were published in the journal *Geology* and featured as a highlight in *Nature Geoscience*, will further contribute to the debate over climate change as they appear to contradict the common model which links high levels of Carbon Dioxide (CO2) - as recorded in the Cretaceous era - with reduced polar ice caps.

Despite being located in the Arctic Circle, Svalbard was home to numerous species of dinosaur and was typically characterised by warm, shallow seas and swamps.

But the research team, led by Dr Gregory Price of the University of Plymouth, found evidence in fossils and carbonate materials preserved in marine rocks in the region of a transient shift to cooler glacial conditions around 137 million years ago.

Dr Price said: "At certain times in the geological past, the world has

been dominated by greenhouse conditions with elevated CO2 levels and warm Polar Regions, and hence, these are seen as analogues of future global climate.

“But this research suggests that for short periods of time the Earth plunged back to colder temperatures, which not only poses interesting questions in terms of how the dinosaurs might have coped, but also over the nature of climate change itself.”

Dr Price, along with Dr Elizabeth Nunn, of Johannes Gutenburg Universitat in Mainz, Germany, first visited Svalbard in 2005 to collect fossils and samples, in an area famed for a number of paleontological discoveries, including giant marine reptiles such as pliosaurs and icthyosaurs.

The samples were analysed back in Plymouth and prompted return trips to the area to gather more evidence.

“The flourishing of the dinosaurs and a range of other data indicates that the Cretaceous period was considerably warmer and boasted a high degree of CO2 in the atmosphere,” said Dr Price.

“But over a period of a few hundred or a few thousand years, ocean temperatures fell from an average of 13 degrees centigrade to between eight and four degrees.

“Although a short episode of cool polar conditions is potentially at odds with a high CO2 world, our data demonstrates the variability of climate over long timescales.”

Provided by University of Plymouth