

# Next Ice Age delayed by rising CO<sub>2</sub> levels

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Future ice ages may be delayed by up to half a million years by our burning of fossil fuels. That is the implication of recent work by Dr Toby Tyrrell of the University of Southampton's School of Ocean and Earth Science at the National Oceanography Centre, Southampton.

According to New Scientist magazine, which features Dr Tyrrell's research this week, this work demonstrates the most far-reaching disruption of long-term planetary processes yet suggested for human activity.

Dr Tyrrell's team used a mathematical model to study what would happen to marine chemistry in a world with ever-increasing supplies of the greenhouse gas, carbon dioxide.

The world's oceans are absorbing CO<sub>2</sub> from the atmosphere but in doing so they are becoming more acidic. This in turn is dissolving the calcium carbonate in the shells produced by surface-dwelling marine organisms, adding even more carbon to the oceans. The outcome is elevated carbon dioxide for far longer than previously assumed.

Computer modelling in 2004 by a then oceanography undergraduate student at the University, Stephanie Castle, first interested Dr Tyrrell and colleague Professor John Shepherd in the problem. They subsequently developed a theoretical analysis to validate the plausibility of the phenomenon.

The work, which is part-funded by the Natural Environment Research

Council, confirms earlier ideas of David Archer of the University of Chicago, who first estimated the impact rising CO<sub>2</sub> levels would have on the timing of the next ice age.

Dr Tyrrell said: 'Our research shows why atmospheric CO<sub>2</sub> will not return to pre-industrial levels after we stop burning fossil fuels. It shows that if we use up all known fossil fuels it doesn't matter at what rate we burn them. The result would be the same if we burned them at present rates or at more moderate rates; we would still get the same eventual ice-age-prevention result.'

Ice ages occur around every 100,000 years as the pattern of Earth's orbit alters over time. Changes in the way the sun strikes the Earth allows for the growth of ice caps, plunging the Earth into an ice age. But it is not only variations in received sunlight that determine the descent into an ice age; levels of atmospheric CO<sub>2</sub> are also important.

Humanity has to date burnt about 300 Gt C of fossil fuels. This work suggests that even if only 1000 Gt C (gigatonnes of carbon) are eventually burnt (out of total reserves of about 4000 Gt C) then it is likely that the next ice age will be skipped. Burning all recoverable fossil fuels could lead to avoidance of the next five ice ages.

Dr Tyrrell is a Reader in the University of Southampton's School of Ocean and Earth Science. This research was first published in *Tellus B*, vol 59 p664.

Source: University of Southampton

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