Mystery mechanism drove global warming 55 million years ago

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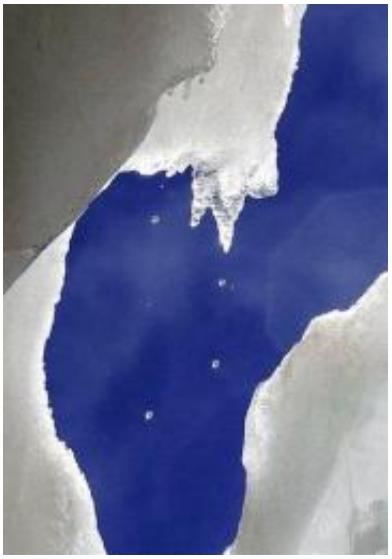

Close up of a melting glacier. A runaway spurt of global warming 55 million years ago turned Earth into a hothouse but how this happened remains worryingly unclear, scientists said on Monday.

A runaway spurt of global warming 55 million years ago turned Earth into a hothouse but how this happened remains worryingly unclear, scientists said on Monday.

Previous research into this period, called the Palaeocene-Eocene Thermal Maximum, or PETM, estimates the planet's surface temperature blasted upwards by between five and nine degrees Celsius (nine and 16.2 degrees Fahrenheit) in just a few thousand years.

The Arctic Ocean warmed to 23 C (73 F), or about the temperature of a lukewarm bath.

How PETM happened is unclear but climatologists are eager to find out, as this could shed light on aspects of global warming today.

What seems clear is that a huge amount of heat-trapping "greenhouse" gases -- natural, as opposed to man-made -- were disgorged in a very short time.

The theorised sources include volcanic activity and the sudden release of methane hydrates in the ocean.

A trio of Earth scientists, led by Richard Zeebe of the University of Hawaii, try to account for the carbon that was spewed out during PETM.

They believe that levels of atmospheric carbon dioxide (CO_2) rose by 70 percent during PETM's main phase to reach 1,700 parts per million (ppm), attaining a concentration of between four and five times that of today.

But all this CO_2 can only account for between one and 3.5 C (1.8-6.3 F) of PETM's warming if the models for climate sensitivity are right, the team found.

There must have been some other factor that stoked temperatures higher.

Even though there are big differences between Earth's geology and ice cover then and now, the findings are relevant as they highlight the risk of hidden mechanisms that add dramatically to warming, says the paper.

Some of these so-called "positive feedbacks" are already known.

For instance, when a patch of Arctic sea ice melts, this exposes the uncovered sea to sunlight, depriving it of a bright, reflective layer.

That causes the sea to warm, which leads to the loss of more ice, which in turn helps the sea to warm, and so on.

But these "feedbacks" are poorly understood and some scientists believe there could be others still to be identified.

"Our results imply a fundamental gap in our understanding about the amplitude of global warming associated with large and abrupt climate perturbations," warns Zeebe's team.

"This gap needs to be filled to confidently predict future climate change."

After the big warm-up, the planet eventually cooled around 100,000 years later, but not before there had been a mass extinction, paving the way to the biodiversity that is familiar to us today.

Man-made global warming, driven mainly by the burning of oil, gas and coal, has amounted to around 0.8 C (1.12 F) over the past century.

Last week in L'Aquila, Italy, the Group of Eight (G8) industrialised countries and other economies that together account for 80 percent of greenhouse-gas emissions pledged to try to limit overall warming to 2 C (3.6 F) over pre-industrial times.

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