Ocean acidification to hit levels not seen in 14 million years

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New research led by Cardiff University has shown that under a 'business-as-usual' scenario of carbon dioxide (CO_2) emissions, ocean acidification is likely to hit unprecedented levels.

Ocean acidification occurs when CO_2 from the atmosphere is absorbed by seawater, resulting in more acidic water with a lower pH.

Around a third of the CO_2 released by burning coal, oil and gas gets

dissolved into the oceans. Since the beginning of the industrial era, the ocean has absorbed around 525 billion tons of CO2, equivalent to around 22 million tons per day.

The rapid influx of CO2 in to the oceans is severely threatening marine life, with the shells of some animals already dissolving in the more acidic seawater.

In their new study, published in the journal *Earth and Planetary Science Letters*, the researchers set out to reconstruct levels of ocean acidity and atmospheric CO2 levels over the past 22 million years.

They did so by studying the fossils of tiny marine creatures that once lived near the ocean surface, specifically using the chemistry of their shells to monitor the acidity of the seawater in which the creatures lived.

Based on this information, the researchers were able to put their new records of pH and CO2 levels in context of the range of future carbon emission scenarios that are recognised by the Intergovernmental Panel on Climate Change (IPCC).

Under a 'business-as-usual' future scenario where we continue to emit CO2 at the same rate as we do today, atmospheric CO2 would be near 930 parts per million in the year 2100, compared to around 400 parts per million today.

Similarly, the pH of the oceans would be less than 7.8 in 2100 compared to a pH of around 8.1 today. This is very significant as the pH scale is logarithmic, meaning a drop of just 0.1 pH units represents a 25% increase in acidity.

These levels of atmospheric CO2 and ocean acidity have not been since the Middle Miocene Climatic Optimum period around 14 million years

ago, when global temperatures were around 3°C warmer than today as a result of the Earth's natural geological cycle.

Lead author of the study Dr. Sindia Sosdian, from Cardiff University's School of Earth and Ocean Sciences, said: "Our new geological record of ocean acidification shows us that on our current 'business as usual' emission trajectory, oceanic conditions will be unlike marine ecosystems have experienced for the last 14 million years."

Professor Carrie Lear, co-author of the study, added: "The current pH is already probably lower than any time in the last 2 million years. Understanding exactly what this means for marine ecosystems requires long-term laboratory and field studies as well as additional observations from the fossil record."

Provided by Cardiff University

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