Scientists link ocean acidification to prehistoric mass extinction
27 April 2010, By Gwyneth Dickey

(PhysOrg.com) -- New evidence gleaned by analyzing calcium embedded in Chinese limestone suggests that volcanoes, which spewed massive amounts of carbon dioxide into the atmosphere for a million years, caused the biggest mass extinction on Earth.

In a paper published April 26 in the Proceedings of the National Academy of Sciences, a team of researchers led by a Stanford geologist said that as carbon dioxide gas dissolved in the oceans, it raised the acidity of seawater.

The research team said it was a deadly combination - carbon dioxide in the atmosphere and higher acidity in the oceans - that eventually wiped out 90 percent of marine species and about three-quarters of land species, in a cataclysmic event 250 million years ago known as the "end-Permian extinction."

"Our best geologically supported idea is that the carbon dioxide release is related to the Siberian Traps volcanoes," Payne said.

Payne calculated that the eruptions, which lasted upwards of a million years, released 13,000 to 43,000 gigatons (1 gigaton equals 1 billion tons) of carbon in the atmosphere. By comparison, scientists estimate we would release an estimated 5,000 gigatons of carbon if we used up all the fossil fuels in the Earth.

During the eruptions, huge amounts of carbon dioxide and molten rock burst through the earth's crust, burning through coal and limestone, and releasing carbon dioxide into the atmosphere. That made oceans and rainwater more acidic, and dissolved more calcium from rocks into the ocean.

Payne said humans may not ultimately release as much carbon dioxide as the Siberian traps, but we may be doing it at a faster rate. The end-Permian extinction could be viewed as a "worst case scenario" for what we could be facing as we burn more fossil fuels and increase ocean acidity, he said.
"We won't necessarily end up with a world that looks as bad as it did after the end-Permian extinction, but that event highlights the fact that things can go very, very wrong," Payne said.

The National Resource Council recently reported that the ocean's chemistry is changing faster than it has in hundreds of thousands of years, because carbon dioxide is being released into the atmosphere and absorbed into the oceans, making them more acidic. Studies have shown increased ocean acidity decreases photosynthesis, nutrient absorption, growth and reproduction of marine organisms.

He said the next step as his research continues is to look at rock deposits in other locations from the same time period to make sure the samples they used represent a global event, as opposed to a local event. The team has already started analyzing rock deposits in south central Turkey, southern Japan, and eastern China.

More information: 'Calcium isotope constraints on the end-Permian mass extinction,' April 26, 2010, Proceedings of the National Academy Sciences http://www.pnas.org/content/ea ... /0914065107.abstract

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