

Turning up the gas

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Sunset on a smoggy summer day in Los Angeles. The discovery of ancient 'hyperthermal' events in Earth's history could help scientists understand how modern global warming could affect the biosphere on Earth. Credit: Barbara Gaitley, JPL image P-48863A

Rapid increases in greenhouse gases have happened more frequently in the Earth's history than previously realized, according to a Scripps Institution of Oceanography-led study published in the journal *Nature*.

Scientists have studied extensively the the Palaeocene-Eocene Thermal Maximum (PETM), about 56 million years ago, a period of rapid global warming that's associated with a temperature spike on par with expectations for today's global warming scenarios.

But according to the Scripps Institute, there's been a series of six smaller greenhouse gas fluxes during the same geologic time period (the

Palaeocene and Eocene epochs, 65 to 34 million years ago). These so-called “modest hyperthermals” (meaning a rapid, pronounced period of [global warming](#)) had shorter durations and recoveries (about a 40,000 year cycle) and involved an exchange of carbon between surface reservoirs into the atmosphere and then into sediment.

The researchers believe that large-scale carbon releases were vented from the ocean floor, but were reburied relatively quickly.

Under higher CO₂ levels, plants take up more toxic materials

Higher concentrations of CO₂ in the atmosphere generally increase plant growth and productivity. Plants take up more nutrients from the soil. But according to a new study, they also take up more toxic materials from the soil.

Benjamin Duval from the University of Illinois at Urbana-Champaign and colleagues showed in a paper published in the journal *Environmental Science & Technology* that contaminants in the soil become increasingly mobile in vegetation and that these toxins could be cycling faster through the ecosystem.

“Plants can’t always distinguish toxic elements from nutrients,” Duval said in a review of his study published in *Chemical & Engineering News*. “For instance, arsenic can look a lot like phosphorous, which plants need for their metabolism.”

Duval and company collected soil and oak tree samples from a site at the Kennedy Space Center in Florida run by the Smithsonian Environmental Research Center. They measured toxins in samples growing under normal CO₂ levels and compared them to those growing at 700 parts per million CO₂, roughly double the concentration. They found that concentrations of the 13 metals studied, which included lead, cadmium,

and arsenic, among others, were up to twice as high in the plant materials in the elevated CO₂ samples.

The researchers point out that the rates are worrisome because the toxic metals may be ingested up the food chain and can depress the decomposition rates of plant litter and hinder soil microbial activity.

The implications for people eating food crops under such a scenario is also troubling. Although, according to Duval, the current uptake of heavy metals didn't exceed toxic thresholds set by health agencies.

Source: Astrobio.net

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