May 18th, 12:00 AM - May 22nd, 12:00 AM

The Past is the Key to the Present: Reconstructing Changes in Seasonal Precipitation Triggered by Ancient Climate Change

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Reconstructing Changes in Seasonal Precipitation Triggered by Ancient Climate Change

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Ancient Climate Change

During the boundary between the Paleocene and Eocene epochs (~56 Mya), environmental instability led to a short-lived global warming event (known as the PETM). In less than 10,000 years, global temperatures rose by 5° - 8° C. There is evidence to suggest that these changes had lasting impacts on the hydrologic cycle, causing global increases in precipitation.

Evidence for Global Warming

- Carbonate minerals in rocks from the PETM indicate atmospheric CO₂ was much higher than today.

Evidence for Rainfall Variability

- Chemical composition (H isotopes) of plant molecules can record changes in precipitation at the time the plant was growing

Methods for Tracking Rainfall

- Sohxlet solvent extraction (Panel a)
- Column chromatography (Panel b)
- Gas chromatography (Panel c)

Research Objectives

- Extracting ancient plant leaf waxes preserved in PETM rocks
- Measuring changes in the hydrogen composition of these waxes
- Reconstructing changes in rainfall during this global warming event.

Summary & Implications

I successfully extracted and isolated plant waxes preserved in 56 myr-old rocks. Forthcoming isotopic analyses will inform on precipitation changes caused by the PETM, a global warming event. Since the PETM is an analog for anthropogenic climate change, our results can improve our understanding of future climate scenarios.