

PETM effects on Neotropical Vegetation

Carlos Jaramillo

Smithsonian Tropical Research Institute

During the onset of the Palaeocene Eocene Thermal Maximum worldwide temperature increased by at least 5°C in ~10 to 20 thousand years returning to pre-PETM temperatures over the next 100 - 200 kyr. Temperatures in tropical regions are estimated to have increased by 3–5°C. For this study, we investigated the tropical forest response to this rapid warming by evaluating the palynological record of three stratigraphic sections in eastern Colombia and western Venezuela. This analysis included 357 pollen samples, 1104 morphospecies, and 37,952 individual occurrences together with 489 carbon isotopes samples, 21 plant biomarker samples, 17 TEX₈₆ samples, and one radiometric age from a tuff deposited within the PETM itself. Contrary to expectations, plant extinction did not increase during the intense warming of the PETM. Instead, we observe a rapid and distinct increase in plant diversity and origination rates, with a set of new taxa, mostly angiosperms, added to the existing stock of low-diversity Palaeocene flora. Plant water use efficiency increased, and aridity did not increase in the northern Neotropics and the tropical rainforest was able to thrive under elevated temperatures and high levels of atmospheric CO₂, in contrast to speculations that the health of tropical ecosystems were catastrophically compromised by heat stress.