Significant shift in Neotropical plant diversity during the Paleocene-Eocene Thermal Maximum Event

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The Paleocene-Eocene Thermal Maximum (PETM) is recognized by an increase in global temperatures of ~5ºC over a period of 10 to 20 ka. This warming is associated with a marked global decreasing in the carbon isotope (ä13C) signal, that has been recorded both in marine and terrestrial environments. We analyzed pollen floras from sections across the PETM in eastern Colombia and western Venezuela. The floral patterns and behaviours were analyzed through several statistical techniques, including rarefaction, cluster analysis, origination and extinction index, and range-through. Also, carbon isotope analyses were used to identify the PETM interval within the sections. Our results strongly suggest a marked increase in diversity, and a considerable change in flora composition during the PETM. These variations in the flora seem to occur in two phases. The lower half of the PETM is characterized by extinction of many Paleocene taxa (~ 35%), in association with a major increase in origination. The upper half of the PETM is characterized by a larger number of originations and low number of extinctions. In summary, the PETM interval is associated with a rapid increase in the number of species added to the Paleocene flora rather than extinction events. These patterns suggest that this fast global warming, 55 millon years ago, was a major factor in enhancing the tropical diversity. A possible scenario for this significant increase in diversity may be related to a combination of high levels of precipitation and CO2 concentrations; both factors could help tropical plants to survive under elevated temperatures.

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