LEAF EVAPOTRANSPIRATION AND PALEOPHYSIOLOGY OF EARLY EOCENE NEOTROPICAL RAINFORESTS

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The Paleocene-Eocene boundary and the early Eocene recorded the warmest temperatures of the last 60 million years. Global estimates of sea surface temperatures and many climate models have suggested a collapse of the Neotropical forests under high tropical temperatures during the early Eocene, however, the pollen record available indicates that tropical rainforests were able to persist under the increasing temperatures. Here, we test whether increased leaf evapotranspiration and consequent thermal cooling may have provided a mechanism for tropical plants to cope with increasing temperatures and avoid thermal damage to the photosynthetic machinery. We compare leaf anatomical and geochemical data from tropical plants grown under high CO2 – high temperatures at the Smithsonian Tropical Dome Project to determine whether changes in leaf evapotranspiration can be potentially observed in fossilized leaves. Results from these experiments are then compared with late Paleocene (Cerrejón Fm., 58-60 Ma) and recently discovered early Eocene (Bogotá Fm.) leaf cuticles from Colombia, as a means to assess relative changes in leaf evapotranspiration in Neotropical rainforests during the global warming events of the early Eocene.