Fire Trends and Variability in Neogene East Africa

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The expansion of C_4 grasses was one of the greatest ecological shifts of the Cenozoic Era and led towards the ecosystems we see in modern tropical environments. Decreased atmospheric carbon dioxide and increased aridity are hypothesized as drivers of C_4 grassland expansion. The asynchronous nature of the expansion suggests regional drivers had pronounced influence, yet regional reconstructions of aridity do not always align temporally with the vegetation shift. Investigation of fire as a driver of grassland expansion in Pakistan and Australia demonstrated that the response of regional fire varied widely. Building upon a dataset of previously measured plant wax carbon and hydrogen isotopes, we analyzed sediment samples from Deep Sea Drilling Project (DSDP) Cores 235 and 241 for polycyclic aromatic hydrocarbons (PAHs). Plant waxes and their isotopes were utilized to study ecological information and climate dynamics, while PAHs are compounds created by biomass combustion that can be used as a proxy for past fire activity. We used an multi-proxy approach, comparing our compared our PAH-inferred fire record with plant wax proxies to improved upon the sampling resolution of the original research to better capture the ecosystem variability of Neogene East Africa before, during, and after grassland expansion 10 Ma.