POLYCYCLIC AROMATIC HYDROCARBONS (PAH) RECORD CONTRIBUTIONS OF TERRIGENOUS ORGANIC MATTER FROM ANGIOSPERMS AND PALAEOFIRES

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Core samples recovered from the Transkei Basin (Hole U1581B), offshore South Africa, during IODP Expedition 392 include an expansive record of organic-rich sediments from the Campanian to Paleocene (~63-74 Ma). Investigation of the biomarker composition of this sequence revealed significant amounts of polycyclic aromatic hydrocarbons (PAH) reflecting terrestrial sources oforganic matter (OM), notably from angiosperms, coupled with evidence for paleofires. Perylene is the dominant PAH in the Campanian sediments, derived from diagenetic alteration of terrestrial OM. Other prominent PAH components are tetrahydrochysenes and tetrahydropicenes, which derive from early-stage diagenetic aromatization ± loss of the functionalized A-ring of triterpenoid precursors. Their relative proportions are similar throughout the sequence, albeit with outliers. Thus, angiosperms serving as a consistent source of OM throughout this interval, suggesting established contributions from these plants following their expansion during the Late Cretaceous. Further evidence for inputs of angiosperm-derived terrigenous OM is provided by the co-occurrence of their precursor triterpenoid alkenes and ketones. The presence of coronene in the sedimentary succession indicates that the sources of terrestrial OM also include pyrogenic material because this compound, like other diagnostic PAH, is formed during intense combustion and therefore serves as a sedimentary marker for fire. Coronene occurs as a minor PAH component in Campanian samples, but it is a prominent PAH component of the Paleocene samples. Coronene is dominant in the basal Paleocene sample consistent with inputs from global fires at the K/Pg boundary, confirming their prevalence at high southern latitudes. whereas the lower proportion of perylene in this interval may reflect a diminished supply of unburnt lignin precursors. Coronene remains a substantive component in later Paleocene samples likely reflecting the protracted occurrence of wildfires. In addition, the supply of PAH generated during the K-Pg boundary event may provide a sustained influx of terrigenous OM derived from erosion and weathering of burnt biomass, which is consistent with evidence that larger PAH are primarily transported by clastic detritus rather than airborne particulates.