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Alkenones confirmed in sediments from high southern latitudes during the Cretaceous and Paleocene: results from the Transkei Basin (IODP Site U1581)

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Preliminary examination of the biomarker composition of Paleocene to Campanian (~63-74 Ma) organic-rich sediments recovered from the Transkei Basin (Hole U1581B; 35° 41'S, 29° 39'E), offshore South Africa, during IODP Expedition 392 reveals suites of alkenones and alkyl alkenoates derived from haptophyte algae. This discovery augments evidence for the temporal continuity of their occurrence since the early Aptian and expands their paleogeographic range to high southern latitudes (~60°S) during the Cretaceous and Paleocene. In addition, the similarity of alkenone distributions between Maastrichtian and Danian samples suggests a conformity in the biosynthetic pathways for their production across the K/Pg boundary likely attesting to the survival of their source haptophytes and recovery after the extinction event. Alkenone distributions in the Transkei Basin sediments are dominated by series of C_{37} to C_{40} diunsaturated components and remain broadly consistent throughout the Cretaceous to Paleocene stratigraphic succession. The presence of both the C_{38} alkadien-2-one and C_{39} alkadien-3-one represents the earliest recognition of these compounds thereby extending the advent for biosynthesis of both methyl and ethyl alkenones to the Campanian (~74 Ma). These sediments also contain C_{37} methyl and both C_{38} and C_{40} ethyl alkadienoates. No C_{37}, C_{38} or C_{39} triunsaturated alkenones were detected in the Paleocene through Campanian succession but minor amounts of a C_{40} alkatrien-3-one were confirmed in Cretaceous samples based on its elution time and diagnostic mass spectrum. This finding raises the question why only the C_{40} triunsaturated component is observed, coupled with pervasive evidence that C_{37} to C_{39} triunsaturated alkenones emerge after the Early Eocene Climatic Optimum (EECO). Among extant haptophytes, C_{40} alkenones occur in species within phylogenic Group II, notably *Isochrysis*, but are absent in extant marine species comprising phylogenic Group III. These observed distributions of alkenones in the marine realm can be best explained as

evidence for contributions from both Isochrysidaceae and Noelaerhabdaceae following their divergence in the early Cretaceous.

Expedition 392 Science Party: Scientific Participants in IODP Expedition 392