Palaeoenvironmental changes in Southwest Africa revealed by the analysis of plant wax constituents isolated from a marine sediment core

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The ocean is an important sink for terrigenous organic matter transported off shore by wind and rivers. The composition of land plant-derived organic material varies due to changing environmental conditions on the continent. Thus, marine sediments preserve a record of continental vegetation and climate. This study focuses on molecular stable isotope compositions (carbon and hydrogen) and distribution patterns of long-chain n-alkanes and n alkan-1-ols as proxies for the climate dependent contribution of land plant wax constituents to marine sediments. We analysed 184 samples (every 5 cm) of the 9.21 m long sediment core GeoB 4917-8. The core was taken off Angola at 11°54.2' S, 13°04.4' E in 1299 m water depth during cruise M 41/1 of the research vessel Meteor in 1998. The sediment age was estimated by comparison of alkenone-based sea surface temperature reconstructions for this core with temperature records of two other cores from the same region, namely GeoB 1016-3 (distance ca. 160 km) and ODP1079A (distance ca. 30 km). As a first approximation a linear sedimentation rate was assumed and an age of 80,000 years was estimated for the deepest samples. Our study elucidates the variation of the molecular parameters in glacial and interglacial times. Initial results show a significant shift to more negative values for the carbon isotopic composition of the dominating n-alkanes (n-C29, n-C31, and n-C33) and a trend to shorter-chain homologues from glacial times to the Holocene. This indicates a change of the vegetation on the continent adjacent to the sampling location. In the relatively humid Holocene period, C3 trees and shrubs were abundant. During glacial times the climate in the region was more arid and grasslands expanded. This vegetation type is dominated by C4 species synthesising longer-chain n-alkanes with less negative stable carbon isotope ratios.