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Increased aridity in southwestern Africa during the warmest periods of the last interglacial

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Terrestrial and marine climatic tracers from marine core MD96-2098 were used to reconstruct glacial–interglacial climate variability in southwestern Africa between 194 and 24 thousand years before present. The pollen record documented three pronounced expansions of Nama-karoo and fine-leaved savanna during the last interglacial (Marine Isotopic Stage 5 – MIS 5). These Nama-karoo and fine-leaved savanna expansions were linked to increased aridity during the three warmest substadials of MIS 5.
Enhanced aridity potentially resulted from a combination of reduced Benguela Upwelling, expanded subtropical high-pressure cells, and reduced austral-summer precipitation due to a northward shift of the Intertropical Convergence Zone. Decreased austral-winter precipitation was likely linked to a southern displacement of the westerlies. In contrast, during glacial isotopic stages MIS 6, 4 and 3, fynbos expanded at the expense of Nama-karoo and fine-leaved savanna, indicating a relative increase in precipitation probably concentrated during the austral winter months. Our record also suggested that warm–cold or cold–warm transitions between isotopic stages and substages were punctuated by short increases in humidity. Increased aridity during MIS 5e, 5c and 5a warm substages coincided with minima in both precessional index and global ice volume. On the other hand, austral-winter precipitation increases were associated with precession maxima at the time of well-developed Northern Hemisphere ice caps.