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Oceanographic and monsoonal variability in the Arabian Sea during Dansgaard-Oeschger oscillations

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The Dansgaard-Oeschger oscillations and Heinrich events described in Greenland ice cores and North Atlantic sediments are expressed in the climate of the tropics, for example, as documented in Arabian Sea sediments. Given the strength of this teleconnection, we seek to reconstruct its range of environmental impacts. We present geochemical, sedimentological as well as micropaleontological data from core SO130-289KL from a water depth of 570 m off the Indus mouth, spanning the past 80,000 years. Elemental and grain-size analyses combined with end-member modeling consistently indicate that interstadials are characterized by an increased contribution of fluvial suspension from the Indus River. Decadal-scale shifts at climate transitions, such as onsets of interstadials, were coeval with changes in productivity-related proxies such as alkenone concentrations. Stadials are characterized by an increased contribution of aeolian dust from the Arabian Peninsula. Heinrich events stand out as especially dry and dusty events, indicating a dramatically weakened Indian summer monsoon and increased aridity. The hydrogen isotopic composition of terrigenous plant lipids reflects that stadials/Heinrich events are the driest phases whereas humid conditions seem to have prevailed during interstadials. The stable oxygen isotopes of the surface-dwelling planktonic foraminifer *G. ruber* and the thermocline dweller *P. obliquiloculata* show a strong correspondence to Greenland ice core δ^{18}O records. The deepwater stable oxygen isotope signal of benthic foraminifera (*U. peregrina* and *G. affinis*) primarily reflects δ^{18}O patterns recorded in ice cores from Antarctica. Strong shifts in δ^{18}O during stadials/Heinrich events are attributed to frequent advances of oxygen-rich intermediate water masses into the Arabian Sea originating from the southern ocean. Alkenone-derived SSTs show initial abrupt shifts towards higher SSTs followed by cooler temperatures during interstadials, which are probably connected to the onset of upwelling-like processes. Our results strengthen the evidence that circum-North Atlantic temperature changes translate to hydrological shifts in the tropics, with major impacts on regional environmental conditions such as rainfall, river discharge and ocean margin anoxia supported by changes in the supply of water masses from the southern hemisphere.