Geophysical Research Abstracts
Vol. 18, EGU2016-6607, 2016
EGU General Assembly 2016

Monsoon variability in the northeastern Arabian Sea on orbital- and millennial scale during the past 200,000 years

Andreas Lückge (1), Jeroen Groeneveld (2), Stephan Steinke (2), Mahyar Mohtadi (2), Thomas Westerhold (2), and Hartmut Schulz (3)

(1) BGR, Marine Geology, 30655 Hannover, Germany (andreas.lueckge@bgr.de), (2) MARUM – Center for Marine Environmental Sciences, Bremen University, 28359 Bremen, Germany, (3) Eberhard-Karls-University, 72076 Tübingen, Germany

The Dansgaard-Oeschger oscillations and Heinrich events described in the Greenland ice cores and in North Atlantic and Western Mediterranean sediments are also expressed in the climate of the tropics, for example, as documented in Arabian Sea sediments. However, little is known about these fluctuations beyond the reach of the Greenland ice cores. Here, we present high-resolution geochemical, sedimentological as well as micropaleontological data from two cores (SO130-283KL, 987m water depth and SO130-289KL, 571m) off the coast of Pakistan, extending the monsoon record on orbital and millennial scales to the past 200,000 years.

The stable oxygen isotope record of the surface-dwelling planktonic foraminifer *G. ruber* shows a strong correspondence to Greenland ice core δ^{18}O, whereas the deepwater δ^{18}O signal of benthic foraminifera (*U. peregrina* and *G. affinis*) reflects patterns recorded in ice cores from Antarctica. Strong shifts in benthic δ^{18}O during stadials/Heinrich events are interpreted to show frequent advances of oxygen-rich intermediate water masses into the Arabian Sea originating from the southern ocean. Alkenone-derived SSTs varied between 23 and 28˚C. Highest temperatures were encountered during interglacial MIS 5. Rapid SST changes of 2˚C magnitude on millennial scale are overlain by long-term SST fluctuations. Interstadials (of glacial phases) and the cold phases of interglacials are characterized by sediments enriched in organic carbon (up to 4 % TOC) whereas sediments with low TOC contents ($<$ 1 % TOC) appear during stadials and Heinrich events. Shifts at climate transitions, such as onsets of interstadials, were coeval with changes in productivity-related and anoxia-indicating proxies. Interstadial inorganic elemental data consistently show that enhanced fluxes of terrestrial-derived sediments are paralleled by productivity maxima, and are characterized by an increased fluvial contribution from the Indus River. In contrast, stadials are characterized by an increased contribution of aeolian dust probably from the Arabian Peninsula. Heinrich events are especially dry and dusty events, indicating a dramatically weakened Indian summer monsoon and increased continental aridity.

These results strengthen the evidence that North Atlantic temperature changes and shifts on the hydrological cycle of the Indian monsoon system are closely coupled, and had a massive impact on regional environmental conditions such as river discharge and ocean margin anoxia. These shifts in the surface and sub-surface ocean were modulated by changes in the supply of water masses from the southern hemisphere.