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Variation of terrestrial input and paleoproductivity in the Arabian Sea: millennial-scale variations of the Indian monsoon during the Quaternary as recorded at IODP Exp. 355

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The Indian monsoon is a major component of the global climate system. Variation in the yearly moist and dry episodes affect livelihood of the densely populated northwest Indian region. In order to develop mitigation strategies at a regional scale, it is necessary to accurately predict local future climatic trends. Unfortunately, there is a scarcity of long continuous, high-resolution climate archives recording the variability of both atmospheric and oceanic processes. The sediment cores obtained from the Indus fan during IODP Exp. 355 (Arabian Sea monsoon) have the potential to fill this gap. We use time and cost saving methods (FTIRS and XRF) in order to obtain high resolution records spanning the past 1.5 Ma to simultaneously reconstruct terrestrial paleoclimatic conditions (using element ratios and mineralogical data as weathering and provenance indicators) and paleooceanographic circulation patterns (using paleoproductivity proxies) at millennial scale resolution. Preliminary findings indicate that a higher supply of eroded material from the Karakorum is associated with stronger westerlies and a decreased monsoon during glacials, whereas interglacials are characterized by a dominant supply of Himalayan eroded material due to strong monsoon rainfalls and weak Westerlies. Furthermore, the prelimary paleoproduction record indicates that increased productivity in the eastern Arabian Sea resulted from stronger winter monsoon winds during glacials. Our preliminary data suggest that an anti-phase relationship of the Westerlies and the Arabian Sea Monsoon exists for both orbital scale (glacial-interglacial) and millennial scale variability during the past 1.2Ma. Preliminary spectral analysis shows a shift from a precession to a obliquity driving at around 0.35Ma, furthermore there are indications of a co-presence of the major Milankovich cycles during intervals of high sedimentation rate such as 0.12Ma. The mechanisms behind this are yet to be explored and completing this dataset at higher resolution will lead to a more comprehensive understanding of the interplay of the local atmospheric and oceanic circulation processes over glacial-interglacial cycles; an essential prerequisite for regional predictions of global climate change impacts.