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Tracing seasonality of synoptic scale modern dust transport over the Northeast Arabian Sea during the southwest Monsoon using geochemical signatures

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The Arabian sea receives significant amount of mineral dust particularly during South west monsoon (SWM), providing essential macro and micro nutrients which can modulate the surface ocean biogeochemistry. In this study, wet deposit particulates (WDP) samples were collected during SWM period over a span of three years (2014-15 and 2019) at a coastal station (15.4° N, 73.8° E) in the North East Arabian Sea (NEAS). These WDP samples were used to characterize and identify sources of mineral dust using mineralogical, elemental as well as isotopic (Sr and Nd) signatures. Additionally, the surface sediment samples collected from various location over the Thar desert region were also processed and analysed which could act as one of the sources of dust to the NEAS. The samples collected during SWM have been classified as Beginning of Monsoon (BM, June samples), Mid Monsoon (MM, July- August samples) and End of Monsoon (EM, September samples). Palygorskite, Smectite, Kaolinite, Illite and Chlorite are the major clay minerals identified in these samples. The Palygorskite (average = 40%) content is relatively high during the BM period, which subsequently found to decrease in MM and almost negligible (0-10%) in EM samples. Whereas, smectite shows an inverse relation to that of palygorskite, being maximum during MM. The $^{87}Sr/^{86}Sr$ ratios and ε_{Nd} values in silicate fraction of WDP samples ranged between 0.7091 and 0.7194 and -0.6 and -9.1, respectively. The ε_{Nd} values display an opposite trend to that of the $^{87}Sr/^{86}Sr$ ratios throughout the study period, with more radiogenic ε_{Nd} in the MM, and less radiogenic at the EM. We also observed a large variability in the isotopic composition of Thar surface sediment samples, with $^{87}Sr/^{86}Sr$ ratio ranging from 0.7137 to 0.7352 and ε_{Nd} value ranging from –8.0 to –14.6. These variabilities in the mineralogical as well as isotopic composition of WDP samples indicate the contribution from various dust sources surrounding the Arabian sea such as Arabian Peninsula, Northeast Africa and Southwest Asia as well as Thar desert particularly during SWM.