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Radiogenic Sr-Nd isotope characterization of surface sediments and airborne dust from northwestern India

ROHAN BHATTACHARYYA[1], SATINDER PAL SINGH[2] AND SUDESH YADAV[3]

[1]Indian Institutes of Science Education and Research Bhopal
[2]Indian Institute of Science Education and Research Bhopal
[3]Jawaharlal Nehru University

Presenting Author: rohanb17@iiserb.ac.in

Mineral dust emanation from natural deserts regulates the air quality, climate, and ecosystem health. The spatiotemporal variability of Thar dust outflow before the onset of the world's strongest Indian Summer Monsoon is crucial for regional socioeconomic developments. Tracing of Thar dust dispersal during modern as well as pre-instrumental times requires its robust provenance signatures. For this purpose, we have measured radiogenic Sr and Nd isotope compositions in decarbonated Thar surface sediment collected from northwest Rajasthan. A few size-segregated airborne-dust samples of the summer season from Bikaner, Jhunjhunu, Delhi, and Garmukhtesar in Northwest India were also analyzed. The measured dataset ($^{87}Sr/^{86}Sr$ 0.7283±0.0064 and e_{Nd} −12.7±2.1; n=54) in these Thar sediments overlap with the reported values for downwind eolian deposits in northwestern India[1]. The intra-dunal variations are found in sediment samples from Rajgarh ($^{87}Sr/^{86}Sr$ 0.7288±0.0040 and e_{Nd} −13.0±0.7; n=6) and Jhunjhunu ($^{87}Sr/^{86}Sr$ 0.7293±0.0053 and e_{Nd} −13.8±0.4; n=5) probably due to grain-size and/or mineral effects. Free-fall dust samples from Bikaner and Jhunjhunu reveal relatively less radiogenic $^{87}Sr/^{86}Sr$ and e_{Nd} in the finer fractions, while an inverse trend is seen in the Delhi free-fall samples.

[1]Tripathi, J.K., Bock, B. and Rajamani, V., 2013. Nd and Sr isotope characteristics of Quaternary Indo-Gangetic plain sediments: Source distinctiveness in different geographic regions and its geological significance. Chemical Geology, 344: 12-22.