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Fine detritus material in Red Sea cores as indicator of dust transport and regional climate conditions during MIS6/5 and MIS2/1 transitions

D Palchan (1,2), M Stein (2), Y Erel (1), A Almogi-Labin (2), and S.L. Goldstein (3)
(1) Institute of Earth Science, The Hebrew University, Jerusalem, Israel. , (2) The Geological Survey of Israel, 30 Malkhe Israel St, Jerusalem, Israel., (3) Lamont-Doherty Earth Observatory and Columbia University, 10964 Palisade, NY, USA.

The Red Sea (RS), located in the midst of the Arabian-Sahara desert belt, comprises an ideal archive for reconstructing dust transport and atmospheric circulation in this region during the late Quaternary. The information is recovered from deep sea cores that were drilled at the bottom of the RS by the Meteor. Here, we present data recovered from core KL-23, which was drilled in the northern RS (25°44' 88N 35°03' 28E). Interpreting the fine-grain (<63μm) detritus in the cores as desert dust we explored the mineralogy, grain-size distribution, major and trace elements chemistry and Sr-Nd-Hf isotope composition of the silicate residue (insoluble in acetic acid). Initial core chronology was based on the SPECMAP δ18O age model indicating that the core spans nearly 370 ka. The core chronology was improved by matching the δ18O patterns with those of core GeoB- 5844-2 (north to KL-23) that was dated by radiocarbon and δ18O patterns of the densely dated (by U-Th) Soreq Cave (Israel) speleothems. We focused on two glacial interglacial transitions: MIS 6 to 5 and MIS 2 to 1 (at $\sim$ 150/130 kyr BP and $\sim$20/8 kyr BP, respectively).
Nd-Sr-Hf isotopic ratios indicate contribution from two main lithological sources: "granitic" material, which is common in the Arabian and Sahara crustal terrains and "basaltic" material, which possibly originated from the Cenozoic basaltic terrains at the southern margins of the Red Sea. The "granitic" source was more dominant during glacials, while enhanced supply of detritus from the "basaltic" source occurred immediately after glacial terminations and transitions to interglacials. Major elements probably record weathering processes at the source regions where enhanced alteration of basaltic source occurred during interglacials.

Glacial intervals in the core are characterized by uni-modal grain-size distribution with a mean value at $\sim$20 μm, while the interglacials show bi-modal distribution that reflects a change of the wind regime and the additional “basaltic dust” source. We suggest that the “basaltic dust” probably originated from the Ethiopian highlands due to higher frequencies of Red Sea trough. Stronger activity of the African monsoons may have caused the enhanced weathering of the dust sources as evident in the major element chemistry of the interglacial samples. This observation is consistent with the timing of deposition of sapropel layers in the Eastern Mediterranean.