

Detrital calcites from the Sahara: source of alkalinity to the Dead Sea, the Mediterranean and the Atlantic Ocean

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Enormous amounts of fine detritus particles were blown during the past few million-years from the Sahara deserts to the continents and oceans. These particles comprise the surface cover soils, e.g. the loess deposits and mountain soils in the circum Mediterranean areas. The desert dusts comprise mainly detrital grains of quartz and calcite. Nd-Sr isotope compositions of detrital calcites in modern desert dust, loess deposits and fine detritus of the Quaternary lacustrine formations at the Dead Sea Basin trace the origin and processes of mobilization of the detrital calcites. The calcites show uniform $^{87}\text{Sr}/^{86}\text{Sr}$ ratio ~ 0.7081 and ϵNd values ~ -10 to -15 . The very negative ϵNd values indicate that the calcites were originally deposited in lakes that derived their waters from the mid-Proterozoic shields during times of enhanced precipitation in the Sahara deserts (e.g., interglacials). During glacials the detrital calcites were blown from the Sahara to large distances. Their dissolution led the formation of loess deposits and mountain soils and provided calcium and bicarbonate to the Dead Sea. Similarly, dissolution of detrital calcites from the entire circum-Mediterranean areas could provide alkalinity to the sea and possibly to the Atlantic Ocean. Thus, the detrital calcites provide a new source of alkalinity to the oceans, particularly during glacial periods, a source that has not been explored so far.