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Controls on aragonite precipitation in the Dead Sea and Lake Lisan: a lesson from geochemical measurements in flood plumes

Reuven Belmaker, Nimer Taha, and Revital Bookman

Dr. Moses Strauss Department of Marine Geosciences, Leon H. Charney School of Marine Sciences, University of Haifa, Haifa 31905, Israel (rbookman@univ.haifa.ac.il)

Several studies demonstrated that authigenic aragonite precipitates from the Dead Sea (and its late Pleistocene precursor Lake Lisan) in response to mixing between flash-floods and lake brine. However, the factors that control this precipitation were not robustly established. Here we addressed this issue by measuring the chemical composition (pH, Na+, K+, Ca2+, Mg2+, Sr2+, Cl-, Br-, B, alkalinity) of modern flood plumes. In total, seven cross shaped sampling transects were conducted and 37 samples were collected. Our results indicate that (a) mixing is the only process that affects the Na+, Mg2+, K+ and Cl concentration whereas Ca2+ and Sr2+ are adsorbed on the flood suspended load, (b) Adsorption of boron to the flood suspended load possibly facilitated aragonite precipitation within the flood plume, and (c) In contrast to what was suggested in previous studies Aragonite precipitation in the Dead Sea and Lake Lisan is not controlled solely by the input of freshwater but also requires high dust fluxes. This explains the increased occurrence of aragonite laminae both during the last glacial period and during the last 3000 yr. Although the water input during these two periods was completely different they are both characterized by relatively high dust fluxes. This result is of great importance for paleoclimatological reconstructions.