# Biogeochemistry of the redox-sensitive elements in the sediments of the Gulf of Aqaba

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The Gulf of Aqaba, Red Sea, is dominated by aeolian dry deposition from the adjacent deserts, mostly from Sahara. This study was designed to understand a biogeochemical cycling of the redox-sensitive elements in the sediments of the Gulf of Aqaba with focus on an impact of aeolian dust deposition on distribution and speciation of the redox-sensitive metals in the sediment. The depth distribution of electron acceptors available for mineralization of organic matter was studied in the upper 90 cm of the sediments of the Gulf of Aqaba. Distribution of redox-sensitive elements in the aerosols was studied as well. Sediment was sampled at the 694 m water depth. Concentrations of sulfur species (sulfate, hydrogen sulfide and its oxidation intermediates), dissolved iron and manganese in the pore-waters were measured. AVS, CRS, and elemental sulfur contents, total and highly reactive iron, molybdenum and aluminum concentrations were measured in the solid phase. Concentrations of total and reactive iron, molybdenum and aluminum were measured in aerosols, including samples collected during the dust storm.

Manganous zone was found in the upper 1-10 cm of sediments, ferruginous zone was found in the upper 50 cm of sediments, with the maximum concentrations of dissolved iron at 7-23 cm bsf depth (up to 14.9 μM). Enrichments in total and highly reactive iron contents observed in the sediments, result in oxidation of hydrogen sulfide to sulfate and intermediate sulfur species. The highest concentrations of free hydrogen sulfide in sediment pore-waters were detected below 50 cm bsf depth (up to 0.31 μM). Sedimentary pyrite was found below 10 cm bsf depth as an evidence of bacterial sulfate reduction zone even in the absence of free $H_2S$. The molybdenum profile exhibited an overall decrease with depth with maximum concentration of 4 ppm near the sediment-water interface. Similarity in speciation of iron in the sediments and dust suggests strong influence of the dust deposition on the biogeochemical cycling of iron in the Gulf of Aqaba.