

Inorganic elemental characterization of coastal sediments along the Egyptian Mediterranean Sea

A. Elsenbawy^{1*}, Wael M. Badawy^{1,2}, Andrey Yu. Dmitriev², Hussein El Samman³,
Ayman A. El-Gamal⁴, Nariman H. M. Kamel², Mohamed A. Mekewi⁶

¹*Radiation Protection and Civil Defense Department, Nuclear Research Center, Egyptian Atomic Energy Authority (EAEA), 13759 Abu Zaabal, Egypt*

²*Frank Laboratory of Neutron Physics, Joint Institute for Nuclear Research, 141980 Dubna, Russian Federation*

³*Menoufia University, Faculty of Science, Department of Physics, Shibin El-koom, Egypt*

⁴*Marine Geology Department, Coastal Research Institute, National Water Research Center, 15, St. Elpharanaa, Elshalalat, 21514 Alexandria, Egypt*

⁶*Department of chemistry, faculty of Science, Ain Shams University, Cairo 11566, Egypt*

Abstract

A comprehensive investigation of the elemental compositions of the sediments along the Egyptian Mediterranean Sea was carried out. A total of 99 marine sediment samples were collected from three sectors along the coastal areas (Rashid, Elbrullus, and Ras ElBar) subjected to the instrumental neutron activation analysis. A total of 39 elements namely, Na, Mg, Al, Si, Cl, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, As, Br, Rb, Sr, Zr, Mo, Sn, Sb, Cs, Ba, La, Ce, Nd, Sm, Eu, Tb, Dy, Yb, Lu, Hf, Ta, Th, and U were determined. The concentrations of the determined elements in mg/kg were calculated, compared with the corresponding values regionally and worldwide, and statistically treated. Bivariate and multivariate statistical analyses were employed. The quality of the sediments was assessed using different pollution indices such as contamination factor, enrichment factor, geoaccumulation index, and pollution load index. The spatial distribution of the pollution load index and total pollution index was mapped and areas of significant pollution were depicted (River mouth of Damietta, ElBurullus Lake, and curvature of Abu Qir). The obtained results may serve as geochemical background values of the coastal sediments along the Egyptian Mediterranean Sea.

Keywords: *major and trace elements/ coastal sediments/ NAA/ statistical analysis/ pollution indices*

* Corresponding author: Ahmed Elsenbawy (a.t.elsenbawy@gmail.com)