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The interactions of some radioelements activity patterns with some hydrographic parameters at the petroleum and phosphate regions in the Red Sea, Egypt

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ABSTRACT

The activity patterns of, ^{226}Ra , ^{228}Ra , ^{232}Th , ^{40}K , ^{210}Pb and ^{210}Po and the interaction with some hydrographic parameters; salinity, pH and dissolved oxygen (DO) were studied near the oil production and exploration fields at Rasel Behar and near the phosphate mining, milling and shipping at Hamrawin area. The average activities of ^{226}Ra , ^{228}Ra , ^{232}Th , ^{40}K , ^{210}Pb and ^{210}Po at Resel Behar were; 15.2 ± 6.3 , 15.8 ± 8.6 , 16.2 ± 8.7 , 330.7 ± 107.1 , 19.3 ± 12.7 and 27.5 ± 21.18 Bq/kg and at Hamrawin were; 103.9 ± 141.6 , 13.4 ± 18.5 , 14.1 ± 18.8 , 242.6 ± 79.3 , 92.3 ± 128.5 and 133.0 ± 184.5 Bq/Kg respectively. The distribution patterns of ^{226}Ra , ^{228}Ra , ^{232}Th and ^{210}Pb at Rasel Baher to the brine water drainage from oil tanks and petroleum production platforms at Jubal Strait. The highest activity values recorded at Hamrawin marine area were concentrated inside the shipping zone and decreasing abruptly seaward and southward indicate to the dropped phosphate raw materials are the main radioactive source in the locality. The activity pattern of ^{40}K indicates to multiple sources of accumulations mostly from the terrestrial runoff.

The negative correlation with pH and salinity as well as the positive correlation with DO indicate that the radionuclides in sediments were less soluble with increasing pH and salinity therefore; they tend to accumulate in sediments under more the oxidizing conditions. The ^{40}K variations in the sediments to the high solubility of potassium, the organic matter content and the particle size which corresponds to the clay content.

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1. Introduction

Red Sea belongs to the category of land-locked seas, as it is semi-enclosed basin in an arid zone in which evaporation far exceeds precipitation and runoff. Like the other enclosed seas, its chemistry is intimately linked with physical and biological processes, in particular with topographical features (Morcos, 1970). Red Sea coastal plain is from 2 to 50 km wide and slopes up gently to the east until it meets the mountains. The

Red Sea Mountains are deeply cut by valleys but streams flowing in the uplands fail to cross the coastal plain to reach the sea (Behairy, Sheppard, & El-Sayed, 1992, 41 pp.). Most sandy shores in the northern Red Sea are narrow beaches adjoining narrow coral reef flats (Chiffings, 2003). Red Sea is considered the most important and the biggest navigation path in the world as well as northern Red Sea and the Gulf of Suez involve about 90% of the Egyptian oil exploration and production activities (El Afifi & Awwad, 2005; Shawky, Amer, Nada, Abd El-Maksoud, & Ibrahim, 2001). Also, the Egyptian

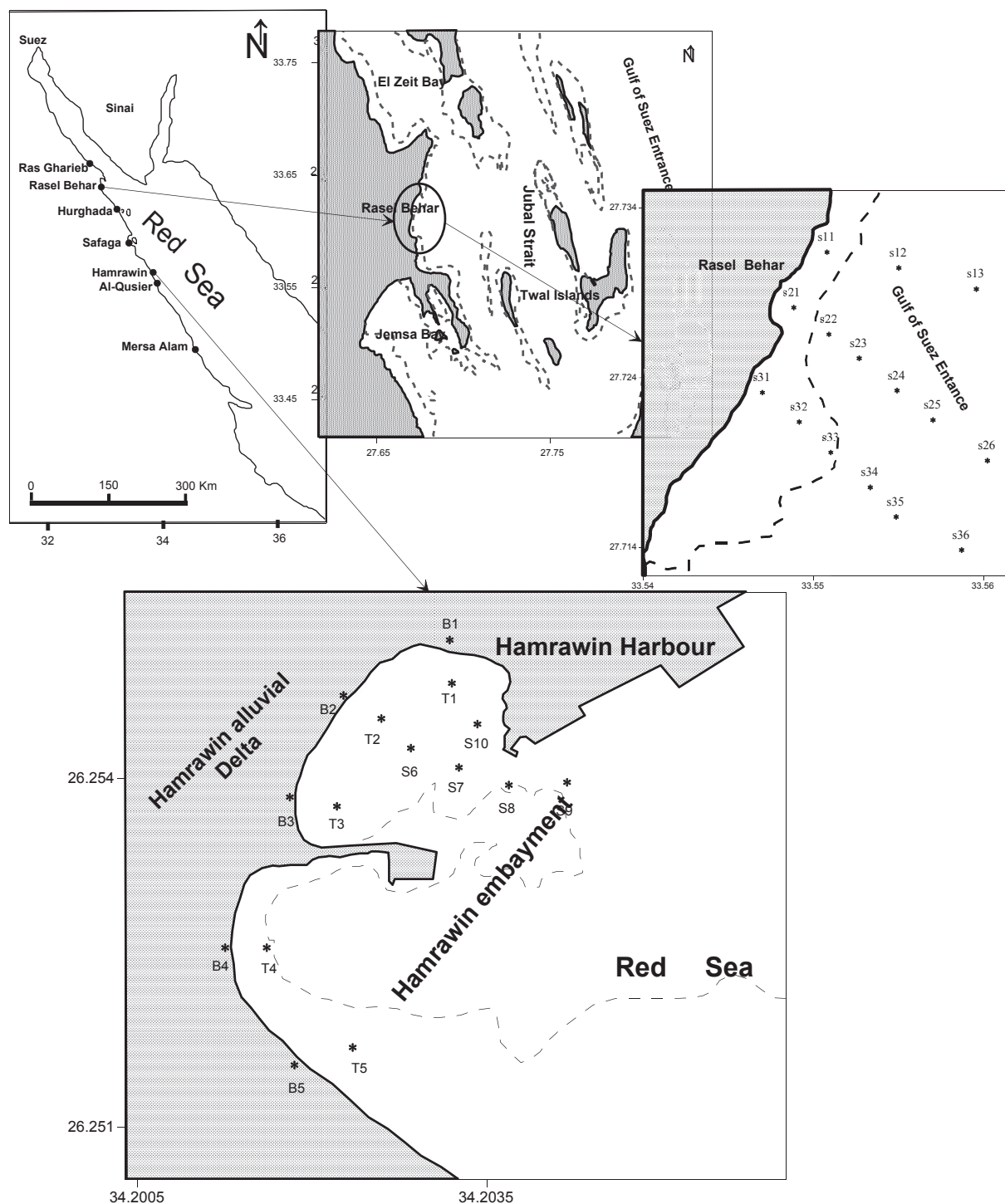


Fig. 1 – Location maps show the investigated locations and the samples distribution.

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