

Geomorphological & Geoarchaeological Indicators of the Holocene Sea-Level Changes on Ras El Hekma Area, NW Coast of Egypt



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ABSTRACT

Ras El Hekma area is a part of the NW coast of Egypt. It is located on the Egyptian Mediterranean Coast, approximately 220 km West of Alexandria City. It is shaped as a triangle with its headland extending into the Mediterranean sea for about 15 km, and is occupied by sedimentary rocks belonging to the Tertiary and Quaternary Eras. Its western coastline consists of Pleistocene Oolitic limestone ridges with separated steep scarps, while the eastern coastline consists of sandy beaches, coastal spits, coastal bars, tombolos and bays.

The objective of this paper is to define some geomorphological and geoarchaeological indicators of The Holocene sea-level changes in the study area, especially the geomorphic landforms such as: marine notches, cliffs, sea caves and benches. This is to add to some archaeological remains that have been discovered by the paper's author under the current sea level. These remains include: submerged ruins of Greek and Roman harbors, wells and fish tanks near the coastline (Leuke Akte, Hermaea, Phoinikous and Zygris), in addition to an ancient Roman harbor used during the World War II in Tell El Zaytun area (Site #6). Evaluations of the discovered archaeological remains help our understanding of the evolution of the sea level during the Holocene. This study is based on observation of the relative sea-level curves drawn of the Holocene, detailed geomorphological and Geoarchaeological surveying, sampling, dating and mapping as well as satellite image interpretation and GIS techniques.

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1. Introduction

1.1. Geological and geographical setting

Ras El Hekma area is a part of the NW coast of Egypt. It is located on the Mediterranean, 220 km West of Alexandria City. It is shaped as a triangle with its headland extending into the Mediterranean for about 15 km. It covers about 230 km² (Fig. 1).

The major geomorphic features of Ras El Hekma area are oriented towards E/W-direction, parallel to the present shoreline. Geologically speaking, the study area consists of parallel coastal ridges composed of aeolionites and paleosols along the recent coastline, which can be used as an indicator of former shorelines. The Miocene Marmarican homoclinal plateau may be seen as the Southern border of the study area with elevation between 100 and 135m above sea level. Extensive field investigations, measurement of selected geomorphic features above and under the current sea

level, topographic maps, DEM, Landsat images and geomorphic mapping, have all participated in classifying the following geomorphic units from South to North:

- A. The first unit is The Middle Miocene Carbonates Plateau: "El Daffah or Marmarica Plateau". It is formed from Miocene limestone rock up to 150m thick. The plateau is affected by weathering processes and is developed into a hard pink crust with many solution-holes formed by chemical reactions as a result of rainfall and humidity.
- B. The second unit is the sloppy surface piedmont plain between the Miocene plateau in the South and the coastal plain in the North. It is separated by some gullies and short V-shaped seasonal streams or wadies. Its surface is covered by mixed fluvial and aeolian sediments.
- C. The third unit is a coastal plain. It covers the triangle's coastal plain to the north of the Miocene plateau. It is covered by Quaternary deposits which rest with conformable and or unconformable relation to the Tertiary deposits. These deposits

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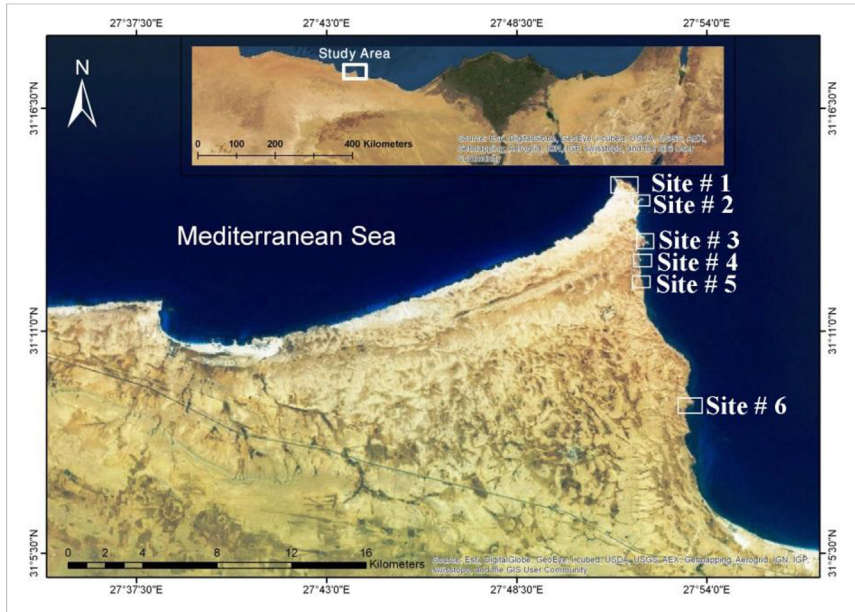


Fig. 1. Location map of the study area and selected field surveying sites.

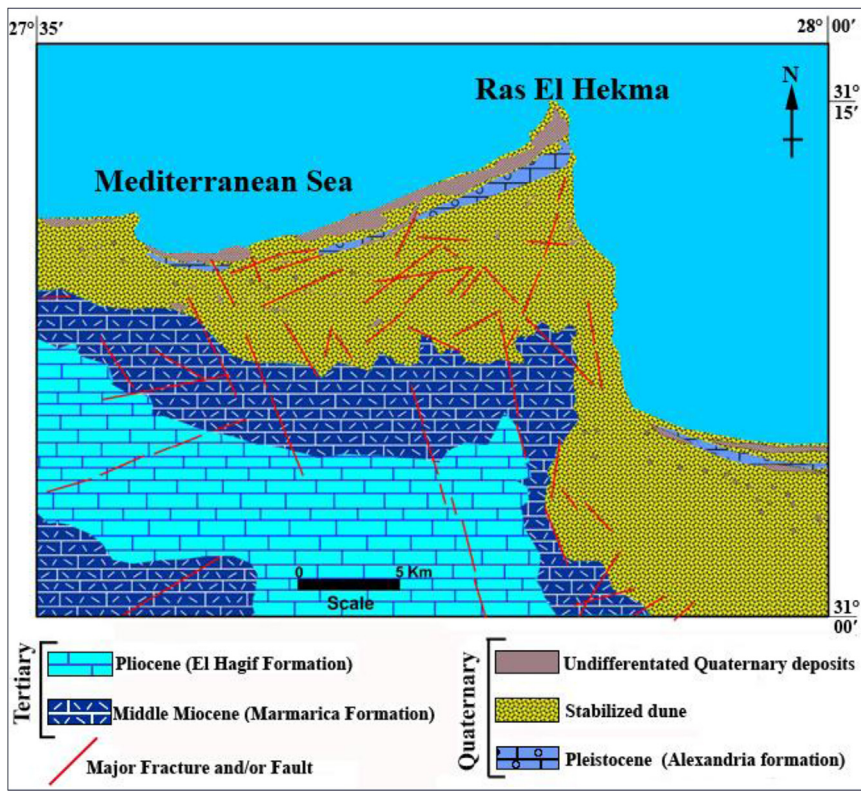


Fig. 2. Geological map of the study area. (After: Yousif and Bubenzer, 2011).

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