Palaeogeographic reconstruction of Akrotiri Salt Lake, Lemesos, Cyprus

(Web Report)

Introduction & Study Area

Akrotiri peninsula is located 5km west of the city of Lemesos and is the southernmost part of the island of Cyprus (Fig.1). It consists of Quaternary sediments which are unconformably deposited on Miocene Pachna formation chalks and marls (Morel, 1960). The Quaternary sediments are composed of fluvial, marine, deltaic, aeolian and lagoonal deposits. In the central part of the peninsula is the Akrotiri Salt Lake, which dominates the topography, covering an area of approximately 20 square Km. The maximum depth of the Salt Lake reaches -2,8m. West of the Salt Lake there is an extensive tombolo, which consists of deltaic and aeolian deposits. To the East of the Salt Lake, there are rows of sand dunes and sandy beach bars. The northern area is covered by Quaternary alluvial fans, which were formed by discharged material of the Kouris River, the largest river in Cyprus. In the southern region of the Peninsula, there are uplifted marine terraces, which are overlapped by sand layers of aeolian origin. Aeolian deposits exhibit silica composition with a uniform grain size (Fig 2).

Fig 1. Location of Akrotiri Peninsula

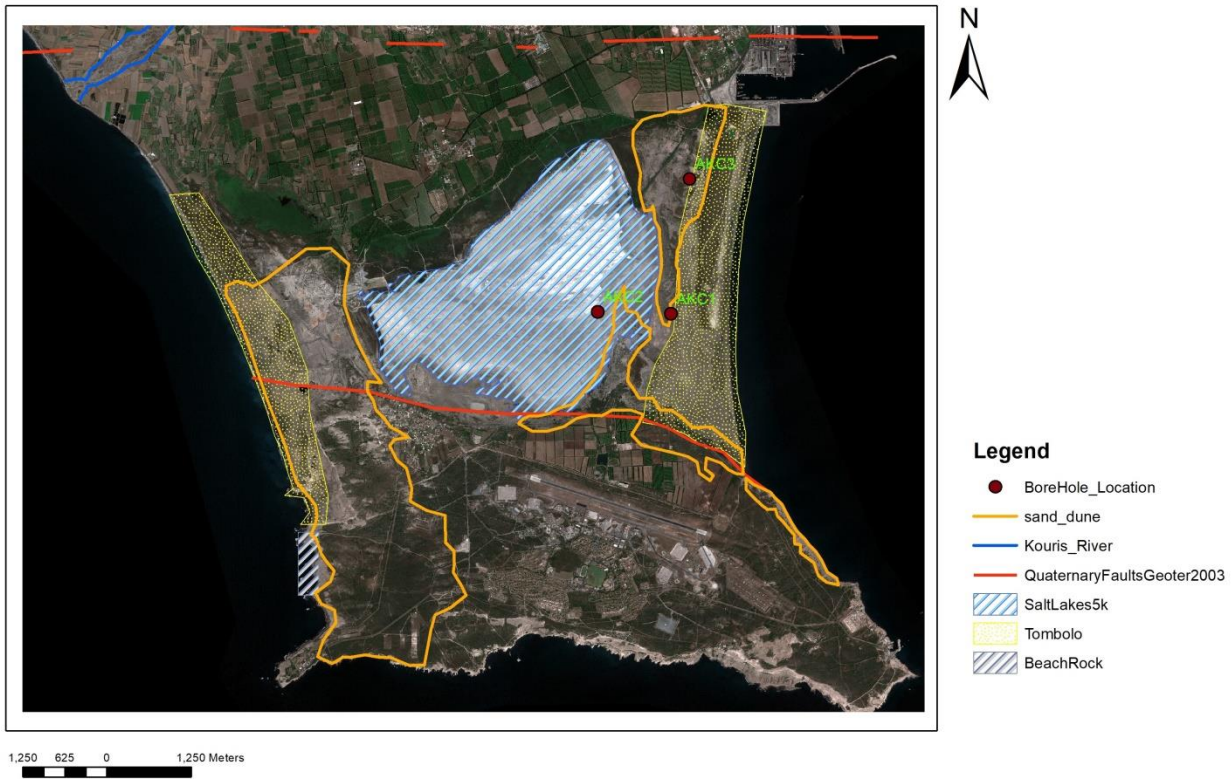

Fig 2. Simplified Quaternary Geology Map of the area

Methodology

- ***Coring Campaign :*** Three cores were retrieved from the eastern side of the Salt Lake (Fig 2). The cores were extracted using a Cobra 32T vibracore with a 2 inch diameter plastic pvc tubes into a metal tube housing with a drilling head.

- ***Granulometric Analysis*** : including grain size analysis, hydrometric analysis and sieving analysis performed to the cores.

- ***Micropaleontological Analysis :*** Micropaleontological analysis: A total of 73 samples from 3 drilling boreholes were selected for micropalaeontological analysis: 26 samples from AKC1, 17 samples from AKC2 and 30 samples from AKC3. A fraction of 10gr (dry weight) from each sample was wet sieved and dried. Ostracods and benthic foraminifers were collected from the fraction > 125 μm. A detailed quantitative and qualitative analysis was performed. Furthermore, four assemblage structure indices were calculated using PAST 3.25 (Hammer et al. 2001), based on the absolute abundances of the ostracod species: the number of taxa in each sample, dominance (D) and two diversity indices (Shannon-Wiener [H(s)] and Fischer alpha [S']).

- ***Geochronology***: Carbon 14 dating was applied into seven samples which were extracted from the cores. Macro contaminants were removed from the samples by mechanical handpicking under optical microscope. The selected portion of the samples was treated in order to chemically remove any possible source of contamination. The purified sample material was then

converted to carbon dioxide by combustion in sealed quartz tubes. The obtained carbon dioxide was converted at 550°C into graphite by using ultrahigh purity Hydrogen as reducing medium and 2 mg iron powder as catalyst. The radiocarbon concentrations have been determined in the accelerator mass spectrometer by comparing the ^{12}C, ^{13}C currents and the ^{14}C counts obtained from the samples with those obtained from standard materials supplied by IAEA (International Atomic Energy Agency) and NIST (National Institute of Standard and Technology). The "conventional radiocarbon age" was calculated with a $\delta^{13}C$ correction based on the $^{13}C/^{12}C$ ratio measured directly with the accelerator. For the estimation of the measurement uncertainty (standard deviation) both the radioisotope counting statistics and the scattering of the data have been taken into account.

Results and Discussion

- ***Paleogeographic evolution:***

Due to climate change and tectonic forces, fluvial material from Kouris River, which was drained directly into the Salt Lake area west of the Asomatos village, began creating an extensive system of fluvial deposits, which represents topographically by the creation of a tombolo west of the Salt Lake, resulting in the maritime area to close to the west and create an open bay well before the beginning of the Holocene (Fig 3). The activation of Quaternary faults during Holocene caused the migration of the south part of Kouris River to the west, resulting in a discontinuance of fluvial material in the lake area (Fig 4). Also, the eustatic movement of the sea level combined with the tectonic activity of Quaternary faults, resulted in the closure of the eastern entrance of the bay approximately at 3636calBC (Fig 5) and the final closure of the lake's connection to the sea, creating a closed lake (Fig 6).

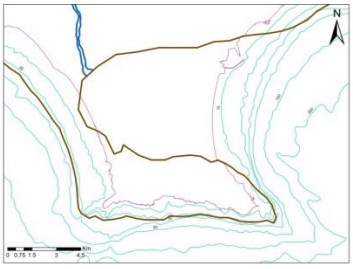

Fig 3. Paleogeography 10ka

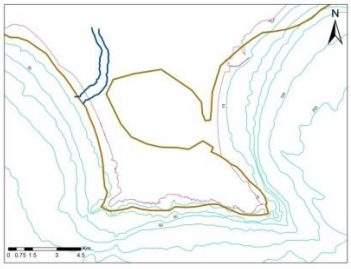

Fig 4. Paleogeography 7ka

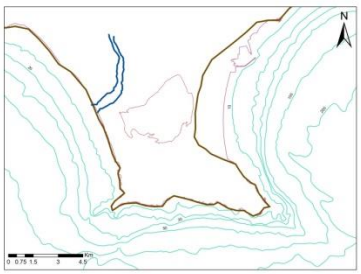

Fig 5. Paleogeography 5ka

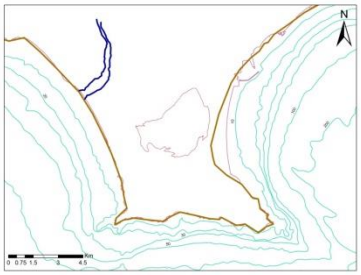

Fig 6. Paleogeography 2.5ka