

SEARCHING FOR MARINE AGGREGATES DEPOSITS IN THE AFANDOU BAY (RHODES ISLAND, GREECE)

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Abstract

The present study investigates a marine aggregate deposit offshore the Bay of Afandou (Rhodos Island, Greece) in order to be used for beach nourishment. The dimensions, internal structure and sediment properties of the deposit have been designated by the use of a multibeam echo sounder, a sub-bottom profiler and a Smith-McIntyre grab. Preliminary results show that the detected sandy deposit comprises a thick (up to 3 m) surficial formation on the seabed located at water depths between 13 and 35 m with a volume of approximately $1.3-2.0 \times 10^6 \text{ m}^3$.

Keywords: *Sediments, Swath mapping, Coastal engineering, Aegean Sea*

Afandou Bay is located on the N.E. Rhodes Island coast. The beach morphology is characterized as relatively smooth [1] [2]. The broader area has been subjected to major uplifting tectonic movements (2.9 to 3.7 m) during the Holocene [3] [4]. A Reson Dual-Head Seabat-7125 multibeam system and a Geoacoustics GeoPulse subbottom profiler were used for the detailed mapping and profiling of the seabed, respectively. 12 surficial sediment samples were taken along three vertical to the shoreline transects at water depths of 12 to 47 m, for granulometric, geochemical, mineralogical and benthic analyses (fig. 1).



Fig. 1. Bathymetry, seismic tracks and sampling positions in the Afandou Bay

Two main morphological features are present in the Afandou Bay: A submarine canyon at the northeastern part of the bay and a rocky shoal at the southern part. In the central part of the bay, the bottom deepens gradually having the shelf-break at depths of 75 – 90 m. The broader area of the bay consists of medium to fine sand at water depths of 15-35 m, with mud increasing its percentage, but remaining always lower than sand, in greater water depths. No *Posidonia oceanica* meadows were detected, but sparse appearances of the invasive green alga *Caulerpa racemosa* var. *cylindracea* were found. At the central part of the Afandou Bay, acoustic tomography has depicted a sub-surficial sedimentary formation with sigmoid clinofolds at depths of up to 40 m

below mean sea level, which evolves to an oblique parallel layer formation in greater depths. (fig.2).

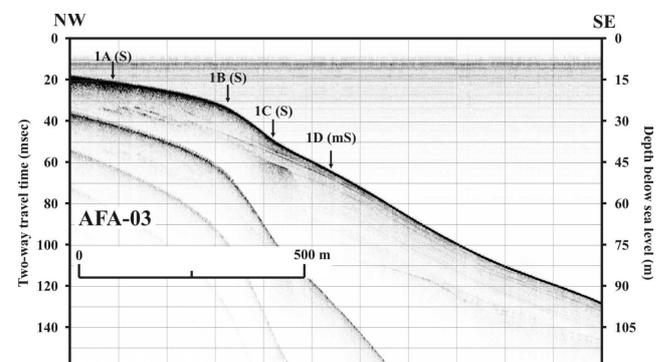


Fig. 2. High resolution seismic profile, showing the extension of the sandy deposit in the Afandou Bay. Arrows indicate the sampling positions of sediments. S: sand; mS: muddy sand.

Based on the above internal structure and sediment configuration, it is estimated that the thickness of the sand deposit is sufficient (1-7 m) in water depths from 13 to 35 m, with the thickest deposits being at depths of 17 to 25 m. The surface of the area under investigation is about $0.65 \times 10^6 \text{ m}^2$, thus, in case that the average thickness of the sand that can be extracted is 2-3 m., the volume of the aggregate can reach up to $1.3-2.0 \times 10^6 \text{ m}^3$.

References

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