




Article

Coastal Quarries as Relative Sea-Level Markers: A Methodological Approach Applied in the Apulia Region (Southern Italy)

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Abstract: The assessment of past sea-level positions requires a multidisciplinary approach that involves both scientific and historical humanistic fields. The use of a multidisciplinary approach allows us to obtain reliable information on the relative sea-level position, the determination of which requires the evaluation of the eustatic and steric components as well as an assessment of the vertical ground displacements, such as the isostatic adjustments and tectonic movements. In this context, coastal geoarchaeological markers play a fundamental role since their architectural height (generally defined as functional height) was relative to the sea level at the time of their construction. Thus, a comparison between the current elevation of geoarchaeological structures (or depth in the case they are currently submerged) with their estimated functional height allows us to obtain the relative sea-level variation. In this study, we applied a methodological procedure for the evaluation of the functional height of architectural elements using modern technologies (Terrestrial Laser Scanner and GPS-Real Time Kinematic) and detailed sea-level analysis. The proposed methodology was applied to coastal quarries located along the coast of Bari (Apulia region, southern Italy). The results allowed us to confirm the functional height of the detachment surface reported in the literature and to assess the sea-level position in the fifth and fourth centuries before Christ.

Keywords: geoarchaeological markers; coastal quarries; sea-level; functional height



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1. Introduction

Geoarchaeological remains, partially or completely submerged, are widely used as markers for the evaluation of Holocene sea-level change along the Mediterranean coast [1–5]. These markers can define the past sea-level position with high precision by accounting for their original elevations [6–12]. The elevations of geoarchaeological markers can be influenced by coastal changes that occurred in the Mediterranean region.

The current physiography and sedimentary settings of the Mediterranean coastal areas are the results of evolutionary processes determined by the transgression following the Last Glacial Maximum (LGM—20 (kyears) before present (BP)) [13–15]. In fact, during the LGM, the sea level was about 120 m lower than the present level; then, as a consequence of ice melting, a rapid transgression occurred, which submerged wide coastal sectors with rising rates of up to about 8 mm per year [1,16]. At about 7–6.5 kyears BP (Middle–Late Holocene), the sea-level rise underwent a deceleration of 1 mm per year, and coastal progradation occurred, mainly in the low-lying areas [17–20].