



## Recent environmental changes in the area of La Maddalena Harbour (Sardinia, Italy): data from mollusks and benthic foraminifera

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Mollusks and benthic foraminifera are reliable tools to paleo-environmental reconstructions because they commonly occur in most marine habitats and are sensitive to major and short-lived changes of environmental drivers, induced by both natural and anthropogenic events. Their community structure provides useful information about the characteristics of their habitat and some species are sensitive to specific environmental controls. Features such as changes in species composition and community, or variation in test morphology provide evidence of fluctuation of several environmental factors. Therefore, both mollusks and benthic foraminifera can be used as an efficient method for identifying the history and ecological trajectory of marine ecosystems.

This study focuses on the macro- (mollusks) and micropaleontological (benthic foraminifera) study of a 3 m long sediment core collected in the former military arsenal of the La Maddalena harbor (N Sardinia, Italy), at a depth of 15 m. The core site is located on the S-E coast of La Maddalena island, that underwent a complex history of human occupation along with natural environmental evolution and human-derived pressures. We aimed to reconstruct the main environmental changes recorded in the fossil benthic communities along the core, and to propose the most likely factors that caused these changes. Both mollusks and benthic foraminifera have been picked from the core, identified at genus/species level and counted. Ecological indications for each species have been extracted from literature. Univariate and multivariate statistics have been applied to highlight the community dynamics.

More than 90 species of benthic foraminifera have been identified, and 101 mollusk species (846 specimens). The foraminifera diversity indices show a general reduction from the first 50 cm downcore. This slight decline is accompanied by changes in foraminiferal assemblages. The results concerning changes in foraminiferal species composition, their abundance and biodiversity, supported by statistical analyses (cluster analysis), allowed identification of three major foraminiferal associations corresponding to different marine coastal settings. The same results have been obtained by using mollusks and their ecological significance in the framework of benthic marine bionomics. Species are related to infralittoral vegetated bottom such as *Posidonia* meadows (HP) or photophilous algae through the core, but with variation in percentage

of abundance, and HP species decreases from the bottom to the top, whereas species related to muddy bottom follow the opposite trend (coastal detritic mud, deep mud). This testifies that the area underwent a progressive reduction of *Posidonia* meadows and light-loving algae with a shift toward muddy bottoms, possibly related to the effect of the intensive renovation works of the harbor area. Moreover, radiocarbon dating obtained from *Cerithium* specimens indicated that the sedimentation rate increases in the upper portion of the core, according to the ecological signal reconstructed by the analysis of the mollusk assemblage.