

The harbour of the *mansio ad speluncas* (Brindisi, Italy): a key to the lecture of sea level changes in the past 3500 years?

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Abstract

The archaeological site of Torre Santa Sabina is to the north of Brindisi along the Adriatic coast of Apulia, not far from the ancient *Karbinia*, the modern Carovigno. It is well known because of the continuous human presence from the Neolithic to the Middle Ages, through Mycenaean and Roman times. It was named *ad speluncas* during Roman times; when little villages—*mansions*—were placed along the main roads playing an important role as logistical stations between the main cities. Numerous archaeological structures have been found in the coastal area of the *mansio ad speluncas*. They are *land indicators* or *sea indicators* since they only indicate that sea level was lower or higher than present at the time of their building. The most important *sea level indicators* are two wrecks of Roman ships ascribed to the Late Republic or Ist century of the Imperial Age. Beached at the mean depth of 2.5m b.p.s.l. sea level, they could indicate the position of the sea level at the time of their abandonment on the beach. The archaeological remains suggest that about 3300 years ago the sea level stood up to 3m below the present one; 2200 years it raised up to 2.5m lower than the present one as also indicated by data coming from the near harbour of *Egnatia*. The following rise of the sea level has been responsible for the flooding of medieval structures.

Keywords: sea level changes, historic harbour, wreck, Puglia, Italy.

1 Introduction

Archaeological data have been widely used in the Mediterranean basin for the reconstruction of sea-level change during historical times [i.e.: 1, 2, 3, 4 and



references therein] and a number of sea-level curves have been reconstructed on this basis. Usually, the main problem in sea-level studies is the evaluation of eustatic component from the other contributions such as tectonics or isostasy. The Mediterranean basin is a microtidal region characterised by a tidal range lower than 1.5m. In this area some morphological features are very important in sea-level studies. Some erosive landforms indicate precisely the intertidal zone [i.e.: 5 and references therein] even if they cannot be dated easily because the material suitable for radiometric analyses is often lacking. Faunal and algae assemblage can contribute to individuate a former sea level stand; some *in situ* bioconstructions are considered to be the most valuable indicators of past sea-level in the Mediterranean region [i.e.: 6, 7]; unfortunately they are not easily preserved.

The diffuse and continuous presence of human settlements in the Mediterranean coastal area, even if diachronic, represents a valuable tool for sea level studies since numerous data have been supplied from underwater surveys and coastal archaeological researches. Generally, archaeological data range from the Neolithic age up to present time and allow sea level changes during the Middle-Late Holocene to be reconstructed with good approximation. Unfortunately, only few types of archaeological structures indicate past sea level positions precisely, generally those ones whose use was controlled by tidal changes [2, 8] as fish tanks or particular harbour structures [9, 10, 11, 12]. Useful information can be inferred by man-made structures such as caves, tombs, paintings, sewers, cisterns, quarries, houses and wells: they indicate that at the time of their construction, sea level was lower than their present position, so that they can be used as *land indicators* [3, 4]. In the case of quarries and tombs, these also indicate a position above the coastal phreatic zone. Few others can be used as *sea indicators* since they were built underwater such as harbour structures [4, 11].

Aim of this paper is to use a combination of geomorphological and archaeological data collected in the area of the *mansio ad speluncas* (Torre Santa Sabina, Carovigno) to determine past sea-level positions along the coast of Apulia region during historic times.

2 Geological and geomorphological setting

The area of *mansio ad speluncas* is placed between the cities of Bari and Brindisi, along the Adriatic coast of southern Apulia (fig.1). From the geological point of view, Apulia region represents the emerged part of the Adria plate which constitutes the foreland of the Apenninic chain. It is compound by five main structural blocks limited by faults and marked by different uplift rates. They have been estimated using the elevation of MIS 5.5 shoreline, assuming the eustatic sea level during MIS 5.5 about 6m above the present position [13 and references therein]. Geomorphological data indicated that Torre Santa Sabina area is affected by a very low rate of subsidence [14] as rheological models would confirm [15].

The coastal landscape of southern Apulia is characterised by a staircase of marine terraces incised by a poorly developed drainage network. The coastline is

studded with a number of fresh water springs, coastal swamps and lakes. Beaches are bordered by dune belts that formed during three main aeolian phases: the oldest one is dated back to about 7.0-6.5 ka BP; the second one can be referred to the Greek-Roman age (3.0-1.9 ka BP); the youngest phase started about 0.8-0.5 ka BP [16].

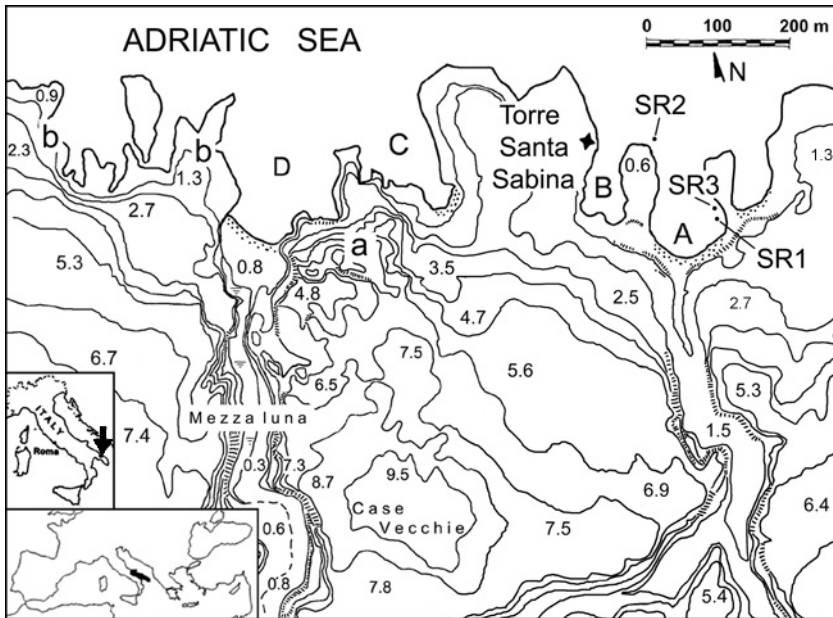


Figure 1: Geographical position of studied area and topographic sketch. Elevations are in m; marks and letters are explained in the text.

3 The *mansio ad speluncas*

During the Roman Empire, little villages called *mansiones*, placed along the main roads, played an important role as logistic stations between main cities. The *mansio ad speluncas* corresponding to the present area of Torre Santa Sabina is placed no far from *Karbinia*, the present Carovigno. It is located along the Via Traiana running on the Adriatic side of Apulia, between *Egnatia* and *Brundisium* (Brindisi) villages [17]. This area was settled continuously since Bronze Age.

The first underwater archaeological survey in this coastal area was carried out in the 1972. New surveys have been performed recently thanks to the financial support of University of Lecce, of University of Bari, and of Archaeology Administration of Puglia by a team of scientists from Universities of Bari and Lecce.

3.1 Geomorphological data

The landscape is shaped on well-cemented Plio-Pleistocene calcareous sandstones; it is marked by a staircase of marine terraces bordered seaward by a

partially submerged cliff. The coastline shows several inlets that correspond to the lower part of relict valleys, partially flooded by the sea. Several large blocks have been carved from the sublittoral/supralittoral zones and scattered inland by extreme waves [18]. The archaeological area of the *mansio ad speluncas* comprises five main inlets marked by the presence of sandy pocket beaches. The coastline is made of low cliffs and by gently sloping coasts. These last ones are bordered seaward by an active wave cut platform which continues underwater down to 5m of mean depth. The inlet A (see fig.1 and fig.2) is cut by a deep channel N20E oriented whose banks are placed at about 2-3.5m of depth; the channel shows the present bottom at about 5m of depth and is partly filled with about 9m of sand.

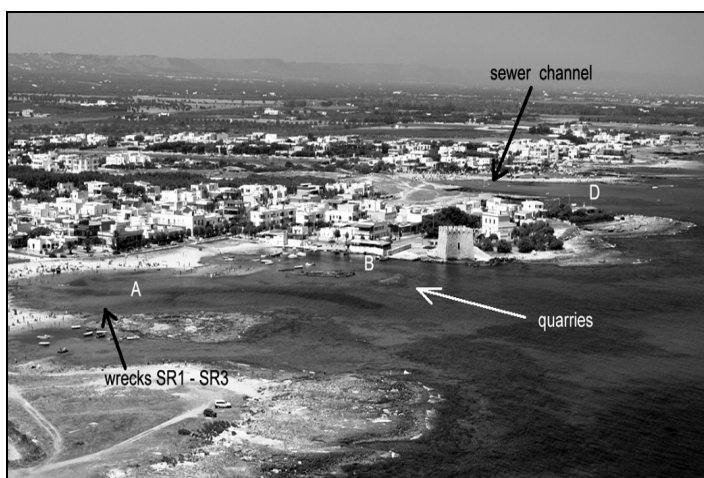


Figure 2: Aerial view of the studied area.

3.2 Archaeological data

The human presence in the area of modern Torre Santa Sabina starts from the Epipalaeolithic; however, it was settled continuously only since the Bronze Age. In fact, sparse remains referable to the Ancient Neolithic are recognisable on a palaeosurface partially covered by cemented dunes formed about 6 ka BP (area **a** in fig.1). The human presence is testified during the Late Bronze Age by the existence of a settlement whose more evident traces are pile's holes aligned water-front no more then 20m inland respect the coastal line at about 1m a.p.s.l. (area **b** in fig.1). Very interesting is also the presence of a graveyard with Mycenaean pottery (type LH IIIA-B-C). The archaeological artefacts, submerged as well, suggest a frequentation of the area, also by Aegean peoples, between XIV and X century B.C. [19, 20 and references therein]. From the Archaic to the Ellenistic Age, the investigated area represented a sort of port of trade related to the nearest messapic centres of Karbinia and, probably, the modern San Vito dei Normanni and Ostuni. The exceptional repertory of artefacts from underwater

salvage nevertheless shows a particular wealth for the Late Republic time (II–I centuries B.C.), due to the outbreak of productive activities of the countryside: oil and wine, mainly, and amphorae-containers to export them mainly to the Eastern Mediterranean. Torre Santa Sabina will continue to absolve the function of service port of the hinterland also during the following centuries, even if on a smaller extent. It is evident the link with the caves and the complex of archaeological remains (settlement, graveyards, necropolis and roads) occurring in the locality of *Mezzaluna - Case Vecchie*, very close to the studied area, related to the *mansio ad speluncas* of *via Traiana*, mentioned in the ancient sources, in the Roman *itineraria*, between Egnazia and Brindisi and that surely was active from the I century B.C. to the end of Imperial Age [17 and references therein].

Underwater surveys in the inlet A (fig.1) have detected below the mattes of *Posidonia oceanica*, between 3-5m depth, abundant pottery remains (≈ 8000 pieces), local or imported, some weapons and rigging objects. They represent the broken material discharged from ships during the download operations; the pottery is dated from the Mycenaean time (Type LH III) to the late Roman age (Late Roman C) and includes several classes: corinthian, laconic, eastern Greek type, attic black gloss and red figures, Gnathia, banded wares, ionic or ionic type cups, etc. and Chian, Coan, Thasian, Rhodian, Corinthian, Corfu, Tripolitanian, mainly Adriatic and Late Roman Eastern amphorae.

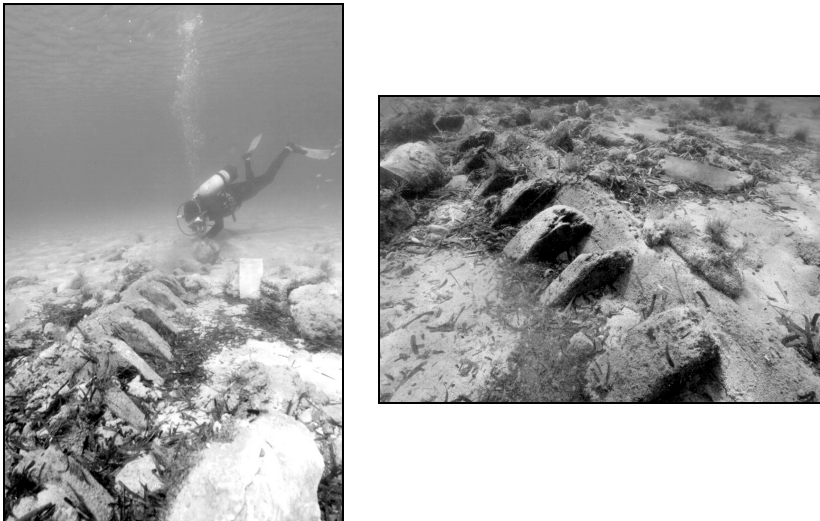


Figure 3: Two particular of the floor of the wreck SR1.

Several hull's wrecks are present along the coastline of inlet A. The deepest one is at about 5m of depth (wreck SR2). The hull is scraped by the sinking, partially burnt and sparse by wave action on the sea bottom and poorly preserved. At the moment of its discovery, it was covered by numerous local

amphorae which suggest that the sinking occurred to the end of II – beginning I century B.C. More important data are supplied by two wrecks (SR1 – fig.3 - and SR3) recognised between 1.8–3.1m below present sea level on a sandy/cobble bottom; at the moment of discovery they were covered by about 1.5m of sands which have been eroded in response to some recent coastal works. Keels are entire and well preserved in navigation shape; both are characterised by absence of load and are placed perpendicular to the shoreline, most likely in download position. The technology of ship building - shell *construction* - and details of the assembly of the planking with mortise – and – tenon - joint permit to ascribe them to the I century B.C. – I century A.D.

The numerous quarries occurring in the little peninsula that separate the inlet A from the inlet B (fig.4) and to southeast to the inlet A can be referred to the Messapic, Roman and Medieval periods. The bottom is placed between 0.5 and 1.1m and up to 0.6m below mean present sea level, respectively.

Lastly, in the inlet D a sewer channel of Roman age, characterised by barrel-vault hardly preserved and partially submerged, has the outlet 0.7-0.9m below m.s.l. [4] (fig.5).



Figure 4: The quarries between inlets A and B; in the background the medieval Torre Santa Sabina.

4 Discussion

The archaeological remains that have been recognised in the coastal area of the *mansio ad speluncas* suggest some past sea level positions during historical times. Firstly, the presence of XIV–XII century B.C. pile's holes close to the

present coastline and at about 1m a.m.s.l. represent a good *land indicator*. In this case it is possible to evaluate the past sea-level position lower at least 3m than present since these structures should be placed far from storm wave run-up zone [3] and no fast shoreline erosion is evident.



Figure 5: The sewer of Roman age, here partially filled by sand.

The presence of wreckage assemblage scattered on shallow water, close to the present shoreline, would indicate with good approximation the former sea level [3]. Moreover, the hulls beached in the inlet A at the about same mean depth (2.5m b.m.s.l.), without charge, both perpendicular to the shoreline, would suggest that their present position is that one they have when they landed to be discharged in correspondence of the most sheltered area of the inlet. The difference between the depth of the bow (-1.8m for SR1 and -2.2m for SR3) and of the stern (-3.1m for both) is compatible with the local tide range (no more than 0.8m) and with the part of the keel submerged during the discharge. In the case of the wrecks SR1 and SR3 it is not difficult to suppose an abandonment after the use, not unusual in the harbour areas. Therefore, they individuate a former sea level stand with good accuracy. The presence of the Roman sewer channel partially flooded by seawater point out a former sea level at least 1m lower than present. Only in this case the sewer was able to work properly. Similar considerations can be formulated for the presence of partially flooded quarries.

5 Conclusions

The archaeological and morphological data-set available in the area of the *mansio ad speluncas* improves the knowledge on sea level changes occurred in this coastal area during the last 3500 years. Notwithstanding the inaccuracy of the use of *land indicators*, the presence of the wrecked hulls of two different ships of Roman Age indicates with good approximation that sea level rose from

a position lower than -3m in correspondence of the XIV century B.C. to -2.5m during Roman period, reaching -0.6m in the Middle Age (fig.6). This model is in good agreement with data coming from the harbour structures of the Messapic and Roman town of *Egnatia*, close to the studied area [21] and with those of Torre S. Gregorio, near Leuca [22], and Saturo, near Taranto, along the Ionian coast, where breakwaters actually submerged (-2/-2.3 b.m.s.l.) mark the sea level at the time of their building. The proposed model is also in good agreement with data of Morhange et al. [23] surveyed into the ancient harbour of Marseille.

The multidisciplinary research of *mansio ad speluncas* area reveals that it is not only a site of remarkable archaeological importance but it covers an extraordinary role in the reconstruction of historical sea level changes along the Adriatic coast of Apulia. From this point of view, this site can represent a geosite, i.e. a place of particular importance for the comprehension of Earth history. It could play a leading role in the development of the geotourism of this coastal area. The realization of a GeoPark, for example, would give the possibility to protect the natural and archaeological heritage of this area as well as to develop the economy of the local community.

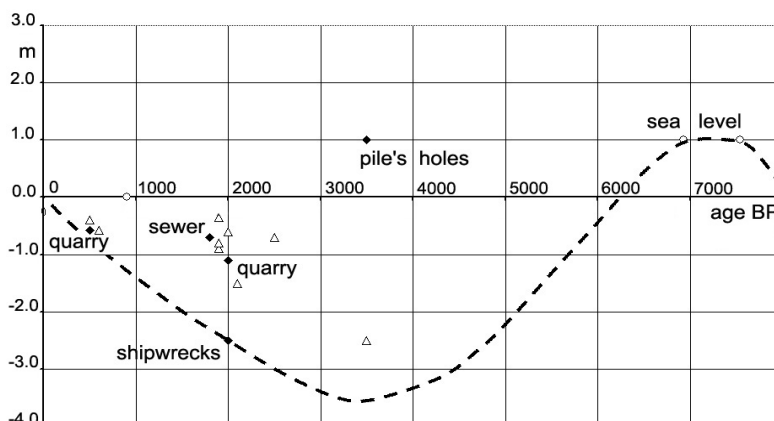


Figure 6: Curve of sea level change during the last 7000 years reconstructed from Auriemma et al. [4] data (white circles: *sea level indicators*; white triangles: *land indicators*) and modified according to the *mansio ad speluncas* area data set (black symbols).

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