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Ancient Harbour Structures in Croton, Italy: a reappraisal of the evidence

Dr Jeffrey G. Royal recently published in this journal (2008) the discovery of apparent remains of two submerged harbours and the walls of two buildings which sank in the sea off Croton, southern Italy. After having worked with Royal in Croton in the summer of 2005, and continued the research in 2006, this author has been able to collect further evidence which leads to different conclusions. The harbour IT05-AA is more likely to represent what is left *in situ* of a Roman *navis lapidaria* after most of its artefacts were raised in 1915. The two sites IT05-AB and IT05-AD, which Royal interprets as ruins of submerged walls of the Greek temple of Hera Lacinia, also appear to be remains of shipwrecks with cargoes of marble. No new information is available regarding the 13-m-deep breakwater of supposed Greek Archaic age (IT05-AE/AF), but its depth does not correspond well with a submerged calcarenite quarry in the same area, which is only 6 m deep and is tentatively dated to between the Archaic and Hellenistic periods. While Royal's contribution to the study of Croton's maritime history remains useful, and his 2005 survey is important for its documentation of the area's archaeological heritage, this note aims to rectify some of his conclusions in the light of updated field data.

Figure 1. General extension of the survey area: Croton and Praialonga, along with the other places mentioned in the text. (D. Bartoli)

The 2005–2006 research seasons

In the summer of 2005 Francesco Prosperetti and Annalisa Zarattini, heads of the Soprintendenza per i Beni Archeologici della Calabria, granted the Institute of Nautical Archaeology at Texas A&M University (INA) and RPM Nautical Foundation (RPM) permission to survey the sea between the harbour of Croton and Praialonga, along the Ionian coastline of Calabria (Fig. 1). Royal and this author co-directed the project on behalf of RPM and INA respectively. The search area, along some 40 km of coastline, in waters between 5 and 75 m deep, was chosen after a preliminary study of historical, archaeological and geological data attested to the relevance of Croton and the nearby promontory of Capo Colonna to navigation in antiquity (the Panhellenic sanctuary sacred to Hera was built at the tip of the promontory which closes the Gulf of Tarentum, and was the most important landmark for ships coming from the east). Also important was the low sedimentation rate, which would facilitate visual identification of potential ancient sites on the sea-floor. The absence of seasonal rivers, called

fiumare, which, between Metapontum and Rhegium, have buried most of the Greek and Roman coastal settlements and shallow wreck-sites under a thick layer of sediment, led to the conclusion that Croton represented the best area in the region in which to conduct remote-sensing surveys.

RPM's two research vessels worked in tandem from 20 August to 24 September 2005. The 8.2-m-long *Juno* mapped the shallow areas (5–25 m) using a keel-mounted Reson Seabat 8125 multibeam sonar. The 37.3-m-long *Hercules* completed the survey in deeper waters (25–75 m) using two Kongsberg multibeam sonars (EM 1002 and EM 3000D), which were interchanged according to the particular depth. By the end of the summer, nine sites of archaeological relevance were mapped: four consisted of semi-worked marble blocks and column-shafts (Punta Scifo A, Punta Scifo B, Punta Cicala, and Capo Cimiti); five of cargo remains ranging in age from Hellenistic to 18th-century; and one resembling a submerged breakwater, at least in shape. It is important to note that, in 2005, the survey was conducted primarily with remote-sensing equipment, and there was little or no time to take manual measurements of the archaeological targets located. The main goal of the first search season was to create a detailed map of Croton's submerged archaeological heritage which could be used as a reference for future expeditions.

The following summer, fieldwork continued from 15 July to 15 August, with the renewed support of INA and the Center for Maritime Archaeology and Conservation at Texas A&M University (CMAC). The season's goals were to review the available reports in the archives of the museums of Croton and Reggio Calabria regarding known shipwrecks in the area, and to take new measurements of the Punta Scifo A and B sites. Just before the end of the summer, a fifth cargo of marble blocks and column-shafts was spotted near the promontory of Capo Bianco. Archival research revealed that all five marble sites were already known to the Italian Fine Arts Bureau, and had been partially excavated between 1983 and 1991. Unfortunately the results of this fieldwork were never well published (short notes on the 1983 excavation at Punta Scifo A, Lattanzi, 1984a: 573–5; 1984b: 9–13; and a list of the artefacts raised at Punta Scifo between 1915 and 1983, Pensabene, 2002: 36–7). However, a review of these unpublished reports, augmented with new measurements of individual marble items used to check the general dimensions determined from multibeam images, allows for different conclusions to be reached than those previously reported by Royal.

A brief comment on methodology is also warranted. It is important to stress that, when dealing with large and heavy items such as marble blocks and column-shafts, multibeam sonar generates only *2-dimensional* images, and cannot indicate the height or depth of objects. A thick marble block will look identical to a thin slab, since both are rectangular, even though the difference between them could be several tons in weight. It can therefore be potentially misleading to use such images and a few measurements as a basis for calculating the total tonnage of material present on a site, as Royal does (2008: 52–3, 63–4). Methodologically, it is precarious to base one's assessment of a site on such approximations, and to eliminate the possibility that an assemblage of marble blocks could represent the cargo of a shipwreck. As discussed below, manual measurements provide tonnage-estimates consistent with medium-to-large marble-carriers which were typical during Roman Imperial times.

Punta Scifo A (Site IT05-AA)

The first site which should be interpreted not as a port facility but as a marble-carrier of the early-3rd century AD is the so-called 'Paolo Orsi' wreck, which here will be identified as 'Punta Scifo A' to differentiate it from the 'Punta Scifo B' site, only 179 m away. Figure 2 shows the multibeam image of Punta Scifo bay, with the wreck-sites A and B circled in red, and Fig. 3 provides a close-up of the sites. Due to water-depth of only 4.5 m, and some surfacing rocks which prevented RPM's research vessel from approaching closer to shore, the multibeam image of Punta Scifo A is incomplete. Three missing blocks and a column-shaft have been added to the plan at the correct scale. The site is located 200 m offshore and covers an area of about 12 $\times$ 15 m on a rocky sea-floor with some sandy spots. The dimensions and tonnage of each item are listed in Table 1.

Archival and bibliographical sources indicate that the site was discovered on 21 August 1908 by a local fisherman who recovered a large marble basin, followed in 1909 by two more basins and three column-shafts which were transported to the harbour of Croton (Valente, 1973: 50 n.31). In 1910 Paolo Orsi, Director for the Archaeological Patrimony of Calabria, examined this material, recorded Roman inscriptions on two columns referring to the consulates of Lateranus and Rufinus (AD 197) and Severus and Victorinus (AD 200), and published the first scholarly report on the discoveries (Orsi, 1911: 118–24). However, the majority of the artefacts were recovered

Table 1. *Dimensions and tonnage of the in situ Punta Scifo A marble items. Measurements obtained using PhotoModeler™*

Artefact	Width/Diam. (m)	Height (m)	Weight (tons)
10	>1.30	>0.30	2.9
11	2.45	0.62	8.87
12	2.20	0.49	6.35
13	1.43	0.62	10.56
7	0.58	—	2.91
Total	—	—	***c*.31.59**

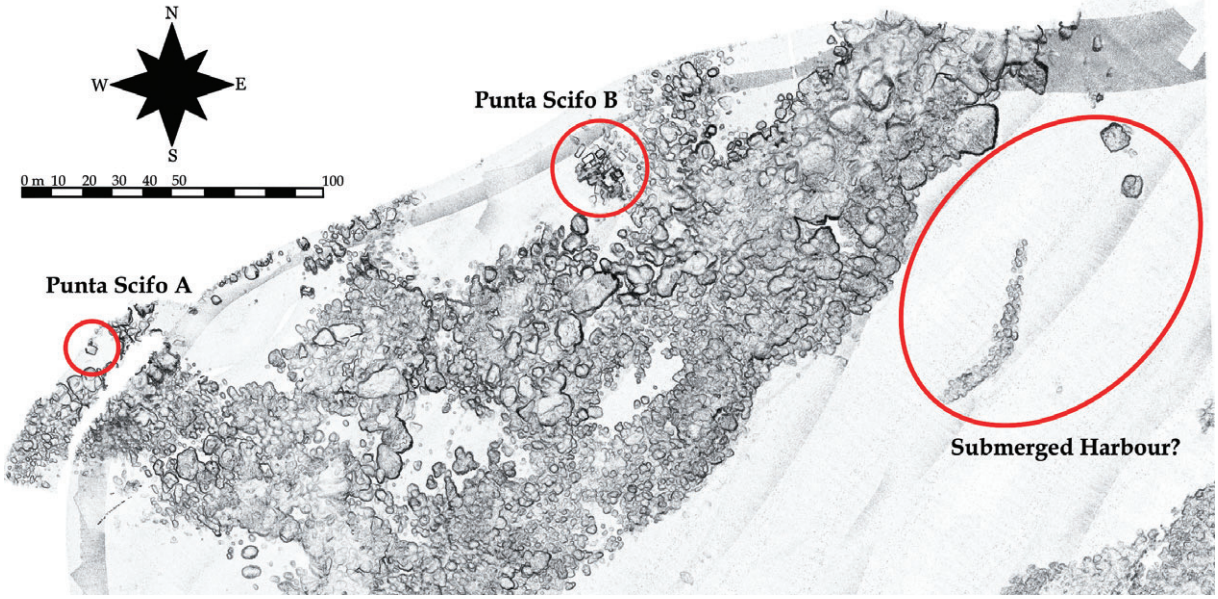

Figure 2. The Punta Scifo A and B sites, with the location of the possible submerged harbour. (drawings, D. Bartoli; data, INA-RPM Nautical Foundation)

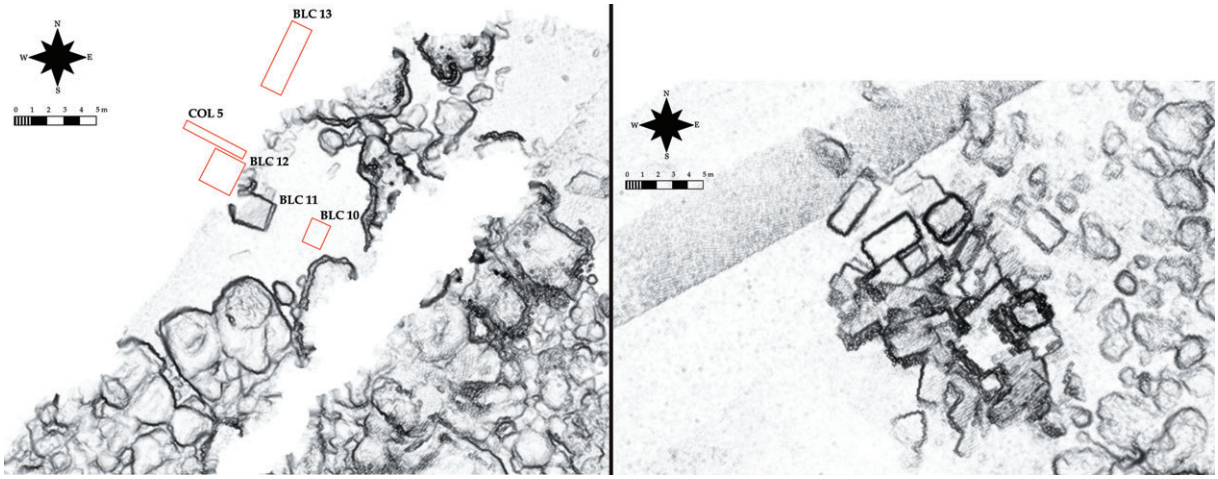

Figure 3. Left, close-up of the Punta Scifo A wreck-site; right, Punta Scifo B. (drawings, D. Bartoli; data: INA-RPM Nautical Foundation)

accidentally—and the site almost entirely disassembled—between 30 April and 3 May 1915 when the contracting company Forcellini dredged the seafloor for material to be used in the construction of a new dock in Croton harbour. Instead of rocks, Forcellini raised *c*.150 tons of marble artefacts, along with nails and wood from the ship that carried them (Orsi, 1921: 496; original record 15 May 1915).

Comparing archival documents with Orsi's publications, it is possible to conclude that between 1908 and 1915 no fewer than 52 marble objects were raised: 8 partially-finished *labra* (basins); 10 pedestals each with lions' paws at their four corners; 6 statue-bases; 15 column-shafts; 10 blocks, an unspecified number of which had lead seals 'in the shape of an ansate little plate'; and three tables (Orsi, 1921: 493–6; original record 15 May 1915). In 1978, Patrizio Pensabene published a detailed review and new catalogue of all the marble pieces which he could relocate on land, and determined that they were quarried at Docimium and Proconnesus, Turkey (Pensabene, 1978: 105–18). Five years later Alice Freschi, director of the archaeological firm *Aquarius*, carried out the first excavation of the wreck. Her expedition raised five more *labra*; five pedestals; a 3 × 3-m portion of the ship's hull; two Kapitän type-2 amphora necks; some coarseware plates, lids, and trefoil pitchers; two bronze ladles and a bronze sliding stand for an oil-lamp; a few marble and slate *coticulae* (tablets); and a lead plate bearing a representation of Heracles holding a hind (Lattanzi,

Figure 4. Selection of artefacts raised from the Punta Scifo A wreck-site. A, column-shaft, broken in two pieces, still retaining a protective collar at one end; B, a block with a notch for a lead cartouche; C, statue-pedestal; D-E a higher and lower pedestal stands decorated with lions' paws at their corners. All are of pavonazzetto marble, with the exception of the Proconnesian statue-pedestal; F, one of the two large basins raised in 1909, currently at the entrance of Croton's Archaeological Museum. (D. Bartoli)

1984a: 574; Lattanzi, 1984b: 11; Pensabene, 2002, 36–7). Most of these artefacts can be seen at the Museums of Croton and Capo Colonna, on the Antonio Caputi roundabout in Croton, and in the small village of Corazzo, 15 km north-west of Croton (Fig. 4).

While a more complete description of this shipwreck is beyond this article, the data collected so far proves that the underwater remains at Punta Scifo A do not belong to a submerged Roman harbour, but are what remains *in situ* of the cargo which Paolo Orsi studied, after most of the material was recovered in 1915 and 1983. The 'bollard' Royal uses to propose a harbour identification appears to be a natural geological formation (there are many similar specimens known along the coastline of Croton, their characteristic circular shape caused by marine erosion, pers. comm. Domenico Marino, 2009); the two amphora sherds and the isolated broken tile found beneath Block 12 are probably scattered remains from the ship's galley, though due to their poor condition it has not been possible to date them, and they have been left on the sea-floor.

Considering that the four blocks and single column-shaft still under water weigh some 32 tons and that, in 1915, *c*.150 tons of marble were raised, and several more heavy artefacts in 1983, it is possible to postulate that this Roman merchantman was carrying *c*.200 tons of marble when it sank. The ship was probably 30–40 m long and 10–12 m wide, and, based on the orientation of the blocks and column-shaft still visible on the sea-floor, settled to the bottom aligned perpendicular to the shore. The ship's point of departure was probably along the western coast of Asia Minor—perhaps Ephesus or Miletus—where the *pavonazzetto* items could have reached the coast and the Proconnesian elements transhipped from the Propontis. Because the column-shafts and blocks bear inscriptions and notches for lead seals usually associated with imperial ownership of marble items, it is likely that the cargo was commissioned by the emperor and destined for Rome.

Punta Scifo B (Site IT05-AB)

The second site in need of reassessment is the Punta Scifo B marble-carrier, a large wreck of the 3rd century AD located 179 m from site A. Royal's theory that these blocks were scavenged from the nearby temple of Hera Lacinia, stacked on the shore, and toppled by a 3rd-century-AD earthquake, should be discarded. The site lies at a maximum depth of 7 m and consists of 30 marble slabs and 24 blocks, covering an area of *c*.24 × 15 m on the sandy sea-floor. Manual measurements of each item (Table 2) yield an estimated total weight of some 350 tons, far less than the more than 500 tons that Royal (2008: 52) calculated, which led him to conclude that the objects were too heavy to be the cargo of an ancient shipwreck. The stone has not yet been analysed, but its bluish-white colour, appreciable in blocks preserved under the sand, suggests it may have come from Proconnesus. The overall tonnage was estimated

Table 2. *Dimensions and tonnage of marble blocks and slabs from the Punta Scifo B wreck-site (INA data merged with data from Freschi, 1987: 41–3)*

Item no.	Type	Length (m)	Width (m)	Depth (m)	Tons
1	Slab	1.81	2.50	0.36	3.17
2	Slab	1.82	1.53	0.26	1.86
3	Slab	2.40	4.91	0.34	10.27
4	Slab	2.41	2.88	0.29	5.16
5	Block	2.06	1.02	0.63	3.39
6	Slab	1.77	1.63	0.33	2.44
7	Slab	1.84	2.00	0.34	3.21
8	Slab	1.86	2.72	0.32	4.15
9	Block	3.28	2.00	0.97	16.31
10	Block	2.62	1.80	0.62	7.49
11	Block	2.04	3.32	0.88	15.2
12	Slab	3.02	2.25	0.28	4.88
13	Block	1.26	6.00	0.63	12.21
14	Block	4.08	1.42	0.95	14.11
15	Slab	2.45	2.50	0.34	5.34
16	Slab	2.50	3.15	0.28	5.65
17	Block	2.37	3.70	0.97	21.8
18	Block	1.40	2.17	1.30	10.12
19	Block	1.50	1.20	0.67	3.09
20	Block	3.79	1.45	1.03	14.51
21	Block	3.24	1.12	0.84	7.81
22	Block	3.40	2.00	0.70	12.2
23	Slab	2.40	0.60	0.25	3.23
24	Block	3.90	2.05	1.05	21.52
25	Block	2.45	1.45	1.20	10.93
26	Block	1.40	1.75	1.05	6.59
27	Block	1.35	1.20	0.60	2.49
28	Slab	1.80	1.50	0.35	2.42
29	Slab	1.80	1.45	0.35	2.34
30	Slab	1.80	2.70	0.30	3.74
31	Slab	1.80	2.50	0.35	4.04
32	Block	2.50	2.05	1.60	21.02
33	Block	2.10	1.60	1.00	8.61
34	Slab	1.80	1.20	0.35	1.94
35	Block	2.60	1.20	1.20	9.6
36	Block	2.30	2.75	1.65	26.75
37	Slab	1.80	2.55	0.35	4.12
38	Slab	1.80	1.40	0.35	2.26
39	Slab	1.80	1.65	0.35	2.66
40	Slab	1.80	1.20	0.30	1.66
41	Slab	1.35	1.50	0.30	1.56
42	Slab	1.45	1.85	0.35	2.41
43	Slab	1.80	0.97	0.26	1.16
44	Slab	1.80	1.15	0.32	1.7
45	Slab	1.80	1.15	0.32	1.7
46	Slab	1.50	1.85	0.30	2.13
47	Slab	1.20	1.90	0.35	2.05
48	Slab	1.20	1.85	0.30	1.71
49	Slab	1.90	1.25	0.35	2.13
50	Slab	2.00	1.75	0.35	3.14
51	Slab	2.75	1.80	0.30	3.81
52	Slab	1.00	1.00	0.35	1.35
53	Slab	1.20	1.70	0.30	1.57
54	Slab	1.95	1.08	0.35	1.89
Total					**348.63**

using the dimensions of each element and a specific gravity for marble of 2563 kg/m^3 (Specific Gravity of General Materials Table, 2009, http://www.csgnetwork.com/specificgravmattable.html).

It must be stressed that Royal's calculation was based on one multibeam image and sample measurements of only six of the 54 artefacts. While the results thus obtained can provide a rough estimate, they should not be used to derive precise dimensions, nor as the basis on which to build a site identification. The Punta Scifo B tonnage is actually in line with the tonnage of large, but not uncommon, stone-carriers, several wrecks of which are known, dating from the 1st century BC to the 6th century AD. The 3rd-century-AD Isola delle Correnti shipwreck is remarkably similar to the Punta Scifo B wreck. It carried a cargo of 49 marble blocks with an estimated weight of 350 tons (Kapitän, 1971: 296–8). Marzamemi 1, another marble-carrier of the 3rd century AD, carried 6 columns (or architraves?) and 7 blocks with a total weight of 200 tons (Kapitän, 1971: 298–303). The Torre Sgarrata shipwreck, also 3rd-century, had a cargo of 23 marble blocks and 18 sarcophagi, weighing *c*.160–170 tons (Throckmorton, 1989: 263–74; Antonelli, 2002: 39–142). The 1st-century-BC Mahdia ship carried *c*.300 tons of marble (Merlin and Poinssot, 1956: 59–124; Ridgway, 1995: 340–47), and the 6th-century-AD Marzamemi 2 shipwreck had 200–300 tons of marble on board (Kapitän, 1969: 122–33; Van Doorninck, 1972: 136–7; Kapitän, 1980: 71–136).

Research in the public library of the Archaeological Museum of Croton provides further evidence that this site is an ancient shipwreck. An unpublished report of Freschi's excavation in the summer of 1987 lists artefacts best associated with an ancient merchant vessel: an intact terracotta tile, two bronze ladles 35 cm long with curved swan-head handles, fragments of two Kapitän type-2 amphoras with remains of pitch lining their interiors, and sherds of galley-wares which locate the ship's stern just beyond the blocks on the south-eastern edge of the site (Freschi, 1987: 4). A plank from the ship's hull was also found, 2.7 m long and 8 cm thick, with two rows of mortises and tenons; along with a fragment of lead sheathing perforated with holes and probably intended to protect the outer hull from marine borers; square-sectioned copper nails of different lengths and copper bolts with cylindrical shanks, one of which is 65 cm long (Freschi, 1987: 3–4). Based on the distribution of the marble cargo, the hull must have measured close to 40 × 12 m (by comparison, the 3rd-century-AD Isola delle Correnti shipwreck measured 40–48 m long and 10–11 m wide (Kapitän, 1971: 296–8). The ship sank with a south-east/north-west orientation, with its bow facing the shore. The marble objects are still arranged next to one another or superimposed in two or three layers with the heavier blocks beneath and lighter slabs above, presumably as they were placed originally inside the ship's hold. The Punta Scifo B merchantman seems to have had a cargo larger

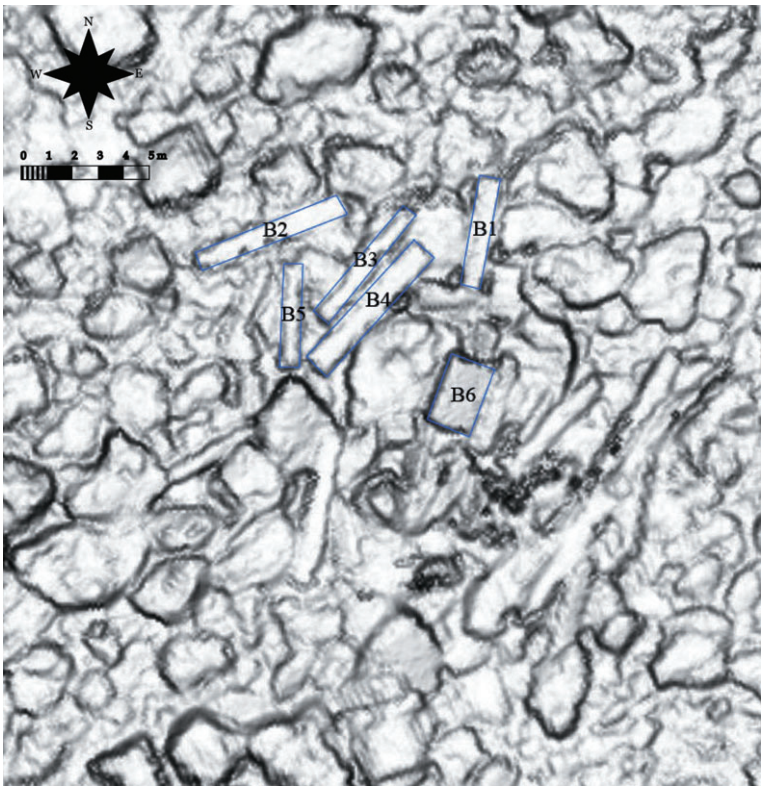

Figure 5. The Punta Cicala shipwreck in a multibeam image; note the rocky sea-floor. (drawing, J. Royal and D. Bartoli; data, INA-RPM Nautical Foundation)

and heavier than the nearby Punta Scifo A wreck, but without finished and decorative artefacts.

Punta Cicala (Site IT05-AD)

The third site in the Punta Scifo area where marble blocks and column-shafts were found is located 1.5 km to the east of Punta Scifo B. The archaeological material lies at a depth of 6.5 m among the sharp rock outcrops of Punta Cicala. Its remains cover an area of *c*.15 × 12 m and consist of at least 29 blocks and column-shafts (Fig. 5). Although there was not enough time in 2005 or 2006 to collect precise measurements of these objects, several considerations can still be made regarding what has been previously published.

Royal locates the Greek temple of Hera Lacinia and its surrounding wall on the promontory of Capo Colonna, but his plan (2008: fig. 2) contains an error of 1 km, which seriously affects his general interpretation of the site. It is readily apparent how misplaced are the features of Punta Cicala by superimposing a map of the point over Royal's plan (Fig. 6). The sanctuary of Hera Lacinia has been placed in the middle of Punta Cicala bay, and not on the tip of Capo Colonna, where it actually stands. Similarly, the wall that surrounds the *temenos* should be located towards the end of the promontory, be much shorter, and not extend across the entire promontory, but only along its northern edge. Therefore, Royal's site IT05-AD is not in line with a possible submerged projection of the temple's Roman wall, and has no connection with a defensive structure toppled during an earthquake.

Moreover, as Royal also notices, some of the blocks have 'steps' cut into their surface, which are characteristic of the way Romans extracted some varieties of marbles, roughed out their surfaces, and shipped them to their destinations (see, for instance, the items discovered in Ostia and produced in Teos, Docimium, Karystos, and Chemtou; Baccini Leotardi, 1979, 35–6). Probably, their function was to give a more regular surface to the quarried block, remove the natural imperfections of the stone and make it lighter for transportation. The steps might also have made it easier to saw the block into slabs (Baccini Leotardi 1979, 35–6; Pensabene and Lazzarini, 1998, 145). These notches clearly identify newly-quarried blocks, and not re-used material. It is therefore impossible to accept Royal's (2008: 57) hypothesis that they were manufactured in the Greek Archaic period and are associated with the early phase of construction of the sanctuary.

The total tonnage of the marble items remains unknown, but a quick visual inspection in 2006 showed about 29 blocks and column-shafts of dimensions similar to those of Punta Scifo B, which can hardly total more than 500 tons. Freschi (1987: n.10), who

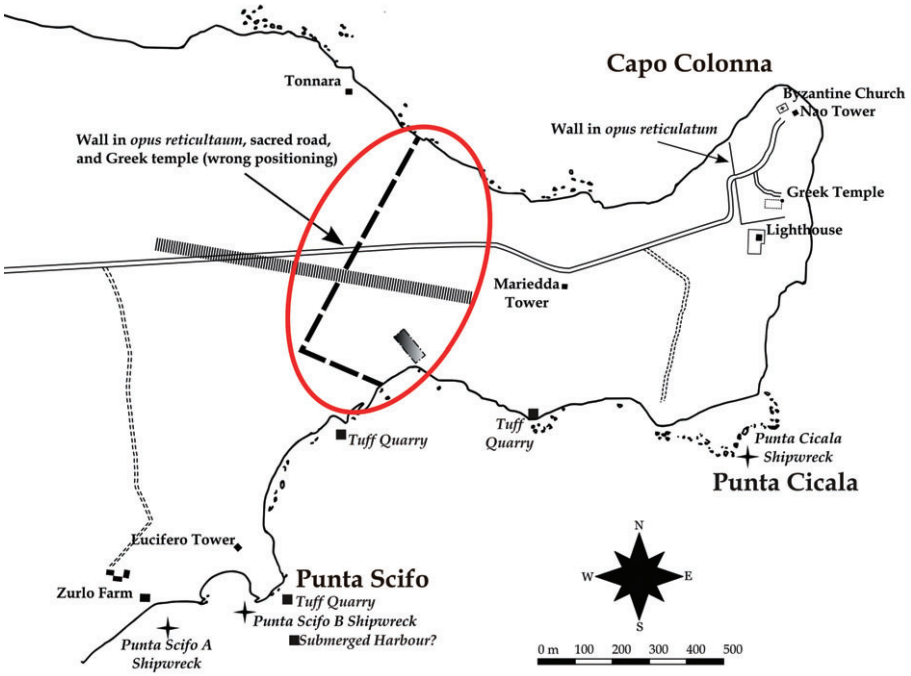

Figure 6. The Greek temple of Capo Colonna, the surrounding *temenos* and the access road in their wrong (red circle) and right location, along with the supposed breakwater and the nearby quarry blocks. (D. Bartoli)

excavated this site in 1983, also believes it to be the remains of a marble-carrier which sank in the 3rd century AD. Unfortunately, efforts to locate the final report of her excavation were unsuccessful, and so the types of artefacts found in 1983 remain unknown. Only further investigation will provide additional clues regarding this interesting site, which does, in any case, represent a merchantman, and not the remains of a submerged building.

A Greek Archaic breakwater?

Finally, the images Royal published of site IT05-AE/AF, along with its depth, raise some serious doubts regarding its proposed identification as a submerged breakwater. Thirteen metres would seem too deep for a port installation built in the Greek Archaic period which supposedly was still above sea-level in the early-4th century BC, when Syracusan troops invaded Croton (Royal, 2008: 64). A submerged calcarenite quarry, which Domenico Marino dates between the Greek Archaic and Hellenistic periods, is visible in the bay of Punta Scifo; it is located at a depth of 6 m, some 170 m towards the shore from the supposed breakwater (Fig. 6) (for a review of all the quarries known in the territory of Croton, see Marino, 1996: 17–38: the author dates the terrestrial quarries of Le Castella between the early-6th and 4th centuries BC). Due to similarities in the shape of the blocks and extracting techniques, it is likely that the submerged quarries at Punta Scifo date to the same period (pers. comm. Marino, 2009). If Greeks were exploiting the local quarries and contemporaneously using the nearby port facility, it is difficult to explain such a dramatic difference in depth between the two sites. Furthermore, based on Royal's image, the breakwater appears to lie only 30 m from the ancient coastline, which would create an extremely small basin, of little use even for the standards of ancient merchantmen. The lack of any associated artefacts, amphora sherds, or other traces of human occupation at the site raises further questions. It is possible, given the overall shape of the feature and its linearity, that it is ancient submerged beach-rock.

Conclusions

Data from surveys of the sea south of Croton, and information gathered from documents in local libraries and archives, permit the reconstruction of details of the Punta Scifo A wreck-site from its early discovery until its excavation in 1983. A forthcoming companion article will provide further details about this wreck, its cargo, hull-remains, port of departure and possible destination, as well as additional information on the other marble-carriers found in the sea south of Croton. The arguments presented here are meant to convince the reader of a different interpretation of the archaeological sites located in 2005, and re-open the discussion of an area of the Mediterranean which, due to its central location between the east and west basins, has been of strategic importance for navigation throughout antiquity, but has remained largely unknown to the broader field beyond Magna Graecia's local scholarship.

As these preliminary results show, the sea of Croton still holds an enormous amount of information which could benefit the study of navigation in antiquity, and particularly that of the Roman marble trade. With five shipwrecks loaded with marble cargoes located within such close proximity—less than 16 km separate Punta Cicala and Capo Bianco, the two most distant sites—Croton has the highest concentration of wrecked *naves lapidariae* of any spot in the Mediterranean. This author believes that Punta Scifo A and B and Punta Cicala are the sites of ancient shipwrecks and not the remains of submerged buildings, and is sceptical that an Archaic breakwater could be located 13 m deep. But perhaps, more than anything, the study of this unique area has benefited from the work and original contribution of Royal and the discussion of the sites and their interpretations generated by his earlier article.

Dante G. Bartoli
ProMare Inc., Via F. De Filippi 5, 20129 Milan, Italy, dante@promare.org

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