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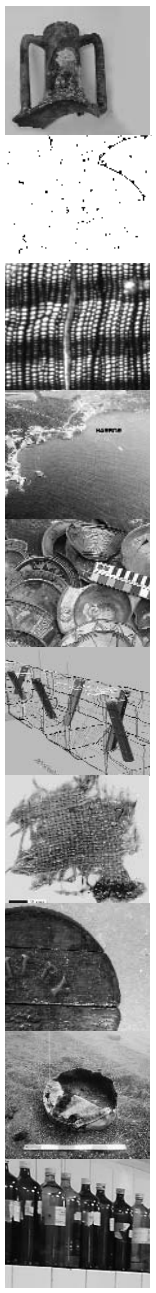


Inhalt

Im vorangehenden Artikel von Vladimir R. Cepelev wird eingangs erwähnt, dass „die Vorfahren der Russen, Ukrainer und Weißrussen mit ihren Einbäumen auf dem Dnepr und Don bis zum Schwarzen Meer..." gelangt seien, und zwar teils des Handels wegen, teils in kriegerischer Absicht. Da auch im vorigen Jahrgang dieser Zeitschrift zwei Beiträge desselben Autors enthalten sind

The PIAS Project (Terceira Island, Azores, Portugal)

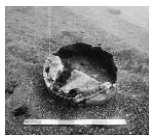
Preliminary results of a historical-archaeological study of a transatlantic port of call

José Bettencourt – Patrícia Carvalho – Cristóvão Fonseca

Abstract *– The PIAS Project, started in 2006 and with the end foreseen for 2008, aims to contribute to the study of Angra do Heroísmo harbour from the 16th to the 19th centuries, through the study, monitorization and cultural heritage evaluation of the archaeological sites Angra A, B, D, E, and F. These underwater shipwreck remains are located within the protected area of Angra Bay Archaeological Park, created in 2006. The project aims also to contribute to the study of the written sources related to the Azores as Atlantic ports of call. This paper presents the preliminary results of the first PIAS field season, carried out in 2006 on Angra A, Angra B and Angra F shipwreck sites.*

Inhalt *– Das Projekt PIAS, das 2006 begonnen wurde und 2008 enden soll, hat das Ziel, am Studium des Hafens von Angra do Heroísmo vom 16. bis zum 19. Jh. durch Untersuchung, Kontrolle und Auswertung des Kulturerbes an den archäologischen Fundstellen Angra A, B, D, E und F mitzuwirken. Diese Wracks liegen innerhalb des geschützten Bereiches des 2006 geschaffenen Archäologischen Parks der Angra-Bucht. Außerdem will das Projekt zum Studium der Schriftquellen beitragen, die mit den Azoren als atlantischem Anlaufhafen in Verbindung stehen. Dieser Beitrag legt die vorläufigen Ergebnisse der ersten, 2006 durchgeführten Untersuchungen an den Wrackstellen Angra A, B und F vor.*

1. Introduction



European voyages of discovery and expansion in the Atlantic and Indian Oceans soon revealed the importance of the geographic position of the Archipelago of the Azores, a fact particularly clear after the establishment of regular connections between Europe, Asia and the American continent, by the end of the 15th and the beginning of the 16th century. In effect, until the generalization of steam navigation in the second half of the 19th century, the natural factors influencing sailing navigation in the Atlantic forced ships en route to Europe to pass near the Azores or to call at the Azores islands.

The Azores are a group of nine volcanic islands located on the North Atlantic between the European continent and North America, 1500 km west of the Iberian Peninsula (fig. 1). Through the entire 16th and part of the 17th century, the main Atlantic port of call was located on the southern coast of Terceira Island, at Angra Bay, which became a deep sea harbour for Portuguese and Castilian ships returning to Europe. Although Angra Bay is a natural anchorage area, protected from the dominating winds of north-northeast, it remains exposed to south and southeast storms, which were the cause of several shipwrecks, attested by written sources and oral tradition, and confirmed by archaeological evidence, which only recently began to be analysed.

Traditionally, studies on the Azores as ports of call and on Atlantic navigation have been based solely on written sources. In 2006, however, the *Centro de História de Além-Mar* (CHAM)[1], launched the PIAS[2] project, funded by the *Direcção Regional da Cultura dos Açores* (DRC). This interdisciplinary historical-archaeological project has as its primary goal to analyze the role of Angra harbour and of the Azores in the context of transoceanic navigations from the 16th to the 19th centuries, on the basis of an integrated study of written and archaeological resources related to the subject in its different environmental, economical, social and cultural aspects. Additionally, the project intends to assess the tourist and cultural potential of the Azores archaeological underwater heritage, contributing in this way to valorise it. With these general aims, CHAM plans to survey and investigate the sites Angra A, B, E, and F, while continuing the ongoing work on the underwater remains of Angra D ship. This paper presents the preliminary results of the first PIAS field season, carried out in 2006.

2. Historical and geographical background

The important role played by the islands of the Azores as ports of call in the structure of navigation in the early modern period is well known. The structural conditions of navigation in the Atlantic, determined by the Canaries Current and the Northeast trade winds[3], prevented ships returning to Europe from Asia, Africa and America from following a straight route along the African

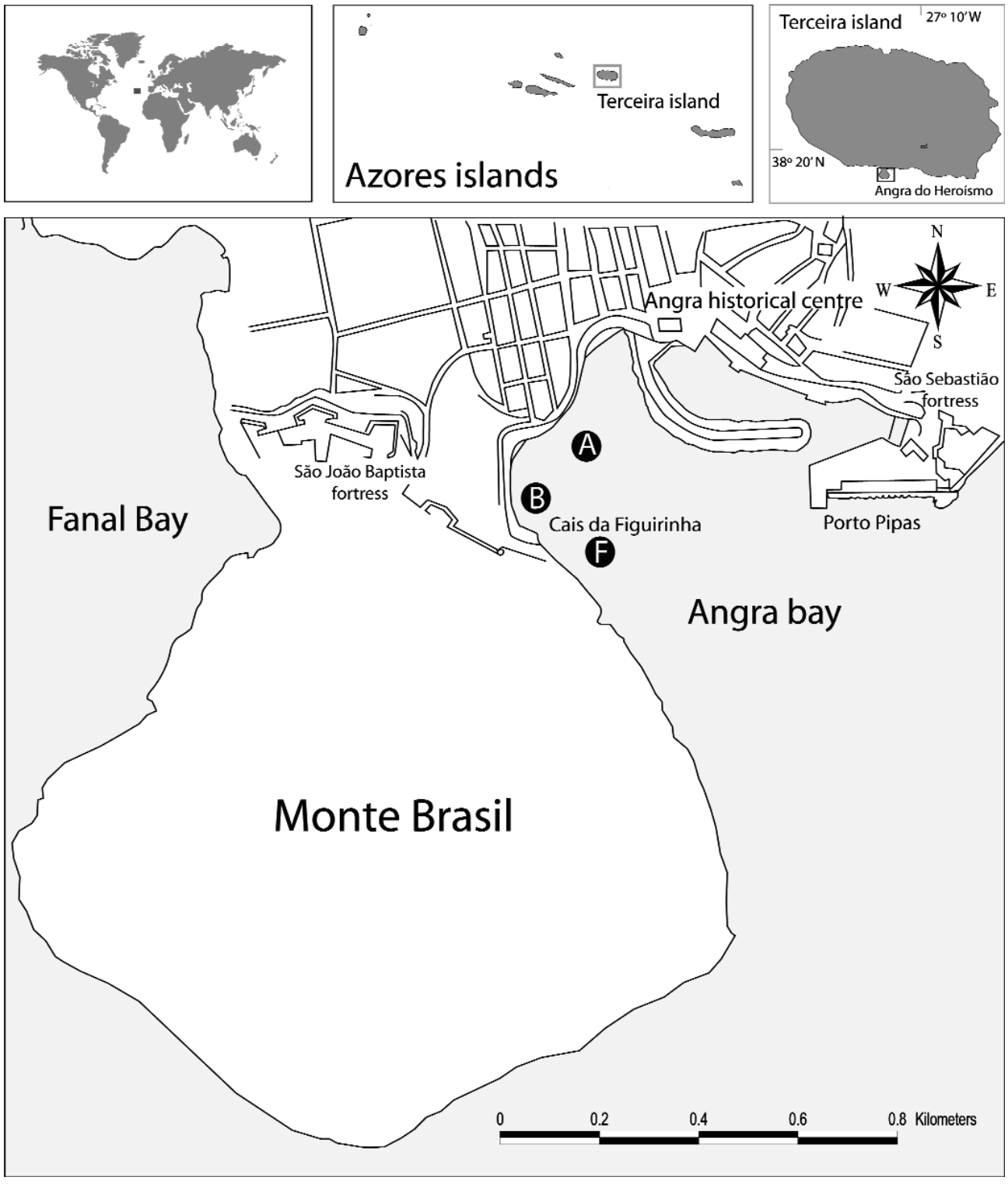


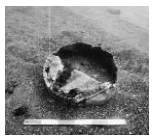
Fig. 1: Location of the Azores Islands and archaeological sites surveyed in 2006.

coast. Therefore, before the end of the first quarter of the 16th century, a new route was developed, the so-called *volta da Guiné ou da Mina* (the Guinea or Mina turn), by which ships left the vicinity of the West African coast and entered the ocean to circumvent the Northeast trade winds, a deflection which eventually made them pass by or call at the Azores islands[4].

With the beginning of the India Run (*Carreira da Índia*) in 1500, connecting annually Lisbon to Asia, and with the establishment of regular connections between Castile and the American continent, the Azores definitely became a geostrategic reference point. In this context, the town of Angra, owing to its natural conditions and to the safety of its anchorage, became a well-established port of call. That brought about the expansion of several activities – defence, naval repairs, supplying of provisions, recovery of the crews, protection of the ships and its cargos – which, as far as the Portuguese ships were concerned, were mostly a *Provedoria das Armadas* assignment[5]. This Crown institution, which appeared around 1527, was responsible for the outfitting of Portuguese

ships coming from India, Brazil and Africa and calling at the islands; it also ensured the protection of the Crown's finances by fighting pirates and privateers and by salvaging goods lost in shipwrecks. The naval defence of the fleets was ensured by the warning caravels (*Caravelas de Aviso*), by the Islands fleet (*Armada das Ilhas*) and by fleets of the Crown operating in the Azores. The warning caravels and the Islands fleet detected and gave warning of the presence of enemy ships near the islands, delivered the King's orders to the fleets – indicating the route to take to Lisbon and the precautions required on arrival at Tagus River – and escorted the ships in the last stage of the voyage.

The islands were also an indispensable geographic reference point for orientation purposes. Usually, ships steered east at the latitude of the Flores and Corvo islands. After calling at the islands, they took the course of the European continent between 40º N and 41º N, taking advantage from the winds of the Portuguese coast, which blow mainly from north-northeast during the summer months[6].



Support for Portuguese and Castilian fleets made possible the development of Angra and conditioned the urban structure of the town, which became an important military and economic regional center. The original settlement core dated from the middle of the 15th century and it still looked very much medieval, being located on a hill where a castle was built; afterwards, the settlement expanded into the bay area, where the seats of power were gradually installed and the harbour was built, along with a shipyard and facilities designed to support navigation[7] . From the middle of the 16th century onwards, Angra, along with other harbour areas in the region, was protected by a complex of coastal fortifications, among which the one located on top of Monte Brasil[8] stood out, protecting both Angra Bay (east of Monte Brasil) and Fanal Bay (west of Monte Brasil). In effect, with the increase in maritime traffic brought about by transoceanic navigation, it was necessary to react to the frequent attacks by foreign pirates and privateers, mainly French and English, who began to visit the islands in the 16th century, laying in wait for the Portuguese and Spanish fleets coming from Asia, Africa and the American continent[9].

In this context of intense nautical activity, it was natural that shipwreck losses were frequent – especially near the main harbours of the region – and they were often mentioned in the official correspondence between the Crown and its officers in the region. The literature of the time also mentioned them, as happened, for instance, on the Dutch Jan Huygen van Linschoten's Itinerario[10], which described how, during the author's stay at Angra in 1591, a storm caused the loss of several ships from a Spanish overseas fleet, twelve in Terceira, two in São Jorge, two in the Pico, three in Graciosa, and four in São Miguel, while others were lost between the islands. A recent work based on archival documentation as well as printed bibliography, counted approximately 550 known shipwrecks in the region between 1525 – the year of the first known mention of a ship loss – and 1995[11].

3. The first underwater discoveries

In this historical background, interest for the underwater remains of shipwrecks that took place over the centuries in Angra Bay has been significant, although knowledge of the Azores' underwater heritage is still scant. After the introduction in Portugal of scuba equipment, invented by Jacques Cousteau and Emile Gagnon in the 1940s, the Azores' underwater cultural heritage began to be explored. Between 1961 and 1965, the Portuguese Navy working together with the Azores Air Zone Command, recovered five submerged bronze guns at Fanal Bay **(fig. 1)**, near the Zimbreiro and São Diego fortresses, which led several researchers to identify them as pieces fallen from these fortresses into the sea as result of earthquakes[12]. During the following decade, British teams carried out archaeological surveys at the coast of Terceira island. Sidney Wignall – who led a team which for six months looked for the remains of the English ship REVENGE, lost in 1591 – mentioned the discovery of at least two shipwreck sites at Angra Bay, and of a bronze gun, recovered in 1972 and at present entrusted to the Angra Museum. The gun was located in the vicinity of Monte Brasil, at 30 m deep, next to Santo António fortress[13]. Another piece, bearing the arms of Francis I of France (1515-1547), was recovered by the Underwater Archaeology Group (*Grupo de Arqueologia Subaquática*) in 1996 in the same coastal area at 36 m deep.

4. The beginning of underwater research

After those pioneering surveys, the first studies with acceptable scientific standards were conducted, from 1995 to 1998, by the Angra Museum – through the Underwater Archaeology Group –, the Institute of Nautical Archaeology (INA) and the Portuguese National Centre for Nautical and Underwater Archaeology (CNANS – *Centro Nacional de Arqueologia Náutica e Subaquática*) and partially supported by the Regional Government of Azores. At first in the vicinity of Angra, afterwards in other islands of the Central and Western group, several field seasons were conducted on wrecks previously known to local divers. Those preliminary surveys made possible to carry out the identification of some shipwrecks in Angra Bay dating from the period between the 16th and the 19th centuries – Angra A (19th century), Angra B (16th or 17th centuries), RUN'HER (1864) and LIDADOR (1878), thus confirming the great scientific potential of this coastal area of the region[14].

The first excavations were carried out in 1998, following the predisturbance survey prior to Angra's leisure harbour construction. In consequence, the remains of two other vessels, i.e. Angra C (17th century) and Angra D (16th or 17th centuries), located at the implantation area of the protection breakwa-

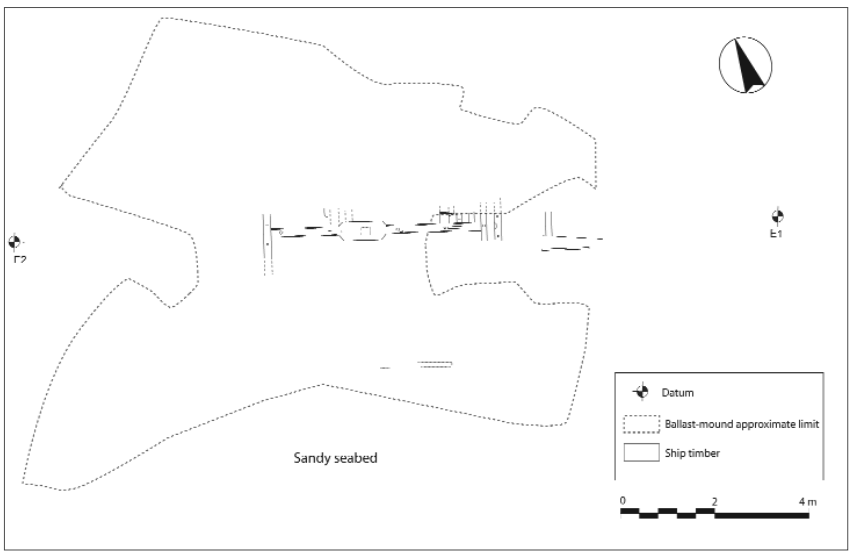


Fig. 2: Preliminary planimetric sketch of Angra F archaeological site.

ter, were excavated, recorded, disassembled and deposited in a deeper area of the bay[15].

In 2002, the discovery of two other sites – Angra E and Angra F (16th or 17th centuries) – was declared by local divers. Finally, in 2004, a DRC survey in Angra Bay and the adjacent coast of Monte Brasil let to the identification of some scattered finds and another modern wreck (Angra G)[16].

5. Preliminary results and analyses

The first archaeological field season in the scope of PIAS project was carried out in August 2006 and had as its main aims to assess and preliminary survey the shipwreck sites Angra B, E and F and to monitor Angra A and the deposit conditions of Angra D. In Angra A, B, and F all exposed features were analysed, measured and recorded by photography and photomosaics. The positions of these remains, the scattered artifacts and the limits of geological features, were obtained by trilateration using tape measurements and relative depths in relation to an established grid of datums around the sites. The available data were combined and organised on a digital sketch plan, which integrates the diverse data formats at a site level.

In Angra F, it was possible to delimit the archaeological remains, which correspond to an area that measures about 13 m length and 9 m wide (fig. 2). The wreck remains are located at 9 m deep and orientated roughly north-west/south-east. The exposed archaeological deposits are dominated by a pile of ballast stones, in which blocks of limestone and quartzite were identified and where parts of the ship are visible: the keelson, the main mast step assemblage, sections of frames (floor timbers and futtocks) in one of the ship's boards and a hull plank in the other.

The preserved part of the keelson measures about 4,5 m length and 19,8 cm sided. In its upper surface, that presents chamfered corners, it bears two longitudinal mortises, where the stanchions that supported the first deck were inserted, and two iron concretions.

The mast-step is an expanded portion of the keelson measuring about 1 m length by 0,38 m wide (fig. 3). In this part, intensively colonized by marine borers (*Teredo sp.*), were preserved the mortice for the mast heel, 18 cm maximum length by 15 cm wide and 9 cm deep. One lateral buttress, that supported laterally the main mast, is visible in one of the ships boards.

Eight floor timbers were recognized partially exposed near the keelson. They measure between 10 and 19 cm sided and seem to be fastened to the futtocks by a combination of nails and treenails, observed in one joining visible in an eroded top.

One plank was found in the approximate limit of the ballast mound. The only available data concerning their dimensions is the thickness of about 5 cm. The treenails pattern observed in the upper surface of the exposed frames suggests that the planks were fastened to the frames with a combination of nails and treenails, but only the wooden treenails, with an approximate diameter of 2,2 cm, are well visible.

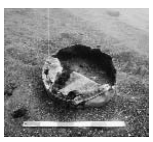


Fig. 3: Angra F. General view of the keelson and the main mast step assemblage. The mast step corresponds to an expanded portion of the keelson and was supported by buttresses.

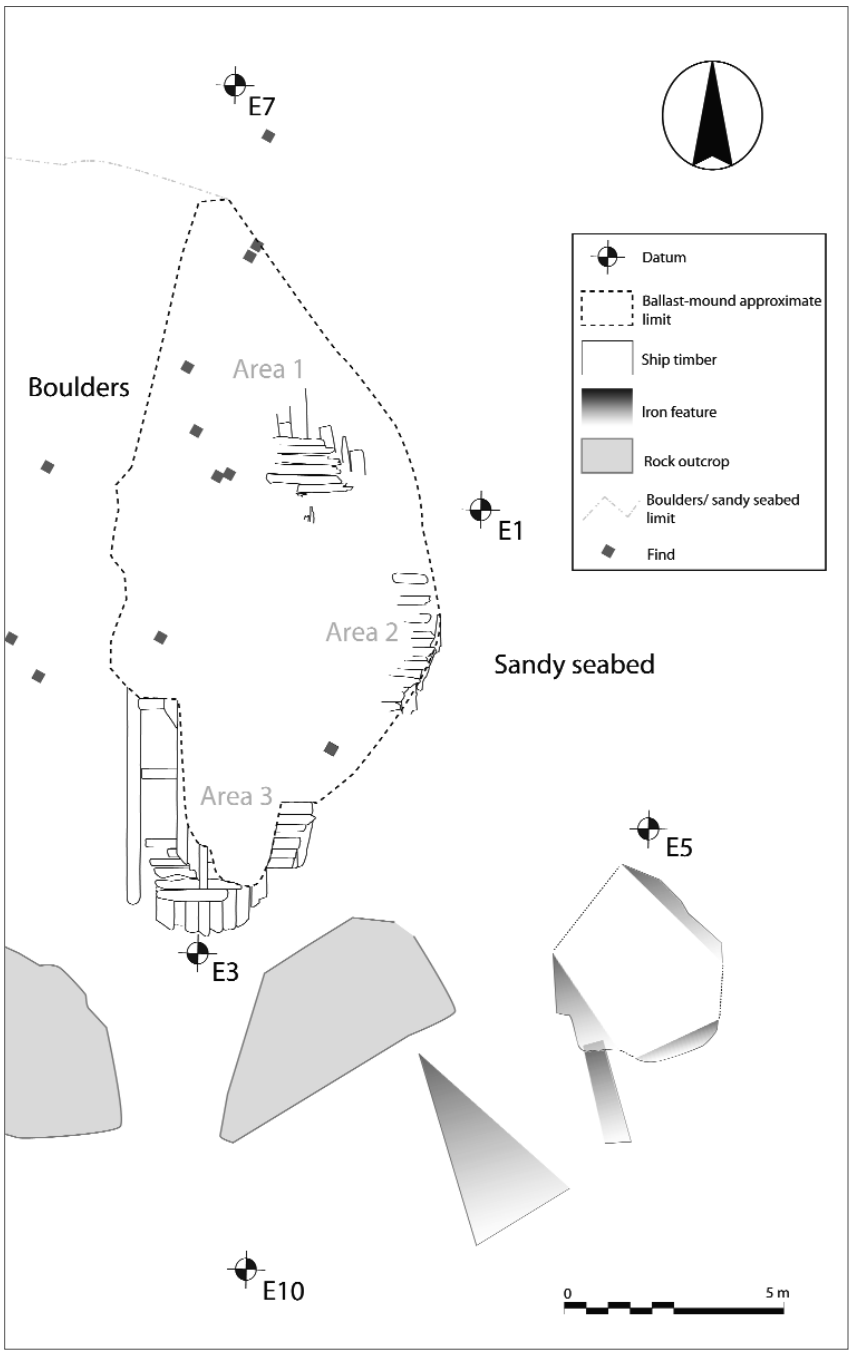


Fig. 4: Preliminary planimetric sketch plan of Angra B archaeological site.

The scarce finds included pottery, which cannot be related to the shipwreck, copper nails and lead bullets recovered in the mortice for the mast heel.

Compared with other modern wrecks, these features present similarities to those recorded in hull remains related to the 16th and 17th century Iberian-Atlantic tradition of shipbuilding. On the one hand, the visible mortises on the top of the keelson resemble the existing mortises in Ria de Aveiro A wreck (Portugal, 15th century), in SAN DIEGO wreck (Philippines, 1600) or in the Cais do Sodré ship (Portugal, 15th century)[17]. On the other hand, the expanded portion of the keelson for the main mast supported laterally by buttresses appears, for instance, in the remains of Highborn Cay (Bahamas, 16th century), Cattewater (England, 16th century), SAN JUAN (Canada, 1565), Rye A (England, 16th century), Western Ledge (Bermuda, 16th century) or Angra D (16th or 17th centuries)[18]. Iron bolts joining the keelson, the floor timbers and the keel, presumed in Angra F by the presence of concretions in the keelson's upper surface, also appear in the same remains, where they were spaced every three or four floor timbers. Other similarities concern the fastening joining the outer planking and the frames or the floor timbers and the first futtocks, which in most of the above examples is also a combination of nails and treenails. The scantlings of the ship timbers observed seem to indicate that we are in the presence of a vessel of small to medium size, which makes it of extreme relevance for the study of shipbuilding during the Iberian expansion period.

Angra B wreck was located, near the Figueirinha quay, at around 5 m deep. Archaeological work was conducted some years before[19] and the preliminary comparison between the data collected then and those collected in 2006 suggests that there was a deep change in the exposed conditions of the remains. According to Kevin Crisman, in 1996, were visible part of the keel and of one area in the south extremity of the site with an exposed part of the ship (frames, stringers, inner and outer planking) underneath a ballast pile 15 m length and 11 m wide. The preserved part of the keel measured around 15 m length, 27 cm moulded and 17 cm sided, and it seemed also to be covered with lead strips. The ten visible extremities of the frames in that area measured between 13 and 25 cm sided and around 20 cm moulded. The inner planking, measuring about 26 cm width and 5 cm thick, was joined to the frames with a combination of iron nails and wooden treenails and was flanked by two stringers between 19 cm sided and 11 cm moulded. The outer planking, for its part, measured approximately 27 cm width and 5 cm thick in average and it was fixed to the frames with two or three iron nails and one wooden treenail with an average diameter of 2,5 cm. Kevin Crisman also recorded two kinds of stone ballast, one composed of loose blocks of granite and limestone, the other of a type of concrete. This led him to conclude that the ship had been loaded, between the frames, with a primary ballast composed of a liquid mix of sand, lime and hardened

gravel, covered by the inner planking and by a secondary ballast of smaller than usual size, similarly to ships built in Biscay like the NUESTRA SEÑORA DE ATOCHA (1620) and the NUESTRA SEÑORA DE SANTA MARGARITA (1622)[20].

In 2006, however, Angra B wreck was exposed in an area measured approximately 17 m length (fig. 4) were could be observed three distinct areas with ship remains: in the first (fig. 5), located at the north extremity of the remains, parts of the frames and of the planking were preserved, occupying an area of about 7 m^2; in the second, the extremities of the frames of one of the ship's boards were found, measuring a maximum length of about 3,60 m; in the third, that corresponds to the one analysed in 1996, located at the south extremity of the ballast pile, part of the frames and the inner planking were preserved, measuring a maximum length of 2,90 m. The ship remains were below a ballast pile (limestone [?], quartzite, flint and other unidentified rocks), ensuring the protection of a significant part of the hull in an area very exposed to the swell of the sea during extreme wave events.

As in area 3, inspected by INA, the actually exposed frames were very worn away from the top down and measured between 15 and 21 cm sided. In area 2 they correspond to a continuous succession of frames, without in between spacing (fig. 5). They were also fixed to the planking by a combination of nails and treenails (two or three nails and one wooden treenail). In area 1, the outer planking measured between 5 and 5,5 cm thick and between 32 and 35 cm width. In areas 1 and 2, in the exterior face of the outer planking, were visible the lead strips that protected the hull.

In 2006, finds in the site included a musket bullet and fragments of pottery and of the lead strips that protected the hull. They could be observed scattered and among the ballast.

Fig. 6: The stern heel photographic mosaic.

Fig. 5: Exposed ship remains in Angra B site protected by the ballast mound. In this area we have the extremities of the frames of one of the sides, and part of the hull planking.

No remains were found of the keel and the primary ballast mentioned by Kevin Crisman, which may point to a gradual and simultaneous process of erosion and sedimentation of different parts of the site, as seems to be suggested by the fact that all exposed frames in area 1 were only a few centimetres high, due to erosion by abrasion. In spite of the modifications in the deposit conditions, the available data, at this stage, suggest that the remains belong to a ship of medium size, probably bigger than Angra F. Regarding its origins and chronology, the hypothesis put forward first by Kevin Crisman suggesting that it corresponded to an Iberian vessel from the 16^{th} or 17^{th} century, still seems valid, in view of the similarities detected in 2006 between the wreck and others ships previously related to that tradition, namely the lead sheathing and the fastening pattern between the frames and the planking[21].

During the survey carried out in the vicinity of Angra B other archaeological materials in wood and in concretions were located, that, at this stage, cannot be related to the hull structure preserved at Angra B. The most remarkable piece among these materials is part of a ship's stern (fig. 6), located over the iron plating of a more recent wreck. This piece of wood was recovered at the end of the field season because it was clearly at risk of being damaged by natural processes. It corresponds to a stern heel preserved in 2,60 m of its original length and maintaining the

Fig. 7: Exposed ship remains in Angra A site. We can observe evidences of bioerosion responsible for the gradual destruction of exposed wooden timbers in the middle part of the site (frames, keel and hull planking).

skeg, the beginning of the stern post, with 1,17 m high, and iron concretions of the first gudgeon. Its maximum thickness is about 18 cm at the base, and its minimum 10 cm at the top, at the surface for the Y-shaped floor timbers. At the incomplete extremity, the heel stands at a height of 19 cm, which then increases to 39 cm due to the presence of a salience. At 1,7 m from this extremity, the rabbet, which runs along both side surfaces, rises diagonally, marking the beginning of the stern post. Over the skeg, the heel seems to have a filling piece which is preserved with a maximum height of 40 cm and a width of 14 cm. The rabbit has a depth around 4 cm carved on the sides of the heel for the insertion of the garboard planks. Although the fastenings have not yet been recorded in detail, they seem to consist of iron nails and bolts. This type of stern bears close similarities to that of some 16th and 17th centuries ships of Iberian origin, namely the SAN JUAN, the Ria de Aveiro A, the Angra D, and the Corpo Santo ship (Portugal, 15th century). These elements were also described and represented in some of the 17th Portuguese treatises on shipbuilding, like in João Baptista Lavanha and Manuel Fernandez's works[22]. The characteristics and the state of preservation of this stern heel clearly distinguish it from the Angra B wreck, the closest context, suggesting that it may come from another shipwreck site in the bay.

At the end of the field season, the examination of some wood structures observed near Angra B, led to the identification of the remains of another shipwreck. A superficial cleaning by hand-fanning of the structures revealed them to be part of a ship's extremity. The exposed remains were made up of some hull planking and a wooden knee**.** A ballast pile, measuring about 10 m length, and other ship structures were identified in the vicinity, scattered around and deeply protected by the sand. A connection between these remains and the stern heel mentioned above is a possibility that can only be confirmed by future excavation of the remains.

Recording and monitoring work was also conducted on the Angra A wreck. The site is located approximately 5-7 m deep and it corresponds to a ballast pile measuring around 35 m length and 11 m width, that protects the remains of a 19th century ship[23]. The work carried out by CHAM in 2006, a photomosaic of the area occupied by the exposed hull and the observation of the structures, made possible to monitor the deposit conditions. The hull presents visible signs of bioerosion **(fig. 7)**, responsible for the almost total destruction of the exposed wood (frames, keel, hull planking and stringers) and for the dismantling of the structures.

Angra E, discovered by a local diver in 2002, was not relocated, which may be explained by an accretion occurrence at the western part of the Angra Bay. Accordingly to Catarina Garcia, who undertook a preliminary observation of these remains located between Angra A and Angra B, the site is composed of a hull extremity and remains protected in a sandy seabed.

Finally, a copper cauldron (fig. 8), found isolated north of Angra F, was recovered and is at present undergoing treatment at the Conservation Centre of the Azores (*Centro de Conservação e Restauro dos Açores*).

Fig. 8: The copper cauldron in situ before recovery.

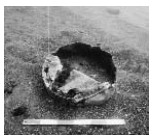
6. Concluding remarks

In relation to site formation processes, the sites' location, throughout the east coast of Monte Brazil, suggests a loss caused by south or southwest winds, the biggest danger for ships anchored in the bay. The small amount of artifacts, the absence of anchors and artillery indicate that intense salvage operations occurred after the shipwreck initial event and are responsible for the lack of those categories on the archaeological record. Contemporary salvage operations, as reported in documentary sources, were common, both in Angra Bay and in the other islands. For instance, by the end of the 16th century, Philip I of Portugal (Philip II of Spain), gave great importance to the salvage of submerged artillery pieces lost following shipwrecks of Portuguese and Spanish ships or naval clashes near the main Azores' harbours. During the same period, there were attempts to retrieve the artillery of the carrack CATALINA, lost near Vila Franca do Campo at São Miguel Island[24].

On the other hand, the ships conservation of the ships is due to the presence of ballast piles that protected the remains in areas exposed to the wave effects, during storms. However, the changes observed during monitoring works done at the Angra A and Angra B shipwrecks and the observation of Angra F suggests that these remains are actually affected by a complex combination of environmental processes that can not be assessed by now. For example, we recognized the action of marine borers in the exposed wood of Angra F and Angra A. In Angra B, however, the exposed wood seems to be mostly affected by an abrasion process.

Based on this preliminary archaeological assessment, it is still too early to advance definitive presumptions about the origin, dimension and chronology of the surveyed wrecks. Nevertheless, the exposed elements of Angra F are similar to those presented by ships of the Iberian-Atlantic tradition dating from the 16th and 17th centuries. Data available on Angra B are not as conclusive, since no structural elements were found that could serve as safe architectural signatures, but they point to a similar conclusion and the same applies to the stern heel located next to Angra B. The litological classification of the ballasts also confirms an exogenous origin for this ships once local geology is entirely formed by basalt.

Analysed together, the archaeological data available by now, more than just an important evidence of ships technology, allow us to relate most of the archaeological remains mentioned to the Azores Islands as Atlantic ports of call in the 16th and 17th centuries. In fact, in the Angra Bay area most of the other identified shipwrecks and scattered finds date from the 16th and the 17th centuries as well and can be related to the same subject.



Angra D, the best preserved wreck ever excavated in the Azores, also presented most of the architectural features usually associated to Iberian-Atlantic shipbuilding – some of which can also be observed at Angra F, such as the expanded portion of the keelson. During the rescue excavation, finds related to the ship's functioning and live aboard were located under and beneath the protective layer of stone ballasts; olive jars and ceramics manufactured in the south of Spain were predominant among these finds, making possible to identify it as a vessel lost during the last decades of the 16th or the first decades of the 17th century, possibly of Spanish origin[25].

The Angra G shipwreck, found in the course of a survey carried out by DRC, was located 50 m deep, near Monte Brasil. The site is characterized by the presence of a wood structure exposed near two iron anchors

and other scattered surface materials. The presence of cowry shells among the surface finds suggests that it may have been a ship coming from Asia[26], from where the Portuguese used to bring this kind of items, as can be attested by its discovery at shipwreck sites of India Run ships, namely, in Azores, at the NOSSA SENHORA DA LUZ wreck site[27].

The remains of another wreck, Angra C, also excavated in 1998, were located at about 28 m from Angra D. These remains, for their part, presented features suggesting that they belonged to a vessel of North-European, possibly Dutch origin, in view of the similarities between the ship's structural features and those prevalent in the shipbuilding tradition of that region in the first half of the 17th century, such as the double outer planking and the fastening made exclusively of wooden treenails[28].

Other archaeological remains of the port of call of Angra can be found at the anchorage place known as Cemitério das Âncoras (Anchors Graveyard)[29]. Located east of Monte Brasil, inside the line defined by the alignment of the Santo António and the São Sebastião fortresses, the site is known since the beginning of scuba-diving in the region. It consists of a group of iron anchors scattered on a large area between 15 and 30 m deep. The nautical use of this area is documented in written sources and appears in the iconography as a favoured anchorage for ships in transit.

Aside from these remains, mention should also be made of the artillery assemblage described a few paragraphs above, made up of Portuguese, Spanish, French and English bronze guns from the 16th and the first decades of the 17th century; they have been associated with losses fallen accidentally into the sea from fortresses located nearby[30], a hypothesis that, in our view, must be seen with caution, owing to the lack of deposition contextual data.

At a regional level, known underwater archaeological resources in the other islands of the Azores are also significant and can be related to the same subject. In the 1970s, pieces of iron guns were found and recovered near the Vila Franca do Campo islets (São Miguel island) and Flores island. In 2000, CNANS carried out a rescue excavation of an 18th century shipwreck site at Vila da Calheta (São Jorge island)[31]. In 2002 and 2004, *Arqueonova* carried out a preliminary survey on the NOSSA SENORA DE LUZ wreck site, a Portuguese Indiaman carrack lost in 1615 at Faial Island on its way back from Goa (India). At this scattered site, artifacts recovered included sherds of Chinese porcelain, Martaban jars, Chinese jars, glass beads and cowry shells[32].

In sum, the archaeological remains located at Angra Bay and the Azores islands document the use of this coast by transatlantic navigation between the 16th and the 19th centuries. Integrated studies of both written and archaeological sources point to it being used, between the 16th and 17th centuries, mainly by Portuguese and Spanish vessels, which called at Angra harbour during the homeward voyage from Asia, Africa and America. In this context, these remains launched again, with new data, the discussion on the contribution that Maritime Archaeology can give to the development of our historical knowledge of overseas expansion, namely of the strategic role played by islands in the scope of the North Atlantic navigation and their influences to the regional cultural identity.

The results achieved in the first field season of the PIAS project confirm the exceptional scientific, cultural and heritage potential of Angra Bay. They also validate in the sea the historical importance and the World Heritage City status conferred to Angra do Heroísmo by UNESCO in 1983.

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Notes

[1] Research unit of New University of Lisbon (*Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa*) and from Azores University (*UA-Universidade dos Açores*), which promotes several activities related to the study of Portuguese overseas expansion, namely on the field of the history of the Azores.

[2] The Project PIAS (project for the study, protection and valorisation of the sites Angra A, B, D, E and F) is funded by the Azores government (*Governo dos Açores*); the Nautical Club (*Clube Náutico de Angra do Heroísmo*) provides logistical support; Professor José Damião Rodrigues (CHAM-UA) is the coordinator of the historical component of the project; the coordinator of the archaeological component is José Bettencourt, one of the co-authors of this paper.

[3] Guedes, M.J., O condicionalismo físico do Atlântico e a expansão dos povos ibéricos, Studia, Vol. 47 (Lisboa 1990) 254-291.

[4] On this matter see, for instance: Os Açores e o Atlântico (séculos VIX-XVII), Actas do Colóquio Internacional realizado em Angra do Heroísmo de 8 a 13 de Agosto de 1983 (Angra do Heroísmo 1984); Matos, A.T., Os Açores e a carreira das Índias no século XVI, in: Estudos de história de Portugal. Homenagem a A.H. de Oliveira Marques, Vol. II (Lisboa 1983) 93-110; Matos, A.T., A provedoria das armadas da Ilha Terceira e a carreira da Índia no século XVI (Lisboa 1985); Matos, A.T., As escalas do Atlântico no século XVI, Série Separatas Vol. 197 (Lisboa 1988); Matos, A., A Armada das Ilhas e a Armada da Costa (Novos Elementos para o seu Estudo) (Lisboa 1990).

[5] In 1520, the Crown had already issued a set of written instructions for ships bound to the Azores. This document put forward the basic programme of what came to be later the *Provedoria das Armadas e Naus das Índias* at the islands. The activity of the institution

was intense during the 16th and 17th centuries. At the head of the *Provedoria* was the *provedor das armadas*, a post which was in the possession of the Castro family until its extinction in the 19th century; there were also many minor officers – *guardas das naus*, *patrão das naus e ribeiras*, *escrivão da Provedoria* – who ensured the fulfilment of the institution's duties. At the other islands, the *Provedoria* was represented by the *almoxarifes*, *feitores* or *juízes da alfândega*, who were responsible for supplying the carracks and frigates of the fleet, for outfitting of supporting ships, and for informing the *provedor* on the movements of fleets and of enemies. For more on this matter, see note 4.

[6] See note 3.

[7] Rodrigues, J.D., A Carreira da Índia e a Escala Açoriana, in: Pavilhão de Portugal Exposição Mundial de Lisboa de 1998, Catálogo Oficial (Lisboa 1998) 131-147.

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[9] See, for example: Meneses, A., Os Açores e o domínio Filipino: 1580-1590 (Angra do Heroísmo 1987).

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[13] Wignall, S., In search of Spanish treasure (Vermont 1982) 114-149.

[14] See note 11.

[15] Garcia, C., – Monteiro, P. – Phaneuf, E., Os destroços dos navios Angra C e D descobertos durante a intervenção arqueológica subaquática realizada ... na baía de Angra do Heroísmo (Terceira, Açores), Revista Portuguesa de Arqueologia 2.2, 1999, 211-232.

[16] Garcia, C., Campanha de Carta Arqueológica Subaquática da Baía de Angra do Heroísmo. Relatório Final – 2004 (Angra do Heroísmo 2005).

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[18] Oertling, T.J., The Concept of the Atlantic Vessel, in: Alves, F. (ed.) International Symposium etc. (see note 17), 233-240.

[19] Crisman, K., Angra B: the lead-sheathed wreck at Porto Novo (Angra do Heroísmo, Terceira island), Revista Portuguesa de Arqueologia 2.1, 1999, 255-262.

[20] Ibid., 255-262.

[21] Ibid., 255-262.

[22] On this matter see, for example, several papers in: Alves, F. (ed.), International Symposium etc. (see note 17).

[23] Crisman, K. – Lowenn, B., Revista Portuguesa de Arqueologia 2.1, 1999, 249-254.

[24] Meneses, A., Os Açores e o domínio Filipino: 1580-1590, vol. I (Angra do Heroísmo 1987) 113, 229-230.

[25] See note 15.

[26] See note 16.

[27] Bettencourt, J., Os vestígios da nau NOSSA SENHORA DA LUZ: resultados dos trabalhos arqueológicos, Arquipélago – História, 2ª série, IX-X, 2005-2006, 231-273.

[28] See note 15.

[29] See note 16.

[30] See note 12.

[31] Garcia, C., Intervenção arqueológica subaquática – HMS Pallas, Calheta, S. Jorge, Atlântida 2002.

[32] See note 27.

Sources of illustrations

Figs. 1, 2 and 4: PIAS project (CHAM).

Figs. 3, 5-8: José Bettencourt (CHAM).

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