

The shipwreck *Nuestra Señora de las Mercedes*

Second exploration and excavation campaign

September 2016

(Depth: 1,136-1,138 m)



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The looting carried out by the North American treasure hunter Odyssey on the Spanish underwater cultural heritage, specifically on the wreck of the Frigate *Nuestra Señora de las Mercedes*, sunk in international waters, and the international repercussion of this usurpation, made it necessary to carry out an oceanographic mission of scientific-technical nature in situ to carry out a valuation objective of the current state of the remains of the wreck and of the dispersion zone of the archaeological site. The first operation lasted five days with an initial and final port at the Rota Naval Base (Cádiz), specifically from August 18 to 23, 2015. During the campaign, it was possible, for the first time in the world, to carry out an archaeological prospecting at 1,200 meters under the sea. This has been a milestone in underwater archeology and has managed to put Spain at the highest level in this discipline. During the expedition an archaeological mapping and analysis of the current state of the wreck was carried out. Likewise, a series of pieces were extracted in order to document and investigate the frigate *Nuestra Señora de las Mercedes*. Currently, the recovered pieces are in the laboratories of the National Museum of Underwater Archeology (ARQVA) for their treatment.

However, this General Direction considered it necessary to carry out the year next, 2016, another survey on the archaeological site of the wreck. The objective of this campaign was to characterize the situation of the archaeological site, accurately and concisely position the cultural assets that are still in the site for subsequent documentation and study, as well as the extraction of archaeological material, provided that its conservation is ensured outside the aquatic environment.

With this survey, we wanted to carry out a scientific-technical study of Spanish naval history at the end of the 18th century and the beginning of the 19th century and of underwater archeology in Spain. The 2016 campaign, along the same lines as the previous one, obtained highly relevant scientific results. In this campaign it was decided to concentrate the ROV dives in two strategic points of the wreck that would allow finding related objects in the Cargo Manifests of the Seville's General Archive of Indies. The results of the same have confirmed that the technological success of the 2015 campaign was not the result of chance or optimal weather conditions. Specifically, 34 related objects could be located in the General Archive of Indies documentation, which were extracted with the maximum security measures and transferred to ARQVA for study, research and conservation.

Do not forget that this work and the success of it, are due to good work of an interdisciplinary human team, belonging not only to the General Direction of Fine Arts and Cultural Heritage (National Museum of Underwater Archeology and for the Subdirector General Protection of Historical Heritage), but also the Spanish Institute

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of Oceanography and the Navy. The three united institutions have made it possible, and Spain continue being an international leader in underwater archeology, and have shown that large-scale scientific projects are only feasible with the sharing of diverse scientific knowledge and technical means from different institutions.

For all of this, our congratulations to all those who have made possible this scientific project. Finally, to emphasize that it is this type of work that helps raise awareness of the urgent need to conserve the underwater cultural heritage, which is grant the importance it has as a source of culture and history and to transmit to society the history that wrecks, in different seas or inland waters, have what to tell us.

Ministry of Education, Culture and Sport

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1. Previous aspects regarding the project

1.1. Project objectives

In 2015 the General Direction of Fine Arts and Cultural Heritage starts the archaeological project of prospecting the frigate *Nuestra Señora de las Mercedes*. For it decides to have an interdisciplinary team made up of technicians of their own Directorate General, belonging to the National Museum of Underwater Archeology (in forward, ARQVA), to the General Subdirectorate for the Protection of Historical Heritage, to the Spanish Institute of Oceanography (hereinafter, IEO) and the Navy. The project was born with the intention of extending for several years.

The main objectives of the project are:

- A. To document the current state of the remains of the shipwreck conserved on the seabed in order to learn more about the ship. We intend to discover what is left of the ship which was sunk on 5 October 1804 and in what state it is in following the intrusions of the US treasure-hunting company Odyssey Marine Exploration. All under the umbrella of the US Supreme Court judgment of January 2012 declaring the shipwreck to be the exclusive property of Spain, consistent with the UNCLOS Montego Bay Convention and the UNESCO Convention of 2001.

The ultimate goals should be to:

- Become as familiar as possible with the entire archaeological site;
- Draw up a bathymetric map of the site;
- Position as many of the remains as possible on the surface of the seabed;
- Identify the artefacts that best contribute to identifying this shipwreck as the frigate *Mercedes* according to documentation extracted from the archives;
- Clean those parts of the wreck that are of greatest scientific interest;
- Extract a selection of artefacts that prove that this shipwreck is the same ship described in the documentation from the archives.

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- B. Document the ‘works’ and ‘operations’ performed by the company Odyssey.
- C. Follow-up on the legal action taken by the Spanish government to recover its underwater heritage and protect it from the pillage of the company Odyssey.

1.2. Project calendar

The First Archaeological Campaign focusing on the shipwreck took place in August 2015 and was carried out by the same Institutions that participated in the project that year: ARQHA and IEO, plus an observer from the Navy (Negueruela *et alii*, 2015. Negueruela *et alii*, 2016).

We conducted the second campaign in September 2016 based on the results of this Report. Plans are under way to conduct a third campaign in 2017 and, depending on the results, that one may be the last.

1.3. Location and depth of the *Mercedes* resting place

The August 2015 campaign confirmed that the shipwreck was located off the Southern coast of Portugal, opposite Faro at a distance of 34 nautical miles and a depth of between 1,131 and 1,138 meters.

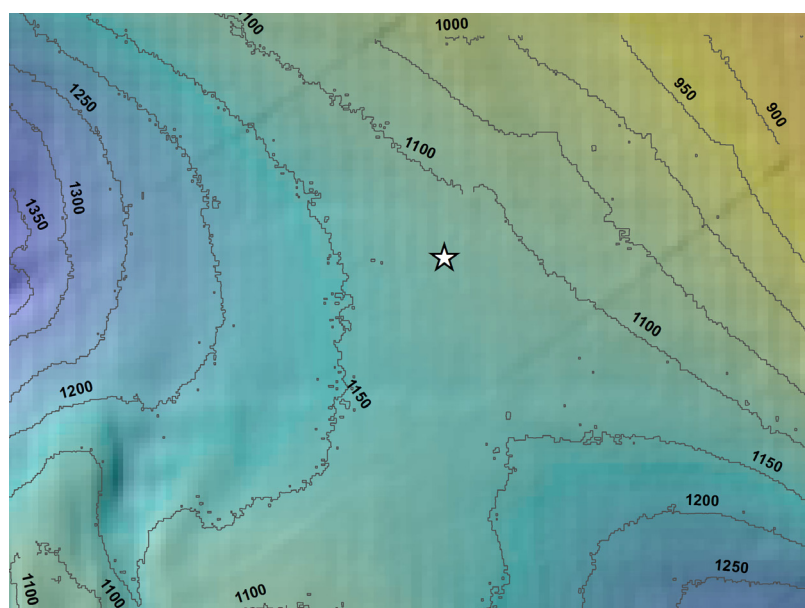


Figure 1: Site of the shipwreck (IEO).

2. Overview of the 2016 campaign

2.1. Objectives of the 2016 campaign

A. Continue with the work undertaken in the first campaign as concerns collecting information about the shipwreck:

- Extension of the shipwreck;
- State of conservation of the artefacts;
- Dispersion of the ship's remains;
- Continuation of the archaeological 'mapping';
- Progress on the interpretation and analysis of the shipwreck;
- The specific objectives focus on the Southern and South-eastern areas of the wreck, areas where we were unable to document any material during the 2015 campaign. As a result, there was a gap in the 2015 archaeological documentation as regards these areas because the brevity of that campaign precluded us from being able to document or explain them.

B. Extraction of a small number of artefacts based on the following criteria:

- Artefacts that are listed in the General Archive of the Indies. The aim of extracting artefacts of this nature is to unequivocally identify this shipwreck as the frigate *Nuestra Señora de las Mercedes* and thus remove even the slightest shadow of a doubt that could be used in future years or decades by anyone, specifically anyone within the sphere of the company Odyssey.
- Unique and unrecognizable artefacts that could provide new insight into that period of history. All of this, based on historical, cultural,

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museographic and conservation criteria, and on archives and legal grounds:

- a. 16th century bronze culverin. Approximate weight: between 1,300 and 1,800 kg.
 - b. Bronze “pedrero cannon” also known as a “size 3 howitzer”. A twin of the one extracted in 2015.
 - c. Elements of broken dinnerware made of silver (scrap silver) described in the documentation of the General Archive of the Indies.
- C. Complete the cartography of the area where the frigate *Nuestra Señora de las Mercedes* went down. Details are included in the Oceanographic Report.

2.2. Institutions and technical experts participating in the 2016 campaign

- a. General Direction of Fine Arts and Cultural Heritage (Ministry of Education, Culture and Sport):
 - National Museum of Underwater Archaeology (ARQVA)
 - Subdirectorate General Protection of Historical Heritage.
- b. Spanish Institute of Oceanography (IEO) (Ministry of Economy and Competitiveness).
- c. Spanish Navy (Ministry of Defense).
- d. Madrid Scientific Films (external film company).

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Staff	Origin	Duty
José Ignacio Díaz Guerrero	IEO	Fleet Chief
Gerardo Bruque Carmona	IEO-Remolcanosa	Survey
José González Dávila	IEO-Remolcanosa	Acoustics
Marco Antonio Gómez Mato	ACSM	ROV supervisor
David Peixoto Fernández	ACSM	ROV technician
Ruben Rodríguez Rey	ACSM	ROV technician
Iván Negueruela Martínez	ARQVA	Project Director
Rocío Castillo Belinchón	ARQVA	Archaeology
Juan Luis Sierra Méndez	ARQVA	Chemistry Restoration
Patricia Recio Sánchez	ARQVA	Documentation archives
Juan Rengel Ortega	Navy	Observer
Augusto Conte de los Ríos	Navy	Observer
Javier Trueba	Scientific Films	Camera filming

2.3. Technical navigation and exploration resources made available by the IEO to the campaign

- a. Ship: oceanographic vessel *Ángeles Alvariño*, chartered in 2012.
- b. Remote Operated Vehicle (hereinafter, ROV) Liropus 2000, able to operate at a depth of 2,000 meters. (It should be noted that the ship was not equipped with side-scan sonar or a proton magnetometer).

We would further note that several improvements were made to the ROV for this second campaign as explained in the oceanographic report.

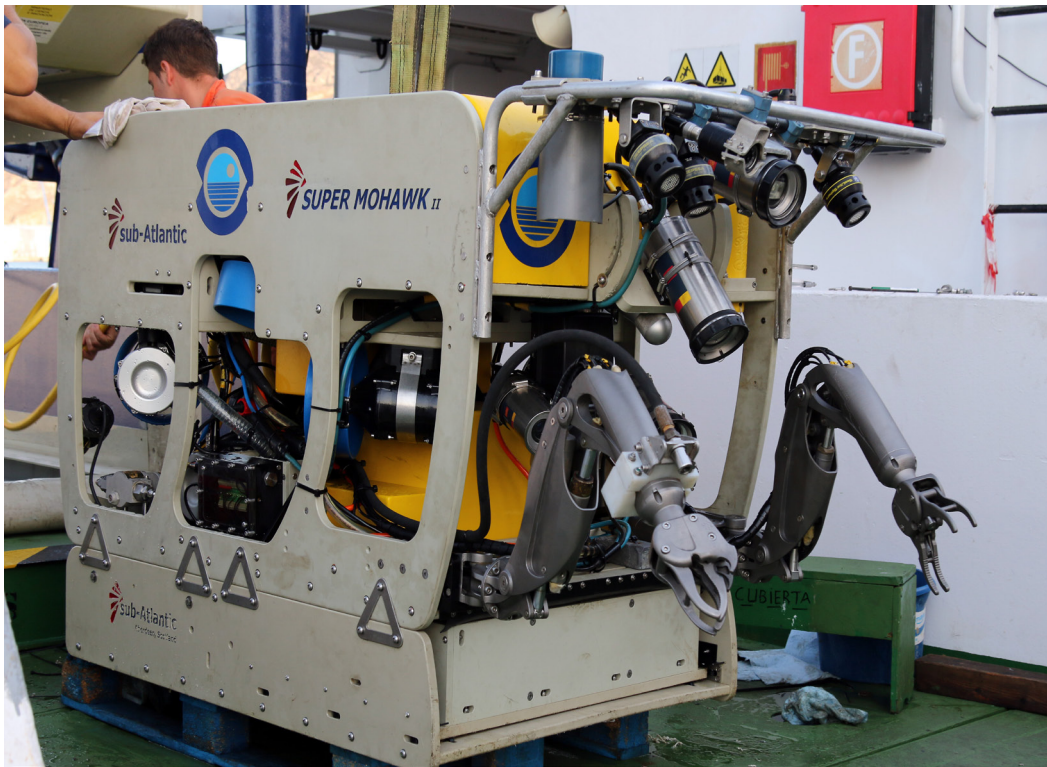


Figure 2: The ROV, fitted with its new titanium arms and new video and photographic cameras.

2.4. Specific equipment supplied by ARQVA

In addition to the usual excavation equipment provided by ARQVA for this campaign, the General Directorate of Fine Arts and Cultural Heritage provided the Museum various computer-specific, restoration and transport elements. Likewise, it made arrangements with the General Directorate of the Civil Guard for the escort of the extracted items from the port of Cádiz to Cartagena. Transport was provided by a specialised company. All this was arranged through the General Directorate of Fine Arts and Cultural Property.

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Figure 3: Stowage of container No 2.



Figures 4, 5 and 6: Some of the trunks and boxes prepared to carry archaeological and restoration materials.

2.5. Navy officials invited as ‘observers’

Continuing with the work begun for the first time in Spain in the 2015 campaign, the Museum invited a Navy officer to participate as an observer in the spirit of the Navigation Act of 2014. The Navy requested that two officers participate, one in the first and another in the second half of the campaign. The Navy officers selected were the corvette captain Augusto Conte (from the Cartagena Arsenal) and the frigate captain Juan Rengel (from the Navy’s hydrographic Institute in Cádiz). Corvette captain Conte embarked in Cartagena in the evening of the 7th and was aboard until the 11th when he was relieved by frigate captain Rengel who remained until the end of the campaign.

2.6. Visit of the media with the collaboration of the Navy

Of the five main aspects of any archaeological research project (background documentation, fieldwork, cataloguing-restoration, exhibition and outreach), in this campaign the Ministry decided to promote outreach and to that end arranged two press conferences, one at the beginning and another at the conclusion of the campaign, and invited the media to come on board in the middle of the campaign.

The Navy collaborated by providing a ship to transport a group of journalists from various media to the site of the wreck from the port of Huelva.



Figure 7: Arrival of a Navy vessel with several journalists.

2.7. Initial press conference

At the initiative of the Press Office of the Ministry of Education, Culture and Sport, a press conference was organized in Cartagena on the same day of the expedition's departure. This press conference was given by Dr. Iván Negueruela, director of the Museum, captain Miguel Ángel Izquierdo, in representation of the Admiral of Cartagena and the chief of the IEO Fleet, José Ignacio Díaz. It was held on the same day of the departure, the 7th at 12:00 noon at the dock adjacent to the ship *Ángeles Alvariño*.



Figure 8: Press conference at the dock in Cartagena before boarding.

3. Campaign log

3.1. Campaign dates

- 7 Sep: Embarking in Cartagena.
- 8-10: Sep: Travel to destination.
- 10-18 Sep: Archaeological works.
- 19 Sep: Landing in Cádiz early in the morning. Load all the artefacts to a truck and transfer to the ARQVA in Cartagena. Arrival at the end of the day to Cartagena with the extracted artefacts.

3.2. Embarking of ARQVA staff in Cartagena and transfer to the archaeological site

- The ship, *Ángeles Alvariño*, sailed from Cartagena on **the 7th** at 11 p.m. carrying the ARQVA staff, the IEO staff and the two guests: the Navy observer and a guest from DEGUWA (Deutsche Gesellschaft zur Förderung der Unterwasserarchäologie e.V.).
- On **the 8th** the ship stopped at a point off the coast of Almería to allow the IEO technicians to conduct various tests with the ROV. The ship then crossed the Strait of Gibraltar.
- We arrived at the vertical corresponding to the site at dusk **on the 9th**.

3.3. Start of the campaign and incidents relating to the state of the sea: 10-15 Sep

- **10th** As from early morning on the 10th the ship's equipment indicated that the ROV could not be put into operation due to the waves that were over one meter in height according to the sensors. This meant that no archaeological operation could be carried out on the 10th.
- The weather forecasts, constantly checked by the captain's bridge and the ROV container, indicated that there would be a "window of calm sea" on the 11th as from 02:00 p.m.



Figure 9: The ship's captain informing members of the museum of choppy seas.

- **11th** As planned, a Navy ship sailed from the port of Huelva with two journalists on board from Spanish Television (TVE), a journalist from Spanish National Radio (RNE), and a journalist from the *ABC* newspaper, plus the frigate captain Juan Rengel to relieve the corvette captain Conte. The Navy ship came up alongside the *Alvariño* at about 01:00 p.m. and left at 04:00 p.m.

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Figure 10: Transfer of journalists aboard a Navy rubber dinghy.



Figure 11: Visit from different media.

- At approximately 02:00 p.m. we began the ROV dive as the weather had apparently improved (DIVE 1) but when it reached a depth of 150 m we had to suspend the operation and raise the ROV so in the end no archaeological work was done on the 11th either.

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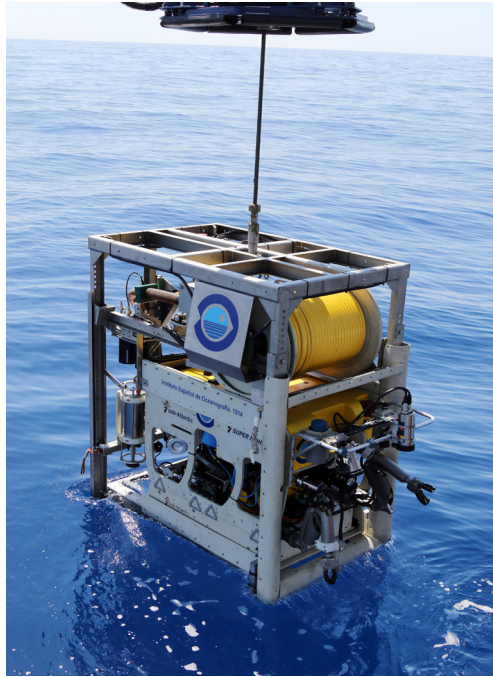


Figure 12: ROV descent on the 11th.

- At 04:00 p.m. the group of journalists and CC Conte re-embarked, leaving the *Alvariño*.
- On the afternoon of the 11th, all the meteorological forecasts consulted indicated that it would be impossible to conduct any work before the 16th.



Figure 13: Information showing that it would be impossible to work at the site until the sea conditions improved.

- **12th, 13th, 14th and 15th** In the light of the forecast, calling for waves of more than two meters in height, the captain decided to sail to Cádiz where we would wait for better weather forecasted for the 16th.

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- **12th** On the night of the 12th the ship set sail for Cádiz where it arrived on the 13th at dawn.
- **13th, 14th and 15th** The Museum team spent these days visiting different museums in Cádiz with special focus on the Provincial Archaeological museum, the Hydrographic Institute of the Navy, and preparing diverse documentation. On the night of the 15th the ship left Cádiz to sail to the site in order to be there in the morning of the 16th.

3.4. Work performed on 16 Sep.

3.4.1. Changes in the objectives of the campaign due to the bad sea conditions.

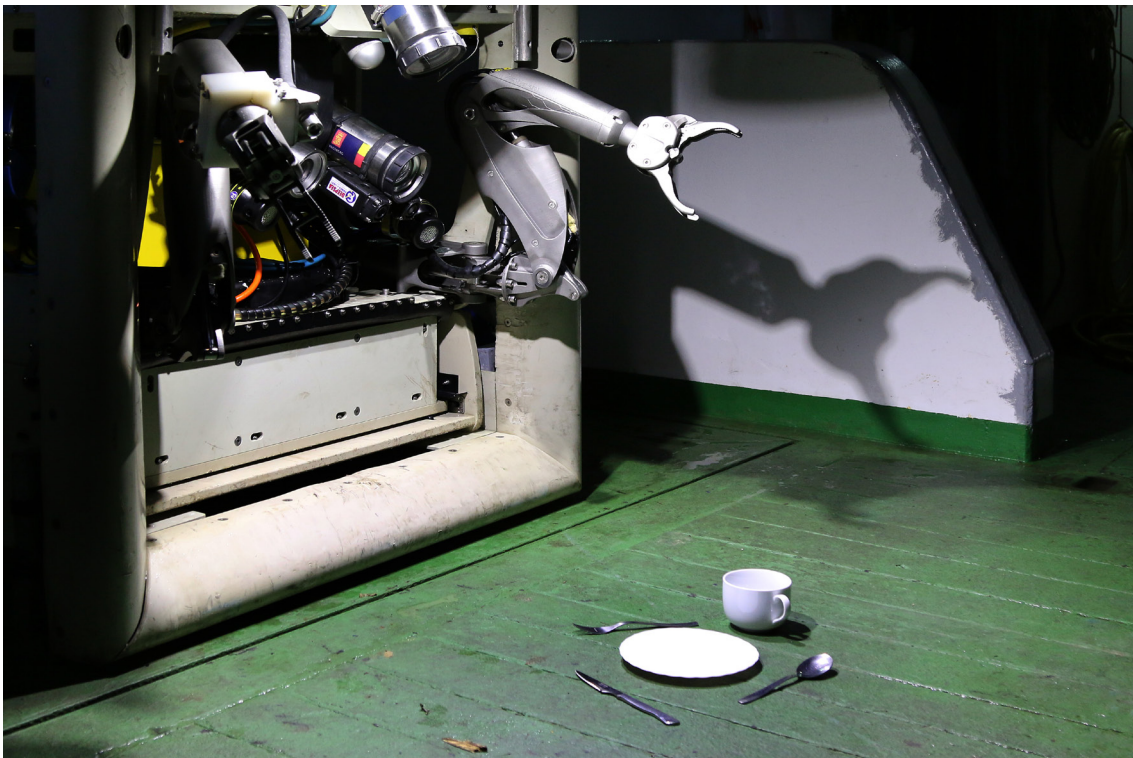


Figure 14: One of the on-board excavation drills.

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Our archaeological study plans had to be changed due to the weather forecasts and the state of the sea. We returned to the site on the 15th as the bad weather precluded any work until the 16th when the forecast called for a few hours of calm seas. We decided to focus directly on a set of dinnerware as explained in the archaeological report. With a view to making the most of the time available on the seabed, we first performed two excavation drills on the deck of the ship and took careful time measurements to calculate how long the operation would take once the ROV reached the seabed.

We were seriously considering the possibility of spending the 16th trying to document the Southern and South-eastern areas of the wreck, but given the likelihood that this would not contribute anything to the project it was finally decided to conduct the above-mentioned operation to recover dinnerware and the culverins as discussed in detail in the archaeological report.

3.4.2. Activities on 16 Sep.

- 08:00 a.m.: DIVE 2. Thanks to calm seas, the ROV began its descent early, i.e. before 02:00 p.m. which was the time when calm seas were forecasted. Team members was therefore hopeful thinking they would have more time to work.
- 09:08 a.m.: ROV exits the Tether Management System (hereinafter, TMS).
- 10:04 a.m.: Dinnerware found marking the commencement of the extraction of artefacts.
- 01:00 p.m.: ROV taken out of the water and the campaign director recorded all the artefacts found. The Museum technicians then conducted an inventory, took measurements and packed the artefacts throughout the afternoon.
- 03:38 p.m.: DIVE 3. Commencement of the third DIVE to extract the culverin. Unfortunately, the cable broke when it was tensed leaving the cannon and the transponder on the seabed. The tension registered by the equipment indicated that the cannon had been lifted off the seabed but the tension reached over 3,000 kg and the cable ended up breaking. Increasing sea swells also caused many problems when trying to get the ROV back into the TMS, which was finally achieved at 10:07 p.m. and it reached the surface the surface at 10:53 p.m.

3.5. September 17th

- At 08:45 a.m., the director informed that the head of flota, José Ignacio Díaz, had told him that were getting worse so they prevented to continue working with the ROV 08:45 a.m. Upon receiving that news, the Museum team spent the day preparing written, filmed and photographic documentation for the press conference on the 20th. They also completed the inventory, photographed and stored the materials extracted the day before in boxes.

3.6. September 18th

End of the campaign. Transfer to the port of Cádiz

- Work continued on documentation and registration tasks of the previous day.
- During dinner, the boat sailed for Cádiz and was scheduled to arrive on the 19th at 08:00 a.m.

3.7. September 19th

Material unloaded in Cádiz and transfer to Cartagena

- At 8:00 in the morning, five Civil Guard vehicles and one camouflaged vehicle were waiting at the Marqués de la Victoria pier in Cádiz to escort the artefacts taken from the site to Cartagena. They were loaded into a truck hired through a transport company.
- Once all of the boxes and containers were taken from the ship and all of the staff from the Museum's teams had disembarked, they were all transferred to Cartagena.

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Figures 15 and 16: The Civil Guard waiting at the port of Cádiz. Civil Guard escort mid-way between Cádiz and Cartagena. Stop to eat.

- The truck arrived at ARQVatec (conservation-restoration section of the National Museum of Underwater Archaeology) at 10:00 p.m. where it unloaded all the equipment. ARQVatec was closed at 11:15 p.m.



Figures 17 and 18: Unloading boxes and chests in Cádiz.

3.8. September 20th Unpackaging of the materials in Cartagena and press conference with the Director-General on Fine Arts and Cultural Heritage

The materials were unpacked and the press conference prepared. The press conference began at 12:00 a.m. with the participation of:

- The Director-General of Fine Arts and Cultural Heritage, Miguel Ángel Recio Crespo.
- The Head of Maritime Action in the Mediterranean, Admiral Manuel de la Puente.
- The Director of the IEO of Murcia, Dr. Fernando de la Gándara.
- The Director of the Museum, Dr. Negueruela.

This outreach event ended at 01:30 p.m. marking the conclusion of the 2016 campaign.



Figure 19:
End of campaign press
conference at the ARQVAtec
facilities.

4. Oceanographic Report of the Spanish Institute of Oceanography (IEO)

4.1. The 2015 and 2016 studies

Before reading this report, one should first read the 2015 Campaign report (Negueruela *et alii*, 2015). Some of the tasks were identical to those performed in 2015 while others focus on new aspects.

4.2. Methodology of the bathymetric work

The work area where the bathymetric survey was conducted is in the Gulf of Cádiz at depths of between 1,000 and 1,200 m. The campaign began at the point indicated on the attached Figure with a sound velocity probe (SV - Plus) to calibrate the multibeam echo sounder:

Sound Velocity Probe Coordinates:
-8,1182° / 36,482° (decimal degrees):

The area was systematically surveyed, expanding the area covered in 2015 with parallel lines of 1.5 mm (2.7 km) in length with a separation of 2,500 m to ensure a 100% overlap, covering the entirety of each survey band for each of the lines.

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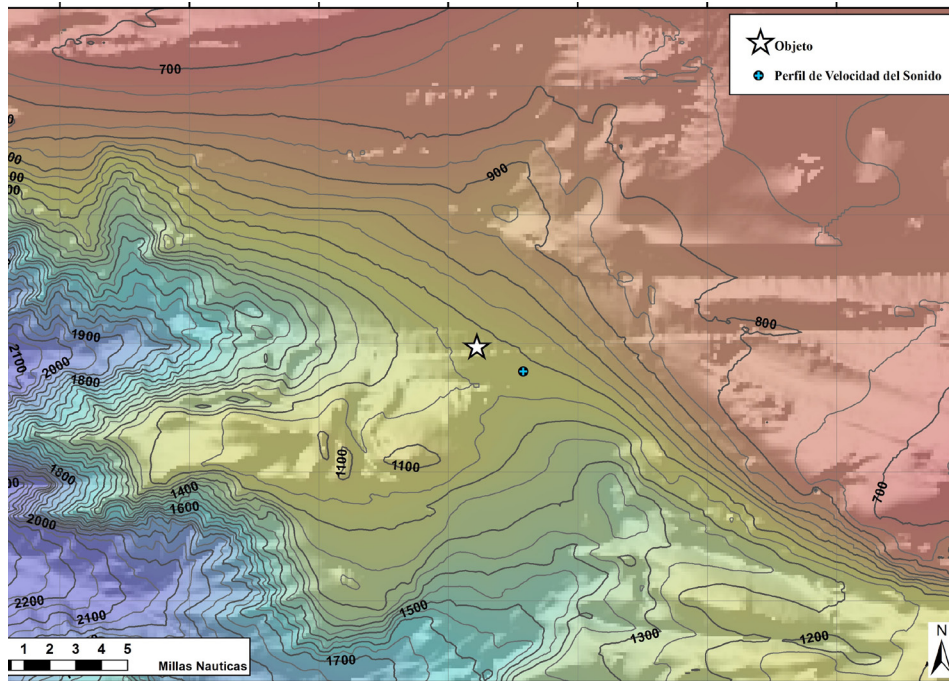


Figure 20: Digital model showing the terrain of the sampling area (Gulf of Cádiz).

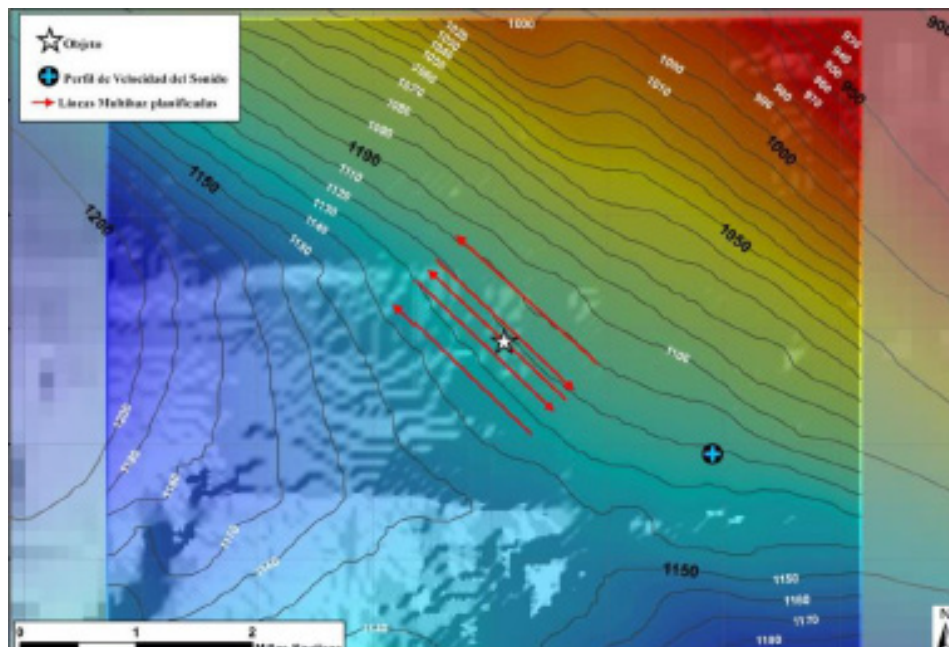


Figure 21: Bathymetric map of the sampling area with line planning.

The EM710 multiple beam probe provided a systematic bathymetric survey of the shipwreck area with redundant coverage and 100% overlap with beams as tight as possible and speed not exceeding 5 knots. This way, a high density of surveyed points was achieved producing a high-resolution map. The bathymetric data obtained were imported into Caris Hips and navigation sensors and later processed by line (Swath Editor) and by block (SubSetEditor). The final data were used to create an interpolated mesh at maximum resolution as the basis for work with the ROV. In addition to acquisition using a multibeam echosounder, high resolution TOPAS (Topographic Parametric Sonar) seismic lines were also drawn.

4.3. Work development. Log

4.3.1. Work prior to the archaeological campaign.

The Liropus system was configured and tested in the second half of August. This included receiving the new equipment that had been provided in early August. The system was packed on 30 August (at the base of Narón) and sent to Cartagena on the 31st.

- On **September 1st** the ROV and its control container were loaded onto the *Ángeles Alvariño* at the port of Cartagena. ARQVA commenced the assembly and preparation work of the ROV Liropus 2000 system for the second campaign of underwater archaeological intervention at the wreck of *Nuestra Señora de las Mercedes*.
- On **September 2nd** technicians were still working on the installation of the ROV Liropus 2000 system.

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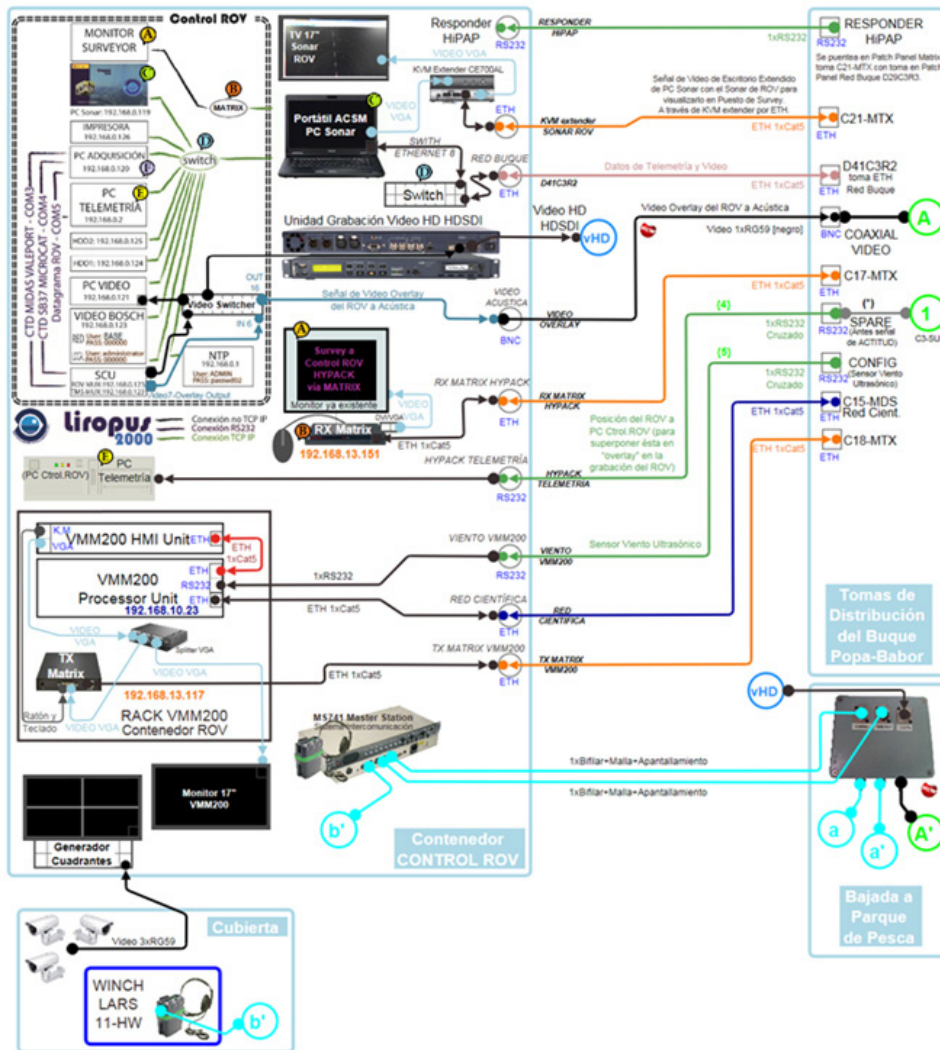


Figure 22: Integration scheme one: Interconnections of the ROV control container's telemetry equipment, VMM200, HD video, deck cameras, intercoms, etc. with the Ship.

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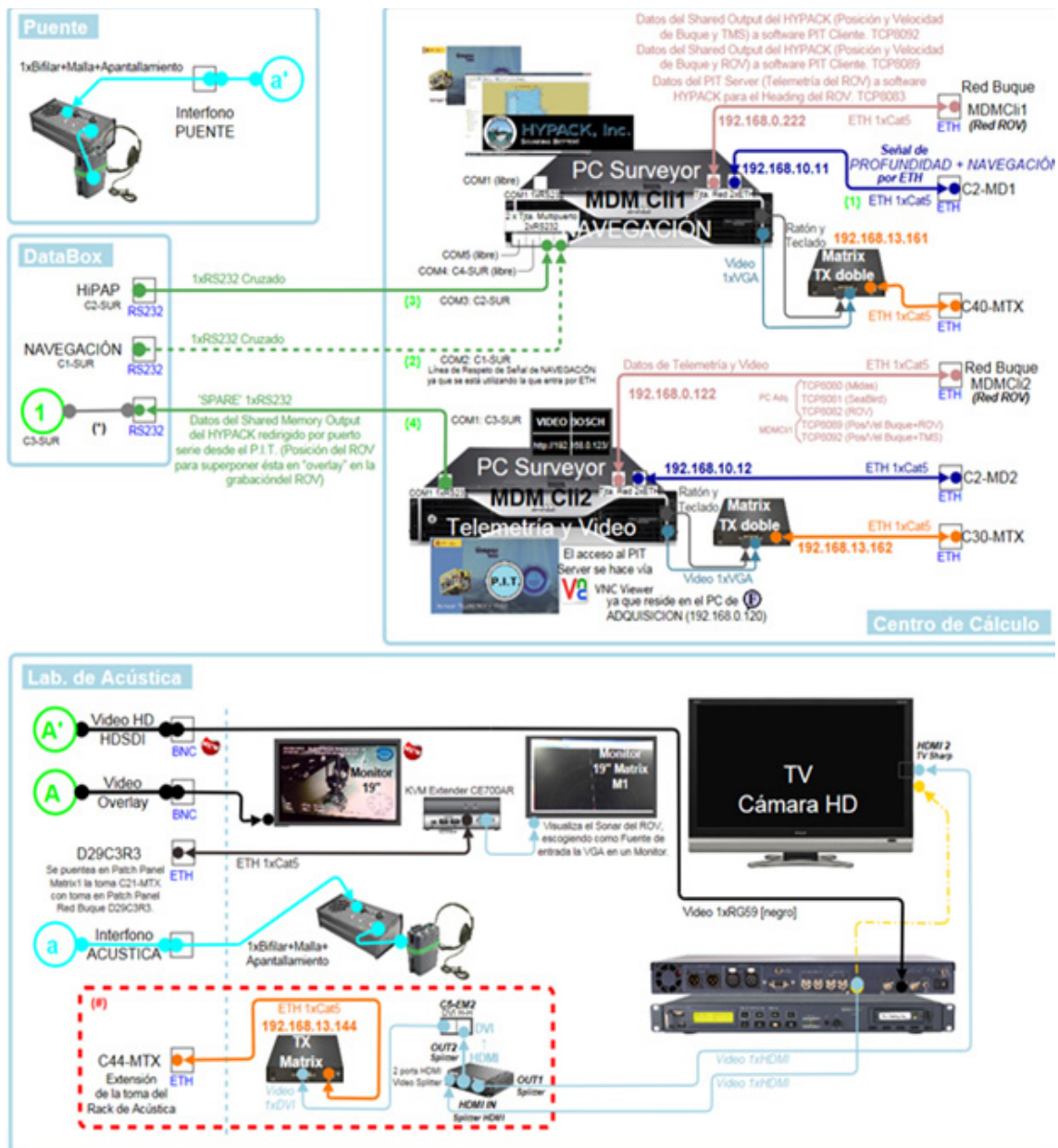
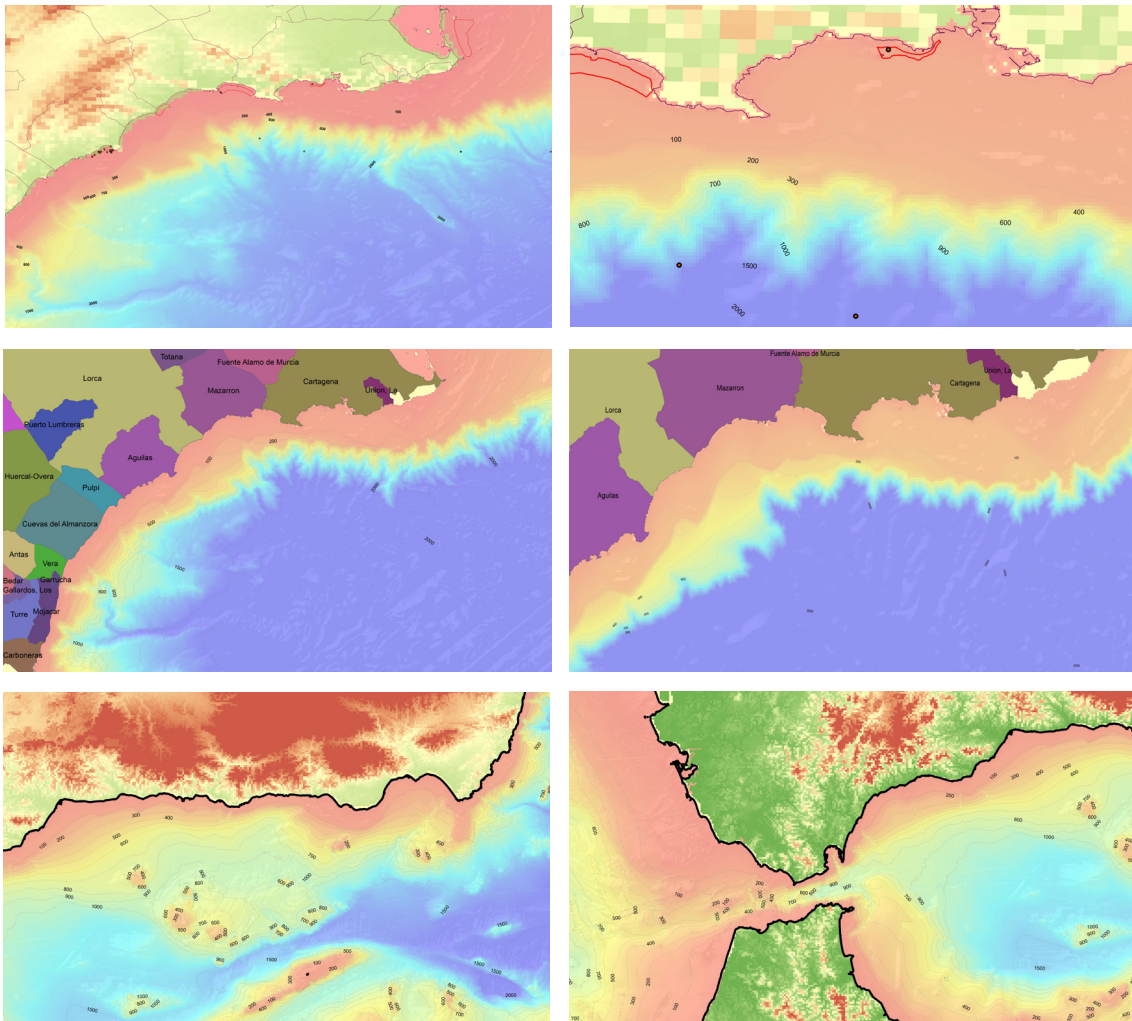


Figure 23: Integration scheme two: Example of interconnections between the ship and the acoustics laboratory, Survey Station, Calculation Centre and Bridge.

- On **September 3rd** at the port, base cartography was developed at different scales for subsequent incorporation into the HYPACK navigation software. This facilitated visualization of the work area and vehicles for ROV control technicians. It was exported in geo-referenced tiff image format (geotiff). Following are some examples:

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- On **September 4th** the new Kongsberg photographic camera was incorporated into the Survey post of the acoustics laboratory with cables from the container to the laboratory. The ROV is controlled by a laptop and the software for the control and visualization of the HD digital camera was installed and configured.

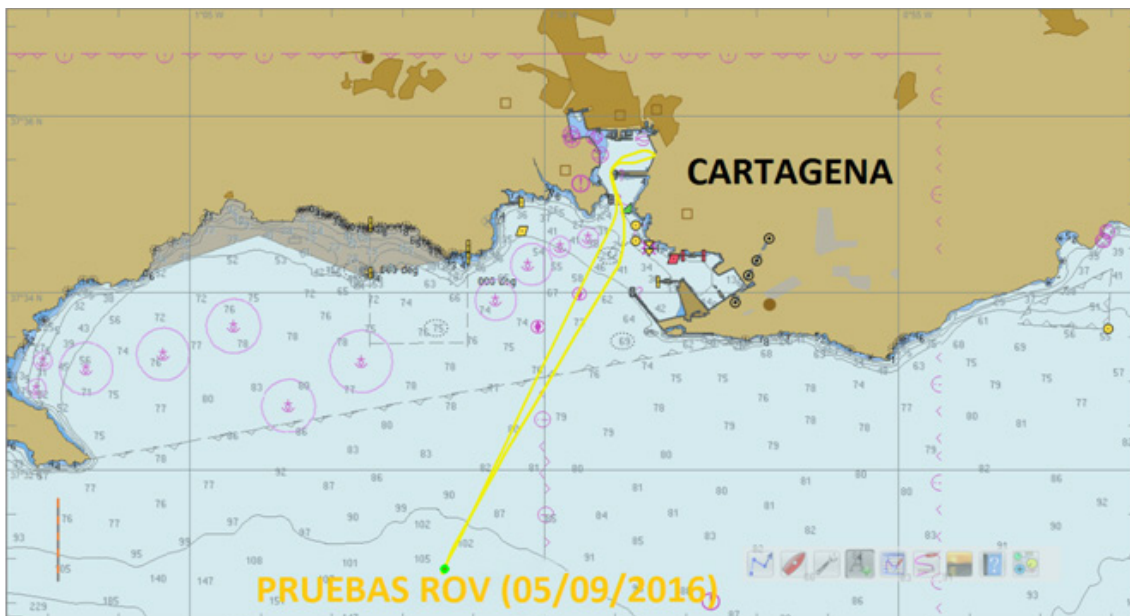
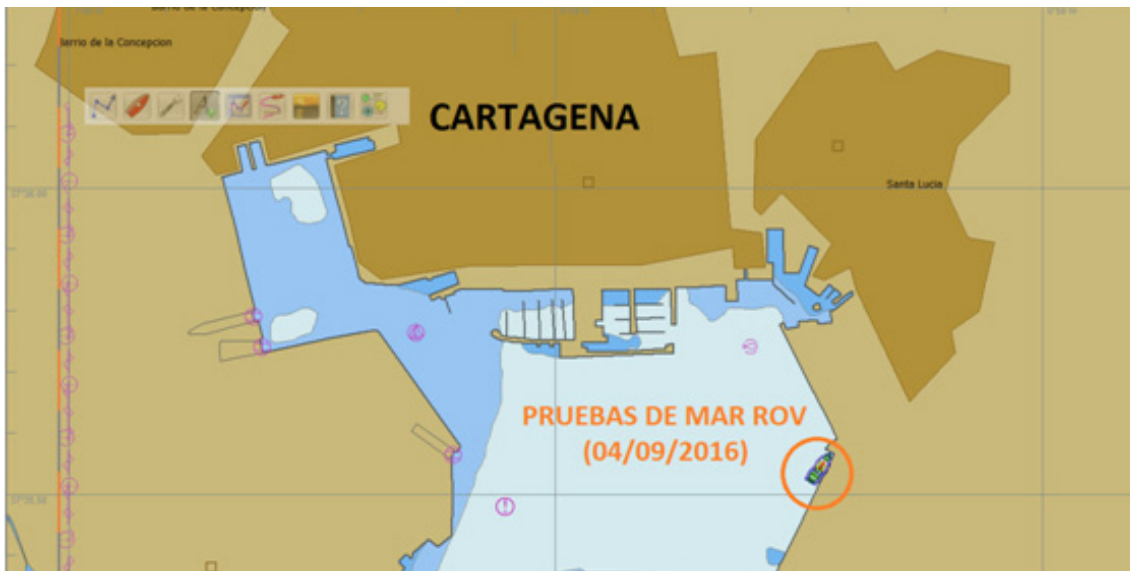
The first ROV dive test was performed in the Port of Cartagena (San Pedro pier). The operability of the Survey Post was checked and data and video were verified once the test was concluded.

- On **September 5th** at the San Pedro pier in the Port of Cartagena, the ship was loaded with the scientific material from the ARQVA Museum (National Museum of Underwater Archaeology), intended for the preservation and subsequent transport of objects recovered from the sunken ship.

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A second dive test was performed, this time outside the port area. The ROV was immersed off the coast of Cartagena to a depth of approximately 100 meters.

The operability of the ROV Liropus 2000 system and all of its equipment was checked.



Figures 24 and 25: ROV tests at the pier of the port and at a depth of 100 meters outside the Bay of Cartagena.

A third dive test was performed with the ROV at a maximum depth of 2,000 meters.

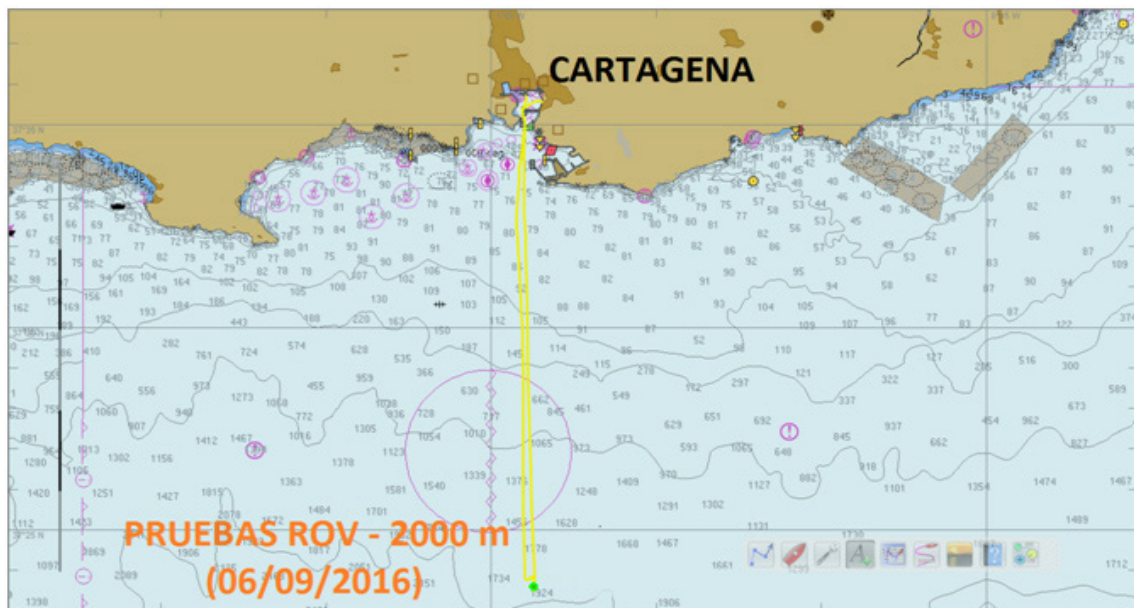


Figure 26: A third dive test was performed with the ROV at a maximum depth of 2,000 meters.

4.3.2. Work performed during the archaeological campaign

- On **September 7th** the director of the National Museum of Underwater Archaeology (ARQVA) called a press conference at the dock where the vessel *Ángeles Alvariño* was moored.

Base cartography digital graphics were designed at different scales and colour intensities for subsequent incorporation into the HYPACK navigation software to facilitate work with the ROV. These were exported in geo-referenced tiff image format (geotiff). Line plans were developed to develop possible work plans and prospecting alternatives. These files were exported to CAD format with a *.dxf extension.

The ship sailed from the Port of Cartagena at 11:12 p.m. Emergency drills were carried out once the ship was out of the port: abandon ship, man overboard and fire.

- On **September 8th** the fourth and fifth ROV dive tests (1,000 m) were performed off the coast of the province of Almería.

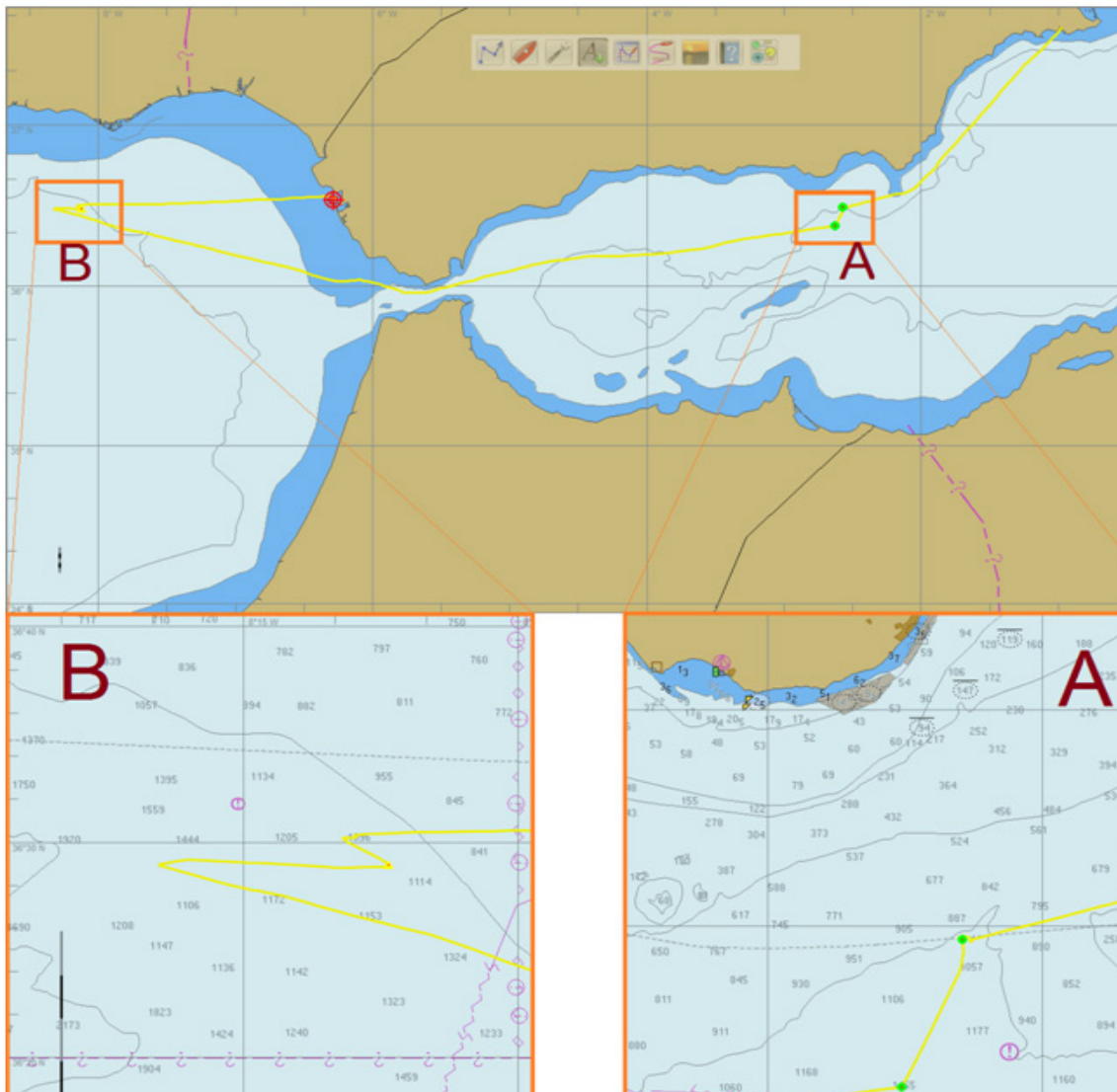


Figure 27: Above: General map showing the journey from the Port of Cartagena to the area of the shipwreck. Below right (Zone A) : Detailed map of the area where two ROV dive tests were performed (at depths of 1,000 and 1,500 meters) on the morning of September 8th off the coast of the province of Almería. Below left (Zone B) : Arrival on the morning of the 9th to the work area. Cable drift tests were performed with a hook to prepare for the recovery manoeuvre from the ship.

- On **September 9th**, since the weather conditions did not allow for exploration work with the ROV, it was decided to carry out different manoeuvres to study the drift effect that the current had on fishing gear to prepare for an eventual shift in position of one of the large cannons (culverin).

Verification tests of the ROV's HD underwater camera focus were performed at night on the ship's deck.

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- On September 10th a sound velocity profile was executed.

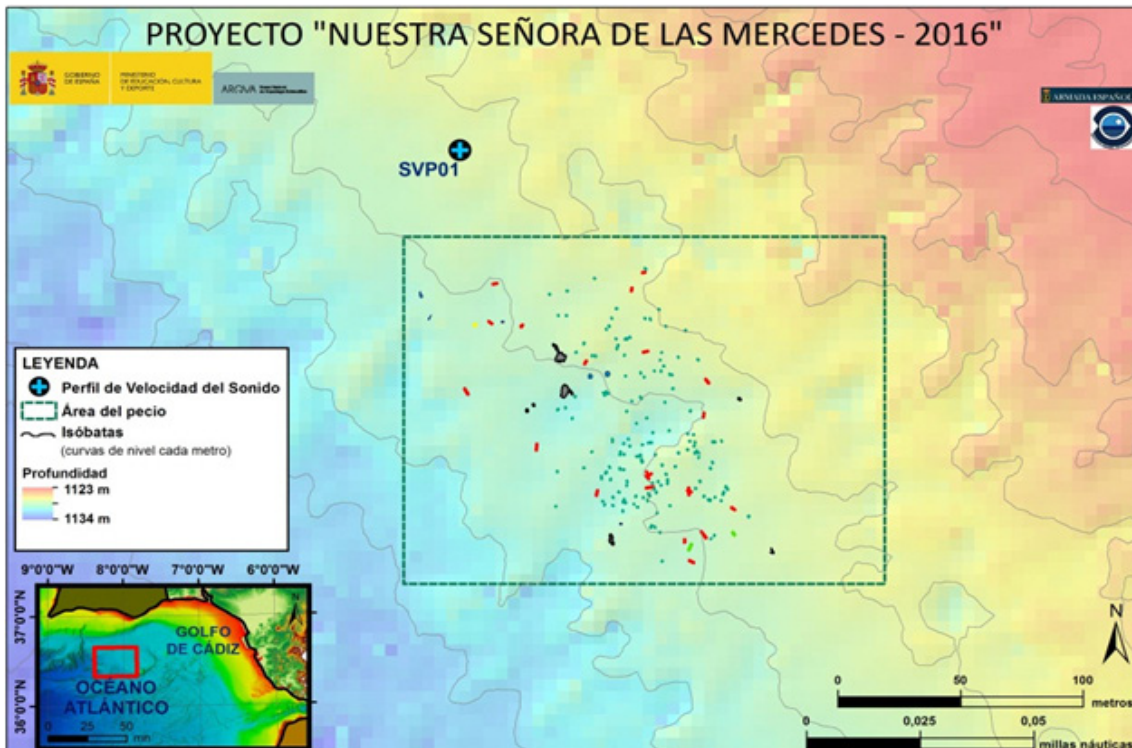


Figure 28: Location of the sound velocity profile (SVP01).

The SVP manoeuvre (SVP01) started at 06:36 (UTC time) on 10 september 2016. The profile was performed at a location northwest of the work area:

The manoeuvre ended (07:13 a.m.) with the profiler on board and the data analysed. The results were accepted and the manoeuvre deemed valid. These results were incorporated into the HiPAP to update calculations of distances and underwater positioning and into the EA600 single-beam echo sounder.

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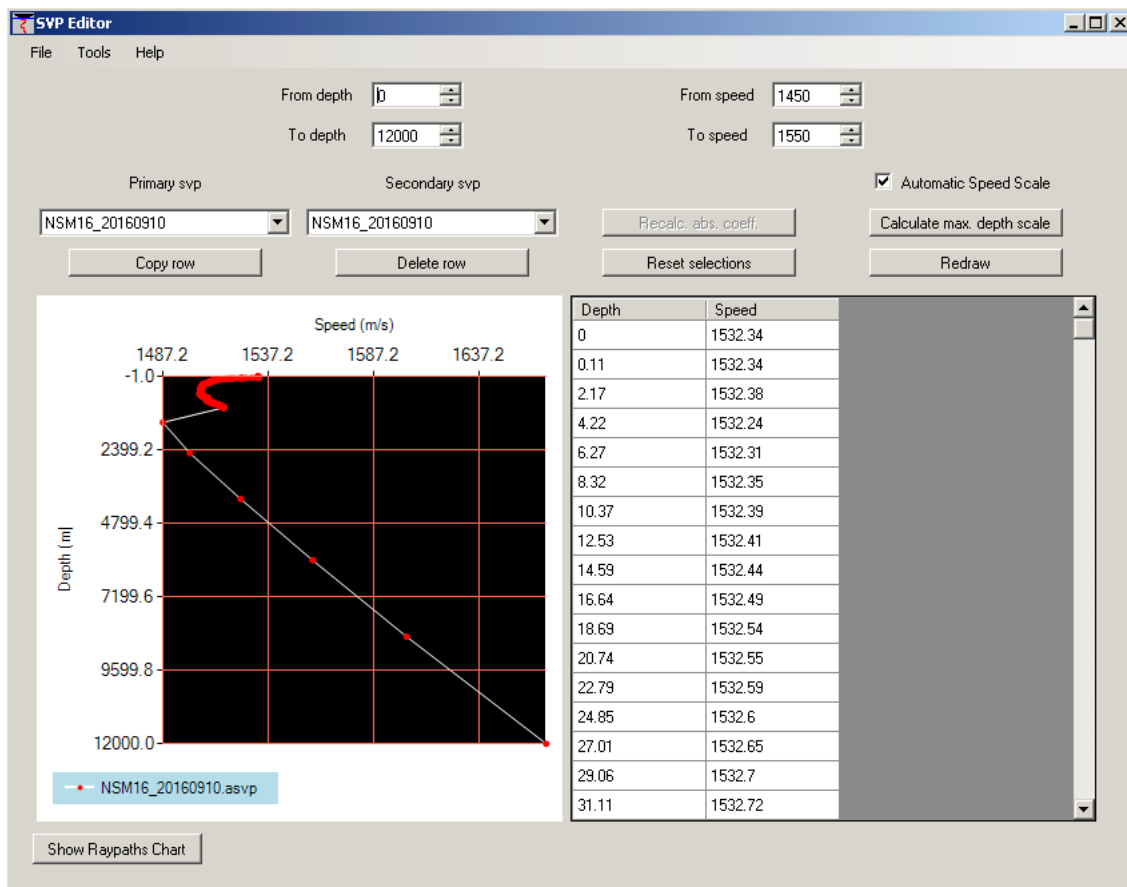


Figure 29: SVP editor interface with data from SVP01.

The geodetic parameters of the HYPACK project were replaced for the area corresponding to the wreck of the frigate *Nuestra Señora de las Mercedes* to optimize navigation and object location georeferencing: from the WGS84 (Mercator) reference system to the North UTM system (with Transverse Mercator projection) zone 29.

A new arrangement of the ROV's led spotlights and camera flash to optimise photo lighting and relief was discussed and an agreement reached between the scientific team, the ROV control team and the technical personnel on board for the survey post.

- A sixth dive was performed on **the 11th**, the first operational one, but had to be aborted at a depth of 150 meters due to poor sea conditions when it was observed that the ROV's internal locking system in the TMS was not able to hold it securely.

The shipwreck *Nuestra Señora de las Mercedes* (2016)

- Sea conditions were not conducive to ROV operations from the 12th to the 15th.

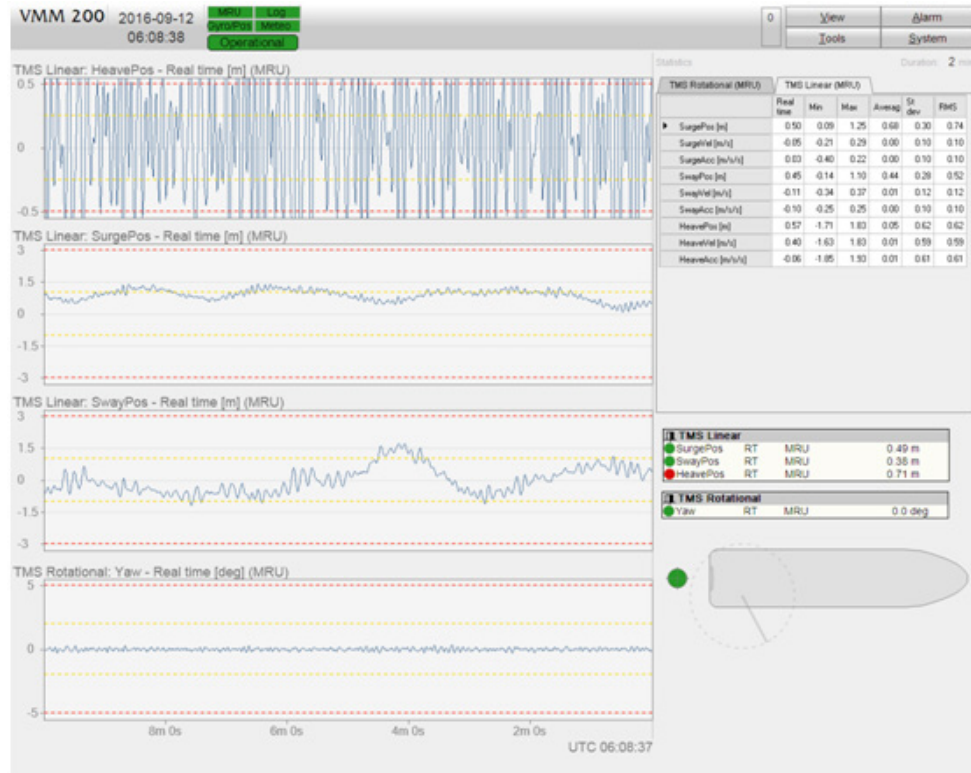


Figure 30: Screenshot of the interface of the VMM200 programme showing the numeric and graphic real-time values of the wave conditions.

- In the light of the weather forecast, at approximately 10:00 p.m. of **12 September**, the ship sailed for Cádiz. The ship arrived at the port of Cádiz at 08:30 a.m. on Tuesday 13 September.

Weather forecasts from different sources were monitored. Based on the wind and wave prediction models, different possible work plans were drawn up. Several meetings were held on a daily basis between managers and team leaders to plan for possible scenarios.

The rolls of cable and the computer and electronic equipment were checked during the time spent in the port of Cádiz.

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- Connection facilities between the ROV and the ship's MATRIX network were checked.
- Technical documentation was reviewed and updated.
- Information from ship and ROV sensors was compiled: MDM500, MIKADO, PIT, TSF, VMADCP, VMM200, SB37 and MIDAS ECM. Information was processed and reports drafted.
- In anticipation of better wind and wave conditions, at 10:00 p.m. on **September 15th** the ship again proceeded towards the study area, the wreck of the frigate *Nuestra Señora de las Mercedes*.
- On **the 16th** weather conditions did permit prospection work with the ROV.

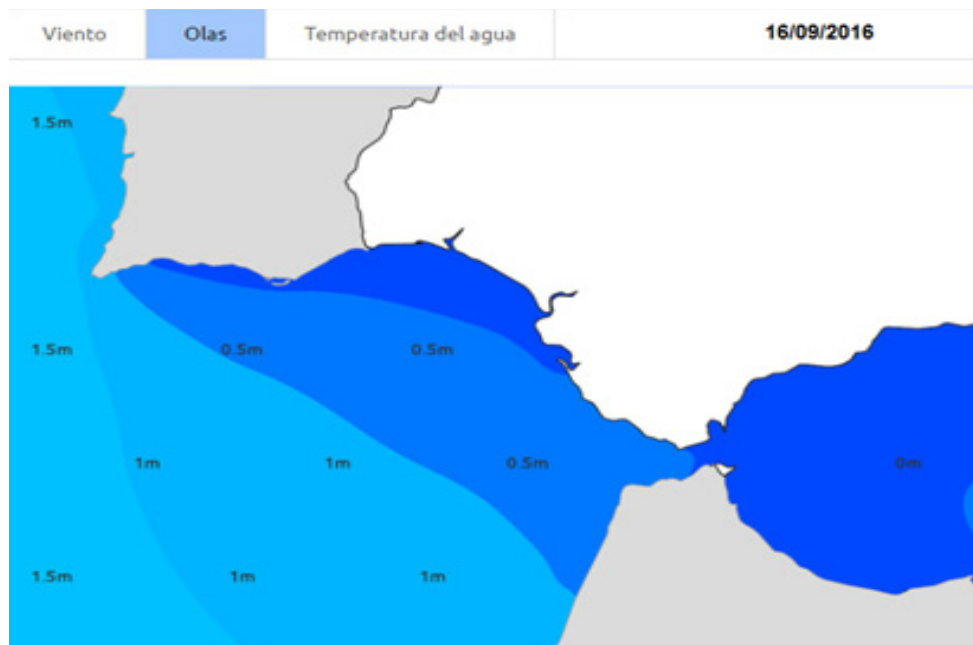


Figure 31: Swell conditions on 16 September 2016.

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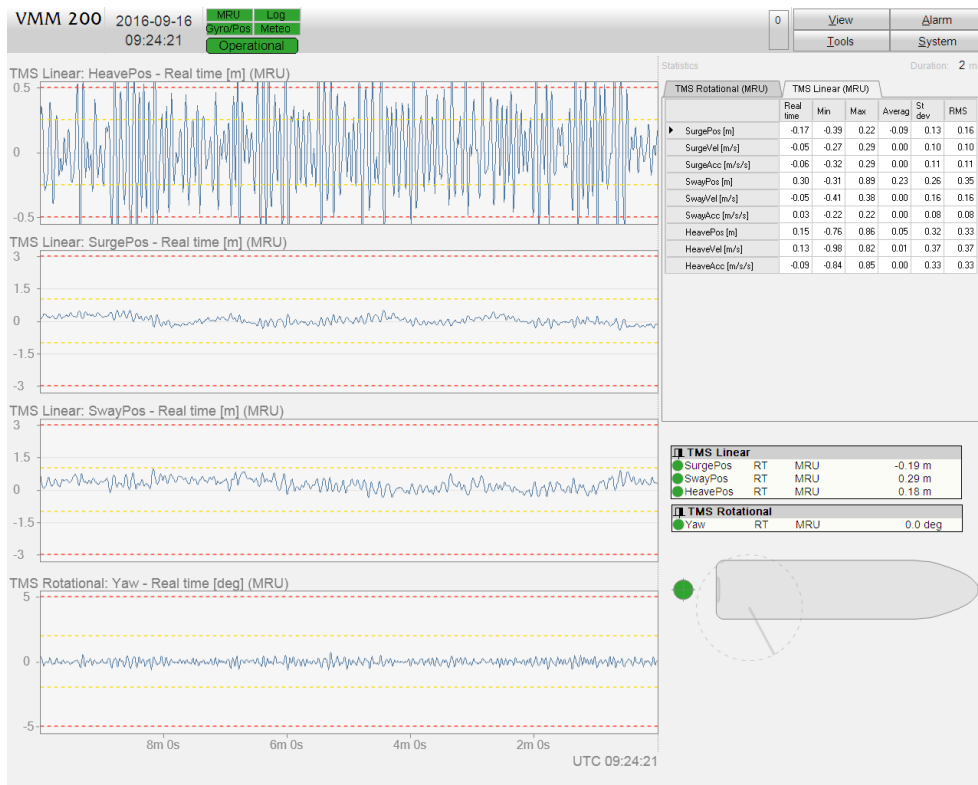


Figure 32: Swell conditions according to the VMM200 programme interface (at 09:24 a.m. on 16/SEP/2016).

- The ROV lowering manoeuvre from the stern began at 08:32 a.m.: DIVE02. The sea depth at the ship's location was 1,136 m. The operation was recorded in HYPACK, in PIT and the video cameras to pilot the ROV. The survey technicians programmed the HYPACK with the point set by the Campaign Leader as the first objective: a pile of dinnerware; this way the rest of the teams involved in the operation could watch it on their screens.

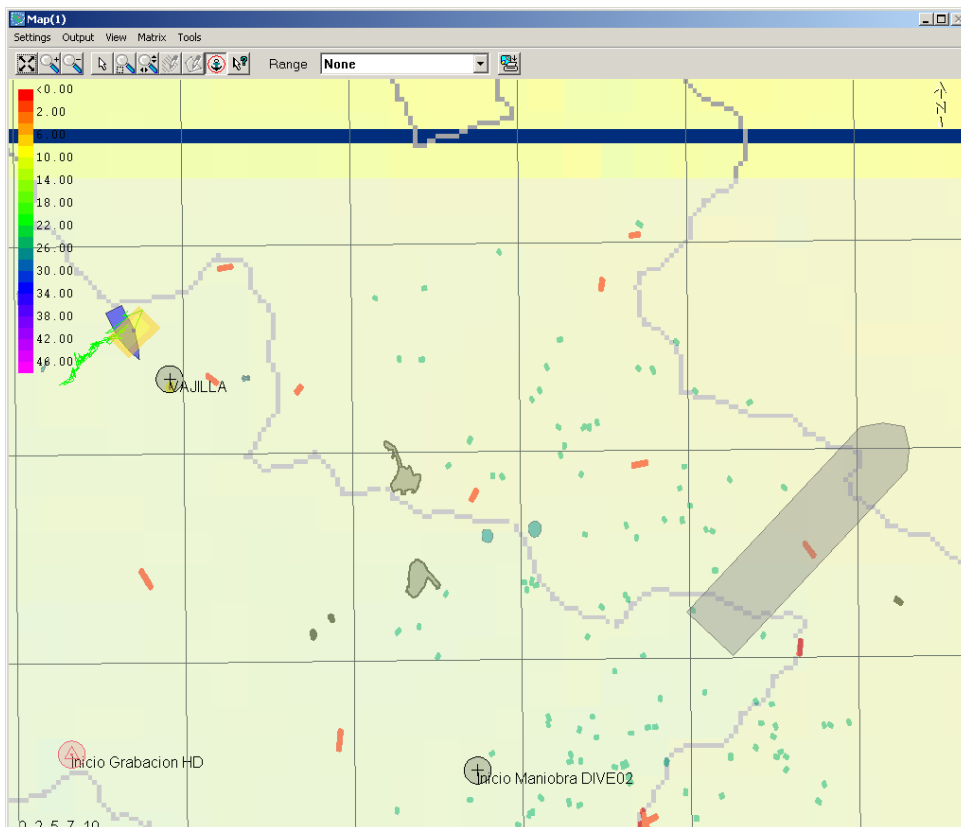


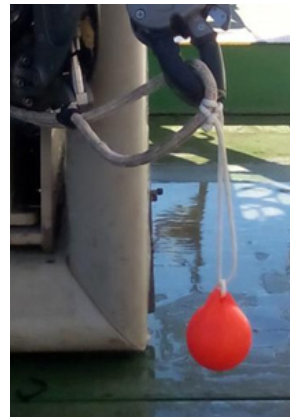
Figure 33: Screenshot of the HYPACK programme where the ROV (in blue) and the TMS (in yellow) can be seen at the top left, approaching the location of the dinnerware. The ship's location (grey) can also be seen in the lower right corner and the objects found in the 2015 campaign are mapped in the background.

- The HD video camera started recording at 09:08 a.m. once the ROV reached a depth of 1,060 meters. The ROV left the TMS at 09:40 a.m. to find the objects defined by the scientific team. Once they were located, the campaign leader gave instructions: photograph, clean and extract the artefacts and register the position of the ROV and the target objects.
- These actions were completed and the campaign manager ordered a new operation in another part of the wreck. The ROV was returned to the TMS at 01:02 p.m. and the TMS was back on the ship's deck at 01:45 p.m. End of DIVE02.
- The drawer was opened and the artefacts collected.
- The bridge officer moved the ship to the South-eastern part of the wreck site in preparation for the next operation. The ship's

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personnel performed another cable drift test with a hook while the removal of the recovered objects continued.

- In the meantime, the ROV technical staff changed the position of the digital HD camera in preparation for the next dive. They also prepared the ROV for its next mission: loop a rope around the muzzle of the bronze cannon (culverin) and then connect that to the steel cable equipped with a hook. The purpose of this was so that the ship could reel in the cable and bring up the culverin.



Figures 34 and 35: The ROV being prepared for DIVE03: a rope in the sample container, one end with a loop prepared in the right arm of the ROV and the other end of the rope in the left arm. The red buoy helps locate this end.

- The survey technicians closed the DIVE02 record and prepared the software for DIVE03. They also downloaded the photos taken during the dive (HD camera); a backup was made and the memory card formatted to free up extra memory for the next dive. Photographs were also taken of the on-deck operations.
- Once all the equipment (Scientific, ROV, Survey and Bridge) were prepared, DIVE03 began at 03:38 p.m. The survey technicians highlighted the bronze barrel on the HYPACK screen to facilitate the ROV's approach. The ROV left the TMS at 04:10 p.m. The ROV found the culverin and slipped the loop over the muzzle of the cannon. It returned to the TMS at 04:50 p.m. and was returned to a safe depth (450 m).
- Without further delay, at 05:27 p.m. the hook was lowered from the stern with a 16 mm steel cable. A transponder was placed inside a stainless steel 'cage' at two meters from the end of the cable in order to monitor its position at all times. After a difficult manoeuvre

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the ship's captain managed to drop the hook very close to the loop.

- The TMS was lowered again nearly to the seabed. The ROV again left the TMS to conclude the operation (07:11 p.m.). It took 10 minutes for it to locate the cable on the seabed. It connected the hook to the loop (07:48 p.m.) but the hook could not be closed because the ROV arm was not strong enough to break the clamp which had been put in place to prevent the hook from closing accidentally. The ROV then returned to the TMS.

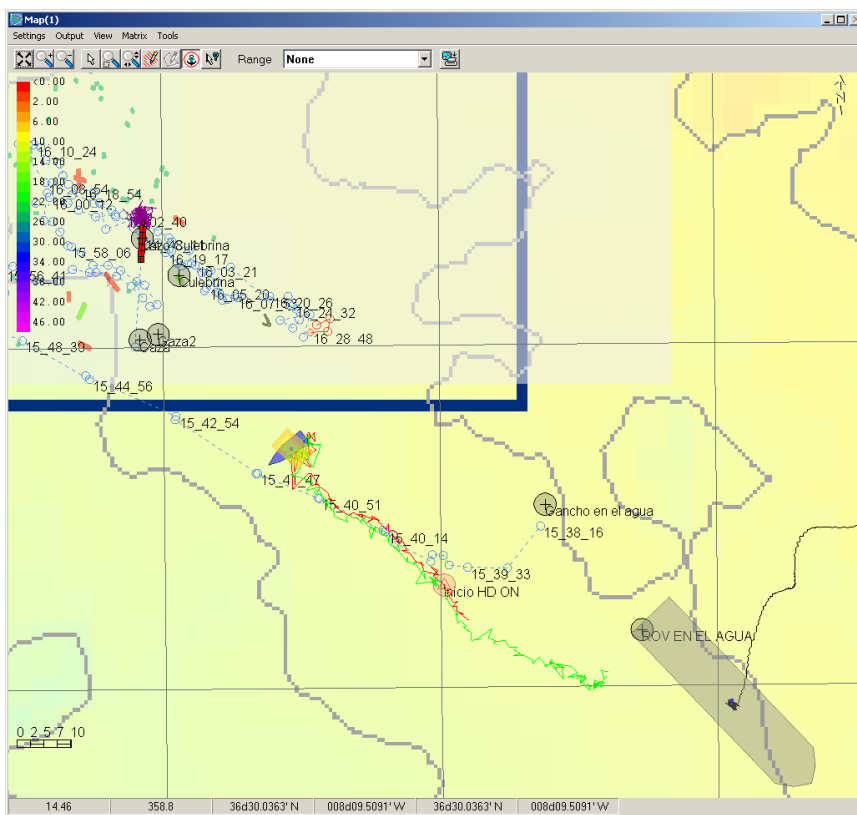
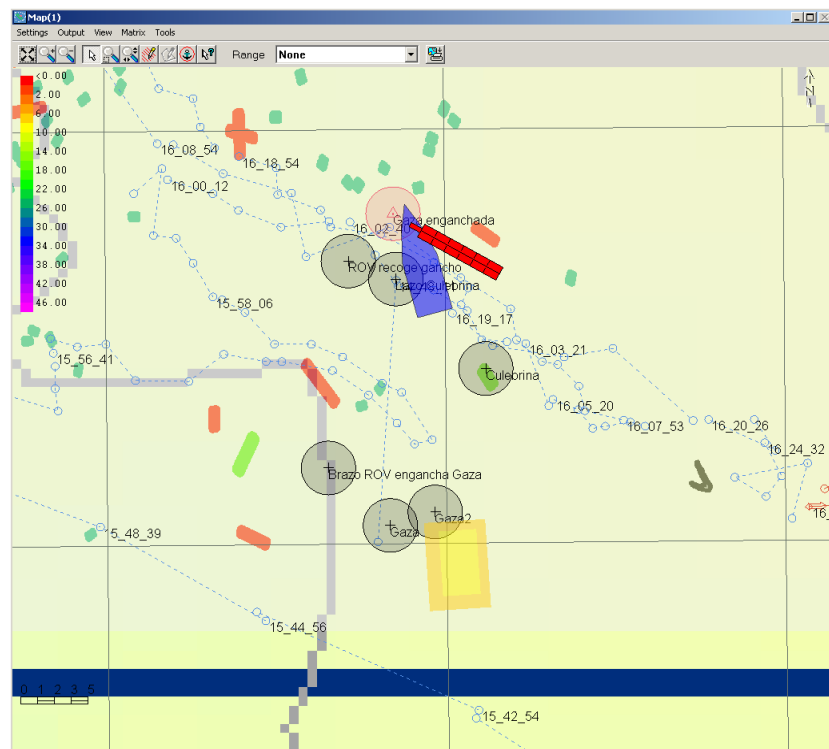
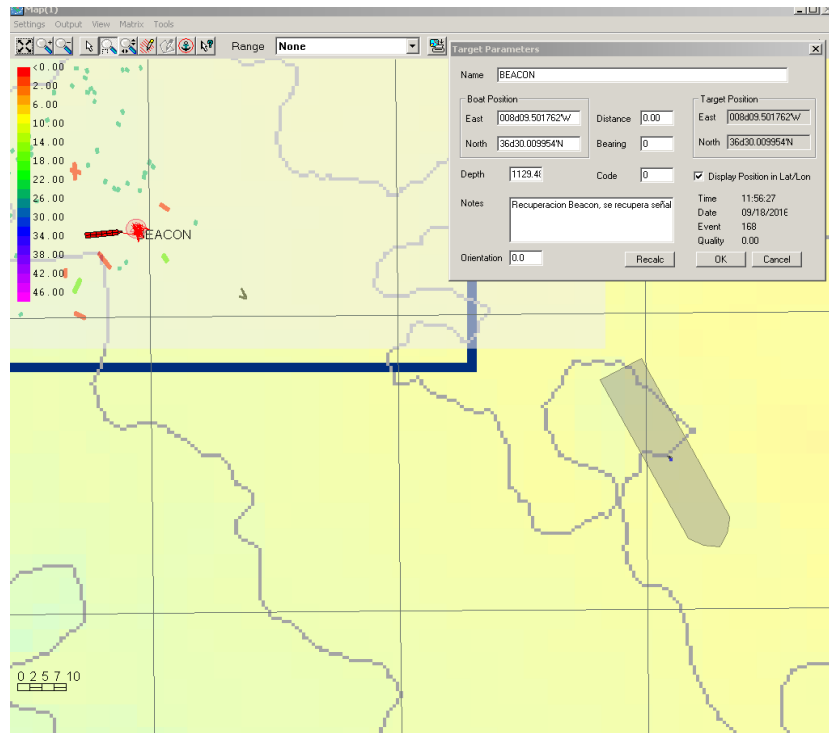


Figure 36: Screenshot of the HYPACK programme: Above: ROV (blue) approaching the cable with the hook (red). Below: The ROV situated next to the cable hook. The TMS (yellow) located above the loop.

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Figures 37 and 38: Screenshots of the HYPACK program: last signal received on September 16th and the signal received on the 18th.

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- The Vessel began to reel in the cable but the hook slipped off. At 08:38 p.m. the same operation was repeated, i.e. the ROV was sent back to secure the hook to the loop (09:57 p.m.). Reverse operation repeated: ROV sent back to the TMS. It was difficult to get the ROV back into the TMS due to deteriorating sea conditions. The ROV was returned to the deck at 10:49 p.m.
- At 11:00 p.m. the ship again began to reel in the cable in order to bring the culverin to the surface. At 11:14 p.m. the mission was aborted as the cable went limp: the cable had broken and the bronze cannon remained on the seabed.
- The transponder was also left on the seabed next to its cage. The transponder is a SIMRAD/KONSBURG, model No MST-342/N and has the following serial number: 1741.

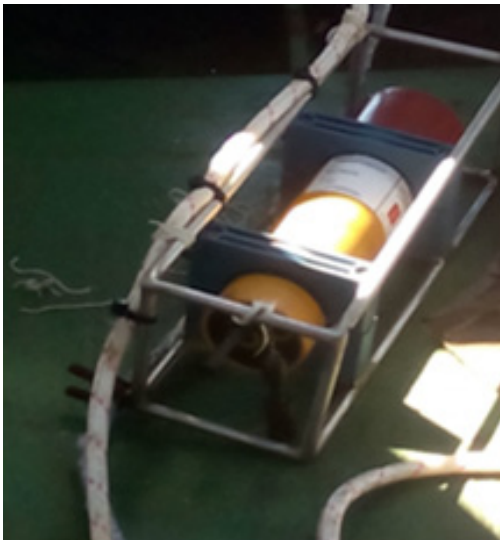


Figure 39: Transponder KONSBERG MST-342 / N ready to be released.

- Work concluded until the following morning.
- On **September 17th**, in line with weather predictions, sea conditions worsened and therefore no ROV work could be performed.

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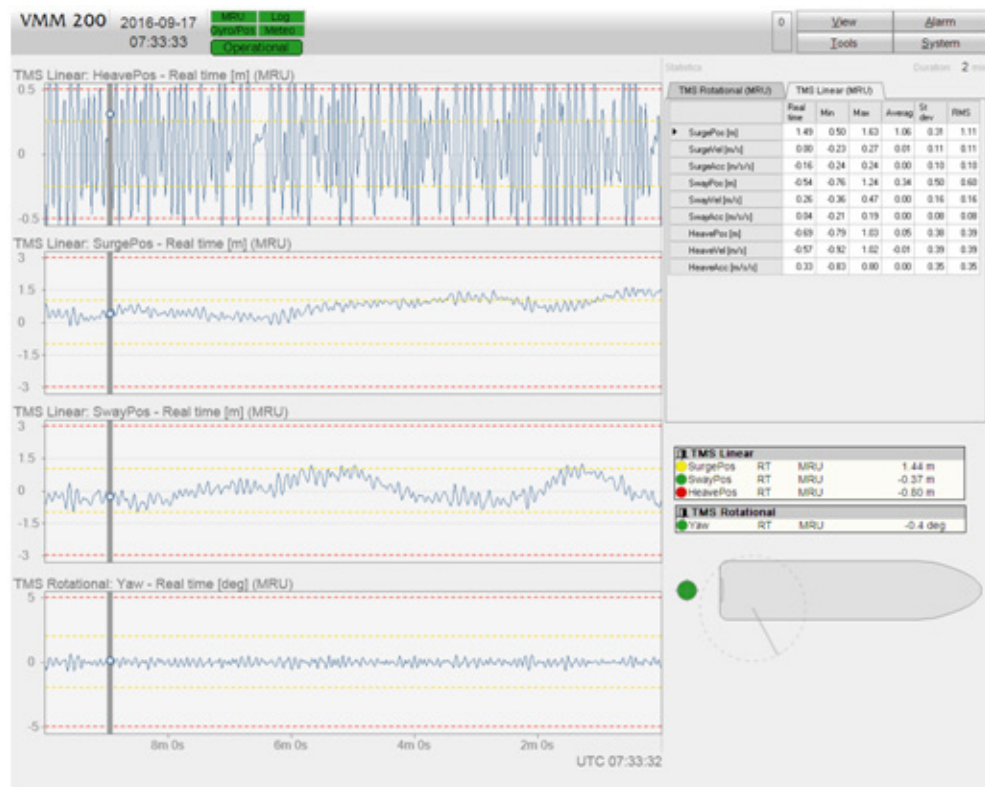


Figure 40: Interface of the VMM200 programme showing sea conditions (07:33 a.m. 17/SEP/2016)

- A copy of all the information collected from the previous day's ROV dives was offered to the scientific team: videos, photographs, weather data, record of the manoeuvres, etc.
- The scientific team had requested this information which they needed to prepare for the press conference scheduled for the 20th.
- The ROV team replaced the left arm of the ROV. The hand had stopped working the previous day due to a minor oil leak.
- The return journey to the port of Cádiz began at 08:30 p.m. in order to arrive before 08:00 a.m. the next day.
- The ship arrived at the port of Cádiz early in the morning on the **19th**, and docked at 08:00 a.m. hours marking the end of the campaign. The process of removing the material and packaging belonging to ARQVA was completed at 11:00 a.m. At the same time, the Liropus system was being disassembled for subsequent transfer to another vessel.

The shipwreck *Nuestra Señora de las Mercedes* (2016)

- Between the 1st and the 19th of September the vessel travelled a total of 721 nautical miles, this includes the ROV test dives.

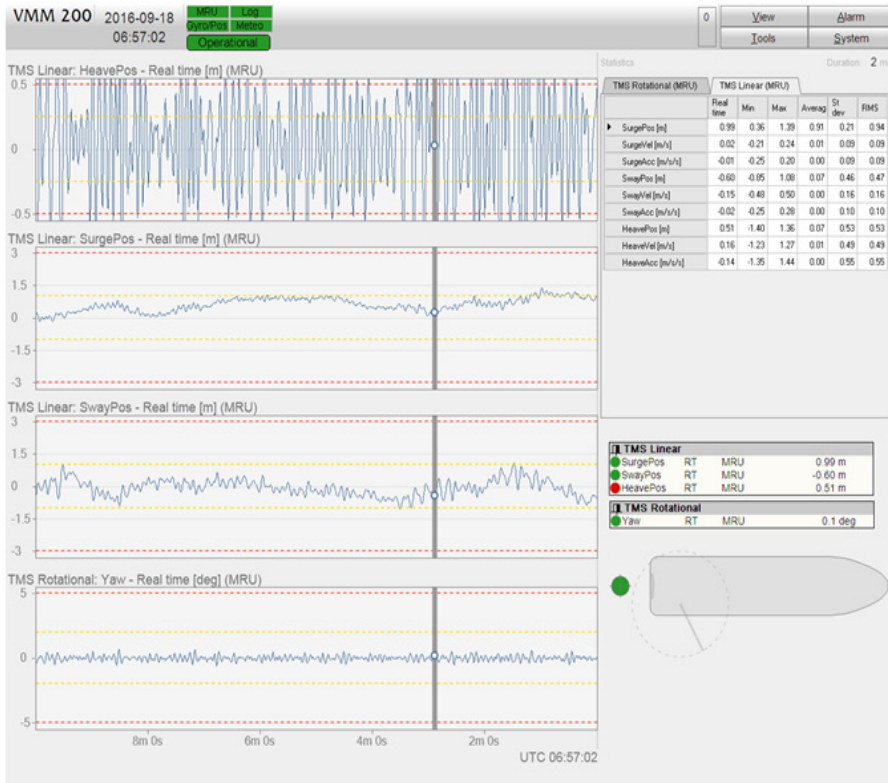


Figure 41: Interface of the VMM200 programme showing sea conditions (06:57 a.m. 18/SEP/2016).



Figure 42: Campaign itinerary

5. Archaeological report: identification of the shipwreck as the frigate *Nuestra Señora de las Mercedes*

5.1. Factors affecting the work performed

As explained at the beginning of this report and in more detail in the IEO report, the sea conditions did not allow us to commence work until the 16th when the campaign was nearly over. These conditions on the seabed would not have had any impact on the work had we been using a much larger vessel. They were, however, a significant handicap due to the characteristics of the *Ángeles Alvariño*.

As a result of such unfavourable conditions, the days of the campaign were spent in anxious anticipation. The time was used to carry out drills, the aim being to make the best possible use of the few hours of time we would have to do the work we had prepared for.

5.2. Proposed objectives

As the days progressed, we were forced to discard one after another of the initial objectives of the campaign. Mostly we had to rule out completing the mapping of the entire wreck and the recording of archaeological elements which, due to the large area over which these were scattered, would have taken several days.

We replaced those tasks with two objectives which would be easier to accomplish due to their location: work on the drawer containing scrap silver and the Renaissance culverin.



Figure 43: ROV control post.



Figure 44: Survey post.

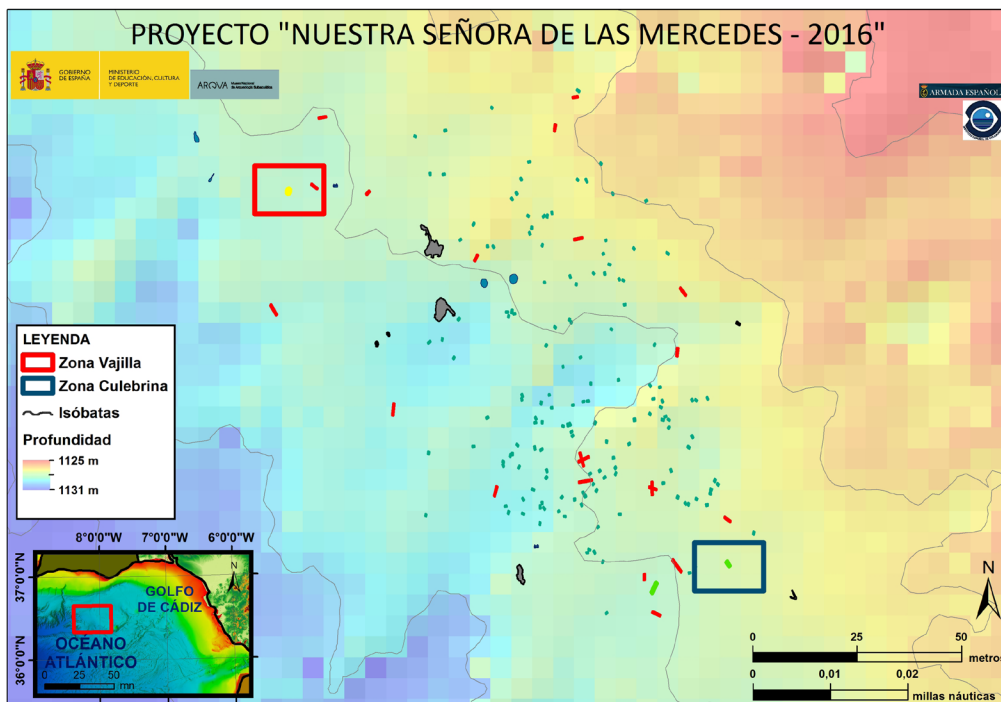


Figure 45: Map of the study area: wreck of the frigate *Nuestra Señora de las Mercedes*. It shows the two areas where work was performed on September 16th: the area where the dinnerware was found (red box to the North-west) and where the culverin was found (blue box to the South-east).

5.2.1. Work on the drawer containing the scrap silver

Once all of the ship's sensors indicated that work could proceed on the 16th, the priority objective was to work in the area of the drawer that contained the scrap silver. We prioritised this work activity over many others as this was the part of the ship's contents that was best documented in the Archive of the Indies and we believed that it would best contribute to the definitive identification of the shipwreck.

We would recall that during the 2015 campaign we recovered, among other artefacts, a gold pestle, remains of two silver candelabra, remains of six pieces of silver cutlery, a set of three dishes in very poor condition and fused together and a size 3 howitzer. Given the poor state of conservation of the silver items, we thought that they could be the "plata chafalonía" (scrap silver) referred to in a document in the General Archive of the Indies. In the 2015 campaign we were unable to establish an unequivocal and definitive correlation between artefacts and the Seville archive documents.

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We had a document from the General Archive of the Indies (Lima, 1535, N.6, page 173) (see attached figure) which, in addition to enumerating general objects that could be from any sunken ship such as: “scrap silver” or “gold mortar and pestle”, it also refers to very specific aspects and details that we hoped to locate. Following is a listing:

1. the name ‘Encina’ as commissioner of some of the objects;
2. the ‘XX’ mark engraved on some of the silver objects;
3. the seals of the royal fifth;
4. the weight of the gold mortar and pestle.

Finding any of these artefacts would be a great help in making the definitive connection between this shipwreck and *Nuestra Señora de las Mercedes*.

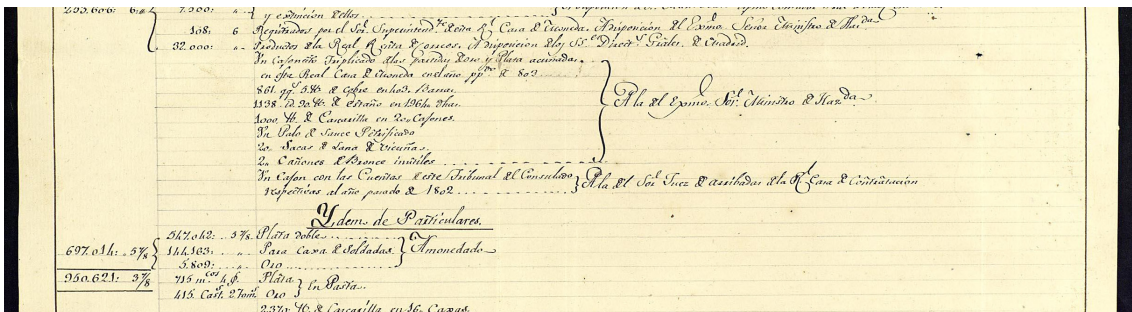
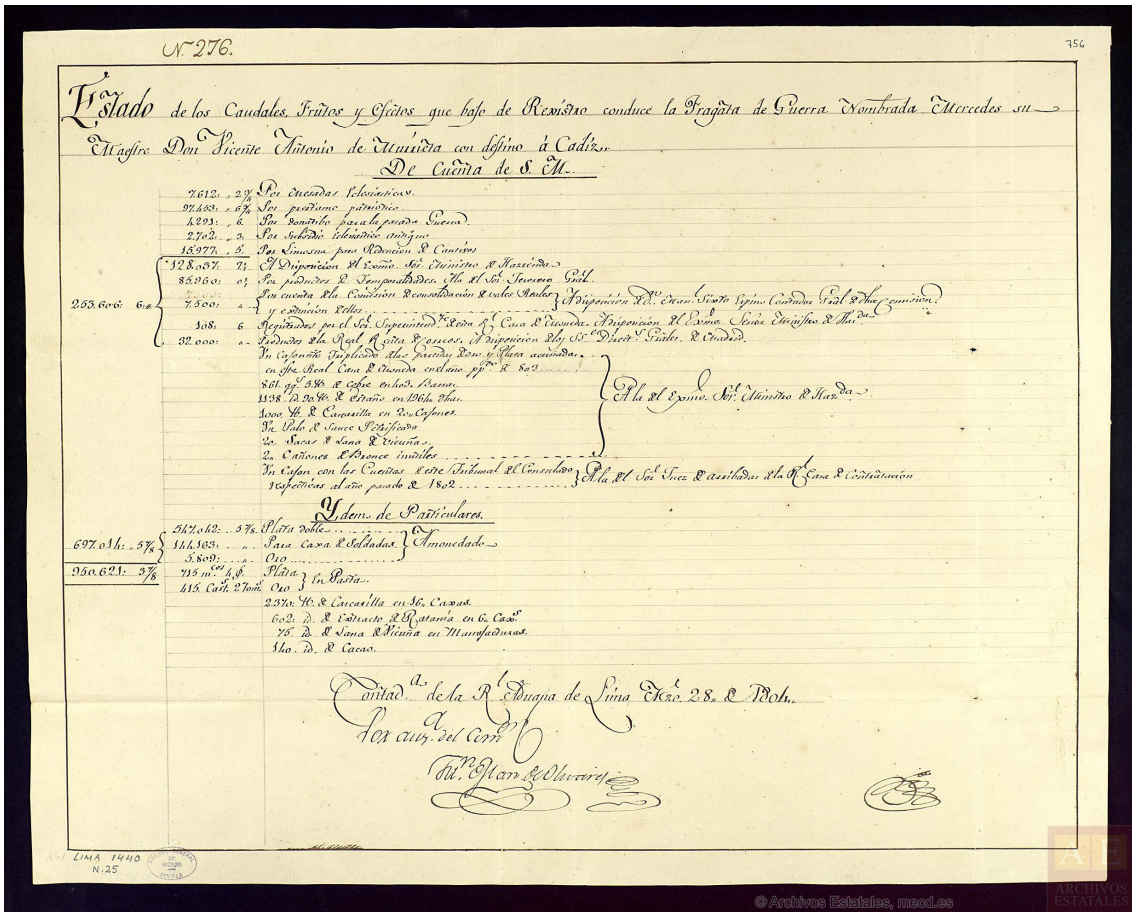
On the basis of these objectives, we took advantage of the marked improvement in sea conditions and proceeded directly to the remains of the drawer containing the scrap silver.

As in 2015, the water lance was used to excavate the archaeological objects and remove the sand deposits that covered them.

Once they were cleaned, several of them were extracted in the hope that they would give us the unequivocal identification we were looking for. Work commenced at 09:40 a.m. and continued uninterrupted until 01:02 p.m., a total of 3 hours and 22 minutes during which a complete ‘pack’ of photographic and video documentation was compiled on each of the steps in the process.

5.2.2. Work on the Renaissance culverin

The second objective was the identification and extraction of at least one of the Renaissance culverins that we had located in the 2015 campaign since the General Archive of the Indies document, Lima, 1440, N.25, page 756 (see figure attached) refers to “two worthless bronze cannons”.



Figures 46 and 47: Document from the General Archive of the Indies: Cargo manifest which includes 'two worthless bronze cannons'. Archive of the Indies, Lima, 1440, N.25, page 756.

The combination of these two factors (finding some of the elements contained in the “drawer with scrap silver” and one of the culverins) would provide definitive certainty as to the shipwreck under study being the frigate *Nuestra Señora de las Mercedes*, thus completing once and for all this aim of the project.



Figura 48: Culverin.

5.3. Excavation with a water lance

In this Campaign we followed the same archaeological procedure used in the August 2015 Campaign with excellent results. So as not to repeat ourselves, the reader should consult pages 48 and 49 of the report of that campaign (Negueruela *et alii*, 2015 and Negueruela *et alii*, 2016).

In 2015 this procedure proved to be extremely effective as long as two parameters were controlled: the force and precision of the water jet. This means being able to accurately aim a wide or very narrow jet.



Figure 49: Zenithal snapshot of the plates.

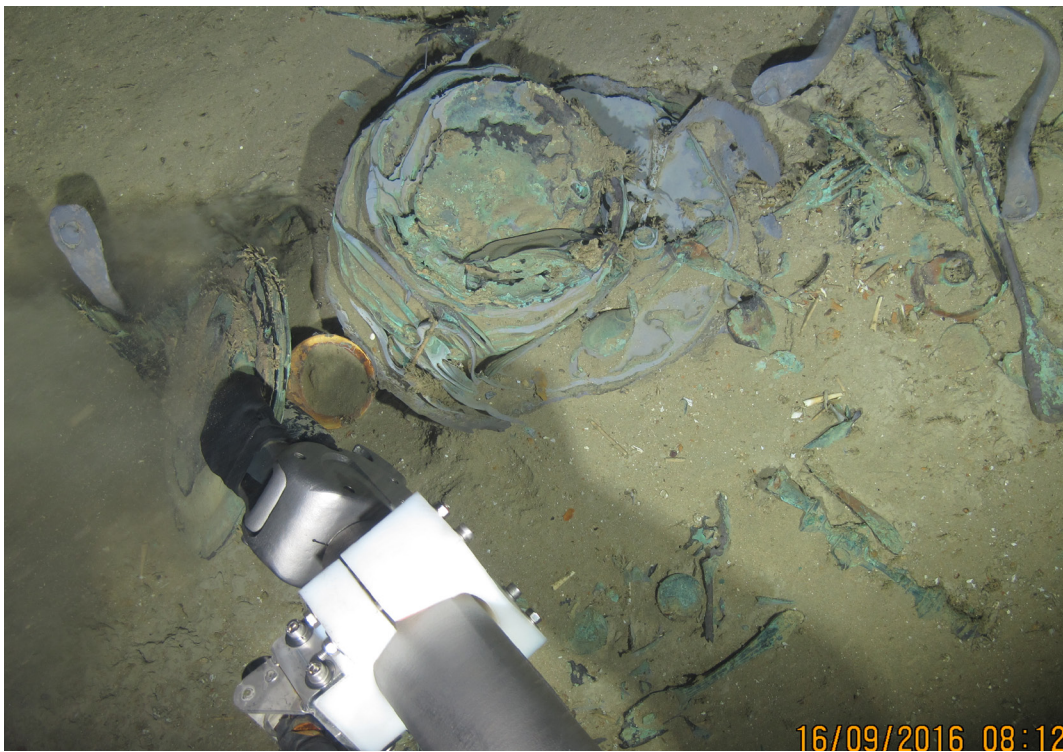


Figure 50: Extraction of tableware's dishes.

5.4. The General Archive of the Indies document with the description of the drawer containing scrap silver

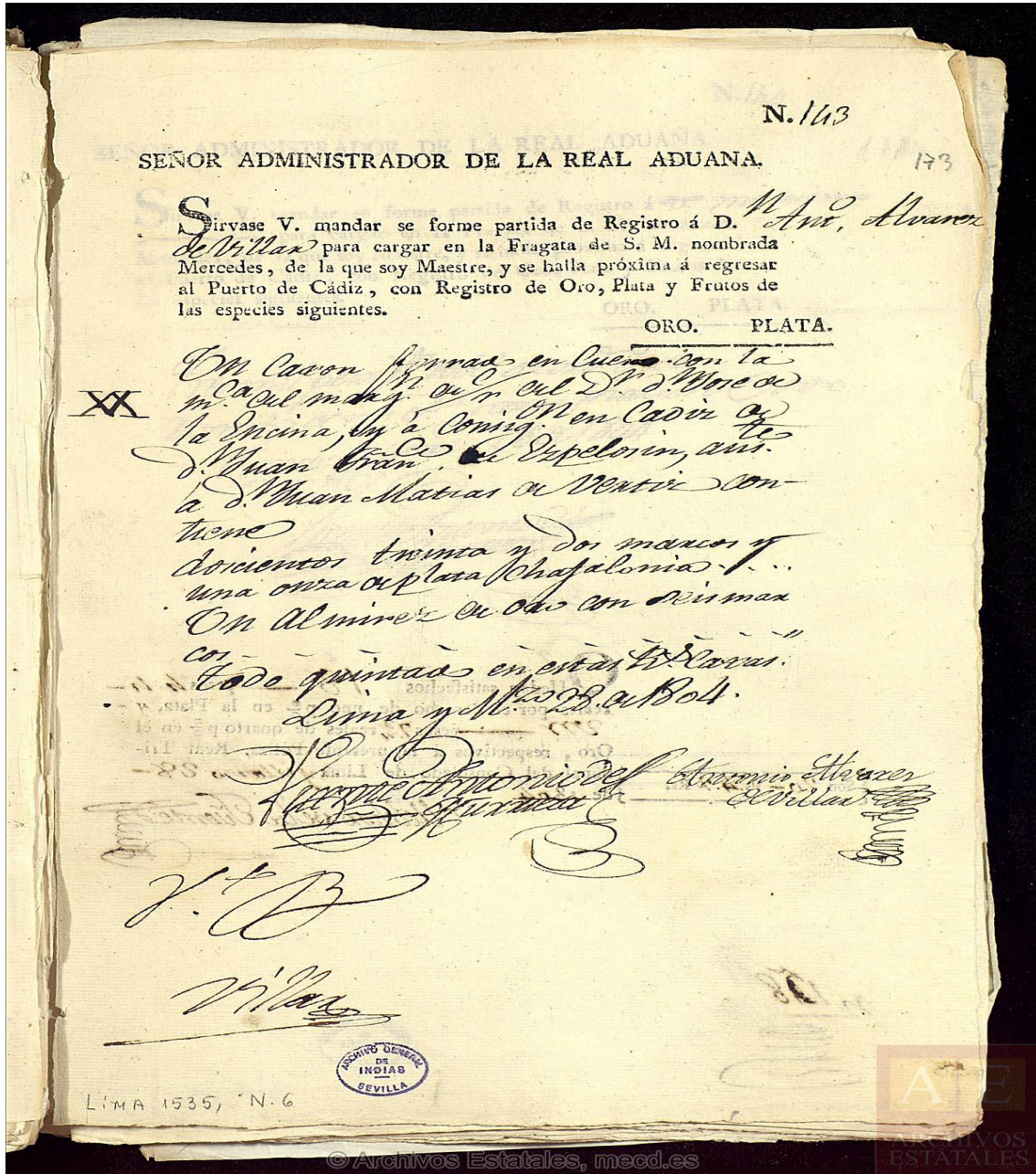


Figure 51: The General Archive of the Indies Document (AGI, Lima, 1535, N.6, page 173) with the description of the drawer containing scrap silver.

The shipwreck *Nuestra Señora de las Mercedes* (2016)

Transcript of the document:

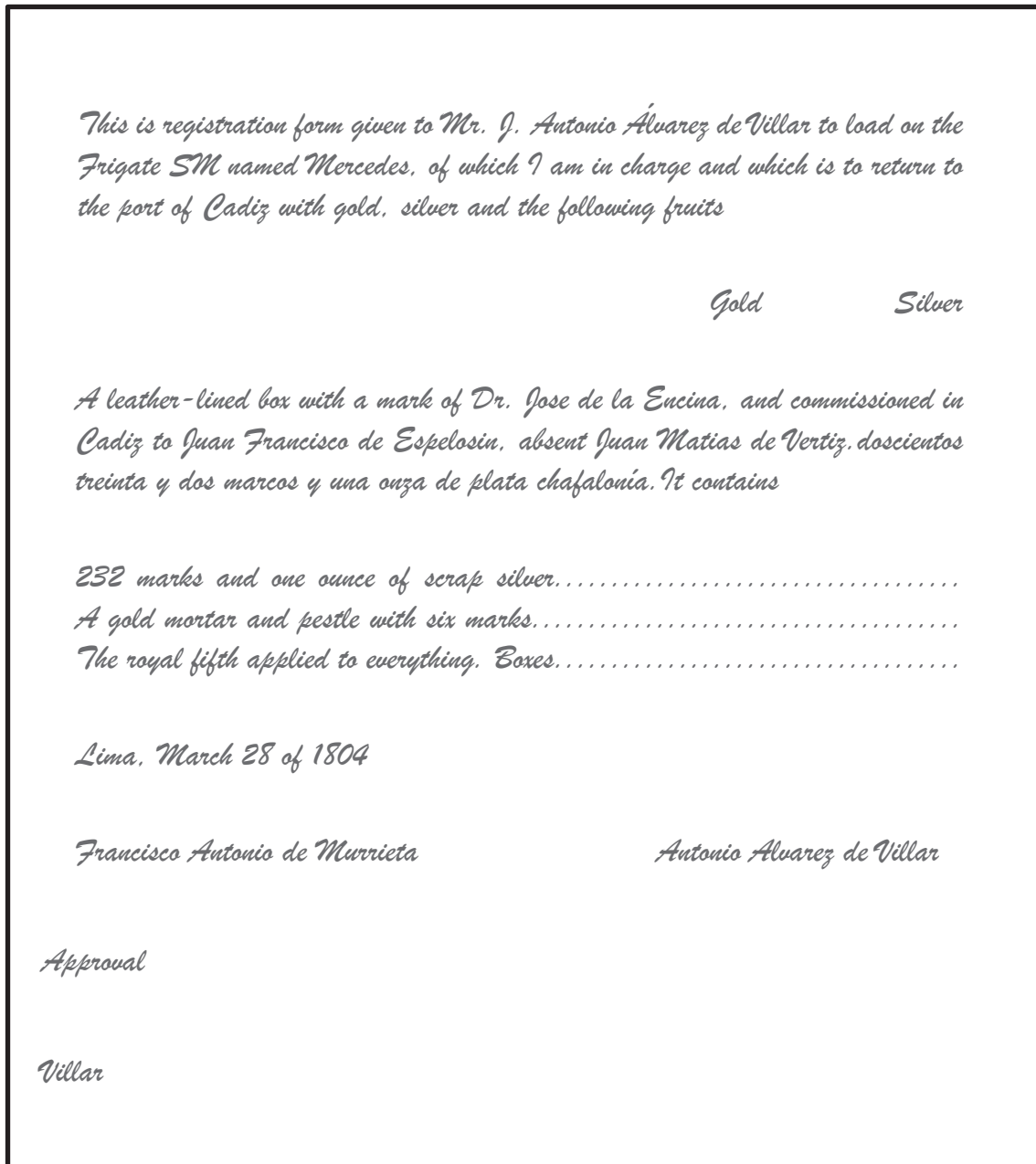


Figure 52: Transcription of the previous document.

5.5. Marks found on the artefacts extracted and mentioned in the Archive of the Indies

1. The 'XX' mark is found in the margin of the General Archive of Indies document (copy attached) with the express indication that the same mark appears on some of the plates. We were able to identify this mark on several of the plates extracted in this campaign.
2. The same document refers to objects 'quintados'. We were also able to identify the seal of the 'quinto' on some plates and cutlery.
3. The gold mortar and pestle is also mentioned in this archive document and corresponds to the weight of the pestle extracted from the site.
4. The surname 'Encina', also mentioned in the document from the General Archive of the Indies, is engraved on two of the artefacts brought up.

These four elements serve as clear evidence supporting the definitive identification of the wreck.

The exact match between the artefacts recovered by the Museum in 2015 and 2016 and the precise data cited in the General Archive of the Indies document definitively proves the identity of the wreck under investigation as the frigate *Nuestra Señora de las Mercedes*. We were fortunate to recover this evidence which is the most conclusive found to date in the history of Spanish underwater archaeology.

These finds satisfactorily cover one of the campaign's objectives.

The other, one of the two bronze culverins referred to in the documents of the General Archive of the Indies as "two defunct bronze cannons", has already been referred to by our colleagues from the IEO who explained that it could not be brought up due to technical problems.

Nonetheless, the main objective for the 2017 campaign is still the extraction of one of the bronze culverins. We believe that the set of artefacts taken from the drawer holding scrap silver and one of the culverins, even though they account for far less than 1% of the total number of archaeological artefacts found by the Museum during the two campaigns, definitively settle the matter of the ship's identification as we have already mentioned.

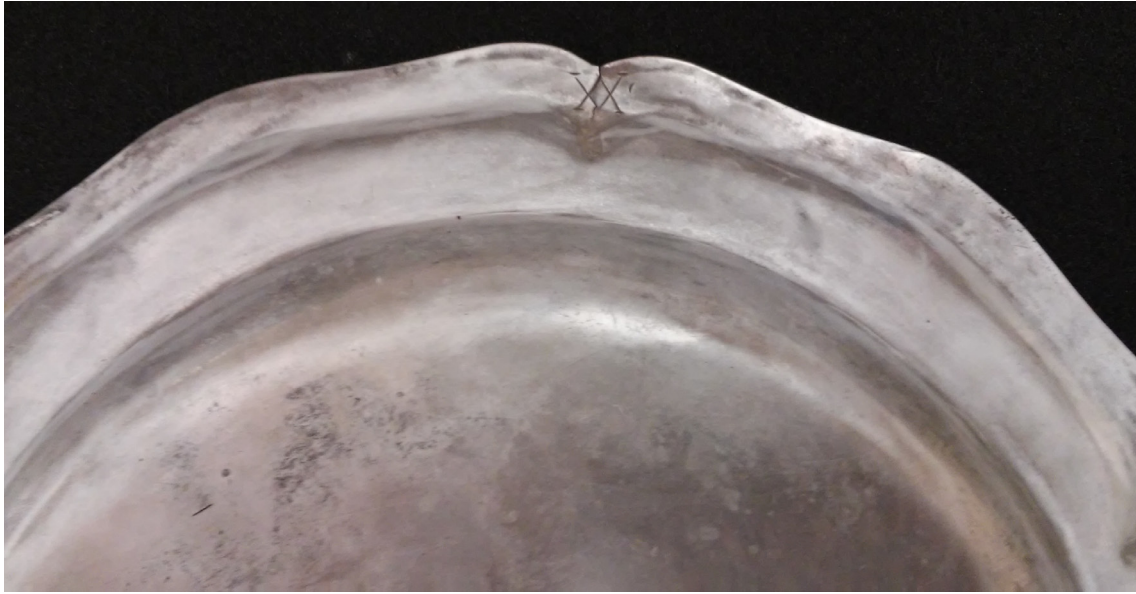


Figure 53: Silver plate with «XX» mark.



Figure 54: Gold mortar with the royal fifth.

The shipwreck *Nuestra Señora de las Mercedes* (2016)



Figures 55 and 56: Gold mortar with the royal fifth.



Figures 57, 58, 59 and 60: Silver plate fragment and fork with quintado mark.

The shipwreck *Nuestra Señora de las Mercedes* (2016)



Figures 61 and 62: 'Encina' engraved on two fork handles.

5.6. The recovered artefacts

Of the several thousand artefacts that we managed to locate at the site of the shipwreck, and of the several hundred that we positioned on the seabed, only 35 artefacts were actually brought up from the depths of the sea: the gold mortar corresponding to the pestle, also made of gold and brought up in the 2015 campaign, and 34 pieces of silver corresponding to soup plates, flat plates, two large incomplete serving platters, a large deep serving platter with horizontal handles of the type placed in the centre of the table, several forks and spoons, coins and a few other pieces. Several of the artefacts mentioned are fused together and need to be separated in the laboratory.



Figure 63: The recovered artefacts in the 2016 campaign.

5.6.1. Dinner service



Figure 64: Large silver serving platter fused with several plates and cutlery.

The shipwreck *Nuestra Señora de las Mercedes* (2016)



Figure 65: Set of silver plates and cutlery.



Figure 66: Set of soup silver plates.



Figure 67: Edge of a silver dish with the royal fifth.

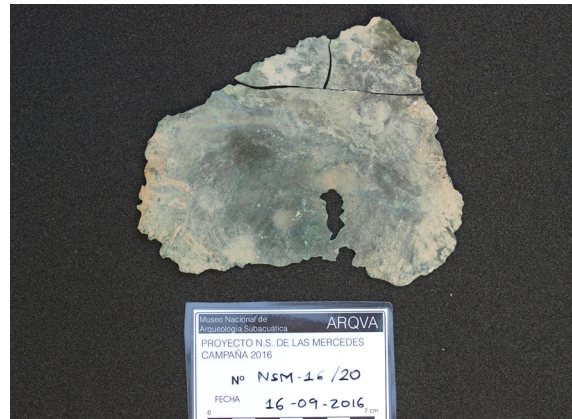
The shipwreck *Nuestra Señora de las Mercedes* (2016)



Figure 68: Incomplete soup plate.



Figure 69: Dish edge fragment.



Figures 70 and 71: Dish edge and center fragments.

5.6.2. Handles



Figures 72 and 73: Two large silver handles from the large serving platter NSM 16/01.

5.6.3. Silver cutlery

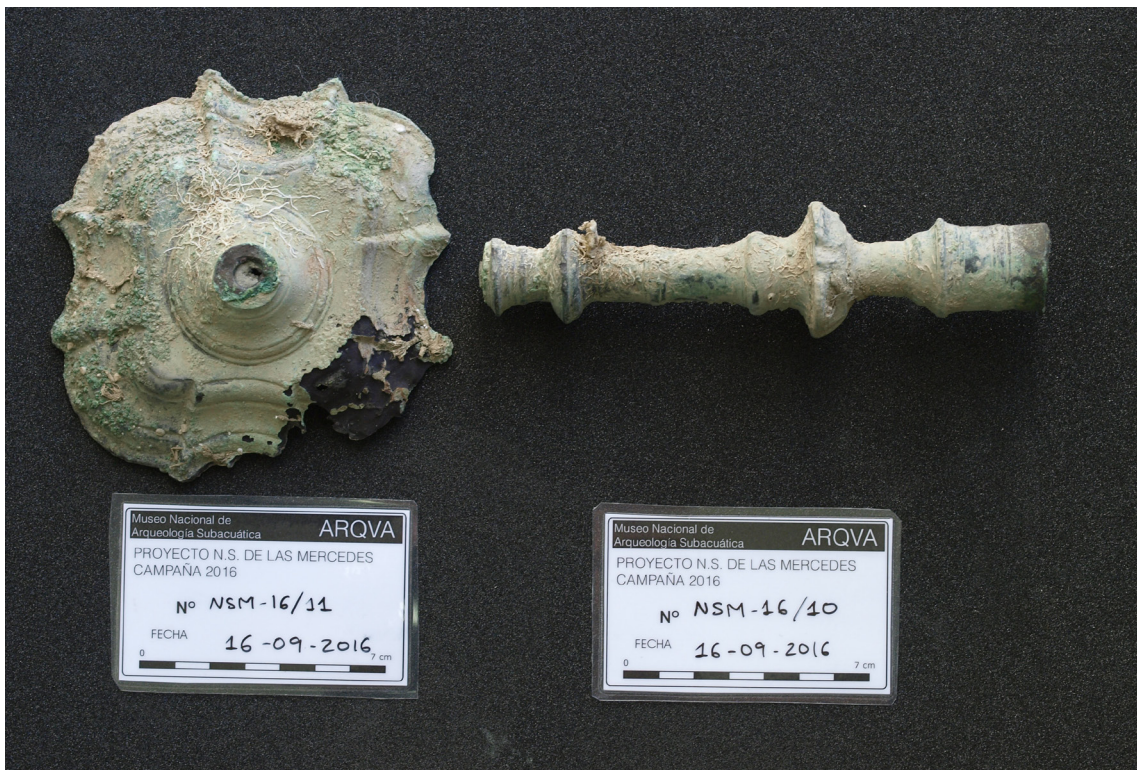


Figures 74 and 75: Fork and detail of the handle showing the seal of the royal fifth.



Figures 76 and 77: Silver fork and spoon.

5.6.4. Candlesticks



Figures 78 and 79: Two variations of the same type of candlestick.

5.6.5. Sundry



Figure 80: Decorative elements.



Figure 81: Reconstruction of the previous decorative elements.

The shipwreck *Nuestra Señora de las Mercedes* (2016)



Figures 82 and 83: Fragment of a candlestick and undetermined decorated fragment.



Figures 84 and 85: Small fragments from cutlery handle.



Figures 86 and 87: Undetermined fragments.



Figure 88: Miscellaneous fragments.

5.6.6. Coins



Figures 89 and 90: Silver coins.



Figures 91 and 92: Silver coins.

5.7. Initial restoration treatments

Thirty-five objects or sets of objects were recovered from the site during the 2016 *Nuestra Señora de las Mercedes* archaeological research campaign —a gold mortar, dinnerware and cutlery made of silver and silver coins—.

Thanks to their chemical stability, the gold mortar and the other artefacts made of silver are not in a bad state of conservation. X-ray diffraction analysis of the green-coloured corrosion on the plates and candlesticks recovered in the previous campaign showed that they are copper oxychlorides (clinoatacamite $\text{Cu}_2\text{Cl}(\text{OH})_3$), atacamite and paratacamite $\text{CuCl}_2(\text{Cu}(\text{OH})_2)_3$; analysis of the gray-coloured corrosion indicated silver halides (embolite AgCl and bromargirite BrCl). Therefore, post-recovery preventive conservation intervention on these artefacts was minimal.

Physical protection was provided by wrapping them in polyethylene film, putting them in custom-made packaging made of polyethylene foam (Ethafoam®) and then placing them inside a large safety box. This kept them safe during their journey to the Museum's conservation and restoration laboratory.



Figure 93: Packing of some artefacts for transport to the Museum.

At the Museum we did not have any unaltered silver coins from the shipwreck, i.e. not altered by the company Odyssey. For that reason it was decided to recover four sets of coins from the site, two individual and two fused sets which were protected from the elements by sealing them with Escal®, a transparent barrier film very resistant to oxygen and water vapour thanks to an internal membrane of vacuum deposited ceramic on a PVA substrate. This procedure protects the artefacts from corrosion as they await future study.










Figura 94: The complete team: Museum, IEO, Navy, camera and ship crew.






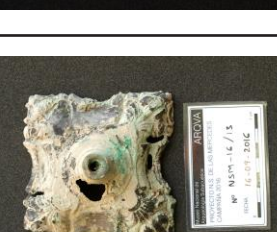

5.9. Bibliography








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Annex:
General inventory of archaeological material


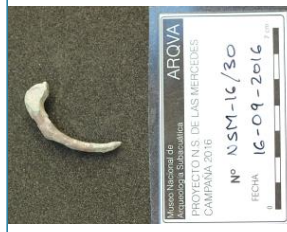





Photograph	Registration No° Inventory No	Date of extraction	Artefact	Material	Size (cm)	Weight	Description	State of conservation
	NSM-16/01 NSM16-00001/1 al NSM16-00001/13	16-09-2016	SET-PLATTER, PLATES AND CUTLERY	Silver	Max. length: 35.3 cm Max. width: 30 cm Thickness: 5.3 cm	2790 g	Set consisting of: an incomplete platter, parts of three large plates, the base of a small plate; a nearly complete spoon, a fork handle with a piece of neck, a nearly complete handle and two handle fragments; six plate fragments (4 edge and 2 base pieces); an undetermined fragment. The back side of the spoon handle bears a stamp and an inscription (the same as the fork NSM-16/09 and the handle NSM-16/27). There is a mark in the centre of the upper part: Possibly G IA Z or 6 IA Z.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Copper oxides, organic matter and sediment is found on the halides. And a small spot of ferrous oxide is found on the large central dish. Matter has been lost due to corrosion and erosion and therefore the pieces have sharp pointed edges.
	NSM-16/02 NSM16-00002/1 al NSM16-00002/17	16-09-2016	SET-PLATES AND FORKS	Silver	Set: Width: 23.5x23.1 cm Max. height: 5.4 cm	3012.29 g	Set of 12 plates (5 small plates on top of five large ones all fused together). Three forks are fused to the side of the group of plates: two together and one with a mark on the handle. There are also other small fragments: a cutlery handle base with a stamp (similar to NSM-16/01, 09 and 27), five plate edge fragments, three plate base fragments and an undetermined fragment.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. The halides are composed of copper oxides and organic matter and sediments. It exhibits atacamite corrosion and white and brown calcareous adhesions. Matter has been lost to corrosion and erosion and therefore the pieces have sharp and pointed edges.
	NSM-16/03 NSM16-00003/1 al NSM16-00003/7	16-09-2016	SET OF PLATES	Silver	Max. diameter: 23 cm Height: 3.3 - 2.9 cm	1194.49 g	Group of three soups bowls, nearly complete, plus the remains of the base of a fourth plate underneath. Nearly the entire perimeter and moulded edge of the three upper plates is intact. There are four fragments on the top plate: Two fork fragments (root of the tine); One plate edge fragment and an undetermined fragment.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Copper oxides, organic matter and sediments were found on the halides. Matter has been lost to corrosion and erosion. It exhibits atacamite corrosion and white and brown calcareous adhesions. There are mollusk remains (pomatocerostriqueter) and balanus crustaceans.
	NSM-16/04 NSM16-00004	16-09-2016	PLATE	Silver	Max. diameter: 23 cm Max. dimensions conserved: 23x18.2 cm Height: 2.3 - 2.5 cm	212.60 g	Incomplete soup plate. Nearly the entire base is intact and approximately 50% of the winged and moulded edge is left.	It has a stable patina of silver halides, copper oxide over the entire surface and a localised spot of ferrous oxide. There are also active corrosion foci (atacamite) on the back of the plate. There are calcareous adhesions and a few organic adhesions. Matter has been lost due to corrosion, erosion and mechanical fragmentation.
	NSM-16/05 NSM16-00005	16-09-2016	MORTAR	Gold	Max. diameter: 7.5 cm Min. diameter: 5.5 cm Height: 5.5 cm	1019.39 g	Complete truncated cone shape mortar with straight divergent sides; smooth circular edge and smooth grooved lip; circular base with marked stand, flat bottom on the outside and concave on the inside; adorned with outer moulding in the upper third. This forms a set with the pestle recovered the year before (NSM-15/03). Both artefacts are listed on the cargo manifest.	Good state of conservation There is iron oxide inside and out, calcium carbonate accretions and adhered organic matter. There are scratches on the outer and inner part of the base.
	NSM-16/06 NSM16-00006	16-09-2016	SPOON	Silver	Max. length: 17.8 cm Bowl head: Max. width: 3.4 cm Handle: Max. width: 2.5 cm	75.11 g	Spoon with a complete handle, ribbed on front and back; and almost complete bowl. It has a circular mark on the back which, despite the accretion, appears to be a 'royal fifth'.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Copper oxides, organic matter and sediment is found on the halides. There are also signs of atacamite corrosion. Matter has been lost due to corrosion and erosion.
	NSM-16/07 NSM16-00007	16-09-2016	FORK	Silver	Max. length: 17.1 cm Back: Max. width: 2.8 cm Stem: Max. width: 2.5 cm	66.94 g	Fork with a complete grooved handle (front and back) and four nearly complete tines.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Quite a bit of copper oxide, organic matter, sediment and calcareous tubules are adhered to the halides. There is also atacamite corrosion and white and brown calcareous adhesions. Matter has been lost due to corrosion and erosion.

El pecio Nuestra Señora de las Mercedes (2016)

Photograph	Registration No° Inventory No	Date of extraction	Artefact	Material	Size (cm)	Weight	Description	State of conservation
	NSM-16/08 NSM16-00008	16-09-2016	FORK	Silver	Max. length: 18.4 cm Back: Max. width: 2.5 cm Handle: Max. width: 2.1 cm	57.43 g	Fork with two and a half tines, a complete smooth narrow handle that widens at the base where a circular mark is found surrounded by pearls with the royal crown in the centre ("royal fifth").	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Quite a lot of copper oxide, atacamite corrosion and active corrosion foci are found on the halides. It has organic and sediment adhesions, some calcareous tubules and balanus crustaceans. Matter has been lost due to corrosion and erosion.
	NSM-16/09 NSM16-00009	16-09-2016	FORK	Silver	Max. length: 15.1 cm Back: Max. width: 2.2 cm Handle: Max. width: 1.5 cm	42.46 g	Fork with complete handle and tine root. The handle has a central rib on the front and back, a stamp on the base and an inscription with "E ... a". That same decoration and inscription appear on other pieces of cutlery: NSM-16/01, NSM-16/27.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Copper oxides, organic matter and sediment is found on the halides. There are also signs of atacamite corrosion. Matter has been lost due to corrosion and erosion.
	NSM-16/10 NSM16-00010	16-09-2016	CANDLESTICK	Silver	Altura máx.: 16.01 cm Max. height: 16.01 cm Shaft: Max. width: 4.2 cm Socket: Ext. diam. 2.5 cm	325.44 g	Complete moulded candlestick shaft. The upper part features the complete cylindrical socket moulded on the outside. The lower part is fused to candlestick base No NSM-16/11 and therefore they were assigned the same museum inventory number (NSM16/00010).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Quite a bit of Copper oxide and spots of atacamite corrosion are found on the halides. It has adhesions of organic matter, sediments and some calcareous tubules. Organic matter was found inside the socket and calcareous accretion on the outside. The surface is heavily eroded.
	NSM-16/11 NSM16-00010	16-09-2016	CANDLESTICK	Silver	Base: Width: 11.5x11.9 cm Height: 3 cm	204.96 g	Candlestick with two moulded nearly quadrangular shafts with rounded corners. It is fused to candlestick socket-shaft No NSM-16/10 and has therefore been assigned a single museum inventory number (NSM16 / 00010).	It has a stable silver halide patina fused to the metallic core. There is a lot of very active copper corrosion on the halides. It has adhesions of organic matter, sediments and some calcareous tubules. Matter has been lost due to corrosion, erosion and mechanical breakage of one of the corners.
	NSM-16/12 NSM16-00011	16-09-2016	CANDLESTICK	Silver	Altura máx.: 21 cm Max. height: 21 cm Shaft: Max. width: 4 cm Socket: Ext. diam. 3.2 cm	320.20 g	The candlestick shaft is nearly complete with less than 50% of the socket. Moulded with several parts. Part of the bolt joining the shaft and the base is intact. It is fused with the base of candlestick No NSM-16/13 and therefore a single museum inventory number was assigned (NSM16 / 00011).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Quite a bit of Copper oxide and spots of atacamite corrosion are found on the halides. It has some active corrosion spots. It has organic and sediment adhesions. The surface is heavily eroded and material has been lost (it is missing over 50% of the socket) due to corrosion and erosion.
	NSM-16/13 NSM16-00011	16-09-2016	CANDLESTICK	Silver	Base: Width: 10.4x10.1 cm Height: 2.3 cm	153.09 g	Base or stand of a candlestick, with two sections. Lower section moulded and decorated with what appear to be acanthus leaves; almost quadrangular in shape with square corners. The upper section is cylindrical and that is where it is fused with the shaft-socket of candlestick NSM-16/12 and was therefore assigned a single museum inventory number (NSM16/00011).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has quite a bit of copper oxide and focal points of active corrosion. Other black corrosion products are also present, especially in the interior. It has adhesions of organic matter, sediments and some calcareous tubules. It is extremely fragile and very eroded. Matter has been lost due to corrosion, erosion and mechanical breakage in one of the corners.
	NSM-16/14 NSM16-00012	16-09-2016	TRAY HANDLE	Silver	Max. width: 25.3 cm Min. width: 16 cm Average thickness: 1.5 cm Max. thickness: 3.13 cm	798.99 g	Large solid tray handle. The two connecting rivets are still intact. Very similar to handle No NSM-16/15.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has a few isolated sediment adhesions. There is no Cu corrosion. Matter has been lost due to corrosion and erosion.

Photograph	Registration No Inventory No	Date of extraction	Artefact	Material	Size (cm)	Weight	Description	State of conservation
	NSM-16/15 NSM16-00013	16-09-2016	TRAY HANDLE	Silver	Max. width: 24.6 cm Min. width: 16 cm Average thickness: 1.5 cm	867.5 g	Solid large tray handle. The two connecting rivets are still intact. Very similar to handle No NSM-16/14.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has a few isolated sediment adhesions. There is no Cu corrosion. Matter has been lost due to corrosion and erosion.
	NSM-16/16 NSM16-00014	16-09-2016	SET OF EIGHT COINS	Silver	Set: 8.5x6.9x2.98 cm Each coin: Max. diam.: 4 cm	258.65 g	Set of eight coins fused together with three small stones. Size indicates R8 coins.	Surface tarnished with corrosion products. It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Significant amounts of copper oxide, isolated active corrosion spots and ferrous oxide stains. This is a conglomerate of coins with adhesions of organic matter, sediment, calcareous tubules and three small stones.
	NSM-16/17 NSM16-00015	16-09-2016	SET OF TWO COINS	Silver	Set: 5.1x4.4x0.8 cm Each coin: Max. diam.: 4 cm	57.23 g	Set of two coins partially fused together. Size indicates R8 coins.	Surface tarnished with corrosion products. It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Significant amounts of copper oxide, isolated active corrosion spots and ferrous oxide stains. The two coins are fused together and exhibit organic and sediment concretions, calcareous micro tubules and balanus crustaceans.
	NSM-16/18 NSM16-00016	16-09-2016	COIN	Silver	Max. diam.: 3.9-4 cm	25.33 g	8R coin.	Surface tarnished with corrosion products. It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Significant amounts of copper oxide, isolated active corrosion spots and ferrous oxide stains. Some organic and sediment deposits.
	NSM-16/19 NSM16-00017	16-09-2016	COIN	Silver	Max. diam.: 4.2 cm	26.08 g	8R coin.	Surface tarnished with corrosion products. It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Significant amounts of copper oxide, isolated active corrosion spots and ferrous oxide stains. Some organic and sediment deposits.
	NSM-16/20 NSM16-00018	16-09-2016	FRAGS. DE PLATO	Silver	Maximum width conserved: 13.8x11 cm Thickness: 0.1-0.2 cm	79.10 g	Dish base fragments.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/21 NSM16-00019	16-09-2016	PLATE FRAGMENTS	Silver	Maximum dimensions conserved: 11.4x3.4 cm Thickness: 0.3 cm	29.61 g	Winged plate edge fragments. Under the moulding decoration the circular "royal fifth" stamp can be seen (circle outlined by pearls and the royal crown in the centre).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.

Photograph	Registration No Inventory No	Date of extraction	Artefact	Material	Size (cm)	Weight	Description	State of conservation
	NSM-16/22 NSM16-00020	16-09-2016	PLATE FRAGMENTS	Silver	Max. dimensions conserved: 5.8x2.6 cm Thickness: 0.2 cm	6.05 g	Fragment of edge of winged and moulded plate.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/23 NSM16-00021	16-09-2016	PLATE FRAGMENTS	Silver	Max. dimensions conserved: 9.9x2.7 cm Thickness: 0.3 cm	12.22 g	Two fragments from the same edge of a winged and moulded plate.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Copper oxide on the halides of the plate wing and a possible spot of active corrosion. Matter has been lost due to corrosion, erosion and mechanical breakage.
	NSM-16/24 NSM16-00022	16-09-2016	PLATE FRAGMENTS	Silver	Max. dimensions conserved: 9.2x2.9 cm Thickness: 0.2 cm	12.24 g	Fragment of edge of winged and moulded plate.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/25 NSM16-00023	16-09-2016	PLATE FRAGMENTS	Silver	Max. dimensions conserved: 2.4x0.9 cm Thickness: 0.15 cm	1.53 g	Small edge fragment of winged and moulded plate.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/26 NSM16-00024	16-09-2016	PLATE FRAGMENTS	Silver	Max. dimensions conserved: 8x2.8 cm Thickness: 0.2 cm	7.04 g	Fragment of the wing of a moulded plate.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/27 NSM16-00025	16-09-2016	CUTLERY HANDLE	Silver	Max. dimensions conserved: 4.8x0.8 cm Thickness: 0.4 cm	8.09 g	Fragment from cutlery handle. With traces of grooves and an inscription which appears to be "Encinas". This could possibly be related to a "Dr. Encinas" whose name appears on the cargo manifest. That same decoration and inscription appear on other pieces of cutlery: the spoon forming part of set No NSM-16/01 and fork No NSM-16/09.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/28 NSM16-00026	16-09-2016	CUTLERY HANDLE	Silver	Max. dimensions conserved: 2.5x1.5 cm Thickness: 0.4 cm	4.58 g	Cutlery handle fragment with a central rib on the front, similar to other pieces of cutlery (NSM-16/01, NSM-16/09 and NSM-16/27).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.

Photograph	Registration No Inventory No	Date of extraction	Artefact	Material	Size (cm)	Weigth	Description	State of conservation
	NSM-16/29 NSM16-00027	16-09-2016	SMALL HANDLE	Silver	Max. length: 7.4 cm Thick end: 0.8x0.5 cm Narrow end: 0.1x0.1 cm	26.59 g	Solid silver handle from a small object, with very thin long extremities. Similar to an artefact extracted by Odyssey (AMS-D-07-0068- OR), which came to ARQVA in 2012 and has been part of the permanent exhibit since 2014 (NSMG-39). It has been deduced to be a fastener or support for a lightweight object.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has some active copper corrosion spots. Very eroded piece; matter has been lost due to corrosion and erosion making for very sharp edges.
	NSM-16/30 NSM16-00028	16-09-2016	SMALL HANDLE	Silver	Max. dimensions conserved: 4.2x0.8x0.5 cm	11.44 g	Solid silver handle fragment corresponding to a small object. Similar to a previous piece (No NSM-16/29) and to one extracted by Odyssey and on exhibit at the MNAS (NSMG-39).	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has some active copper corrosion spots. Eroded piece; matter has been lost due to corrosion and erosion.
	NSM-16/31 NSM16-00029	16-09-2016	CANDLESTICK FRAGMENT	Silver	Max. length: 2.8 cm Upper moulding, diam.: 2.1-2.2 cm Middle moulding, diam.: 3.0 cm Lower moulding, diam.: 2.4 cm	61.12 g	Candlestick shaft fragment with three mouldings intact.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/32 NSM16-00030	16-09-2016	UNDETERMINED FRAGMENT	Silver	Max. dimensions conserved: 1.7x1.6 cm Thickness: 0.5-0.6 cm	4.91 g	Small fragment with decorative stamp.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. Generalised copper oxide on the halides and sediment deposits. Material lost due to corrosion and erosion.
	NSM-16/33 NSM16-00031	16-09-2016	RING	Silver	Dimensions: 2.2,x1.1 cm Thickness: 0.2-0.4 cm	2.33 g	Oval shaped ring, which could be part of a buckle or ornament or a small handle.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has some active copper corrosion spots. Eroded piece; matter has been lost due to corrosion and erosion.
	NSM-16/34 NSM16-00032	16-09-2016	UNDETERMINED FRAGMENT	Plata	Dimensions: 2.4x1.9 cm Thickness: 0.1-0.3 cm	2.87 g	Undetermined fragment.	It has a stable silver halide patina of a purplish grey colour fused to the metallic core. It has some active copper corrosion spots. Very eroded piece; matter has been lost due to corrosion and erosion.
	NSM-16/35 NSM16-00033	16-09-2016	15 UNDETERMINED FRAGMENTS	Silver	Several depending on fragment	21.22 g	Fifteen undetermined fragments.	All the pieces exhibit very stable halide patina of a purplish grey colour fused to the metallic core. Some fragments exhibit isolated copper corrosion spots and on others is more generalised. Many have adhered sediments. Very eroded artefacts; matter has been lost due to corrosion, erosion and mechanical breakage.

