The EXPLORERS CLUB

REPORT OF EXPEDITION

FLAG 97

Ancient Shipwrecks of Croatia

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Introduction

In 2011, AURORA Trust signed a memorandum of understanding with the Universities of Zagreb and Zadar in Croatia. In collaboration with these two prestigious entities, the Trust formed a joint project aimed at exploring the seabed in various parts of Croatia down to the 150 meter contour. For the first operational season the team decided to start the survey around the island of Hvar.

History

The strategic position of this island on the maritime routes of the Adriatic has played a major role in the history and development of this island. In the Neolithic period the so-called Hvar culture evolved, known for its pottery decorated with spiral motives. In the fourth century BC the Ionian Greeks founded the town of Pharos at the head of a deep bay on the north side of the island. The Greek agricultural landscape survives up to the present day and has been recently declared an UNESCO World Heritage Site. Following the arrival of the Romans in the late third century BC, the island evolved into a center for recreation, wine production and fishing. The numerous underwater remains from the seabed point to the island being used as a staging post for vessels sailing between Dalmatia and the Italian mainland. In the Middle Ages, the Venetians took over the island and proceeded to develop the town of Hvar. Major structures built by the Venetians include the cathedral, castle, monastery and arsenal. The latter was used for the building and maintenance of vessels. Venetian rule lasted until the late eighteenth century when the area fell under the influence of the Austro-Hungarian Empire. Austrian rule lasted, except for a brief French interlude, until 1919 when Italian forces occupied Hvar. In 1921, through the treaty of Rapallo, the island formed part of the Kingdom of the Serbs, Croats and Slovenians, which later evolved into Yugoslavia and subsequently the Socialist Federal Republic of Yugoslavia after World War II. In January 1992, Hvar formed part of the newly formed and independent state of Croatia. Today it is a major tourist destination and important hub for the yacht charter industry.
Background

A recent survey and quantification of finds from an underwater context has established over 200 sites, which vary from shipwrecks to individual objects. Information for this survey was gathered from a variety of sources including fishermen, sports divers and archaeologists. The sheer number of finds from around Hvar pointed to the seabed around the island as being of high potential.

The Fortaleza and ISIS II were guests of the Hvar Port Cooperative and both vessels were hosted on the historic dock of the town just opposite the arsenal. In October 2010, ISIS II systematically surveyed a large area around Hvar using side scan sonar. The AURORA team was supplemented by a team of local experts from a variety of fields including marine biology, robotics and archaeology.

Once the entire area was surveyed, AURORA deployed its remote operated vehicle to visually inspect some of the more significant sonar targets. The ROV was also used to explore a large number of sites that were deemed of importance by the team of marine biologists. Video footage and stills acquired will enable experts to study the marine life around the island. From an archaeological perspective, initial results obtained during the course of this first season were encouraging. At least three important discoveries have been registered. These include a whole and well preserved dolium (a very large amphora-type container) which may form part of a larger site buried under the sediment, a Roman shipwreck with Lamboglia II amphorae from the 2nd/1st centuries BC and the wooden remains of a vessel datable to approximately the 17th century.

2011

Side Scan Sonar Survey

The survey equipment that was used for the 2011 survey off the island of Hvar, Croatia consisted of a dual frequency Klein 3900 system (450 kHz and 900 kHz) side scan sonar, which was towed by RV ISIS, the research vessel owned and operated by Deep Blue Surveys and leased to AURORA Trust. The side scan sonar was
interfaced to a precision GPS which ensured that all data captured during the survey was geo-referenced. All navigation and survey line setup and control was handled in SonarPro software while towfish and target positioning was done using a layback algorithm.

The side scan sonar survey consisted of two phases. Phase one was a long range medium altitude survey with widely spaced survey lines using the 450 KHz system. This facilitated the quick coverage of the entire area. The foremost aim of this phase was to create a mosaic map of the survey area with details of seabed topography and geology. In turn, this information determined precise guidance for phase two of the survey. In this phase, the towfish was ‘flown’ much closer to the bottom on short range and high frequency (900 KHz) so as to obtain higher resolution sonar data of targets identified in phase one. This two-phase approach, which includes the gathering of initial bottom intelligence, greatly reduced the risk of hitting seafloor obstructions. It also ensured optimal data were acquired. Once all the data are collected they will be processed into a mosaic map, and then saved as a high resolution geotiff so data can be used in GIS processing software. An analysis of all bottom targets was made and submitted, including a comprehensive target report showing target images, locations and measurements.

Figure 1. Survey area and line spacing for side scan sonar survey off Hvar
ROV SURVEY

In order to securely identify the nature of these shipwrecks, the project team deployed a SAAB Seaeye Falcon remote operated vehicle (ROV). This is a 300 meter depth-rated observation class vehicle with a high resolution color video camera; a Kongsberg underwater stills camera and an Imagenex Sonar. LinkQuest’s Tracklink USBL Acoustic Tracking System was deployed in order to obtain and record the precise whereabouts of the ROV throughout the survey.

The ROV survey entailed the recording of video footage and photographs of the sites that would help identify and date them. In order to achieve this, the ROV was flown ‘freely’ around the shipwrecks with the stills camera mounted at an angle of 45 degrees. This permitted the recording of video footage and photographs from as many angles as possible, thus enabling the acquisition of detailed video graphic and photographic data.
Figure 3. Deploying the ROV.
The Discoveries

Shipwreck

Figure 4. Iron anchor from shipwreck 1.

A series of features (possibly metal) standing proud of the seabed where identified in an area which is completely devoid of other objects. These are full of marine growth and therefore hard to identify. However, one of these features was securely identified as an iron anchor. It has yet to be determined whether more structures and objects lie buried in the seabed.
Shipwreck II

Figure 5. Amphorae from shipwreck II.

A Roman shipwreck datable to the 1st century BC. From our initial studies it is quite evident that the site has been somewhat damaged by trawl nets. Despite this damage, a substantial part of the cargo is still intact and can be identified as Lamboglia II amphorae. These ceramic jars carried wine that was produced all over the Adriatic Sea.
Shipwreck III

**Figure 6.** Amphorae from shipwreck III.

A late Roman shipwreck datable to the 6th-7th centuries AD. From our initial studies it is quite evident that the site has been heavily damaged by trawl nets. Due to this damage, a substantial part of the cargo is fragmented making it hard to identify the objects that are strewn around the site. The current working hypothesis is that the amphorae on this site are those referred to as the Samos Cistern Type which, as their name suggests, originate from the island of Samos in the eastern Aegean.

**Future work**

Enough interest was generated from these finds that an EU grant has been written and submitted which would provide a sea floor habitat to be used to investigate Croatian underwater sites in detail.