



ABSTRACTS

IN POSEIDONS REICH XXII

17.-19. März 2017 in Koblenz

**"Wir sitzen alle in einem Boot -
Die gesellschaftliche Bedeutung von Schiffen, Flößen und Fähren"**

IN POSEIDON'S REALM XXII

17.-19. March 2017 in Koblenz

**"We are all in the same boat -
On the significance of ships, boats and floats in society and culture"**

In Kooperation mit/In Co-operation with:



UNIVERSITÄT
KOBLENZ · LANDAU

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In Poseidons Reich XXII

Vorträge

Batur, Katarina; Bermanec, Vladimir

“The various cargo of Gagliana grossa, with special emphasis to the raw materials for paint production”

The finds from the Gnallić shipwreck site include items of ship's equipment, armament and cargo, including significant evidence on cargo containers. A large percentage of the recovered cargo consisted of more than 5500 glass objects belonging to 60 different forms, including thousands of fragments of glass vessels, flat rounded windowpanes of various sizes, rectangular mirror cast sheets, circular and rectangular finished mirrors, and about 9kg of glass beads.

The iron-clad chest, recovered in 1967, drew the most attention, as it gave the impression of being the ship's strongbox. The chest with great probability belonged to a textile merchant, and contained three linen shirts, eight woollen caps, a small box made of teak wood, containing weights and a precision scale, and an amazing roll of luxurious silk damask.

Considering the various raw materials for paint production, the identification of their composition was realized in collaboration with the Department of Geology of the Faculty of Science, University of Zagreb, by applying the methods of macroscopic examination, X-Ray Powder Diffraction and Scanning Electron Microscopy.

Cassiti, Patrick; Radić Rossi, Irena

“The products of German origin from the cargo of *Gagliana grossa*”

Of particular interest among the rich and various cargo of *Gagliana grossa* were spectacles with leather frames, of probable German origin (Germ. *Lederbrille*). According to an estimate, the total number of spectacles amounts 432 pairs.

Other significant features of the cargo were the brass chandeliers, transported in pieces for assembly at the final destination. Up to now, we dispose of about 600 pieces in three different versions– ceiling, wall, and table chandeliers. The semi-finished products included two types of brass sheeting (Germ. *Bugmessing* and *Rollmessing*). Further finds included brass wire, brass bars and tin-coated steel plates. The Gnalić shipwreck also yielded brass hawk bells, brass pins and needles, brass thimbles, tokens, razors made of steel, brass and wood, and entirely or partly preserved candle-snuffers.

These objects belong to the category known as ‘Nuremberg Wares’, items produced in large numbers in Central Europe by highly specialized and rationalized methods and traded extensively on a global scale. As such, their study provides insights into important networks of material and cultural exchange in the Mediterranean and beyond during the 16th and 17th centuries.

Čelhar, Martina; Mato, Ilkić; Parica, Mate; Vujević, Dario

Prehistoric underwater site near the islet of Ričul in northern Dalmatia (Croatia)

In 2014 the archaeologists from the Department of Archaeology at the University of Zadar started exploring the prehistoric underwater site near the islet of Ričul in northern Dalmatia. Existence of a prehistorical settlement with a harbour was indicated by recovered structures and artifacts in three archaeological campaigns. Wooden piles and prehistoric pottery sherds are visible on the sea bottom of the entire site. Underwater probes revealed a cultural layer c. 1 m thick. In addition to ceramic weights, a fisherman's net needle was discovered suggesting presence of a maritime community. However, the finds of terrestrial fauna, primarily domestic animal bones, make the biggest part of the bioarchaeological material.

An olive pit found at the bottom of the probe is one of the earliest finds of the kind on the eastern Adriatic coast. Typological and technological features of the archaeological finds indicate that this settlement and the accompanying harbour were used in the late periods of prehistory. The conducted radiocarbon analysis of one of the piles dates the settlement and the harbour construction to 1500-1395 cal. BC (1430 cal BC). Dating of this settlement to the Middle Bronze Age opens up new possibilities for discussions about a poorly known prehistoric period in northern Dalmatia.

Enzmann, Jonas

Land, River and Ocean. The transport of rotary querns made of basaltic lava from the Eifel-region in the Roman Iron Age.

The intercultural exchange of goods is very interesting for archaeology. Not only because goods that were produced in one cultural entity and transported in another are often easy to recognize, but also because it makes intercultural contact visible. On basis of objects like rotary querns the archaeologist can comprehend how material, technologies and even ideas spread over cultural borders. The exchange between the Roman Empire and the Barbaricum is in discussion since the early 20th century. In 1938 Rafael von Uslar already recognized basaltic lava as imported goods in the Barbaricum. But beside small scale distribution maps of basaltic lava finds in the northern part of Lower-Saxony and Bremen no research on that subject was conducted.

In his master thesis the author analyzed all published basaltic lava fragments in the northwestern Barbaricum which resulted in a model for a large scale intercultural exchange and transport system. On the basis of Christer Westerdahls transport-zone-model the author wants to show how the natural and cultural background influenced the transport and the exchange in general. The result will be a differentiated model for the distribution of rotary querns made of basaltic lava from the Eifel-region on land, river and ocean.

Gerasimov, Vyacheslav

Unterwasserarchäologische Forschungen in den Gewässern von Tendra Halbinsel (Ukraine) im Jahr 2016

Underwater archaeological exploration in the waters Tendra Spit in 2016

In der Saison 2016 die gemeinsame archäologische Unterwasserexpedition "Ahillos Dromos" (leit. M. Ievlev, V. Gerasimov) IA NAd.W der Ukraine, Kiew, Ukraine und der Abteilung für Unterwasserarchäologie des Archäologisches Institut der Warschauer Universität und einen Studenten Kreis „Wod. O. Lot.“, Warschau (Polen) wurden Unterwasserarchäologische Forschungen in den Gewässern von Tendra Halbinsel (Tendra-Nehrung) in Schwarzen Meer der Gebiet Cherson in der Ukraine durchgeführt.

Unterwasserarchäologische Forschungen waren in den Gewässern in der Nähe der nördlichen Spitze des Spießes Tendra Halbinseln von beiden Seiten in Tendrovsky Zaliv (Tendra Bucht) und vom Meereseite konzentriert. Neben der visuellen Exploration durch Taucher wurden auch nicht eindringende Forschungen des Gewässergrunds unter Verwendung von Echolot, Prophilograph und Side-Scan-Sonar durchgeführt. In Ergebnis der Forschung gelang eine genaue Seebodens Beschaffenheit Karte von Nördlichen und nordwestlichen Spitze den Halbinseln zu erstellen. Während der visuellen Exploration an der Küste und Unterwasser auf relativ kleiner Fläche wurden keramische Artefakten entdeckt. Archäologisches Material ist präsentiert durch zwei Fragmente von Amphorenkehlen, elf Fragmenten von Amphorenwände, zwei Fragmente von Dachziegeln und ein Fragment eines Bronze oder Kupfer Blechs, der höchstwahrscheinlich ein Teil der Schiffshaut darstellt, da an ihn die Löcher von den Nägeln erhalten sind. Alle entdeckten Artefakte gehören zur selben Zeit von I Jahrhundert u.z. und vertreten wahrscheinlich die Überreste eines Schiffswracks. In Ergebnis der durchgeführten Forschungen gelang es eine exakte Bathymetrische Karte des Gewässergründen und Sedimentdichte zu erstellen, fünf potentielle Unterwasser archäologischen Objekte für zukünftige Explorationen und eine mögliche Wrackstelle aus der Römerzeit zu entdecken.

In the season 2016, the joint underwater archaeological expedition "Ahillos Dromos" (ch. M. M. Ievlev, V. V. Gerasimov) IA NAS of Ukraine, Kyiv, Ukraine and the Department of Underwater Archaeology Institute of Archaeology of the University of Warsaw and a student circle "Wod. O. Lot.", Warsaw (Poland) have been carried out underwater archaeological exploration in the waters Tendra spit on the shelf of the Black Sea, Ukraine Kherson region.

Underwater archaeological exploration focused in the waters near the northern tip of the spit Tendra from both Tendrovsky Bay, and from the sea. In addition to the visual reconnaissance divers non-penetrating intelligence bottom waters were conducted using, sonar profiler and side-scan sonar. As a result of the research could make a bathymetric map of the north - north-western tip of the spit.

During the visual intelligence, it has been identified as the surface material on the shore and under water at relatively large area. Archaeological material presented 2 throats amphoras, fragments of amphorae wall 11, 2 fragments of tile and one fragment of a bronze or copper plaques are most likely part of the skin, since it preserved holes from the nails. All the discovered artifacts belong to the same period of I c. and is likely to represent the remains of a shipwreck.

As a result of the research we were able to make an accurate bathymetric map of the bottom waters and sediment density, find five potential underwater archaeological sites, for further studies, and one possible wreck of the Roman period.

Grossmann, Eva

The Nails of Apollonia/Arsuf, Israel

One of the oldest professions was boat building. Boats were made from materials abundant in the vicinity, like hide and reed, but mainly from wood. At first planks were joined by ropes and later by the mortis and tenon method, also using wooden nails. But when metal nails appeared, they solved the problem. During our survey in Apollonia we found a cluster of unused nails, 2 to 22 cm long. They were found with archeological finds from the 2nd century AD. When examining them, after the encrusture was removed, we found out that they were forged, and that some of them have at their tip an extension like a thin needle.

Till now we could not discover the purpose of this extension. There was an abundance of suggestions; that the nails were a weaving tool or that its use was to remove a thorn. The short nails could have been used to fasten metal sheets to cover vessel bottoms and keels, to protect them when beaching. Also of interest is the way how the metal rods from which the nails were made, was produced. The nails were tested at a metal laboratory for hardness and their composition by visual and stereoscopic examination, and were observed by electronic microscop.

Juan, Carlos de

**The Bou Ferrer roman shipwreck (Villajoyosa-Spain),
a field school for Philipps-Universität Marburg**

In the year 2000, two diving enthusiasts who were exploring the seabed off Villajoyosa (Spain), discovered the wreck of a Roman ship, now known as Bou Ferrer. At some time in the first century AD, a large sailing ship was carried with thousands of amphorae, filled with the much-prized kind of garum made in Cadiz, sinking in Alicantes province shore.

Currently, the research excavation is working in the central area of the shipwreck, where four layers of amphorae cargo have been excavated, the hull has appeared in this area, in an excellent state of preservation. The info about the dimensions of the vessel that we are managing at the present, shows us that we are in front of one of those big vessels that connected the Baetican province with the most important harbors of Rome.

At the end of 2016 summer semester, DAAD guest professor program in nautical archaeology (Classical Archaeology Seminar of Marburg University), a successful field school was done in the roman shipwreck of Bou Ferrer, organized in association with the University of Alicante. In this communication, we present the most important characteristics of the site and how the field school was managed by Philipps-Universität Marburg.

Lukoshkov Andrei, Prokhorov Roman

The Study of Ancient Ships on River Routes Russia – Baltic States - Germany

Since 2002, the Russian archaeologists are working to study ancient water trade routes connecting the North-Western territory of Ancient Russia and the Northern coast of Germany. These routes passed the rivers of modern Russia, Estonia, Latvia and along the coastal bays of the Eastern part of the Baltic sea. In the course of expeditions at the bottom, were found more than 100 remains of ships, which allowed to determine the types of Slavic vessels participating in transportation. All of them have counterparts among the ships used in Germany, and there are similarities in the names, and in designs and in production technologies.

The first type of traditional boat is struga – kind of vessel common from the Slavs, also known in the Baltic region: struga, and in Germany: struse, strusekerl. They were the vessels with dugout base, widened with thermal treatment and furnished with planked thin guard boards.

Another traditional kind of vessels is dugout boat ladja, known by all Slavic nations, as well as the Balts aldijs, luotas, and in Germany. These vessels are called lüd'a in the language of the Sorbs living along Elbe River, and loddie, loddige in Middle and Low German.

One more kind of traditional vessel in Russia is named “composed dug-out”. These composite structures were made of 10-11 details dug out of tree trunks. The vessels built according to this technology are also known under the name blockkahn in Germany in the region of Lubeck.

It is interesting to notice that the ancient technology of sealing the joints between parts using protection of caulk with wooden planks which was known from the X century is used. They are fixed on the vessel body with metal staples (German: sintel). This technology is traditional in the regions of settlement of the Slavs on the coast of the North Germany.

Flatbottom ferryboats. The ribs made of tree roots fixed by wooden dowels were used for fixation of bilge and sides desks. Analogous construction were found in the rivers of Latvia and of the North German and even in the region of Bodensee, where they are known under the name lädi.

Ladja with rounded hull and keel girder. Their construction and sailing rig are mostly analogous to North-German kogg. Moreover, fishing vessels known on Lake Ilmen as Ilmen soima by their construction are alike the North-German fishing vessels of Heuer kind, and have the same keel centerboards.

All the enumerated kinds of traditional Russian vessels have absolute constructive and technological similarity with the vessels of the Balts and population of the Northern Germany, which indicates their common origin and old trade links. We should emphasize that all these vessels belong to class “river – sea” and fitted to navigation along shallow coasts of Southern and Eastern Baltic.

Mileszczyk, Małgorzata

The Lake Grid Dwelling in Rybno 1 (Piłakno Lake, Warmian-Masurian Voivodship) – the Impulse for new Interpretations

The archaeological residues of the West Baltic Barrow Culture might be located in south-eastern Baltic region. Its chronology can be approximated for the 1st millennium BC. One of its distinctive features is a defensive type of settlement, with the most sophisticated ones built on islands, both natural and artificial. The second case – so-called lake grid dwellings – (primarily seen as the analogy to Alpine palafittes, later though described as closer to British crannogs¹) were an academic issue since the late 19th century, when (as a result of the intensive drainage) they got the attention of antiquarians.

The next important archaeological enterprise in this matter was the 1960s project in Piłakno Lake, at the lake grid dwelling site Rybno 1, where the newest methods of research were tested.² The uncovered material got to the Warmia and Masuria Museum in Olsztyn. As the previous analyses were made before the valid definitions and typologies of the aforementioned culture were published (specified in 1970³, and lately updated⁴), it was researched accordingly, with some interesting results which might give a new approach for the issue.

¹ OKULICZ, Ł. (1970), *Kultura kurhanów zachodniobałtyjskich we wczesnej epoce żelaza*, Wrocław, 72-77; HOFFMANN, M. J. (2000), *Kultura i osadnictwo południowo-wschodniej strefy nadbałtyckiej w I tysiącleciu p. n. e.*, Olsztyn, 57-61.

² BUKOWSKI, Z. (1965), *Remarks on Archaeological Underwater Research Based on the Example of a Settlement within the lake Piłakno, Mrągowo District (North-Eastern Poland)*, *Archeologia Polona* 8, 105-123.

³ OKULICZ 1970.

⁴ HOFFMANN 2000.

Nicolardi, Mariangela; Bondioli, Mauro

“The role of Gagliana grossa in the historical interpretation of the Late Renaissance period”

Based on Astone Gasparetto’s assumption of the ship’s identification, the systematic research into the Venetian archives started, with the objective of examining all the preserved documents (remaining after the fires of the Doge’s Palace) from the offices of approximately sixty notaries public active in Venice in 1583 and 1584. Final confirmation that the *Gagliana grossa* was indeed lying on the seabed at Gnalić came at the end of June 2012, at a time when the trial research was in full swing. The diversity of all the archaeological finds, and the exhaustively researched historical data, offer a unique picture for the reconstruction of the wealthy European and Mediterranean cultural, economic, political and maritime past during the period of the late Renaissance.

The known crew-members hailed from Italy and Croatia; the merchants, artisans and other personnel involved in the story came from Italy, Croatia, Turkey, Greece, Portugal, the Netherlands, and Great Britain; the cargo, in all probability came from Italy, Slovenia, Germany, Bohemia, Great Britain, and Peru; some affairs and events link the story to Romania, Lithuania, Malta, France, and Spain – and some isolated items to France and Poland. Therefore, we can depict the shipwreck at Gnalić as a microcosm of the intense mutual ties between the states and nations of Renaissance Europe, and its connections with the rest of the world.

Oliveri, Francesca and Lo Porto, Antonina

A safe haven for ships: recent underwater research in Mozia, Western Sicily

A small island located near the coast of Marsala, Western Sicily, Mozia is the typical Phoenician settlement with a commercial vocation, as transmitted by the historian Thucydides. Archaeological excavations on the island of Mozia demonstrate the presence of the Phoenicians from the late eighth century B.C. and highlight how, at the present state of research, it is the oldest Phoenician colony in Sicily. The island is situated on a stretch of sea known as the Stagnone Lagoon, between Isola Lunga and the coast, whose shallow water gave a safe haven for ships. The link with the mainland was insured by a causeway almost 2 km long, built on the sea, which went from Mozia to the mainland. Currently the road is below the sea level, but it was still in recent times used for the transport of carts with high wheels. The so-called “underwater causeway” of Mozia is an archaeological unique in the Phoenician-Punic world.

After the investigations of Isserlin in the seventies, the Soprintendenza del Mare has since 2005 resumed systematic research to define its structural elements and clarify its role in the port system of the Stagnone Lagoon. In fact, from a structural point of view all existing underwater structures around the island, while belonging to different architectural types (West and South Gate included), were elements of a single system that made the shallow waters of the Stagnone a safe haven for those who knew the routes, in the best tradition of the Phoenician homeland harbour architecture.

Olkhovskiy, Sergey; Shmatkov, Aleksey; Verhniackiy, Andrey

3D Seismic Survey in Flooded Part of Phanagoria

Since 2011 IARAS expedition uses hydromagnetic and acoustic methods for locating and study of archaeological objects in Phanagoria' water area. A significant part of adjoining waters is already examined, but flooded part of the city is inaccessible for most survey instruments due to very shallow depths (1-2 m). In the last years there has been growing interest in using of 3D ultra high-resolution (UHR) techniques for various marine seismic surveys, some of them can be used for archaeology purposes. However there are some issues of 3D UHR surveys in the very shallow water due to limitations for receivers array width and accuracy of positioning.

In 2016, we decided to try this method and built a multipurpose automotive platform. The system consists of frame, 4 wheel pairs, engines and boxes with electronics. Movement and acquisition control, data transfer and power supply are provided by umbilical from onshore control station based on components of the MSS-350 ROV. A moving carriage with mount for sub-bottom profiler (Innomar SES-2000 Compact) and DGPS (Trimble SPS-461) are located on the perpendicular truss construction 5,5 m width.

Consequently, it provides possibility to acquire seismic traces with spacing about 5-10 cm between them in swath 5 m per one scan line. During the survey distance between scan lines had varied from 20 to 30 cm. The bin size of final seismic cube (5 to 30 m) was 25 to 25 cm. Analysis of the survey results showed that it detects stone accumulations and small objects lying separately. This greatly increases informative value of the survey and helps to locate archaeological sites.

Öniz, Hakan

A New Discovery: 274 Slipways of A Shipyard of Dana Island-Cilicia

During the underwater research project along the Mediterranean shore in Silifke district of Mersin province, a shipyard has been identified on an Island. The name of the island is “Dana Island” and located two kilometers off the coast of the Rough Cilicia archaeological region. The team of Selcuk University has carried out underwater survey around of the Island in 2015 and found anchors from Bronze, Iron, Roman, Late Roman periods, one iron ram and some sunken constructions at the coast. These constructions were mainly entrances of the slipways and some of the buildings of the shipyard because of the earthquakes and probably sea level rise.

During works in 2016, team has documented 274 slipwayson the island which were available to built from small size boats to bigger size polyremes. Iron melting units, workshops, houses, watch towers, churches and different constructions have been detected but not completely documented yet. Surface materials such as coins and amphorae are dated to 5th-6th Century AD. However there are some reasons to think that this shipyard was used in the Late Bronze Age, Iron Age, Hellenistic, Roman and Byzantion periods.

Pydyn, Andrzej; Radka, Krzysztof

The Royal dugout – the Medieval early boats from the Lake Lednica in western Poland

Dugouts are one of the earliest watercrafts known from archaeological evidence. Probably the oldest example of this type of boat is known from the Pesse Swamp in Holland, dated to 8265 ±275 BP. Not much younger are the findings from Noyen-Seine in France, dated to 7960±100 BP. Logboats were probably becoming common in Europe with the development of the post-glacial wood zone. This type of watercrafts was still in use in rural areas of Europe in the 20th century.

Many of dugouts discovered in Poland are dated to the Early Medieval times. A number of them were discovered near the island Ostrów Lednicki. The fortified settlement on the island was one of the strongholds of the early Polish state. The first Polish king Bolesław was probably borne there, and in the year 1000 he welcome on the Ostrów the Otto III, Holy Roman Emperor. At this time the island was connected with land by two large bridges.

Underwater research in the lake were carried for the last few decades. As a result of the work two so-called “Royal logboats” were discovered. Both of them were almost 10 m long. The first of them made of oak was well preserved and it was salvaged in 70’s of the 20th century. The second dugouts made of ash tree was in very bad condition and it was lifted in the year 2016. Both boats were made and used during the construction of the bridges between 10th and 11th century or during the military expansion of the Czech Prince Bretislav I.

In the last few years the Department of Underwater Archaeology from Nicolaus Copernicus University conducted a number of projects that had interdisciplinary approach. On the one hand we tested on shallow waters new techniques like sonar, side scan sonar, ground-penetrating radar surveys, and on the other hand we intensified environmental analyses, including dendrochronological, pollen, macro and geomorphological research.

New methods of documentation were also introduced, including photogrammetry and 3D modeling. A significant part of the research were supported by Polish Ministry of Culture and the National Heritage Board. Surveys were carried both on prehistoric – the Stone Age, the Bronze Age and the Early Iron Age sites, as well as on the Medieval ones. The majority of research took place in north-eastern Poland (the Ilawa Lake District) and in central-western Poland (the area of Greater Poland).

Radić Rossi, Irena; Casaban, Jose; Boršić, Luka

The ship *Gagliana grossa* in its social and cultural context

In the early 1960s, local divers discovered an outstanding shipwreck site, near the small island of Gnalić at the south-western entrance of the Pašman Channel. Subsequently, several archaeological interventions in the late 1960s and early 1970s, and one in 1996, rescued part of the archaeological remains of a large merchantman, dated to the late 16th century. In the summer of 2012, an international, interdisciplinary expedition returned to Gnalić, with the intent to determine the condition of the hull, verify the quantity of the artefacts remaining on the bottom that required recovery and conservation, and perform a proof of concept to support a full-scale excavation of the shipwreck.

The extent of the site and the excellent preservation of the ship remains and its cargo make it one of the most interesting post-mediaeval shipwrecks known. Research in the Venetian archives revealed the owner and the name of the ship, as well as many interesting details of its amazing story. The social and cultural, European and Mediterranean context of the ship *Gagliana Grossa* is particularly rich with important historical figures, and various historical events.

Ravn, Morten

Social organisation on board Viking-Age long ships – an experimental archaeological investigation

In 2004, the Viking Ship Museum in Roskilde launched a full-scale reconstruction of the Viking-Age longship, Skuldelev 2. The ship, named The Sea Stallion from Glendalough, has since been used for sailing tests and trial voyages in both Danish and international waters

The experiences gained during the sailing and rowing experiments demonstrates that the large crew and the limited space on board would have made special demands on working conditions and social organisation. The conditions on board helped to mould the crew into a unit whose individual members understood and obeyed orders and functioned as a single collective unit. A similarly intense collective formation is seen among warriors – in prehistoric, historical and present-day contexts.

One important point is, therefore, that practice on board the longships might have helped to forge the strong, smoothly functioning military units of the Vikings. The self-commanding military units expressed in a ship's crew could adapt to the process of war, where uncertainty, lack of clarity and chaos forces ongoing re-evaluation and adaptation. On board the personnel carrier, the seaman became a crew-member and the warrior was incorporated in the fighting unit.

Ridao, Pere; Gracias, Nuno

“The methodology and the results of the AUV (Girona 500) survey of the present state of the Gnalić shipwreck site”

In the framework of the Breaking the Surface field workshop on underwater robotics and applications, held in Biograd na Moru (Croatia) in October 2016, the Autonomous Underwater Vehicle GIRONA 500 was employed to record the state of research of the wooden hull of the late 16th century shipwreck of Gnalić. The work was conceived to demonstrate the state-of-the art of applying the underwater robotics in rapid high-resolution mapping of shipwreck sites.

The work was realized in collaboration between the Department of Archaeology of the University of Zadar and the Computer Vision and Robotics Research Institute of the University of Girona. The AUV was programmed to survey the shipwreck at multiple altitudes, and the data collected was used to build 2D photomosaics and 3D optical reconstructions with 1 mm x 1 mm pixel resolution, as well as development of topological panoramic maps which were made available only 3 days after the diving.

The challenges that marine archaeology poses to underwater roboticists will be briefly discussed, as well as the contribution that this technology may bring to the archaeology community.

Siepenkötter, Christa; Titius, Wolfgang

“The role of volunteers in the underwater archaeological research: The case study of the shipwreck of Gnalčić, Croatia”

During the four intense research seasons, realized from 2013 to 2016, the collaboration between University of Zadar the German Association for the Promotion of Underwater Archaeology (Verein zur Förderung der Unterwasserarchäologie e.V. FUWA) and the Tauchbasis Koblenz proved to be an extremely efficient solution for realizing the demanding underwater research campaigns.

The divers provided with the basic archaeological training, realized through the NAS courses, experienced all phases of the systematic underwater archaeological research, encompassing the initial setup, excavation and documentation of the hull, recovery of the artefacts and the *in situ* protection of the site. Through the multi-year engagement, they became the skilful assistants to the archaeologist, and experienced the full involvement in a nautical research project.

Stefanile, Michele; Morra, Pasquale

Homeric shipbuilding: trees, woods, tools and symbols

In the tradition of studies related to the field of ancient shipbuilding, a particular attention has been focused so far on a famous section of the V book of Homer's *Odyssey*, in which the cunning hero sails away from *Ogygia*, Calypso's Island, on a self-made boat, or eventually raft.

This part of the poem impresses for the accuracy of the description and for the abundance of the details, in some cases very precise: the trees are chosen for the specific qualities of their woods; the tools, offered by the demigoddess, are not simply makeshift, but instead, they are the more appropriate for a real naval carpentry.

For these reasons, several scholars used this text as a specific reference to the shipbuilding of a period still lacking of good archaeological evidences, connecting them with the rich iconographic body of the ships and boats depicted on the Greek pottery from the Geometric period.

By the way, in the light of the advances in the modern naval archaeology, it is perhaps possible to reconsider, again, this text together with the long list of interpretations of it, linking the original words with the few comparable data from the shipwrecks, and highlighting, at the same time, the lexical choices related with symbols and symbologies and not straightly with real shipbuilding.

Tilley, Alec

Some distinctive types of boat, and the distinctive people in them

In this paper, I examine several ancient representations of boats which resemble boats of our era. Did people who used the same distinctive type of boat have other things in common?

This from the Balawat Gates, is a boat of the 9th-cent BC bringing tribute from Phoenician Tyre to Shalmaneser III, king of Assyria. It looks very like today's Venetian gondola.

Very similar Phoenician boats are portrayed on a wall relief in the palace of Sargon. The late Professor Lionel Casson published his opinion (citing mine) that: "these small boats have a modern descendant that shows incredibly little change, the *dghaisa*, a distinctive harbor craft of Malta" (Casson, 1995, p66-7). Continuity between today's Maltese boats and ancient Phoenician boats is not surprising, because Malta was a Phoenician colony until the Romans occupied it. By contrast, a connection between Phoenicians and Venetians sounds too much like a pun to be easily accepted. But if the gondola is indeed closely related to the *dghaisa*, a Phoenician/Venetian connection becomes more acceptable.

Although the *dghaisa* is casually called the gondola of Malta, a common ancestry for them is generally discounted by people claiming expertise, because the *dghaisa* has a keel and the gondola has not. Conventional wisdom makes that a major difference, as great as the difference between vertebrates and invertebrates in zoology: but a gondola under construction invalidates that view because the boat then appears to have a keel. What seems to be a keel is a baulk of timber called a *cantiere*, to which the ribs are temporarily nailed, until the side planks are fastened to the ribs. Then the embryo boat is detached from the *cantiere* (which stays in the boat-yard) and turned upside down for the bottom planking to be added.

Another striking feature which the two boats have in common is that the side planking runs horizontally, making no attempt to follow the steep sheer-line. That is in marked contrast to the northern tradition, where the planking follows the sheer-line.

In Portugal, the *saviero* or *xavega*, the *moliciero*, and the *mercantel* have planking that similarly ignores the steep sheer-line. In Kerala (India) I photographed several types of boat with a marked sheer and horizontal planking. A boat (name unknown) in Bangladesh has the same characteristics and is almost identical with the Portuguese *saveiro*.

It seems that a combination of high extremities with horizontal planking may be a boat-building technique that originated in the Indian ocean.

Herodotus tells us that the Phoenicians came originally from the Indian Ocean. (His testimony is usually ignored, following the tradition deplored in Bernal's *Black Athena*).

Sur (Tyre) on the Lebanese coast was an, extending from Portugal to Bangladesh was the result of Phoenician influence. early and important Phoenician port. It has the same name as Sur, one of the most ancient ports of Oman. Sharing a name implies a close connection. Oman once had a formidable navy, and an empire extending from east Africa to Baluchistan. Allen Villiers sailed in traditional Arab ships in the 1930s and recorded the ships and seamen from Sur as prominent.

It would make a coherent whole of the rather indistinct evidence we have, if Sur in Lebanon was founded from Sur in Oman, and that the horizontal planking style' of ship building, extending from Bangladesh to Portugal.

Vianello, Andrea

Moving across rivers and lakes in prehistory

Reed boats, canoes, and rafts have been used for mobility across lands throughout prehistoric times. The mobility that they allowed was often exceptional, enabling regular contacts with distant lands and meetings with foreign peoples, especially if access to the sea was possible. The archaeological record indicates the presence of canoes even before the Neolithic, but it is only after the introduction of agriculture and sedentarism that the canoe acquired significant social importance. At that time, many people stopped to move around the territory, and control of the territory as well as contacts with neighbouring peoples and trade depended on fewer people capable of great mobility. Moving around became at times an attribute for divinities or reserved to important people. The importance of canoes is demonstrated by their presence in the iconography (e.g. Egyptian solar barge) and literature (e.g. Akkadian epic of Atra-Hasis).

The recurring themes that make boats and canoes stand out as socially important are the abilities to float on waters, to travel past the horizon, and to trade. The boat was perceived as a device to reach something out of range, controlling these vessels made possible for humans to overcome their physical limits. A review of these vessels in their contexts across the world will help in determining the reasons for their importance to ancient societies.

Wintjes, Jorit

**Schiffe, die die Welt verändern – kleine, hochseetüchtige Panzerschiffe
am Beginn einer neuen Ära der Marinegeschichte**

Wie kaum eine Epoche der Marinegeschichte zuvor war die zweite Hälfte des 19. Jh. von einem dramatischen technologischen Fortschritt geprägt. Die Dampfmaschine, die Verwendung von Eisen im Schiffsbau, die Einführung von Panzerung und leistungsfähiger Artillerie veränderten das Gesicht des Seekrieges innerhalb weniger Jahrzehnte vollständig. Diese Entwicklung hat bislang sowohl in der Wissenschaft als auch in der Öffentlichkeit im Wesentlichen im Kontext des amerikanischen Bürgerkrieges Aufmerksamkeit gefunden. Dabei erweisen sich die technologischen Neuerungen, die in diesem Konflikt auf beiden Seiten eingeführt wurden, zwar als teilweise höchst innovativ, insgesamt blieben allerdings gerade die wichtigsten Neuerungen – etwa die Verwendung von Spierentorpedobooten oder von Panzerschiffen – zunächst ganz auf den Einsatz im Küstenvorfeld beschränkt. Im Vergleich dazu hat die nahezu gleichzeitig einsetzende Entwicklung kleiner, hochseetüchtiger Panzerschiffe in Europa deutlich weniger Beachtung erfahren, obwohl diese Schiffe in nicht geringer Stückzahl ab der Mitte der 1860er Jahre auf europäischen Werften für Abnehmer in Europa und Übersee gebaut wurden. Die zentrale marinegeschichtliche Bedeutung dieser Schiffe lässt sich in drei Bereichen verorten.

Zunächst waren sie Träger technologischer Innovation und beförderten den für die zweite Hälfte des 19. Jh. charakteristischen Fortschrittsprozess erheblich. Sodann trugen sie in starkem Maße zur Veränderung des taktisch-strategischen Denkens über den Seekrieg bei.

Schließlich kam diesen auf privaten Werften entstehenden Schiffen eine zentrale Rolle bei der Herausbildung des privaten Kriegsschiffsbaus zu, der – trotz zahlreicher Veränderungen – bis heute die europäische Schiffsbaulandschaft prägt. Der Vortrag wird zunächst kurz die wichtigsten Beispiele des Typus des kleinen, hochseefähigen Panzerschiffes vorstellen und dann dessen Bedeutung technikgeschichtlich, militärgeschichtlich und wirtschaftsgeschichtlich ausleuchten.

Yamafune, Kotaro; Casaban, Jose Luis; Oliveira Torres, Rodrigo de; Batur, Katarina

“The systematic photogrammetric recording of the Gnalić shipwreck hull remains”

Key words: Gnalić shipwreck, Renaissance, photogrammetry, 3d-models, orthophoto, 3d-trilateration

In the late 1960s and early 1970s, a series of short term rescue excavations were conducted on the remains of the 16th-century Gnalić shipwreck. In 2012, a new archaeological project, the Gnalić project, began under the direction of the University of Zadar, with the partnership of Texas A&M University (USA) and other local and international institutions.

Between 2012 and 2016, the remains of the Venetian merchantman La Gagliana grossa, which sank near the islet of Gnalić (Croatia) in 1583, were excavated and documented three-dimensionally using underwater photogrammetry. The archaeological excavation of any shipwreck is always a destructive process, therefore an accurate recording methodology is crucial to preserve all the data related to the spatial distribution of artefacts, and to document any hull remains.

Underwater photogrammetry has proved to be an effective and accurate mapping method that allows underwater archaeologists to produce precise three-dimensional models of any shipwreck and/or artefact with a minimum level of water visibility.

This paper presents the methodologies applied from 2013 to 2016 to document photogrammetrically the remains of the Gnalić shipwreck, including the results produced after each archaeological intervention. In addition, during the 2016 season, artefacts recovered from the site were also recorded photogrammetrically, with the aim of documenting the different stages of their conservation process. The ultimate objective is the development of an online digital database of the three-dimensional models of the artefacts recovered from the Gnalić shipwreck to make them available to the general public.

Zmaić Kralj, Vesna

Maritime trade connections within the Byzantine Empire in the Middle Ages, on the example of the sunken merchantman near Cape Stoba (island of Mljet, Croatia)

Seven medieval shipwrecks (from 8th to 13th century) with amphorae cargo and dozens of sporadic finds of middle Byzantine amphoras found along the Dalmatian coast prove that the widespread use of clay containers for trade was still common practice in this area, despite a predominant use of barrels for sea transportation on the west. Similar situation was reflected in other areas under the Byzantine rule: the middle Byzantine amphorae can be found in Albania, Greece, Bulgaria, Romania, the area around the Black Sea and Marmara Sea as well as along the eastern Mediterranean coast with Byzantium as the trade and commercial center.

Among others, a shipwreck near Cape Stoba (island of Mljet, Croatia) is an impressive demonstration of maritime trade with glass products and clay containers on a traditional trade route between the eastern and the western Mediterranean in the early medieval period.

IPR XXII**Poster****Bekić, Luca****Šimuni, a new Bronze Age Underwater Site in Zadar County**

Underwater prehistoric finds are quite rare in Croatia, especially traces of settlements, mostly due to configuration of the high rocky coastline. However, in the last decade, a number of interesting sites have been located, and some of them even partly excavated. Just a two months ago, a Foka dive centre owner Vedran Dorušić from Pag island near Zadar came across a interesting finds of wooden beams and pottery in a small port of Šimuni village. He reported his find to the ICUA Zadar archaeologist, who checked the site and made first documentation and assessment.

The site is located at 2 - 3 meters depth. It is recently uncovered from a cover of sand and stones by a large fishing vessel that is anchored just over the site. Around thirty wooden beams are protruding from a dug up sea bottom, forming two or more lines. Around this structure a lot of prehistoric pottery lies around, mostly well preserved pieces. A pieces of roman pottery can be also find in the area. Judging by the first glance, it is very likely that the wooden beam structure is connected to the bronze age pottery, that is found in the same layer. The success in the protection of the underwater cultural heritage can only be achieved if the divers are promptly reporting to the authorities, as Mr. Dorušić has made in more than ten instances so far.

Čvrljak, Matko

Kalverev Syd. A medieval ship-find from Storstrømmen, Denmark:

Description of fieldwork methods and post processing

Since 2013, the Viking Ship Museum has been conducting investigations and excavations ahead of the construction of the new bridge that will allow smoother crossing of the strait of Storstrømmen between Sjælland and Falster in Denmark. In all an area of 12 km² has been examined and the finds range from Federmesser culture (ca. 11.000 BC) to WW2. One of the finds was part of a ship, preliminarily dated to the third quarter of the 13th century, which was encountered by chance while digging test pits in search of Stone Age remains.

The ship remains were raised, a decision made based on the fact that it had to be moved since it was lying in an area that is subject to dredging, after being documented in situ using photogrammetry.

In addition to a short summary of the Storstrømmen project this poster will look into the 'work in progress' regarding the ship-find itself, as well as methods used in the field and in the lab. Also preliminary results will be shown and their use for disseminating maritime archaeology and visions for the future work with the ship components will be discussed.

Key words: Kalverev Syd, Storstrømmen, Maritime archaeology, Methodology, Dissemination

Daňová K., Stehlíková J., Daňová M.

The Potential and Perspectives for Underwater Archaeology in Slovakia

Similarly to other countries, even in Slovakia, a great attention is being paid to the newest methodological procedures in archaeological research. We keep up with times and the leading European institutions in methodological procedures in research, documentation, and processing of archaeological sites. However, we are yet beginners in a certain method of archaeological research: research, documentation, and preservation of artefacts and sites found under water. Although the law on cultural heritage covers the protection of the underwater heritage, nobody has dealt with the issue in Slovakia yet.

We have decided to begin with a theoretical research. The aim is to reveal the potential and further outlooks of this research method. The first step was to collect information about known sites located under water. We have found out that those locations that had been flooded due to constructions of water projects or alterations of watercourses have the greatest potential. The second step is looking up for potential sites, such as bridges, harbors, and fords. The third step will be to confirm our presumptions directly in the water.

Fazlullin, S.; Gorlov, I.; Bukatov A.; Kamaeva, A.; Zubets, M.

Joint Research in Quarantine Bay

In 2016, Chersonese museum and the Russian State University for the Humanities started a joint project to conduct research in the field of maritime and underwater cultural heritage. The first stage of the project was a joint expedition to survey the bottom of the waters of the Quarantine Bay and the organization of training dives with students of Russian State Humanitarian University and the staff of the museum as part of the course a scientific diver. During the work was carried out sonar scanning of the bottom. Sonograms obtained terraces near the bottom of the north-eastern coast of the reserve, the eastern shore of Quarantine Bay. The study included land in the area of deep stall. Shooting was carried out with the use of sidescan sonar Humminbird Helix 5 SI at a frequency of 400 kHz, with a band coverage of 80-100 meters on board. Based on the recorded tracks obtained georeferenced mosaic acoustic image of the bottom relief.

Together with representatives of “Transkor-K”, the entrance to the expeditionary group RSUH were tested the manual version of the flux-gate gradiometer. The tests was needed to assess the impact of the work of the diver on the readings in a scanning polygon. The approve technique of using the manual version of the device in real conditions. Based on these results it was later developed and successfully tested a working version of the device.

Kaleb, Maja

Iron nails from Veruda shipwreck in Croatia

During archaeological research in 2016. on medieval shipwreck in the waters of small island Veruda near Pula a large number of iron nails in few different types were found.

A total of 479 labels were given to a special objects that were found. Completely or partially preserved conglomerates of concretion in whose marrow once was iron make 50.731 % of all finds. Taking into account the possible circumstances of the sinking, and the fact that the ship was thoroughly looted, it is clear that most of found objects are ship equipment or parts of ship structures and ballast.

Taking into account that by the 16th century shipbuilders used skeleton first technique for a long time, iron nails were used to connect hull and deck planks to skeleton of keel and transverse frames. In addition to their primary role, there is also the possibility that a portion of found nails were carried as cargo for the trade, or carried as a backup in case of need.

Opposed to individual items of valuable materials, iron nails do not attract the attention of the general public, but unjustifiably they also do not attract the attention of archaeologists, so this work will try to give some new perspectives for this issue.

Loizou, Evgenia

**Bronze Age Harbours in the Aegean
Towards a new theoretical approach**

Placed on the littoral, harbours are an important human creation. They are the nodal points where people and the marine environment meet. Prehistoric harbours though, in contrast with the ancient ones, leave scarce remains and have been less investigated.

On the proposed poster the various evidence on the Bronze Age Aegean harbours are introduced. Iconography, archaeological finds, geomorphological surveys, theoretical models and homeric poems are shortly presented and documented. Moreover, a critical exposé of the above evidence, including their theoretical frameworks and results, is presented. The aim of the presentation is to discuss the old question on the existence and necessity of the prehistoric harbours by composing an interdisciplinary synthesis and, consequently, to evaluate the approaches that have so far been employed to detect a Bronze Age harbour.

Finally, a new theoretical approach on the detection of the BA Aegean harbours is attempted. It is suggested that, under the notion of the dynamic seascape, prehistoric harbours should be considered as active cultural landscapes with sociopolitical implications. These qualities can be found on the architectural and urban development of the settlement. In other words, we should look the harbours as a place

Müller, Dr. Johann

STORM Project

Safeguarding Cultural Heritage through Technical and Organisational Resources Management

STORM Project. Safeguarding Cultural Heritage through Technical and Organisational Resources Management intends to develop an integrated approach for a better management of the risk that endanger cultural heritage, through the creation of tools and instruments designed to assist in decision making during crisis of natural catastrophes, along the distinct phases of prevention/mitigation, preparedness, response and recovery.

Objective 1: Environmental assessment methodologies and services assessment.

Objective 2: Mitigation of natural hazards and the assessment, management of threads.

Objective 3: Survey and diagnosis based on the study of materials properties, particular environmental conditions, and profile of cultural heritage sites.

Objective 4: Models and services for generating and managing a situational picture based on data collected by physical and human sensors.

Objective 5: Methodologies, practices and software tools for more reliable maintenance, quick restoration and long-term conservation.

Objective 6: Collaboration and knowledge-sharing framework for the community of stakeholders.

Objective 7: Proposal on adaptations and major changes in existing policies and validation of new knowledge of government processes.

Objective 8: Cost analysis for the sites protection against natural hazards managed by the STORM data analytics tools.

Nikolaev, I; Fazlullin, S.

The Tradition of Wooden Pleshcheyevo Lake Shipbuilding, Russia

Pereslavl-Zalessky is located on the old trade route from Central Russia to the White sea. The city was built on the shore of a large lake Pleshcheevo, which is connected with the basin of the Volga. In the XV and XVI centuries Pereslavl was a fiefdom of the princes of Moscow and was obliged to deliver to the court the fish.

During the existence of Pereslavl-Zalesskiy craftsmen built boats. Over time the boat craftsmen have mastered the technology of making boats from the boards. This tradition has been preserved until now. Depending on the destination, boats may have different length and even a little different structurally.. The main material for building boats – fir board. The boat has clinker siding. A characteristic feature of the boat is the stud, tightening the front and back of the boat.

Boats are divided into two varieties – 6 m. and 9 m. in length. Long boat allows you to go through a short and steep waves. Recorded typology of the boats was known, at least since the 30-ies of XX century. One master is able to make the boat for 1-2 weeks. The prevalence of people's boats is constrained by the prohibition of fishing on the lake, which became 20 years ago the core of the national Park.

The lack of commercial fishing on the lake and the aging masters may violate the preservation of local folk traditions of shipbuilding. Folk boats of lake Pleshcheyevo in need of updating and museums.

Schröder, Anna-Konstanze**Maritime Religion – Can it be (re)constructed?**

Various interactions between religions and the specific challenges of seafaring can be described: Sailors brought their beliefs and rituals onto the ships. They adjusted them to the new living conditions. Hybrid forms of religiosity emerged from the interaction of people with different religious or cultural backgrounds. But also seafaring elements were brought to the religious sites at land. The maritime cultures of the coastal areas developed their specific religious elements throughout the world.

The poster will illustrate how the building blocks approach (e.g. by Ann Taves) – a contemporary theory of religion – evinces elements of religion in maritime cultures. The crucial point is the ascription of specialness to elements which might appear to be an aspect of everyday life. Such elements are for example the naming of the sea conditions, ritualized everyday routines, superstition and magic, or even navigation techniques. They can be interpreted as gods and other special beings, rituals, ethics, or cosmologies. For future research, the analysis of commonalities and differences between the elements of different maritime cultures in the world can contribute to (re)construct a maritime religion of its own. On this level of abstraction, all maritime religions are in the same boat.

Tusa, Sebastiano; Oliveri, Francesca; Schaffeld, Rebecca; Fiederling, Max; Peukert, Detlef; Knepel, Gerd

Waves - Beach Environment - Wreck - „We're all in the same boat“ - but how long?

A „post“ Classical example of the damage by re-exposing of a sheltered wreck by the *Posidonetum oceanicae* plant society: **The Isola Lunga-wreck** (Stagnone Marsala, Sicily).

In front of the Isola lunga a wreck was found 28 years ago. Enzo Lombardo discovered it on 20th August 1988 by chance. Leonardo Nocitra, Maria Antonietta Nocitra, Anna Paola Nocitra and their professor Antonina Milione did the first research on it and gave the information to the appropriate authorities.

Beltrame 2002¹ investigated the process of wreck formation on the beach environment in the Mediterranean. He mentioned that wreck and noted in general: „Several deleterious effects on the beach (are): stresses caused by the turbulence of the water, high-speed impact of sediments with strong abrasive power (and), damage and consumption caused by motion“ (and further) „main characteristics common to shipwrecks of this type (on beach): the exceptional state of preservation of the hulls, the excellent condition of finds of organic materials (and), the presence of precious objects“. In particular to the Isola lunga wreck he referred: „... the conservation of these hulls is seldom facilitated by a protective mass of non-perishable cargoes. A clear example of this is the „post-Classical“ hull of Isola Lunga near Marsala which lies 40 m from shore in two meters of water in a well-preserved condition despite the absence of any physical protection apart from that provided by the sand which periodically covers it“. „In fact, in the coastal zones containing the wrecks which are closest to the beach such as, for example, ... near Isola Lunga at Marsala, a storm is capable of exposing a covered site and, at the same time, of burying another previously visible site just a few meters away“. His conclusion is „... we lack a predictable simulation of the phenomenon. Such a model is difficult to elaborate on a large scale because of the presence of complex and irregular wind-flow process, cause of the dynamics of the shoals.

It is our opinion that some sort of prediction is possible only with a profound direct knowledge of a specific zone“. So the problem statement resulted in this research was: If and how long the Isola lunga wreck remains „in a well preserved condition despite the absence of any physical protection“. Is there any „predictable simulation of the phenomenon“ of the dynamics of the shoals?(Beltrame 2002). As Tusa and Oliveri 2014², 2016³ and Lena 2015⁴ did their research on the wreck it was eaten more and more by the sea since the discovery. A research in 2016 by the cooperation it could be demonstrated that the wreck lying 40 meters offshore in a depth of 2 m the shelter of the *Posidonetum oceanicae* disappeared with the collapse of the plant society. This caused by transgression of the sea. The seaground reached the breakwater zone of a depth of $\lambda/2$ and less which destroys the Neptune grass meadow and removes the shelter for the wreck.

Conclusion: The problem statement could be answered:

- The wreck in a zone less than about $\lambda/2$ does'nt remain „in a well-preserved condition despite the absence of any physical protection“. Its destruction is about 60% in less than 30 years.
- A wreck within the zone from about $\lambda/2$ and less will predictably destroyed by absence of Posidonia shelter.
- Vice versa one can conclude the height of the waves sometimes must have been about 2 meters in the last years.
- The consequence is to protect a historical underwater monument like the Isola lunga wreck (a schifazzo?) by suitable shelter for instance geotextile with a well fastening at the sea ground
- All the more concerning a ship which shows forgotten knowledge of former shipwrights.

¹ Carlo Beltrame: Investigating Processes of Wreck Formation: Wrecks on the Beach Environment in the Mediterrean Sea. Archaeologica subacquea. III Studi, ricerche e documenti Tuscia-Viterbo 2002, 381-398

² Sebastiano Tusa e Francesca Oliveri: Ritrovamento a Isola Grande - Mozia. Servizio Soprintendenza per i Beni culturali e ambientali del Mare 10 agosto 2014

³ Sebastiano Tusa e Francesca Oliveri: Indagini Stagnone di Mozia. Servizio Soprintendenza per i Beni culturali e ambientali del Mare 2016

⁴ Gabriele Lena: Oggetto: Relazione preliminare sulla indagine archeologica e morfobatimetrica dell'area dello Stagnone di Marsala attraverso l'uso di Marini-Prototipo Hydrometra (mini USV-Unmanned Surface Vessel). Int.Geo.Mod. Srl Spin Off Università degli studi di Perugia 2015.

