

IPR XX Abstracts

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The ancient submerged landscape of MPA of Santa Maria di Castellabate on the Tyrrhenian coast (Italy)

The landscape of MPA of Santa Maria di Castellabate at the southern side of the Gulf of Salerno represent a variety archaeological evidences once emerged along the coast. From north to south are preserved several remnants of coastal quarries built in antiquity, that now provide insights into the intervening sea-level changes occurred during the last millennia. Many quarries have been found along the Castellabate coastal stretch, carved in well-cemented Pleistocene sandstone. Here, there are tens of extraction rings and in situ millstones. According to some authors, millstone extraction along the coastal stretch between Castellabate and Palinuro is attributable from roman age to medieval times. The quarried coastal stretch is about 2 km long with 3 different sites showing more than 200 millstones carved.

In relation to these sites to south is situated a maritime villa on the headland and on the sandstone platform (island of Licosa) on which it is identified part of a system of cetariae with rectangular plan located on two levels. Maybe these structures are related with some other artifacts as geometric mosaic green and white, and a series of nurseries for fish farming, located at western cliff of the island. The oldest source relating to this portion of territory about the area of Licosa is Licofrone into "Cassandra", refers to the mythical Sirens, and to Promontorium Enipeum or Posideion. The research aims, also through the study of the geomorphology, to understand the function of such evidences.

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Flusslandschaft der Donau und Siedlungsentwicklung aus hydrogeologischer Sicht

Die Besiedlungsentwicklung im Ingolstädter Raum war durch die hydrogeologischen Bedingungen entscheidend beeinflusst und wurde durch Grundwasserdargebot, Flussverläufe, grundwassernahe Böden und insbesondere durch Hochwasserereignisse bestimmt. Der Referent zeigt durch eine gezielte Aufbereitung von digitalen Geländemodellen, räumliche Verschneidungen, Hochwassersimulationen und hydrogeologischen Karten auf, wie sich Strukturen eines damals von Wasser stark geprägten Landschaftsbildes nachvollziehen und rekonstruieren lassen.

Die Ergebnisse können zukünftig archäologische Arbeiten begleiten und geben uns zugleich eine Vorstellung davon, wie sich ein durch Grund- und Hochwasser geprägtes Landschaftsbild seit keltisch – römischer Zeit bis in die heutige Zeit entwickelte und veränderte.

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The Port of Histria during the Greco-Roman Antiquity. Contributions on the Geomorphology of the Western Black Sea Basin

Histria (Istros), a Milesian colony founded on the western coast of the Euxine Sea, is an archaeological site of the greatest significance for the Greek colonial ecumene. Archaeological research in Histria, commenced in 1914 and still continued today, has contributed to the elucidation of various aspects of the development of the colonial world in this region. One of the most recent researches concern the interaction between the geomorphological configuration of the area and the anthropic environment. In this sense, it has been ascertained, among others, that nowadays the sea level is at least three meters higher than during the Greco-Roman period. The issue of identifying and investigating the harbour and the port installations is major objective.

In 1996, a team led by G. Peschel and O. Höckmann identified through geophysical means two port yards to the north and, respectively, south of the ancient city. These researches continue today by an interdisciplinary project entitled The captation Area of the Resources of the Histrian Territory in the Greco-Roman Time. An Ecochronological Approach.

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Archaeological landscape of Venice lagoon: The case of San Francesco island

The Venice lagoon landscape is the result of the age-long interaction between man and nature. Archeological surveys show that water erosion had often influenced the living conditions of the resident population. The phenomenon is mainly due to the raising of water level and its subsidence in association with destructive action of waves made by north-easterly wind.

A remarkable case is that of San Francesco del Deserto island (Northern Lagoon), where the research campaign has led up to the location of ten submerged structures referred to two different phases in the island history: the first dates back to the medieval period when defensive barriers against bora winds were erected and various reused artifacts of the Roman age, and the second to the Renaissance, when the island was equipped with a wooden border and joined to Sant'Erasmus Island by a bank-road. Unexpected and very interesting was the discovery of some finds, that is amphoras with graffiti and two planks of roman sewn boat.

This finds are of special importance not only because of their relationship with San Francesco's structures (they are in fact reused building materials) but above all for their typological features. This research, like others carried out recently in the Venice lagoon, was initiated to provide us with information and to lay solid basis for the revision of the complex history of this environment, always balanced between fresh and sea water.

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The Contribution of Metal Finds to the Study of Shipwrecks: Test Case – The Akko Tower Wreck

The Akko Tower Wreck was discovered in 1966 in the ancient harbour of Akko, Israel. In 2012–2013 two underwater excavation seasons were conducted by the Leon Recanati Institute for Maritime Studies of the University of Haifa. The various finds in the shipwreck included metal and wooden artefacts and ceramic ware. The metal finds comprised brass nails, rigging fittings, and metal concretions, and were studied using metallurgical non-destructive (visual testing and XRF) and destructive (Vickers microhardness measurements, optical microscopy, and lead isotope analysis) methods.

The brass nails were used to connect the hull planks to the pre-existing framing timbers. The nails were divided into three typological groups: type A (long and narrow, about 32 wt% zinc), type B (short and thick, about 35 wt% zinc), and exceptional nails (34–35 wt% zinc). All nail types were manufactured by casting. Their shape, microstructure and composition indicate that each nail type was manufactured by a different technique.

Two large concretions were retrieved from the shipwreck. These were X-rayed, and upon disassembly three iron-bound deadeyes were revealed. The deadeyes were made of oak (*Quercus* spp.). The iron reinforcement comprised of a 38-cm-long iron strap and an iron chain with a number of links, each link about 7 cm long.

Based on the study of the metal finds, it is suggested that the ship was built in the first third of the 19th century. The metal used for alloying the nails most probably originated from Great Britain. Thus the nails could have been commercially manufactured in Great Britain, but it is also possible that they were manufactured elsewhere from imported English ore. Through the archaeometallurgical study, we now know more about the Akko Tower Wreck, as well as adding to the existing database related to metal artefacts from other shipwrecks of the period.

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Wood Resources, Shipbuilding and Social Environment: A Comparative perspective in Maritime Communities in Europe during the First Global Age (XV-XVIII).

During the First Global Age (15th to 19th centuries) the construction of ocean-going ships was paramount to the development of cultural encounters within Europe and beyond in what became known as the Age of Discovery and European expansion. Shipbuilding techniques underwent major technological changes when new ship types suited for oceanic exploration were developed particularly on the seaports region in Europe. The establishment of new trade routes coincided with the development of integrated seagoing artillery and the construction of armed merchantmen, galleons and smaller vessels. Ships of the Age of Discovery thus represented the technological avant-garde of the time. These new technologies placed unprecedented demands on forests for the supply of suitable timber leading to pressures on domestic timber-supply and the development of new networks of timber trade. Forestry and sea power became inextricably linked, creating new geopolitical tensions and alliances reflected in contemporary treaties, laws, forest regulations and estate management. During this period, timber became as strategically important as oil was to become in the 20th and 21st centuries. Key questions to be addressed in this context are: could Iberian forest resources sustain this increasing demand for timber, or was the wood imported from elsewhere? If so, how were the trade networks organized? Did a scarcity of raw materials encourage the technological changes which occurred in Shipbuilding?,

Did demand for timber lead to sustainable changes in forestry practice in Europe or deforestation and increased dependence on imported material? How did affect this to the natural and social environment and the evolution of human behaviour and communities settled at the littoral spaces in maritime regions in Europe? These questions should be seen within the present-day context of a move away from high-carbon fossil fuel driven economies to life styles linked to low-carbon practices such as increased usage of sustainable forest products to meet our manufacturing and energy needs. The primary research goal is to find answers to these questions through multidisciplinary, innovative and pioneer research programmes, to improve the understanding of our historical past, our cultural heritage, and our knowledge of the use of forest resources for shipbuilding. The prerequisite for such an approach is the combination of knowledge derived from Humanities (Maritime Archaeology, History, Geography, Sociology) and Life Sciences (Ecology and Wood Dendroarchaeology). Our vision is that such synergies guarantee major advances in Humanities, ecological and cultural heritage studies.

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SHIPS ON WALLS: A short contribution on ship iconography from Byzantine Cyclades

The paper will attempt to approach the archaeological and iconographical evidences which document the maritime activities in the Aegean Archipelago and especially the insular complex of Cyclades, from the late roman to the post byzantine period.

Cyclades, from Antiquity, were the crucial crossroad of maritime routes in the Aegean Sea as well as the object of disputes by several sovereign and pirates powers.

A part coastal settlements of anchorages and harbours or shipwrecks, ship iconography from frescos and graffities of byzantine churches walls are testifying the rich maritime commerce activities and the sea conflicts and battles that happened in the Cycladic waters through the ages.

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The legal protection of wrecks of warships in the Belgian part of the North Sea: 'maritime war graves' or not?

In 2013, Belgium ratified the 2001 UNESCO Convention on the protection of underwater cultural heritage and implemented it in the law on the protection of underwater cultural heritage of 2014. Since the creation of this law, Belgium has designated two shipwrecks as underwater cultural heritage. One of these ships is a British warship that is a 'maritime war grave'. Which specific measures the Belgian government will take to protect this wreck is not known yet, which leads us to the question in what way a 'maritime war grave' is legally protected.

Under international law wrecks of warships have a special legal status, however the idea of protecting them as 'maritime war graves' is not generally recognized. The 2001 UNESCO Convention provides a special regime for wrecks of warships, as well as the rule that respect must be paid to human remains found in maritime waters. It falls short however of regulating the protection of 'maritime war graves'. Nevertheless, in the Belgian part of the North Sea alone over twenty German 'maritime war graves' from WWI and WWII are located that need protection.

The paper elaborates on how these and other 'maritime war graves' can be protected based on the provisions of the 2001 UNESCO Convention and State practice, including Belgian practice. For e.g. in 2002 Belgium decided not to move the wreck of a British warship a.o. based on its protected status as a military maritime grave under British law. This and other cases offer the necessary insights to determine in what way 'maritime war graves' should be protected.

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On Dive Trails and Underwater Audio Guides: Giving a Voice to Heritage on the Seabed

With the ever-growing number of underwater cultural heritage (UCH) sites and the promulgation of *in situ* preservation, it is as evident in itself as any argument can make it that there are both ethical and pragmatic grounds on which the cultural heritage management sector can be said to be directly obliged to facilitate public engagement with said heritage sites. Despite the many efforts to make UCH more accessible, underwater dissemination devices on dive trails in their current state do not satisfy modern interpretation standards and are essentially limited to rather rudimentary media devices. In this essay, the writer seeks to promulgate a multisensory approach, explaining the benefits of dive trails and arguing that the development of underwater audio guides is an inviting prospect in the management of UCH sites. The use of submersible MP3 units on UCH sites can remedy the current situation and address the challenges faced today with regards to public engagement, namely inaccessibility, general disregard and museological estrangement.

The writer explains the potential of the devices to act as effective dissemination mediums on UCH sites and the possibility of incorporating them into larger outreach programs of museums. In doing so, it will be demonstrated that submersible MP3 units can effectively link both the public (divers and non-divers alike) and the museum world to heritage on the seabed. The concept design, though in need of considerable elaboration, thus joins the ranks in the call for the development of dive trails and the use of more sophisticated dissemination

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When the River Meets the Sea: A Neo-Assyrian Logistical Network in Operation

Before the second half of the 8th century BC, the Assyrian empire was basically a land-locked kingdom, possessing, however, developed abilities of river transportation. Following the incorporation of the Levantine coast into the Neo-Assyrian realm, with direct access to the Mediterranean Sea, new strategies of imperial domination were created.

Using a few case studies, it will be demonstrated how under these circumstances both the rivers and the sea became connected within an intentionally created imperial network and landscape.

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Why and what type of ships/boats are depicted in clay objects from the Greek Geometric to the Roman Periods

The purpose of the proposed presentation is to bring into discussion ship/boat shaped clay objects from the Geometric to the Roman Periods. This survey may point to the development of defined ship types, their propulsion and nautical development that brought to the Greek and later to the Roman thalassocracy in the Mediterranean. The objects brought into discussion come from Greece, Cyprus, Italy, Israel, as well from several museums: British Museum, Lovre Museum, Trier, Ferrara, Copenhagen and the Museum of Fine Arts in Boston. Only specific ship shaped objects were chosen for the presentation: broad vessel such as a bowl-like found in funerary context, rhyta or drinking vessels used in ceremony such as libation, and lighting in temples, private villas or even in sailing ships in the Mediterranean.

These models indicate preserved shipbuilding traditions brought through military sea combats, trade, and cultural exchange in the Mediterranean. The models also will be looked at as symbols and metaphors representing strength, wealth and practical ability. Water crafts are means of transport for passengers and cargoes, weapons of war and soldiers, as well as in religious context. The nave of the churches originates from the Latin navis, the definition of ship.

The allegorical use of ship/boat models, reflect the experience and involvement in maritime activities such as shipping, commerce or fishing of ancient societies, as well as the main source of cultural diffusion in the Mediterranean through the centuries.

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Hartke, Hinrich et al.

Die Anfänge einer wissenschaftlichen Unterwasserarchäologie als Komponente der Idee einer multidisziplinären Unterwasserforschung an der Akademie der Wissenschaften der DDR

Vom 17.12.1959 bis zum 10.12.1968 bestand beim Präsidenten der Deutschen Akademie der Wissenschaften zu Berlin (DAW) eine Kommission für Unterwasserforschung (UFW), der eine Arbeitsgemeinschaft für Unterwasserforschung beigeordnet war. Die Gründung der Kommission und der ihr angeschlossenen Arbeitsgemeinschaft geht auf einen Antrag des Tauchvereins „Nautilus eV.“ an das Präsidium der DAW zu Berlin vom Frühjahr 1959 zurück. Der Kommission für Unterwasserforschung und der Arbeitsgemeinschaft für Unterwasserforschung gehörten führende Wissenschaftler aus den Bereichen Archäologie, Biologie, Geologie, Ozeanographie, Medizin und Physik sowie Spezialisten des Film- und Fotowesens und der Tauchtechnik an. Die Aufgaben der Arbeitsgemeinschaft für Unterwasserforschung leiteten sich aus den Arbeits- und Forschungsplänen der an einer wissenschaftlichen und interdisziplinären UFW interessierten Institute der DAW, der Sektionen der Universitäten und Einrichtungen der Industrie ab. Die Arbeitsgemeinschaft für Unterwasserforschung war nicht auf dem Gebiet des Tauchsports und der Taucherausbildung tätig. Sie wurde von einem gewählten Vorstand geleitet. Die Verwaltung der Finanzen, die Organisation der Geschäftsstelle und Berichterstattung an die Kommission für UFW war ein hauptamtlicher Sekretär verantwortlich. Diese Funktion bekleidete bis Oktober 1961 Gerhard Kapitän, der entsprechend seiner beruflichen Orientierung einen wesentlichen Anteil an der Entwicklung der Unterwasserarchäologie in der DDR hatte.

Nach seiner Entscheidung, von einer Forschungsreise im Sommer 1961 im Auftrage der DAW zu Berlin und auf der Grundlage einer Einladung der Altertümerverswaltung Siracusa und des Institutes für mediterrane Unterwasserarchäologie Rom nicht nach Berlin und in seine Funktion als Sekretär der Arbeitsgemeinschaft für UFW zurückzukehren, wurde der Biologe Dr. Martin Rauschert in die Funktion eines Sekretärs der Arbeitsgemeinschaft für UFW berufen.

Die Fortführung der archäologischen Arbeiten in Italien waren in den folgenden Jahren in den Forschungsplänen der relevanten Institute nicht mehr vorgesehen. Die archäologischen UW-Forschungen wurden vornehmlich in Binnengewässern der DDR und an der Ostseeküste durchgeführt. Mit den befreundeten Akademien in der UdSSR, Polen,

CSSR, Rumänien, Bulgarien und Albanien wurden in den Folgejahren Absprachen über mögliche Kooperationen verhandelt. Mit dem Ende der Tätigkeit der Kommission für UFW und ihrer Arbeitsgemeinschaft sind diese Aufgaben an die fachwissenschaftlichen Einrichtungen der AdW der DDR und des Hochschulwesens gefallen.

Die Analyse der Publikationen von G. Kapitän aus der Zeit seiner Tätigkeit als Sekretär der Arbeitsgemeinschaft für UFW bei der DAW zu Berlin zeigen das Anliegen auf umfangreiche Information der Fachwelt und der Öffentlichkeit. Die Themen der Veröffentlichungen befassen sich nicht nur mit den wissenschaftlichen Ergebnissen der archäologischen Untersuchungen, sondern beschäftigen sich auch mit allgemeineren und übergreifenden Themen wie Geschichte der Unterwasserarchäologie, UW-Fotografie, Tauchsicherheit, UW-Prospektion- und Grabungstechnik und entsprechen damit der Gründungsidee der Kommission für UFW und der angeschlossenen AG für UFW eine interdisziplinäre Forschungsmethodik zu entwickeln und beispielhaft anzuwenden.

Im Vortrag sollen die Ergebnisse der Archivstudien, die Erinnerungen von Zeitzeugen und die Auswertung der Publikationen wiedergegeben werden.

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Hoyt, Joe und Delgado, James

Exploring a Submerged WWII Battlefield: Discovery of the U-576 and *Bluefields*.

Beginning in 2009 NOAA, began searching for the remains of a convoy battle that took place off the coast of North Carolina during the Second World War. This search required the use of some of the most sophisticated marine survey technology to map hundreds of miles of seabed. In the process, dozens of potentially historic sites have been identified, including the remains of the German U-boat, U-576 and its victim, *Bluefields*. These sites were discovered in 2014 resting just 200m apart.

Together, they represent a battlefield, which has been interpreted from a landscape based perspective to offer new insights into the Battle of the Atlantic on the east coast of the United States. This discovery combines cutting edge science and technology with in-depth historical analysis to paint a more holistic picture of these events.

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Hochwasserprobleme in Bremen und umzu im ersten Jahrtausend n.Chr. und die Möglichkeiten und Methoden ihrer Erforschung

Das Bremer Becken war im 1. Jt. von zwei Seiten her hochwassergefährdet. Der Gezeitenwechsel der Nordsee reichte und reicht noch heute von Nordwesten her bis weit nach Bremen hinein. Von der gegenüberliegenden Himmelsrichtung zieht die Weser, aus dem Mittelgebirge kommend, mit ihren Zuflüssen in zahlreichen Seiten- und Altarmen entgegen. Die meisten der fast 100 Siedlungen im Bereich von Marsch und Geestrand besaßen inselartige Lagen und waren mit dem Element Wasser auf das innigste verbunden. Handel, Austausch, Kommunikation und Personentransport konnten nur per Boot oder Schiff erfolgen. Ebenso musste man sich vor Hochwasser und Überschwemmungen schützen. Änderungen von Meeres- und Grundwasserspiegel konnten zur Aufgabe von Siedlungen führen, Auflagerungen von Auenlehmen wiederum dazu, dass Seitenarme von Weser, Lesum und Ochtum abgeschnitten wurden und Siedlungen den Kontakt zu Nachbarn verloren.

Das DFG-Projekt „Häfen im Bremer Becken“ (SPP 1630) geht mit geophysikalischen und archäologischen Prospektionsmethoden der Frage nach, warum Bremen an der heutigen Stelle gegründet wurde und nicht an einer der 100 Siedlungen und kommt zu dem Schluss, dass die sich wandelnden Umweltfaktoren eine wesentliche Rolle dabei gespielt haben. Eine Anpassung daran konnte unterschiedlich erfolgen: Die Siedlung Hoher Horst besaß ein treppenförmiges Ufer und konnte je nach Wasserstand den Schiffsverkehr aufrecht erhalten. Die Siedlung Am Sodenmatt, mit leicht zentralörtlicher Funktion, lag geschützt auf einer besonders großen Insel, musste jedoch mit Brunnen die Trinkwasserversorgung gewährleisten. Für die große Siedlung Grambke war das Versiegen eines Weserarmes der Grund für einen erheblich kleineren Neuanfang auf dem Bremer Dünenrücken.

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To built and maintain under water: a wreck of the Late Antiquity used in the repair of a breach in the bank of the harbour channel of Narbonne

The archaeological excavations undertaken in the Narbonnese marshes since 2006 revealed a harbour channel of almost 2 km length made up in second half of the 1st century of our era, prolonged and maintained without interruption until the late Antiquity. Within the framework of one of these repairs, the wreck of a harbour barge damaged at the time of an unspecified climatic episode having caused the rupture of one of the banks of the channel, was used to fill in a breach.

The preserved remains measure 10 m by 3,80 meters and include 29 frames and 15 strakes at port including a wale, 12 strakes at starboard. The position of the mast step, not with the front third but with the quarter before ship is incompatible with the use of a square sail intended for maritime shipping. It is either an unloading boom or a mast for carrying a spritsail or perhaps a lugsail. This boat must thus be regarded as having surfed exclusively inside the harbour channel. This restricted space of navigation is confirmed by the frequency and the low quality of repairs like by the use of re-employments for the ceiling plates and the frames.

The study of this boat is capital for the knowledge of the harbour boats. Indeed, so thanks to the development of underwater archaeology, these fifty last years, one starts with well knowing the deep-sea ships and the coasting ships but the flat-bottomed boats used for offloading seagoing vessels remain less known.

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Water offerings from the territory of Poland as an example of aquatic relations of the Neolithic and the Bronze Age societies

The meaning of water offerings has been, for many years, a subject of discussions among archaeologists. Although there are already many different hypotheses that consider the reasons and purpose of objects deposition in waters, so far no explicit explanation has been established. As a starting point of the debate it is worth to consider miscellaneous possibilities of depositions that are not necessarily connected with an offering. Firstly, it is possible that objects might have been lost or abandoned for some reason (breakage?). Secondly, the valuable items could have been temporally hidden and then, due to various circumstances they were not collected. Thirdly, the hoards that are found along watercourses might have been landmarks of the water routes. Last but not least also the hypotheses of intended offerings must be considered. The presented essay is an attempt of summation and interpretation of deposits that derived from Polish rivers and lakes. The first well documented deposits are dated to the Neolithic and then to the Bronze Age.

Based on abovementioned consideration a sketch of the water – human relation, in questioned time frames, will be drawn. The authors will try to find an answer to the meaning of that type of behaviour. Moreover the question of human affection to living next to and with water will be agitated.

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Entwicklung der Unterwasserarchäologie in Bulgarien. Erforschung des unter Wasser liegenden Kulturerbes

Im Referat werden die Forschungsgeschichte der bulgarischen Unterwasserarchäologie – von der ersten 1959 veranstalteten Expedition, über die darauf folgenden verwirklichten Projekte bis zu den neuesten, bereits in den letzten Jahren durchgeführten Forschungen – und die Praxis sowie Spezifika der Erforschung des unter Wasser liegenden Kulturerbes in Bulgarien.

Im ersten Abschnitt des Referats wird die Geschichte der unterwasserarchäologischen Forschungen in Bulgarien vorgeführt. Berücksichtigt werden zum einen die Anfänge, die durch eine rege Forschungstätigkeit gekennzeichnet werden – in der Periode 1959-1974 wurden insgesamt 15 Expeditionen durchgeführt. Zum anderen werden die Unternehmungen in den folgenden Jahrzehnten (1975-2003) geschildert, die – obwohl nicht so intensiv und aufschlussreich – allerdings einen weiteren Schritt in der Erforschung bilden und die Kontinuität in der Unterwasserarchäologie Bulgariens bezeugen. Im Anschluss daran wird die 2003 erfolgte Ratifizierung der „UNESCO-Konvention 2001 zum Schutz des unter Wasser liegenden Kulturerbes“, die jedoch erst 2009 in Kraft getreten ist, die begleitenden Ereignisse und die Auswirkung dieser Maßnahmen auf die in der Folgezeit zustande gekommenen Forschungen besprochen.

Im zweiten Abschnitt wendet sich man zu dem Sachverhalt bei der Erforschung des Kulturerbes unter Wasser. Vorgeführt werden einerseits die Fragestellungen sowie Probleme, die schon gelöst wurden, aber auch erst zu lösen sind, und die Vorgehensweise hierzu, die von der Eigenart der Küste und des Meeres, die Lage der Befunde etc. abhängt. Andererseits wird angesprochen, welche Institution in Bulgarien für die Durchführung von unterwasserarchäologischen Forschungen sowie den Schutz des Kulturerbes unter Wasser verantwortlich und somit in der Lage sind, eine positive künftige Entwicklung im Forschungsbereich und den Erhalt des Kulturerbes zu sichern.

Leiterin des Marine-Museums Varna
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Liphschitz, Nili

Three Yassi Ada wrecks: a comparative dendroarchaeological investigation

Yassi Ada, meaning a “flat island,” is an uninhabited Turkish island in the south-eastern portion of the Aegean Sea. The island is located approximately five kilometers off the Turkish coast near Bodrum.

During the excavations of a late fourth-century Roman merchantman off the coast of Yassi Ada in 1967, another, more recent wreck was discovered, lying across the stern of the Roman wreck. The artifact assemblage, dendro-chronology, and a radiocarbon dating indicated that the wreck was of Ottoman origin, dated to the late sixteenth – early seventeenth century. Only the bow section of the Ottoman wreck overlies the 4th century wreck, so the Ottoman wreck is not entirely on top of the 4th century wreck. Also a small portion of the Ottoman wreck is over the wreck spillage of the Yassi Ada 7th century wreck.

The remains of the fourth-century Yassi Ada wreck were found at a depth of 36-42 m. Timber analysis showed that the planks and boards were made of *Cupressus sempervirens* (25%), the frames and treenails were of *Quercus cerris* (46%), one frame was of *Pinus brutia* and two unidentified timbers were of *Fagus orientalis*. Although a small number of the surviving hull members were sampled and studied, based on the assemblage of the wood species represented, it appears that the vessel was built in southwestern Turkey (Liphschitz and Pulak, 2007-08).

Yassi Ada 7th century Byzantine shipwreck was made mainly of two conifers: The 12 meter long keel, sternpost, wales, through-beams and large sized ceiling strakes were all made of *Cupressus sempervirens*. *Pinus* sp. was used for planking, false sternpost and hanging knees. *Ulmus* sp. was used for frames and white oak - for tenons (van Doorninck, 1982: 55).

The Ottoman Yassi Ada wreck's timbers were raised in 1982-82 and have been kept since then in tap water in Bodrum. The dendro-archaeological research was carried by the author during the last three years and 1431 wood samples were examined. More than half of the timbers (58.0%) including the majority of the planks, but also frames and other components were made of *Fagus orientalis*. About a quarter of the wooden components (25.7%) including planks, frames, floors, part of the keel and treenails as well as few more timbers were made of *Quercus cerris*. About 5% of the hull timbers, including frames, floor, planks and part of the keel were of *Quercus petraea*, and few other hull timbers were made of *Acer pseudoplatanus*, *Fraxinus excelsior* and *Ulmus campestris*. Very few members were made of two conifers: *Cupressus sempervirens* (9 samples; 0.6%) and *Pinus brutia* (3 samples; 0.2%).

The paper will compare and discuss the use of the various tree species in the three Yassi Ada wrecks dated to three different centuries.

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„... und alle waren wie Enten...“

Wahrnehmung, Rezeption und Versuche der Bewältigung überhoher Nilfluten in der Antike. Beim Gedanken an die Nilflut in Ägypten stellt sich sowohl bei interessierten Laien, als auch Wissenschaftlern das Bild der segensreichen, seit der Frühzeit die Fruchtbarkeit Ägyptens garantierenden Fluten des Nils, kaum jedoch ein Bild verheerender Wassermassen ein. Dieses fast vollständige Ausblenden der zerstörerischen Kräfte einer zu hohen Flut bedingt sich durchaus aus der Wahrnehmung und Tradierung der Antike: Zwar wird auch bereits in der pharaonischen Zeit Ägyptens – vereinzelt, verhalten und vorsichtig – von den katastrophalen Folgen zu hoher und zu langer Fluten gesprochen, diese Berichte bleiben in Anzahl und Vehemenz jedoch weit hinter den Beschreibungen der Folgen zu niedriger oder ausbleibender Fluten zurück; eine Tendenz, die sich bis zu den griechischen und römischen Autoren fortsetzt.

Gründe für dieses informelle Ungleichgewicht lassen sich sowohl auf kulturell-religiöses Brauchtum, als auch die praktischen Möglichkeiten, auf die verschiedenen Katastrophen zu reagieren, zurückführen: Die generell positive Konnotation von Wasser in der Altägyptischen Kultur soll mit ihren Ursprüngen genauso beleuchtet werden, wie die verhältnismäßig einfach zu ergreifenden Maßnahmen gegen eine Dürre (Wasserleitsysteme und Lagerhaltung) den, so vorhandenen, aufwendigen und größtenteils ungenügenden Vorkehrungen gegen eine zu hohe Flut gegenübergestellt werden sollen. Hierbei stehen Aufbau, Organisation und Entwicklung der ägyptischen Damm- und Kanalsysteme im Mittelpunkt.

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Neues zur Hanse im Nordatlantik: Schiffe und Häfen in Island, Shetland und den Färöern

Ein neues interdisziplinäres Forschungsprojekt zur Hanse im Nordatlantik (Island, Shetland, Färöer) untersucht archäologische Überreste an Land und unter Wasser, um diesen kaum erforschten Bereich der Hansegeschichte aufzuarbeiten. Vom späten 15. Jahrhundert bis etwa 1700 dominierten Kaufleute aus Bremen und Hamburg den Handel mit diesem Gebiet. Wichtige Güter waren Stockfisch und Schwefel, der für die Landkriege und Seeschlachten dieser Zeit eine wichtige Rolle spielte. Kern des Projekts ist die Erstellung einer online-Datenbank, die alle vorhandenen Schriftquellen dieser Zeit aus den Archiven von Hamburg, Bremen und Oldenburg in Transkription und Edition zugänglich macht. Darin enthalten sind Schiffsbezeichnungen und Ladekapazitäten, die für schiffsarchäologische Untersuchungen von großer Bedeutung sind.

Neben Schiffsfunden und Baustrukturen an den entsprechenden Küsten stehen darüber hinaus auch Fragen zum hansischen Fischhandel im Vordergrund, die mit Hilfe der Archäozoologie beantwortet werden sollen. Vorgestellt und diskutiert werden Schiffstypen, Hafeneinrichtungen, Gebäude und die vielschichtigen Handelsbeziehungen zwischen den Städten Bremen und Hamburg mit dem Untersuchungsgebiet. Das dreijährige Projekt wird finanziert von der Leibniz-Gemeinschaft und ist am Deutschen Schifffahrtsmuseum Bremerhaven verankert.

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Roman maritime villa at Vižula, Croatia

Due to its position and the indented coast the Medulin bay drew numerous tribes and peoples to its territory. This area was inhabited from the Prehistoric Period, but the historical period that made the greatest mark on this area is the Roman times. The Romanisation led to the settling of this area with rich patricians, senators and emperors, and with them came the construction of large villas and all the agricultural buildings, such as the one at the Vižula peninsula in Medulin. The existence of the Roman villa was known from the end of the 19th century, but the excavations on land started at 1994, and in 1995 excavations started on the submerged remains of the villa. The remains at the seabed of Vižula were divided in eight sectors named A through H, and through a series of small excavation campaigns the sectors unearthed remains of the waterfront, piers, a road and termae.

Along with the small finds the architectural remains painted the picture of a luxurious Roman villa that was inhabited for at least four centuries. Vižula is a precious example of a Roman maritime villa, threatened by devastation. For that reason, and for its historical and cultural significance, we continue the research and protection of this area. The plans for future research involve the participation of experts from other areas of expertise and the continuation of research with non-destructive methods allowed by today's technology.

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Momber, Garry

Early European connections across drowned landscapes

8,000 years ago the modern human dispersal across an evolving Europe was facing a time of dramatic change. The climate continued to warm following the Ice Age, arguably making living conditions more tolerable for humans, but it also caused negative impacts. The northward migration of forests and the ingress of the sea fragmented east to west migration routes for herds of mega-fauna. In addition, sea level rise isolated communities on islands, removed access to large tracts of the continental shelf and took away subsistence territories. But on a positive note, the changes presented new opportunities that facilitated adaptation and sowed the seeds of modern European cultures. The increasingly temperate climate supported the expansion of farming from the south-east to the north-west regions of Europe while the ingress of marine environments into the Channel, North Sea and Baltic necessitated technological advances that helped exploit the growing, resource rich estuarine environments.

Information on the interplay between the cultures that were lost below the coastal seas around Britain, as it became separated from the European mainland, have been hard to extract from the archaeological record on land. However, recent discoveries from the well preserved submerged deposits dating to this crucial time of change are raising new questions about prehistoric human networks. This paper reports on unique DNA evidence from the drowned Mesolithic site of Bouldnor Cliff, UK, along with a reappraisal of the archaeological evidence from this land under water, to question our perceived understanding of European cultural connections.

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Müller, Heike

Geflutetes Kulturgut – Auswirkungen des Staudammbaus auf den Denkmalbestand

Eine Denkmalgruppe, die bis jetzt wenig Beachtung fand befindet sich heute auf dem Grund deutscher Stauseen. Ein Inventar von über 300 Stauseen in Deutschland, die seit dem Ende des 19. Jahrhunderts gebaut wurden zeigt, dass mehr als 1470 Gebäude und über 67 ganze Dörfer den Seen weichen mussten. Die Gebäude wurden abgetragen und das Baumaterial weiterverwendet, die Fundamente jedoch wurden in den meisten Fällen im Boden belassen. Diese Überreste, die sich heute unter Wasser befinden, bieten einmaliges archäologisches Potential. Unberührte Ortstrukturen der ersten Hälfte des 20. Jahrhunderts findet man in dieser Form nicht mehr. Zusätzlich ist die archäologische Vorgängerbebauung ebenfalls im Boden erhalten, und zwar ohne die massiven Eingriffe moderner Baumaßnahmen. Hier seien nur kurz die zahlreichen Mühlen und Hammerwerke erwähnt, die sich an den später aufgestauten Flüssen befanden, wo auf Grund ihrer relativen Standorttreue die Fundamente von Vorgängerbauten aus dem frühen und hohen Mittelalter zu erwarten sind.

Nur in manchen Fällen ist es möglich, einem breiteren Publikum diese Objekte näher zu bringen. Ein schönes Beispiel hierfür ist der Edersee in Hessen, bei dem der Wasserspiegel um bis zu 40 Meter schwankt und somit die Überreste der Dörfer, der Kirche und der Friedhöfe des Edertals wieder zum Vorschein kommen. Sogar eine vollständig erhaltene Brücke ist dann wieder begehbar.

Leider ist nur ein Bruchteil dieser Objekte offiziell als Denkmal gelistet, trotz ihrer immensen kulturellen, sozialgeschichtlichen, städtebaulichen und archäologischen Bedeutung.

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Nowakiewicz, T., Nowakowska, M. and Rzeszotarska-Nowakiewicz, A.

The Wetland and Underwater Archaeology of the Southern Baltic Zone in Antiquity: an example from Ermland and Pomerania (NE and NW Poland)

The paper presents the results of two research projects conducted at two extraordinary sites located in Northern Poland. One of them is the island in the Legińskie Lake located in eastern Warmia (Ermland). The remnants of objects registered during archaeological works at the island are evidence of specific non-settlement function of this place. This is illustrated by a series of finds of a very wide chronological span from the Early Iron Age to the Viking Age. The horizon of human activity at the island embrace approx. 1.5 thousand years, what is unique in the Prussian environment. The reasons for such treatment of the island in the Lake Legińskie remain unknown, what makes the registered phenomenon even more interesting.

The other site is the lake located near the village Lubanowo (former Liebenow) in Western Pomerania. During preliminary underwater prospection (in October 2014) numerous finds of the weapons dating back mostly to the Roman Period have been found there.

Their precise typological and chronological identification is quite difficult because of the lack of weapons in burial grounds of Germanic societies (the Wielbark Culture) at that time inhabiting Pomerania region, therefore findings from Lubanowo can be taken as supplement of this cultural taboo. Equally important is the settlement context in nearest surrounding, indicating that not only the penetrated lake, but also neighboring waters in this region played a special role in antiquity.

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Sacrificial Lake . Research of Nidajno bog (Masuria, NE Poland)

The paper presents the results of excavations conducted on the first sacrificial bog-site in Prussian lands, researched by archaeological methods. Tested area is located near the village of Piecki in the southern Masuria (former Peitschendorf in East Prussia), within the area of former lake Nidajno.

The results of the field-works situate the site as one of the most important offering-places (next to the famous Jutlandic sacrificial bogs at Illerup, Thorsberg, Nydam Mose and others), what is proofed by golden artefacts of Eastern Roman provenance (among them golden sword fittings, figurine of vulture and the others) and set of weapons.

Research carried out within the area of the former lake requires special methodology, tools, logistics – to be mentioned in the paper as well.

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Özdaş Harun und Kızıldağ, Nilhan

Some submerged coastal remains in Caria and Lycia

Anatolia is one of the most important centres of the ancient world due to its location on the trade routes of several ancient cultures and due to having long coastal zones. Particularly, the regions of Caria and Lycia are significant in terms of their location on a natural route for maritime trade between East and West. These regions have many sheltered bays which provide anchorage points for ships before sailing into the open seas. Numerous local harbour cities have been established along their extended coastline. Many cities played a significant role in maritime activity from Hellenistic to Byzantine times. However, these cities were affected by plague in 6th century AD and the Arab invasion in 7th century AD, as were some other coastal cities in the eastern Mediterranean. In addition to plague and the Arab invasion, several significant earthquakes caused considerable damage to coastal settlements. Many earthquakes specifically occurred around the middle of the 6th century AD, creating a profound effect on the southern coast of Anatolia. After this series of disasters, many of the coastal sites were abandoned.

We have performed numerous underwater archaeological surveys along the coasts of Caria and Lycia and recorded many submerged architectural remains, as well as shipwrecks. We investigated many of the coastal settlements and local ports of Caria and Lycia, such as Halicarnassus, Cedrai, Cnidus, Tymnus, Thyssanous, Lydai, Crya, Telmessus, Lebissos, Patara, Aperlae, Simena, Theimiussa and Dolichiste. These sites have various maritime installations, such as quays, moles, breakwaters, fish tanks, etc. However, some portions of these installations are submerged today due to the relative sea level rise that comprises the eustatic rise of global mean sea level and/or vertical tectonic movement. Apart from harbour facilities, we observed some submerged public buildings, roads, sarcophagi, rock-cut tombs, water channels, staircases, pipes, etc. Nevertheless, most of the coastal settlements in Caria and Lycia would not have been used as harbour cities for a long period after the early 7th century A.D. Their harbour facilities must have been for the most part inundated after this period due to the tectonic subsidence of the coastal plain.

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Olkhovskiy, Sergey

MAGNETOMETRIC SURVEY IN PHANAGORIA' WATER AREA

Phanagoria – the largest known ancient Greek settlement on the territory of Russia is situated on the Taman peninsula, between Black and Azov seas. Founded by the Ionian Greeks from Teos in 540-s B.C. the settlement was inhabited till XI A.D. In the classical period Phanagoria is considered to have been the capital of so-called Asian, or Cimmerian, Bosphorus. Due to the transgression of the Black sea level 1/3 of the settlement is currently flooded. The drowned part of Phanagoria is covered with the sand layer, so we tried the magnetometric method to reveal those underwater objects, which were unable to notice visually and by high-frequency acoustic methods. We succeed partly because of the specific geological structure of Taman peninsula ground, which is mostly consists of clay without any boulders. The magnetic intensity of imported stones differs substantially from the local magnetic background that gives possibility to reveal massive stone objects, for example, remains of harbor structures.

In 2013-2014 the magnetometer survey of 68 hectares of water area was conducted on the range of depth from 0.5 m to 4.5 m. The purpose of the survey was precise map of magnetic induction, which enables to reveal even relatively weak anomalies, which are most interesting as potential archeological objects. It was found that mean square error of the survey was no more than 1nT, and minimal amplitude of certainly distinguished magnetic anomalies could be taken as 5nT. As a result we revealed both separate anomalies and zones of massive closely situated anomalies. Magnetometer survey in Phanagoria' water area demonstrated the efficiency of special devices to allocate underwater objects covered with sediments and invisible for the naked eye.

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Perez-Alvaro, Elena

Climate change and in situ preservation of underwater cultural heritage

Is in situ preservation still the best option for the preservation of underwater cultural heritage?: climate change and its effect on submerged archaeological sites.

The paper will be looking at the preservation of underwater cultural heritage in situ. One of the common agreed principles in preservation of UCH named by the 2001 UNESCO Convention on the Protection of the UCH is the preservation in situ (Rule 1). The reason for this is mainly because archaeological objects are better preserved under layers of mud and in saline water.

However, climate change is warming the oceans and the poles ice is melting causing the sea levels to raise. Oceans are also being overfertilized and suffering chemical changes, such as acidification or changes on the salinity. Currents may change their pattern and as a consequence ecosystems are becoming increasingly more endangered.

These climate changes will have a direct impact on the underwater cultural heritage. For instance, higher global surface temperature will dry some submerged heritage and, on the contrary, sea-level rise will drown many coastal places, creating new underwater cultural heritage. In addition, each one of the changes (warmer waters, changes on currents, rise of the oceans and chemical changes) will have a different effect on the different materials that constitute a submerged archaeological site.

If the seas are changing it is necessary to choose what to preserve, how to preserve it and if preservation in situ is still the safest and best option for underwater cultural heritage preservation.

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Underwater Archaeological Discovery of “Werth- Mill” Deserted in Medieval Times and “Werth- Fording” in the Lahn River at Wetzlar-Garbenheim (Hesse, Germany): Investigation of a millstone remainder used differently and the structures of the mill house

Bei einer unterwasserarchäologischen Prospektion der Bayerischen Gesellschaft für Unterwasserarchäologie e.V. in Kooperation mit dem Historischen Forum Waldgirmes e.V. und genehmigt durch das Landesamt für Denkmalpflege Hessen gelang im Jahr 2014 erstmalig der archäologische Nachweis der Existenz der historischen „Werth-Mühle“ in der Lahn bei Wetzlar-Garbenheim. Zuvor konnte im Jahr 2013 das dazu gehörige Wehr, die „Werth-Furt“, mit einem Side-Scan-Sonar nachgewiesen und von Herrn Roman Scholz (Deutsches Archäologisches Institut Abteilung Römisch-Germanische Kommission (RGK) Frankfurt a.M.) tachymetrisch vermessen werden. Diese fand sich bei Flusskilometer 6,4 zwischen der Gemarkung Lahnau-Dorlar und Wetzlar-Garbenheim unterhalb der Brücke der A45 über das Lahntal. Dort konnten auch mehrere bearbeitete Eichenpfähle geortet werden, die zum ehemaligen Mühlengebäude gehörten.

Dendrochronologisch konnte die Existenz der im 14. und 15. Jahrhundert häufig erwähnten Mühle „mule zu werde“ bzw. „zu Wyrde“ mit Ersterwähnung von 1322 um 216 Jahre früher auf 1106, datiert werden (Dr. Thorsten Westphal, RGK). Ein mittelalterlicher Mühlstein aus Eifelbasalt (ähnlich dem Typ Avenches) bestätigte die Mühle. Die Untersuchung der Spuren auf dem Mühlstein legen eine Mehrfachnutzung des ursprünglichen Läufers in späterer Zeit als Achslager, Komposit-Bodenstein und Anker nahe und unterstreichen den Wert des noch zu 60 % erhaltenen Steins für seine Besitzer über seine Nutzungsdauer hinaus.

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Plath, Gerhard

The correlations of Phaistos, Kommos and Agia Triada under aspect of coastal alterations.

The Island of Crete was part of the development in high sea shipping during Bronze Age. The Minoan culture was based on sea trade inside of the Aegean and Near East. The "doors" to Near-east were the harbour-sites of Zakros and Kommos, located in the Gulf of Messara. Seismic and tectonic movements have had changed the coast-lines of this Gulf until today. Geotechnical drillings have brought to light a connection between the plain area of Messara and the Timbaki basin. Geologists assign this process in Late Neolithic and Early Minoan. In correlation to the phases in building activities it could explain changing harbour-sites and in special the establishment of Kommos.

All aspects in definition of harbour-sites, coastal alterations, harbour-installations, maritime conditions, development in ship-building techniques, logistic, archaeological and pictorial evidences, town-planning, fleet-formations, cargo dimensions and the so called "night jump" will be part of this research.

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Pydyn, Andrzej

Prehistoric submerged settlement on the Lake Gil Wielki in the Ilawa Lake District. An example of interdisciplinary approach.

Underwater archaeological surveys have been carried for the last three years on number of lakes of the Ilawa Lake District in north-eastern Poland. Current project called Survey of archaeological potential of selected lakes of the Ilawa Lake District was funded by National Heritage Board of Poland.

In the previous years 2012 and 2013 a number of underwater sites were discovered. Majority of them should be associated with the Medieval and Post-Medieval communities from this part of Poland. The most interesting discovery from the season 2014 is the submerged prehistoric site on the Lake Gil Wielki. The site is located on the shallow in the north-eastern part of the lake. It was occupied a number of times through prehistory, but probably the earliest settlement developed here at the end of the Neolithic and should be associated with communities of the so-called Corded Ware Pottery.

Underwater prospections were accompanied by sonar, side scan sonar and ground-penetrating radar surveys. Also a number of environmental (pollen, macro, geomorphological) analyses were conducted on the site.

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Rocha Santos, Antonio und Trápaga Monchet, Koldo

“The administration of woodlands (*Coutadas, Matas y Sitios Reales*), regarding naval construction, on the Iberian Peninsula, during the 16th century”

During the Modern Ages, wood represented a natural resource, indispensable to naval construction. Since the discoveries period, both Portuguese and Spanish Monarchies increased the consumption of this prime-material. However, the demand was superior to the supply capacities of Iberian woodlands. This matter lead the Iberian sovereigns to develop legislations concerning the safekeeping, maintenance and control of forests and woods (*Sitios Reales* in Castilla; *Coutadas y Matas* in Portugal). The union of both crowns, in 1580, by Filipe II, brought together two distinct traditions.

The objective of this presentation is to approach the institutionalization held by the Courts of Lisbon and Madrid during the 16th century, with particular attention to the reign of Filipe II (I of Portugal). During his ruling we recognize the establishment of political structures, regulated by the crown. This administrative changes had impact on the ordination of Iberian forests, understood as natural areas, source of a necessary provision of arsenals and naval dockyards.

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Royal, Jeffrey G.

Exploring the Economic Factors and Landscape of Naval Warfare during the First Punic War

Nervos belli, pecuniam infinitam: "...the sinews of war, endless money...". Few statements have explained so concisely a relationship between governance in wartime and economics as that uttered by Cicero in denouncing Marc Antony. This fundamental relationship between military action by a state and the resource means to carry it out is germane to all periods of history and was a central issue managed by the protagonists of the First Punic War. A substantial share of the battles fought in this conflict were naval encounters, and taken altogether one of the greatest naval engagements in the ancient world. Both archaeological and historical evidence indicates the grueling 24-year conflict strained the economic bases for both Rome and Carthage.

Understanding the economic factors and landscape inherent in this struggle are critical elements in understanding the naval engagements, including the decisive battle in 241 BCE. With the discovery of the battle of the Egadi Islands site, material evidence allows archaeological investigation into the economic factors associated with conducting naval warfare. This provides new insights into such factors as technology, tactics, and strategies that were once the sole domain of historians. Moreover, the paper will offer a first attempt at delineating the economic landscape in the wider Mediterranean where the evidence for exchange and resource extraction speaks to the complexities of wartime economies.

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Sanna, Laura

Submergeds landscapes in the Marine Cave of Bergeggi (Liguria)

In late nineteenth century Issel first recognized the importance of the Marine Cave of Bergeggi (SV- Northern Italy), where he found a complete stratigraphy referring to Quaternary, with different stages of marine transgression and regression. The site is in fact known as the largest karst cave and the most important coastal cave of Liguria, with a submerged and an emerged part both shaped by marine processes occurred during different sea level changes. This is the reason why the cave has recently been studied by archaeologists and geo-morphologists. These latters have identified marine and continental deposits, landforms of marine origin (i.e. marine wall grooves and L. Lithopaga bands), and one of the best documented marine wall groove dated to MIS 5.5 of the whole Tyrrhenian coast.

From an archaeological point of view, researches held in the past century in the cave have allowed the recovery of a great number of artefacts relating to different periods of prehistory and history of Liguria. Between 2013 and 2015, a new team began the investigation of the submerged tunnels of the cave to find out possible traces of anthropogenic stratigraphy still in its original position: the main purpose of this research is, in fact, to reorder the old data that come mostly from surface surveys as well as to get first-hand information about stratigraphy, to be used for precise archaeological finds dating.

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Schöbel, Gunter

Die Anfänge des wissenschaftlichen Tauchens im VDST ab 1954

Fragestellungen und Methoden der Unterwasserforschung waren Gegenstand der grundsätzlichen Überlegungen bei der Gründung des Verbandes der Deutschen Sporttaucher, wenn auch zunächst die Bemühungen um eine gemeinsamen Satzung, die Rechts- und Organisationsform oder den Ausbildungsstandards wenige Jahre nach dem Zweiten Weltkrieg im Vordergrund standen. Es galt, die regional organisierten Tauchclubs von München über Magdeburg bis Berlin in einem Dachverband zu einigen, tauchmedizinische und technische Grundlagen zu kommunizieren, erste bundesweite Verbandstagungen zu organisieren, gemeinsam zu lernen, den Kontakt zu ausländischen Tauchfreunden aufzunehmen, aber auch Überlegungen anzustellen wie botanische und zoologische Themen, Schiffswracks oder prähistorische und historische Siedlungsfunde am besten aufzunehmen seien.

Neu aufgefundene Archivalien im Pfahlbaumuseum Unteruhldingen am Bodensee aus dem ehemaligen Besitz des Gründungsvorsitzenden des VDST, Prof. Dr. Hans Reinerth, ab 1954 geben einen Einblick in die damalige Diskussion um eine deutschlandweite Vereinigung der Tauchsportfreunde. Beachtenswert ist eine noch angestrebte Zusammenarbeit mit den ost-deutschen Clubs vor der Errichtung der Mauer.

Die Ergebnisse der ersten Unterwasserforschungen in Binnengewässern und im Meer sind in den Zeitschriften Delphin und Neptun gegenüber der Öffentlichkeit dargestellt. Tödliche Tauchunfälle und juristische Auseinandersetzungen zwischen den Clubs erschwerten in den ersten Jahren die bundesweite Organisation. Dennoch waren die gemeinsam vorgetragenen Überlegungen zu Dokumentationsmethoden unter Wasser und zum Kulturgüterschutz aus heutiger Sicht prägend für die Diskussionen der Folgejahre. Der VDST feierte als größte Tauchsportvereinigung in Deutschland im Oktober 2014 sein 60-jähriges Bestehen. Nachträglich ist jetzt durch die wiedergefundenen Dokumente eine Bewertung der archäologischen Ansatzpunkte im wissenschaftlichen Tauchen möglich.

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Stefanile, Michele

Living by the sea, building in the sea Underwater researches in Roman maritime villas on the Tyrrhenian coast of Italy.

The villae maritimae along the Tyrrhenian coast of Italy are important testimonies of the Roman architecture during the Late Republican and Imperial Ages: their analysis allows us to understand how the Romans were able to build directly on rocky coasts and jagged promontories, often deeply changing the natural landscape.

Despite a long and fruitful tradition of studies on the subject, the scholars rarely worked on what now lies below the sea level, where, actually, a considerable part of the most remarkable structures is.

The Southern Latium Underwater Survey, established inside a cooperation agreement between the new Underwater Archaeology Research Unit of the University of Napoli "L'Orientale" and the Soprintendenza Archeologica del Lazio, aims at reconsidering the maritime villas of Southern Latium, and at increasing our knowledge through data coming from underwater contexts.

In September 2013, a first campaign of underwater surveys took place in Gianola, in the submerged part of a huge villa. Building techniques and decorative elements suggest a first phase during the II century BC. In a few days of work, a big fishpond was documented, with very interesting artefacts related with the closing system of the tanks and with the mixing of freshwater and salty water, for a more profitable fish breeding. New works, in 2014, have been concentrated on the waterfront of this and other villas in the same area.

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„Land unter“ als Motor kultureller Entwicklung? Das Fallbeispiel Kykladen

Das Thema der Tagung lenkt den Blick auf verschiedene Phänomene, die Überschwemmungen mit sich bringen. In diesem Beitrag sei eine wesentlich langfristige und weiträumigere Perspektive auf den Prozess der Überschwemmung gewagt. Die Inselgruppe der Kykladen bildete sich nach Ende der Würmkaltzeit ab ca. 12.000 v. Chr. aufgrund des steigenden Meeresspiegels aus einer einst die Ägäis ausfüllenden größeren Landmasse. Verbindungen zum Festland waren durch eine Landbrücke und schmale Wasserstraßen gegeben, so dass ein Überwecheln leicht möglich war. Das Steigen des Meeresspiegels um bis zu 150 m zerteilte diese Landmasse über den Zeitraum von 6.000 Jahren nach und nach in immer kleinere Inseln und Inselgruppen. Für die Menschen, die in diesen Raum spätestens seit dem 10. Jahrtausend v. Chr. siedelten, stellte sich die Herausforderung der Anpassung an diese naturräumlichen Gegebenheiten. Plätze mit interessanten Rohstoffen, wie das obsidianreiche Melos, waren nur mit seefahrerischen Mitteln zu erreichen, wobei einhergehend mit immer stärker auf die Schifffahrt sich auswirkenden Winden und Strömungen die wachsenden Distanzen das Erlernen grundlegender seefahrerischer Fähigkeiten erzwangen. Dies ist die Grundlage für die außerordentlich aktive Seefahrgesellschaft der frühbronzezeitlichen Kykladenkultur.

Als Drehscheibe des Handels und Ideenaustausches erwarb sich diese Kultur eine tonangebende Rolle. Deutliches Zeichen dafür ist, dass die direkt benachbarten Küsten Kretas, Attikas und Euboias ihrem kulturellem Repertoire kykladisierende Elemente aneigneten. Die fortwährenden und wechselnden Herausforderungen, die das wachsende Meer an die Bewohner der Ägäis stellte, mögen auf individueller Ebene kaum bemerkbar gewesen sein. Jedoch erlaubt uns die spätere Perspektive ein umfassenderes Bild zu gewinnen und einen Anpassungsprozess zu postulieren. Die Bildung des Archipels erzwang seefahrerische Aktivität, um an gesuchte Rohstoffe zu gelangen. Mit Kontaktaufnahmen zu benachbarten Kulturräumen wuchs die Bereitschaft des Austausches mit diesen, und neue Techniken und Sozialpraktiken konnten Eingang in die ägäischen Gesellschaften finden. Damit war eine Grundlage zur Schaffung der ägäischen Hochkulturen gelegt.

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New research of Suleyman Bridge in Darda, Croatia

In May of 2008, during the cleaning of a fishpond and backwaters near the Esterházy baroque period palace by Darda municipal employees, wooden posts were extracted along with silt .

Information in historical sources indicated the possibility that these could be the remains of the well-known Suleiman's bridge that linked Osijek and Darda during the 16th and 17th centuries. The bridge was built at the order of Suleiman the Magnificent in 1566. The main reason for its construction was the need of the Ottoman army to cross the trackless swamps in northeast Croatia on their way to conquest central Europe. After 120 years of service, Suleiman's bridge was finally destroyed in 1686.

New archaeological researches were based in the fishpond area, at the position of the presumed northern end of Suleiman's Bridge. The aim of archaeological campaigns was to document all wooden elements of the bridge and sampling of timber piles (bridge piles) samples, which were located in situ or lying on the bottom of the pond, for dendrochronological analysis. All the discovered constructive elements will be very useful in further research for the ideas how to reconstruct the original appearance of the bridge. The archaeological research gave us numerous interesting finds which gives us a new view of every day life that flowed on this famous bridge.

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The Castle of Crusader Arsuf (Israel) in View of Land and Maritime Investigations

The Castle of Crusader Arsuf (Apollonia-Arsuf, Israel) is a time capsule (1241-1265 CE) that from the archaeological stand-point better known from its destruction; in March 1265 CE, the Mamluk sultan Baybars laid siege to the town of Arsuf and after 40 days of fierce fighting, took it by storm. The entire site of Arsuf was razed, and it has been left in ruins ever since. Among the excavated features of the castle, a cesspit used for refuse by the besieged Hospitaller knights and defenders was unearthed, yielding large numbers of local and imported pottery vessels, undecorated and luxury glass vessels, and metal and stone artifacts, in addition to sizeable number of animal bones. The importance of this assemblage lies in its terminus ante quem of late April 1265, and the relative scarceness of well-dated everyday artifacts of this period. The size, diversity, and secure archaeological context of this assemblage make it an important study case for Crusader maritime trade in Israel and beyond.

The so-called 'port' of Apollonia-Arsuf (Crusader Arsuf) is located at the foot of the cliff on which the Crusader-period castle (1241-1265 CE) stands, in the northern town limits of Herzliya, Israel. It is rectangular in plan, about 80 m from north to south and 33 m from east to west. It has walls or breakwaters at its northern and southern sides, while on the western side is a reef of fossilized dune sandstone. There were towers at the seaward ends of the walls, and an entrance at its south-western corner.

Opinions have differed as to the true nature of this installation: Was it a real port or harbor or just a mooring basin for small craft? Or, as some scholars claim, an inland installation designed to prevent an approach from the coast to the cliff on which the castle itself stands? In an attempt to elucidate its function various works were carried out, within the "port" itself as well as out of it, in the deeper sea surrounding it. Using a ground penetrating sonar Drs. Storch and Günter-Martin, in and out of the port revealed some anomalies. Water jetting probes and dives at some anomalies revealed various findings, mainly grain and pieces of wood, 14C dated to the Crusader and Mamluk periods (13th-14th cents.). Measurements and probes in the port showed its depths. Underwater photography revealed typical maritime "header" construction. Ceramic objects found by underwater surveying in the "port" are similar to those found in the castle. This, combined with the findings strongly indicates shipwrecks and maritime traffic.

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Heritage for Reconciliation and Dialogue

The rich and significant underwater cultural heritage from World War I provides a particularly intriguing testimony from the past. By interpreting its meaning in a historical context, students are encouraged to critically reflect on the heritage site, as well as on war, peace and reconciliation. Learning that war emerges in the minds of people transmits understanding of the value of peace and of the importance of heritage.

UNESCO's project "Heritage for Reconciliation and Dialogue" shall help educators to introduce in their approach the concepts of dialogue, peace and reconciliation through the understanding of cultural heritage. The project was agreed upon by all States Parties to the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage.

The main purposes of this educational initiative are:

- to provide content on the topic of underwater cultural heritage in relation to the First World War and to incorporate this topic into the course outline of lessons on human rights and responsibilities, conflict resolution, intercultural understanding, awareness of cultural heritage, etc.
- to provide additional information on the pedagogical approach to peace and remembrance education
- to build confidence in educators when covering topics about underwater cultural heritage and its importance for peace, remembrance and reconciliation
- to assist educators in effectively integrating local initiatives on the Centenary of the First World War and underwater cultural heritage in the curriculum
- to furnish educators with learning activities and teaching suggestions.

The lecture discusses in more detail the main ideas of this project which was elaborated by UNESCO and UN Association Flanders.

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Flood control at Lipari Harbour (Italy).

The discovery of submerged structures, in 2008, during archaeological works in the port of Lipari, Sicily, highlights a series of natural and anthropological factors on the struggle of the inhabitants of Lipari against the sinking of their old wharf. The issues considered in this study are based both on the underwater archaeological discoveries of the Superintendenza del Mare, on a case of sinking in the sea level in the area, and on photographic and historical sources about the site.

The discovery of some bases of columns and stone fragments suggests the existence of a building of considerable size in the area, maybe designed but never completed, partially reused in the harbor structures in the II century BC, possibly after telluric events historically determined.

The actual excavations (2008-2013) radically changed the image of romantic coves with beaches for hauling boats, in favor of a mighty structure connected to the port, also suggesting a review of the urban part of the Roman city: Lipari, for centuries a strategic center for the domain the southern part of the Tyrrhenian Sea, began to lose its importance, probably because of the sinking of the port, around the II-I centuries BC.

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The Sunken Village of Rosslare Fort, Wexford, Ireland

The medieval village of Rosslare Fort was of strategic importance, controlling shipping on the Irish side of St Georges Channel. Situated at the entrance to Wexford Harbour, the village was an important defensive and administrative centre. 19th Century flood defences and reclamation elsewhere in Wexford Harbour caused acute erosion around the Fort, and the village, overwhelmed by a storm in the early 1920's, was finally evacuated in 1926.

While still a curiosity in historical terms, there is some confusion on the layout and the defensive structures once extant. Various survey methods have been used to decipher the evidence left underwater and in the intertidal zone.

It is the living traditions still retained by former families of Rosslare Fort that is of particular interest to the author. Although joined to the mainland by a four kilometre sand spit, the village was quite isolated, and was more like an Island community. In common with other Island communities it became a repository for traditional ways of life, which included boat building in a style that has been suggested to be of Romano Celtic origin. These flat bottomed boats, now known as Rosslare Cots, were once built up to 14 metres long and traded across the Irish Sea.

The area was known to the Greeks, and appears on Ptolemy's second century map of Ireland. At least two Romano Belgic tribes were known to have settled in Wexford.

The presentation will cover the history, survey and results of this ongoing research.

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The Ioppa Maritima Project

Yafo (Jaffa) was one of the most important harbors in antiquity along Israel's long and straight Mediterranean coast. The site, which today nestles inside Tel Aviv, is first mentioned in Egyptian sources as one of the cities conquered by Thutmose III in the 15th-century B.C. Later, in the Iron Age, it was to the port of Yafo that Hiram of Tyre sent timber in rafts for the building of Solomon's Holy Temple and his royal palace (2 Chronicles 2: 16). The site's importance as a maritime center continued throughout antiquity and into modern times. The Ioppa Maritima Project takes a two-pronged approach to examining the maritime dimensions of this important site. To the east of the tel is a large geological depression, which has been proposed as the location of an ancient harbor. This depression, known locally as "the Bassa," would have been a harbor estuary of the Ayalon River, which has since disappeared under sediment and recent construction.

Water/swamp flats still appeared in this area in recent times as, for example, can be seen on Jacotin's map in the Napoleonic Description d'Égypt (1799) and in an 1839 painting by Project will examine the possibility that the Bassa served as an estuary harbor in pre-Roman times.

A second focus of the project is a search for shipwrecks of historical/archaeological significance in deep water (~50-300 meters) off Yafo, based on targets derived from a recent Geological Survey of Israel multibeam survey.

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Craft products of Nuremberg from the Mijoka shipwreck (Croatia)

During the period between 2006 and 2012 the Department of underwater archaeology of the Croatian Conservation Institute carried out the explorations of ship remains that had been sunk on the shallows of Mijoka near the island of Murter (Croatia). The site was found devastated, but the first campaigns showed that a stratum of the shipwreck was still containing very valuable archaeological material like the luxury consumer goods, decorative merchandise and goldsmith's material, glass products and various silver and gold coins. Among other movable finds, the craft objects like the brass casting-counters and small ivory diptych sundials with signatures of craftsman originated from the town of Nuremberg were also found.

The casting-counters were produced by Hans Schultes in Nuremberg during the period between 1586 and 1612 and sundials had the engraved signature of Hans Miller, who was mentioned in historical sources as a member of the guild of compass makers and a manufacturer of small folding watches from Nuremberg, active at the beginning of the 17th century. Since these objects revealed historical persons and facts that were recorded in the archives, the shipwreck can be dated to the beginning of the 17th century.

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IPR XX Poster Presentations

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Underwater finds from Risan, Montenegro. Season 2011

In the years 2003-2011 in the area of Risan Bay, on which is situated the town of Risan (gr. Rhizon, lac. Risinium) in modern Montenegro, was conducted by the Center for Research on the Antiquity of Southeastern Europe, University of Warsaw underwater archaeological prospection. During several seasons of research have been raised from the bottom single artifacts. The great majority of them were different types of amphorae, mostly MGS V, MGS VI and Lamboglia 2, dating from the fourth century B.C.

As part of this study will be presented preliminary analysis of objects lifted during 2011 season. From area 'R' and 'S' comes 13 fragments of amphorae, 2 Gnathia bowls, lid and amphorae stopper. One of amphorae hold a stamp for which known is an analogy from Croatia. It will be the first study of these artifacts.

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The shipwreck on the bank of the Padus Vetus river and a plausible dock between early empire and late antiquity

In the sixth century. A.D. the church of Santa Maria in Padovetere, close to Comacchio, was set close to the bank of a bend of an old branch of the river Po, by that time almost dried up. The excavation carried out in the autumn of 2014, as a result of the data collected in 2008, led to unearth the remains of a boat, made of elm wood for the planking and oak for the frames, approximately 15 mt long, with a flat bottom that reaches the maximum width of 3 mt and a flank reaching 1.5 mt. It is a *sutulis navis*, ie, a vessel whose wooden planks have been sewn together with ropes, after a widespread technique that started in the 2nd century b.C. and persisted in the north-Adriatic area until the 6th-7th century. A.D. The ship was found lying on the northern bank of the river, apparently abandoned in ancient times and with no cargo. The debris drift from the river covered it completely, leaving visible only the upper part of the side, which was destroyed in a short time.

In the layers that covered the boat were found numerous fragments of amphorae dating from the 5th and 6th centuries AD, which made it clear that the boat was abandoned on the river bank not later than in the 5th century AD, when the church and the necropolis still did not exist. In the same layers of the amphorae a portion of another vessel was brought to light; the type is called "monoxyle" or "canoe", formed with a single oak trunk. Numerous monoxyles have been identified throughout the Po delta and two examples, between 12 and 14 mt of length, are on display at the National Archaeological Museum of Ferrara. These vessels were definitely used for inland navigation along rivers and canals. All these finds support the hypothesis that the site was inhabited even before the setting of the church and used as a river port, considering also the presence at a short distance of a brick building, often identified with a lighthouse for river navigation, along the ancient Fossa Augusta.

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Aktuelle Forschungen der AMLA

Die 1997 gegründete Arbeitsgruppe für maritime und limnische Archäologie (AMLA) der Christian-Albrechts Universität zu Kiel besteht aus geprüften europäischen Forschungstauchern. Überwiegend handelt es sich bei den Mitgliedern um Archäologen aber auch verwandte Wissenschaften, wie die Biologie und Geologie sind vertreten, sodass interdisziplinäre Forschungsansätze Teil des Konzepts der AMLA sind.

Primäres Ziel der AMLA ist es, die maritime bzw. limnische Kulturlandschaft zu erforschen und der Öffentlichkeit zugänglich zu machen. In den letzten zwei Jahren absolvierten einige Mitglieder ihren Abschluss in der Archäologie mit unterwasserarchäologischen Projekten.

Diese und weitere Tätigkeiten der AMLA sollen in diesem Poster vorgestellt werden.

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Submerged remains of ancient Kekova in Antalya, Turkey

Kekova (ancient Dolichiste) in southern Lycia is a well-known ancient settlement which contains a number of submerged remains such as moles, quays, public buildings, sarcophagi, etc. along its extended coast. This coastal settlement, now uninhabited, is situated on an ancient sea trade route. Due to its suitable location as a natural sheltered anchorage on this route, Kekova was used for a long period by merchant ships. Indeed, shipwrecks in the region, which variously dated from the Archaic to Byzantine periods, indicate that Kekova was used as a harbor city for several centuries. The adjacent settlements such as Aperlae, Theimiussa, Simena and Andriake offer important parallels of development. They also have several submerged public buildings and harbor structures, similar to Kekova, dating from the late Roman to early Byzantine period. Major disasters such as earthquakes, plague and Arab invasions in the region probably impacted local communities in the 6th and 7th centuries A.D. However, ongoing significant earthquakes would have had more of an effect on the abandonment of the region. Numerous submerged remains provide considerable evidence of active seismicity in the region. We performed marine archaeological and geophysical surveys on submerged archaeological remains in Kekova and its surrounding area in order to expand our knowledge of Lycian coastal history.

We found some evidence from approximately the time of the last use of the harbor structures. Numerous ceramics near the submerged quay, dated to Early Byzantine Period, indicate that the harbor structures must have been used in the late 6th - early 7th century A.D. Thus, we can suggest that the coasts of Kekova have subsided over the last 1400 years, hindering their function, and this may have contributed to the end of maritime activity in the area. A similar subsidence trend is observed in the other coastal settlements on the southern Lycian coast. Considering the combination of earthquakes, plague, Arab invasions, lack of evidence for medieval settlements and the latest ceramic finds, we can conclude that Kekova and nearby Lycian coasts were abandoned in early Byzantine times. We suggest that tectonic movement was a dominant cause for the abandonment of the region.

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The fortress under the lake. The case of Mazallakkar in Sicily.

In the province of Agrigento (South Sicily), in the area between Sambuca di Sicilia and Sciacca, the ruins of a fort built by the Arabs and called Fortino of Mazallakkar can be found. It stands (or better used to stand) in the area of the mills, so named for the presence of several mills operated by the waters of the Carboj River, which extends into the lower part of Sambuca di Sicilia. Its construction is contemporary with the foundation of the town of Zabut (Sambuca) by the Arabs, little after the year 830 A.D. The fort has a square shape; in every corner stands a circular tower, covered by a dome in limestone. The towers are equipped with slits and the height of the walls reaches approximately four meters. Still uncertain is the history of the fort and not yet perfectly defined datation, nor its destination to road network control point in the territory. Until the fifties of the 20th century, even if used as a shelter for sheep and cattle, the Fort of Mazallakkar was in excellent condition. After the construction of the dam Carboj, it remains partially submerged by the waters of Lake Arancio for at least six months a year.

Temperature ranges and hydro-geological depressions are destroying hopelessly this historical and architectural masterpiece, unique in all Sicily. The protection of this ancient structure, unique in the type, must be pursued through specific studies of engineering, which could assume the insulation of the structure from the water or on land transfer. The Fort of Mazallakkar and the remains of the Castle of Zabut are physical documentation of the presence of Muslim populations in this area and an archive of stone for local history, which through accurate and specific archaeological campaigns may return additional data to the history of Sambuca di Sicilia.

Keywords: Sicily, Lake Arancio, Carboj Dam, Mazallakkar Fortress, Sambuca di Sicilia.

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**Underwater Archaeological Discovery of the Medieval Deserted Mill "Werth-Mill" and
"Werth-Fording" in the River Lahn at Wetzlar-Garbenheim (Hesse, Germany): Investigation
of a Millstone Remainder used more than once and Structures of the Mill House**

Özdaş, Harun

Some submerged coastal remains in Caria and Lycia

Radić Rossi, Irena und Siepenkötter, Christa

The Shipwreck of Gnalić; Sunken history of the Late Renaissance World

The shipwreck near the islet of Gnalić, not far from the coastal town of Biograd na Moru in Central Dalmatia (Croatia), is one of the most significant post-medieval shipwreck sites in the Mediterranean. Built in Venice in 1569 for Benedetto da Lezze, Lazzaro Mocenigo and Piero Basadonna; captured by the famous Ottoman corsair Uluç Ali in 1571 and sold to Odoardo da Gagliano in Pera (Constantinople) in 1581; the ship sunk at Gnalić in early November 1583, loaded with precious cargo shipped from Venice to Constantinople. Thanks to the exceptional preservation of the ship's hull and cargo, and hundreds of documents revealing its exciting story, the interdisciplinary research of the shipwreck offers a unique opportunity to study and illustrate the economic, political, cultural and historical situation in the Late Renaissance in the whole Europe and Mediterranean.

During the two intense research seasons, realized in 2013 and 2014, the collaboration between University of Zadar, Texas A&M University and the German Association for the Promotion of Underwater Archaeology (FUWA) proved to be an extremely efficient solution for realizing the demanding underwater research campaigns.

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From survival to preservation: water management in Veneto

The Veneto is an Italian region particularly rich in waters that has developed and implemented innovative water management measures since prehistory to build towns and use its natural resources. Flooding of rivers in particular has been a recurring scourge throughout its entire history. Some of the water management techniques implemented throughout its history will be assessed in light of the benefits, perceived or real, that were acquired by often monumental works. Venice in particular will be used as case study to discuss the changing reasons for water management, and particularly the preservation of heritage and its peculiar culture.

After managing the rivers for millennia in the last centuries the main threat has been perceived to be coming from the sea, the focus of the most recent very large projects, the murazzi of the Venetian Republic and the Mose of the Italian Republic. The aim is to emphasise the different motivations that have prompted water management in Veneto over millennia and determine whether there was a progressive development that can be traced in its history or it is a recurring fight.

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