Roman Ports in Time and Space: Reflections upon Issues raised by the PortusLimen Project

The British School at Rome 29th and 30th January 2019

Organized by Simon Keay and Pascal Arnaud

Programme Day 1

Introductory Address

9.00-9.10: Stephen Milner (Director, British School at Rome)

All papers 20 minutes plus 5 minutes questions

Research Questions

9.10-9.35: Simon Keay (University of Southampton): Archaeological and Geoarchaeological Evidence for the Layouts, Functions and Inter-Relationships Between Ports

This is the first of two papers that set the scene for the research undertaken by the PortusLimen project. It focuses upon the state of the art of archaeological and geoarchaeological approaches to the study of harbours and ports at the time the project was conceived. It begins by exploring what we felt was the unrealized potential of Roman ports for understanding pan-Mediterranean commerce, and our conviction that an interdisciplinary approach was needed. It then briefly reviews archaeological work at some of the more important sites in terms of what was known about the functions of the larger ports at the time, before moving on to look at smaller ports and anchorages, and then on to the littoral and terrestrial contexts of ports and the connections between ports. This is followed by a brief outline of geoarchaeological approaches to the study of ports and
harbours and why they are so crucial to our broader understanding. The paper concludes by emphasizing our conviction that more closely integrated archaeological and geoarchaeological approaches were a vital pre-condition for a fuller understanding of Roman Mediterranean ports.

9.35-10.00: Pascal Arnaud (Université Lumière-Lyon 2) : **Textual Evidence (Literature, Epigraphy, papyri, Jurisprudence) for the Layouts, Functions and Inter-Relationships Between Ports. A voyage through Complexity**

Textual evidence relating to ports was the second pillar of the project. It relied upon a study of evidence provided by ancient literature, both Latin and Greek and epigraphy, mainly Latin and Greek. This also included papyri and Roman Jurisprudence. This range of material led to an interesting voyage through complexity. A first layer consisted of lexicography, in other words understanding the meaning of the words used to describe ports, their infrastructure, their management, the occupations and places relating to ports, and their society, bearing in mind that the meaning of words could change through time and space and from one kind of evidence to another. It also had to understand to what extent contexts may impact the meaning and value of various kind of evidence. The project also conceived a new approach to periplographic literature. The paper concludes by arguing for the importance of textual analysis to a better knowledge of a range of ports, reconstructing port-systems, understanding ports as places of controlled economic activity and in contextualizing ports within their wider networks.

**Broad Scope of Project Achievements**

10.00-10.25: Jean-Philippe Goiran (CNRS - Université de Lyon UMR 5133 Archéorient), Winnie May Chan (CNRS - Université de Lyon UMR 5133 Archéorient) and Stoil Chapkanski (University of Paris 1 Panthéon-Sorbonne, UMR 8591 LGP): **The Geographical Context of Ports**

An important aspect of ancient harbour geoarchaeological research is to understand its functionality by studying the chronoestratigraphic sequence of the basin’s infill using sediment archives. We developed a stratigraphic model to help interpret the sequences which are divided into three units: (i) pre-limenic, (ii) limenic, and (iii) meta-limenic. The pre-limenic, or pre-harbour phase, represents the depositional environment prior to the
construction of the harbour. The limenic unit contains sediment infill that occurred while the harbour was in use. Analysing these sediments can determine the quality of a harbour’s infrastructure and may also reveal dredging phases based on radiocarbon dating and changes in sediment texture. The meta-limenic unit contains sediment infill when the harbour was abandoned (i.e. post-harbour phase). Furthermore, the second step of harbour geoarchaeological research involves studying the harbour structures themselves. On a quay, for example, fixed shells help determine the ancient biological sea-level, which is fundamental to understanding which type of boats could reach and enter the quay. Sediment cores obtained from the quay can determine the origins of the structure (e.g. the material used), when it was built, and its depth. The final step of this research is to understand how harbours evolved with changes in the regional landscape through time, its social impacts on port cities, and the causes and/or results of their abandonment.

10.25-10.50: Pascal Arnaud (Université Lumière-Lyon 2), Simon Keay (University of Southampton) and Jean-Philippe Goinan (CNRS): Building Inter-Disciplinarity in the Study of Ports as Interfaces between Land and Sea

This paper illustrates how a pan-European project with a focus upon ports, which from its inception encompassed disciplines that had traditionally been studied side by side, namely archaeology, texts and geoarchaeology, became an interdisciplinary one. Collegial direction, mutual knowledge and understanding reinforced by frequent meetings, and multi-skilled « middlemen » were the key elements of success. A key moment in the life of the project occurred when colleagues were able to understand each other’s methods, and the conceits and polysemy of words used by their various disciplines. Real interaction was not possible until all colleagues understood each other’s disciplinary lexicons. It was only then that it was possible to develop a common, interdisciplinary, definition of “ports” that moved away from that of self-evident nodes in time and space in favour of organized interfaces between sea and land. Interactions were possible between all the different strands of research, making redundant the more traditional form of relationship between one data type and another. Further to this original achievement, the project also found ways of integrating its many differing results in a way that made the inter-disciplinary approach a reality: the PortusLimen database is the manifestation of this.
Coffee: 10.50-11.15

11.15-11.40: Simon Keay (University of Southampton): *Advances in Our Understanding of the Character and Functions of Ports*

This paper summarizes the results of the archaeological and geoarchaeological research undertaken at a range of ports across the Mediterranean during the PortusLimen project, and acts as an introduction to the papers that follow. It much of the work has focused upon harbours and port infrastructure. The paper begins by exploring the accessibility of harbour basins by sea. It then focuses upon the definition of harbour basins, their uses, relationships to surrounding buildings, capacities and life-cycles, and canals. The work draws primarily upon the results of what has amounted to a methodological laboratory at Portus, but also compares and contrasts them with our work Puteoli, Baelo, Utica, Tarraco and Ephesos. It then moves on to consider the results of project research into port activities along adjacent shorelines beyond harbour basins, which provide solid grounds for seeing “ports” as part of more complex systems of commercial infrastructure.

11.40-12.05: Stefan Feuser (Universität zu Kiel), Eric Laufer (DAI Athens), Felix Pirson (DAI Istanbul), et alii: *The Multifaceted Port System of Pergamon’s Sea Front: Elaia, Pitane, Kane and Beyond*

The Kane Regional Harbour Survey was conceived as a multi-disciplinary archaeological project including geophysical prospection and geoarchaeological investigation. It aimed at understanding the various ports, anchorages and landings along the Kane peninsula and the Bay of Elaia. In conjunction with the latest research in Elaia, the maritime city of Pergamon, the project offered us the chance to study a coastal micro-region, with a hierarchy of major and minor ports and bays suitable for cabotage and their relationship to Pergamon in a diachronic perspective. Furthermore, this region provided us with a good opportunity to compare the obvious changes in the importance and frequented of harbour sites during the Roman period with those of the Greek period.
In this paper, we will outline the development of Pergamon’s Sea Front in a diachronic perspective from Classical to Roman Imperial periods based upon the latest research along the coast of the Kane peninsula and the Bay of Elaia. On the one hand, we will concentrate on the major port cities of Kane, Pitane and Elaia and their historic development. On the other, we will introduce the phenomenon of minor anchorages and ask about their significance within the local harbor network. Key questions are: how did the different port cities and anchorages relate to each other? What were the driving factors that changed the local maritime networks and the relevance of the different port cities?

12.05-12.30: Helmut Brückner (Universität zu Köln), Martin Seeliger (Goethe-Universität Frankfurt), Lyudmila Shumilovskikh (Georg-August-Universität Göttingen): Challenges to Understanding Port Systems: The Examples of Elaia and Kane

Throughout human history, communication and trade were key to societies. Since maritime trade facilitates the rapid transportation of passengers and freight at relatively low costs, harbours became hubs for trade, traffic, and exchange. This general statement also holds true for the Pergamene kingdom, which ruled wide parts of today’s western Turkey during Hellenistic times. Its harbour, located at the city of Elaia on the eastern Aegean shore, was used extensively for commercial and military purposes.

This study reconstructs the coastal evolution around the ancient city of Elaia and the Kane Peninsula. It compares and contrasts the observed environmental changes with archaeological and historical evidence. We used micropalaeontological, sedimentological, and geochemical proxies to reconstruct the palaeoenvironmental dynamics. The geoarchaeological results confirm the archaeological and historical research concerning Elaia’s prime during Hellenistic and early Roman times, and the city’s gradual decline during the late Roman period. Furthermore, our study demonstrates that Elaia holds a unique position as a harbour city during ancient times in the eastern Aegean region, because it was not influenced by the high sediment supply associated with river deltas. Consequently, no dredging of the so-called closed harbour is documented, wherefore it could be used as an exceptional geo-bio-archive for reconstructing the vegetation changes. The lecture will also outline the evolution of Kane Peninsula from a former island, and clarify the mystery about the three Arginusian islands mentioned in historical accounts (e.g., Strabo 13.2.2).
The pollen diagrams from Elaia and Kane reveal similar trends. The lower part is dominated by deciduous oaks and pines, suggesting a spread of open oak forests. The change from oak forests to a cultural landscape, with olive, pistachio, walnut, and grape, started around 850 BC, reached a maximum ca. 250 BC, and continued to ca. AD 800. This period is characterised by increased fire activity, pastoral farming, and soil erosion. The millennia-long intensive land use led to the turnover of the climax ecosystem, i.e., open deciduous oak forests, to pine stands.

**Contributions to our understanding of Ports as Infrastructure**

12.30-12.50: Simon Keay (University of Southampton), Stephen Kay (British School at Rome), Stoit Chapkanski (University of Paris 1 Panthéon-Sorbonne, UMR 8591 LGP) and Carlo Rosa (Instituto Italiano di Paleontologia Umana (IsIPU): Recent Advances in our Understanding of the Port of Claudius

This paper presents the results of project work at the Claudian basin at Portus. This major element of infrastructure was established by Claudius by c. AD 46. Excavations undertaken during the construction of the Aeroporto Internazionale di Leonardo da Vinci in the 1960s (Testaguzza 1970) revealed eastern stretches of the northern mole, while more recently, deep coring by Cinzia Morelli and Antonia Arnoldus-Huyzenveld (2011) detected the approximate position of the western extent of the north and south moles and the Pharos. Our work, which began in 2017, has concentrated upon trying to fix the exact position of the western extent of the northern mole and the Pharos and sample the harbour sediments by a combination of geophysical survey and deep sedimentary cores. The first part of the paper reports upon the results of the 2018 season, which saw the use of Electrical Resistance Tomography successfully map the foundations of the mole at a depth of c. 9m over a considerable distance in the direction of the western entrance to the harbour near the Pharos. The second part of the paper reports upon the mineralogical analysis of the materials used to construct the mole in order to identify the sources of raw materials used in their construction. Samples of mole materials, collected at different depths, were compared with tuff and pozzolana from different outcrops in the vicinity of Rome using Mid-Infrared Spectroscopy. The first results suggest that a selective choice of Tuff Lionato was employed to build the foundation of the northern jetty of the harbour.
Questions: 12.50-13.00
Lunch: 13.00-14.00

14.00-14.20: Nicolas Carayon (University of Southampton and Ipso Facto), Ferréol Salomon (CNRS UMR 7362 Université de Strasbourg), Kristian Strutt (University of Southampton) and Costanza Gialanella (Soprintendenza Archeologia, Belle Arti e Paesaggio dell'area Metropolitana di Napoli): Geoarchaeological Investigations of the ERC RoMP Project at Puteoli

From its foundation in 194 BC, the port of Puteoli (Pozzuoli) played an essential role in the supply of goods for the city of Rome from across the Mediterranean. The import of grain from Egypt from the reign of Augustus down into the 2nd c AD was particularly important in this respect. Attempting to understand its harbor, however, is complicated by long-term volcanic activity involving eruptions and bradyseisms, but by also coastal variations (sedimentation / erosion). Related changes in the terrain of Pozzuoli over the last 2000 years have led to massive variations in the relative sea level in the ancient harbour, with the sea having submerged and/or uplifted parts of the ancient sea-front. Consequently, attempting a palaeo-geographical reconstruction of the Bay of Pozzuoli represents a significant challenge owing to the complexity of the geomorphological processes in the surrounding Phlegrean Fields.

In the context of the PortusLimen Project we organized a fieldwork at Pozzuoli with a team conducting geophysical surveys in the area of the Vicus Lartidianus and Portus Iulius, while a second team drilled a transect of 3 cores of 20 meters deep, running between Puteoli and the adjacent Portus Iulius (Cores POZ-1, POZ-2 and POZ-3). Our aim was to reconstruct the coastal variations during the last millennia and the creation of the man-made coast associated with the ancient ports. We will present the results of the geophysical surveys after processing the data and the results of the sedimentological and palaeoenvironmental analyses performed on the cores in laboratory. We are particularly interested in using the sedimentary archives to evaluate the height of the water column along the waterfront of Roman Puteoli and its evolution through time. One of the challenges we now face is to propose a consistent chronology for the cores using different chronological methods:
tephrochronology, radiocarbon, OSL, and archaeological dates (ceramics). We will present the preliminary results and discussions related to this issue.

14.20-14.40: Ada Lasheras González (ICAC), Josep Maria Macias Solé (ICAC), Ferréol Salomon (CNRS UMR 7362, Université de Strasbourg), Kristian Strutt (University of Southampton) and Patricia Terrado (ICAC): Urban Evolution of the Harbour Area of Tarraco: A Proposal Based Upon the Evidence of Geophysics, Geoarchaeology and Excavation

El desarrollo del proyecto PortusLimen en la actual Tarragona –prospecciones geofísicas y geoarqueológicas–, ha coincidido con la realización de dos tesis doctorales sobre el puerto Tarraco (Hispania Citerior). Estas tesis han sido elaboradas en base a los numerosos indicios proporcionados por la arqueología urbana, la cartografía y las fuentes históricas. Así, la conjunción de estos esfuerzos permiten afrontar el reto que constituye el análisis de un frente portuario de unos 600 m de longitud. Además, esta zona portuaria comprende 12 siglos de historia entre las etapas íbera y visigoda. Actualmente, este sector se halla cubierto por una ciudad contemporánea que ha avanzado casi 200 m mar adentro. Como en la Antigüedad, el puerto de Tarragona es uno de los más importantes del Mediterráneo Occidental y, desde el siglo XV, la costa y su rada portuaria han sido intensamente transformadas.

Tarraco, capital entre Augusto y Diocleciano de la provincia más extensa del Imperio, desarrolló un dinámico urbanismo suburban inseparable del área portuaria de la ciudad. Las evidencias arqueológicas esbozan un amplio sector portuario de unas 10 ha de superficie, donde a lo largo de los siglos se desarrollaron y complementaron diversas actividades con una evidente vinculación portuaria, pero también de tipo productivo y de ocio. Hoy conocemos mejor la evolución urbana y funcional de este sector que no los componentes específicos de un puerto complejo y extenso como el Tarraconense. Aquí se han documentado el teatro de la ciudad, unas extensas termas públicas y otras de menores dimensiones, numerosos almacenes portuarios y extensos conjuntos materiales que reflejan una urbe interconectada con las principales redes comerciales.

Mientras, los indicios geoarqueológicos obtenidos aportan evidencias sobre la evolución del calado de la rada portuaria, aunque debemos considerar las dinámicas de sedimentación de
puerto, donde desaguaban dos colectores urbanos y el cercano río Francolí (antiguo Tulcis). Las prospecciones geofísicas complementan el conocimiento urbano y todo ello permite establecer una propuesta de la evolución de la ciudad sobre las antiguas paleoplayas, así como el desplazamiento de las estructuras portuarias y el desarrollo de la ciudad suburbial hacia el río, en el área más occidental.

14.40-15.00: Darío Bernal-Casasola (Universidad de Cádiz), Nicolas Carayon (University of Southampton and Ipso Facto), José Juan Díaz Rodríguez, (Universidad de Cádiz), José Angel Expósito (Conjunto Arqueológico de Baelo Claudia), Ferréol Salomon (CNRS University of Strasbourg), Kris Strutt and Simon Keay (University of Southampton) (CNRS UMR 7362, Université de Strasbourg) and Kristian Strutt (University of Southampton): Geoarchaeological Research into the Harbour of Baelo (Bolonia, Cádiz)

Baelo Claudia (modern Bolonia, Tarifa, province of Cádiz), located on the northern coast of the Strait of Gibraltar in the Conventus Gaditanus, is one of the most well-known halieutic Roman cities in ancient Hispania. From the mid second century BC until at least the fifth century A.D., it was involved in marine resource exploitation (salted tuna fish and garum production). Three fieldwork seasons have been conducted on the coastal area of the Roman city of Baelo Claudia. Archaeological survey of the maritime façade, a geophysical survey, and 25 percussion bore holes were completed in May 2016 and July 2017. The last season was conducted in late May/early June 2018. Some archaeological trenches were excavated in an attempt to verify geophysical anomalies identified during the survey, of which the main results will be shown, including harbour structures related to maritime activities west of the so called Arroyo de las Viñas (Sounding 37); new harbour structures destroyed by the sea offshore (Sounding 42); the discovery of large blocks of biocalcarenite deriving from the monumental façade/wall, including a new mooring-stone near the southern wall (Soundings 36 - 38); a southern city wall partially destroyed by marine erosion in post-Roman periods. No archaeological evidence remains of the so-called ramp to the Roman harbour suggested by previous research. We will also present the C14 and OSL dates from the cores drilled in 2016 and 2017, and their general interpretation.

15.00-15.20: Sabine Ladstätter (Österreichisches Archäologisches Institut), Helmut Schwaiger (Österreichisches Archäologisches Institut), Simon Keay (University of
Since the beginning of research in Ephesos in the late 19th century, the importance of a connection to the sea and the existence of functioning harbours were undisputed for the settlement region. It is therefore even more surprising that, in spite of the cultural-historical importance attributed to the harbours of Ephesos, a scientific examination of them has not taken place. Research has concentrated much more on the evaluation of historical sources and archaeological fieldwork activities were limited to isolated excavations; in the 1990s geoarchaeological investigations dealt with the reconstruction of the costal geography. Since 2008 an interdisciplinary research project has focused specifically upon the diachronic development of the various harbours of Ephesos.

In the first part of the paper, preliminary results of the geophysical survey will be presented, revealing the structural changes of the harbour-installations itself and also of buildings related to activities taking place in the harbour. In the second part of the paper, attention is focused upon important discoveries made by core drillings in the harbour basin. Firstly, dredging is not only attested in various inscriptions, but also in the drill cores from the harbour basin. Building adequate time-depth models is crucial for every sedimentological work, whatever the analytical method. Radiocarbon forms the backbone of each of the applied analyses. Anomalies in the model need to be explained, and their causes require thorough discussion. Secondly, geochemical analyses were applied in order to trace organic indicators of anthropogenic activities: after a solvent extraction from the sediments, organic compounds are analysed using gas chromatography and mass spectrometry. Thirdly, heavy mineral analysis had been inspired by a text incised onto a marble stele mentioning the discharging of rock flour and emery abrasive into the harbour. The overall heavy mineral composition basically corresponds with the components expected for the Kaystros river basin, with one remarkable exception: corundum, the main mineral component of emery. Fourth, there have been important results from the analysis of pollen from the harbour. Pollen profiles are a crucial tool for the reconstruction of vegetation composition and vegetation changes through time. However, sometimes they show rather unusual signals. In our talk we will focus on shrubs, which may have served as dunnage required for a wide variety of cargo also in Roman Antiquity. Lastly, valuable information was derived from the
parasitological evidence, which shows a massive amount and variety of eggs, derived from wastewaster.

15.20-15.40: Ferréol Salomon (CNRS UMR 7362, Université de Strasbourg) : 
_Palaeoenvironmental Age-Depth Model (PADM Chart) and Chronologies of Roman Harbours_

In the context of the PortusLimen Project, we developed a chart called _Palaeoenvironmental Age-Depth Model_ (PADM) that allows researchers to combine all relevant archaeological and geoarchaeological indicators in order to estimate the harbour potential of a given ancient port. It also allows us to compare harbours in terms of their degree of closure and water depth available against a synchronised chronology. This PADM is drawn onto a classic age-depth model. However, it brings together several kinds of interdisciplinary data such as stratigraphic information, palaeoenvironmental data, their interpretation, sedimentation rates, relative sea level markers, ships and boats from the broader area period of the port(s) being studied, and ultimately the relevant archaeological and/or historical dates that could have influenced the sedimentation. The PADM has so far been applied to the sedimentary cores drilled in the harbours of Ostia and Portus (Salomon et al. 2016, 2017; Lisé-Pronovost et al. 2018), but in this presentation, we would like to apply it to other Roman harbours studied in the context of the PortusLimen Project. The application of the chart to several harbours and its standardization allowed us to compare more easily one core to another and one harbour to another. We are also aiming to discuss the interdisciplinary chronologies produced. Specifically, we will highlight some limitations of the study of a single core and the use of a single dating method for the study of ancient harbours.

_Civil Law and Life in Ports_

15.40-16.00: Emilia Mataix Ferrandíz (University of Helsinki): Beyond Materials: Law and Life in Roman Mediterranean Ports

The aim of my work in the PortusLimen project has been to study the commercial activity of Mediterranean ports during the first three centuries of the Roman Empire, through commercial epigraphy and law. Some of the results of this work have revealed that in fact, _scripta commercii_ followed a system, meaning that they used some repetitive patterns in commercial inscriptions that allowed the subjects involved in long distance trade to
understand the features of the agreements in which they were involved. In this work, I have created a model of procedures in order to consider all the structural elements which can be present at any port, and the commercial operations taking place in them. The variations lie in the different port structures, the control of the port by the local or Roman authorities, and the agreements established between the parties. By studying specific cases through the prism of this model, it is noted that there is no such thing as a cargo-type, a sale-type, or an inspection-type. There were some contractual schemes provided by Roman law, and some procedures that needed to be performed in distribution in order to avoid risk and maintain the flow of the goods. Other conclusions have been that there is no justification for the commonly held view that the needs of long-distance trade lay at the root of Roman authorities and state supply. Roman imperial trade was formed by individuals and authorities who, through regulations and customs wanted to ensure that the cargoes reached their destinations. Finally, *scripta commercii* suggest that across the Roman Mediterranean, local rules and customs were prominent and influenced commerce. In that sense, the *scripta commercii* are both archaeological artefacts and historical documents. They are snapshots of commercial practices, and allow us to challenge some traditional views about Roman commerce. If we follow this approach, then suddenly the subjects involved in these processes appear visible, and it is possible to imagine ports in a new way.

Tea: 16.00-16.30

*Portscapes, Symbolism and Ideology*

16.30-16.50: Stéphanie Mailleur-Aldbiyat (University of Southampton): *Imagining Roman Portscapes from the Perspective of Iconographic and Epigraphic Evidence*

Port studies by scholars have increased in recent decades due to the development of maritime archaeology and a growing interest in maritime networks and trade. Nevertheless, despite the recent excavations conducted at Roman ports, our knowledge of port architecture under the Roman Empire is very unclear and the reality of the port infrastructures remains poorly understood. The layout of most ancient Mediterranean ports are, in fact, archaeologically often preserved only at the level of their foundation, if at all. Archaeologists are able to reconstruct a plan but the volumes of individual buildings and the
portscapes as a whole are difficult to imagine. What did Roman ports really look like? Due to the significant lack of ancient sources relating to Roman ports, iconography can be a useful source of information. My research aims to demonstrate that depictions of ports can make an important contribution to our understanding of ports, since they are the only source of information that shows the third dimension of port architectures that no longer exist archaeologically. This paper will focus on two concrete case studies in order to demonstrate how we can deal with the iconographic and epigraphic evidence to better understand the components of Roman portscapes. In the case-study 1, we will explore the weighing control facilities called *sacomaria* whose presence is attested at Puteoli by different types of sources, such as the “glass of Prague” and an inscription referring the professional (*sacomarius*) working at the *sacomarium*. The epigraphy of Portus and Ostia also confirm the presence of this type of weighing place. In the harbour of Tarraco, a *sacomarium* is also attested by an inscription as well as by the discovery of a large bronze weight found in the harbour area. The case-study 2 focuses on single monuments like freestanding columns and arches. In harbours, this type monument is well attested by iconography. However, we do not still clearly know what their functions were, or what symbolic role they played in the topography of ports. In this paper, I will demonstrate that these monuments are not simply ornamental, and that they had a more complex function. They not only monumentalized the port space but also commemorated and honoured people, events or deities. Beyond their honorific and commemorative functions, the freestanding column monuments seem to have also a votive function.

*The Significance and Functioning of Port Systems*

16.50-17.10: Pascal Arnaud (Université Lumière-Lyon 2): *General Reflections*

The notion of port system lies at the very heart of our reflections in this project. We believe that it is a key to understanding the complexity of connections between ports, especially, but not only, in small areas. This paper will address several issues: first that of the scale of the system. The conceit is used to describe a certain number of ports (or basins) whose coalescence and connections form the port of a city. It also characterizes larger areas and their constituent ports, which connect to one port by means of a distribution/redistribution
pattern, or to various ports situated en-route from one port to another. It will address the differing range of ports (natural, including beaches, artificial, small and large, with or without warehouses etc) and the initiative (empire, city, private) behind the creation of these composite “systems” and their rationality; also it will examine cases of concurrence rather than complementarity between ports. It will eventually address the relevance of some conceits, such as opportunistic ports, or the porto diffuso, to our concept of port-systems that in turn encompasses the broader phenomenon of port-networks.

17.10-17.30: Maria del Carmen Moreno Escobar (University of Southampton): *Case Study 1 – Linking the Parts to Understand the Past: the Port System of Rome in Imperial Times*

During the past five years, researchers of the PortusLimen project have focussed their work upon developing a new understanding of the role of Rome’s Mediterranean ports which stems from the concept of the port-system (*e.g.* Carayon, 2018). Such idea is based on the multidirectional interrelations established between ports, their environments and societies, and thus highlights the importance of integrating all of these elements into archaeological analysis as means for achieving a fuller understanding of ancient ports and their role in the Roman Empire. However, recent research (*e.g.* Moreno Escobar, 2018) has placed a stronger emphasis on the technologies and research methods that make possible the integrated analysis of these relationships, leaving open the discussion on how suitable this theoretical conceptualisation is for potentially enhancing our understanding of the port system of Imperial Rome and its development through time. In this context, the present paper focuses its attention upon how the concept of port-system can be illustrated by the example of the ports of Rome, building upon the results and insights developed in previous research, as well as in the wider implications the use of this concept entails for the understanding of the Roman Empire.


Within the framework of the PortusLimen Project and in collaboration with the Collective Research Project Les ports antiques de Narbonne (CNRS, UMR 5140 Archéologie des sociétés méditerranéennes), it has been possible to precisely define the harbour system of the Colonia Narbo Martius between its foundation in 118 BC until the late antique period. In this paper, I will synthesize the results obtained during the four years of the PortusLimen project by focusing on three research questions. (1) How fundamental is the notion of harbour system in characterizing describing Narbonne, a port which is described by Strabo as being the “emporium of all Gaul”? (2) How the occupation of the harbour system evolves between the second century BC and the third century AD and how it reflects underlying historical and economic processes? (3) How, by applying the notion of harbour system, can we better understand the functioning of ancient ports?

Discussion

17.50-18.45

Rinfresco: 18.45-20.00

Conference Dinner: 20.00-22.00
Programme Day 2

Part 2

Each paper 20 minutes plus 5 minutes initial questions

Ships and Ports

9.00-9.25: Christoph Schäfer (Universität Trier): Reaching the Port - Ships, Traffic and Connectivity in the Roman Empire

Anyone who wonders about the layout of Roman port-building and the ways in which Roman ports actually did worked must look at merchant ships and their sailing abilities. These abilities were relating to their architecture, conception and tonnage. This paper will focus upon the ways in which ships were managed in port and how they were unloaded. It will first consider a Roman oared river barge, since these craft used to be the standard means of riverborne transportation of merchandize. Evidence for the discussion is to be found in ancient literature and archaeological remains, and includes modern sailing replicas. Altogether with comparisons with modern nautical equipment these elements allow the performance of these boats to be reconstructed

Geographical Context

9.25-9.50: Tony G. Brown (University of Southampton, Tromsø University Museum, UiT, Norway), Kevin Walsh (Department of Archaeology, University of York) and Dan J. Fallu (Palaeo-lab, Geography and Environmental Science, University of Southampton): Roman Ports in the Mediterranean: Geomorphology, Environment and Resilience

Classical ports in the Mediterranean Sea existed not only in a social, economic and technical contexts but also in a geomorphological context. This geomorphological context is a function of marine factors (bathymetry, low amplitude tides, surges, tsunamis etc.), and also the geomorphology of coasts and catchments (including neotectonics). A simple geomorphological analysis of the major Roman ports of the Mediterranean shows that they are dominated by river mouth (46%) and lagoonal/deltaic settings (5%). All types of Roman ports had siltation problems, as nearly all ports do, but this is even more pronounced for river-mouth ports (69%), partly due to low tidal amplitudes and supressed estuarine energy regimes. Many adaptations can be illustrated including mole design, dredging and not
infrequently changing port location. The resilience of river-mouth ports was closely connected to river catchment dynamics of erosion and sediment transport. The generally short, and relatively steep gradients, of most rivers entering the Mediterranean (with obvious exceptions) limited the storage space for fine sediment and resulted in high rates of estuarine sedimentation. A recent analysis of pan-Mediterranean erosion by Walsh et al. (2019) has shown that although erosion/sedimentation rates varied catchment to catchment, there was a general increase over the early Roman Period followed by a decline and then increase again in the Medieval Period, although some regions, e.g. southern France are out of phase with this pattern. Optically-stimulated luminescence (OSL) dating of sediments in the Tiber catchment shows a pulse of sediment deposition in the late Roman-early Post Roman period and again later in the Renaissance (c. 1500-1700 AD) caused by a combination of intensive cultivation and climate, including the Little Ice Age.

The paper concludes that the history of Roman ports cannot be de-coupled from their sediment-catchments, either coastal cells, and/or fluvial catchments as both placed heavy burdens on the sustainability of ports but to different degrees. Along with technological change and the geopolitics of trade, these geomorphic factors played a role in the spatially differential resilience of Mediterranean ports during and after the Roman period.

Reference

Ports and Economic History

9.50-10.15: Véronique Chankowski (Université Lumière-Lyon 2) : Delos, Rhodos, Ephesos and Other Communities: Building a Port-System with Multiple Authorities in the Greek Mediterranean before the Roman Empire

The network of Eastern Mediterranean trade, with load break points and transit points, is well documented in our sources. The existence of regional networks, upon which emphasis has been placed in several recent studies, should not obscure the presence of large circuits based on intermediaries. Since the Classical era, this was the role of the emporion in Greek
trade, but Hellenistic sources provide more details on the modes of operation of these
distribution channels.

Greek cities with large transit commercial ports are also taking up this issue at the political
level: how to ensure both the well-being of the civic community by protecting its supply and
the profit necessary for the city's growth? It is therefore the question of prices that is in the
foreground, without the cities making identical choices among themselves. But also, the
practices of merchants shape the operation of these port systems. The development of
storage practices and related interests, the role of associations, show that interactions with
the State are complex.

The paper will address the issue of port-systems back to the Hellenistic period by exploring
the notion of interplay between decision-makers and practitioners in order to emphasize
the micro-level sources in a long-term approach.

Merchant Needs to Know*

A merchant sailing into a port never before visited faced a number of questions. How to
manoeuvre safely into the harbor? Where and how to dock? How to find either the
consignees of his cargo, if already sold, or buyers, if not? Who could he trust, and how
would he know? How would he go about getting help, like a loan or material needed to
repair or outfit the ship? Where did fellow merchants from the same hometown
congregate? What about locals hostile to or suspicious of unknown strangers?

No definitive answers to these questions appear (to my knowledge, anyway) as such in a
single source from the Roman imperial world. But there are scattered sources that directly
or indirectly can provide some sense of how merchants might have gone about dealing with
them. Some of the documents in the Sulpicii archive from Puteoli show merchants from
distant locations interacting with locals for loans and able to engage locals as guarantors.
Papyri and ostraka from Egypt, both relating to sailing on the Nile and into the Red Sea port
of Berenike, reveal efforts to get boats repaired and help draw a picture of craftsmen and
supplies available in ports to serve merchants. The *Periplous of the Red Sea* provides details about dangers at certain ports and the presence of pilots to help merchants navigate safely. Inscriptions from Puteoli attest to associations of non-native merchants, and the mosaics of the *Piazzale delle corporazioni* in Ostia directed visitors to the offices of firms dealing with different commodities.

In this contribution I have drawn together a small collection of such sources to sketch a preliminary picture of the ways that merchants might find the information they needed to address the questions posed in the first paragraph. This paper is only a first pass at exploring the problems merchants faced in ports new to them, many of which have been treated also in the work of the PortusLimen Project, which has offered a detailed picture of how Rome’s most important port worked. My efforts here are intended as a small contribution to this bigger project.

Coffee: 10.40-11.00

11.00-11.25: Roald F. Docter (Ghent University), Joseph A. Greene (Harvard University) and Mariano Torres Ortiz (Universidad Complutense de Madrid). *Phoenician-Punic Harbours in the Mediterranean*

This presentation intends to provide an overview of the current state of knowledge on Phoenician and Punic harbours and port installations, both in the coastal Levant and in the central and western Mediterranean. It is argued that besides sheltering estuaries and navigable rivers, both natural and manmade channels were favoured as points of anchorage and for loading and unloading cargoes.


Abstract to follow

11.50-12.15: Michel Bonifay (MMSH – Centre Camille-Jullian): *Port Interconnectivity through the Prism of African Pottery and Amphorae*
Even if the ability of ceramics to reconstruct trade flows and direction may have been over-emphasized during these last decades, pottery and amphorae produced in Africa from the 2nd to the 7th century, due to their ubiquitous presence throughout the Mediterranean, still remain one source among others to our understanding of Roman port interconnectivity. After recalling the progress made in improving traceability of these wares, this paper will first focus upon Sicily, where the survey recently carried out with Daniele Malfitana in the footsteps of Lisa Fentress, made it possible to define three different patterns of port interconnectivity capable to explain the differences in the supply of African ware in the island. Then, comparisons will be sought in other areas of the Mediterranean over time, in order to verify the ability of African pottery to provide information on the commercial routes between key African ports and the City of Rome or the rest of the ‘Roman’ world. Lastly, a first attempt to periodisation from the Republican period to late Antiquity will be proposed, seeking to identify the different turning points of these networks.

12.15-12.40: Matthias Tranchant (Université de Bretagne Sud) : Les Dynamiques de la Mise en Place de la Carte Portuaire de la France Atlantique (XIe-XVe siècle)

C’est durant la seconde moitié du Moyen Âge, entre les XIᵉ et XVᵉ siècles, que fut mis en place l’essentiel du dispositif portuaire de la France atlantique. Cette genèse s’inscrit dans le même rythme que les grands mouvements de croissance économique puis de crises qui ont marqué l’Europe occidentale à cette époque. Fondée sur l’étude de plus de 620 sites répertoriés, notre présentation entend d’abord poser et analyser les caractéristiques des territoires portuaires, dont la pluralité des situations, des fonctions et des cadres juridictionnels n’a été jusque-là qu’effleurée. Leur compréhension repose en particulier sur l’analyse du riche vocabulaire employé à l’époque pour désigner les sites destinés au transport naval. Il s’agira aussi d’apprécier la mise en place du semi irrégulier des ports français atlantiques au regard des dynamiques environnementales, économiques, politiques et technologiques qui déterminaient, favorisaient ou handicapaient leur création et leur essor. Plusieurs concepts nouveaux ont été inventés pour cela : la « perméabilité littorale », la « seigneurie rivagière », le « château port ». Notre attention portera notamment sur les phénomènes de dispersion, de concentration, de spécialisation, de polarisation et de hiérarchisation qui organisèrent l’ensemble du dispositif selon plusieurs phases.
chronologiques. Et puis, alors que les dynamiques physiques du milieu remaniaient de façon parfois sensible le littoral, nous entendons mettre en lumière les actions considérables consenties par les usagers et les acteurs politiques pour défendre, préserver et adapter ces territoires au demeurant fragiles.

12.40-13.00: Questions for morning papers

Lunch: 13.00-14.00

14.00-14.25: Olivier Chaline (Université Paris-Sorbonne, Paris IV) : *From the Wharf to the Warehouse and the Merchant’s House. Some Reflections about Portus-Limen Useful for Studying Early Modern Ports*

La démarche et les résultats de Portus / Limen méritent d’être examinés avec le plus grand intérêt par les spécialistes d’histoire maritime de l’époque moderne qui peuvent y trouver de très utiles éléments de réflexion. En effet, si les études sur les milieux marchands et sur les flux commerciaux ne manquent pas pour cette période, ce n’est pas autant le cas pour les navires de commerce et les installations portuaires, si bien que PortusLimen peut aider à ouvrir des pistes nouvelles. Historien moderniste vivant en Normandie, j’essaye de saisir les modalités concrètes de l’interface mer – terre. Je m’y suis intéressé en particulier pour les deux ports de Rouen et du Havre aux XVIIe et XVIIIe siècle, le premier est fluvio-maritime, le second artificiel et à bassins. Au-delà de ces deux sites d’observation complémentaires, une même question se pose, pour les ports de l’Europe moderne : comment s’effectuait la mise en rapport entre ces trois espaces que sont le navire amarré ou au mouillage, le quai ou la berge et les lieux de stockage des marchandises, entrepôts ou maison du marchand ? Par cette interrogation qui porte à scruter la topographie portuaire et son utilisation, mes préoccupations ont rejoint celles de PortusLimen. Examinons pour chacun des trois termes, le navire, le quai et le lieu de stockage, comment un dialogue peut commencer.

*Maritime Archaeology and Seascapes*
14.25-14.50: Timmy Gambin (University of Malta): *Points of Convergence in a Parallel Universe - Shipwrecks and Ports in the Roman Period*

Ports are built to accommodate ships and ships are designed to travel across the sea from one port of call to another. In the ancient world, as today, the vast majority of raw materials and manufactured goods travelled by sea and were channelled through ports that in turn provided connectivity between areas of production and areas of consumption. Since the advent of SCUBA equipment more than five decades ago, there has been a near-constant flow of shipwrecks discovered, some of which have been excavated and studied in great detail. Such studies have contributed to our increased knowledge of a number of subjects including ancient shipbuilding and seafaring, cargoes and amphora studies as well as on-board societies. However, shipwrecks are, more often than not, discovered in places where the master of the vessel certainly did not want to be. Likewise, ports are studied devoid of the very craft they were built to accommodate. Besides presenting some shipwreck case-studies I will also study synergies that may exist between shipwreck studies and the results of the PortusLimen Project. This paper will also explore the aforementioned ‘disconnect’ that exists in the archaeological record and whether these two parallel archaeological realities can indeed be brought closer.

*Ancient, Modern and Medieval Engineering*

14.50-15.15: John Oleson (University of Victoria, British Columbia): *The Social and Technological Context for the Appearance of Maritime Hydraulic Concrete*

Research on Roman harbour technology, including the PortusLimen Project, has come to focus on harbour design, the organization of commercial activity at the ports, and the relationships among large and small harbours and anchorages in particular regions and across the Mediterranean world. The evidence involves archaeological remains, both direct and secondary, ancient written sources, and -- more recently -- computer-based analysis of these data. The ROMACONS Project used some of these same approaches for the analysis of the character and use of marine pozzolanic mortars in many of the large and small Roman harbours. One issue, however, has been neglected: the social and technological context of the origins of harbour construction with pozzolanic mortars that could set underwater, a revolutionary development that made possible the most ambitious imperial projects. After
an introduction to the technology of Roman hydraulic concrete, this paper will explore the significant literary and archaeological evidence for the involvement of the Roman elite in personal construction projects involving marine concrete, particularly piscinae (fish tanks) and villae maritimae (seaside villas), which prepared the way for the enormous imperial construction projects such as Sebastos, Portus, and Antium.


This presentation aims to compare ancient and modern maritime breakwaters and quay walls. Archaic shipping and the oldest known port structures are briefly presented. Vertical breakwaters and quays, large concrete blocks, pilae and arched breakwaters, timber walls, moulded structures, in-the-dry constructions, rubble mound breakwaters and training walls are described in the ancient and in the modern world. A few geomorphological aspects of coastal harbours are also reviewed. It is concluded that most natural shelters were used in Roman times, but some major ports have been built in places without any natural shelter, for strategic or economic reasons. Most of today’s concepts for maritime structures were already existing in Roman times and it seems that little progress was made until the 18th c. when large maritime structures started to be built again. The combination of reinforced concrete and steel enables modern engineers to build higher, deeper and larger than Roman engineers could dream of, but some modern structures may not last as long as some Roman structures, especially in salt water

Tea: 15.40-16.15

Maritime Law

16.15-16.40: Peter Candy and Paul J. du Plessis (University of Edinburgh): Parallel Developments in Roman Law and Maritime Trade during the Late Republic and Early Principate

In this paper I demonstrate that the development of Roman maritime law coincided with the rapid increase in the volume of Roman maritime traffic during the late Republic and early Principate. By comparing the chronological distribution of shipwrecks in the
Mediterranean basin with the likely date ranges for the introduction of maritime legal rules, I show that the most prolific period of praetorian and juristic innovation coincided with the period during which the volume of maritime traffic was increasing at its greatest pace. The coincidence of legal innovation with the intensification of transactional activity invites the question as to the relationship, if any, between these parallel developments.

The results of the PortusLimen project contribute to our understanding of this relationship by providing new insights into the development of Roman ports during the period in question. Ports and their associated infrastructure, such as warehouses, were important loci in the fabric of trading networks, and the way in which they developed in part reflects the way in which long-distance trade was conducted. The question that arises is the extent to which the conduct of maritime trade – as mediated through port environments – and the socio-legal context in which it took place influenced each other’s development through time. It is my submission that the introduction of remedies relevant to the conduct of maritime trade at Rome was intimately connected to the intensification of long-distance trading activity during the same period, and that the course of legal change was shaped by the way in which that trade was conducted at Roman ports.

16.40-17.05: Dominique Gaurier (Université de Nantes) : PortusLimen, a Project Seen Through the Eyes of a Historian of Medieval Maritime Law

The paper will ask whether some distinctions are apparent in the manner of considering harbours since the fall of the western Roman Empire and the Middle Ages. A negative answer should be given: no major difference between the ships which were then still used, i.e. generally galleys for the coastal shipping and, and as regard the harbours, ancient ports were also used if they were still offering a possible use, whereas some other new creations of ports were sometimes made by cities or other local authorities when it seemed appropriate. One thing, however, remains constant: it is very difficult if not totally impossible to find a legal definition of the harbour in the medieval customs or other local statutes and then the jurist is very much confronted with a general deception with respect to his desire of a legal definition of a harbour which still remains today.
Modern maritime and trade law owe little to the historical phenomena that pre-date them. The conditions for trade in a connected society, and the rapid developments in construction of vessels transport of goods, as well as the contractual mechanisms by which they are managed, mean that historical law plays no part at all in determining modern commerce. But can modern maritime commerce provide some clues as to the relationships involved in complex trading transactions, and what the fundamental features of the contract would be? One advantage of modern trade as a phenomenon of study is that all elements thereof are available to us to scrutinise and understand. This paper looks at modern trade and maritime law, seeking to discern elements that would have been an essential part of the business models of maritime trade in ancient times. Drawing examples from modern ship building, cargo transactions, trade finance and dispute resolution, the paper aims to outline the complexity of the network of relationships inherent in international trade and the legal relations between the many parties involved. Just like modern commerce, some relations will be based on the terms of an agreed contract, while others will have as their essence the good name and standing of a guarantor. The aim is to identify some contracts, relationships and dramatis personae as essential to modern commerce, to permit comparison to and interpretation of the archaeological evidence.

Conclusion

17.30-18.15 Final Discussion