Preliminary Account on the Geomorphology of the Roman Port of Ariminum

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The northern and central Adriatic Sea was one of the wealthiest maritime communities in the Roman world, and the presence of harbours was well-attested. In this area, the presence of maritime structures captured the imagination of Greek and Roman writers such as Strabo, Livy and Pliny. The scant physical and literary evidence left behind by the reports of ancient authors has certainly hampered scholars from dedicating much attention to the harbours. My investigation offers a more defined picture of the harbour of Rimini, with the help of the rare but important and understudied archaeological and geomorphological evidence remaining along the Adriatic Sea area. The first part analyses the historical development of the Rimini harbour and its topographic location. The second part of my research identifies how it is possible to conduct an investigation through the adoption of geomorphological data regarding this complex structure. I note how to link this data to the investigation of the harbours, and assert that certain aspects of its use allow us to study these structures, while also showing the rich potential geoscience offers in reconciling important archaeological questions.

The Roman ports located along the Italian coastline of the Adriatic Sea were part of a unique geomorphological context. While in the environment of the Dalmatian coast these were natural and coastal harbours, here they were built as advanced structures, linked with the nearest rivers and core cities. A preliminary account of these structures should begin with the analysis of the geomorphology which allow us to understand better the causes that favoured the decline of these monumental structures. The ports of the Roman Adriatic represent an element undoubtedly connected with the surrounding landscape, and the presence of river mouths, swamps and marshes, hills and low shallows have deeply influenced the development of these ports and their continued use. The Roman port of Rimini, for instance, has a unique geomorphological context which probably affected its development and its decline. The principal focus of this paper is to give a preliminary account of the geomorphological variation which occurred in the case of the Roman port of Rimini in Italy. This is an abbreviated
version of an argument to be developed at greater length in my PhD thesis. This work also aims to clarify and to fill in some of the lacunas in our knowledge of the Rimini harbour. The first part will examine the history of the ancient port. The second part will investigate the geomorphological interactions considering the structures. A first attempt to define the elements that contributed to these changes will be analysed in this paper and some conclusions will be suggested.

The Roman city of Ariminum and its port

The city of Rimini (Latin: Ariminum) is situated at the Adriatic Sea on the coast between the rivers Marecchia (ancient Ariminus) and Ausa (ancient Aprusa).\(^1\) During the Roman period, the city was a key communications node between the north and south of the peninsula. Rimini, in Northeastern Italy, contains some spectacular extant architectural monuments which date to the Roman period, including the Arch of Augustus, the Tiberius Bridge, supported by five arches of Istrian stone, and one of the biggest amphitheatres in Italy. The city was one of the most important cities in the Adriatic world, the area being previously settled by the Etruscans, the Umbrians, the Greeks (possibly from Aegina), and the Gauls. In 268 BC, the Romans founded the colony of Ariminum, a name probably came from the toponym of the river.\(^2\) Ariminum was not only intended as a starting point for conquering the Padana Plain, but was also a bastion against invaders from Gaul. Being the terminus of the Via Flaminia, whose end was indicated by the Arch of Augustus, Rimini was a road junction connecting Central and Northern Italy by the Via Aemilia, which led to Piacenza, and the Via Popilia, which extended to Ravenna. Rimini also opened up trade by sea and river thanks in large part to its strategic location. The city developed and prospered further during the Imperial period because its port, trade, and commerce supported the spread of farming products.\(^3\)

In the case of Rimini, the near absence of direct archaeological finds means that the evidence must be sought mostly in historical and literary evidence. According to the chronicles of the classical authors, the initial indications seem to be poor. A brief reference pertaining to a harbour does exist, one which shares the same name as the local river. Additionally is the fact that the area was repeatedly used as a starting point for military expeditions from the Republican period to the beginning of the Middle

\(^{1}\) Tonini (1864); Mansuelli (1941).
\(^{2}\) Braccesi (2007).
\(^{3}\) Turchini (1992: 134).
The Geomorphology of the Roman Port of Ariminum

Ages. Strabo included Rimini among the main cities of Umbria, and claimed the presence of a river and a harbour with the same name.\(^4\) During the Second Punic War, the consul Titus Sempronius Longus led an army from Sicily to Rimini by way of the Adriatic Sea.\(^5\) In addition, Archbishop Giovanni Agnello, in the middle of the 9\(^{th}\) century, reported a well-dated event in his chronicles. He recorded that in 491 AD, the Ostrogothic king Theodoric left the port of Rimini to conduct a siege of Ravenna, while the Chronicle Sorattense, from the 10\(^{th}\) century, recalls the decision of Charlemagne to provide with guards several Adriatic ports, such as Aquileia, Ravenna, Rimini and Ancona.\(^6\)

During the Late Antique period, we must note the medieval partition between Portus Mariculae, in the present day course of the Marecchia, and the Portus Aprusae, oriented east of the ancient Roman port, linked to the Fossa Patara, also renamed Apisa or Apsella.\(^7\) As evidence would suggest, this implies the presence of two different moorings during Late Antiquity. For instance, as has been stated by Cardinal Anglico in 1371: “Civitas Arimini...habet portum pulcherrimum supra mare iuxta civitatem et supra fluvium Mariculae”, which would still suggest the use of the whole coastline near the city, and the defensive breakwater close to the Marecchia. Later, during the Renaissance period, sea-structures were identified, with docks dating to the medieval period, probably already reinforced during the period of Charlemagne.\(^8\)

The historical evidence supports a plausible confirmation of the presence of port structures located in the area of the modern city centre. The critical review of the current research may demonstrate the location of the remains and the continuity of use over the Late Antique period. Different elements contribute to the resolution of this question, elements which are closely related to the morphology of the ancient basin and its topographical definition.\(^9\)

**Geomorphology of the ancient port of Ariminum**

The latest research on the geomorphological development of the local watercourses located near the city centre has partially contributed to our knowledge about the causes of the abandonment of the maritime structures

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\(^4\) Strab. 5,1; 5,11.
\(^5\) Liv. 21,5: 21,7.
\(^6\) TONINI (1864: 2); MORIGI 1998; PAUTRIER (2010: 124).
\(^7\) TONINI (1864); MORIGI (1998).
\(^8\) TONINI (1864).
belonging to the Roman period. The research, based on the formation activities of the River Marecchia, is particularly relevant for a better understanding of what caused the obstruction of the port facilities. For instance, between 1980s and 1990s, Antonio Veggiani and Stefano Cremonini analysed the evolution of the Marecchia River and the geomorphology of the harbour area.\textsuperscript{10} They point out that sea-level changes and sedimentary deposits influenced the development of the port and the river-mouth, the coastal lagoon, and geological features. Their investigation of the geological background rightly focused on the analysis of the lengthening shoreline and the progressive formation of the Marecchia delta, linking these changes to the resulting sedimentation of the mouth in the proximity of the ancient port.\textsuperscript{11}

This achievement permitted Veggiani to quantify the sea level change in the Upper Adriatic, with particular attention paid to the area of the littoral of Rimini. In this context, he knew that the sea level in the 3\textsuperscript{rd} century AD was approximately one metre higher than in the Republican period.\textsuperscript{12} The perception that this difference may have implied some direct impact to the harbour structure is confirmed by the progressive obstruction of the basin and the area of the docks recorded by the local chronicles of the Late Antique period. The flooding of the port basin and the growth of the sedimentary deposit level, operated by the combined forces of the river and the sea level, have completely modified the maritime position of ancient Rimini. In other words, the geomorphological impact has been an obstacle for the development of the port, having caused the disappearance of the structures in the mooring area of the Marecchia.\textsuperscript{13} The Marecchia silted up and progressively buried the area in front of the docks covering the basin with sand and clay. This presumably explains why starting from the Middle Ages, several references have been made regarding the presence of a small sheltered port on the River Ausa as a replacement for the ancient one.

The chronicles record how the Marecchia mouth was unsafe and dangerous for the loading of boats and small vessels because of its currents. Although some doubts still remain as to the existence of this secondary harbour, as a confirmation of the precarious condition of the ancient port, some speculations reinforce the claim about the particularly adverse condition of the ancient basin which led to the change of that

\textsuperscript{10} Cremonini (1995); Veggiani (1983).
\textsuperscript{11} Veggiani (1983: 125).
\textsuperscript{12} Veggiani (1968: 117).
\textsuperscript{13} Adimari (1616).
The Geomorphology of the Roman Port of *Ariminum*

city’s context. Indeed, as previously seen, first Veggiani and later Cremonini clearly illustrated that in the pre-Roman period, especially in the 8th and 7th centuries BC, the Marecchia originally had two or three mouths that flowed into the sea to the north-east and east of the port site. Their conclusions are based on the observation of fluvial deposits in the deep centre of the foundation level of the harbour, deposits which suggest two implications: first, the port was effectively located in the core city, more precisely at the intersection of the *cardus* and the *decumanus*, which are the main roads of the Roman settlement; secondly the setting of the Marecchia widely contributed to the changes which occurred throughout the centuries, changes that affected mainly the Roman port basin and then the core city, as well.

The classification of the harbour by Marriner and Morhange may help us better explain the geomorphological variation which occurred in the area of the ancient sea structures in Rimini. According to their ranking, the port of Rimini may be classified as a buried urban harbour. This may be explained by some of the factors that contributed to the changes of the territory of Rimini and increased the deposition activities until the complete burial of the infrastructures. For instance, the impact of human activities on the riverine environment (e.g. farming, deforestation) from the pre-Roman period onwards increased silt levels in the river Marecchia. These processes of accumulation and deposit of sand and clay in the mouth of the river accelerated the progradation of the coastline. These combined factors worked simultaneously with the sea level change, deeply modifying the local environment and burying the sea structures.

Having seen that the depositional activities of the river and the sea changes operated with a considerable impact on the Rimini coast, the study of the geomorphological evidence of the ancient port may be supported by the analysis of the depth of the shallow. In fact, a careful evaluation of the depth of the shallow of the Upper Adriatic, in the view of the recent studies done by Betti and Morolli, helps us ascertain the causes that favoured the modification of the port environment. Briefly, the Upper Adriatic presents a bathymetry equal to 0-30 meters depth (up to 20 km from the coast), implying a modest shallow of the water. Here the shallow is subjected to variation due to the eustatic rise, calculated at 1.25 mm per year, a phenomenon which occurred starting after 5000 BC. More

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recently, Betti’s study has shown that this rise, combined with the progradation of the coast (due to the sedimentary activity of the river), has changed the above sea level of +2.5-3.00 metres (from the Early Imperial period).\textsuperscript{19} Thanks to this, in the Rimini context, the coastline advanced 1.5 km toward the sea from the Roman period.\textsuperscript{20} This means that the combined effect of these phenomena has contributed to the obliteration of the port. The sediment of the Marecchia, the stretching of the coastline, and the flooding of the port basin have implied the formation of several layers of sediment that nowadays cover the ruins of the port. This allows us to hypothesize that the ruins of the port may be still buried at -2.50-3.00 metres ASL. These types of evidence (sea-level change, bathymetric data and analysis of sedimentary deposits) helped the current investigation achieve a better understanding of the geomorphological variation that affected the Rimini port structures.

**Conclusion**

The ancient harbour of Rimini is unique due to its geomorphological and topographical context (Fig. 1). Near the current city centre or, more precisely, the modern railway station, and in proximity to the ancient urban walls, the Roman port complex may be still buried. The port was named and mentioned by the locals as Marecchia or Maricla harbour. The sea-structures were probably made of \textit{opus quadratum}, as evidenced by local scholars.\textsuperscript{21} Tonini first pointed out that the presence of these stone blocks might be referred to the remains of the mole of the ancient port, with Cremonini and Morigi agreeing with Tonini’s finds in subsequent decades. These remains would have also been confirmed earlier in the historical chronicles, which also confirmed that the port suffered from geomorphological instability starting at the beginning of Late Antiquity.\textsuperscript{22} During the Renaissance, the port was completely buried, but was still known and identified thanks to the docks related to the medieval period, previously reinforced during the period of Charlemagne.

\textsuperscript{19} Betti–Morelli (1998).
\textsuperscript{20} Zaghini (1994).
\textsuperscript{21} Morigi (1998); Cremonini (1993); Tonini (1864: 2).
\textsuperscript{22} Arrigoni (1616); Clementini (1610).
The Geomorphology of the Roman Port of Ariminum

Figure 1. Ariminum city centre

Line A: silting Imperial period 3rd century AD
Line B: silting Late Antique period 5th-6th century AD
Line C: silting Medieval period 9th-12th century AD
Line D: quay and mole of the Roman port
Square E: location of the Roman lighthouse

The historical sources reported that the port was a great commercial hub, and that it was linked to the course of the riverine environment of the city that was presumably reconstructed by Augustus in the years of his principate, mainly to supply the lack of mooring points. From these historical mentions, the port was considered only a modest fluvial mooring, but a harbour well-structured for commercial purposes, nonetheless. The port was the result of several transformations, probably also because of the impact of the nearest natural element, one which
influenced the development of the infrastructures. The partial remains may still be placed in the area of the current railway station, as well as its foundations made of stone blocks. Briefly, this port may be considered a 1st century structure made by Augustus, most likely to confer prestige on the city and to emphasize its role in the Adriatic. The ancient port was reinforced during the Middle Ages, and then was gradually involved in the urban space and the wall line located on the mainland sea-side of the city centre, so that the port was considered the inner side of the Marecchia mouth area.

An updated interpretation of the port of Rimini has been possible thanks to the discussion of these undervalued sources. This new reading of the port remains comes as a result of the geomorphological analysis of the area considering the port remains, and is guided by an archaeological approach, matching the evidence with the records given by the historical documentations. To sum up, the different elements that allow us to posit the presence of well-established port structures may be seen in:

- a series of docks built in the area of the urban wall in the Early Imperial period that were practically buried by the flowing of the Marecchia;
- the port, restored in the 1st and 2nd centuries AD, started to be obliterated in the late-3rd century AD, as seen in the chronicles and judging from stratigraphic records;
- once the port, jetty, and warehouses were dismantled, the port was buried in the coastal basin by the flood sediment of the River Marecchia and probably completely buried during the early 15th century.

Some suggestions on the dimensions of the port may be proposed as follows: the area affected by the sedimentation activities, and by the flooding of the Marecchia, covered a portion of the city centre with new layers of sand and clay. Additionally, the port of Rimini perhaps extended in a following curvilinear and crescent shape, following the curve of the coastline. The port was perhaps a pattern considering its hypothetical form and the presence of the mole stretching toward the sea, being one of the oldest in the region, for the successive construction of these structures, along the Northern and Central Adriatic. The observed changes help us ascertain the chronological context of the ancient port, which may have belonged to the Augustan period, but also help us learn more about the topographical situation of the ground plan, its proportions, and relationship to the urban environment. An interesting aspect is that the supposed shape of the artificial basin and the protruding crescent shape with keystone were peculiar in the Imperial period, as is found in Trieste and Ancona. The exploitation of the geomorphological sources, applied to the study of the ancient Adriatic ports, is a point that probably deserves more careful analysis in the coming years.
The Geomorphology of the Roman Port of Ariminum

References


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Federico Ugolini


