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Case Studies I:
The Western Mediterranean

Studying Coastal Resources and Resource Control in the Context of Early State Formation on the Tyrrhenian Coast (Italy)

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Keywords: Tyrrhenian Italy – coast − salt − territory − city state

Introduction

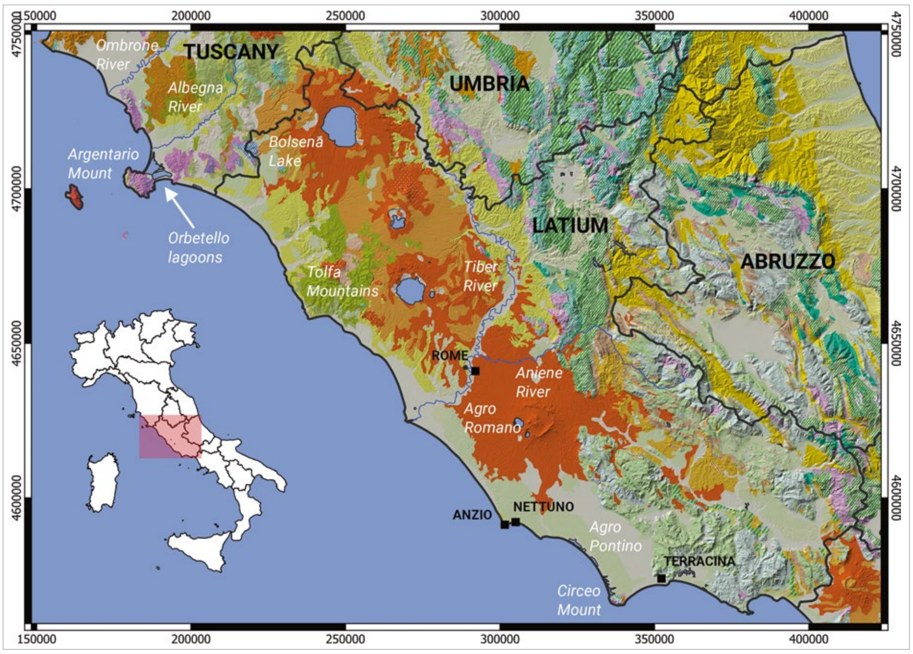
In November 2021, the University of Groningen started the research project »Salt and Power, Early States, Rome and Resource Control«, funded by the Dutch Research Council[1]. In this project, an interdisciplinary team composed of the authors and supported by international colleagues, looks into the changing modes of salt production within the context of early state formation in Tyrrhenian Italy from the Bronze Age to the Roman period. We postulate that the Etruscan and Latin city states strived to control parts of the coastal area that were suited for salt production and related activities in order to meet the demand of their growing populations for salt and food preserved with salt (meat, fish, vegetables). In this paper, we first briefly describe the coastal landscapes in which we work and then discuss how the various coastal micro-regions characterizing the Tyrrhenian coast of Central Italy in the Early Iron Age became part of larger territories. To investigate the economic relationship between the exploitation of coastal resources and inland early states the team´s focus is on the production of salt as an indispensable commodity for human and animal life. In the conclusion, we will reflect on the tension between organically grown micro-regions and their importance within the geopolitical process of the formation of city state-controlled territories in Central Italy during the 1st millennium BCE. Table 1 gives an overview of the chronology of the main phases we are concerned with in this paper.

Central Tyrrhenian coastal landscape characteristics

The area of study in the Salt and Power project is the Tyrrhenian coast of ancient Latium, an NW–SE oriented stretch of land with a varied geology and morphology[2] (fig. 1). Large tracts of this coastal landscape consist of stacked series of marine terraces that resulted from the complex interaction between sea level fluc-

1 File nr. 406.20HW.013. See for a paper on the aims and methodology of the project Alessandri – Attema 2022.

2 Soldati – Marchetti 2017.



1 The varied coastal environment of central Tyrrhenian Italy. Background, SRTM Digital Elevation Model merged with Geological Map of Italy 1 : 1000000

	Simplified Latial Chronology	
BCE	2200–1700	Early Bronze Age
	1700–1400	Middle Bronze Age 1–2
	1400–1300	Middle Bronze Age 3
	1300–1150	Recent Bronze Age
	1150–1050	Final Bronze Age 1–2
	1050–950	Final Bronze Age 3 (Roma-Colli Albani I)
	950–880	Roma-Colli Albani IIA
	880–800	Roma-Colli Albani IIB
	800–725	Roma-Colli Albani III
	753–509	Roman Monarchy
	509–27	Roman Republic
	27 BCE–476 CE	Roman Empire (Western)

Table 1 Overview of the chronology of the main phases.

tuations (glacial-interglacial cycles)[3], massive explosive volcanism and concurrent deposition of tephra, and regional tectonic uplift during the Quaternary[4]. Such stepped marine terrace landscapes dominate the northern part of the Latium coast (territories of Vulci, Tarquinia and Cerveteri) as well as the Agro Romano and Agro Pontino to the south of the Tiber delta[5]. Sea level rise during the Holocene in combination with long shore transport of sand led to the development of beach ridge – lagoon systems of which the dimensions generally remain rather limited because of the overall small supply of sediment. The area in the north (the current southern Tuscany) has an entirely different geology and tectonic history, with a very large Holocene lagoon, bounded by barriers that connect the mountainous Argentario promontory with the mainland. This mainland lacks the stepped earlier marine terraces and exhibits far less prominent tectonic uplift and a lesser input of tephra. The sediment supply by the various rivers in this area (Ombrone and Albegna) is considerably larger than to the south, explaining the build-up of the large Orbetello lagoonal system and, further north, the Ombrone delta.

A deviating coastal morphology is encountered in the Tolfa area, where stepped marine terraces are largely rock-cut and of far smaller dimensions. Here Holocene beach ridge – lagoon systems are virtually absent, a cliff-like coast being rather common. The same holds for the Monte Circeo and Terracina limestone coasts, where rock-cut terraces dominate. Holocene beach ridge – lagoon systems are also poorly developed in the Anzio – Nettuno coastal area, where the balance between sediment supply by longshore sand transport and coastal erosion is such that no full beach ridge – lagoon system has developed during the Holocene. The Tiber delta and adjacent coastal areas evidence the important role of fluvial sediment supply in the development of major coastal beach ridge – lagoon system and forms a typical example of a protruding delta with large scale development of beach ridges and lagoonal areas (Maccarese and Ostia lagoons), which

3 Lisiecki – Raymo 2005.
4 Marra et al. 2019.
5 Milli et al. 2013.

evidence the complex interactions between Holocene sea level rise and sediment supply by the Tiber, the salinity of its lagoons varying over time.

In mediterranean shallow and enclosed coastal settings salinity regimes are highly variable and can range between freshwater, brackish or saline, in main lines depending on the influx of river water and the seasonal precipitation surplus/deficit. The influx of sea water is related to the dimensions and variability of marine gateways[6]. In a warm region like the Tyrrhenian coast, especially during summer months when the freshwater input is limited, strong evaporation can easily lead to an increased salinity of shallow lagoons. This peculiar setting makes such shallow lagoons the perfect area for salt production, considering that a first brine can be harvested directly from its natural source to be further processed. Recent studies undertaken in the Tuscan coastal area of Puntone on the coast in northern Tusacany prove how such saline lagoonal sediments were leached and the brine collected for further employment in salt production[7].

Exploitation of Tyrrhenian coastal micro-regions for salt production and related activities

Based on the above observations, we can define a series of coastal micro-regions in Central Tyrrhenian Italy running from northern Tuscany at Grosseto to Terracina in the south that from prehistory onwards were exploited for various purposes among which salt. As rock salt is hardly available in the Italian peninsula, past communities in Italy depended foremost on marine salt and thus on the exploitation of those parts of the coast that were suited for its production. These are essentially lagoonal zones and level rock outcrops with natural basins where sea water could evaporate leaving crystalline salt[8]. Direct evidence for salt production and related activities during the protohistory is furnished by the so-called ›reddish potsherd sites‹ that scholars have interpreted as remains of briquetage industry, i. e. the production of salt through the boiling of brine in ceramic containers that had to be broken to obtain the salt cakes[9].

In recent investigations at Caprolace in the Pontine Region, a Middle Bronze Age settlement located on the shores of the lagoon of Caprolace in the southern part of the Pontine plain, Alessandri et al.[10] discovered the so far earliest briquetage debris found on the Tyrrhenian coast. The ceramic briquetage debris, including pedestals used to support the ceramic containers, appeared to be associated with fragments of domestic pottery. The early phase of the Caprolace settlement (Middle Bronze Age, subphases 1 and 2) is therefore not representative of the bulk of the reddish potsherd sites that largely lack domestic pottery. In another area of the same settlement, a later layer (Middle Bronze Age, subphase 3) only contained the characteristic reddish potsherds of jars, suggesting that the salt production, previously located in a domestic environment, now occupied a separate area of the settlement.

Not all the ceramics of reddish pottery sites can be put in relation to the production of salt. Especially the variety of shapes of the pottery studied from reddish pottery sites from Late Bronze Age and Iron Age contexts, even if the repertoire is limited to only a few shapes, indicates that the pottery served more purposes than the production of salt cakes, and may have included containers for the preservation of food using brine[11]. Recent studies show that reddish pottery sites seldom occur in isolation, but rather are part of extended areas with sparse but dense distributions of broken jars and other debris, often still occurring in the form of in situ heaps, and showing evidence for furnaces, pits and dumps of leached sand. The Iron Age areas on the lagoonal shores and coast at Puntone in Tuscany[12] and in the lagoonal environment of Ostia[13], where the Salt and Power Project team is currently working, reveal how these coastal micro-regions developed into ›proto-industrial‹ areas. Geophysical prospection, using gradiometry and archaeological artefact survey, reveals the extent of such productive areas.

6 Bird 1994.
7 Sevink et al. 2020; Sevink et al. 2021.
8 Harding 2013; Weller – Brigand 2015; Harding 2021.
9 Pacciarelli 1991; Alessandri et al. 2019; Sevink et al. 2020; Alessandri et al. 2021; Sevink et al. 2021.
10 Alessandri et al. 2019. See for datings in calender years, table 1.
11 Alessandri et al. 2019.
12 Sevink et al. 2020; Sevink et al. 2021.
13 Pisani Sartorio – Quilici Gigli 1984.

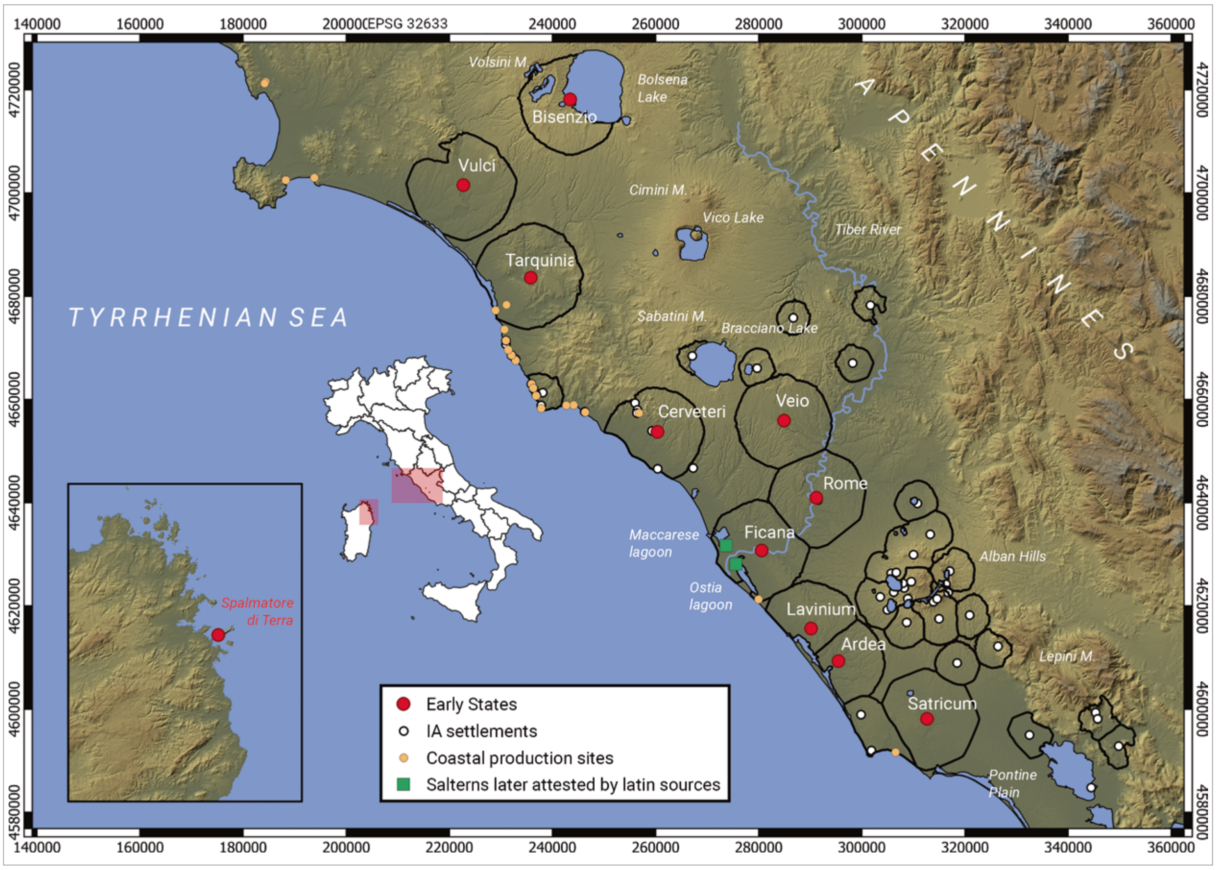
Coastal Tyrrhenian micro-regions and their incorporation into geopolitical territories

On the Tyrrhenian coast, the typical reddish potsherd sites broadly date between the Late Bronze Age and the 7th century BCE. This is the period in which north of Rome, in Etruria, and south of Rome, in Latium Vetus, large (proto)urban settlements developed having infrastructural links with the coast and featuring harbor facilities[14]. This is also the period in which Rome itself rose to power[15]. Judging from the proliferation of reddish potsherd sites from this period, salt making and related activities became more specialized during the Final Bronze Age and Iron Age with the extensive debris zones reflecting a complex coastal production economy. In the Salt and Power project, we hypothesize that previously autonomous Bronze age exploitation of coastal resources at some point started to respond to the increasing demand of the growing urban populations inland. This would have resulted in a situation in which each major inland center came to control a portion of the Central Tyrrhenian coast. In order to investigate a possible link between the coastal production zones and the inland population centers, we need to zoom out onto the wider landscape and reconstruct the territories that belonged to the Early States and evaluate their spatial relation with the coastal production zones. To do this we use the so-called Bubble Model[16].

Several attempts have been made so far to reconstruct the territories of the Etruscan and Latial city states, using different methodologies usually drawn from economic geography, mainly Thiessen polygons[17] and Weighted Voronoi diagrams[18]. Another method to reconstruct settlement hierarchy, called X-Tent, has been proposed by C. Renfrew and E. Level in the seventies[19] and was recently used by D. Redhouse and S. Stoddart to explore the development of the ancient territories in Northern Lazio and Southern Umbria[20]. All of these methods share some common limitations, notably so their a-dynamic character[21]. Trying to overcome these limitations, Alessandri proposed the use of the Bubble Model[22], being the only diachronic model where the result of a phase is influenced by the previous one. Moreover the Bubble Model allows one to distinguish between hierarchical and federative polities. The result of the application of the model to Southern Etruria and Latium Vetus shows at the beginning of the Iron Age two types of territorial modules: a smaller one encompassing the area at 50/60 minutes walking time from the settlement, and a larger one at around 130 minutes. The former seems to be typical of single or federative polities and it is quite common in the earlier phases, before the Iron Age. The bigger module starts to appear at the beginning of the Iron Age, when the Early States are quite regularly distributed in the landscape[23]. The portion of the map in Figure 2 showing coastal production sites concentrated along the Tyrrhenian coast between Tarquinia and Cerveteri, indicates that in this part of Etruria in the Iron Age both types of modules existed side-by-side. In between the inland territorial modules of Tarquinia and Cerveteri there appears a small territorial module linked to the single Iron age site of Castellina del Marangone. The coastal production area around this modest settlement falls well outside the territorial modules of Tarquinia and Cerveteri and neither can it be linked to an inland population centre in the Tolfa mountains. Here settlements comparable in size to Tarquinia and Cerveteri lack. Strictly speaking, only two coastal sites (Saline di Tarquinia and Fontanile delle Serpi) would, according to the model, in the Early Iron Age have fallen within the reconstructed territory of Tarquinia. However, due to its vicinity to the urban core, the string of sites immediately to the south of the territorial module of Tarquinia may have soon become controlled by the city as well, just as the three coastal production sites near Cerveteri. The above example shows how the Bubble Model may help in reconstructing the tension between the two types of territorial modules in time and in monitoring changes in their relationship during the phase of early state formation, revealing the mechanisms of resource control exerted by the Etruscan and Latin Early States over the coastal resources in Roman times.

Interestingly, the evidence for briquetage becomes less evident from the end of the Archaic period / Early

14 Pacciarelli 2001; Guidi 2006; Guidi 2010; Alessandri 2013.
15 Carandini 1997; Carandini 2006; Alessandri 2013; Fulminante 2014; Cifani 2020.
16 Alessandri 2016a; Alessandri 2016b.
17 Di Gennaro 1982; Amoroso 2016.
18 Fulminante 2014.
19 Renfrew – Level 1979.
20 Redhouse – Stoddart 2011.
21 Alessandri 2016a.
22 Alessandri 2016a; Alessandri 2016b.
23 Alessandri 2016a; Alessandri 2016b.

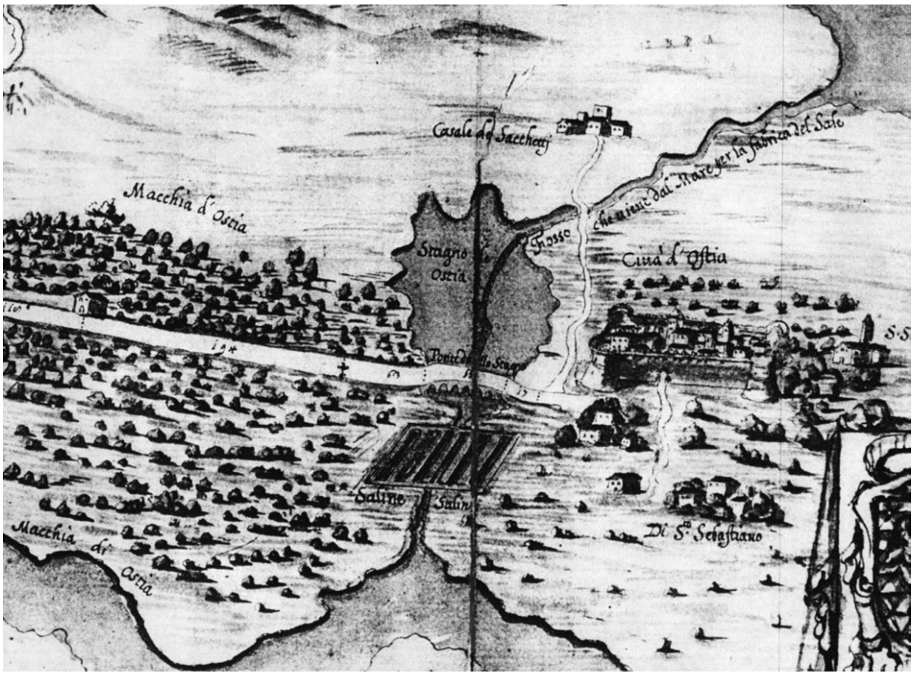


2 Territories of settlements from the early Iron Age and coastal production sites

Roman Republican period onwards to eventually disappear totally. We pose that it is in this period that salt production by the briquetage method was replaced by salt works of the saltern type, even if we must imagine that the transition from briquetage to salterns was gradual and overlapping and that the upscaling of salt production to meet the growing demand for salt by the rising city states may initially have been met by a combination of salt production modes. Undoubtedly, we will need to develop more complex models. It is not unlikely that alongside the leaching of salt-bearing sediment deposits and other techniques, natural or adapted salt pans were already used from an early point in time, possibly to obtain low-quality salt intended for animal consumption and that such small-scale production persisted alongside the eventually large Roman enterprises. It must be noted that the archaeological detection of salterns where salt precipitated in a network of evaporation basins is, at least for the Tyrrhenian coast, a wholly new field to explore. We know from historical sources that two salterns existed at the mouth of the Tiber River: a northern one under the control of Veio and a southern one under the control of Rome[24] (fig. 3). Palynological data from the northern Maccarese lagoon point at increased salinity already at the end of the 7th century BCE[25]. The same situation holds for the southern Ostia lagoon, where a similar increase in salinity was detected in pollen records between 700 and 600 BCE. In both cases, it has been suggested that those modifications might be related to an artificial opening of the lagoons to let in seawater to further salt production[26]. Already in the 4th century BCE, salt production with the saltern mode of production had gained such importance that Rome declared war on Veio to take control of its salterns (by that time, Ficana was controlled by Rome).

In our project, it will be important to look into past hydrogeographical circumstances in the various micro-regions we define, and based on those to look for remains of ancient hydraulic engineering works that might have facilitated the layout of the evaporation basins. In both cases, the briquetage and saltern

24 Liv. 1, 15,5; Dion. Hal. 2, 55,5–6; Plut., Rom. 25,4.
25 Di Rita et al. 2010.
26 Bellotti et al. 2011.



3 The saline in the Tiber delta (extract from the Catasto Alessandrino, 1660)

mode of salt production, we should not underestimate the level of technological knowledge required to produce good quality salt. As to labor organization, we hypothesize that salt making at first may have been an activity embedded in the agricultural calendar of small coastal communities like it was the case in the Middle Bronze Age Caprolace settlement[27], but became more specialized from the Late Bronze Age onwards. After this it developed into an organization whereby Roman professionals were involved in overseeing and guaranteeing salt production for Rome[28]. It also led to provisioning inland communities living in the Apennines through the so-called Via Salaria.

Finally we note that very recently, some of the reddish jars usually linked to briquetage sites on the Tyrrhenian coast have been found on the island of Tavolara at Spalmatore di Terra, which is located less than 2 km from the northwestern Sardinian coast (fig. 2). Archaeometric analyses revealed that at least a portion of the collected potsherds likely originated from Etruria[29]. This discovery fits Francesco di Gennaro's hypothesis that the reddish jars, rather than being (only) used to produce salt, may have contained (salted) food as provision for the crew of boats sailing oversees[30]. This would also support the hypothesis that most of the coastal lagoons were used as natural harbors during the Bronze and Iron Ages (and after)[31]. This recent observation implies that the sea must be included in our modelling of geopolitical power and resource control.

Microregions and Resource control: Concluding remarks

To look into ways in which salt production is linked with (proto)urban growth and the process of state formation in Tyrrhenian Italy, we refer to the work of Jeffrey R. Parsons, author of »The Last Saltmakers of Nexquipayac, Mexico, An Archaeological Ethnography« (2001)[32]. In this book, Parsons discusses the sociopolitical implications of salt production, distribution and consumption providing examples of the re-

27 Alessandri et al. 2019.
28 Marzano 2013; Cébeillac-Gervasoni – Morelli 2014; Morelli – Forte 2014.
29 Amicone et al. 2020.
30 Di Gennaro 2019.
31 Alessandri 2007; Alessandri 2013.
32 Parsons 2001.

lationship between salt access and polity territoriality using the Valley of Mexico as a case study. One of his conclusions in the book's chapter on worldwide comparative perspectives is that »controlled access to spatially restricted salt-making localities often becomes an important component of local and regional politics« and that »there are hints that access to salt has been universally considered so significant that standard concepts of territoriality may be suspended to equalize this access, or to diffuse tensions that might arise from difficult access«. In our project, we postulate on basis of the historical sources and geographical analysis that the Etruscan and Latin city states will have strived to control those parts of the coastal environment that were suitable for salt making and related activities to meet the demand of the growing population in the Latial and Etruscan polities for salt and salt-preserved food and that at this juncture, geopolitics aimed at controlling (sub-)coastal resources would have intertwined with the advancement of new technologies. This indeed resulted in tensions over access, as exemplified by hostilities between the rivalling and neighboring city states of Rome and Veio over access to the salt pans near the Tiber river mouth. (fig. 2) Already in 1985, Giovannini noticed that in the Roman expansion to the South, Rome immediately strove to control the areas of Hadria and Canusium on the Adriatic side of Italy since that was where the only salt supply areas in Southern Italy were located, together with Nuceria, on the Tyrrhenian side. The only other supply area was Tarentum. With the conquest of the latter in 272 BCE, Rome came to control all salt production in central Italy[33]. The focal point in the Salt and Power project is therefore the pressure on the economic potential of coastal micro-regions within the context of the formation of overarching geopolitical territories during the period of state formation in Tyrrhenian Central Italy using a novel interdisciplinary methodology[34].

Addresses

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Figure credits

Fig. 1: L. Alessandri, Groningen Institute of Archaeology. – Fig. 2: L. Alessandri, Groningen Institute of Archaeology. – Fig. 3: The Ostia saltern in the Catasto Alessandrino (1662), from Frutaz 1972, plate 128

33 Giovannini 1985.

34 For an overview of the adopted methodology see Alessandri – Attema 2022.