Modeling Micro-Regions in the Ancient Western Mediterranean Sea

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Abstract: As the research corpus of archaeological data on the floor of the Mediterranean Sea has continued to grow, maritime archaeologists have been developing and testing methods that use this corpus to model maritime movements in antiquity. Like other examples, this study also uses this corpus but rather than projecting routes of movement, it uses an alternative approach that can model areas with higher and lower densities of activity. In turn, it proposes that these concentrations of activity – as areas with a density of people's interests and needs – may also represent socially-constructed places and micro-regions within the maritime space of the Mediterranean Sea. This paper discusses the application of this alternative interpretive approach to Roman-Republican era data in the western Mediterranean basin, relates the results to contemporaneous geographies of the sea, then investigates if these preliminary archaeological models of activity may also be illustrating micro-regions within this maritime landscape.

Zusammenfassung: Da immer mehr archäologische Daten vom Boden des Mittelmeeres vorliegen, testen und entwickeln Meeresarchäologen Methoden, mit denen maritime Bewegungen in der Antike modelliert werden können. Auch für die hier vorgelegte Studie werden diese Daten verwendet, aber anstatt Routen zu rekonstruieren, wurde ein alternativer Ansatz gewählt, in dem Bereiche mit höherer und niedrigerer Aktivitätsdichte modelliert werden. Dabei wird angenommen, dass diese Aktivitätskonzentrationen Gebiete mit einer bestimmten Dichte von Interessen und Bedürfnissen von Menschen darstellen. Die Bereiche sind somit als sozial konstruierte Orte und Mikroregionen im maritimen Raum des Mittelmeers zu verstehen. In dem Aufsatz wird die Anwendung dieses alternativen Interpretationsansatzes auf Daten der römisch-republikanischen Ära im westlichen Mittelmeerraum diskutiert und die Ergebnisse auf zeitgenössische Geografien des Meeres dahingehend untersucht, ob diese vorläufigen Aktivitätsmodelle Mikroregionen innerhalb maritimer Landschaft veranschaulichen können.

Introduction

Since the 1970s, maritime archaeologists have been using their growing corpus of archaeological data to categorize movement and to decipher patterns of maritime activity in antiquity. Piece by piece, studies by G. Boetto, M. Bonifay, A. Hesnard, S. Kingsley, J. Leidwanger, J. Nieto, A. J. Parker, A. Tchernia, and others, have built a body of interpretive tools that enable scholars to generate diachronic and centennial models of movement using only data from the corpus of material on the seafloor[1]. This is a particularly important development because it not only demonstrates the gradual maturation of maritime archaeology – as we are able to generate models and theories about the past that are independent of other disciplines – but also because it argues that within antiquity, there was a structure and order to the sea itself. The sea was not an anarchic space but an inhabited place, with a cognitive and cultural topography equal to others on land. This essay, too, adopts this perspective and hopes to add to it by demonstrating a new approach to modeling and to understanding maritime regions and micro-regions at sea.

1 Hesnard – Tchernia 1978; Parker 1984, 1992; Nieto 1988, 1997; Kingsley 2009; Bonifay – Tchernia 2012; Boetto 2012; Leidwanger 2017.

Modeling and Constructing Place and Communities at Sea

This impetus to adopt a new means of modeling maritime activity emerges from two related characteristics inherent to much of previous scholarship. The first is a limited chronological perspective of a vessel's movements. Although the many elements within a wreck assemblage, such as the cargo, the personal items, or the ship's equipment, could have been collected at any time during the vessel's activities, our present collection of interpretive tools cannot accommodate this chronological flexibility. Instead, one element of the assemblage – often the cargo – is prioritized and becomes the key dataset upon which interpretations are based. The resulting model thus proposes activity only related to this component of the assemblage, a collection that was likely compiled soon before the vessel's loss. The second characteristic is an inevitable corollary to the first: A tendency to create models with generalized routes between the last port visited and the location of the assemblage[2]. Although these are useful models, the compressed chronological perspective unnecessarily limits how a ship's activities are illustrated; most commonly they appear as vectors.

As an effort to accommodate a more flexible chronological and spatial perspective on a ship's activities, this investigation has loosely adopted and adapted two elements often applied in other types of archaeology. The first is a component of Site Catchment Analysis (SCA), an interpretive approach most common in prehistoric investigations. Established and tested by C. Vita-Finzi and E. Higgs in their 1970 study of different Epipaleolithic-era settlements in the Levant, SCA is partially built upon an understanding and modeling of the catchment basin, the space commonly demarcated by the sources of items in an assemblage. In 1970, Vita-Finzi and Higgs defined this basin as a parcel of land 10 kilometers in diameter, an area that likely represented the presumed limits of activity within an intensive subsistence agricultural economy[3].

In its inaugural use, therefore, the catchment basin was a fixed area determined by the scholars' estimation and understanding of the prehistoric economic structure of the Levant. It was the area within which people were moving around to collect items, and to carry them to their settlement for use. Importantly, it had no preconceived chronological boundaries, for the basin could represent the area used for one month, one season, or many years. Adapting this approach for assemblages under water, then, could build upon this chronological flexibility, although a slight reversal of perspective was required as well. The sources of items within a maritime assemblage were necessary because those sources defined the limits of the catchment basin, but movement in the basin was no longer defined by people radiating through an environment to bring items to a stationary location. Instead, as the assemblage on the seafloor represents movement in space, often that of a ship, the resulting catchment polygon represents the most likely area in which that activity may have taken place. The polygon contains no chronological component to propose what items were collected first or last, or how long the ship may have been in use, nor does it contain any vectors. The polygon only poses the most likely area that the ship may have been operating in before the material was deposited on the seafloor.

Importantly, this polygon also contains a human component. As ships and their activities do not progress independently of people's interests and needs, a polygon not only represents the movements and mobility of people, it is a human expression as well. A single polygon can represent how much of the sea was in use, how people were interacting with the sea, and be a discrete portion of a sea's cultural topography. Nevertheless, a single polygon reveals little. Instead, like previous studies by Kingsley or Boetto, much more information emerges with the compilation of a large dataset.

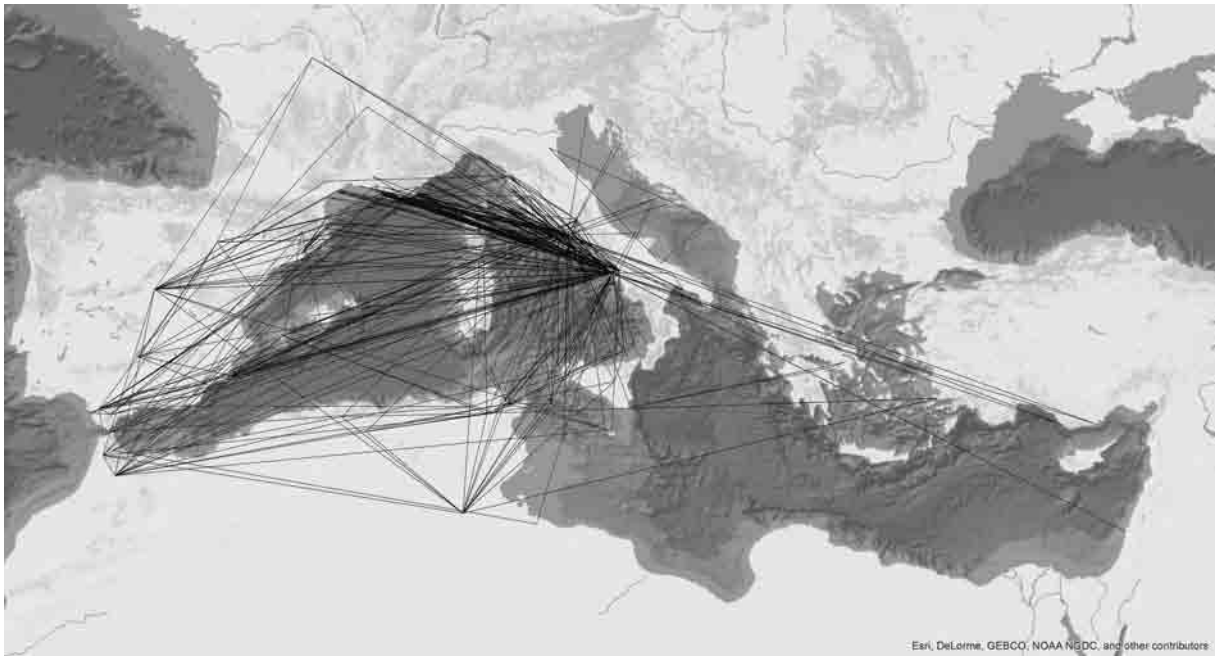
In this study focusing on the western Mediterranean basin from the 3rd to the 1st century BC, 288 assemblages were analyzed to create an equivalent set of polygons (fig. 1). Information came from both primary and secondary sources; a large percentage of the data came from Parker's 1992 catalogue »Greek and Roman Shipwrecks in the Mediterranean and Roman Provinces«, while a collection of 12 journals and 13 other publications produced after 1990 were sources of more recent information. The polygons representing the activities of each assemblage, in turn, were generated in ArcGIS by joining the location of the assemblage and the source(s) of items in that assemblage[4].

As SCA, or the concept of a catchment basin, was used to generate this projection of polygons, concepts within Social Network Analysis (SNA) may be used to understand the polygons. As one manifestation of graph

2 Nieto 1988, 1997; Strauss 2007; Boetto 2012; Bonifay – Tchernia 2012.

3 Vita-Finzi – Higgs 1970.

4 A preliminary version of this approach was presented at the International Symposium on Boat and Ship Archaeology (ISBSA) Meeting in 2012; see Harpster 2017.



1 The dataset of 288 mobility polygons used in this study representing assemblages from the 3rd to the 1st centuries BC

theory, SNA uses nodes and links (or edges) as a means of modeling social networks. When applied in contemporary studies, the nodes may be a single person or a group of people, and the links joining nodes can represent a tangible or intangible unit that is shared between them. A shared unit could be a religious affiliation, a familial tie, educational status, or a lamp or cuisine. By plotting these links between the nodes, relationships and a hierarchy within the set of nodes may be illustrated. Equally, the constitutive nature of some forms of SNA is evident, for it is through the collection and compilation of a large body of nodes and links that patterns within the corpus emerge. In general, a dense cluster of links and their associated nodes may be interpreted as a social unit within the broader network, a unit that could be defined by similarities in cuisine, religion, or educational background. When SNA is applied archaeologically, however, the relationship between nodes often relies upon the presence, absence, or distribution of material data[5]. Thus, a relationship is often assumed through the presence of similar material culture, or similar material characteristics, but social networks among this set of nodes may still be assessed through the varying density of links and their strengths.

These projected polygons, too, can be used to pose the presence of social groups or communities of people. Key to doing so, however, is the use of a different relational space. Rather than gauging a relationship based upon the sharing of units among nodes, requiring a relational space of distribution, relationships among these polygons are based upon the area of movement each represents. This requires a relational space that gauges mobility. As polygons are superimposed, the similarity or dissimilarity of the different mobility areas represented can gauge the strength of the relationship between the polygons. A greater overlap can equate to a greater similarity in activity, while the density of the projected polygons can represent the commonality of the activities and human experiences within the entire corpus. In figure 2, for example, the varying densities of the mobility polygons were measured and color-coded in ArcGIS to represent activity in the western Mediterranean Sea in the 3rd century BC[6]. Darker areas on the map represent a higher density of polygons, whereas lighter colors represent less. The uneven results suggest that certain areas of the western Mediterranean basin, such as the waters between Sicily and Rome, or from Sardinia to Gibraltar, were used more than others.

As movement at sea is an expression of people's interests and needs, however, these confluences of activity may also represent areas with a higher similarity of people's expressions. Darker areas on the map may thus rep-

5 Knappett 2013, 8; Terrell 2013, 20.

6 The Joint Count tool was used to generate a join count between the projected polygons, then the IDW (Inverse Distance Weighting) tool generated the raster, using the join count as the Z coordinate in the IDW.

2 A density map of the polygons associated with 3rd-century BC assemblages. Darker areas represents a higher density of polygons

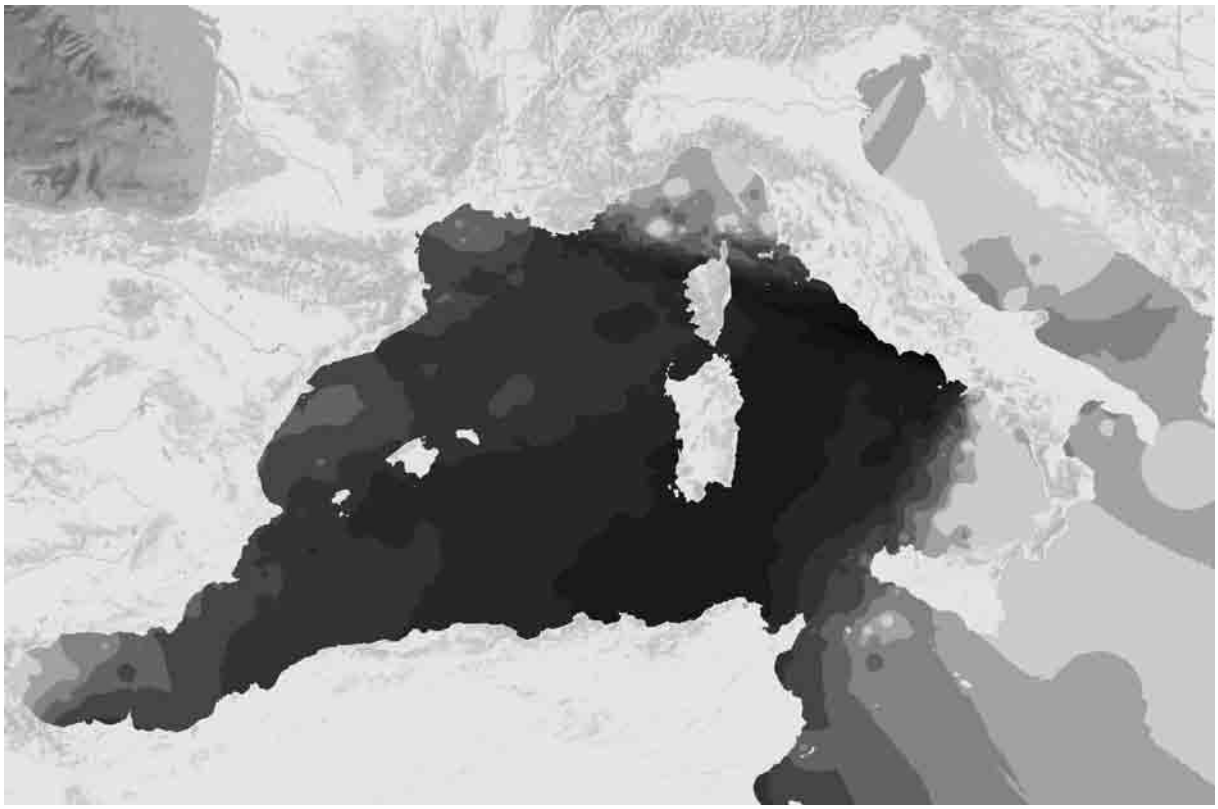
resent small seafaring communities coalescing within the overall population based upon their shared experiences. Moreover, change in these patterns is evident as the varying densities of more mobility polygons from the 2nd and 1st centuries BC were modeled in the western basin (figs. 3–4). It is possible to view how robust or ephemeral one of these maritime communities is, or to view how their area of activity shifts. The community seemingly just southwest of Sardinia in the 3rd century BC, for example, appears to grow in activity and density over the following two centuries and migrate northwards.

As these polygons are projected in geo-referenced space, unlike some examples of SNA, these concentrations of mobility can acquire a third interpretation. In addition to symbolizing concentrations of movement and a small seafaring community, these loci may also represent the generation of a ›place‹ at sea. As J. Lee and T. Ingold argued, and as reiterated by J. Ur, J. Leary, and G. Lucas, place is not only an origin or a destination, but the area of movement as well – through the entanglement of journeys, a place can be made[7]. This is an approach that draws upon the use of a ship as a shared experience. Seafaring, after all, is a journey across an environment that is often portrayed as antagonistic both physically and spiritually, and the ship is the most common vehicle for these experiences[8]. As a ship is a tool for structuring the surrounding space, this is an approach that also draws upon perceptions of the human creation of a landscape[9]. In this case, how these repeated activities and experiences transform a space into meaningful place within people's landscape of the sea.

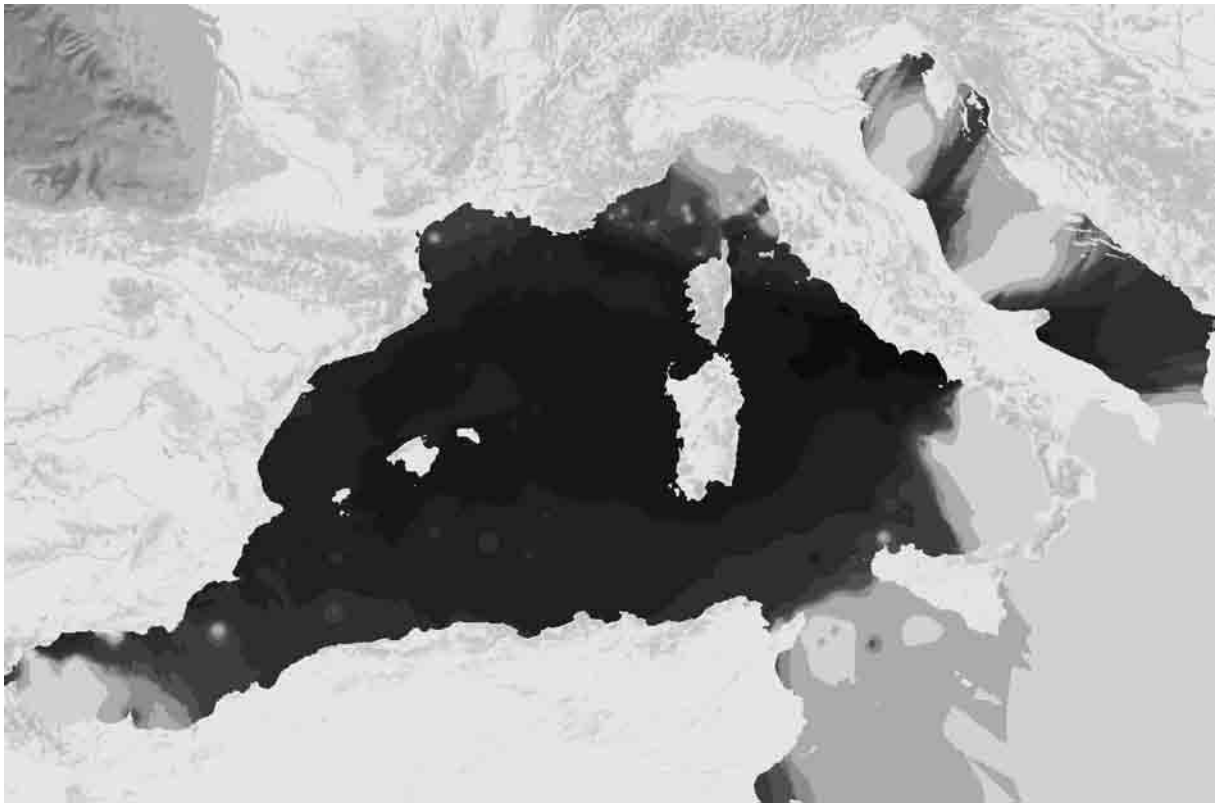
7 Lee – Ingold 2006; Ur 2009; Leary 2014; Lucas 2014.

8 Goldziher 1971; Robertson 1984, 378–380; Ramsey 1989, 89–91; Wyatt 1996, 127; Connery 2006, 499.

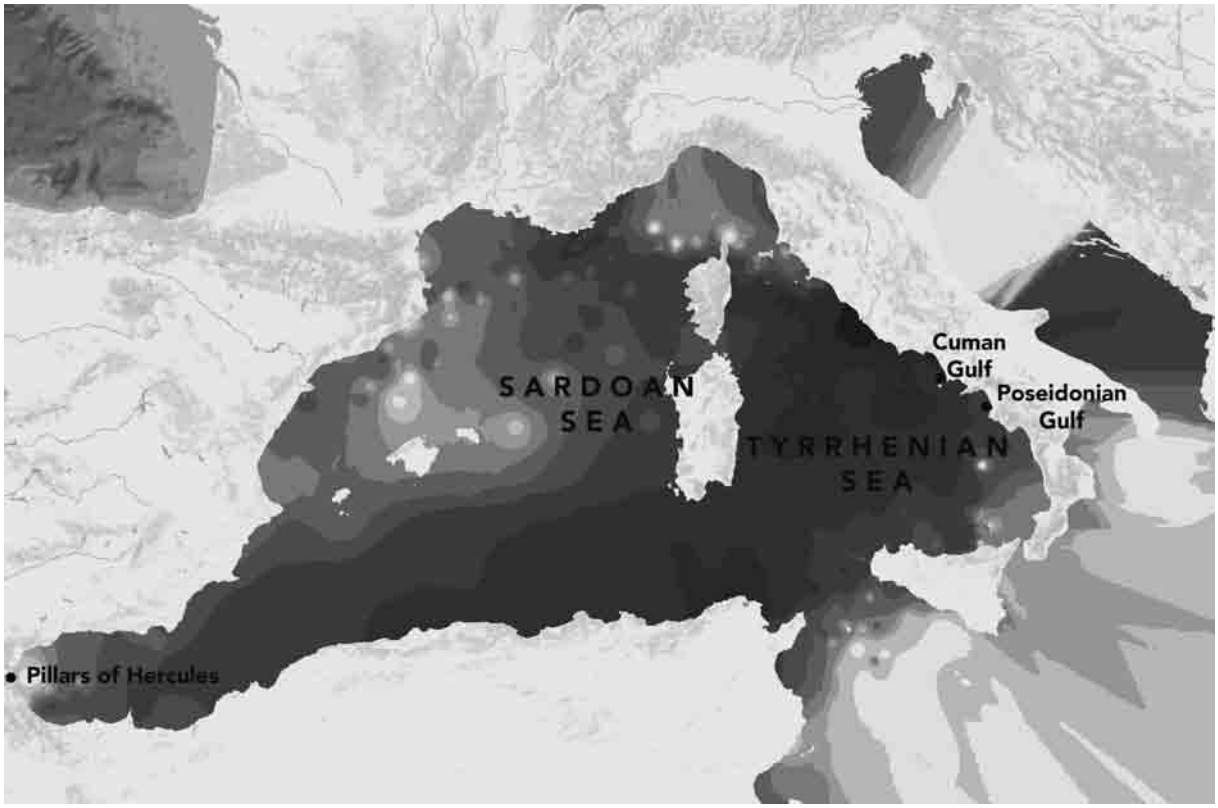
9 Darvill 2010.



3 A density map of the polygons associated with 2nd-century BC assemblages (left) and a density map of the polygons associated with 1st-century BC assemblages (right). Darker areas represents a higher density of polygons



4 A density map of the polygons associated with 2nd-century BC assemblages (left) and a density map of the polygons associated with 1st-century BC assemblages (right). Darker areas represents a higher density of polygons



5 Superimposition of Eratosthenes' maritime toponyms in the western Mediterranean basin over the density map of 3rd-century BC activity from figure 2. As it is unclear if Eratosthenes' Geographika was released over time from the 3rd to the 2nd century BC, or only in the 2nd century BC, his toponyms are superimposed over a map of 2nd-century BC activity as well (left) and superimposition of Eratosthenes' maritime toponyms in the western Mediterranean basin over the density map of 2nd-century BC activity from figure 3 (right)

A Mosaic of Maritime Micro-Regions: Updating The Corrupting Sea?

Moreover, it appears that these maritime places north of Sicily and west or southwest of Sardinia were not only present within the informal topographies of these seafaring communities. Instead, perhaps due to their longevity and social significance, and like other micro-regions on land, they seem to have had a varying impact on the formal topography of the western basin. Within the three primary geographies of the western Mediterranean Sea in the Roman Republican era by Eratosthenes (276–194 BC), Polybius (203–120 BC), and Strabo (64 BC– 23 AD), only five seas or *maria*, and seven gulfs or *sinus*, were mentioned. In addition to the Pillars at Hercules, near Gibraltar, for example, Strabo's geography of the western basin contains ten other maritime places, including gulfs at Lucrinus (now a lake near Pozzuoli), and Hipponiate (Gulf of St. Euxemia)[10]. Eratosthenes' geography only refers to five places, and Polybius wrote of only four[11]. Among these three sources, however, the Sardinian / Sardoan and Tyrrhenian Seas are the only toponyms for *maria* in the western basin shared by all three authors, and curious is their emplacement of these labels at sea (figs. 5–8). As a geographic construct bounded by Rome, Sardinia, and Sicily, the Tyrrhenian Sea appears to have a consistent relationship with the noticeable density of activity from the 3rd to 1st centuries BC within the same area. The Sardinian / Sardoan Sea, if broadly west / southwest of the island, has a slightly weaker association with the modeled activity in the 3rd

10 Strab. geogr. 2, 5, 19. 22. 24–25. 28–29; 5, 1, 1. 3; 5, 3, 6; 5, 4, 5–6. 13; 6,1,4.

11 Erat. (in Strab. geogr.) 1, 2, 11–14. 1, 3, 1–4. 1, 3, 11–15. 2, 1, 40. 3, 75; Poly. Hist. 1, 10, 5. 2, 14, 4. 4, 44, 4–7. 34, 4, 6.

6 Superimposition of Eratosthenes' maritime toponyms in the western Mediterranean basin over the density map of 3rd-century BC activity from figure 2. As it is unclear if Eratosthenes' Geographika was released over time from the 3rd to the 2nd century BC, or only in the 2nd century BC, his toponyms are superimposed over a map of 2nd-century BC activity as well (left) and superimposition of Eratosthenes' maritime toponyms in the western Mediterranean basin over the density map of 2nd-century BC activity from figure 3 (right)

century BC, if only because there is less movement evident. Yet the strength of this association seems to grow through the Republican period.

While the reiteration of these two maritime toponyms by Polybius and Strabo could be a result of simply copying Eratosthenes' text, both later authors present positive and negative commentary on their predecessor. For them, Eratosthenes' work was not sacrosanct[12]. Equally, if Eratosthenes' text prompted Polybius' emplacement of the Sardinian and Tyrrhenian Seas, these are the only two maritime toponyms Polybius copied; he ignored the Cuman and Poseidonian Gulfs in the western basin. Strabo used the Posidonian Gulf while ignoring the Cuman Gulf, but otherwise added seven locations apparently not present in Eratosthenes' work. It may be only a coincidence that these two toponyms are repeated in these Republican-era texts and that they coordinate spatially with these modeled places at sea, but it is a very compelling coincidence nevertheless.

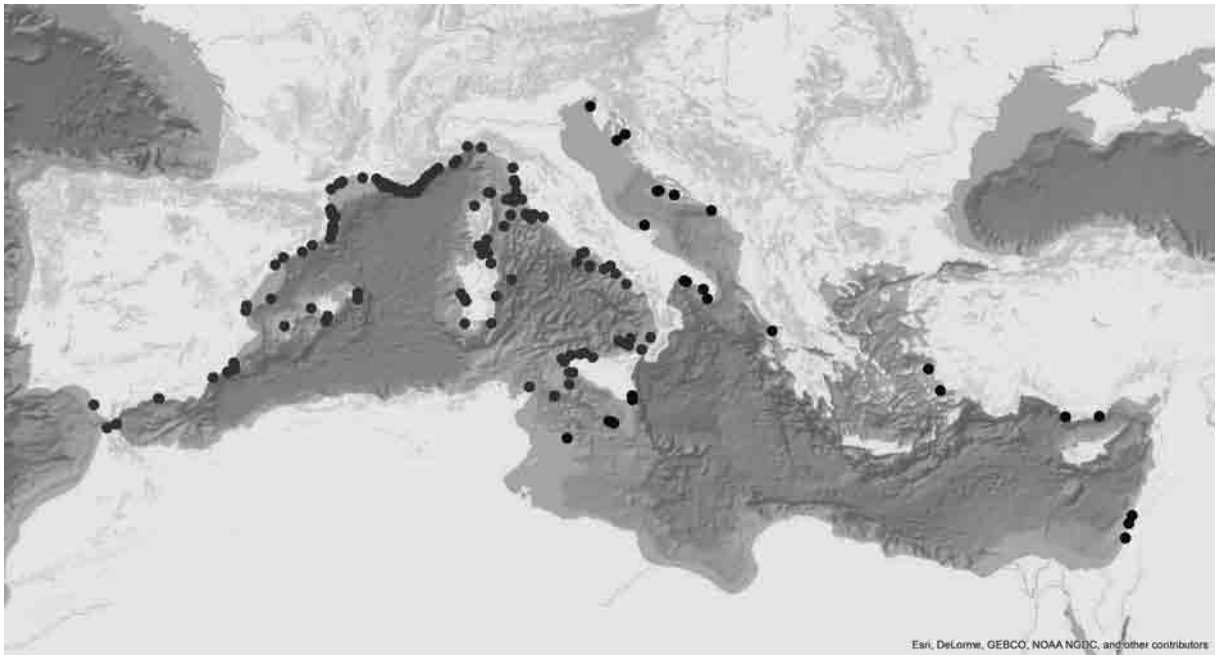
But do these two amalgamations of activity and toponyms make these maritime places ›micro-regions‹ as P. Horden and N. Purcell might conceive of them? Certainly, the western Mediterranean basin as a whole can be classified as a ›region‹. As evident in Burr's study, this area may have lacked a single shared toponym like the ›Adriatic‹ sea, but it was continually recognized as a common geographic space for centuries[13]. The environment unites this maritime space as well, with surface currents churning in a general counter-clockwise cycle that draws the area's movements and communications together. In addition, the collection of 288 assemblages used in this study appear to demonstrate the internal inertia of the western basin in a different way. As this investigation focused on the western Mediterranean Sea, the dataset contains only assemblages that have only western-Mediterranean material. Significantly, although there was no technological impediment to any of these vessels or items moving farther eastwards, only 36 of the assemblages in this dataset represent such an ef-

12 Roller 2010.

13 Burr 1932.

7 Superimposition of Polybius' maritime toponyms in the western Mediterranean basin over the density map of 2nd-century BC activity from figure 3. Polybius writes of the Straits at Gades, west of the Pillars of Hercules (left) and superimposition of Strabo's maritime toponyms in the western Mediterranean basin over the density map of 1st-century BC activity from figure 4 (right)

8 Superimposition of Polybius' maritime toponyms in the western Mediterranean basin over the density map of 2nd-century BC activity from figure 3. Polybius writes of the Straits at Gades, west of the Pillars of Hercules (left) and superimposition of Strabo's maritime toponyms in the western Mediterranean basin over the density map of 1st-century BC activity from figure 4 (right)



9 Distribution of the 288 assemblages used to generate the dataset of polygons. Of this corpus, only 36 assemblages (black) are outside the western Mediterranean basin

fort – these are the examples found outside the western basin itself (fig. 9). Lacking an environmental cause, then, it seems possible that a socially-constructed frontier just east of Sicily may have been containing this maritime activity instead.

The maritime places modeled north of Sicily and west of Sardinia, thus, could be micro-regions for the very pedantic reason that they are smaller units of a larger region. Moreover, P. Horden and N. Purcell recognized that the sea already contains the ecological variability emblematic of other micro-regions like South Etruria or the Beqaa Valley[14]. Horden and Purcell's investigation and characterization of particular maritime places as micro-regions, however, was limited likely due to two reasons. First, the notion of culturally-constructed places in the Mediterranean Sea was still exotic when Horden and Purcell's book appeared. Maritime cultural landscapes were introduced by C. Westerdahl in 1980, and refined in his articles in the following decade, but only through his research in Northern Europe[15]. Geographers like P. Gilroy, and M. Lewis and K. Wigen, promoted similar notions of a socially-constructed spatial hierarchy at sea in the same period, but these efforts were focused on larger spaces like the Atlantic or Indian Ocean[16]. As a result, when »The Corrupting Sea« appeared, the sea at its center had the potential to envelop micro-regions, but was still portrayed as a singular and uniting element.

»The Corrupting Sea« may not have embraced maritime places or micro-regions for a more fundamental reason, however. With an argument drawn from Greek and Roman perceptions of their own history, P. Horden and N. Purcell posed that the connectivity fostered by an uninterrupted maritime space becomes a corrupting catalyst[17]. The boundless Mediterranean Sea led to the end of the Golden Age in the 4th century BC and the decline of human morals[18]. It was a medium that embodied temptation, admitted intruders, fostered religious transformation, carried crusaders and pirates, and drove the endless change characterizing the terrestrial micro-regions that surrounded it[19]. The fragmentation of the sea into a mosaic of localized maritime micro-regions equivalent to their prototypes in Lebanon, Italy, and elsewhere, could have countered their proposal that the illimitable sea was a widely commingling force.

Almost two decades after the book's appearance, however, we may be able to speak more cogently and confidently about the construction of place at sea and, equally, how these maritime places can be micro-regions. Their environment already contains the neces-

14 Horden – Purcell 2000, 191.
15 Westerdahl 1980; 1992; 1994.
16 Reid 1988, 1993; Gilroy 1993; Lewis – Wigen 1997. See also Armitage 2001, 2002, and Whelan 2004.
17 Horden – Purcell 2000, 342, 438.
18 Horden – Purcell 2000, 278, 300, 342.
19 Horden – Purcell 2000, 276. 407. 438. 460. 464.

sary ecological diversity and, like such features on land, that fluctuating diversity is paralleled by fluctuating levels of engagement. Through the Republican era, these models suggest that human interaction with the Sardinian / Sardoan and Tyrrhenian Seas varied with need; as Horden and Pucell wrote, »Flexibility is all«[20]. Nevertheless, this mutability of use is contrasted to a spatial constancy, for micro-regions at sea have a spatial stability like their terrestrial counterparts, even if their location is determined in a different way. On land, a micro-region's location is defined by the geology and environment of the place itself: the mountains of the Beqaa Valley in Lebanon or, in Italy, the Apennine and Alban Hills, and the coastline, that demarcate South Etruria[21].

Within the maritime environment, however, place-making at sea is what Aristotle proposed in the 4th century BC: a function of the nearby coastline providing a stable and constant referent[22]. A place at sea is not defined by the water, but by the adjacent land, such as the gulfs at Paestum or Cumae. Sailors in antiquity knew where they were, when they could see what they were near. Lastly, micro-regions at sea, or at least the two places at the center of this study, seem to be more than an informal construct built by the maritime community. Instead, their repeated identification as the Sardinian / Sardoan or Tyrrhenian Seas suggests that the importance of such places became embedded in the broader cultural consciousness of the region itself, and is still evident today.

Conclusions

To conclude, these two modeled maritime places certainly seem to be micro-regions or, at least, should be considered as micro-regions. Doing so not only accommodates the ›maritime turn‹ in scholarship that has brought the sea and its elements to the forefront in the Humanities and Social Sciences, but also valorizes the cosmological, cultural, and personal complexities that the sea has represented over millennia[23]. Simultaneously, however, perceiving the Sardinian / Sardoan and Tyrrhenian Seas as maritime micro-regions is to exclude Strabo's Iberian and Ligurian Seas, and the various gulfs, and to generate a variety of new questions equivalent to those posed in a terrestrial context. Is there a spatial limit to a maritime micro-region? Does the presence of the toponym signify the presence of the micro-region, and what happens if the toponym disappears from use? Does a minimum threshold of activity characterize a maritime micro-region? We may be able to pose that the sea was a fluid mosaic of culturally constructed ›places‹ as complex as other micro-regions on land, but it seems that we are only beginning to understand what these places are, and how they were perceived in antiquity.

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figs. 1–9 M. Harpster

20 Horden – Purcell 2000, 58.
21 Horden – Purcell 2000, 54–65.
22 Aristot. phys. 4, 4, 212a, 17–20. See also Sorabji 1988, 187–90, and Casey 1998, 55. 70.
23 Connery 2006.