

The dynamic coastal landscape of Crete between the 7th and early 9th century AD

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ABSTRACT

This paper intends to shed light on the changes that occurred in the coastal landscape of Crete during the period of Transformations (7th - 9th centuries AD) with a special focus on ports and harbors. It discusses how these changes reflect the changing social, economic and political conditions in the Aegean Archipelago between the mid-7th and early 9th centuries AD. It tests questions concerning how ports and harbors interacted with one another, with fortified sites, with other places across water, and with maritime navigation. Overall, considering recent historical and archaeological evidence, it aims to shed more light on the period of Transformations, highlighting certain aspects of the resilience and adaptability of the insular communities of Crete. Ports and harbors are not regarded as isolated dots on a map, but instead, they are viewed as parts of various networks with different types of interaction and as cultural products of political, social and economic circumstances. This human-centered approach puts at the center of attention people, their actions and experiences, as well as their engagement with natural environment. Maritime mobility and interaction are considered as key factors of island life. Due to the complexity of the topic, this research adopts an interdisciplinary framework which includes historical and archaeological approaches, combined with spatial analytical tools offered by the Digital Humanities (Geographical Information Systems).

Keywords: Crete, Aegean Sea, Byzantine Ports and harbors, Landscape Archaeology, GIS, period of Transformations

1. INTRODUCTION

The Byzantine state was closely linked to the sea throughout its long history. It developed a strong maritime culture, controlling extensive parts of the Mediterranean coastline and numerous islands, large and small. Ports and harbors, sea routes, maritime trade and navigation played a decisive role in Byzantium's economic development, communication and defense [1, 2, 3, 4]. The relationship between the Byzantine state and the sea remained a crucial factor even in periods of unfavorable political and economic conditions, insecurity and wars. In turbulent periods of its history, Byzantium did not lose its maritime character and its strong connection with the sea, as many ports and harbors continued to play diverse roles and perform multiple functions as parts of various networks with different types of interaction (economic, social, administrative, cultural, military, etc.). It is therefore surprising that Byzantine archaeology still faces a serious problem in the study of these waterfront localities, especially in times of crisis such as the period of Transformation (7th - 9th century AD). This is evident in the study of the ports and harbors of the island of Crete, which is strategically located in the most important maritime area of the core of the early medieval Byzantine Empire. Despite the particular importance of the island for the interests of the Byzantine state, the Cretan ports and harbors between the middle of the 7th and the Arab conquest of Crete (824-828) have not yet been the subject of systematic research. During these centuries, new political, social and economic conditions were created across the east Mediterranean world. Modern scholarship views these centuries as a transformative period during which a complex sequence of changes, transformations, contractions and survivals took place, resulting in the gradual emergence of a new world with different lifeways and mentalities compared to Late Antiquity (4th – mid-7th centuries AD). This paper is the first attempt to shed light on the transformations that occurred in the coastal landscape of Crete during the period under consideration with a special focus on ports and harbors. It discusses how these transformations reflect the changing social, economic and political conditions in the Aegean Archipelago between the mid-7th and early 9th centuries AD. It tests questions concerning how ports and harbors interacted with one another, with fortified sites, with other places across water, and with maritime navigation. Overall, considering recent historical and archaeological evidence, it aims to shed more light on the period of Transformations, highlighting certain aspects of the resilience and adaptability of the insular communities of Crete.

2. CRETAN COASTAL LANDSCAPE IN LATE ANTIQUITY

The analysis of a wide set of data (i.e. terrestrial archaeological evidence on the coasts and the immediate vicinity of maritime areas, underwater archaeological material, results of geophysical surveys, mentions in written sources or maps, and geographical, geomorphological and climatic conditions), produced a number of 85 sites along the shores of Crete and its numerous offshore islands, that can be characterized either with certainty or with a certain degree of possibility as ports and harbors during Late Antiquity (Figure 1) [5]. These harbor sites are not regarded as isolated dots on a map, but instead, they are viewed as parts of various networks with different types of interaction and as cultural products of political, social and economic circumstances. They can be generally classified into three main types based on their functions and roles: primary ports, secondary harbors, and lesser sites such as anchorages with permanent or temporary use [5].

Cretan ports and harbors played diverse roles and performed different functions at local-, regional- and interregional-scale during Late Antiquity [6]. They became places that brought different levels of interaction together and linked particular places (e.g. urban, rural, coastal, inland, offshore, distant production centers and markets, etc.), activities (e.g. economic, social and administrative activities, religious practices, navigation, etc.), materials (e.g. ceramics, agricultural and pastoral products, etc.) and people with varying perspectives (e.g., the central authority, state representatives, the local ecclesiastical elite, merchants, sailors, pilgrims, urban and rural populations, etc.). They were connected to both terrestrial and maritime traffic routes.

It is no exaggeration to say that during Late Antiquity the inhabitants of Crete exploited almost all harbor locations at their disposal along the coastline of the island and made a systematic effort to benefit from the maritime environment. The rich data collected and analyzed for a large number of active ports and harbors reveal that the entire island possessed a complex, interacting and well-organized harbor network between the 4th and mid-7th centuries AD. What is also important is the fact that this broad picture is subdivided into smaller local micro-scale networks, which had different types of interaction [5, 6]. This complex situation can be seen as a cultural product of political, social and economic circumstances, and because of topographical, nautical and environmental variables. It also makes it clear that access to the sea and sailing routes was of crucial significance for the economic and social life of Crete during Late Antiquity. It indicates a high level of mobility around the island for various purposes.

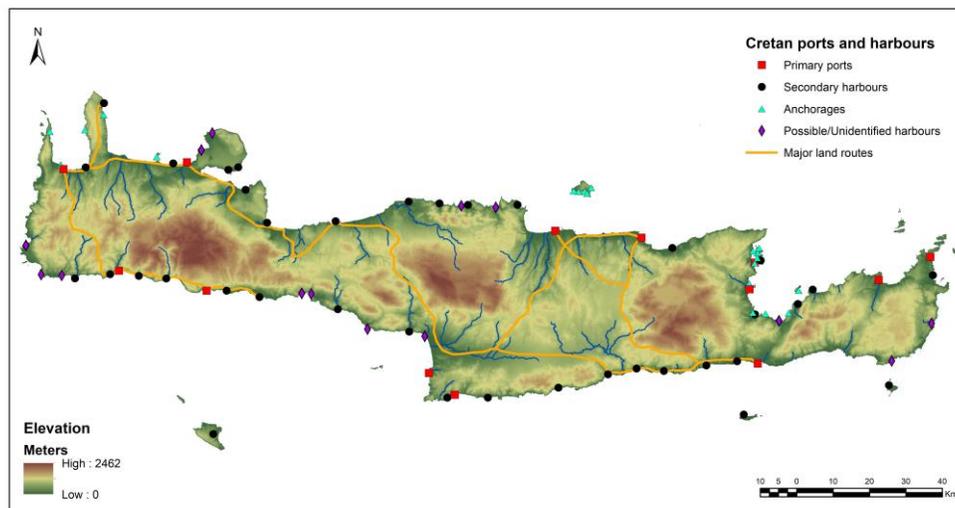


Figure 1. Port and harbor network along the coasts of Crete during Late Antiquity.

3. THE AEGEAN IN THE PERIOD OF TRANSFORMATIONS: A BRIEF OVERVIEW

In the 7th and 8th century AD a new reality was created across the Aegean world due to the economic crisis, the political and social transformations, and the emergence of Arab fleets. After the progressive loss of the rich Eastern provinces, from the second half of the 7th century AD, Crete and the neighboring islands of the southern Aegean (the Cyclades and

the Dodecanese) became a border region of Byzantium [7, 8]. Due to the subsequent problems in supplying Constantinople and the increasing Arab hostility, this maritime region acquired a vital role for the interests of the empire, especially regarding the supply and defense needs of the capital [9, 10, 11]. These changes had far-reaching consequences for the pattern of exchange, and movements of goods and travelers in the Aegean and east Mediterranean basin. As such, maritime routes and trade networks between Constantinople and the large islands of the Mediterranean were reorganized [1, 10, 12].

In this context, the control of the south Aegean was of paramount importance for the byzantine central government [7, 8, 10, 13, 14]. The early Arab raids in the broader region of the southern Aegean (especially in the Dodecanese and Crete) brought to the forefront the need for strengthening the defense of the islands. Both local authorities and the central government realized the necessity to respond effectively to the new circumstances. The latter paid considerable attention to the supervision of the coastlines and the protection of the sea routes. As such, it adopted new naval policies by giving priority to the reorganization of economic, administrative and military networks in the south Aegean. In other words, there was a central planning for the exploitation of this insular region through the control of its economic and military infrastructures [10, 12, 13]. A crucial part of this wider strategy created by the central government, in collaboration with the local state representatives, was the construction of fortifications on the islands for the surveillance of the coastlines and the maritime routes [7, 8, 13]. The reorganization of the military and economic networks in the Aegean Archipelago was a major investment and a lengthy process, which was set in place gradually between the 7th and 9th centuries AD.

4. CRETAN COASTAL LANDSCAPE IN THE PERIOD OF TRANSFORMATION

Taking into account the broader picture briefly described above, it is interesting to highlight changes that occurred in the coastal landscape of Crete during the transition from a time of prosperity and stability (4th – mid-7th century AD) to a period of transformations (late 7th - early 9th century AD). By piecing together available archaeological material from old and more recent discoveries, and re-examining it within a modern framework, it is possible to shed more light on various aspects of human activity along the shoreline of Crete in the period of Transformations. In summary, during this period the following changes can be observed in the coastal landscape of Crete: a) some ports and harbors of Crete were completely abandoned, b) many others continued to function normally, c) some of the active primary ports were protected by fortified walls built sometime during the 7th or 8th century AD, and d) fortified sites were established on the tops of steep mountains near the coastline.

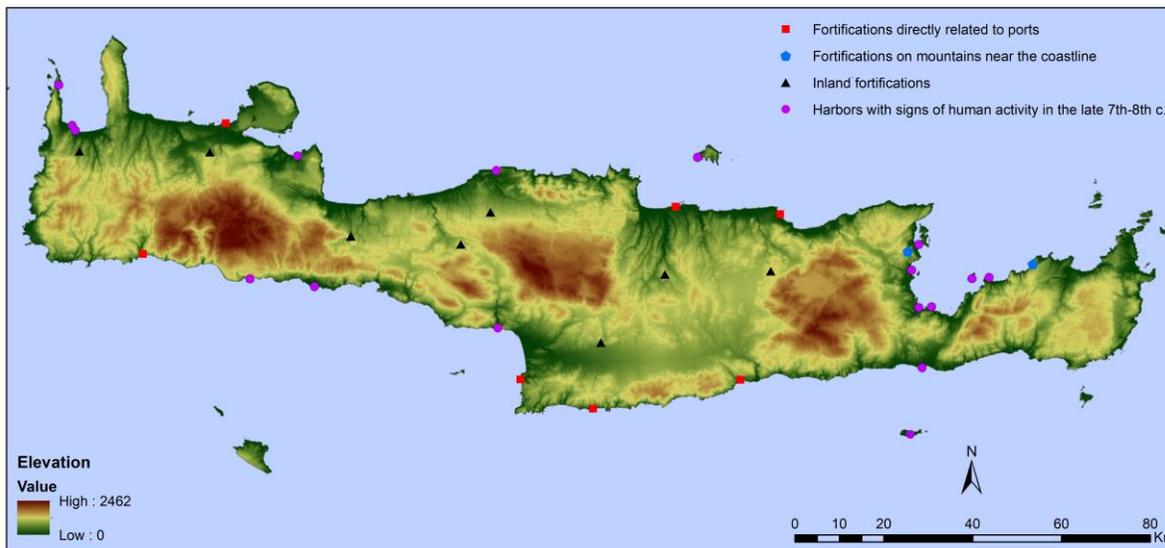


Figure 2. Port and harbor network along the coasts of Crete during the period of Transformations.

First, archaeological material from excavated coastal sites make it clear that some ports and harbors of Crete were totally abandoned sometime during the 7th or 8th century AD. The most characteristic example is the port of Itanos, which is

located on the northeast coast of the island. Based on excavation results, it seems that this Cretan port city was abandoned sometime during the second half of the 7th century AD [17]. In other cases, like Hierapytna, archeological evidence suggests that former primary city ports progressively shrunk to small coastal settlements by the second half of the 7th century AD [18].

In parallel with this picture of discontinuity or shrinkage, the synthesis of the available archaeological data from coastal sites of Crete makes it clear that many of the island's ports and harbors located at strategic part of the shoreline continued to operate showing clear traces of economic activities and commercial connections between the 7th and probably the early 9th century AD. Putting all these dots on the map (Figure 2), it becomes evident that the number of harbors sites during the period of Transformations on the island is significantly lower than in Late Antiquity. It has been pointed out by many scholars that a reduction in the number of harbor sites occurred in many parts of the eastern Mediterranean in the 7th and 8th centuries AD [19]. In the case of Crete, although we identify this phenomenon, it is not possible to obtain a more accurate picture due to the limitations of the current state of knowledge. At present, there are no archaeological studies for most Cretan ports and harbors that focus on the material culture of the period of Transformations. Therefore, we lack information about their historical course in the late 7th and 8th centuries (continuation, decline or abandonment). In other words, fewer dots on the map does not necessarily mean complete abandonment of coastal sites during the period of Transformations in all cases, but may instead represent, to some extent, a research gap. As such, it is not possible to determine the exact number of operational harbor sites along the Cretan shoreline between the 7th and probably the early 9th century AD. The construction of fortification walls to protect certain primary ports, such as Kedonia, Heraklion, Chersonesos, Syia, Matala, Leven and Inatos, is the strongest evidence of the operation of port infrastructure on both the north and south coasts of the island (Figure 2) [20, 21]. During the same period this phenomenon is also observed in many Aegean islands, such as Lesbos, Chios, Samos, Rodos and Kos [10].

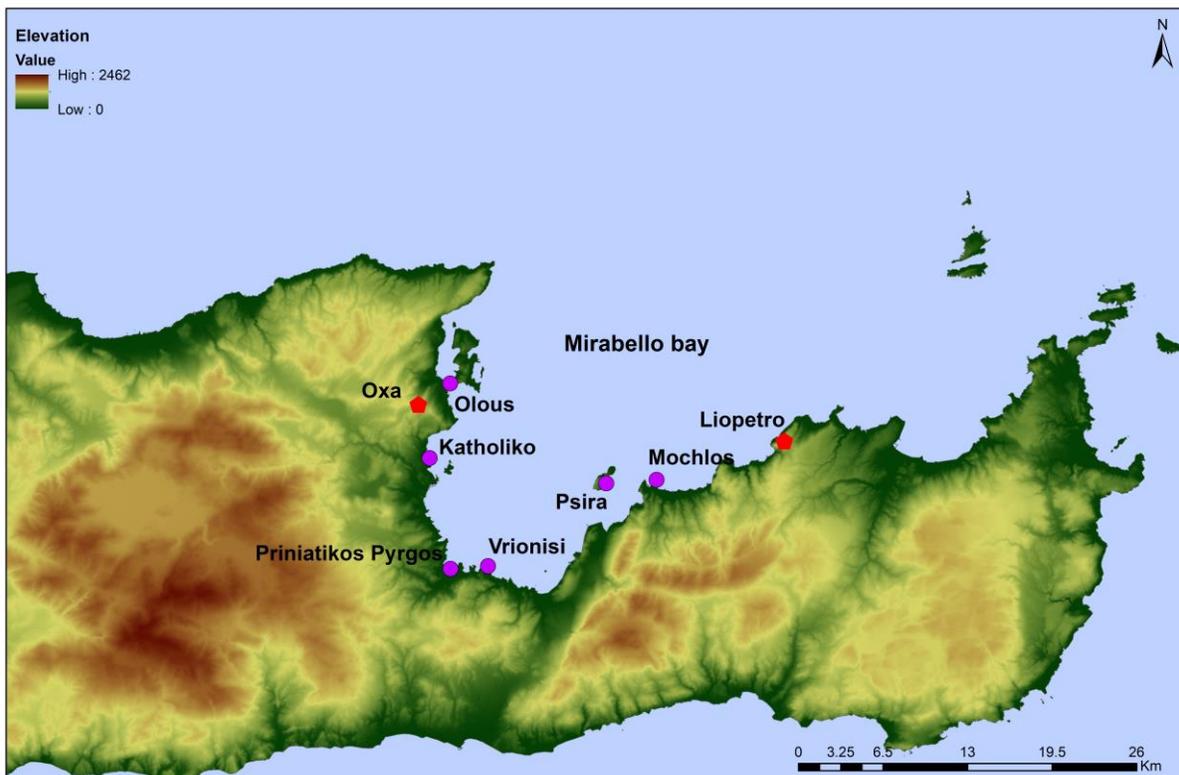


Figure 3. Port and harbor network along the coasts of the gulf of Mirabello during the period of Transformations.

A closer look at the map shows that the highest density of harbor sites during the period under consideration is observed in the gulf of Mirabello on the northern coastline of eastern Crete (Figures 2 and 3). This is not only due to the importance of this coastal landscape for past societies, but also reflects the particular interest of contemporary researchers in this area. The gulf of Mirabello has long attracted the attention of archaeologists, especially those

specializing in the Minoan period. As a result, almost the entire area has been the subject of intensive surface surveys (i.e. Vrokastro Survey, Kavousi Survey, Gournia Survey) and at the same time important sites have been systematically excavated (i.e. Priniatikos Pyrgos, Psira) [22, 23, 24].

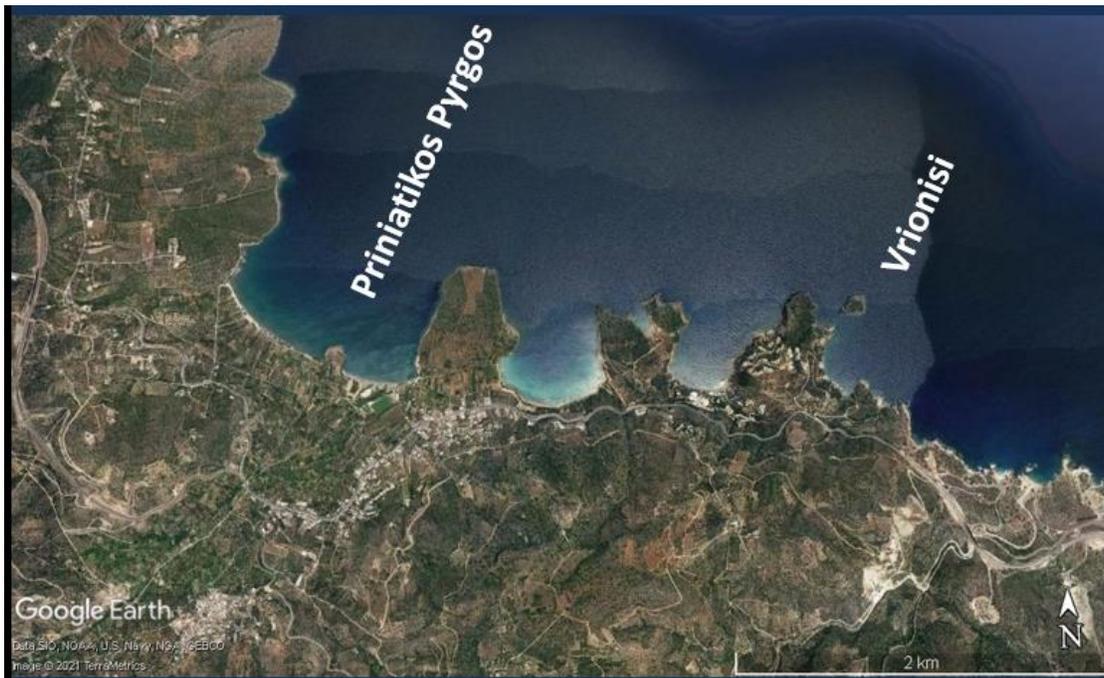


Figure 4. The port of Priniatikos Pyrgos and the islet of Vrionisi (Google Earth).

The most worthwhile information is derived from the coastal site of Priniatikos Pyrgos (Figures 3 and 4). This coastal environment underwent major changes due to rises in sea level over the millennia. Priniatikos Pyrgos was once a hillock near the coast, but now is a limestone promontory jutting out into the sea. The multi-phase site is well-documented by an intensive surface survey and a systematic excavation [24, 25, 26]. Based on excavations findings, such as pottery, coins, seal and metal objects, it has been suggested that an important coastal settlement existed and flourished at Priniatikos Pyrgos between the 4th and the early 9th century AD presenting undisturbed human activity [24, 25, 27, 28]. The discovery of a lead seal of the first half of the 8th century AD at Priniatikos Pyrgos may indicate that it was the seat of an official, who was the receiver of the letter that bore the seal [28]. Furthermore, the analysis of the pottery shows that the harbor was commercially active as evidenced by amphorae sherds from Crete, regions of the Aegean, North Africa and west Asia Minor [25, 27, 28]. The rich material from Priniatikos Pyrgos suggests that the bonds connecting this local harbor and the hinterland remained more or less stable until the end of the early 9th century AD, despite the Arab threat. It seems that from the 8th to the early 9th centuries AD Priniatikos Pyrgos continued to function as the most important harbor of the Vrokastro area. In addition, Priniatikos Pyrgos was still participating in the maritime trade networks of the eastern Mediterranean.

Another interesting issue is the function of the offshore islet of Vrionisi, which is located less than 2nm to the east of Priniatikos Pyrgos (Figures 3, 4 and 5). The tiny rocky islet is strategically situated just northeast of the tip of the Vrionisi promontory, almost in the middle of the Mirabello gulf. The coastline is formed by a line of high cliffs with the exception of the east and northeastern side where the rocks are lower. On the slopping upper surface of Vrionisi several architectural remains, such as an enclosure, a large cistern, a gate, a footpath and other collapsed buildings, have been identified. In the context of the Vrokastro survey it was interpreted as a monastery, similar to the complex of Psira. Based mainly on surface pottery, the surveyors have dated the major phase of occupation of the islet between the 4th and possibly the early 9th century AD [23].

A closer look at coastal topography and environmental data of the region suggests that it was exposed to northerly and northwesterly winds. When winds from those directions blow, the harbor of Priniatikos Pyrgos might not offer a safe shelter to ships. Instead, the rocky islet, due to its orientation, presents a barrier, which breaks the force of strong

northerly and northwesterly winds offering the safest place where a ship could find shelter in this micro-region (Figure 5). The shoreline along the opposite promontory is rugged and steep with no areas suitable for harbors.



Figure 5. The leeward south side of the islet of Vrionisi.

Furthermore, viewshed analysis has been applied in order to generate an overview of the visibility of the gulf of Mirabello from Vrionisi and Priniatikos Pyrgos (Figure 6). Within a visual of zone of 15km radius, Priniatikos Pyrgos had a good view to the central and western section the gulf of Mirabello (Figure 6a). It did not have any view of the southern and eastern section of the maritime zone within the gulf, as well as of the western, southern and eastern coastline. On the contrary, the visibility from Vrionisi was much higher within the spacious gulf, since almost every section of the entire coastline and the maritime zone of Mirabello was visible from the tiny islet (Figure 6b). Vrionisi has direct visual contact with other major sites of the gulf, such as the ports of Olous and Kamara as well as the islet of Psira.

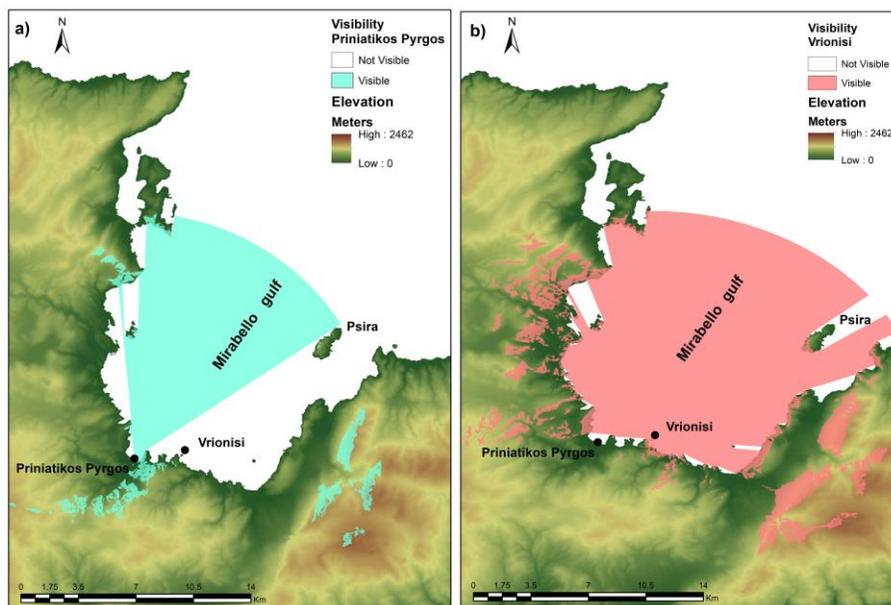


Figure 6. Viewshed from Vrionisi (red) and Priniatikos Pyrgos (turquoise) -15km radius

Taking into account, topographical features, archaeological evidence, GIS analyses and wind patterns, it is reasonable to connect the small maritime installation at Vrionisi with the nearby harbor of Priniatikos Pyrgos and the maritime traffic through this particular sea area. On the one hand, despite the fact that there is no mutual visibility between the two sites, it is quite possible that the leeward south side of Vrionisi could offer a shelter for ships, which waited their turn in order to be landed at the nearest harbor of Priniatikos Pyrgos. On the other hand, Vrionisi due to its prominent location could have acted as control point for mobility within the large gulf. It could also facilitate passing ships that the harbor of Priniatikos Pyrgos was not part of their journey. In a case of sudden storms it could provide a temporary safe haven given the fact that rapid changes in wind direction normally cause squally conditions at sea in this particular maritime zone. Considering that sometimes storms could have lasted for several days and ships were unable to leave their temporary haven safely, the mariners could also find some basic supplies on Vrionisi. It seems that escaping storms at sea using offshore islands as natural barriers was a common strategy in ancient sailing. The maritime function of the islet is further supported by the incised inscription or graffito that occurs on the south-facing limestone cliff, directly above sea level [29]. This inscription can be related to a sailor that waited at the site for the wind to change.

Finally, surface survey and excavations on Psira, which is located just off the eastern end of the gulf of Mirabello about 1.7 nautical miles from the harbor of Tholos, have shown that from the 5th to the 8th centuries AD the built environment of the island contained a monastery, two farms (the northern and the southern), a small settlement at Megali Ammos, nine threshing floors and small structures associated with them [30, 31, 32] (Figure 3). This coastal activity suggests that sea and sailing routes were still important for the economic and social life of Crete.



Figure 7. The mount Oxa in the gulf of Mirabello

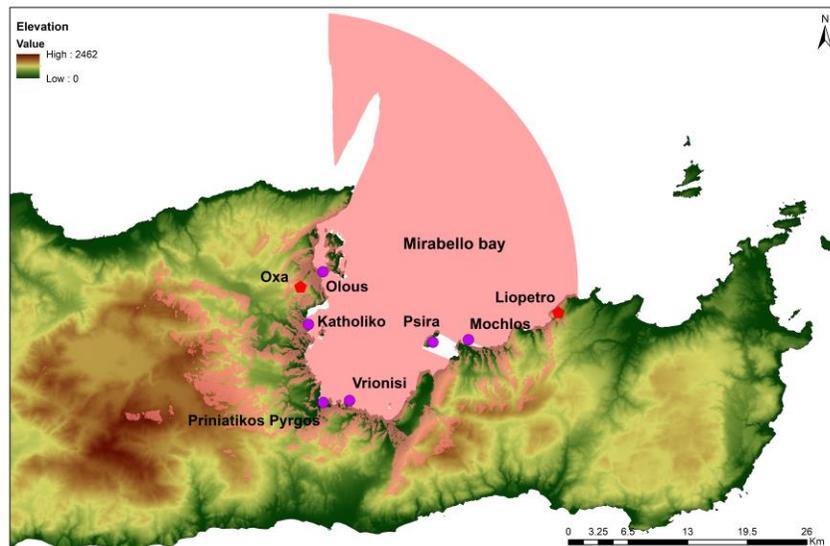


Figure 8. Viewshed analysis showing the visibility from Oxa. Visible areas are marked with red.

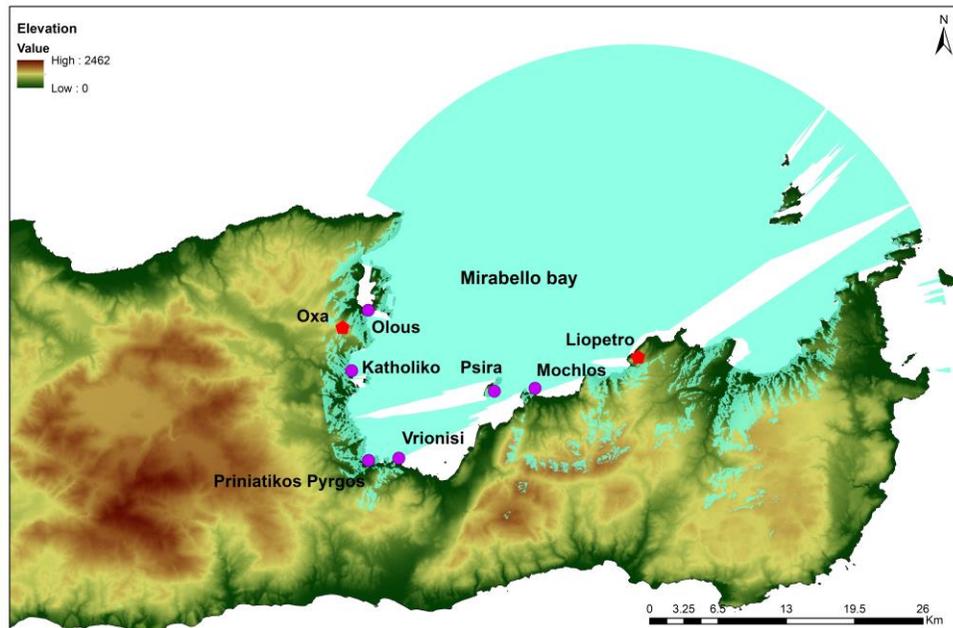


Figure 9. Viewshed analysis showing the visibility from Liopetro. Visible areas are marked with turquoise.

In parallel with the coastal activity, fortified settlements were established on the summits of the steep mountains of Crete in the 7th-8th centuries AD, either in the island's interior or along the shoreline (Figures 2 and 3) [21, 33]. Unfortunately, in most cases no systematic archaeological fieldwork has been undertaken. In the spacious gulf of Mirabello, two important fortified sites have been identified (Figures 3): a) Oxa, located on the western side of the gulf, south of Elounda [34, 35], and b) Liopetro, situated in the steep coastal area of Sitia, east of the gulf [33, 34]. The results of viewshed analysis from Oxa show that it was oriented towards the north-east and certainly had commanding views over the entire shoreline of the Mirabello gulf and the open sea to the north-east (Figures 7 and 8). In addition, Liopetro was also oriented toward the sea, overlooking large sections of the shoreline of the Mirabello gulf as well as the open sea to the north and north-west (Figure 9). The placement of these fortified sites within this coastal landscape, their extensive visibility and the fact that they were mutually inter-visible may suggest that they formed a local communication network. Similar networks in the same period have been identified in the islands of the Cyclades during the same period [7]. The medieval fortresses at Oxa and Liopetro were not isolated communities, established only for purposes of defense. They formed a local system with the surrounding landscape, functioning as reference points in the region of the Mirabello. Despite their mountainous character, they were able to interact with the harbor sites in the coastal landscape of the gulf of Mirabello. At the same time, they networked with the broader world through the sea, despite the Arab threat.

The material from the gulf of Mirabello discussed above suggests that between the late 7th and the early 9th centuries AD, the picture is more complex than we thought. It seems that life did not stop in many coastal localities of Crete, as evidenced by Priniatikos Pyrgos, Psira and Vrionisi. Coastal sites interfaced at the same time with the island's interior and the external world. At the same time, the network of fortified sites of various functions established on Cretan mountains close to the coastline was the result of a wider strategy created by the central government in order to reorganise life, protection and administration in Crete. It illustrates the reaction of the Byzantine state to the new circumstances pertaining to the Aegean.

5. CONCLUSIONS

Putting all this into context, throughout the period between the late 7th and the early 9th century AD, there were significant changes in the coastal landscape of Crete. As far as the archaeological material at hand is concerned, there were a gradual reduction in the number of ports and harbors in Crete. However, at present, it is not possible to obtain a more accurate picture, as for a large number of Cretan harbors there are no reliable excavation data and environmental studies (research gap). For example, more specific studies are needed to measure the impact of earthquakes (e.g. 795) on the operation of ports during this period. However, the changes (continuity, discontinuity, shrinkage, fortifications, etc.)

that have taken place in the coastal landscape of the island cannot be seen as a sign of collapse and decline. Crete experienced two opposite sides of the spectrum. On the one hand, some coastal settlements were totally abandoned. On the other hand, life did not stop in many coastal localities of the island (and off-shore islets), especially those which were well-protected by fortresses. This could reflect a gradual reorganization of Crete's settlement network towards a new model, which was more centralized and easier to manage from an administrative and economic point of view. A similar picture derives from the analysis of the archaeological material of the central Cyclades in the same period [7]. Thus, in Crete changes in the coastal landscape reflects a transformation and adaptation to new circumstances. They illustrate a more complex reality showing that insular communities continued to live and travel despite the dangerous situation caused by the Arab hostility. They reflect a positive force of human flexibility and resilience in relation to changing circumstances of life. Until at least the Arab conquest of Crete, the island continued to offer good and improved trading prospects for merchant ships. At the same time, the spacious and well-protected gulf of Mirabello could have been used by the Byzantine navy.

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