

The case of the missing *antipharos* from ancient Patara's port

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Abstract

In the major port city of Patara on the southern coast of Roman Asia Minor, excavations unearthed a *pharos* (lighthouse) with an inscription that referred to an *antipharos* (a structure ‘opposite’ the lighthouse). It is unknown where the antipharos stood in Patara’s harbour, and scholars’ brief speculations about its location all assume that the antipharos was a second lighthouse. Yet a number of factors combine to suggest that there was only one pharos at Patara, including cautious Roman nocturnal sailing practices, the norm of single lighthouses in the ancient world, evidence of the pharos’ high visibility, and the only other instance of the word *antipharos* referring to something other than an operating lighthouse. Instead, the antipharos was probably either an unlit tower or a beacon instead of a lighthouse. I establish six possible locations for such an antipharos, and consider their likelihood based on how they might have ameliorated dangers to sailors entering the harbour. While there is not enough evidence to be completely confident, a rock islet that was in the middle of ancient Patara’s harbour emerges as the most probable location for the antipharos. The choice to build both a pharos and an antipharos, and where to place them, can illuminate the decision processes behind Roman harbour construction and the currently little-understood meaning of the word *antipharos* in antiquity.

Özet

Roma Anadolu’sunun güney kıyısındaki önemli liman şehri Patara’da yapılan kazılarda, üzerinde *antipharos* (fener kulesinin ‘karşısında’ bulunan bir yapı) yazılı bir *pharos* (deniz feneri) ortaya çıkarılmıştır. Antipharos’un Patara limanında nerede bulunduğu bilinmemektedir ve akademisyenlerin konuyla ilgili kısa spekülasyonları, antipharos’un ikinci bir deniz feneri olduğu üzerinedir. Ancak çeşitli faktörler, Patara’da yalnızca tek bir pharos bulunduğunu düşündürmektedir. Bunlar arasında Roma’nın temkinli gece seyir yöntemleri, antik dünyada tek deniz feneri normunun yaygın olması, pharos’un yüksek görünürlüğüne dair kanıtlar ve *antipharos* kelimesinin bilinen tek diğer kullanımında faal bir deniz feneri dışındaki bir yapıyı ifade etmesi yer almaktadır. Buna göre, antipharos bir deniz feneri değil, muhtemelen aydınlatılmamış bir kule ya da bir işaret kulesiydi. Bu makale, söz konusu antipharos için altı olası konum belirlemektedir. Bu konumların doğruluğunun test edilmesi, limana giren denizciler için oluşabilecek olası tehlikeleri azaltmadaki etkileri göz önünde bulundurularak gerçekleştirilmiştir. Kesin bir sonuca varmak için yeterli kanıt bulunmamakla birlikte, antik Patara limanının ortasında yer alan bir kaya adacığı, antipharos için en olası konum olarak öne çıkmaktadır. Aynı zamanda bir pharos ve antipharos inşa etme ve bunların nereye konumlandırılacağı kararı, Roma liman inşa süreçlerini ve antik çağda *antipharos* kelimesinin bugün hâlâ tam olarak anlaşılmamış anlamını aydınlatılabilir.

Ancient Patara was a major Lycian port city close to the mouth of the Eşen River, or the ‘Xanthos River’ in antiquity (Fig. 1). Inscriptions from an excavated Roman lighthouse indicate the presence of a ‘φάρος’ (*pharos*, lighthouse) and an ‘ἀντίφαρος’ (*antipharos*, a structure

opposite the lighthouse) at Patara (İşkan-Işık et al. 2008: 114; Milner 2016: 114). While the location of the pharos is clear from the excavated lighthouse building, the location of the antipharos remains unknown. Some scholars have speculated where it may have stood, but these attempts are



Fig. 1. Ancient Asia Minor; with Patara's location marked as a star (Enricopedia and author; Creative Commons BY-SA 2.5 License).

brief sections of larger studies and offer little logic behind their theories (Duggan, Akçay 2014: 396; İşkan-Işık 2016: 164; Koçak 2019: 84).

These scholars all assume that the antipharos was a second lighthouse, yet I argue that a second lighthouse would have been unlikely. First I discuss nocturnal sailing practices and the role of the lighthouse in ameliorating dangers at night. The written and archaeological records both indicate that single lighthouses were the norm for Roman harbours. For lighthouses like at Patara, their primary role was to guide ships towards the harbour from far away, while beacons might come into play to direct a ship up close once it entered the harbour, rather than an expensive second lighthouse. To analyse whether a second lighthouse would have been worth the investment in construction, management and fuel costs, I calculate viewshed models for the extant pharos and six possible locations for a second lighthouse. All of these locations except for the top of the southern hill produced narrower viewsheds than the pharos, and the hilltop is an unlikely location for a second lighthouse because of fog, difficult access and no archaeological evidence of a platform, much less a tower. Finally, the only other appearance of the word *antipharos* is in a medieval Greek commentary on an ancient geography, and does not refer to a working lighthouse.

Instead of a second lighthouse, the antipharos was probably either an unlit tower or a beacon to protect against a hazard in the harbour. This essay reconsiders the six possible locations for an antipharos of this sort, and weighs their merits based on how they might mitigate dangers in the harbour. The most promising candidate for the antipharos' location is the rock islet in Patara's harbour, although one

cannot rule out the other potential locations. This study shines some light on the decision-making process behind Roman harbour construction, the rationale behind the Romans' placement of the pharos where it is, what caused the need for an additional antipharos structure and the possible meanings of the word *antipharos* in antiquity.

The context of the pharos

Before the Romans controlled Patara, it was already a major harbour with a 'λιμὴν κλειστός' (separated inner harbour) in the late fourth century BC (Dündar, Koçak 2021: 127). When the Romans built the lighthouse, they mounted the following dedication on the outside wall, which survives in the holes for bronze letters. Nero's titles date to 64/65 AD, during the tenure of governor Sextus Marcius Priscus (Milner 2016: 114). The inscription indicates the pharos was an imperially funded project.

Νέρων Κλαύδ[ι]ος Θεοῦ Κλαυδίου νίος,
Τιβερίου Καίσαρος Σε[β]αστοῦ κ[α]ὶ Γερμ[αν]ικ[οῦ]
Καίσαρος ἔκγονος, Θεοῦ [Σε βας]το[ῦ]
ἀπόγονος, Καῖσαρ Σεβαστό[ς] Γερμ[αν]ικός,
ἀρχιερεὺς μέγιστος, δημαρχικῆς ἐξ[ου]σί-
ας τὸ ἰα', ὕπατος τὸ [δ'], αὐτοκράτωρ γ[ρ]ῆς
καὶ θαλάσσης τὸ Θ', πατὴρ πα[τρ]ίδος,
τὸν φάρον κατέσκευασεν πρὸς ἄσ[φα]-
λ[ει]αν [τῶ]ν πλοῖ[ζ]ομένων διὰ
Σ[έ]ξτου Μαρκί[ου] Πρεῖς[κου] πρεσ-
β[ευ]τοῦ [καὶ] ἀντ[ιστ]ρατήγου
[Καίσαρ]ος [κτ]ίσαντος τὸ ἔργον

Nero Claudius, son of the god Claudius,
offspring of Tiberius Caesar Augustus and
Germanicus Caesar, descendant of the god
Augustus, Caesar Augustus Germanicus,
Pontifex Maximus, Tribune for the eleventh time,
fourth time Consul, emperor of the land and sea
for the ninth time, father of the Fatherland,
has built this lighthouse for the safety
of the sailors, carried out by
Sextus Marcius Priscus, *legatus pro*
praetore of Caesar and the one who has
made the dedication of the work¹

A second inscription, discovered on the base of a statue of Priscus abutting the eastern wall of the lighthouse, dates to 70/71 AD. This dedication mentions both the pharos and antipharos, which indicates that even if the antipharos was not built concurrently with the pharos, it was established soon after (İşkan-Işık et al. 2008: 114).

1 *Supplementum Epigraphicum Graecum*, 57-1672 A; Jones 2008: 153–54. English translation from Arnaud (2015: 77), with edits by author.

[Σέξστον Μάρκιον Πρεῖσκον, πρεσβευτὴν]
[Αὐτοκράτορος Οὐεσπασιανοῦ Καίσα]-
ρος Σεβαστοῦ ἀντιστρά-
τηγον καὶ πάντων αὐτοκρα-
[τ]όρων ἀπὸ Τιβερίου Καίσα
ρος Παταρέων ἡ βουλὴ καὶ ὁ
δῆμος δικαιοδοτήσαντα
τὸ ἔθνος ὅκτετί ἀν ἄγνῳς
καὶ δικαί[ω]ς, κοσμήσαντα τὴν
πόλιν ἔργοις περικαλλεστά-
τοις, κατασκευάσαντα δὲ φά-
ρον καὶ ἀντίφαρον πρὸς ἀσφάλει-
αν τῶν πλοιζομένων, τὸν σω-
τήρα καὶ εὐεργέτην

Sextus Marcius Priscus, *legatus pro*
praetore of the Emperor Vespasian
Caesar Augustus
and of all emperors
since Tiberius Caesar
From the Council and the People
of Patara, to him for having administered
justice to the 'ethnos' (Lycians) impartially
and rightly, and having embellished the
city with the most beautiful
works, and having constructed
a lighthouse and 'antipharos' for
the safety of the sailors, the
saviour and benefactor²

Fahri Işık and Havva Işkan-Işık point to a tsunami in 1481, but this date does not hold up because the lighthouse appears intact on Piri Reis' 1524 map (Daily Sabah 2021; Duggan 2010: 64; Hürriyet Daily News 2021). Whenever the lighthouse collapsed, the damage caused suggests the involvement of a tsunami because its podium is most damaged on the southeast corner, and the tower fell to the northwest (Özkut 2009: 25). It was not the falling tower, then, that damaged the southeast part of the base, but probably a wave, perhaps the same wave that knocked the tower down. The discovery of a skeleton crushed in the tower door by falling blocks might indicate that the lighthouse continued to operate until its Early Modern collapse (Mattson 2018: 102), although it is also possible that this was someone seeking shelter from the storm rather than a lighthouse keeper; this remains uncertain since the skeleton has no published date, C¹⁴ or otherwise.

The 24.2m-tall lighthouse tower stood on a stepped podium with a height of 2.3m, making a total height of 26.5m (Daily Sabah 2021; Işık 2011: 70; Işkan-Işık 2016:

164). The 20m x 20m podium sat on a rocky outcrop on the western side of the harbour entrance (Fig. 2). The tower has a spiral staircase with steps 80–90cm wide, walls 1.2m thick and 6m in total diameter (Işkan-Işık et al. 2008: 92). These figures come from a combination of *in situ* evidence and reconstructions based on the large number of blocks surviving from the tower, which were buried in sand after the lighthouse's collapse. Fahri Işık and Havva Işkan-Işık, using artificial intelligence to analyse scans of the stones and virtually reconstruct the tower in advance of the lighthouse's physical reconstruction, estimate that 80% of the original stones remain (Hürriyet Daily News 2021; Özkut 2009).

The geomorphological context of Patara's harbour

Patara was an important Roman port, a city that acted as both the gateway and capital of the Province of Lycia (Liv. XXXVII: 15; Rice 2021: 250, 256; Salway 2005: 130). Its natural geographical advantages would not last forever. Core samples from the region indicate that after the 15th century AD the harbour became landlocked because strong westerly winds, which carried sands eastwards from the Xanthos River delta, finally carried enough of it to cover the harbour entrance (Işkan-Işık 2016: 142; Öner 2019: 317, 318). Today, the former harbour has become a marsh (Fig. 3; Fant, Reddish 2003: 259). The intense westerlies may have influenced the decision to place the pharos on the west side of the harbour because, if one was being blown eastwards, one would want to aim one's ship towards the western side of the harbour to correct for the movement caused by the winds. Coring survey also recorded a 'high and rough' formation of Mesozoic carbonate in the ancient harbour, and when compared with the sea level in antiquity, this would have emerged above the surface as a 20m-wide rock (Fig. 2 letter D; Işkan-Işık 2016: 148; Öner 2019: 309, 314). This rock represents a major safety hazard in the harbour, especially at high tide, when it would have become less visible to incoming ships; accordingly, it plays a central role in determining the antipharos' location.

The position and purpose of the antipharos

Because there are currently no clearly identifiable remains of the antipharos, its location is in doubt. In 2014, after a drought, remains of a circular tower at the end of the inner harbour's breakwater appeared (Fig. 2, location A). This led Işkan-Işık to theorise that this was the antipharos, but she provided no further analysis (2016: 164). Duggan and Akçay argued instead that the undiscovered antipharos marked the eastern side of the harbour entrance as a second lighthouse, but this too lacked explanation (2014: 396). A third theory developed from the evidence of a large rock in the harbour. Koçak postulated that the rock created a need for a second lighthouse, but he offered little further

2 *Supplementum Epigraphicum Graecum*, 57-1672 B. English translation from Arnaud 2015, 77, with edits from author.

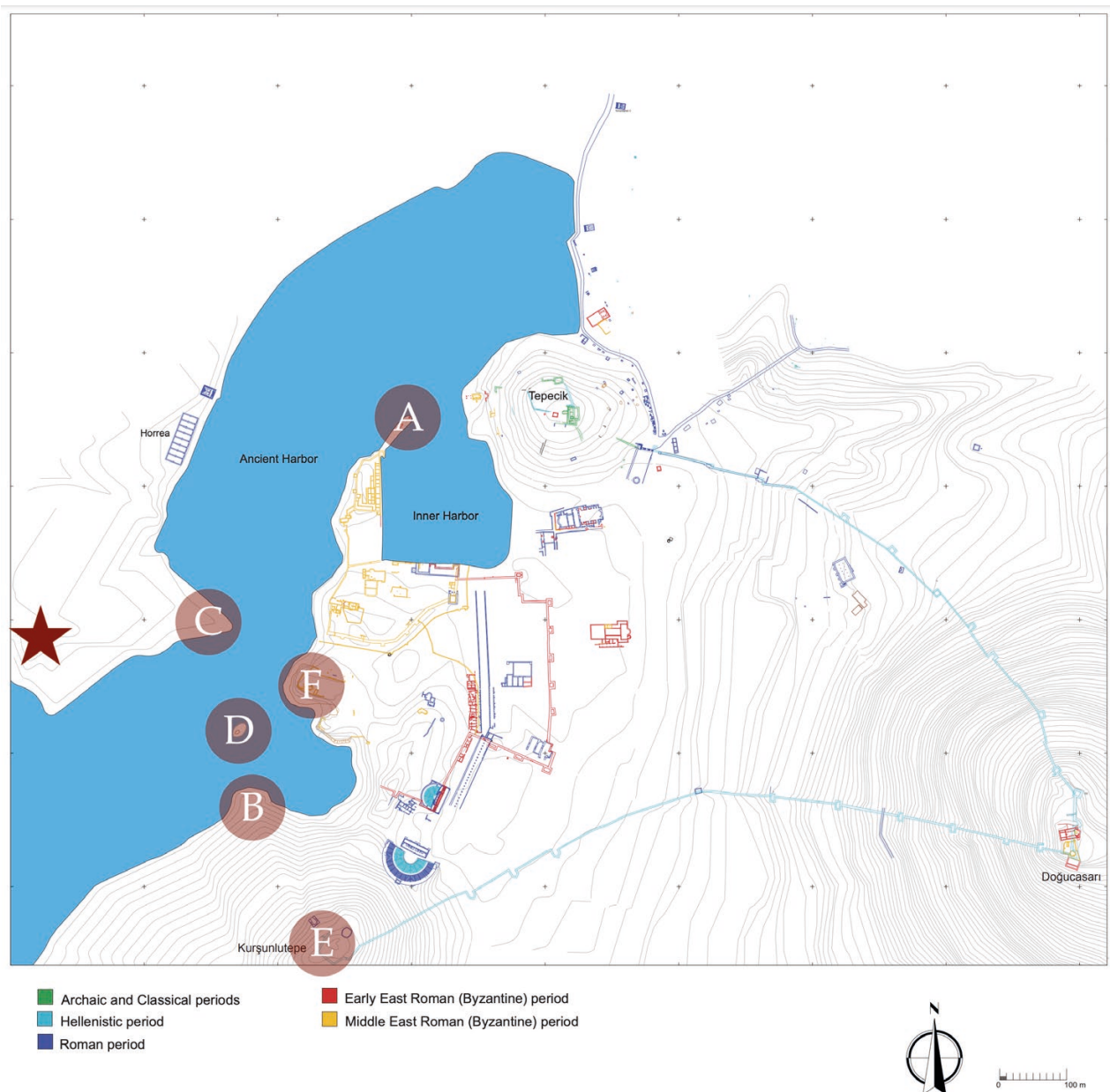


Fig. 2. Author's annotated version of 'Plan of the city centre of Patara' from DüNDAR and RAUH (2017: 511, fig. 2). The star represents the location of the pharos, and the letters A–F represent potential locations for the antipharos.

discussion, nor speculated about a possible location (2019: 84). All of these hypotheses assumed that the antipharos was a second lighthouse, rather than a much smaller beacon or an unlit structure. Yet the word *antipharos* with its prefix of *anti* can mean a construction *spatially opposite* a lighthouse, a construction that is not necessarily *also* a lighthouse (as in Antikythera, an island spatially opposite Kythera).

To analyse the potential need for a second lighthouse, one must discuss night-time sailing practices in antiquity. Long-distance voyages could sail overnight in open water, but navigation became more dangerous in coastal waters where rocks, reefs and other hazards became far less visible

at night. Procopius mentioned how sailors along the coasts of the Red Sea would anchor during the night to avoid dangers in the low visibility (Beresford 2013: 204–05). Approaching a harbour entrance at night would have been quite perilous, and Jamie Morton argues that crews often deliberately aimed to reach land 'during daylight' for that reason (2001: 255, 262, 263; see Beresford 2013: 204). Evening was actually a good time to *leave* a harbour rather than enter it because the difference in temperature between the water and the land late in the day created favourable wind conditions for ships to depart. Ships could enter a harbour at night, and Eunapius records how a vessel bore the ailing sophist Prohaeresius into the port of Athens when

‘ἦν τε νυκτὸς τὸ σταθερώτατον’ (it was deepest midnight) (Eunapius, *Life of Prohaeresius*). But this may have been a rare decision due to Prohaeresius’ illness rather than a common practice.

A passage from Josephus indicates that, at least for the Pharos of Alexandria, the dangers of entering the harbour at night meant that the primary function of the lighthouse was to bring ships to the vicinity of the harbour, where they could drop anchor for the night, rather than to guide them into it. Josephus writes that the pharos cast a light to the ships, ‘ὥς ἐν νυκτὶ πόρρωθεν ὁρμίζοντο πρὸς τὴν δυσχέρειαν τοῦ κατάπλου’ (so that at night they might be anchored from afar, in consequence of the difficulty of putting ashore) (Josephus BJ IV.613). According to this account, sailors found it safer to wait until morning to actually enter the harbour. Across the Mediterranean at Portus, Suetonius writes that the lighthouse there was ‘*in exemplum Alexandrini Phari, ut ad nocturnos ignes cursum navigia dirigerent*’ (after the model of the Alexandria Pharos, to be lit at night and direct the course of ships) (Suetonius V.20). The choice of the word *cursum* as opposed to a word that suggests ‘entrance’ may indicate a similar function for the Portus lighthouse, especially if it is ‘after the model of the Alexandria Pharos’, both in form and in sailors’ use of it as a means of approaching but not entering the harbour.

A lighthouse with a fire on an elevated tower would also not be the best nor most cost-effective way to guide entrance *into* a harbour unless it was right at the edge of the entrance. At Caesarea Maritima the lighthouse was located on the end of one of the arms of the harbour, and stood right at the entrance to the harbour from the sea (Patrich 2011: 99), and a lighthouse positioned like this could have helped guide in ships. But in Patara, the lighthouse stands 100m away from the edge of the harbour’s entrance so could not play this role (Fig. 2). Patara’s pharos had an elevation that served to bring ships towards the harbour from afar because its height ensured long-distance visibility. Yet its height up and away from the harbour’s water level would have greatly diminished its effectiveness at illuminating the harbour’s dangers. To perform this function, Roman harbours could use ‘fixed beacons’ in the form of much smaller lights such as lanterns (Morton 2001: 213). Incoming ships could have their own lights as well (Casson 1971: 247). All of these smaller lights would have been less costly because they required far less fuel. A single lighthouse, if well-positioned, could serve the long-distance function, and for those rare instances where ships needed to enter the harbour at night, smaller beacons could do the job.

At each of the ports of Alexandria in Egypt; Portus in Italy; Lepcis Magna in North Africa; Caesarea Maritima in Judea; Onoba Aestuarina and the Port of Menestheus, both in Hispania, there is only evidence of one lighthouse

(Bartoccini 1958: 35, 63–64; Caffarelli, Caputo 1964: 23; Goddio 2008; Meléndez, Carrasco 2020; Patrich 2011: 99; Strabo 3.1.9; Suetonius V.20). According to Suetonius there was one lighthouse on Capri, and Caligula erected a singular lighthouse after his ‘triumph’ against the ocean (Suetonius III.74, IV.46). In ancient literature on Roman harbours, one does not encounter the word *pharos* other than in the singular. Having two lighthouses was not the norm in the ancient world. Indeed, if there were two lighthouses in Patara’s harbour, why speak of a *pharos* and an *antipharos* instead of *pharoi* in the plural? The ancient norm of just one lighthouse – especially at the well-equipped ports Portus and Alexandria, whose heavy traffic would have justified a second lighthouse if necessary – is the first piece of evidence that Patara did not have a second lighthouse either, and that the antipharos was something else.

Fuel was expensive, and to operate twin lighthouses would have been costly. One would have only built a second lighthouse at Patara if the visibility of the first was restricted in some way. The redundancy of a second lighthouse to fulfil a long-distance visibility function becomes evident upon examination of ancient Patara’s topography. The Patara pharos’ position on the landscape features largely comprehensive coverage of the surrounding sea, with no serious barriers to visibility other than the large hill on the southeastern side of the harbour’s entrance (today named Kurşunlutepe; see Fig. 4).

To better analyse visibility in Patara’s harbour, I calculated a viewshed analysis for the pharos and six possible locations for the antipharos. The second inscription indicates that the antipharos was ‘for the safety of the sailors’, and so to deduce where an antipharos might have



Fig. 3. Patara's landscape today (Google Maps with author's annotations, 2022).

stood in the harbour, I evaluate a comprehensive list of six possible safety hazards to determine the best candidate, marked with the letters A through F. On the reconstructed layout of the ancient harbour from İşkan-Işık 2016 (Fig. 2), annotations of the letters A through F represent such locations. An antipharos could have indicated where the east end of the harbour entrance was, as Duggan and Akçay suggested (2014: 396). The use of the prefix *anti* in the word *antipharos* may indicate a structure on the eastern side of the harbour, opposite the western position of the pharos. This role is fulfilled by potential locations B, D, E and F.

An antipharos could have possibly marked the entrance to the inner harbour, as İşkan-Işık suggested, one that would not have been immediately visible to ships entering the harbour. The best place for a lighthouse serving this function would be the very end of the breakwater, at location A. This is a noteworthy location because it has the base of a round tower (İşkan-Işık 2016: 164). Here *pharos* versus *antipharos* would be ‘service of the main harbour entrance’

versus ‘service of the inner harbour entrance’. Finally, there could have been a need to identify potential hazards to incoming ships, such as the large rock at location D or the point jutting out into the harbour at location C. If this were true, the pharos would guide sailors towards the harbour and the antipharos would ward them away from its more dangerous features upon arrival.

To assess whether these would have been effective locations for a lighthouse, I use ArcGIS Online’s viewshed analysis tool. The resulting maps are included as Figures 4–10, and are publicly accessible in their full interactive form on ArcGIS Online under the search term ‘Patara Visibility’. This viewshed analysis calculates the ‘nominal range’ of a lighthouse, or the maximum area from which a lighthouse is visible in clear weather. For a previous example of a viewshed analysis of an ancient lighthouse see Meléndez and Carrasco (2020). Because of the curvature of the earth, a sailor could have seen the 26.5m-tall pharos from a maximum distance of ca 30.7km to 27.4km,

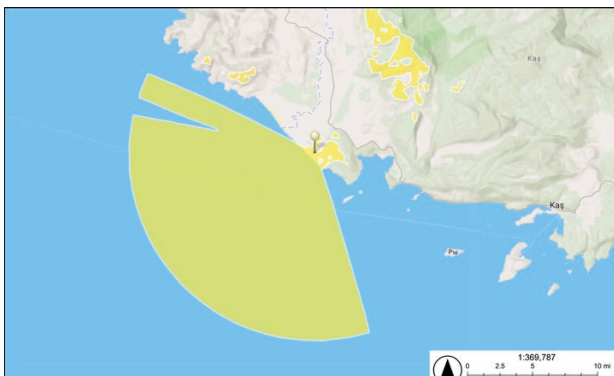


Fig. 4. Nominal visibility range of the 26.5m-tall pharos on modern terrain for a small vessel. Areas marked in yellow are the locations from which the pharos was visible (source: author via ArcGIS Online).

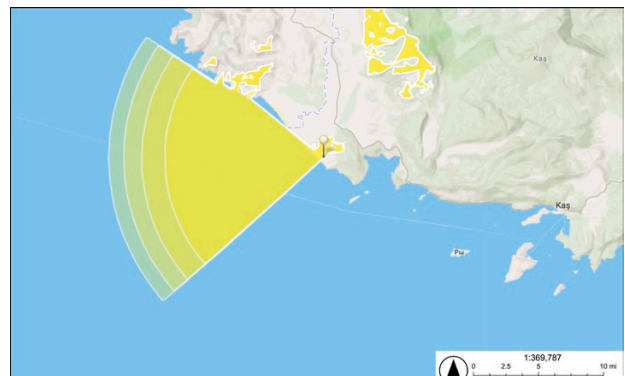


Fig. 6. Nominal visibility range of a potential antipharos at location B at heights of 5m, 10m, 15m, 20m (source: author via ArcGIS Online).

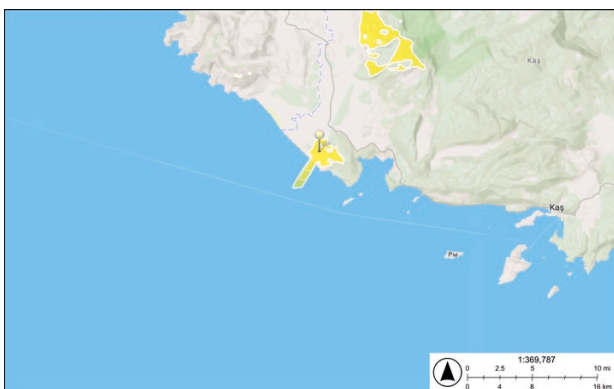


Fig. 5. Nominal visibility range of a potential antipharos at location A. Because its height is unknown, the calculation features the possible heights of 5m, 10m, 15m, 20m. The darker the colour, the lower the tower height (source: author via ArcGIS Online).

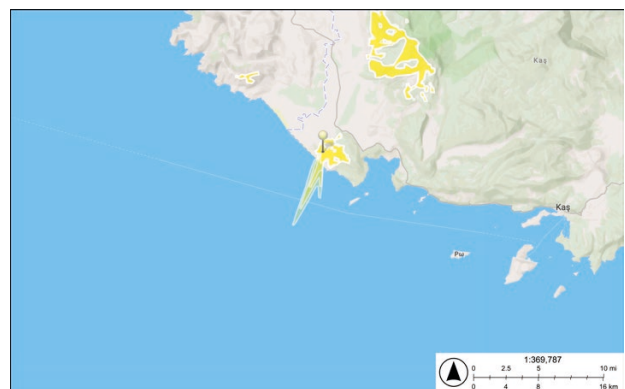


Fig. 7. Nominal visibility range of a potential antipharos at location C at heights of 5m, 10m, 15m, 20m (source: author via ArcGIS Online).

depending on the size of the ship.³ The viewshed model uses the low-end estimate to be conservative.

This is a rough estimate of nominal visibility because it relies on ArcGIS's modern terrain set rather than an ancient terrain model. Yet it is still worthwhile because the largest geomorphological change has been the silting up of the harbour; the hills on either side of the harbour's entrance were the primary barriers to visibility from the sea in antiquity, and these have seen less change. The modern

3 The lighthouse had a height of 26.5m, and stood on a rock outcrop 20m above sea level (see Işkan-Işık 2016: 148), totalling 46.5m above sea level. The large Punta Scifo D ship carrying the weight of its cargo had a depth in hold (distance from the deck to the bottom of the hull) of ca 4.1m, and a midship draught (distance from the bottom of the hull to the waterline) of ca 2.6m (see Beltrame et al. 2016), which puts the height of the deck at midship around 1.5m. With a sailor with an estimated height of 1.7m, the viewer height would be 3.2m, for a high-end estimate. For a low-end estimate, one can imagine a small fishing boat with a seated viewer at a height of 0.75m. See the caption of Fig. 11 for the equations of calculation.

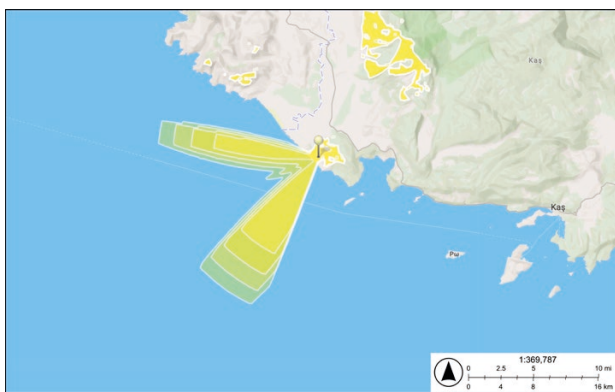


Fig. 8. Nominal visibility range of a potential antipharos at location D at heights of 5m, 10m, 15m, 20m (source: author via ArcGIS Online).

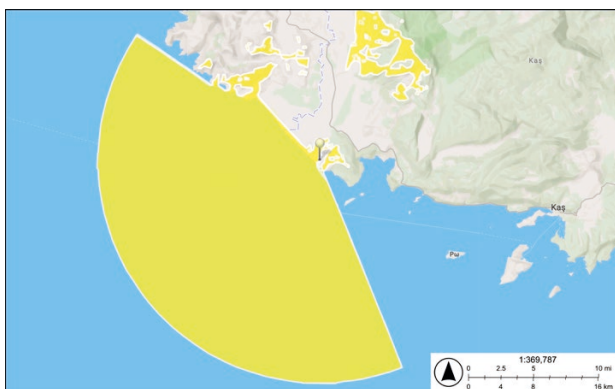


Fig. 9. Nominal visibility range of a potential antipharos at location E at heights of 5m, 10m, 15m, 20m (source: author via ArcGIS Online).

viewshed corresponds closely to the ancient terrain reconstruction when the maps overlap each other; visibility drops off exactly when going to the other side of the hillcrests on the northwest and southeast sides of the harbour, as would have been the case in antiquity (Fig. 12). The modern terrain is thus close enough to act as a general estimate for the ancient visibility of the Patara pharos.

Even this very conservative model shows that the existing lighthouse's visibility was extensive, leaving little need for a second lighthouse (Fig. 4). Locations A, C, D and F all have significantly narrower viewsheds. Location B does feature slightly more extensive coverage of the north-western coast, but is not visible at all towards the southeast because it is at the base of the large hill there. Locations within the harbour itself are limited by the hills on either side (Fig. 13). These viewsheds smaller than the pharos would not have expanded the visibility of the harbour enough to justify the high cost of fuel. There would thus not have been a return on an investment in a second lighthouse in these locations.

Location E is the only promising candidate, and indeed it has a significantly larger viewshed than the existing pharos because it is on the top of Kurşunlutepe, the highest of the hills next to the harbour entrance (Fig. 13). This leads to an important question about the design of the harbour. Given the greater viewshed, why did the Romans build the original pharos on the northwest hill in the first place instead of at location E? Location E might have actually been *too* high up given the local weather conditions. While the elevation of Kurşunlutepe could have brought increased visibility in *clear* weather, such a high elevation would have potentially been a disadvantage at Patara during days with worse atmospheric conditions. Such a high pharos would risk being 'obscured by fog and mist' in a lush coastal region where fog was particularly prevalent in the

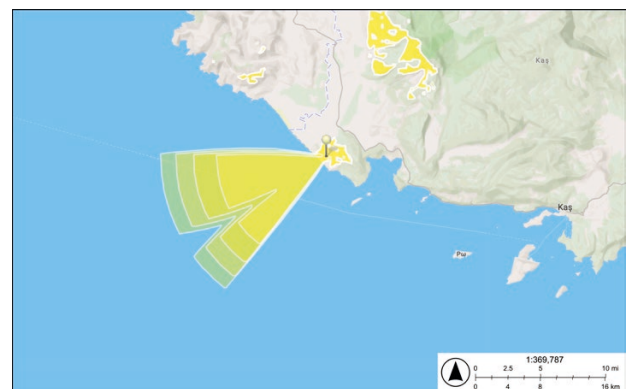


Fig. 10. Nominal visibility range of a potential antipharos at location F at heights of 5m, 10m, 15m, 20m (source: author via ArcGIS Online).

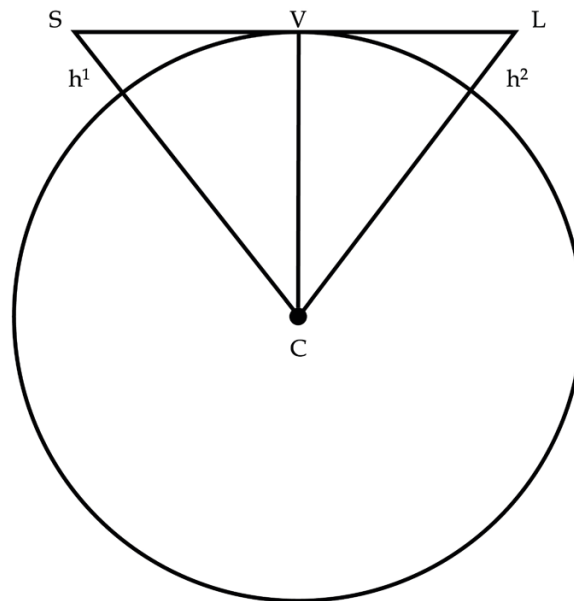


Fig. 11. Visibility calculation based on the curvature of the earth. *S* represents the sailor, with h_1 as the sailor's eye level; *L* represents the lighthouse, with h_2 as the height of the lighthouse light. *C* represents the centre of the earth, and *V* represents the place on the horizon after which the lighthouse would no longer be visible.

Given $h_1 = 3.2\text{m}$, $h_2 = 46.5\text{m}$, $\text{line} = 6,371,000\text{m} = r$ (the average radius of the earth), using the Pythagorean theorem, $= + = \sqrt{(2r \times h_1 + (h_1)^2)} + \sqrt{(2r \times h_2 + (h_2)^2)} = 30,726\text{m}$, or around 30.7km visibility from the deck of the Punta Scifo D ship deck.

Given $h_1 = 0.75\text{m}$, $= 27,432\text{m}$, or around 27.4km visibility from a small vessel.

late spring and summer, prime sailing season (Beresford 2013: 96; Williams 2004: 32). The height of the hill may have posed further difficulty when transporting fuel for the light. It would have been far easier to move fuel carts along the smaller northwestern outcrop than all the way up the steep slope of Kurşunlutepe.

In addition to fog and fuel problems, the intense winds blowing to the southeast along Patara's coastline come into play. If the Romans built the lighthouse on the hilltop to the east of the harbour, they would have risked directing ships towards the eastern side; in this case, the westerly winds would have carried ships too far east and they would miss the harbour. This risk is exacerbated because location E is over twice as far away from the edge of the harbour waters than the pharos' location on the smaller outcrop to the northwest. When the Romans decided where to put the pharos in the harbour, these would all have been important factors to consider in addition to the viewshed. Some combination or even all of these factors probably influenced their decision to place the pharos where it still is today, on the outcrop on the northwest edge of the harbour's entrance, despite it having a smaller viewshed on a clear day than location E.

It is unlikely that the Romans decided to put a *second* lighthouse at location E to maximise long-distance

visibility because of the difficulties of fog and fuel supply atop Kurşunlutepe. Location E would also put the lighthouse next to a mausoleum and a cistern. While it is not impossible that a lighthouse could have been next to these structures, there is no material evidence of a tower or even a tower base on the top of this hill. To assume that a structure as massive as a lighthouse vanished from the hilltop without any trace is a stretch, especially given the survival of the mausoleum. With the redundancy or implausibility of alternative lighthouse locations, we have our second piece of evidence that Patara resembled other Roman harbours and only had one pharos.

There are currently no other identified antipharoi in the material record, and the word is extremely rare in writing. The only other reference to the word *antipharos* in historical sources does not refer to a second lighthouse, appearing in the commentary on Dionysius' *Periegesis* by the 12th-century bishop of Thessaloniki, Eustathios. One must always take non-contemporaneous texts with a grain of salt, and Eustathios wrote over a millennium after the reign of Nero. He drew on classical sources, however, so while one cannot draw certainties about classical antiquity from his commentary, one *can* draw theories. Dionysius' description of Alexandria mentioned the ἄκρα σκοπιαὶ

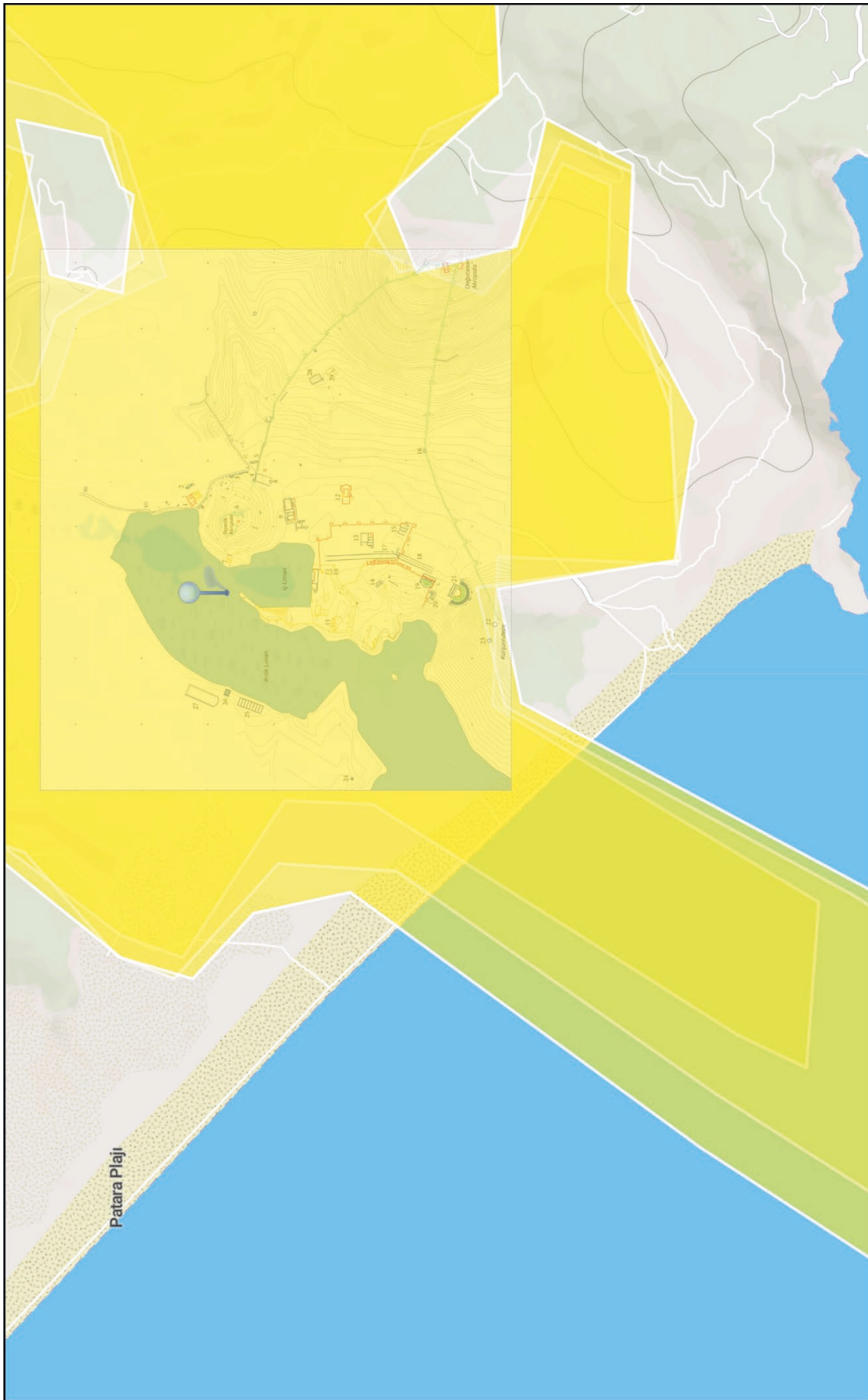


Fig. 12. Overlap of the ancient terrain from Işkan-İşık 2016 with the author's ArcGIS Online map of the visibility of a potential lighthouse at the circular tower on the inner harbour's breakwater using a modern terrain set. See how the visibility starts to drop off exactly as one goes over the crests of Kurşunlutepe and the pharos' outcropping to the northwest.

Παλλιωίδος Εἰδοθεΐης [sic]’ (elevated lookouts [or heights] of Pallenidis Eidotheia) (Dionysius *Periegesis* line 259, from Del Rio 1577: 37). Eustathios wrote that by the ‘lookouts of Eidothea’ Dionysius meant ‘κατ’ Ἀλεξάνδρειαν φάρον [...] εἴρηται [...] ἥ τὸν Ἀντίφαρον ὑψηλὸν, ὃς λέγεται τάφος Ὀσίριδος, [καὶ] Εἰδοθέας τῆς τοῦ Πρωτέως’ (the lighthouse in Alexandria, which has already been mentioned, or the high Antipharos, which is called the tomb of Osiris, and of Eidothea daughter of Proteus).⁴

‘Τάφος Ὀσίριδος,’ combined as ‘Ταφόσιρις’ or ‘Ταπόσειρις,’ may refer to one of two locations.⁵ Carrez-Maratary believes Eustathios was referencing Taposiris Parva, 15km to the northeast along the coast from the Lighthouse of Alexandria (2006; Strabo 17.1.16). Khan takes Eustathios to mean instead Taposiris Magna, a city over 30km southwest along the coast from the Lighthouse of Alexandria (2002: 94–95; Strabo 17.1.14). Neither location suggests that *antipharos* meant a lighthouse.

4 It is difficult to tell precisely how to take the preposition ‘κατ’, but since it pairs with ‘Ἀλεξάνδρειαν’ in the accusative it is probably something to the effect of ‘in’ or ‘for’ Alexandria. A Byzantine scholiast’s added commentary only includes a paraphrase of Eustathios’ comment. (Eustathios’ commentary on Dionysius *Periegesis* line 259, from Del Rio 1577: 38).

5 Calderini suggested that *antipharos* referred to some sort of observatory in Alexandria, but that does not match with a ‘grave of Osiris’ (1966: 120).

At Taposiris Parva, there is no indication of a port major enough to require a lighthouse. It is also unclear what ‘elevated lookouts’ Eustathios refers to. Submarine surveys are ongoing in the region of the gulf of Maamura by Taposiris Parva; these are mapping changes in the ancient coastline, and have already established evidence of an islandscape there (Abd el-Maguid 2015: 117–18). If structures identifiable as ‘elevated lookouts’ were discovered on an islet during future projects there, it could establish a pattern of antipharoi on islets opposite lighthouses, as Patara also has a rocky islet in its harbour. Here the prefix *anti* indicates a geographical position spatially opposite the Pharos of Alexandria along the coast.

If there were no elevated lookouts at Taposiris Parva, and Eustathios had to have meant Taposiris Magna, one could then conclude that the word *antipharos* was more flexible in meaning and might mean ‘imitation of a lighthouse’, in addition to a definition based on spatial opposition to a lighthouse. At Taposiris Magna, the Tower of Abusir is high enough to count as an ‘elevated lookout’. The tower resembles a lighthouse, likely the Lighthouse of Alexandria specifically. Yet its narrow internal staircase would have made carrying fuel difficult; the fact that it stands ~2km away from the sea and ~1km away from the city’s lake port, as well as its location in the middle of a cemetery, all indicate a funeral monument inspired by the Lighthouse of Alexandria rather than an actual lighthouse.



Fig. 13. A vertical transect diagram of the harbour at Patara with modern terrain, and the locations of the pharos and the potential antipharos indicated with the vertical bars. Note that in antiquity the harbour area in the middle would be lower down, at water level, and not filled up with sand and marsh. In antiquity the pharos’ outcrop would have been significantly higher up than the harbour level rather than the slight elevation it is today (Google Earth with author’s annotations, 2024).

(El Fakharani 1974: 260, 261, 272). If this funerary tower was the 'elevated' structure Eustathios referred to, one of the meanings of *antipharos* could therefore have been 'lighthouse-like', the prefix *anti* as in 'ἀντίθεος' (god-like), but this was certainly not an *actual* lighthouse. At both Taposiris Parva and Taposiris Magna, the term *antipharos* would not correspond to 'lighthouse'. This tentatively indicates that, at least in the sources that Eustathios read in the 12th century, *antipharos* did not always mean a lighthouse; this is yet more evidence that the antipharos at Patara was probably not a lighthouse either.

Location of a non-lighthouse antipharos

If not a lighthouse, then what was Patara's antipharos? It was not a funerary construction like at Taposiris Magna because it was attested in an inscription about the civic works of Sextus Marcius Priscus, and was built 'for the safety of the sailors'. The antipharos instead seems to have been a different sort of safety construction, possibly in the form of a lit beacon or an unlit tower. Unlit towers performed a safety function in the harbour of Caesarea Maritima (Josephus *Bellum Iudaicum* I.408–18; *Antiquitates Iudaicae* XV.335–41). The harbour had artificial arms with a narrow entrance, and to mark each side of this entrance there was the lighthouse on the end of the southern arm, and an unlit tower on the end of the northern arm. There is another example of an unlit tower at Lepcis Magna, where the lighthouse stood on the breakwater on the western side of the harbour entrance, with an unlit tower standing on the east (Bartoccini 1958: 35, 63–64; 1961: 233, 239–40; Caffarelli, Caputo 1964: 23, 67). A similar unlit tower to mark a hazard could have been built in Patara. The antipharos would have needed to be a structure impressive enough to be worth mentioning in the dedicatory inscription with the word 'κατασκευάσαντα', so if it were a lit beacon, it would probably be on a 'beacon plinth' of some kind rather than a simple hung lantern on an extant structure (Beresford 2013: 201). Once Patara's pharos got a far-off ship close enough to the harbour, the ship could avoid risk and anchor until daybreak, or if need be, take the risk of entering the harbour at night. The antipharos would then help to guide the ship safely through the harbour.

With this in mind, we can return to the list of potential locations. Duggan and Akçay's suggestion of a safety marker of some kind at the eastern edge of the harbour is a conceivable location for an antipharos, even if it is not a lighthouse (2014: 396). With the pharos' location on the western side of the harbour entrance, an unlit tower or a beacon opposite it could help ships avoid crashing into the eastern side. Location E is unlikely as a marker of the eastern edge of the harbour because it was far away from the edge of the harbour's waters, and this would not just have been imprecise, but potentially dangerously misleading.

The hilltop would also suffer from the fog problem, as mentioned above. Other locations closer to the harbour's edge would have been more effective.

Location B places the antipharos on a projecting feature of Kurşunlutepe with a less steep slope than elsewhere on the harbour side of Kurşunlutepe, both in Işkan-Işık's and in Dündar and Koçak's topographical reconstructions: an inviting location for a construction (Dündar, Koçak 2021: 128). However, this location does not line up with the route into the harbour, especially in Işkan-Işık's reconstruction (Fig. 2), and one would have still run the risk of hitting the massive rock to the north of location B. The safest path into the harbour would go north of this rock, and so location B is probably too far to the southeast to effectively guide a ship safely into the inner harbour.

Location C posed some risk to oncoming ships, but not as great a risk as the eastern side of the harbour, with its ca 20m-wide rock and steeper slopes at the water's edge. The greater need at the eastern side of the harbour – as well as the word *antipharos*, which implies spatial *opposition* – suggest that location C was probably not where Patara's antipharos stood.

Location A is the only candidate that has physical evidence of a tower (Işkan-Işık 2016: 164). This tower is slightly smaller than the pharos, at roughly 5m in diameter, as measured on Google Earth, perhaps in accordance with the smaller size of the inner harbour entrance. Dündar and Koçak struggled to date this tower, however. They theorised a military role for it that, combined with the masonry technique, indicated to them a Hellenistic date around the fourth or third century BC. Such a date would rule it out as a new, Roman-era antipharos (Dündar, Koçak 2021: 145). While it is possible that the tower is from the Roman era, or that it was converted into an antipharos to mark the inner harbour (Dündar, Koçak 2021: 139), this would not have been a major safety risk for the harbour at the time. Once a ship made it through the narrow passage between locations C and F, and into the calmer waters of the sheltered bay beyond, it would not have been a difficult task to guide the ship into the inner harbour. For an antipharos built 'for the safety of the sailors', one would expect a more pressing safety concern than the easy entrance to a protected inner harbour.

More likely locations are F and especially D. Location F would mark the actual eastern side of the entrance, unlike location D, and it would have been far easier to build an antipharos there rather than on the rocky islet in the harbour. Yet that still leaves the major safety hazard of the 20m-wide rock. The rock's 20m x 10m dimensions, lengthwise the same width as the 20m-wide built platform of the pharos, would have been more than wide enough to support the construction of an antipharos safety marker, whether an unlit tower or a beacon plinth. A smaller-scale beacon would be far easier to refuel than a giant lighthouse fire, even out on a rock.

To build such an antipharos on the rock would not have been easy, but it was well within the Romans' capabilities. At Portus, the Romans even made their own artificial island to support the *altissimam turrem* (exceedingly tall tower) of the lighthouse there (Cassius Dio, *Roman History* LX: 11; Pliny the Elder, *NH* XXXVI.14.70, XXXVI.18.83; Suetonius, V.20). In Alexandria, reconstructions of the ancient harbour landscape and the scatter pattern of blocks from the fallen lighthouse on the sea floor suggest that the structure may have been built on an islet just off the eastern end of the island of Pharos (Abdelaziz, Elsayed 2019: 1; Goddio 2008: 38).⁶ Such constructions were clearly possible to build in the ancient world. Patara's rich trade and role as Lycia's leading city would have been important enough to warrant a construction project of this scale. The difficulty of building on the rock would have also added to Priscus' reputation, an impressive project that explains why it would have been worth placing on his dedicatory inscription.

Why did the Romans not originally build the Patara lighthouse on this rock to serve both as a warning against hitting the rock and as a lighthouse, while only needing to build one structure? The viewshed model of a potential lighthouse at this location (Fig. 8) shows that a lighthouse on the rock would have had a far more restricted visibility range, both because the rock was at a lower height above sea level than the pharos' rocky outcrop, and because the hills on either side of the initial harbour entrance narrowed the area on the sea from which the lighthouse could have been visible. As a result, the Romans needed to put the lighthouse on the western outcrop to make it more visible, and, I argue, therefore needed to build a separate antipharos to act as a safety marker on the rock in the form of an unlit tower or a beacon.

6 Another possible islet harbour construction surfaces in Hohlfelder's theory that the lighthouse at Caesarea Maritima's harbour was possibly built on a 'small bit of rocky islet', contrasting earlier theories that it was at the end of the southern breakwater (see Hohlfelder 2003: 28; Vann 1991).

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Conclusion

In sum, the rock in the harbour stands out as the most likely place for an antipharos, whether an unlit tower or a lit beacon. This does not exclude the other locations from possibility, but an antipharos on the rock would best address the greatest safety hazard of the harbour, and would have been impressive enough to justify a monumental inscription. The choice to build both the pharos and the antipharos sheds light on the decision-making behind Roman harbour constructions. Given the highest hill's difficulties with accessibility and weather, the northwestern rock outcropping was a better location for a pharos to draw ships into the harbour. Whereas Roman lighthouses could stand right at harbour entrances, as at Caesarea Maritima and Lepcis Magna, and could serve the dual functions of drawing in ships from afar and of marking the edge of the entrance, the Romans responded to Patara's harbour geography by building two structures, the pharos and antipharos. This compromise placed the pharos light in a place that maximised its visibility and fuel-cart accessibility, while the second structure marked a danger to sailors in the harbour, possibly the large rock. When one considers Patara's harbour with an antipharos structure spatially opposite the pharos in some way, the unlit towers at Caesarea Maritima and Lepcis Magna that stand across from the lighthouse – and others like it in Roman harbours across the Mediterranean – are potential candidates for other antipharoi, although whether the Romans used that specific name for them is far from certain. Further excavation of the land now over Patara's harbour may reveal evidence of the antipharos, and shed yet more light on Roman harbour construction.

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