

# Medieval Lighthouses

## Part 11 -The Mediterranean Sea

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Extracted from *Medieval Lighthouses* (2026) ISBN 978-1-9993273-3-0 <https://www.medievallighthouses.info>



It is easy to develop the impression that the fall of Rome resulted in centuries of political instability that lacked any incentive or resource to build lighthouses for a thousand years. Indeed, this might have been a very thin and uninteresting book if it were true. And in some ways it was! However, if we take a step back and consider the big picture it soon becomes clear that there were great variations of practice in different regions of this important sea and over such an unimaginable time period. In this chapter I will lead you on a long journey through many marine and cultural environments, roughly in parallel with the site survey presented in Sections D, E and F at the end of this book.

Volume 1 of this series reported extensively on the ancient history of the Mediterranean that was dominated by Roman and Greek activities in what we call the Classical Period. Across many centuries, the development of civilization was largely controlled by a curious combination of Greek mentality and Roman physicality that led to what is now called Greco-Roman culture.

Although the Greeks had first provided the stimulus for the use of lights to assist mariners, it was mostly the Romans who implemented these beneficial ideas. However, we now know that after 476 - the official end of the Roman Empire in the west - the fracture between eastern and western lands was unevenly balanced such that, in the west, a long period of political turmoil ensued, whilst an increasingly powerful new Empire emerged in Byzantine Constantinople.

Then a new destructive competition emerged between the two factions of Christianity - on the one hand, the Roman Catholic branch powerfully headed by the Pope, and on the other, the Orthodox Church led by the Emperor in Constantinople. But a third element had also come into play with the rise of Islam and the military successes of its forces in taking Jerusalem, parts of North Africa and southern Spain. By the end of the first millennium, religious rivalries had begun to dominate a large part of the world still recovering from a crash. For these and other reasons, the use of lights throughout the Mediterranean region differed from practices in the colder climes of northern Europe. This chapter will explore how these developments impacted upon the navigation in this busy world of sea traffic.

### Objectives

**To follow a loose clockwise route around the Mediterranean coast.**

**To describe and analyse the political changes that took place in different regions during the period of study.**

**To outline the effects of political change upon the adoption of formalized systems of lighted navigational aids.**

**To look for possible sites where genuine medieval lightstructures might be found.**

# Lighthouses And Their Mediterranean Roots

The detailed story of the use of navigation lights in the Mediterranean is one that may never reach the clarity of a crystal. The reasons for this disappointing assessment are obvious. As I have previously explained in detail, there were several overlapping motives as to why lights were shown by so many different peoples and cultures over such a wide area over so many years. In a sense we are victims of our own success, for there is no shortage of historical accounts, or of places to look for information, but in this research we are trying to look deeper into everyday life than the records permit and all that results is fog in too many cases. We are trying to make sense of a well-understood process at a level of detail that is perhaps too fine, so our analysis must ultimately be based upon the application of logic to what we do know.<sup>1</sup>

Let's begin by considering an anonymous port somewhere in that beautiful sea where the stars shine most nights and the weather, at least in summer, is generally benign. Our period of study is one in which the processes of civilization are quite well established. States had rulers. At the top of the tree, kings, princes, city-republics (polities), and imperial governors were ultimately responsible for the existence and legal status of ports, and in the background were always considerations of defence from attack. The bottom line was that - at a whim - a port could be declared open (public) or closed. Over time, privileges, exemptions and monopolies could be granted. Construction and taxation could be implemented. All this happened at the Republic of Venice, the Crown of Aragon, and the Byzantine Empire.

Whilst these authorities were usually responsible for harbour dues and customs frameworks, they also ordered defence works that affected navigation. As always, the military considerations took the top spot in deliberations, but in times of stability, regulation of foreign merchants was another consideration. These changes were ordered at the highest level. Those in the seats of power rarely built or maintained everyday port infrastructure directly, but they were only too aware of the opportunities to earn revenue from taxation.

Tasks were delegated down the levels of authority, so below the rulers themselves, the next stratum

consisted of urban communes and municipal governments. In most western Mediterranean ports, communes were the real operational managers. Typical communal responsibilities included:

*Quays, landing stages, and slipways;  
Harbour dredging and maintenance;  
Cranes, weighing houses, and bonded warehouses;  
Regulation of pilots, boatmen, and port labour.*

These works were funded by:

*Harbour tolls and anchorage fees;  
Municipal taxation;  
Fines and commercial levies.*

Crucially, ports were treated as civic assets and finance was needed for the regime to be successful. Investment was justified by trade, prestige, and military readiness. In these times when the cost of a human life was far less than it is today, defence mostly trumped navigational safety.

The next parameter of major significance was religion and the role of those working within it. It could be argued that religion was the single most important driving force behind the changes that occurred everywhere. I shall write in more detail below about how the balance between Christianity and Islam affected the provision of navigational lights. It turns out that Christianity had a bigger impact.

The role of Christian ecclesiastical institutions cannot be overstated. Not only were they major landowners but they had well established systems of finance and access to the kinds of resources that few others could compete with. And, as if that were not enough, they had their own authority, granted from the highest levels. I have already written about the religious ethics that, it could be argued, placed a greater emphasis on the value of human life than those in command of armies, and so it is clear that a great proportion of the efforts that went into the provision of aids to safe navigation originated from the orthodoxies of Christianity.

As I scan the details of the shorelines across the Mediterranean, I am amazed at the number of times I find chapels, churches, monasteries and other religious buildings, many of them dedicated to

Saint Nicholas, an observation that is undoubtedly linked to when Greek culture demanded religious offerings at the points of arrival and departure by sea. This is, after all, the very root of the idea of a lighthouse.

## The Evolution Of Mechanisms: Basic Economics

Once the safety and security of a port had been established, its primary objective was clear - the safe conduct of merchants and others who would play a vital role in the healthy development of the community it served. A significant feedback loop was in operation: as the prestige of a port increased, so did its volume of traffic and so did the revenue. Better facilities could be provided and word soon got around that one port was better than another. Economics 101. We shall see later how important this was for a port such as Genoa. The merchants did not themselves own ports, but they did often finance and operate key aspects. They might, for example, maintain warehouses and other buildings such as counting houses and residences. They might sometimes own or lease private jetties and wharves, and all was done under the agreed local legislation.

Sometimes, a port was the direct property of a landlord with the authority to create his own working environments. This was generally the case in earlier centuries before the larger polities had been substantially consolidated. In such cases, we naturally find a much greater focus on the military and defensive aspects of port functions, so as to protect the interests of the owner, and less consideration of communal benefit.

I must make clear at this point that in the 5th-12th centuries there was no systematic obligation to provide navigational aids. Lights, beacons, and fires fell outside the remit of legislative practice in almost all regions. If a light was shown to aid navigators, it was based on a long-established tradition or custom, usually seasonal. Lights were episodic, that is, they were not expected to be shown with perfect reliability every night. Many were based upon prevailing political conditions of the time that could change suddenly and turn a substantial investment into a punishing loss. In essence, navigation relied upon daymarks, skilled local pilots and good coastal familiarity. Temporary fires were lit in moments of

danger and could never be relied upon. This picture is not one in which the adoption of lit navigational aids is unavoidable and it would be a very long time before the situation changed radically.

The next step in the argument is to consider how these aids did actually appear at all. Lights intended to assist mariners were, for centuries, a secondary consideration given that, to most observers, there was already sufficient knowledge inside the practice of seamanship to maintain the status quo, any deviation from which would place them at the mercy of God Himself.

Before 1200, we can safely say that lights seen from offshore were generally not associated with a message from ashore wishing you a safe journey. Lights were visible from towers, fortifications, city walls, and other structures intended to serve operations ashore, not to be a sign of goodwill to allcomers - with the exception, as we have already seen, of the lights from dedicated ecclesiastical sites.

We can focus on the 11-13th centuries in particular as the time when these religious institutions became the most stable custodians of lights - and for good reasons. In the first place, they provided continuity, for they generally outlasted many of the disruptive events of the communities they served. They were funded well enough that lack of resources rarely posed problems for their continued existence. And the bottom line was the service provided to humanity that their theology demanded. Indeed, there were many instances where the showing of a light was an ecclesiastical obligation legally bound up with the rights to hold the land.

So here is one of the fogs to which I referred. On the one hand, we find a very great presence of religious personnel in sites adjacent to waters where travellers pass by, or in positions of high ground where visibility from the sea is ensured. Yet we will never really be sure of the number of sites that provided actual navigational assistance at night.

We can be sure of one thing, however. There is no doubt that the Christian communities did provide by far the most significant assistance to mariners in these early centuries, and possibly even consolidated the unconscious knowledge amongst all who were associated with the sea that here was a methodology ripe for future consideration.

I could argue that the biggest change occurred during the period 1200-1400. During these years the increasingly successful enterprises encapsulated by the polities of Venice, Genoa and Pisa began to broaden their objectives in such a way as to now include the showing of lights, though always limited by the lack of effective lighting technology. A measure of success was clearly reached whereby it became commonly recognized that an efficient and organized lighting system benefitted the community. Suddenly it became normal to show lights in a regularized manner from dedicated locations. The presence of pre-existing structures was turned to advantage when resources and management were focused on the showing of lights from these high points. One of the most obvious examples is to be found in Genoa where the star of this treatise shone brightly from the beautiful tower we call Lanterna. Here was a location where development of marine practices had reached a point that early fires had already proven to be beneficial. Lanterna now took on the role once owned by the Pharos of Alexandria - a role in Egypt now under serious stress because of the severe damage from earthquakes, coupled to the different focus towards navigation that was part of the Islamic culture.

With Lanterna excepted, the new emphasis towards safety of navigation adopted by the city-states of the north Mediterranean zone did not yet stretch as far as to build actual lighthouses in the style of the great Pharos, for they were expensive, required year-round staffing and were only an indirect benefit since they did not (yet) themselves raise revenue towards their upkeep. It was far easier to re-use and modify existing towers, walls or moles.

The next pressures would only come with an increase in the size of ships - a factor that has a clear financial implication in itself. As the trading practices changed, economic factors changed also and suddenly there was a far more obvious reason to ensure the safety of ships, their cargoes and their crews! Economics 102.

## Lights Go Out

We might ask why many of the Roman light structures fell into disuse after the Roman Empire fell from 476 onwards? A good network of lights had been established that was proven to be

useful to shipping, but only a very few continued in use. The main reason was the collapse of funding and the administrative structures that supported them. Roman coastal lights were not just local conveniences: many belonged to an imperial system of maritime logistics and when the western empire fell, no central institution was in place to continue the mechanisms that kept them alight. Suddenly, all of the following functions were missing:

*Lamp fuel;  
Staff/supervision;  
Structure repair;  
Harbour administration.*

A Roman lighthouse required enormous amounts of fuel in the form of wood, oil or pitch. Post-Roman economies simply could not sustain continuous night burning except at vital harbours.<sup>2</sup> The result was that only those lights with a strong local authority or monastic patronage survived.<sup>3</sup>

Another impact was a rapid decline of urban centres and harbour silting. As populations increased and land usage changed with the growth of agriculture, soils that were washed off the fields found their way along rivers to the harbours where the solids held in turbulent suspension were deposited as mud once the flow stopped. Many Roman ports were abandoned and depopulated.<sup>4</sup>

New coastal centres arose that no longer needed the Roman lightstructures. But another big factor was that silting rendered harbour light structures obsolete because the shoreline shifted. The most obvious impact was at Roman Ostia<sup>5</sup> and there are many other examples, identified in the data in my site survey of later pages.

The widespread political upheaval that took place caused changes to long-distance bulk trade which greatly contracted in the early Middle Ages. Navigation became more coastal, shorter-range, and diurnal and so the demand for high-visibility seamarks - especially for night navigation in open seas - was reduced. In many places, the Roman light tower survived structurally, but was repurposed as a military lookout, a customs or signalling tower,<sup>6</sup> or a simple daytime seemark. These roles required no night illumination.<sup>7</sup> Other structures were simply destroyed.

# The Crusades

The Crusades were a series of religious wars launched at the behest of the Pope by Western European Christians between 1095 and the late 13th century, primarily aimed at capturing and controlling Jerusalem and the Holy Land from Muslim rule. Pope Urban II initiated the first Crusade in 1095 which successfully captured Jerusalem in 1099 and established Crusader states in the Levant. After this initial success, subsequent Crusades had mixed results.

The second Crusade (1147-1149) ended in failure, while the third Crusade (1189-1192) saw Richard the Lionheart fight Saladin after Jerusalem's recapture by Muslim forces in 1187. A truce was eventually achieved but the city was not recovered.

Religious zealotry then went seriously off track during the fourth Crusade (1202-1204) when, instead of fighting Muslims, Christians from the west were infamously diverted to sack the properties of other Christians in the east in Constantinople. As we shall see, this severely weakened the Byzantine Empire.

Beyond the military campaigns, the great amounts of cross-cultural interactions that had been stirred up by the Crusades significantly impacted European societies as a whole by stimulating trade with the east, spreading knowledge and technology between cultures, intensifying religious antagonism between Christians and Muslims, and strengthening papal authority over European monarchs.

The Crusades also targeted other groups deemed enemies of the Church, including heretics in southern France and pagans in the Baltic region. Crusades had evolved into a broader phenomenon of religiously justified warfare that shaped medieval Europe and left a complex legacy of cultural exchange and religious conflict.

## Islamic Practices

The very different administrative practices employed by the many ports that, at one time or another, fell under the control of Islamic authorities have led to a significant shortfall in our understanding of the history of our subject. However, the effects observed are reasonably clear.

In many Muslim-controlled ports, especially under the Abbasid Caliphate, Fatimid Caliphate, and later the Ottoman Empire, ports were:

*Directly administered by state officials;  
Integrated into military and fiscal  
hierarchies;  
Less dependent on autonomous urban  
communes.*

This matters because communes are document-producing machines. Where communes dominate, we get such things as statutes about lights, contracts with keepers or disputes over fuel and wages. By contrast, where executive governors or admirals dominate, practice can exist without paperwork that survives so fewer references mean fewer lights that we know about.

Latin port lights increasingly served merchant convenience by:

*Facilitating night entry;  
Extending the sailing day;  
Supporting dense commercial traffic.*

In contrast, many Muslim ports prioritised:

*Regulation of access;  
Defence against surprise attack;  
Seasonal fleet movements.*

The result of this different approach was the encouragement of:

*Conditional lighting (only when fleets  
were expected);  
Temporary fires;  
Signals linked to watch systems, not  
continuous beacons.*

In a system that is constantly nervous about its own existence, a permanent, always-burning light is not good by default and may even be undesirable. A key contrast with Latin Europe lies in the endowment culture. In Christian ports lights could be justified as works of mercy, and there were many monastic endowments that ensured continuity; the failure to maintain a light could be morally charged. In Islamic legal thought, however, charitable endowments, though certainly used to fund infrastructure, were rarely used for lighting; there was no moral obligation. Responsibility for this was practical and lay with rulers, not religious institutions. As a result,

lights where Islamic control was in force lacked the ecclesiastical continuity seen in Genoa, Marseille, or Venice and provision of these lights remained pragmatic and revocable.

When Muslim sources did mention coastal fires or signals, they were usually in the context of warnings of danger, military alerts or indicators of anchorage or approach under specific conditions. Support for this argument is to be found by studying the Ottoman infrastructure that came to dominate parts of the Mediterranean in later centuries. Ottoman practice shows that lights were subordinate to fortresses. Their maintenance was linked to garrisons and illumination was activated according to orders, not custom. Where permanent lights do appear, they generally followed Venetian or Genoese precedents. They served mixed populations and emerged alongside early modern bureaucracy. This strongly suggests continuity with earlier Islamic practice, rather than innovation.

In summary, Christian clerics appear to have been more engaged with maritime assistance than their Muslim counterparts, not necessarily because of greater concern for seamen, but because Latin Christianity integrated occupational danger into a pastoral and charitable framework that encouraged permanent, place-based assistance such as lights and chapels. In Islamic societies, maritime infrastructure remained the responsibility of rulers rather than clerics. The contrast is therefore one of different administrative practice than ethics.

## The Contrast Between Southern Spain And France

Readers who follow the site survey data presented in Section D will begin at the Straits of Gibraltar. I could have extended the logic of the grouping slightly to the west because of the importance of those significant sites that arose largely because of the Phoenician adventurers and traders, discussed at length in Volume 1.

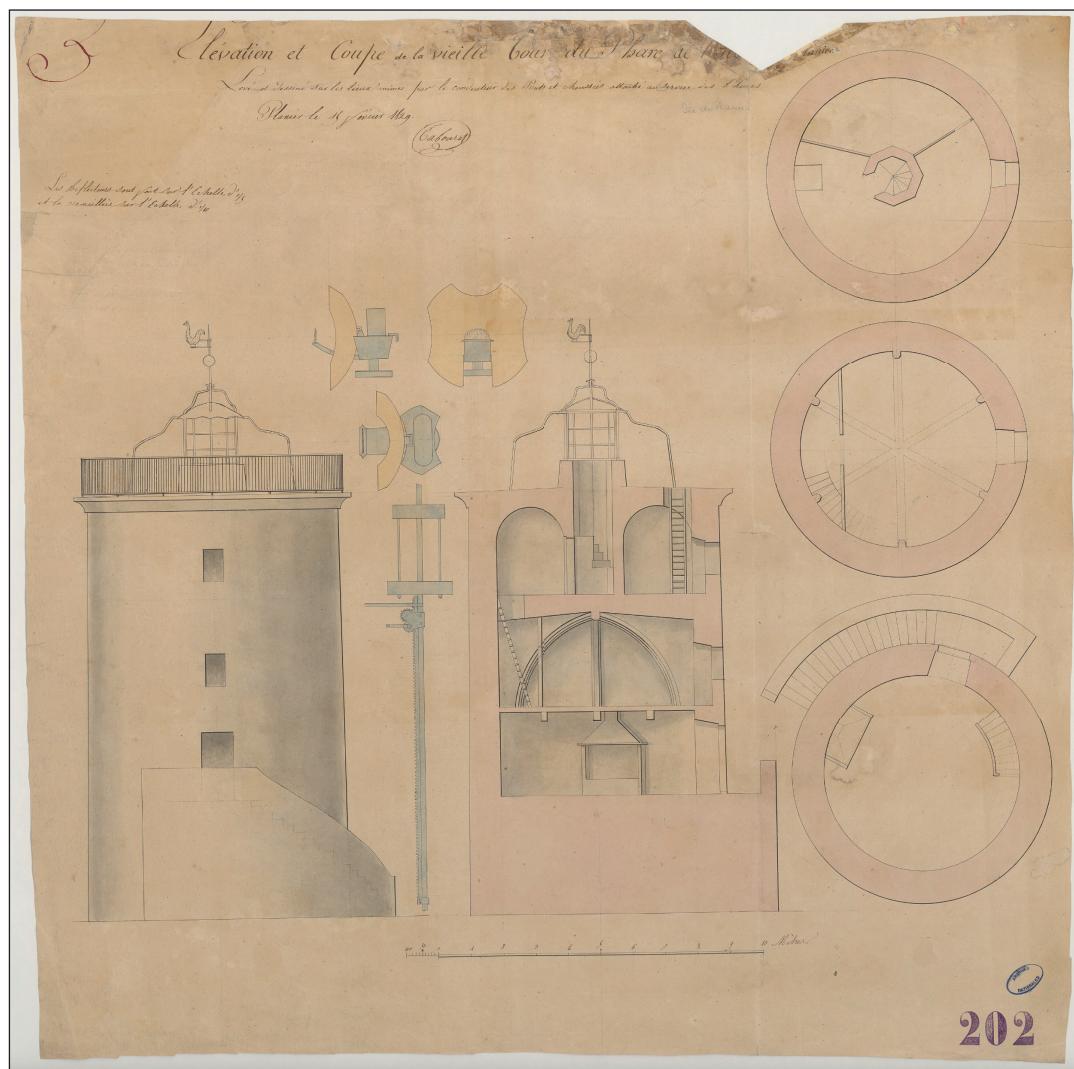
The history of southern Spain is markedly different from the rest of this large land mass and so we would expect to find cultural practices that fall into a category dominated by the extended Muslim presence. Then, progressing along the coast to what is now France the culture became mostly Christian. This part of the French Mediterranean coast before 1700 presents a striking pattern of

selective and geographically constrained maritime lighting, sharply contrasting with assumptions of continuous coastal illumination. From Roussillon through Languedoc and the Camargue, ports such as Port-Vendres, Collioure, Narbonne–Gruissan, Agde, Aigues-Mortes, Sète, and La Ciotat reveal persistent reliance on pilotage, daymarks, and local knowledge, with no solid evidence for institutionalised lighthouses. The showing of occasional lights in port areas is essentially undocumented, and although it might be inferred from local traditions, it has no firm basis for concerted navigational assistance. Even fortified towers (Gruissan, Agde, Brescou) and dominant ecclesiastical structures (Saintes-Maries-de-la-Mer) at most supported intermittent fires, not permanent navigational lights. Lagoonal geomorphology, silting river mouths, and flat coastal relief fundamentally discouraged durable lighthouse traditions.

A break in the logic occurs at Marseille, where offshore geology enabled a different solution. The lighthouse on Île de Planier, documented from the early fourteenth century, represents the first clear case of medieval lighthouse continuity on the French south coast. Its success rested on three factors absent further west: a stable rocky site, open-sea landfall function, and sustained civic administration. Beyond Marseille, secondary ports such as La Ciotat simply did not develop independent lights.

By contrast, the Spanish Mediterranean coast - especially Catalonia, Valencia, and Andalusia - shows earlier, denser, and more continuous traditions of coastal lighting, often integrated with ecclesiastical, municipal, or royal institutions. Towers at Barcelona, Tarragona, Valencia, and along the Andalusian coast appear more frequently in medieval sources as maintained beacons or lantern sites. Spain's earlier urban coastalisation, stronger municipal autonomy in maritime cities, and longer continuity of Roman–Islamic–Christian navigational practices fostered a more obvious pre-modern lighting landscape.

In comparative terms, France represents a minimalist western Mediterranean model, where lighthouse continuity is exceptional and offshore, while Spain exemplifies a systemic model, in which lights - though still sparse - are more regularly embedded in medieval maritime governance. This contrast tells us that medieval lighthouses were not a technological inevitability, but a choice based upon geography and local practices.



LEFT: In the early 1820s, as part of a broader effort to modernise aids to navigation on the French coast, a new lighthouse design by engineer Garella was drawn up in 1823 to replace the earlier 1774 tower on the île de Planier, a rocky islet off Marseille where lights had traditionally been shown for centuries, a rare benefit for mariners in these parts.

BELOW: The remains of the old tower are shown in this old photo alongside the current lighthouse.



The Spanish Mediterranean sector - especially Catalonia and Valencia - shows earlier and more frequent emergence of permanent lights and documented beacon traditions, often tied to municipal or royal authority and to denser networks of fortified headlands. While Spain also relied heavily on pilotage, its coastline offered more rocky promontories directly controlling approaches, facilitating earlier institutionalisation of lights. The French coast west of Marseille represents an empty coast where medieval lighthouse traditions were the exception rather than the rule. And then we come to Genoa.

## City-states Show Lights

The legacy of these complex and convoluted political interactions was the gradual creation from around 1100 onwards of a reasonable network of navigational aids to assist the increasing mercantile activity across the Mediterranean, possibly more in the east than the west. And it is to the lands of current Italy that once again we turn to examine the progress made by those living in three great city-states. By the 12th century it had become generally accepted that the showing of lights from ports was a desirable action, although the extent to which it was formalized continues to be somewhat unclear. In the detailed notes about individual sites that follow, there are numerous examples of officially administered lights, amidst the many that were casual, intermittent or simply to aid military forces.

The Genoese, perhaps prompted by benefits perceived to accrue from the burst of maritime activity during the Crusades, took lighthouse construction very seriously by building one of the most remarkable structures still standing today; I will shortly describe it in detail. People of Genoese origin can be found as sponsors of lights around the Mediterranean. However, uncertainty remains concerning the specific details of function, for example, the degree of uninterruptedness, the degree of overlap of navigational aid and military signalling, and the delineation of sponsorship between civic and military authorities. Clearly, the continuous risk of military attack must have made the long-term showing of lights unreliable, but there must nevertheless have been significant periods when mariners were able to rely upon the lights mentioned in their sailing instructions and on

their sea charts.

By far the most significant evidence is to be found in the archives of the city-state of Venice where there are many records showing that lights were lit as a community asset and provision was made for finance to support the efforts, particularly in the provision of oil to fuel the lights. It could be argued that, at last, recognition of the true value of lights to the health of polities and their trade had been recognized. For reasons that will become clear, Venetians did not embark upon a spree of lighthouse building, although they certainly contributed to pharology, if not entirely in Venice itself.

The third city-state of Pisa had rather different problems. Visitors leaning against its famously angled tower today will realize just how far the city is from the sea and that its wonderful attraction was never a lighthouse. No, the main problem faced by Pisans was the difficulty of keeping its waterways clear from silt.

## The Byzantine Period

The Byzantine Empire came about from the continuous existence of the Roman Empire in its eastern territories. The crucial permanent split occurred in 395 CE when Emperor Theodosius I died and divided the empire between his two sons: Arcadius received the eastern half with its capital at Constantinople, and Honorius received the western half with its capital at Ravenna (having moved from Rome). Both halves were still considered part of a single Roman Empire. The real transformation began earlier with Emperor Constantine I, who in 330 CE established Constantinople (previously the Greek city of Byzantium) as a "New Rome" on the strategic Bosphorus strait separating Europe from Asia. Constantine had chosen this location for its defensible position and proximity to the wealthy eastern provinces, and he made it a Christian capital, breaking with Rome's pagan traditions. This eastward shift of imperial power and the establishment of Constantinople as a great Christian city laid the groundwork for what would become the Byzantine Empire.

When the Western Roman Empire collapsed in 476 CE, the Eastern Roman Empire continued for a time without interruption. The emperors in Constantinople still called themselves "Roman Emperors," their subjects called themselves

“Romans”, and they maintained Roman law, institutions, and the claim to be the legitimate continuation of the ancient Roman state.

The empire reached its greatest extent under Emperor Justinian I in the 6th century, reconquering parts of Italy, North Africa, and Spain, though these gains proved temporary. It survived numerous existential threats including Persian wars, Arab conquests that took Syria and Egypt in the 7th century, and the iconoclasm controversy that divided the church in the 8th-9th centuries.

## The Iconoclasm Controversy

This was a bitter religious and political conflict within the Byzantine Empire during the 8th and 9th centuries over the use of religious images (icons) in Christian worship.

In 726, Emperor Leo III initiated the iconoclast (“image-breaking”) movement by ordering the destruction of religious icons - painted images and mosaics of Christ, the Virgin Mary, and saints that were central to Byzantine Christian devotion. The iconoclasts argued that venerating images violated the biblical prohibition against idolatry and that icons had become objects of superstitious worship rather than aids to spirituality. They destroyed countless works of religious art throughout the empire and whitewashed church mosaics.

Opposing them were the iconophiles who defended icons as legitimate aids to worship, arguing that since Christ had taken human form, he could properly be depicted in images. They distinguished between veneration (showing respect) and worship (which belonged to God alone). Monks, who were often icon painters and promoters of icon veneration, became particularly strong defenders of icons, leading to persecution of monastic communities by iconoclast emperors.

The controversy had profound political dimensions as well - it intensified the growing rift between the eastern and western churches, as the papacy in Rome firmly opposed iconoclasm. It also reflected struggles between imperial authority (emperors claimed the right to determine religious doctrine) and ecclesiastical independence.

The conflict went through two major phases: the first period of iconoclasm (726-787) ended when the Seventh Ecumenical Council restored icon veneration, but a second iconoclast period (814-843) followed under different emperors. The

controversy finally ended in 843 when Empress Theodora permanently restored icons, an event still celebrated in Orthodox Christianity as the “Triumph of Orthodoxy.” The controversy left lasting scars and contributed to the eventual Great Schism between Eastern and Western Christianity in 1054. Those of us who today fail to understand the depth of anger between Protestants and Catholics would do well to read the history of this great falling-out. It was yet another factor that worked against building lighthouses.

## Byzantine Decline

For those of us unfamiliar with the complex history of the Mediterranean region during these centuries, we must remember that the “Greece” we think of today has been very differently populated and governed in the past. Modern historians use the term “Byzantine Empire” to distinguish this Greek-speaking, Orthodox Christian, medieval continuation from the classical Latin-speaking Roman Empire. The Byzantine empire remained fundamentally Roman in its identity until its end in 1453.

The empire experienced a military and cultural renaissance in the 9th-11th centuries under the Macedonian dynasty, but suffered a catastrophic defeat at the Battle of Manzikert in 1071, losing most of Anatolia to the Turks. The Fourth Crusade delivered a near-fatal blow in 1204 when Crusaders sacked Constantinople and established Latin kingdoms, fragmenting Byzantine territory.

Though the empire was restored in 1261, it never fully recovered its power and spent its final two centuries as a steadily shrinking state. Constantinople finally fell to the Ottoman Turks in 1453, ending the Byzantine Empire and marking a symbolic close to the ancient Roman world.

Greece had been under Roman rule since the 2nd century BCE, when Rome gradually conquered the Greek city-states and kingdoms. When Emperor Constantine established Constantinople, the empire’s centre of gravity shifted eastward and Greece became part of the eastern half of the Roman world.

Greek culture and language were fundamental to Byzantine identity. Byzantines called themselves “Romans”, spoke Greek, and their civilization was built on Greco-Roman foundations. Greece provided the linguistic, cultural, and intellectual framework

for Byzantine civilization, making it less a conquered territory and more a heartland of the empire itself.

The only times Greece ceased to be under Byzantine control were when it was conquered by outside forces. The Fourth Crusade of 1204 temporarily placed parts under Latin rule, but eventually the Ottoman Turks conquered Byzantine Greece in the 14th-15th centuries. Thus, throughout the Byzantine Empire's existence from the 4th to 15th centuries, Greece was a natural, core component.

So, in the 12th century, the geographical Greece we know today had been dominated by the Byzantine Empire, with Constantinople controlling most of the region through a network of fortified cities and agricultural hinterlands. The landscape was dotted with monasteries, castles, and thriving port cities that served as commercial hubs connecting east and west, though the empire faced increasing pressure from Norman invasions in the west and Turkish raids in Anatolia to the east.

## Norman Ventures

When referring to Norman invasions in the west of the Byzantine Empire, this primarily means the military campaigns launched by the Normans of southern Italy against Byzantine territories in the 11th and 12th centuries. The Normans were originally Viking descendants who had settled in Normandy. They began arriving in southern Italy as mercenaries in the early 11th century. They gradually conquered territories in southern Italy and Sicily, which had been under Byzantine and Arab control respectively. By the 1070s-1080s, under leaders like Robert Guiscard, they had expelled the Byzantines from their last holdings in southern Italy, ending centuries of Byzantine presence in the region.

The Normans didn't stop there. They launched aggressive campaigns across the Adriatic Sea into the Balkans, directly threatening Byzantine territory. Robert Guiscard invaded the western Byzantine provinces in the 1080s, besieging the important port city of Durazzo (modern Durrës in Albania) and defeating Byzantine armies. His son Bohemond continued these ambitions and later became a prominent leader in the First Crusade, establishing the Crusader Principality of Antioch, which further challenged Byzantine interests in the east.

In the 12th century, the Norman Kingdom of Sicily under rulers like Roger II continued to pose

a naval and military threat, raiding Byzantine territories including Greece itself. Norman forces even temporarily captured Corfu and raided Thebes and Corinth in the 1140s. These Norman invasions represented a serious western threat to the Byzantine Empire, forcing it to defend on multiple fronts while simultaneously dealing with Turkish pressure in the east.

The Mediterranean in the 12th century was a bustling network of trade routes dominated by Italian maritime republics like Venice, Genoa, and Pisa, who transported goods between east and west, including spices, silks, and precious metals. The Crusades dramatically increased military and commercial traffic, with fleets carrying armies, pilgrims, and supplies to the Holy Land while returning with eastern goods and wealth. Byzantine, Norman, and Muslim naval forces competed for control of key ports and sea lanes, making the Mediterranean a contested space where commerce, piracy, religious conflict, and cultural exchange all intersected.

## Crusader Outcomes

The Pisans, Genoese, and Venetians were the three dominant Italian maritime republics competing fiercely for control of Mediterranean trade during the 12th century, each with distinct spheres of influence and strategies.

Venice held the strongest position in the eastern Mediterranean, maintaining privileged trading relationships with the Byzantine Empire that granted Venetian merchants favourable tax rates and access to Constantinople's markets. The Venetians dominated trade routes to the Levant, Egypt, and the Black Sea, dealing in spices, silks, and luxury goods from Asia. Their republic was highly centralized with a sophisticated diplomatic corps, and they profited enormously from transporting Crusaders while securing commercial concessions in Crusader states.

Genoa emerged as Venice's principal rival, particularly in the eastern Mediterranean and Black Sea trade. The Genoese established colonies and trading posts throughout the region, often in direct competition with Venice, leading to frequent naval conflicts between the two republics. Genoa also developed strong commercial ties with the Byzantine Empire (especially after helping restore it in 1261) and Muslim territories, and controlled

important alum mines in the East that were crucial for the European textile industry.

Pisa, while powerful in the 12th century, focused more on the western Mediterranean and had strong commercial and military presence in Sardinia, Corsica, and the Balearic Islands. The Pisans participated actively in the Crusades and established trading quarters in Syrian ports, but their power peaked earlier than their rivals. By the late 12th and 13th centuries, Pisa declined after military defeats by Genoa, particularly the decisive Battle of Meloria in 1284, which effectively ended Pisan naval dominance.

All three republics combined commerce with naval power and piracy, used their fleets to support Crusades in exchange for trading privileges, and established colonies and merchant quarters in ports throughout the Mediterranean. Their intense rivalry often erupted into open warfare, shaping Mediterranean politics and commerce for centuries.

After the Fourth Crusade (1204), the Byzantine Empire was broken up, and Venice, as one of the victors, was one of the chief beneficiaries. The Republic received a legal share amounting to three-eighths of the empire, according to the *Partitio Romaniae*. This included Crete (Candia), Corfu, Modon and Coron (in the Peloponnese), Euboea (Negroponte) and several Aegean islands such as Tenos and Naxos. From that point onward, these were Venetian colonies defended by Venetian fleets. The local Greek population was not in a position to complain for Venice held military, naval, and legal authority.

Even before 1204, the Byzantine state (which Greek-speakers considered their own) controlled major ports and signalling systems. Private or local communities rarely built harbour lights or towers - those were imperial installations. After the Latin conquest, those centralized resources collapsed. When Venice took over, the Greeks remained as local residents, traders, or labourers, but the means and motive for large-scale maritime works (like lightstructures, mole repairs, arsenals, or beacons) lay entirely with the maritime powers—first Byzantium, then Venice.

When considering the Venetian input to the provision of lights for navigation we meet the term *fanale* (*fanali* in the plural) that is a medieval or early-modern Italian term for an officially maintained coastal light or beacon. It might be a fire

or lantern set on a tower or some other structure to guide ships at night or mark a harbour entrance. Inspection of the data provided here in the site survey for the Mediterranean shows that the Venetian contributions were very significant. Not only were *fanali* built for harbour safety but also for long-distance mercantile navigation.

For example, a *fanale* at Modon (Methoni) guided the galleys along the Alexandria route, whilst another at Candia (Crete) secured the approach to the Venetian fleet base. The *fanale* at Negroponte (Chalkis) marked the narrows in the Euripus strait.

Local Greek seafarers used smaller coastal routes and often relied on daymarks, local knowledge, and timing, not on formal lights. So the infrastructure served Venetian commercial and military interests more than the coastal peasantry or fishermen.

In many Venetian colonies, there were two overlapping societies:

(1) The Venetian elite, governing from fortified towns such as Candia, Modon and Coron with Latin law;

(2) The Greek populace, living under Venetian rule, speaking Greek, and following Orthodox Christianity.

Venetian authorities built the ports, towers, and lights through colonial administration. Greeks provided labour and materials, but the initiative, funding, and engineering came from Venice, the force that had the ships, the money, and the need.

Ironically, centuries earlier, the Byzantines had set up lights, but the decline of Byzantine naval logistics after the 11th century and the transfer of maritime dominance to Italian city-states meant that by the 13th–14th centuries, those technical traditions were gone or severely reduced in the Greek world.

## Norman Contributions

In Volume 3 of this series, the great contributions made by Francophones during the Industrial Age will surprise readers who might have formed the impression that it was the British who transformed the presence of lighthouses. It is somewhat surprising therefore that French-speaking groups made only limited, localised contributions to Mediterranean lighting history before 1700, with the single major exception being the Norman/Angevin presence in southern Italy and Sicily during



ABOVE: The modern Capo Peloro lighthouse at Messina in Sicily.

the 11th–13th centuries. They did not build a network of lightstructures, but they did preserve, revive, or institutionalize several existing beacon sites inherited from Greeks, Byzantines, Arabs, or Romans. Normans were the only French-speaking polity to hold substantial Mediterranean coastline for an extended period which they did in Southern Italy (Apulia, Campania, Calabria) and Sicily. Their main contributions were the preservation and occasional reactivation of earlier Byzantine or Arab lights such as at Messina (Pharos) where Arab-era harbour lights continued under Norman rule.

Under the Hauteville kings, Messina became a major naval base. The port statutes indicate official concern for safe navigation, including lighting practices, though specific references to continuous lights are absent. Thus French-speaking rule indirectly supported sustained lighting through harbour administration. The Straits of Messina remained one of the very few Mediterranean locations where continuous night signalling was strategically essential.

At Syracuse and Palermo, Norman port authorities sometimes maintained harbour beacons, though documentation is sparse and indirect. The

Normans inherited functioning port systems from the Arabs and Byzantines and kept them working for trade, customs, and military purposes. Normans were primarily focused on developing systematic defensive watchtowers across Sicily and southern Italy, a subject dealt with specifically on p215.

In the Levant French-speaking elites dominated the Kingdom of Jerusalem, but they did not build lightstructures. This is surprising since ports like Acre, Jaffa, Tyre were commercially vibrant, but no medieval light towers are documented before the Mamluk or Ottoman periods. A possible reason for this lack of night lights was that navigation relied on pilotage, daymarks, and seasonal sailing, not night voyages. Thus, the Levant contributed nothing to lighthouse development despite French-speaking rule.

Likewise in Cyprus, the Lusignan dynasty (French-speaking) ruled from 1192–1489, yet there was no sustained construction of light facilities. Some harbour fortresses (e.g., Kyrenia, Famagusta) used torches or braziers intermittently from towers, but these were not regulated *fanali* in the Italian sense, and were more *ad hoc* signals. It appears that Cyprus, like the Levant, excelled in fortifications, but not navigational illumination.

The important era of French state lighthouse engineering dates mostly after 1661 due to the efforts of Colbert. Then it was focussed primarily along the Atlantic coastline at Cordouan. That apart, in the Mediterranean, France added customs or watch beacons on the Provençal coast from Marseille to Toulon, but no major stone lighthouses were constructed there before the 18th century. Thus, French state influence on Mediterranean lighthouses is late, limited, and peripheral.

We might ask why French-speaking polities did not develop a network of Mediterranean lights. First, they were not traditional Mediterranean maritime republics. Unlike Venice, Genoa, Pisa, or Amalfi, the Norman and Crusader states did not rely on commercial fleets requiring night navigation; their priority was military control, not maritime commerce so watchtowers and beacons served defensive signalling rather than navigation. The French maritime presence was episodic and often constrained. With the exception of Sicily and southern Italy for just over a century, French-speaking powers actually had limited shoreline control.



ABOVE: By 1571, the date of this picture, Genoa was a city “tres celebre.” In an accommodating location in the northwest Mediterranean, it was a major centre for trade assisted by two lighthouses.

## The Very Famous City of Genoa

The Republic of Genoa was one of the great maritime republics of the Middle Ages and pre-industrial period, alongside Venice and Pisa.<sup>8</sup> As a city-state, a single metropolis with the power of an entire country, Genoa emerged in the 11th century as a strong commercial and naval force and had a major influence on Mediterranean trade and politics.

In early history, Genoa had existed as a small Ligurian settlement known to the Romans as Genua. Later, in Roman times, the main road that passed near Genoa was the Via Postumia. Constructed in 148 BCE by the consul Spurius Postumius Albinus Magnus, it originally connected Genoa on the Ligurian coast to Aquileia in the northeast, traversing a number of important Roman cities like Piacenza, Cremona, and Verona.

From Genoa, it linked to other Roman routes heading west into Gaul and south into Etruria and Rome. Genoa served as a vital maritime hub, and the Via Postumia was essential for moving troops, trade, and information across the lands south of the Alps in what is now northern Italy. It enabled a connections between the Ligurian Sea and the Po Valley, integrating Genoa into the broader Roman road network. So, while Genoa was not on the most famous Roman road like the Via Appia, it was the western terminus of the Via Postumia, which made it a critical point in Roman logistics and commerce.

After the fall of the Western Roman Empire, Genoa came under Lombard<sup>9</sup> and later Frankish rule. It remained a modest town for centuries, frequently raided by Saracen (Muslim) pirates, especially in the 9th and 10th centuries. Then, by the late 10th and early 11th centuries, Genoa began to develop a merchant fleet and engaged in Mediterranean trade.



ABOVE: Part of a large painting of Genoa showing the harbour entrance and two medieval lighthouses.

It played a major role in the First Crusade (1096–1099), providing ships and troops. This earned the city privileges and trading posts in the Levant (Eastern Mediterranean). Just as cities of the Hanseatic League had traded across a network of cities in the Baltic and North Seas, Genoa's merchants established colonies and trading stations across the Mediterranean and Black Seas. It was the key to success. The city gradually gained independence from imperial (Holy Roman Empire) control, solidifying its status as a self-governing republic, known as a polity or city-state.<sup>10</sup>

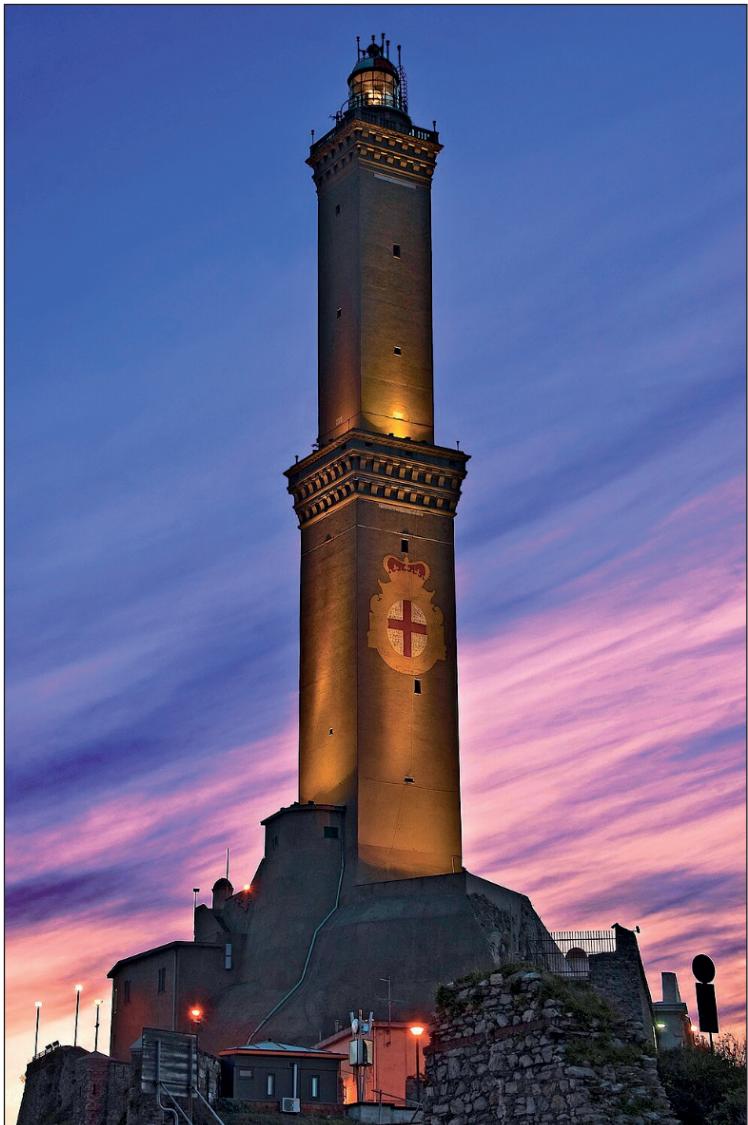
By the 12th century, it had a functioning political system governed by a mix of consuls, later replaced by a Doge (Dux) elected by powerful noble families. The republic was often ruled by factions with old nobility competing against new merchant classes. But Genoa's major rivals were Pisa and Venice. Today we think of them all as Italian, but as independent polities, there was fierce competition that must have paralleled 21st century football! Genoa defeated Pisa away from home at the Battle of Meloria (1284), gaining dominance in the western Mediterranean.

Then it clashed with Venice in the War of Chioggia (1378–1381), which was a kind of goalless draw, ultimately weakening both republics, but especially Genoa.

Genoese colonies and trading posts extended as far as the Crimean Peninsula, the Aegean, the Levant and Corsica (which Genoa controlled for centuries), as well as parts of North Africa and Spain. Genoa developed a strong banking system in the 13th–16th centuries and like the Swiss in later years, Genoese financiers were heavily involved in lending money, for example to the Spanish crown, especially during the Habsburg period.

Over time, internal strife between noble families and frequent foreign domination (by France, Milan and Spain) weakened Genoa. Though it retained independence on paper, it was often a client state of stronger powers. In 1768, Genoa sold Corsica to France, a sign of its decline.

Finally, in 1797, Napoleon conquered Genoa and replaced its constitution with the Ligurian Republic, effectively ending Genoa's independence. The Republic of Genoa left a rich legacy in architecture, law, banking ... and navigation.



*ABOVE: The current fine lighthouse, itself a medieval structure, is formed of two square segments, a shape that has been largely unaltered since 1544. It is possible that this form was copied from that used in the earlier, damaged structures and that it is representative of one of the very earliest medieval lighthouses.*

## Unique Lighthouse Inspiration

Christopher Columbus was born in Genoa in 1451 and his uncle was reportedly employed here as a light keeper around the same time. As if to match this splendid heritage, the city has one of the finest medieval lighthouses.

The first recorded use of a light to guide ships into Genoa's harbour dates back to at least 1128. (It is important here to note the use of the words, 'at least' as we shall see shortly.) In that year there are records that a lantern or open flame was maintained on a tower built on the Promontorio di San Benigno, the outermost point of what was once a significant promontory and close

to where a convent of the same name had already been built to the west of the city.

So we formally accept that the lighthouse was in existence in 1128, but it could have been built earlier than that. The First Crusade (1096-1099) was but a few decades earlier and would have had a profound effect upon the city. It seems very likely that the building of such a structure was a direct result of the efforts made by the city to participate in the Crusade. There are very strong reasons in support. Christianity has been the dominant religion for centuries and the decision to participate would have been made by a combination of mercantile, ecclesiastical and noble pressures in response to orders from Rome.

At the end of 1095, Pope Urban II declared a Holy War, the immediate and explicit objective being the liberation of Jerusalem and the surrounding Holy Land from Muslim control, specifically from the Seljuk Turks, who were ruling much of the Levant at the time.

The Pope's call for the Crusade was spread throughout the Christian world, not through edicts alone, but through preaching, letters, and ecclesiastical networks, reaching Genoa via bishops, monks, and itinerant preachers. Genoa, already a maritime powerhouse, responded swiftly - its involvement was as much about faith as it was about opportunity and identity.

Genoa was a natural geographic stop for ships entering and leaving the western Mediterranean, but as a proactive maritime republic it invited and attracted foreign fleets by offering naval power, infrastructure, and political alliances. The Christian motivation for this exponential rise in traffic led, I am sure, to the consideration of providing a lighthouse for the benefit of the anticipated fleets of ships.<sup>11</sup>

The City adopted the red Cross of St. George for its coat-of-arms, an icon that has remained associated with the lighthouse for many centuries, and the contribution of the Genoese Christian community was to provide some (but not all) of the resources necessary to maintain it, mostly in the form of monks as light keepers. There are records stating that



ABOVE: Art such as this is beautiful and impressive but is more about information of the elements of a city than it is an accurate reproduction. It is nonetheless extremely unlikely that an artist would have included two lighthouses if there had been only one. The actual structure of each tower, however, is more doubtful.

the lighthouse was manned by monks at the very least in these 12-14th centuries before the formal role of light keeper had emerged and it is possible that Columbus's uncle formed part of that team. Thus, while we cannot rule out the Lanterna as strictly an Ecclesiastical lighthouse, it certainly has very strong religious associations.

## Evolution And Development

Much change to the landscape has taken place over the centuries, but the current Lanterna stands on the same location as before, surrounded and isolated by extensive docks that are private land and forbidding to the casual visitor<sup>12</sup> (see p226). Large excavations around the lighthouse, especially to the rear and to the west, were made

in the 18th and 19th centuries as the city expanded westward, and a great deal of material was used to reclaim rocky beach land to extend the area of the docks, rendering the lighthouse further inland than before. However, the height of the light would have been more than adequate to overcome this. The first light was apparently shown to encourage ships into the harbour and thereby enhance trade. There is a legend that the designer of the lighthouse was thrown out of it, so he could not recreate a similar structure in another place that would assist the competition. There is also evidence that shipowners were obliged to pay tolls in return for the benefits provided by the lighthouse. Research indicates that besides the usual lighthouse functions there was a well-developed system of lights and signals in use here.

**B**aghino writes:

*"Night and day, signals were made by burning broom and heather understory. The purpose was to communicate the presence of enemy ships and activate the defense of the port, or to guide the arrival of the ships in the gulf. The same flames were used in order to send messages to the "guards", i.e. the coast outposts or the mountain fortresses located in the hinterland and stretching almost as far as Milan. With the construction of the first tower – initially made of only one segment, to which another one was added later on – the signalling point became more visible and a combination of sails and flags were also used in order to achieve a more precise level of communication with the city. The type and quantity of ships could be signalled as well as the direction from which they were coming. Along with the lower lighthouse on the Molo Vecchio,<sup>13</sup> the Lanterna could indicate the city's exact position to those who were coming from the sea."<sup>14,15</sup>*

It seems clear that the success of having a lighthouse at the entrance to the port was well recognized by the thirteenth century so as to suggest the value of a second lighthouse closer to the port, thus copying the ideas of the Romans. The lack of any other sites with a similar outlook might indicate that the role of lighthouses had been almost forgotten after their success in Roman times. So, Baghino seems to be informing us with little fanfare that the building of a second tower on the ancient breakwater was a deliberate design to make a pair of leading lights. The fact that, unusually, the low lighthouse is built in the middle of the mole, rather than on the end is a further clue that its position was significant. However, inspection of the geodata (see p233) quickly shows that this was not the intent for there is no sensible line of sight linking these two towers.<sup>16</sup> It is more likely they served as individual navigation aids marking general harbour proximity, hazards, or orientation, rather than forming a precise range. They may have been used sequentially (e.g., "sail toward one, then turn toward the other"), which was a common pre-modern practice before precise range lights. Or, one may have functioned primarily as a watchtower or signal tower, rather than a strict navigational beacon. Leading lights became more standardized

in the 17th–18th centuries with the rise of formal maritime navigation authorities and we shall see later how they played an important role in assisting ships through sandbanks (see p300-1). In the 15th century, mariners used visual cues, stars, and sounding lines far more than precise beacons. We conclude that they were both navigational aids, but not a functioning pair of leading lights based on their positioning.

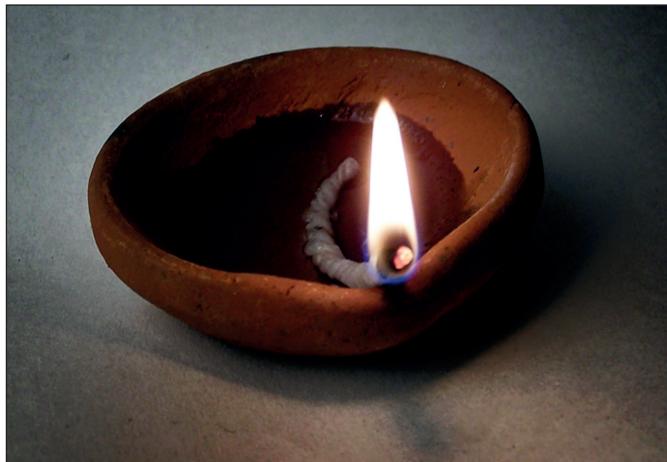
There is a strong likelihood that the two towers were matching in design, the only real difference being the overall height which was smaller in the second tower.

The early tower underwent several rebuilds and expansions due to damage from hostile actions. By 1514, serious unrest in protest at the city's rule by the French, resulted in the destruction of a nearby French-built castle and collateral damage to the lighthouse. A hiatus in the showing of the light then took place and a partial rebuild was necessary. Finally, the new tower was completed in 1544 and the lighthouse took on its present form.

Our understanding of medieval construction techniques might suggest that these changes involved a minimal amount of demolition before the rebuild, particularly as it was on exactly the same elevated foundations. And since it had already been successfully used as the higher of the pair of leading lights, its height may not have been much increased. In my opinion, the original tower, of which there seem to be no images, was similar to the existing one, if rather shorter.

## Torre Dei Greci

**M**uch less detail is known about the second lighthouse built to the east of the port entrance on the first breakwater, but it is clearly shown in contemporary images and artwork. The Torre dei Greci was a historic lighthouse in Genoa, sometimes referred to as the "sister" of the more famous Lanterna. Built after the mid-13th century, it was situated on the opposite side of the harbour from the Lanterna, approximately where the Magazzini del Cotone (Cotton Warehouses) stand today in the Porto Antico area.<sup>17</sup> Thus the Lanterna marked the western entrance to the port, and the Torre dei Greci served as a complementary navigational aid on the eastern side. Together, these two lighthouses flanked the harbour, guiding ships safely into Genoa's bustling medieval port.



ABOVE LEFT: A simple example of light from burning oil.

ABOVE RIGHT: A medieval oil lamp bearing a Christian symbol.

Unfortunately, the Torre dei Greci no longer exists, and detailed records about its structure and operation are scarce. Its name, which translates to “Tower of the Greeks,” perhaps reflects the presence of a Greek community or church in the vicinity during that period.

Inspection of available images leads to the conclusion that the tower was built of stone in two sections, one on top of the other, and with castellated caps on the walls. The height of the tower would seem to be 25-30 m tall - about the same height as Smeaton’s Eddystone. This would be a significant lighthouse in any other situation, yet beside its big sister it seems less significant. A ramp leads from the level of the breakwater up about 5 to 8 m to what we assume is the lighthouse entrance. This was a repeat of the feature used in the Pharos of Alexandria and emphasises the importance of having the lowest entrance well above the height at which waves might reach in storm conditions.

## Light From Burning Oil

A very important aspect of the medieval lighthouse was its light source. I have already discussed how the greatest limitations to the development of lighthouses as we know them today came from the use of open fires and candles (see p78). At Genoa we are at last able to discuss the use of a third option - the flames from a lamp burning oil.

Initially, the light source was created by the burning of readily available brushwood. However, there is good reason to believe that this lighthouse was the biggest user of olive oil for its illuminant.



Installed in 1326, olive oil lamps are thought to have burned here throughout the entire life of the lighthouse and right up until 1898 when it was finally converted to acetylene. This is a remarkable record.

Early lamps in Mesopotamia and Egypt consisted of small bowls with a pinched rim to hold a linen or reed wick. In classical times, people engaged in mass production of terracotta oil lamps with central reservoirs and spouts for wicks. Olive oil was the standard fuel in the Mediterranean where, of course, it was readily available. Roman lamps often had closed tops with decorative motifs, and were highly efficient for their time.

In the Byzantine and Islamic periods (5th–12th centuries) there was continued refinement of ceramic and bronze lamps with wicks. As progress was made and lamps improved, control of the flame gave less smoke and a steadier light. This allowed longer, safer burning. Designs were increasingly more compact for use in enclosed spaces like homes, ships, and early lighthouses.

Many readers will be familiar with the use of hydrocarbon (paraffin, kerosene) fuels in oil lamps but these were not readily available until the 19th and 20th centuries. However, once again, once the benefits of the modern fuel became known, olive oil was quickly phased out as a fuel.<sup>18</sup> Thus, paraffin oil produces about 15–20% more energy per liter.

Olive oil produces a soft, yellowish light. It has a lower brightness per unit of fuel than paraffin, but the flame is stable, tends to be smaller and less intense. The oil is clean burning with little smoke or odour but is thicker and more viscous, so to compete with paraffin would require special wicks



ABOVE: Ancient window glass was far from perfect.

or lamp designs. Since it does not vaporize as easily as paraffin, it is less flammable and hence more safe.

By comparison, paraffin oil is more volatile and burns brighter and hotter. It generates more intense light, suitable for long range visibility - clearly an important property for lighthouses). It can produce soot and odour if not properly trimmed or ventilated. It is easier to pump and use in pressurized systems.<sup>19</sup>

Olive oil was widely used in ancient and early modern oil lamps, including Mediterranean lighthouses, because: It was locally available. It was safe and reliable. It suited open flame, gravity fed lamps. With the industrial production of kerosene in the 19th century, lighthouses switched to paraffin oil for its greater luminous efficiency, longer range, and cost effectiveness. Feature Olive Oil Paraffin Oil (Kerosene) Energy content Lower Higher Brightness Softer Brighter Smoke/odor Minimal Can be smoky Safety Very safe More flammable Historical use Ancient to early 19th c. 19th c. to 20th c. Conclusion: While olive oil was safe and clean, its lower brightness and energy density made it less efficient than paraffin, which quickly became the dominant fuel once it became available and affordable in the 19th century.

Whale oil was also a lamp fuel in the 18th and early 19th centuries, and it played a significant role in lighthouse lighting before paraffin oil became dominant. Whale oil was widely used in lamps in Europe and North America in the 17th century, but it became especially common in the 18th and early 19th centuries, coinciding with the rise of the

whaling industry, particularly out of New England.

Burning whale oil produced a brighter and cleaner flame than animal fats like tallow. It was less viscous than olive oil, making it easier to wick. It produced less odor and smoke than some other oils. It became readily available from the expanding maritime whaling industries and was in use in lighthouses by the late 1700s. Sperm whale oil was considered the premium fuel for Argand lamps, which became the standard in lighthouses due to their bright, clean, and steady light. Whale oil was used extensively in U.S. and British lighthouses through the early 1800s.

So-called train oil obtained from blubber of other whales was of lower grade, thicker, smokier. It was used where cost was more important than quality. In the mid-19th century, especially after Abraham Gesner's invention of kerosene (paraffin oil) in the 1840s–50s, whale oil use declined rapidly. Kerosene was cheaper, more abundant (obtained then from coal and petroleum), and more energy dense.

## Glazing

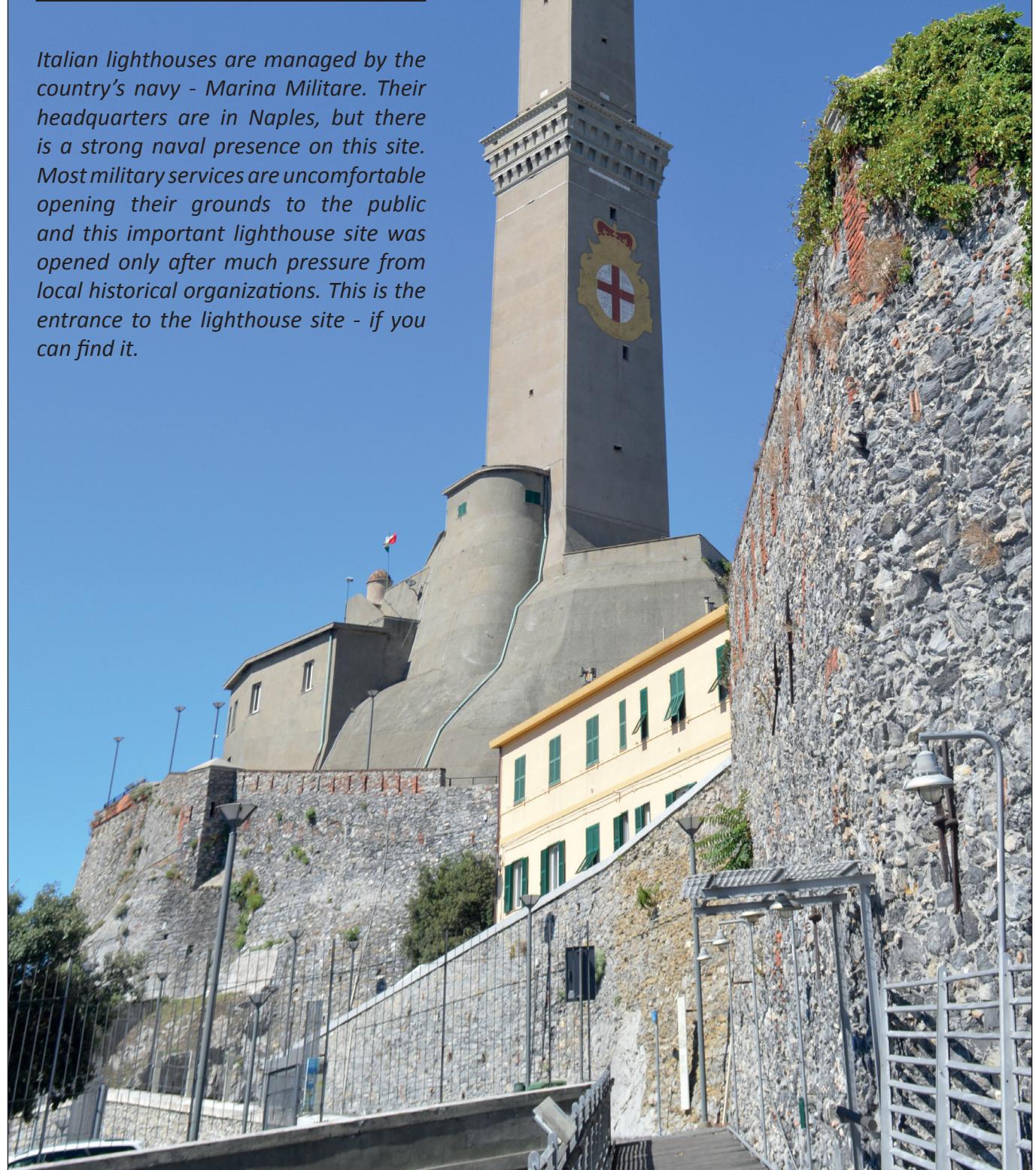
In addition to this lighthouse being the most significant user of oil-based fuels for its light source, we must in parallel emphasize its record of using a glazed lantern. The enclosed lantern and its glass components were both a technological marvel and a significant maintenance challenge for centuries. The lantern's glass panes were crafted by skilled Ligurian and later Venetian glass makers at a time when glass technology was in its infancy, but being perfected by artisans of this region. These panes were notably small, thick and heavy, and the glass quality of the time was far from optimal, full of imperfections and prone to blackening from soot. The panes frequently cracked, shattered, or became misaligned due to strong winds, tower vibrations, lightning strikes, and even wartime damage.<sup>20,21</sup>

Maintaining the clarity of these glass panes was crucial for the lighthouse's functionality. Keepers were required to reside within the tower and a most important task was to ensure that the glass remained clean and transparent. They employed sea sponges, rags, and an egg white emulsion to clean the panes - a method aimed at preserving transparency and extending the glass's lifespan.<sup>22,23</sup>

Clearly, this was a heavy workload with a substantial burden of maintaining the lantern. In 1405, the expense of replacing the glazing consumed



*Italian lighthouses are managed by the country's navy - Marina Militare. Their headquarters are in Naples, but there is a strong naval presence on this site. Most military services are uncomfortable opening their grounds to the public and this important lighthouse site was opened only after much pressure from local historical organizations. This is the entrance to the lighthouse site - if you can find it.*





ABOVE: The Lanterna site is deep inside a private working dock area.

60% of the port's annual budget. This significant investment underscores the importance placed on the lighthouse's operation and the challenges associated with its upkeep.<sup>24,25</sup> The enclosed lantern with its glass components was therefore both innovative and demanding. The combination of fragile materials, exposure to harsh environmental conditions, and the necessity for constant maintenance made it a costly yet indispensable asset for Genoa's maritime navigation.

## The Impossible Lighthouse

*from my diary July, 2016*

On 15 July 2016 we visited the Lanterna lighthouse in the docklands of Genoa in northern Italy. We had been once before in 2003, but found the site extremely difficult to approach. The lighthouse is situated in the heart of the docklands area, which, in this city, is very extensive indeed. Once, when this ancient city was at its peak in the 12-14th centuries, there was a beautiful curved harbour by which the great trading tradition of the Genoese could be maintained. There were also extensive fortifications

to protect those rights, and there was a lighthouse that we call La Lanterna to provide assistance for the many passenger and cargo vessels entering and leaving the port. In many ways, these features are present today, but the changes imposed by modern business requirements have rendered this magnificent jewel extremely difficult to enjoy.

The site of La Lanterna is on an ancient rock, forty metres above sea level, and situated on the western promontory of that ancient harbour. Today, much of the bay has been lost to a sprawling industrial site where heavy lorries, lifting machines and diesel locomotives with trucks in tow, as well as vans and passenger vehicles of all descriptions go about their business. Any uninterrupted view that might have been possible from the gorgeous sea front properties has now been obscured by high-level motorways, cranes and extensive industrial ironwork. Even the sight of cruise liners resting at their berths do not entirely soften the harsh landscape of coal, fuel, freight and container industries.

In 2004 our approaches to the lighthouse were barred by signs that threatened all kinds of official Italian retribution if we trespassed on private property. After miraculously navigating our way



*LEFT: The modern lantern with its 20th century electric apparatus.*

*ABOVE: The lighthouse was part of 19th c fortifications and significant portions of those walls and buildings remain.*

through a spaghetti-like jumble of roads, under- and over-passes, we got quite close but were still barred from access by the ultimate threat of the Navy. Lo! The Italian government had seen fit to turn the lighthouse over to the military, as is so often the case in the Mediterranean. With all views ruined by overhead cables, container stacks and functional but ugly buildings, there was no way of getting close enough to take even a passable photograph. We came away most disappointed.

Twelve years later, I had been promised a personal guided tour by the new civilian curator on this Friday morning and two hours late because of traffic, the dreadful Genoese traffic system and that same dockland maze that had confused us years before, we finally made it to a public car park – the point of closest approach, but still about 0.5 km distant. There were many useful signs directing us to La Lanterna, but, even so, we got lost again! As in 2004 it still seemed impossible and I feared we would fail in our mission once more. Is it so hard to miss a 77 metres tall lighthouse? Yes, definitely this one, for it is at the centre of a maze of curiously Italian character, behind endless stretches of wire fence, and inside secure zones that really do not make visitors feel welcome.

Nevertheless, we did find the entrance gate – eventually, and its secure padlocked gate. It was indeed fortunate that our guide had been contacted in advance, and that he had been prepared to reschedule his diary to accommodate five tardy visitors. Rarely have I been so pleased to see a man with a key!

It was only in 2014 that Andreas had finally persuaded the military and local authorities to allow him and his co-volunteers to open the lighthouse to public inspection. It was most encouraging that a good number of corporate sponsors were found and the infrastructure around the lighthouse is now perfectly complete. Unfortunately, as with so many things these days, this incredible facility operates on a financial shoestring. Andreas is an enthusiastic, lighthouse-loving son of a retired Italian lighthouse keeper who now acts as the attendant for several other lights too. With short, dark hair and smart demeanour, perhaps in his early thirties, Andreas has volunteered to take care of the world's second oldest working lighthouse. First built in 1128, this fabulous tower is well preserved. Today, there are plenty of public walkways, and castle-type features to explore around the base of the lighthouse. Deep inside the caverns that have been used over



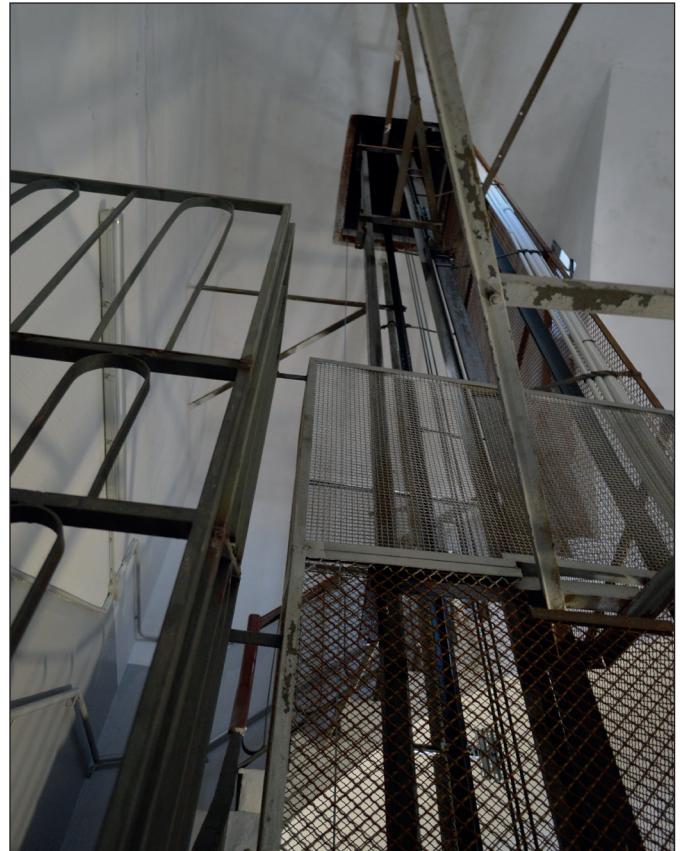
*ABOVE: The base level of the lighthouse is at 40 m, the top of the rock. The lighthouse tower is 77 m tall.*

centuries for many defensive purposes, a beautiful display of lighthouse history and retired equipment has been prepared. There are many exhibits here to keep lighthouse enthusiasts interested for hours, as well as a strikingly rare set of engineering drawings and plans relevant to the lighthouse in its modern form. Once this part of the visit is complete, it is time to climb the enormous rock by way of safe and well-structured stairs to approach the base of the lighthouse tower. Here there are expansive viewpoints that look out in all directions over the wonderful panoramic vistas of the Genoese coast.

The tower itself is in two thick-walled sections of brick, and of square geometry. At some point in its history, it had lost its upper half, but the section in place today had been built in the 16th or 17th century. The staircase winds its way up around the inside of the tower walls in a clockwise direction, with occasional windows and regularly spaced reinforced steel braces around the walls to provide additional strength. In the very centre of the tower is a caged elevator to ease the climb for those officials in charge of the lantern - young and fit sailors, no doubt. Of special note, however, is that there is a double staircase hidden inside the walls, the second one allowing rapid escape in case of military attack. Inevitably, apart from a very few signs of its existence, this staircase is closed to public view. The

structure looked sound, was painted white and in clean condition. It seemed like a long climb to reach the level at the top of the first stage, and at this point we were able to step outside onto the narrow balcony to admire the wonderful views, which were now even more dramatic than before.

At the time of our visit, it was still forbidden to climb the lighthouse any farther than the top of the lower stage of the tower - 36 metres high with 175 steps. The second stage and the remaining 190 steps that led to the lantern was still out of bounds behind lock and key - a great disappointment in view of the fact that the military have relented sufficiently to allow the creation of a very fine visitors' centre, yet dumb enough for the military mind to be incapable of allowing visitors to see the most important part of the lighthouse. For many years I have looked upon this as "The Impossible Lighthouse". It's certainly difficult in many ways. Visitors need to allow plenty of time for prior booking of visits, and allow plenty more time to find the car park and access gate. Keen photographers will need longer still to decide upon the best vantage point for a photograph that is not a silhouette. And once close to it, the tower is so tall that the lantern itself cannot be seen well. There are a number of difficult aspects of enjoying this most beautiful lighthouse, which is definitely not a "click and move on" site for "lighthouse baggers!"



ABOVE LEFT: Climbing up, Marco Vigano, my Italian host (left) with the new lighthouse guardian Andreas.  
ABOVE RIGHT: With so many steps to the top, a lifting mechanism helps a lot.

BELOW LEFT: Climbing the lighthouse stairs is one of the most exciting things we can do. What is up there?  
BELOW RIGHT: Why do military men not understand that people need to see the lighthouse mechanisms?



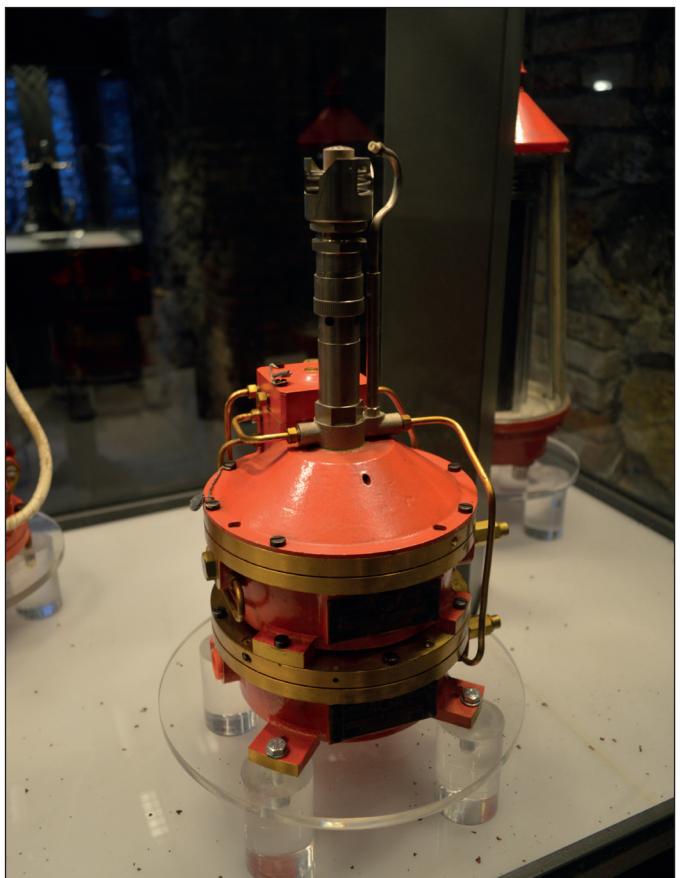


*ABOVE LEFT: Part of the old military fort has been released to the preservation organization.*

*ABOVE RIGHT: The atmospheric lighting inside lends itself well for the museum that has now been created.*

*BELOW LEFT: A full range of old lighthouse equipment is on display, though not necessarily from Lanterna.*

*BELOW RIGHT: Having used oil lighting for centuries, there is a good display of lamps used at other locations.*

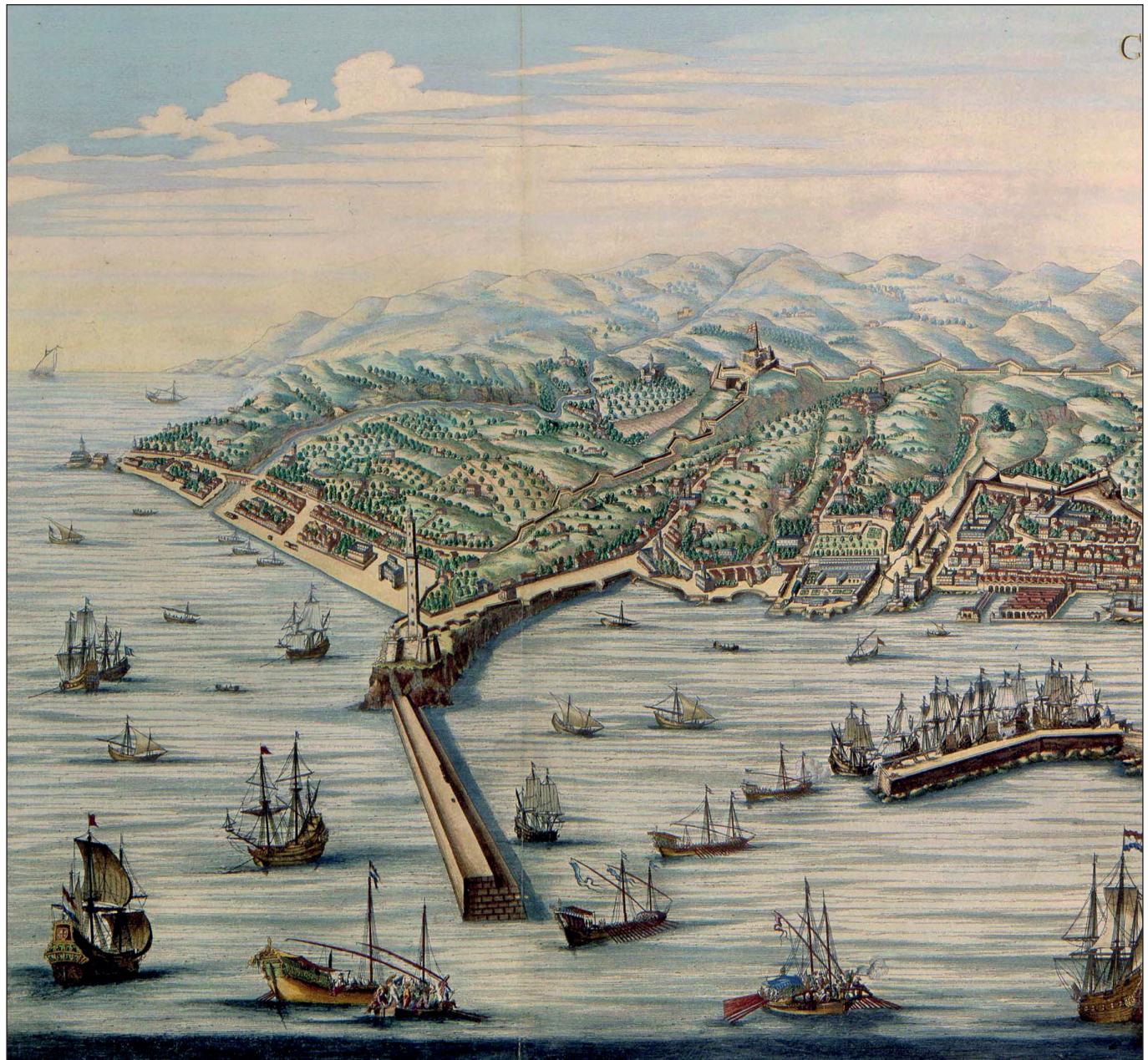




*ABOVE: From the first level of the lighthouse, this is the view to the east.*

*BELLOW: The view to the west shows the great extent of the container port.*





*ABOVE: In this painting, the Torre dei Greci is missing from the mole. The tower was not damaged during hostilities and it is thought that it was simply taken down in the 19th century during the extensive redevelopment of the harbour. However, although some work has been done - notice the mole extension outwards from the Lanterna, the old mole remains largely unaltered in shape yet the lighthouse is gone.*

*RIGHT: A modern satellite image of Genoa is most informative. The basic circular shape of the original haven is clear, with the old town to the east (pink balloon). The location of the Lanterna is marked with the purple pin. It is unchanged since it was originally built and now situated well inside extensive reclaimed land area of the docks. The most likely location of the Torre dei Greci is marked by the red pin and is on what is known locally as the Old Mole. The angled shape of the Old Mole matches that of the medieval shape, even though it has been extended in recent times. It is clear from the relative positions of the two lighthouses that the pair could never have worked as leading lights.*



Image © 2025 Airbus



*ABOVE: The old Meloria lightstructure, right, remains 200 m distant from its modern partner, Secche della Meloria (Meloria reefs), part of a protected marine area.*

## Competition From Pisa

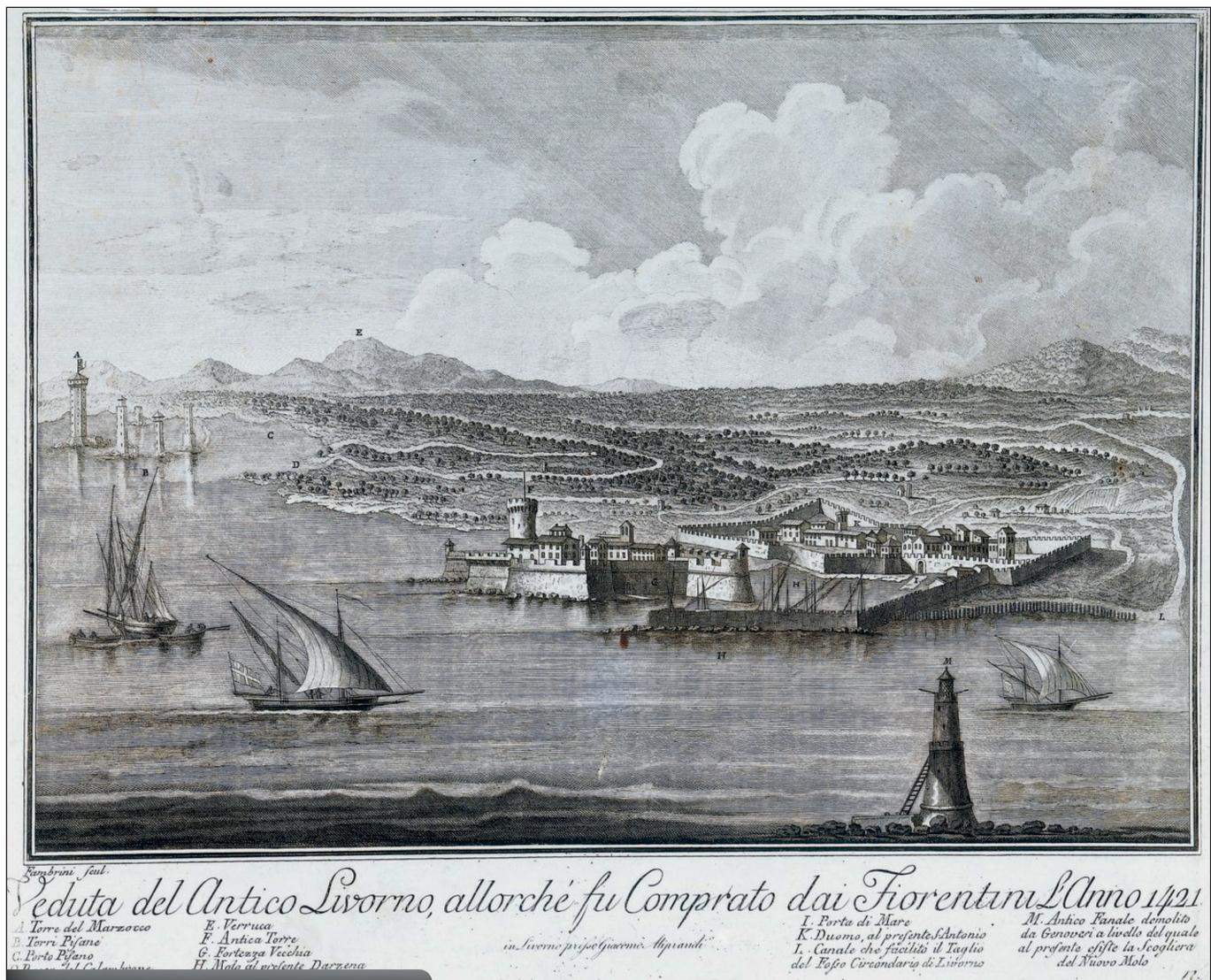
Visitors to Pisa today would struggle to believe that it was once a thriving port city. In the 11th to 13th centuries Pisa was one of the great maritime republics of Italy, alongside Genoa, Venice, and Amalfi. Its port lay a few kilometers inland on the Arno River, connected to the sea by a navigable channel. Despite being inland, the river allowed seagoing ships to reach the city itself. Thus, Pisa's port - Porto Pisano - became a thriving hub for Mediterranean trade, exporting Tuscan products such as grain, timber, wool, alum, and wine, and importing eastern luxuries such as spices, silks, precious metals, and other goods from the Levant. Pisan merchants and fleets operated widely, from North Africa and Spain to the Crusader states and Constantinople. The port area was fortified with quays, towers, and warehouses, and a network of canals supported shipbuilding and maintenance. Pisa maintained a powerful navy based there, essential for both commerce and war. Its naval strength was demonstrated in conflicts with Saracen pirates and rival city-states.

Over time, however, the river Arno began silting, in common with other Italian waterways, most notably at Ostia, thus making access for large vessels harder. Fierce competition between the Pisans and the Genoese resulted in battle and Pisa's defeat by Genoa at the Battle of Meloria (1284) marked the start of its decline as a maritime power, though the port remained active for regional trade for some time.

## Meloria, Leghorn And Livorno

As far as we know, the first time a lightstructure was built on a shoal at sea took place on the reef called Meloria, situated just offshore from the Italian city of Livorno, but called Leghorn in the Middle Ages. In the early Middle Ages, Livorno was only a small fishing village and a minor landing place on the Tuscan coast, overshadowed by the great ports of Pisa and Genoa. But it grew in importance because of its location on a naturally sheltered stretch of coast near the mouth of the Arno River that made it useful as an outport for Pisa. Pisa, as a maritime republic, used nearby anchorages like Livorno to handle overflow trade and as a staging point for ships. But a lighthouse was needed for the dangerous shoals offshore.

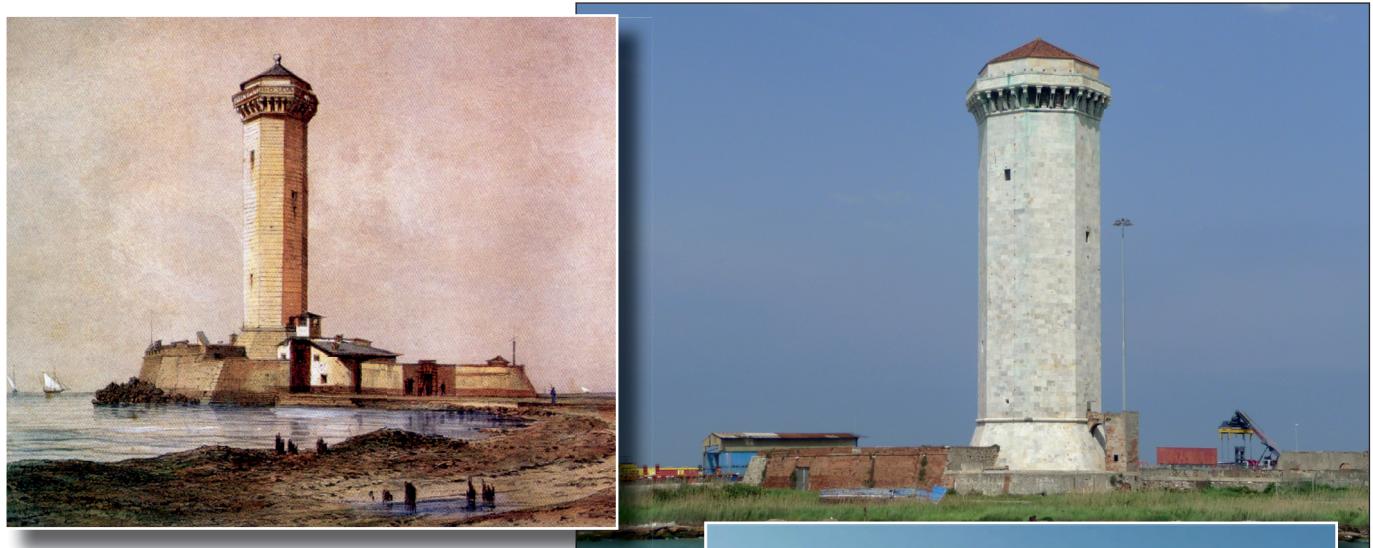
Marine traffic consisting of small coasting vessels and galleys would stop there en route between the Tyrrhenian ports and beyond. Because the seabed near Livorno was shallow and dotted with reefs large-scale trade was limited and most deep-sea ships preferred Pisa's main river port or other established harbours. By the 13th to 14th centuries, Livorno remained secondary but strategically important. Pisa fortified the area and improved access, partly to support their naval war efforts against Genoa. The Meloria lighthouse was maintained to guide ships to the coast safely where there were other markers for guidance. After the Battle of Meloria and Pisa's decline, Livorno's role fluctuated under different rulers. The lighthouse on the shoal was a victim of the fighting, destroyed in 1267 and required several rebuilds.



ABOVE: This engraving is entitled "View of Ancient Livorno when it was bought by the Florentines in the year 1421." We note the Livorno lighthouse shown at the bottom right. Also known as the Fanale dei Pisani, it has a long history. The lighthouse was originally built by the Republic of Pisa between 1303 and 1305 to a design by Giovanni Pisano. It was built to replace a previous lighthouse at Meloria that had been destroyed during the Battle of Meloria in 1284. The medieval tower stood for over 600 years until 1944 when it was blown up by German troops. The lighthouse was rebuilt between 1954 and 1956. On the far left are a surprising group of towers labelled, with others, A: Torre del Marzocco and B: Torri Pisano. These are depictions of several structures offshore from Pisa and give the clear impression of lighthouses!

RIGHT: The current Livorno harbour structure, shown here in 2002, was inaugurated on September 16, 1956, to coincide with the 350th anniversary of the city of Livorno. The reconstruction was meticulously done to follow the original 14th-century design using approximately 90% of the material recovered from the original ruins.





*ABOVE: The Torre del Marzocco could easily have been one of the great Mediterranean medieval lighthouses, but is not generally regarded as such. Right: The Mastio di Matilde is the focus of Livorno's fortifications.*

## A Plethora Of Towers

The Torre del Marzocco was constructed in the late fourteenth or early fifteenth century under Florentine authority, the tower functioned not as a classical lighthouse but as a beacon-tower combining navigational assistance, coastal surveillance, and political symbolism. Its cylindrical masonry form, prominent shoreline position, and probable use of intermittent night fires place it within a broader western Mediterranean tradition of late medieval port markers, comparable to contemporary towers at Marseille and Porto Pisano, yet distinct from the more continuous lighting traditions that survived at exceptional sites such as Genoa and Alexandria. The tower's very name, derived from the Florentine lion (Marzocco), signals its role as a maritime assertion of sovereignty at a time when Florence possessed limited naval capacity and relied on symbolic presence and warning systems rather than large-scale harbour engineering. Unlike Roman imperial ports, where lighthouse construction was embedded within state-sponsored infrastructural programmes, or Islamic *ribāṭ* systems, where beacon lighting served primarily military communication, the Torre del Marzocco reflects the pragmatic priorities of a late medieval territorial state: modest capital investment, flexible use of light as needed, and



integration into a wider network of coastal watch rather than continuous illumination for long-range navigation. Its eventual obsolescence following the sixteenth-century Medici transformation of Livorno into a fortified free port further underlines its historical significance as an intermediate solution by bridging antiquity's monumental lighthouses and the permanent, purpose-built lights of the early modern Mediterranean.

At the focus of the engraving on the previous page is a very visible military structure, but was it ever used for navigation? Once again, we come across the dichotomy of how to consider a clear defensive structure that would unquestionably have carried lights but not be thought of as a lighthouse. The Mastio di Matilde (Matilde Keep) did not function as a lighthouse, but it almost certainly participated in Livorno's medieval maritime signalling environment as a watch and beacon point, forming the inner defensive and visual anchor of the port while towers like the Torre del Marzocco articulated Florence's later, more outward-facing coastal policy.

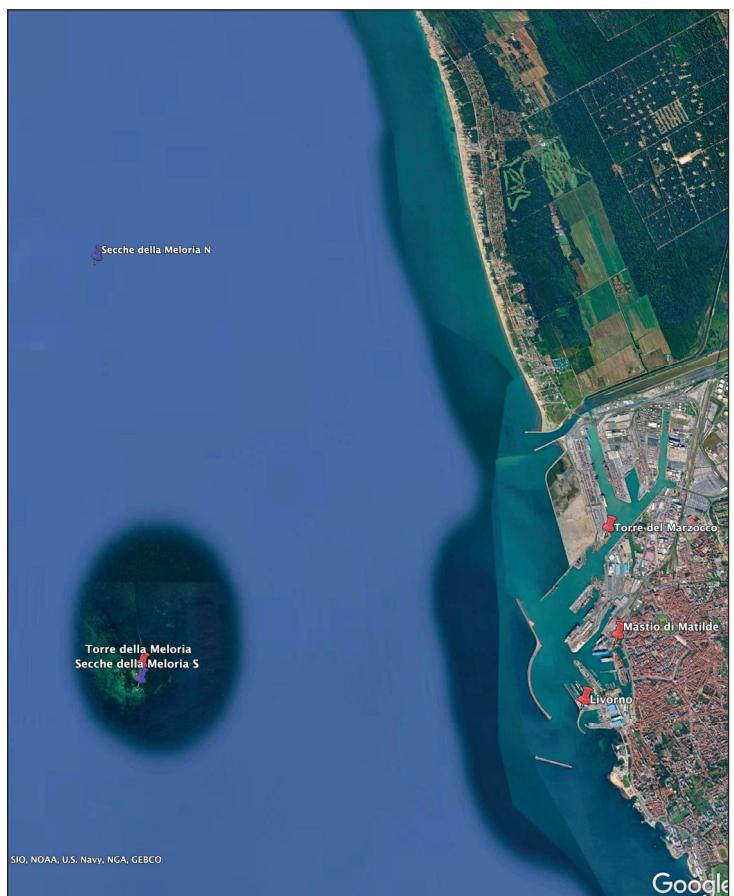
## Meloria

No medieval source provides a detailed architectural or technical description of a lighthouse at the Meloria shoal. Although later traditions consistently assume the existence of a tower or beacon intended to warn mariners of the shoals, the available evidence supports at most an intermittently lit warning structure rather than a permanent, monumental lighthouse, and its precise form remains irrecoverable. In any case, we might at once question the very poor opportunities of the location for permanent habitation by light keepers. Meloria is a historic maritime structure located approximately 7 kilometers off the coast of Livorno. The current structure dates back to 1709, though it stands on the site of much older foundations. The first structure is considered to have been a lighthouse built in 1157 by the Republic of Pisa to warn sailors of the dangerous rocky shoal. It also served as a lookout for Saracen pirate raids. This original tower was destroyed by the Genoese in 1286 following the famous Battle of Meloria (1284), which signaled the decline of Pisa as a naval power. A second tower was built in 1598 by Grand Duke Ferdinando I de' Medici but was eventually demolished by the sea. The tower seen today was commissioned by Cosimo III de' Medici. It features a unique architectural design consisting of four quadrangular pillars connected by Gothic arches, which support a 15-meter-high square stone tower. This design allows waves to pass through the base, making it more resistant to the sea's force.

To provide better signals than the aging 1709 tower, two functional lighthouses were later built on the shoal: the Meloria South End Lighthouse (established in 1867; current tower built in 1950) and the North End Lighthouse (built in 1958).



*ABOVE: The unique design of the old structure (left) on the Meloria shoal stands 200 m distant from the south end lighthouse of 1950. A second modern lighthouse lies 6.5 km to the north. The map BELOW shows the relative positions of the towers described.*



# The Uniqueness Of Venice

The maritime history of Venice is without parallel during three centuries of the timespan in this book. Most readers will be aware that it is a city on the water, a fact that is enough to render it unique, but the consequence is that Venetian mariners developed a special relationship with the sea and this began with the marking of their own waters at home.

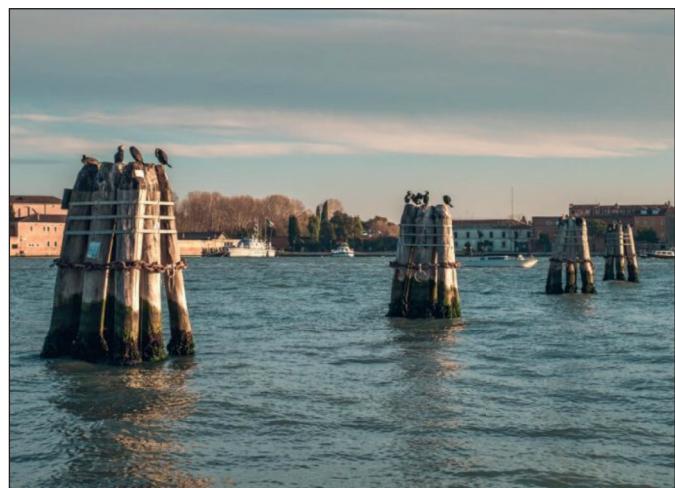
Venice is “complicated” for a very specific reason: most navigation was not coastal landfall navigation, but lagoon-and-channel navigation, so the Venetian Republic, in contrast to their competitors, the Genoese, invested in a system of marks, buoys, and alignments rather than lighthouses. It could be construed that Venice lagged behind Genoa in lighthouse architecture, while surpassing them in navigational sophistication.

There were two different issues faced by Venetian seamen. First, was the offshore approach from the Adriatic where there were several lagoon inlets. Ships needed recognizable entrance points and even today these can be identified as the Lido at San Nicolò, Malamocco and Chioggia. Once a ship had entered through an inlet, long-range lights became less useful than continuous channel marking, alignments, local signals, and regulated pilotage. As a result, Venice developed one of the densest pre-modern signalling systems in Europe, most of which did not involve lights at all and where lights, when present, were secondary to positional markers.

The second feature of navigating these waters was in the pilotage once inside the lagoon, for here ships needed dense marking of channels because of shoals, shifting sands, and narrow dredged fairways. This second problem would result in a network of aids rather than the building of lightstructures.

Venice developed a vocabulary to describe their bespoke material culture of lagoon marks, using terms such as *mede*, *dromi* and *briccole* that indicated routes, junctions, and safe water. Modern views of lagoon navigation still highlight the continuing importance of traditional markers (*briccole*) for navigation and regulation inside the lagoon.<sup>26</sup>

*Mede* or *dromi* were fixed channel markers on the edges of navigable channels. They were wooden piles, posts, or bundled stakes, sometimes paired to form gates. This method has been described



ABOVE: Two different types of piles, unlit markers used in the Venice lagoon.

from the medieval period onward, with continuous renewal. They were generally unlit and relied on daylight visibility and repetition. These markers did the work that lighthouses did elsewhere for they defined where safe water was.

*Briccole* were clusters of piles that indicated channel bends, junctions, or other limits. They were three-pile or multi-pile structures tied together. They also had medieval origins, and were systematised in the late Middle Ages and early modern period. Again, they were unlit until modern times. *Briccole* are still in use today and are the clearest survivals of these medieval lagoon navigation practice.

Alignments and sightlines were factors that Venetian navigators relied heavily upon. These were church towers, *campanili*, fortifications, and island profiles. Some alignments were explicitly known to pilots without ever being referred to in writing. They worked only in daylight, reinforcing the idea that arrivals in Venice were preferred by day.

Lights did exist within this system but they were selective, strategically placed, and subordinate to the marker system. Lights were thus used for the inlet or approach lights, as at San Nicolò del Lido or Sant'Erasmo. Lights were also used at harbour-edges or as control lights near landing points, quarantine stations, or guard posts. Finally, there were occasional or conditional lights set during storms, ceremonies, or military movements.

There was no single lighthouse authority, for before the modern period Venice did not have a dedicated lighthouse service. Responsibility for local navigation was distributed among members of Senate and Collegio who made strategic decisions. Magistrates were also involved to oversee waters and works, with inputs from other stakeholders such as local religious institutions, pilots and port officials.

The key entrance tradition can be found at San Nicolò del Lido.<sup>27</sup> Here, a widely repeated claim in Italian lighthouse-policy literature is that a *faro* was proposed in 1312 and in existence by 1321 at San Nicolò al Lido.<sup>28</sup> A secondary light tradition is based around a site at Sant'Erasmo where a smaller light was reported by c. 1350 and was said to have remained active until the end of the Republic.<sup>29</sup>

Even when lights existed at the inlets, the inner lagoon still required pilots and a dense marking system because fixed long-range lights could solve the problem of a constantly shifting shallow environment. Today's Marina Militare "Servizio Fari" listings make clear that Venice's aids are still distributed as a system: not only "*fari*," but also *fanali*, *mede*, and special marks at or near the inlets and channels.<sup>30</sup> This modern distribution is not direct medieval proof, but it is a good proxy for where the navigational problems were concentrated in the past. Harbour approach lights were primarily to be found at the lido inlet of San Nicolò with the Sant'Erasmo site as a secondary location.<sup>31</sup> Lagoon pilotage marks that were not lit yet still navigationally essential were the *mede*/ *dromi*/ *briccole* networks that formed the signalling infrastructure, even when unlit).<sup>32</sup> In support of these strategies were port governance texts, statutes and regulations.<sup>33</sup> The key medieval approaches to Venice were the northern inlets of the lagoon around Porto di Lido at San Nicolò, with additional passages historically nearer Sant'Erasmo before the shallow waters changed significantly later.

Other points of entry into the lagoon were not lit until much later. For Malamocco, references cluster in the 19th-century institutionalisation of lights, rather than medieval lighting. Two independent secondary accounts describe a state/imperial



ABOVE: *Venice did not have conventional lighthouses like the Murano until the modern period.*

programme that installed the *fanali* of Spignon and Rocchetta at Malamocco in 1855. [giragiralagune.org] An 18th-century Triestine insurance-history text uses "Spignon" as a recognized reference point for vessels leaving the port of Malamocco, showing that the place-name and navigational habitus were established well before modern lights. (Internet Archive) No secure pre-1700 "lighthouse" evidence appears in the readily citable material in the site survey references. Functionally, Malamocco required signals, marks and pilotage, but the fixed lights came later.

At Chioggia, as with Malamocco, the most clearly citable "first" in the material above is modern: the same 19th-century network-building accounts state that a Chioggia light was added in 1863. [giragiralagune.org] Like Malamocco, Chioggia was an inlet where entry depended on daymarks, pilots, and local signalling, with formal fixed lighting becoming clearly visible only in the modern period.<sup>34</sup>



ABOVE: The Benedictine abbey of St Mary's Lokrum is a monastic site that intermittently functioned as an ecclesiastical navigational light.

## An Early Adriatic Network

A mongst all the military, political and economic turmoil we can find elsewhere across the Mediterranean, one little-known maritime success story is to be found along the Dalmatian-Croatian coast. Here we find a history shaped by an unusually stable and plural political structure in which maritime priorities consistently outweighed territorial ones.

After a period of late antique and Byzantine influence along the coast, effective control fragmented between coastal cities oriented toward the Adriatic economy and inland polities with limited naval reach. We have been considering the impact of Venetian influence far beyond its lagoons and it is obvious that the eastern coastline of the Adriatic Sea - those shores closest to home - would soon become a matter of great importance to such an outward-looking people. An inspection of the map quickly highlights a region of great geographical complexity with thousands of small islands and other hazards for the navigator, making it an obvious subject for enhanced navigational skill.

From the twelfth century onward, Venice

progressively asserted dominance over most Dalmatian ports, not as colonies, but as integrated nodes in its continuously growing maritime state. It allowed substantial municipal autonomy in exchange for loyalty, port access, and adherence to Venetian maritime law. Alongside this, the independent city of Dubrovnik pursued an agile diplomatic strategy, maintaining autonomy through treaties with Hungary, the Ottomans, and Italy while also cultivating a sophisticated legal and commercial regime centred on shipping.

Inland pressures from the Hungarian Crown, and later the Habsburgs and the Ottomans, rarely upset this coastal orientation but instead gave support to the dependence on sea-borne trade and external alliances. The result was a coastline governed less by the kinds of feudal fragmentation that took place elsewhere than by continuously operating maritime institutions, in which security, commerce, and navigation were treated as matters of statecraft over several centuries. Forever confined by the available technologies, we find that these waters became well versed in the provision of navigation lights in times much earlier than took place elsewhere, and

in concert with the clear organizing principles adopted by the Venetians across much broader sea areas, it could easily be argued that the Adriatic Sea was an early adopter of the principle of a formal network of lights.

For most of the years relevant to this study, the polity in question was known as the Republic of Ragusa centred on Dubrovnik. Here a dispersed system of coastal/island guard duties and seaward approaches was organised by the state and interlaced with small offshore ecclesiastical establishments that sat in exactly the right places for routine observation, signalling, and it became a repository of practical navigational knowledge such as currents, anchorages and approach-lines.

Documentary and pilotage evidence from Dubrovnik and Savudrija demonstrates that the eastern Adriatic employed maintained harbour and coastal lights from the later Middle Ages, embedded within civic or Venetian maritime institutions rather than arising as sporadic or purely military signals.

From the later thirteenth century, the narrow Ston Channel controlling access to the Pelješac Peninsula and the lucrative salt pans was protected and administered by ecclesiastical institutions closely tied to the Ragusan state. Contemporary Ragusan records indicate the presence of a maintained harbour or channel light, almost certainly a fire or lantern associated with monastic or chapter property near the harbour approaches of Ston or Mali Ston.

The key point is custodianship: the tending of the light fits a broader pattern in which Benedictine or cathedral institutions were entrusted with regular, ritualised maintenance of navigational aids, supported by rents or salt revenues. This arrangement ensured continuity across political and military disruptions and produced unusually stable long-term operation. Ston exemplifies a pure ecclesiastical maintenance model, where navigational lighting is embedded in monastic routine and fiscal endowment rather than civic wages or military watch. This is one of the clearest Adriatic parallels to early monastic light-keeping at sites such as Genoa's Lanterna in its earliest phases.

Another site closer to Dubrovnik is the Benedictine abbey of St Mary on Lokrum<sup>35</sup> founded 1023, with long-lived buildings and landed interests on nearby islands. It is a particularly clear example of a permanent clerical community positioned immediately off the harbour approaches, with a documentary and art-historical trail that makes it visible to historians.<sup>36</sup> Daksa, likewise, is well documented as an offshore Franciscan site with a medieval footprint on the immediate doorstep of Dubrovnik, and it appears in modern scholarly works of the province's strategically sited friaries.<sup>37</sup>

That said, what is unusual here is less the existence of religious houses near sea-routes than the density and archival legibility of such sites around Dubrovnik's island-



ABOVE: Croatia's Savudrija lighthouse.

and-channel geography; comparable lights are also argued for parts of the Byzantine/Aegean world, so the high density of these sites around Croatia is best thought of as a particularly well reported Adriatic concentration than a Croatian invention.<sup>38</sup>

Under Venetian rule from the early fifteenth century, Hvar (Lesina) became a key naval and commercial relay in central Dalmatia, guarding approaches through the Pakleni Islands. Venetian administrative sources and later nautical documents consistently emphasise night entry and protected anchorage, implying the use of maintained harbour fires or lights marking the inner channel rather than the open sea.

As with Savudrija, these were not lighthouses but institutionalised lights, probably mounted on fortifications or harbour structures and supported through Venetian port administration. Their role was to enable reliable nocturnal coastal sailing along the island chain linking Split, Hvar, and Korčula. Hvar shows how Venetian maritime governance reproduced light-bearing sites systematically, even where geography already offered some shelter. It supports the idea that Dalmatian lights were part of an integrated coastal system rather than isolated responses to danger.



ABOVE: In the Rhodes harbour fortress Agios Nikolaos (St. Nicholas) stands one of the very few genuine pre-1700 lightstructures in Greece.

## Greece

It may come as a surprise to readers that although the Greeks can be considered to have 'invented' the lighthouse,<sup>39</sup> after the passage of 13 centuries up to 1700, there were hardly any structures amongst the great stretches of Greek coastline that can today be called a lighthouse or lightstructure. This remarkable observation needs careful analysis.

With the exception of the Pharos of Alexandria (in Egypt, of course - not Greece), Greek and Aegean lights were not conceived as purpose-built towers in the medieval or early modern period. It was not until the mid-19th c. that the modern Greek lighthouse began to appear across the Mediterranean. That does not mean that navigators were without assistance at night. The empirical answers to the puzzle are to be found in Chapter 3 but a deeper analysis relevant to Greece is important at this point.

Night illumination was typically formed of fires, lamps and braziers that were supplementary to local facilities and not architectural structures. Lights were attached to pre-existing places rather than embodied in new structures. The locations used were headlands, city walls, fortresses, monasteries and other towers. There was simply no strong architectural incentive to construct a "lighthouse

building" that would leave a recognisable footprint.

Greek waters contain great numbers of islands and other dense geographical features that make line of sight visibility of great importance. With their great tradition of sea-faring, there was no shortage of experienced local pilots and sailing patterns were both seasonal and regional. Such circumstances made it most suitable, when lighting was desirable and practical, for such aids as open fires on platforms, temporary scaffolds, rooftop lamps and mobile or replaceable installations - all more difficult when attempted in the harsher climates of northern Europe or the Atlantic. A fire that could be rebuilt after a storm was more useful than a tower that required capital investment and maintenance.

An important aspect relevant to these parts of the Mediterranean was that political fragmentation discouraged monumental infrastructure. From late antiquity through to Ottoman rule, Greece experienced rapid changes of sovereignty and fragmented authority during various periods of history we now call Byzantine, Latin, Venetian, and Ottoman. This story of unsettled change imposed chronic fiscal constraints in a region where there were also serious risks due to piracy and warfare.

In such an environment ports were fortified, cities defended and lights, though clearly beneficial to any administration, were part of a general evolution, rather than becoming part of the infrastructure. No polity had either long-term control of a coast, or the bureaucratic incentive to build structural aids to navigation. It is true that during Venetian times, Venice built lighthouses where governance was more stable, but this, as we have just described, was generally in its Adriatic cores and less obvious in the Greek archipelago.

All of this is perhaps most relevant to civic cultures. Where ecclesiastical and military lights were concerned, somewhat different reasoning applies, for in both cases the showing of lights was part of their presence in the community. So apart from those sites where lights were managed by civilian watchmen as part of their community responsibilities, many Greek lights were maintained by religious custodians or garrison troops. But still no construction of lighthouses was involved until modern times. These lights used existing parts of their fortifications or chapels and required no structural modification. They left no architectural signature distinguishable from domestic or defensive use. A parapet that once held a brazier is archaeologically invisible.<sup>40</sup> Where structures did exist, they were repeatedly overwritten. Coastal Greece has experienced continuous rebuilding, seismic destruction and re-fortification, all of which require quarrying and re-use of stone. In Volume 1 I described at length how numerous lightstructures occupied the Mediterranean but the churn of natural events, coupled with political upheavals, meant that any small-scale platform, tower-top, or masonry feature associated with a medieval light would almost certainly have been reused, removed, buried, or obliterated by later works. This is especially true at exactly the sites where lights were most useful.

The long-term influence of the Pharos may also have distorted expectations. Modern scholarship has been much influenced by the Alexandrian model for a tall, monumental, purpose-built lighthouse. We can now see that this model was exceptional, imperial and symbolic and not at all representative of how navigation lighting worked in most of the Mediterranean. This is a curious conclusion given that from today's perspective the Pharos influenced pharology as much as Miles Davis influenced jazz.

## A Broader Comparison

We can confidently say that before 1700 Greek lights were functional systems, not architectural monuments. Lighting was distributed and local, and its inherent adaptability meant that there were very few lightstructures. Apart from those sites of great antiquity that remain, in the many minor cases that can be identified archaeology alone is insufficient to identify early lights: textual, topographic, and institutional analysis is essential.

The absence of surviving purpose-built lighthouse structures in Greece before 1700 is not the result of evidentiary failure, but reflects the fundamentally non-monumental character of pre-modern Aegean coastal lighting, which relied on ephemeral fires and lamps placed on pre-existing religious, military, and topographic features rather than on dedicated architectural structures.

Let's compare this with the situation found in Italy. Here there was civic and state investment in permanent port infrastructure. In several Italian settings (especially maritime-republic contexts), lighting became tied to port governance, customs, naval defence, and urban prestige, encouraging purpose-built installations. Thanks to Roman policy, lights were markers of engineered hazards and commercial hubs, and Italy thus has proven cases where lights were erected to mark specific navigational dangers - whether shoals or moles - that threatened high-volume trade.

We have seen that in Genoa, the Lanterna occupied a longstanding light-site that survives as an easily recognisable lighthouse monument. At Meloria rocks off Livorno/Pisa, a well documented medieval lighthouse tradition was established in response to a dangerous shoal; whatever survives has been rebuilt or modified, but the key point is that it was treated as fixed infrastructure rather than an *ad hoc* fire. The implication here is that Italy produces more lightstructures because the political economy of the coast produced institutions that wanted fixed, inspectable, fundable installations.

In the the Adriatic we find a sea corridor with many urban gateways. The Adriatic's long, narrow geography scattered with many islands in just the same kind of geographical setting as Greece, concentrates traffic into predictable routes and urban choke points, encouraging many harbour works that can physically host lights that are an



ABOVE: A second pre-1700 Greek lightstructure stands at Methoni in the Peloponnese.

attribute of engineered harbour architecture. In many Adriatic towns, the “light” is not a tower in the Pharos sense but a small light on a mole or breakwater, modest but structurally real. For example, at Dubrovnik (Ragusa), the Porporela breakwater is a 15th-century structure on which a small light was placed. Even if the lantern itself is later renewed, the harbour architecture is the durable element. Our analysis of Adriatic infrastructure highlights harbour-works with lights, not necessarily monumental lighthouse structures.

Finally we have the Levant where, of course, there is but one famous exception. The Pharos of Alexandria is the outlier that shaped so many expectations. It survived in part for many centuries but was ultimately crippled by earthquakes and later cannibalised for other purposes.

Elsewhere, there were high losses of original infrastructure because of intense silting, shoreline change, war-damage, reuse of masonry, and seismic events, all hostile to the survival of lightstructures, even where lights certainly existed. It is also true that military harbour control dominates the built

record. Thus in Crusader and later contexts, the archaeology reveals defensive harbour towers and moles; whether a navigational light was maintained can be historically plausible but was rarely preserved. Although it could be argued that many smaller medieval lights or signal fires existed without leaving much record, studies of portolan charts must be matched to other documentary or archaeological records that remain inconclusive in many cases.

On the evidence as it now stands, if we define the category strictly as structures whose primary or original purpose was to bear a navigational light before 1700, then the number of such structures surviving in Greece today even in ruinous form is three - one inside the Castle of Methoni in the Peloponnese another in a similar fortification at Rhodes and a third at Drakano on Ikaria. Clearly, the chances of survival were improved by being associated with a larger robust structure such as an old fortification. Even so, we must attach the codicil that we cannot rule out the use of these towers for provision of military signalling, but these arguments



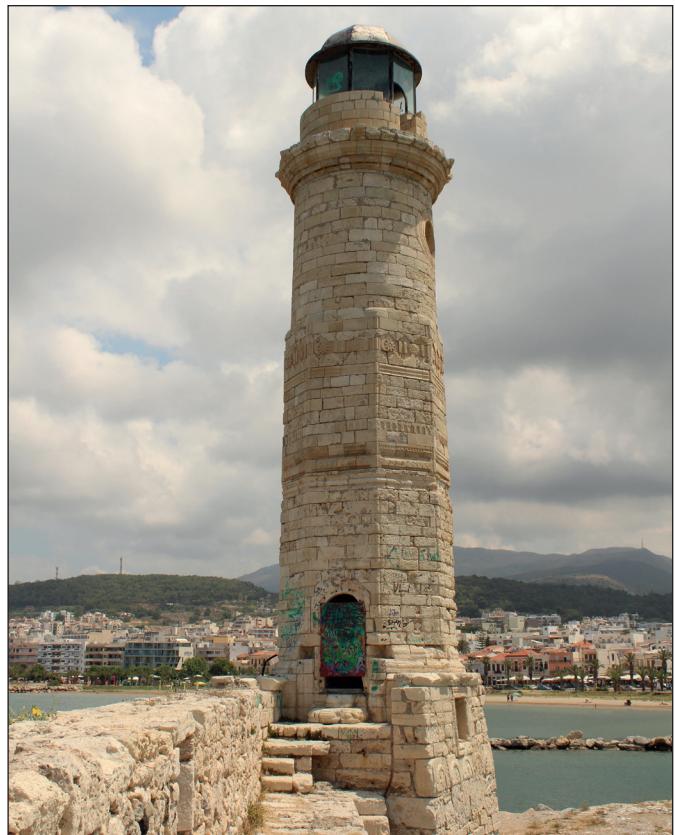
*ABOVE: A tower reported to date from the 4th century at Drakano on Ikaria.*

*RIGHT: The fine lighthouse at Chania on Crete.*

about our never being sure of the intended use have already been made.

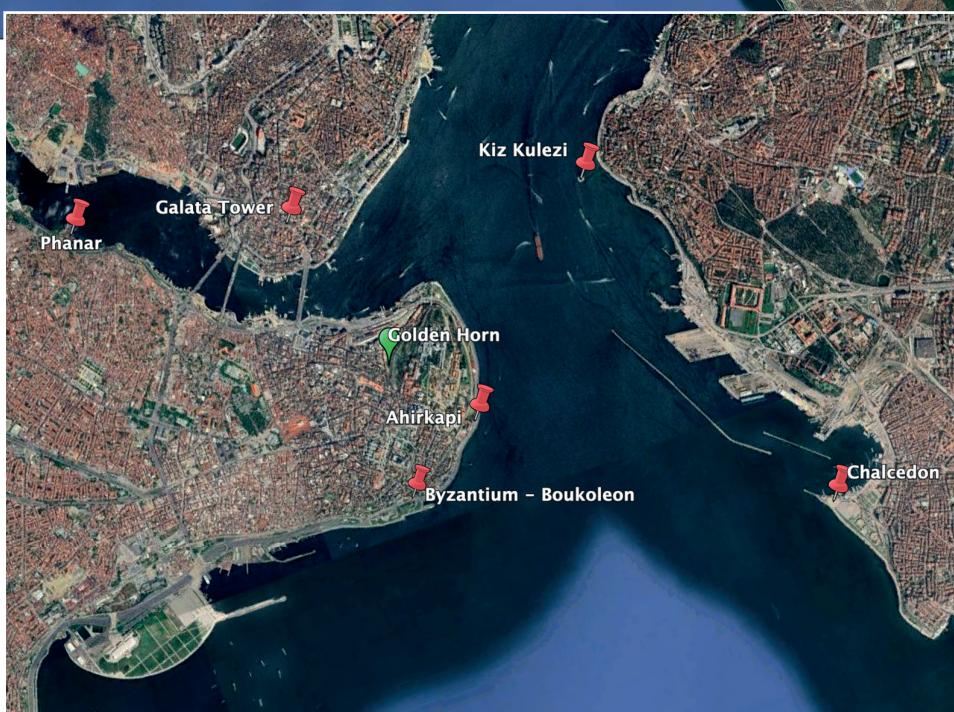
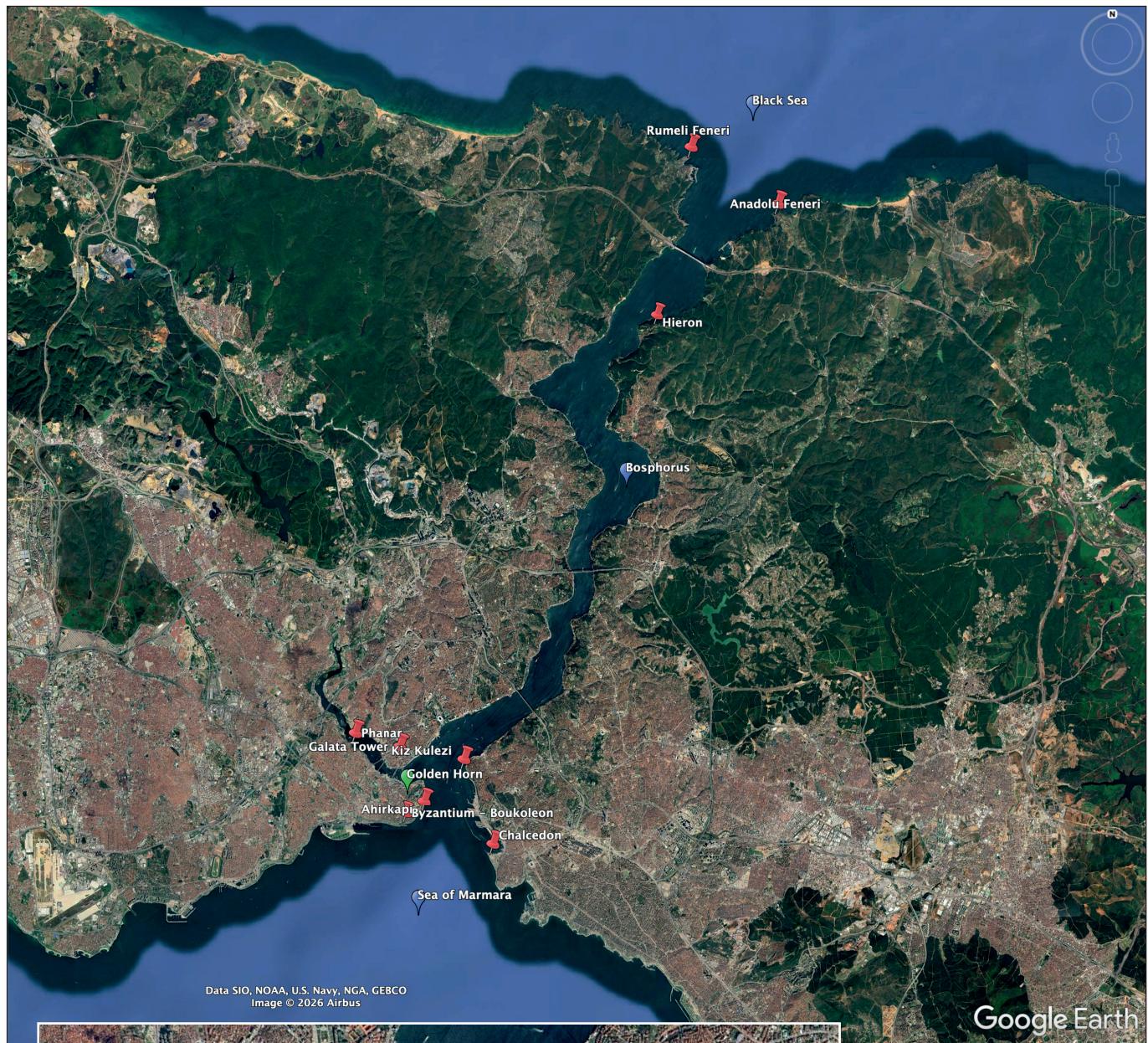
I should also report that studying the results of the site survey for Greece (see p331) shows that, of the 66 sites to be considered of significance, 28 were thought to have been lit with significant support from ecclesiastical sources. Indeed, inspection of the reports suggests that such inputs were rarely absent for many sites, especially in the years up to the 12-14th centuries. An important conclusion is just how valuable were the contributions made by these religious communities. This is, of course, hardly surprising when we introduce our knowledge (from the study of Volume 1) of the most ancient pre-Christian times in Greece when communities were so influenced by the need for holy support before and after their voyages that the building of sacred sites either in or adjacent to their points of arrival or departure became an intrinsic part of Greek culture. The result was that Greek culture was undoubtedly responsible for the creation of the lighthouse.

The rarity of dedicated medieval lightstructures in Greek lands does not mean that lights were rare - they were not. It simply points to a different ideology amongst sea-faring people of deep-rooted experience, operating in a marine environment with which they were well acquainted.



## Crete

Under Venetian rule from 1211 to 1669 Crete developed a selective and port-focused lighting system that reflected Venice's maritime priorities: safeguarding key harbours rather than illuminating coastlines. Venetian authorities relied heavily on pilotage, soundings, and local knowledge, supplemented by harbour beacons and fires at strategic ports, especially Candia (Heraklion), Rethymno, and Chania pictured above. The harbour of Chania (Venetian La Canea) possessed a Venetian-period tower at the mole head that almost certainly carried a harbour light or beacon fire, though not a lighthouse in the classical sense. Contemporary Venetian practice elsewhere suggests that such lights were intermittent or regulated, lit to assist arrivals under specific conditions rather than maintained as continuous long-range beacons. The structure's primary function was to mark the harbour entrance and protect the mole, with illumination integrated into defensive and operational routines rather than as a standalone navigational marker. The present lighthouse at Chania is Ottoman and dates from 1838 but is widely perceived as "Venetian." It well represents Venice's pragmatic approach to maritime lighting on Crete and Greece in general, where lights served ports and fleets, not the open sea.



*ABOVE: Map of the seaway called the Bosphorus joining the Black Sea at the top to the Sea of Marmara at the bottom. It divides modern Istanbul into its western (European) and eastern (Asian) parts.*

*LEFT: A magnification of the south-central historic part of Istanbul and the Golden Horn showing the sites of lights used to guide shipping.*



*ABOVE: The magnificent castle of Hieron oversaw all traffic passing through the Bosphorus and was without doubt a significant navigational aid for ships heading south, exiting the Black Sea towards Constantinople.*

## Turkey

The Byzantine Empire inherited the tradition of displaying lights from the classical Greeks. At Constantinople (Istanbul) the Byzantines maintained several beacon lights around the Bosphorus<sup>41</sup> and Golden Horn. By night, fires were shown to guide ships into the imperial harbour district. The system was integrated with signal beacons inland, which carried news across Anatolia to Constantinople.

A famous lightstructure stood near the entrance of the Golden Horn at the Boukoleon Palace, probably reusing or replacing an earlier Roman structure. It is described in Byzantine sources as being in use from late Antiquity into the Middle Ages. Procopius (6th c.) mentions lighthouses and signal towers on the Bosphorus that were kept for guiding ships and warning of approach. Later Byzantine authors (10th–12th c.) still refer to lights shown for navigation at the entrances to the capital and in key straits.

Archaeological traces at several sites in the Aegean, have found medieval watchtowers which may have carried beacons. We shall see later how

the Crusaders, who encountered Byzantine practice, also made use of beacon fires on towers in the Levant. Some Latin texts explicitly describe coastal beacons in the eastern Mediterranean. Thus we can be confident that the Byzantines maintained a chain of fire-signals (*phryctoriae*) across Asia Minor for military warning, and those same skills may well have been used for seafaring aids when necessary.

## The Black Sea Portal

Just as we have found in so many other locations around the Mediterranean, what distinguishes the evidence here is not the presence of purpose-built lighthouses, but the operation of integrated lighting systems embedded within sanctuaries, fortifications, harbours, and ceremonial spaces.

At the Bosphorus entrance to the north, Hieron functioned as part of a broader signalling complex that included paired headland fires (at Rumeli and Anadolu) and religious markers rather than an isolated light. The city of Byzantium itself operated as a maritime landscape in which walls, towers, and palatial structures substituted for a single pharos.



*ABOVE: The crucial site occupied by Rumeli Feneri is the gateway between the Bosphorus and the Black Sea. Once again, the structure of this tower strongly reflects the original Pharos design using two or more sections.*

In previous discussions, we have come across many locations where navigators benefitted either directly or indirectly from resources provided by members of the church, but here ecclesiastical involvement is generally weak or absent at the less significant sites, but becomes very plausible at the Bosphorus entrance and within the imperial city where churches and monasteries occupied prominent positions and were embedded in systems of defense, communication, and maritime control. Overall, Istanbul demonstrates that in the pre-modern period navigational light was achieved, not through isolated lighthouse towers, but through a dense, multifunctional, and hierarchically organized urban and ritual seascape.

There is little doubt that the entry/exit to and from the southern Black Sea was a crucial location for mariners and we can be very confident that the two locations, Rumeli Feneri (west bank) and Anadolu Feneri (east bank) were critical sites where lights to navigators were shown through many centuries. A third site at Hieron also acted as a kind of pharos.

Hieron lies on the Asian shore at the northern entrance of the Bosphorus, close to the point where vessels committed themselves either to the open Black Sea or to the southbound transit into the straits. Topographically, it occupies a commanding height overlooking the narrows, with distant visibility seaward and southward into the Bosphorus. Hieron is one of the earliest and best examples in the Bosphorus region of a site where fire, ritual, and navigation intersect. Ancient literary sources identify it as a sanctuary, associated variously with Zeus Ourios and other protective deities of passage, that was frequented by mariners before entering the straits. In volume 1, I described these types of sanctuaries at critical maritime thresholds in antiquity that were commonly maintained with visible fires or flames, both for ritual purposes and as place markers. It follows that since the Bosphorus entrance required clear, visual confirmation of landfall and orientation, especially in poor visibility or poor light conditions, there was a long period of use as a navigational waypoint. Later Byzantine and Ottoman signalling practices



*ABOVE: This modern structure at Anadolu Feneri is the partner to Rumeli Feneri, visible in the distance on the right of the image. The Black Sea is to the right; the Bosphorus and Hieron are to the left beneath the bridge that today joins Europe and Asia.<sup>44</sup>*

at the Bosphorus mouth do also demonstrate functional continuity in the use of elevated fires at this location. Evidence supports the conclusion that fires were shown at or near Hieron on a recurrent basis, serving simultaneously ritual, signalling, and navigational functions. This represents structured light-use without specialized lighthouse building.

But Hieron is also crucial in the broader picture because it demonstrates a pre-Christian sacral model of lightkeeping that later ecclesiastical practices could inherit or copy. Perhaps we might conclude that this site was the model upon which the Ecclesiastical light was based in later centuries. It must surely have served as a big influence, given its prominent position for those apocryphal voyagers of the Seven Seas - when ships were made of wood and men were made of steel. We now know that in the pagan period the sanctuary's ritual fire was embedded in maritime practice. Then, in late Antiquity, as Christian institutions replaced pagan cults, the association of sacred sites with prominent coastal positions did not disappear, even as religious meaning shifted. While there is no surviving Christian dogma assigning to monks the responsibility for a navigational light at Hieron, the institutional logic of sacred continuity strongly supports the plausibility of clerical participation in maintaining visible fires or signals in the later period. Thus, Hieron provides a highly significant bridge between pagan sanctuary

fires and later ecclesiastical or imperial signalling at the Bosphorus entrance.

By the Byzantine period, Hieron's original cult function had faded, but the site's signalling value remained. Fires at the Bosphorus entrance were integrated into wider systems of maritime traffic control, early warning and defence and communication with Constantinople. Ottoman practice continued this emphasis, embedding the Bosphorus entrance within fortress-based signalling networks.

## Istanbul

There is an embarrassment of riches when we come to consider the situation in Istanbul.<sup>42</sup> So rich and dense is the history of this area that the possibilities for confusion about specific sites and their past references is rampant. I feel vulnerable to being misled by references claiming academic authenticity so I should start this a section with a disclaimer that I cannot guarantee perfect accuracy. I will, however, present my best judgement of this complicated historical site.

During the course of my research I have identified the following sites in the region for analysis: Hieron, Kız Kulesi, Galata, Phanar (Planar), Chrysopolis, Ahırkapı, Byzantium, and Chalcedon. Together they constitute a virtually complete catalogue of



ABOVE: The famous islet structure of Kız Kulesi is considered by many to be a medieval lighthouse.

locations where pre-1700 lighting or signalling is either documented, strongly implied, or structurally necessary. For navigators steering south through the Bosphorus, they would soon encounter, beyond the twists and turns of this vital artery, the complex of settlements that I here group together as Istanbul. The first problem for us in modern times is to shine a light (pun intended) upon the confusion that exists around two names - Chrysopolis and Kız Kulesi.

References in Byzantine, classical, and early modern sources to a light or tower at Chrysopolis do not denote a distinct mainland lighthouse, but refer to the offshore tower situated on the small islet immediately in front of Chrysopolis (modern Üsküdar), later known as Kız Kulesi or Leander's Tower. In Byzantine usage, Chrysopolis is the name of a location on the Asian shore of the Bosphorus, and structures described as being "at Chrysopolis" are frequently situated off that shore, particularly in texts concerned with ceremonial visibility, maritime control, or the Bosphorus crossing. Classical accounts of a fortified structure associated with a chain of control across the straits also point to an offshore installation rather than a shore beacon. Early modern travellers, including Pierre Belon (1550) and Philippe du Fresne-Canaye (1595), describe a tall, isolated tower standing in the water opposite Constantinople, a description that corresponds to

the islet of today's Kız Kulesi. Modern scholarship has consistently located these references on the islet itself, not on the Chrysopolis waterfront, and there is no firm archaeological or textual evidence for an independent lightstructure on the mainland at Chrysopolis. The apparent duplication of sites in the literature thus results from differing locational conventions rather than from the existence of two separate navigational structures.

So, regarding Kız Kulesi, we know that it occupies a small offshore islet immediately off the Asian shore of the Bosphorus and just south of the strait's narrowest point.<sup>43</sup> It is opposite the historic peninsula known as the Golden Horn. It lies within the inner traffic zone of the Bosphorus, where currents, cross-channel movements, and anchorage manoeuvres converge. Visibility extends both north-south along the strait and westward toward the sea walls of Constantinople.

Kız Kulesi is often described as a lighthouse, but this is anachronistic because there is no evidence for a purpose-built lighthouse here before the modern period. However, we can say that there was a long sequence of tower-based uses for this site in which fire and light almost certainly played continuing roles. Ancient and medieval sources document a tower or fortified structure on the islet from at least the Byzantine period, used for customs control,



*ABOVE: The Galata Tower is another strong candidate for showing lights that assisted mariners.*

surveillance, and defence. Its location also made it an ideal point for signal fires, whether to regulate shipping, warn of danger, or communicate with the city. Any light shown here should be understood as periodic and functional, not as a continuously maintained navigational beacon.

Furthermore, unlike at Hieron, ecclesiastical involvement at Kiz Kulesi is unlikely. The tower's primary functions were imperial and fiscal, and not religiously oriented. While Christian symbolism later attached itself to the site through legend and narrative, there is no evidence of monastic or clerical responsibility for lighting or signalling here. Kiz Kulesi therefore contrasts with Hieron by being a secular, administrative signalling point, rather than a sacred one.

Galata occupies the northern shore at the mouth of the Golden Horn, facing the historic peninsula of Constantinople and controlling the transition between the open Sea of Marmara, the inner harbour of the Golden Horn, and the Bosphorus beyond. The site is dominated by a steep ridge rising immediately from the waterfront, topped in the later medieval period by the Galata Tower, which commands extensive views over the harbour approaches and shipping lanes.

Galata is the best example in Istanbul of a tower-based lightstructure although, sadly, we can

not assign it with a purely navigational function. Once again, as in parts of Greece, we can assign its origin to the presence of Genoese occupiers from 13th–15th centuries onward when Galata possessed a dense system of walls, towers, and harbour installations designed to regulate and protect Genoese maritime trade. The Galata Tower, completed in its Genoese form in 1348, was the tallest structure in the area and ideally placed for signal fires or lamps visible from the Sea of Marmara and the Bosphorus approaches. Genoese maritime practice elsewhere in the Mediterranean and Black Sea is well documented for the use of tower lights as harbour markers, even when not formally designated as lighthouses. While no surviving document states that a permanent navigational light was maintained at Galata, the combination of height, position, and commercial necessity makes the periodic or even regular showing of lights highly plausible, especially during periods of heavy traffic.

Ecclesiastical participation at Galata is unlikely because Galata's maritime infrastructure was commercial and communal, controlled by the Genoese merchant institutions. Churches existed within the colony, but there is no evidence that clergy were responsible for maritime signalling or lighting. This contrasts with sacred sites like Hieron and underlines Galata's secular, mercantile nature.



*TOP: This artist's impression of the Boukoleon Palace includes a suggestion of what the pharos would have looked like.*



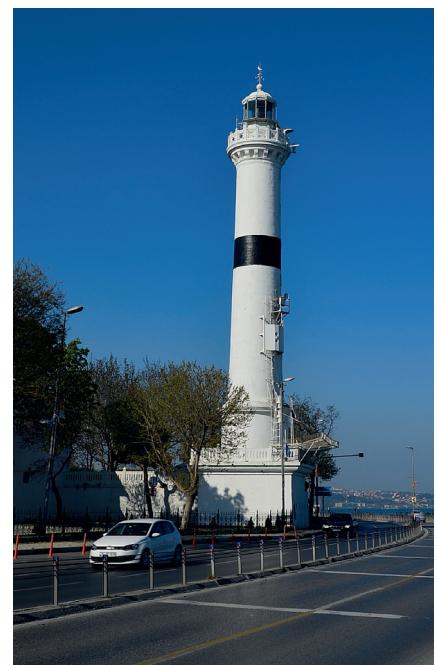
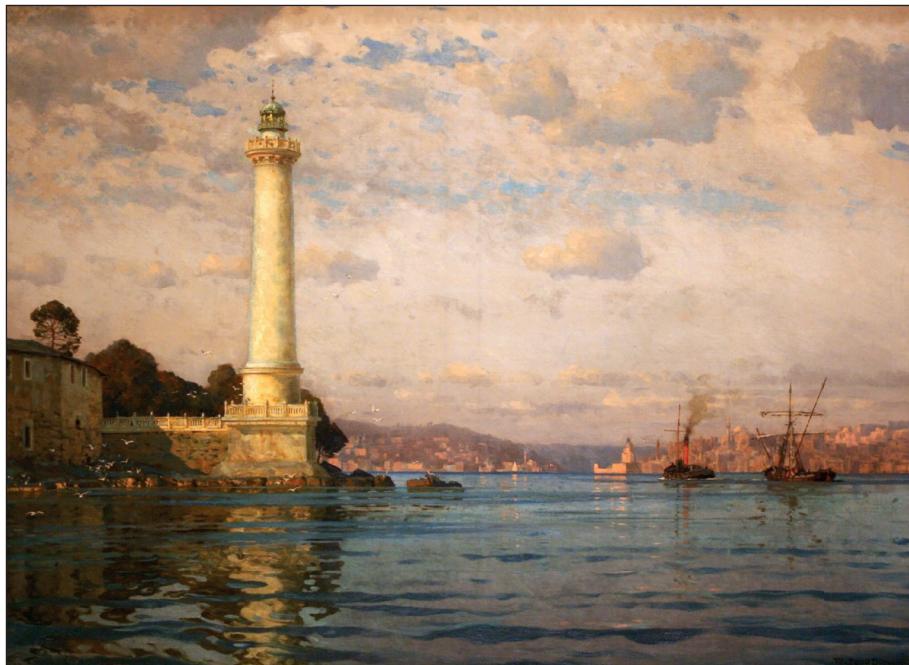
*LEFT: This early 20th century image shows the remains of the palace and the lower half of the pharos before redevelopment moved the remains from the foreshore.*

Even before the Genoese period, the Galata shore functioned as a support zone for Constantinople's maritime system, most likely hosting signal points and watch posts. After the Ottoman conquest, the tower and harbour remained in active use, and signal lights continued to be shown when required, now integrated into Ottoman harbour control and defence. However, no purpose-built lighthouse existed before the 19th century.

Under Byzantine rule, the tower functioned within the inner Bosphorus control system, coordinating with Galata, the sea walls, and Asian shore installations. After 1453, the Ottomans retained and adapted this role, using the structure

for surveillance, quarantine and customs, and warning and communication. Fires or lights may have been shown when required, but always as part of broader control systems, not as independent aids to navigation. Kız Kulesi acquired a true lighthouse role only in the modern period, when fixed lights were installed as part of Istanbul's integrated navigational system.

Phanar lies on the inner northern shore of the Golden Horn, well inside the sheltered harbour and far from the open sea. The area is defined by quays, warehouses, administrative buildings, and later ecclesiastical institutions, all embedded in a densely urban setting. Phanar is often misunderstood in



ABOVE: The modern lighthouse of Ahirkapi essentially replaces the old pharos in its position slightly north of the original, with the modern highway now pushing the Bosphorus aside.

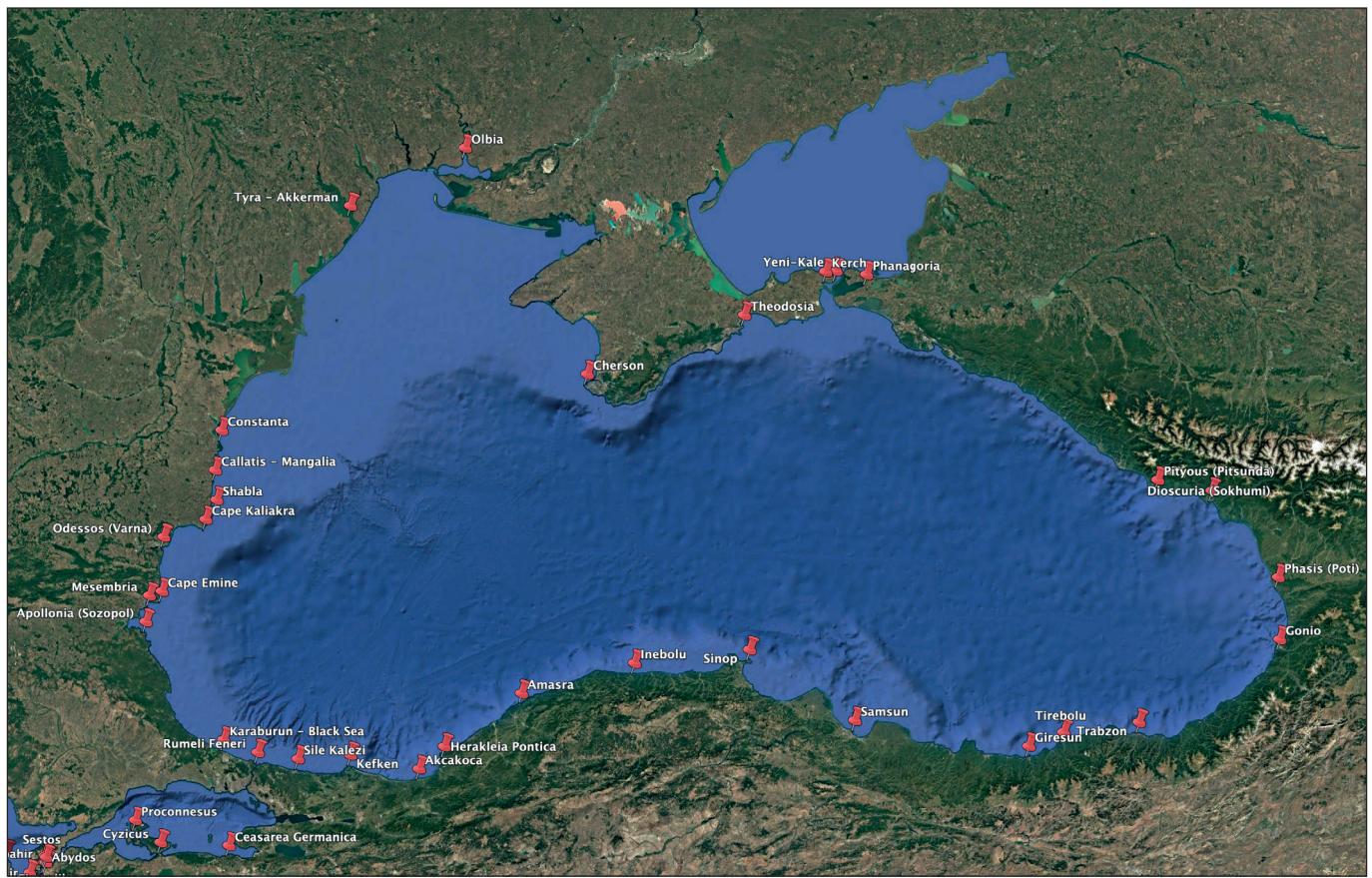
lighthouse histories because of its name (from *phanarion*, “lamp” or “lantern”). Crucially, the name used here does not imply a lighthouse but probably derives from its use either for urban lighting and signalling within the Golden Horn, not navigational marking from seaward, or else for lamps, torches, or fires associated with administrative control, ceremonial display, or harbour management, especially in a busy, enclosed port environment. Perhaps visual signals used to coordinate traffic, labour, or imperial movements inside the harbour, but there is no evidence that Phanar functioned as a navigational light.

There was a site of the Great Palace of Byzantium, served by an imperial harbour complex (Neorion, Prophorion, later Boukoleon), where lights could be shown for harbour operations, imperial arrivals, and fleet movements. An array of palatial and structures lay close to the water, whose illumination served ceremonial and symbolic purposes while also acting as visual markers. Rather than guiding ships by a single fixed beacon, Constantinople announced itself through a great show of light, a model well suited to a capital city whose maritime traffic was constant and internally regulated. At this Great Palace complex overlooking the Boukoleon harbour we can report a ceremonial and maritime lighthouse (pharos), explicitly named and described in Byzantine sources as existing from the late Roman period to Byzantine times, i.e. from at least the 4th

century onwards. As such it is the only confirmed Byzantine lighthouse in Constantinople

Constantinople presents the strongest case in the region for ecclesiastical participation in maritime lighting, though always as part of a broader system. The city contained an unparalleled concentration of churches and monasteries, many occupying prominent coastal or near-coastal positions. In Byzantine practice, ecclesiastical institutions were embedded in imperial infrastructure, including hospitality, storage, communication, and defense. Church lighting, whether lamps, vigil lights or feast-day illuminations, contributed to the city’s nocturnal visibility and could overlap spatially with maritime signalling without being dedicated navigation aids.

No surviving source assigns a church responsibility for keeping a harbour light, but the institutional and spatial integration of ecclesiastical buildings makes clerical participation in maintaining visible coastal light likely. Throughout the Byzantine period, light and fire formed part of urban defence, ceremony, and maritime control. However, the Byzantine Pharos associated with the Great Palace had ceased to exist by the late medieval period; its precise date and circumstances of destruction are unknown, but it was no longer standing by 1453. After 1453, the Ottomans preserved this model of seaway lighting by maintaining wall-based signalling and harbour lighting until the introduction of modern lighthouse technology in the nineteenth century.



## The Black Sea

Before 1700, navigational lighting around the Black Sea formed a coherent but highly constrained system, shaped by geography, harbour morphology, and institutional continuity. Along the western and south-western coasts, where Greek, Roman, and Byzantine urban traditions persisted, lighting took the form of embedded harbour fires and headland beacons, maintained as part of routine watchkeeping rather than as dedicated lighthouse establishments. The northern coast introduced a distinct liman and river-mouth logic, in which low-level, adaptable lights marked shifting channels and controlled access rather than guiding ships from the open sea, closely paralleling Nile-mouth practice in Egypt. In Crimea sites such as Chersonesus and Theodosia sustained Mediterranean-style harbour lighting through Byzantine and Genoese institutional frameworks, while Kerch and Yeni-Kale demonstrate the persistence of strait-based beaconing as an instrument of passage control. Beyond Crimea, along the north-eastern Black Sea, the network attenuated rapidly; steep terrain, climatic instability, and weak urban government reduced lighting to intermittent military signals, marking the effective outer boundary of pre-modern navigational light

provision. Taken together, the Black Sea reveals a lighting culture that was pragmatic, locally rational, and remarkably durable, yet deliberately non-monumental—an ecology of lights that functioned effectively for centuries before being abruptly superseded, rather than evolved, by the modern lighthouse system.

Along the north-eastern Black Sea coast, pre-1700 navigational lighting was sporadic, militarised, and ultimately unsustainable. Although several Greek and Roman ports—such as Phanagoria and Dioscurias—likely employed routine harbour fires during periods of prosperity, the combination of difficult coastal topography, climatic instability, and weak urban continuity prevented the emergence of durable lighting traditions. In the Byzantine and medieval periods, light was used primarily for military signalling rather than for navigation, embedded in forts and watch posts rather than harbours. This region thus represents the outer limit of the pre-modern Black Sea lighting network, beyond which permanent navigational lighting became impractical until the advent of modern engineering and state-sponsored lighthouse systems.



ABOVE: This engraving dated 1855 shows the "Lighthouse at Cape Chersonese Looking South." Here we see the approach to the Greek-founded city of Chersonesus Taurica in Crimea, which in Byzantine and later sources is often abbreviated simply to Cherson. The city near modern Sevastopol was founded as a colony by Dorian Greeks from Heraclea Pontica around 422–421 BCE. At this northern part of the Black Sea the earliest use of light dates from these earliest times as simple harbour fires that were local, intermittent, and practical. Sadly, there is no evidence for a dedicated lighthouse tower before the modern period and Cherson fits the broader pattern of non-monumental lighting common to Greek colonial and Byzantine provincial ports.



LEFT: Despite its importance as a Greek, Byzantine, and especially Genoese entrepôt (13th–15th c.), no source records a purpose-built lighthouse at Theodosia. This is striking given the port's scale and confirms that continuous lighthouse lighting was not a prerequisite for high-volume medieval maritime trade, even in the Black Sea. The massive Genoese walls and towers of Caffa functioned as dominant daymarks, and some towers were certainly capable of showing fires or signals when required but in Genoese practice, lighting was subordinate to defence and control, not institutionalised as a standalone navigational service.

## The Phoenician Coast

As we leave behind the Turkish coastline we move to a region generally known as the Levant, a roughly straight piece of coast running north to south that might also be called the Middle East. From Syria through Lebanon to Israel and Egypt we must be careful not to forget Cyprus which has a long history of difficult participation in the affairs of Greece and Turkey. Cyprus as in many other places, relied on harbour-based beacons and situational lights at its principal ports integrated into fortified moles, towers, or urban defenses. Under Lusignan and later Venetian rule, lighting functioned as a subsidiary aid to pilotage and port control, closely tied to military surveillance and harbour management rather than conceived as a separate navigational infrastructure for open-sea sailing.

In Volume 1 I described in detail how this part of the Mediterranean was home to that great nation of seafarers, the Phoenicians, and indicated how they might have played a role in the early use of lights for navigation. Their extended history was largely over by the centuries of this study, wiped out at the hands of violent Romans, and their lands eventually became settled by peoples we now call Syrians and Lebanese.

Along the Phoenician coast, navigational lighting before 1700 was shaped by a deeply embedded maritime culture embedded with deep practical seamanship, port familiarity, and institutional flexibility. Phoenician seafaring did not favour large towers but valued distributed, low-intensity aids such as harbour fires, quay-side lanterns, island beacons, and signal lights, all deployed where local knowledge identified a genuine navigational risk. This cultural predisposition persisted through Roman, Byzantine, Islamic, and Crusader periods, producing a long-lived preference for functional harbour lighting integrated into existing structures, rather than stand-alone lightstructures.

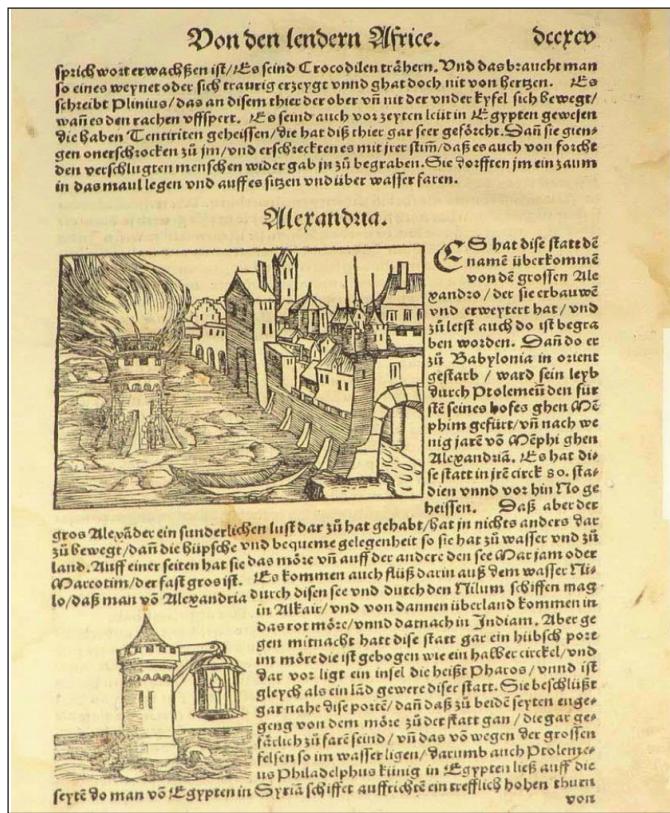
The management of such lights was correspondingly pragmatic. In the Phoenician period, fires were probably maintained by port officials, temple dependants, or civic agents embedded in palace or city administration, rather than by specialist light keepers. Under Roman and later regimes, responsibility shifted to harbour masters (*curatores portus*), military watchmen, customs officials, and fortress garrisons, with lighting treated as one duty among many, rather

than a distinct profession. In medieval contexts, particularly at Sidon, Tyre, and Tripoli, lights were almost certainly tended by soldiers, sailors, or port guards, occasionally supplemented by locally resident mariners or religious communities, operating on a situational or seasonal basis. The Phoenician coast thus exhibits a distinctive history in which navigational lighting was culturally normalised yet institutionally understated, embedded in everyday port practice and coastal surveillance rather than embodied into a specialised system of built structures.

## The Crusader Coast

The Crusader coast was a fortified Mediterranean shore stretching from modern Lebanon to northern Palestine, defined by a chain of Latin Christian port cities that linked maritime trade, pilgrimage, and military power between Europe and the Levant. It did not operate under a single, uniform lighting system, but instead developed, as had already been done for centuries, a rationale based on harbour morphology, military priorities, and inherited infrastructure. At one end of the spectrum stood Acre, where a confined artificial harbour, dense maritime traffic, and military administration made regulated harbour lighting a practical necessity. It was effectively institutionalised without actually building formal lightstructures. Caesarea Maritima<sup>45</sup> represents a case of infrastructural collapse, where fine Roman harbour lights were downgraded to beacon and signal fires once the harbour had failed. The usefulness of lights was substituted by increased dependence upon pilotage and identification. Jaffa illustrates a third model in which a dangerous roadstead precluded the use of true harbour lights altogether, instead relying on intermittent beacons to manage risk and communicate landing conditions. Finally, Ascalon exemplifies the extreme militarisation of coastal lighting for it was here that fires functioned almost exclusively as strategic signals, integrated into fortress defence rather than navigation. Together, these sites demonstrate that Crusader navigational lighting adapted inherited Roman and local practices where it could to serve immediate operational needs.

## North Africa



ABOVE: This image is a mid-sixteenth-century woodcut from Sebastian Münster's *Cosmographia* (first published 1544), shown here in an early German edition. The page forms part of Münster's description of Africa and presents a schematic view of Alexandria, accompanied by moralising and classical commentary (including references to Pliny). The main city view is not topographically accurate but follows contemporary European visual conventions, depicting Alexandria as a fortified harbour city intelligible to early modern readers. Below, a smaller woodcut represents the Pharos lighthouse, rendered as a symbolic tower rather than an archaeological reconstruction, reflecting the persistence of classical authority and inherited imagery long after the monument itself had disappeared. The marked divergence from the historical Pharos arises from the fact that no reliable visual model survived into the early modern period, and Münster was working from textual descriptions filtered through medieval tradition rather than observation. As a result, the lighthouse is shown using a generic tower type familiar from European coastal architecture, prioritising recognisability and clarity over structural accuracy, at a time when printed images functioned primarily as interpretive aids rather than documentary records.

From Alexandria westwards to Carthage, the pre-1700 lighting regime of the North African coast was asymmetrical determined by the very variable interaction of political authority, port hierarchy, and defensive priorities. At the eastern extreme, Alexandria retained the overwhelming exception in the form of the Pharos of Alexandria, which, despite repeated earthquake damage, continued to function as a navigational landmark and at least intermittently as an active maritime light well into the medieval Islamic period.<sup>46</sup>

West of Egypt, however, Roman North Africa presents a more scattered picture.<sup>47</sup> At Apollonia in Cyrenaica, archaeological and topographic evidence indicates a purpose-built lighthouse associated with the Roman harbour mole, though much of the structure now lies submerged following the seismic events of late Antiquity. Similarly, at Leptis Magna, literary testimony and architectural remains strongly suggest a lighthouse or lighthouse-tower integrated into the harbour complex, even if the precise form and lighting technology remain debated.<sup>48</sup>

Beyond these exceptional sites, the Roman and Byzantine periods relied more heavily on harbour towers, prominent headlands, and local pilotage than on monumental lights, producing a coastline only intermittently illuminated in the strict navigational sense.

Following the Islamic conquests of the seventh century, the emphasis shifted decisively away from lightstructures towards a distributed system of coastal surveillance that used fortified ribāts and watchtowers along the Ifriqiyan shore. Examples such as those at Sousse and Monastir have already been given (see p58). They were positioned for inter-visibility and employed beacon fires by night and smoke by day to signal hostile fleets and coordinate defence. Any benefit to navigation was essentially incidental rather than primary.<sup>49</sup>

By the time we reach Carthage, the Punic and Roman harbour complexes are exceptionally well documented archaeologically, but the existence of a discrete, purpose-built lighthouse cannot be demonstrated with confidence. At most, one might propose harbour-entrance towers capable of carrying fires, a hypothesis consistent with Mediterranean practice but not secured in surviving evidence. Taken together, the North

## Final Comments

African coast before 1700 thus reveals not a continuous “chain of lights” but a mosaic in which one enduring monumental beacon, a handful of Roman harbour lighthouses, and a later Islamic signalling coastline fulfilled overlapping but distinct functions within changing political and maritime regimes.

West of Carthage, the Mediterranean navigational lighting network fragments and ultimately dissolves. Roman Mauretanian ports such as Hippo Regius and Caesarea briefly sustained routine harbour lighting, but their early decline prevented long-term continuity. Further west, along the Algerian and Moroccan coasts, maritime practice shifted toward roadstead anchoring, river mouths, and Atlantic-facing routes, reducing the utility of fixed harbour lights. At the Strait of Gibraltar, sites such as Tangier and Ceuta almost certainly employed beacon and signal fires, but these functioned as strategic warning and control systems, not as aids to pilotage. The absence of sustained lighthouse culture west of Ifriqiya thus reflects a fundamental reorientation of maritime geography, where the institutional, harbour-based logic of the wider Mediterranean no longer applied.

In my chapter about the earliest lights of Empire I described the gradual introduction of lighthouse ‘thinking’ to the wider world and it is in some ways appropriate here too for along most of the north African coastline formal maritime lighting was introduced, reshaped, or intensified under regimes whose maritime culture originated in the northern and eastern Mediterranean, above all Roman, Byzantine, Venetian, and Ottoman authorities. This was because these powers brought with them infrastructural traditions that treated lights as part of state- or commerce-supported navigation. Byzantine influence at major ports, and later Venetian and Ottoman harbour lights were clearly tied to imperial logistics.

However, this does not imply the absence of indigenous or Islamic maritime agency. Under Islamic rule, North African coasts developed their own lighting practices, typically embedded in defensive and signalling systems such as ribāts, watchtowers, beacon chains. So external Mediterranean powers tended to introduce “lighthouse” thinking, while local regimes more often employed light as a tool only secondarily useful to navigation.

The purpose of this final section is to tidy up loose ends. This has been an extensive study across a wide area of sea and embracing many different cultural backgrounds. Each section has been a digest of the different geographical regions and the whole chapter is supplemented by much additional supporting data in Sections D, E and F of Chapter 12, the Site Survey.

However, there are a number of issues that remain unanswered so this might be thought of as my attempt at a kind of FAQ section. These questions have occurred to me during the course of my study so I am sure they could be in your minds too.

It seems curious that, despite the most wonderful examples of lighthouses being constructed, first at Alexandria and then at Genoa, there was so little adoption of the model across the wider Mediterranean and such a great extent of time. Before 1700, navigational lighting appears as a naturalised, almost taken-for-granted maritime practice: fires, lanterns, beacons, and harbour lights embedded in fortresses, quays, monasteries, ribats, and watchtowers, maintained pragmatically by local authorities and adapted to specific environments. Yet this long-standing continuity gives way, in the seventeenth and eighteenth centuries, to an extraordinary rupture, in which many traditional lights disappear or fall into neglect before being replaced, often after a substantial hiatus, by a new, technically and institutionally distinct lighthouse system.

This fracture should not be understood as a simple decline or collective amnesia, but as the result of a structural reconfiguration of maritime worlds. Firstly, early modern changes in ship size, draught, and sailing practice reduced reliance on night coastal pilotage. Then shifting trade routes and convoy systems favoured offshore navigation and daylight landfall. The weakening of local port institutions undermined the informal maintenance networks that had sustained pre-modern lights.

At the same time, emerging states were reluctant to assume responsibility for coastal lighting without standardisation, enforceability, and technological reliability, all of which only became viable with the advent of optical science, improved fuels, and centralised bureaucracies in the eighteenth and nineteenth centuries. The modern lighthouse thus did not evolve organically from

medieval practice; it replaced it discontinuously, transforming navigational lighting from a diffuse, situational craft into a systematised, state-managed infrastructure. The “gap” between these two very different worlds marks a moment when older lights no longer aligned with new maritime economies, yet modern solutions were not yet conceptually or administratively possible. This required an epochal transition in how the sea itself was governed.

When it finally arrived, the modern lighthouse system did not enter the Mediterranean as a sudden northern “wave,” nor did it arise from a straightforward internal evolution of medieval practice; rather, it emerged through a slow, uneven process of recognition, experimentation, and selective adoption between the late seventeenth and nineteenth centuries.

Northern Europe, particularly the Atlantic coasts of France, Britain, and the Low Countries, developed earlier pressure for standardised coastal lighting due to tidal navigation, poor visibility, dense commercial traffic, and strong central states willing to fund maritime infrastructure. Mediterranean powers, however, observed these developments, but initially lacked both the economic incentives and the administrative frameworks to replicate them. Traditional Mediterranean navigation continued to favour daylight sailing, offshore routing, and pilotage over continuous night approach, reducing the perceived urgency of large-scale lighthouse investment.

Change in the Mediterranean accelerated only when multiple pressures converged: the growth of deep-draught merchantmen, intensified naval warfare, the expansion of insurance and risk calculation, and the maturation of optical technology capable of producing predictable, standardised lights.

Even then, adoption was piecemeal. Individual ports and capes were upgraded experimentally, often under foreign influence administration, long before coherent national lighthouse services emerged. The result was not a technological invasion but a conceptual realignment, in which Mediterranean authorities gradually accepted that navigation lights must be permanent, uniform, and centrally managed, an understanding that marked a decisive departure from the embedded, situational lighting practices that had prevailed for centuries.

Let us next return to the greatest of them all. To this day, the Pharos of Alexandria stands out as the singular greatest building in the maritime environment and it is such a tragedy that, unlike the pyramids, we can no longer enjoy its aura. And we might say its fame was greater than its frame, yet it did not become the prototype of a reproducible technology.<sup>50</sup> The Pharos was a singular convergence of political ambition, geographic necessity, and fiscal capacity, and it was precisely this singularity that prevented its widespread replication. Alexandria’s harbours demanded a distant sea-mark across a low, featureless coastline; its Hellenistic rulers sought architectural expressions of dynastic power; and its state-controlled economy could sustain continuous maintenance on an unprecedented scale. Most Mediterranean ports faced none of these conditions simultaneously.

Elsewhere, landfall was visually legible, harbour entrances were close-range problems, and navigational risk could be mitigated more cheaply through embedded harbour lights, local pilots, and beacons. Roman “pharos-like” structures, as at Ostia, Boulogne, or Dover, were exceptional responses to local needs, not steps towards a standard system. More importantly, pre-modern polities lacked both the conceptual framework and administrative incentive to treat navigational lighting as a scalable public utility. Lights were justified locally, not regionally, and funded pragmatically rather than systematically. Without standardised optics, fuels, or signal differentiation, large towers offered little advantage over modest installations, while imposing heavy construction and maintenance costs.

The Pharos thus remained an icon but not a model. It was admired, referenced, and occasionally imitated, but never absorbed into a Mediterranean-wide technological tradition until the institutional and epistemic conditions of the modern era made replication both meaningful and economically viable.

We might now legitimately ask why Genoa, as a major sea-faring polity, created such a fine lighthouse, whilst Venice did not. The emergence of the Lanterna of Genoa as the most developed pre-modern lighthouse in the Mediterranean is a reflection of Genoa’s need for a singular, maritime marker, a need that Venice largely did not share. Genoa’s harbour sits on a steep, complex

Ligurian coastline, exposed to heavy weather and approached from open sea routes used by Atlantic, western Mediterranean, and long-distance merchants. Here, a powerful, elevated light visible far offshore provided genuine navigational value. Venice, by contrast, occupied a lagoon environment where access was governed by channels, pilots, tides, and local knowledge: navigation was a regulated process with distributed day beacons, and controlled entry. The maritime power of Venice rested on convoys, statutes, pilots, and bureaucracy, rather than on large, impressive monuments. Genoa was a more contested and outward-facing republic that embraced monumental harbour architecture as a statement of civic identity, autonomy, and maritime credibility, especially in competition with Pisa and Venice itself. The Lanterna thus functioned simultaneously as navigational aid, watchtower, and an emblem of the Genoese commune for which the political culture valued visible markers of sovereignty. In this sense, Genoa's lighthouse was the product of a different maritime rationality. Where Venice mastered the sea through regulation and control, Genoa mastered it through visibility and strength.

These studies quickly identify distinct differences between the three dominant maritime powers of the medieval Mediterranean. Pisa never lacked monumental towers but the city-state is not credited with creating a system of lightstructures. When Pisa is viewed through this lens, it appears anomalous or deficient: a major medieval maritime republic that seemingly "failed" to construct a lighthouse. This conclusion, however, rests on the assumption that effective navigation necessarily required a single, dominant structure. In reality, Pisa's maritime environment and institutional culture encouraged a different navigational logic. The Pisan coast was centred on a shifting river mouth rather than a fixed harbour entrance, and navigation relied heavily on pilots, alignments, and local knowledge. Within this context, the proliferation of coastal towers capable of displaying fires constituted a distributed system of visual cues, flexible enough to adapt to silting, changing channels, and occasional military threats. Because these towers were multifunctional and often only intermittently lit, they do not appear clearly in studies that seek "lighthouses" as discrete, permanent institutions.

A further distortion arises from the fragmentary nature of medieval administrative records. Pisa never developed a centralized lighthouse service comparable to that of early modern Genoa or Venice. Responsibility for coastal towers was divided among communal authorities, ecclesiastical bodies, and private interests. As a result, documentation tends to describe towers in terms of defence, jurisdiction, or taxation rather than illumination, even when lighting was evidently part of their practical use. The absence of explicit reports of "lighthouse" in these records has been mistaken for the absence of lights.

Finally, Pisa's maritime decline after the late thirteenth century, accelerated by the defeat at Meloria and by progressive silting, has encouraged retrospective narratives that read backward from failure. Towers that survived as ruins or were absorbed into later Tuscan defensive systems are interpreted as evidence of redundancy or inefficiency, rather than as remnants of a once-functional coastal signalling network. A more historically sensitive reading recognizes Pisa not as a republic without maritime lights, but as one that pursued an alternative, network-based approach to coastal visibility, effective within its environmental and political constraints, yet poorly served by modern lighthouse-centered analyses. Thus, a detailed study of the navigational strategy for entry into the Pisan harbour system highlights a rather different logic - one in which there is no dependency on a single lighthouse. Offshore there was a distinct hazard at Meloria that gave rise to a tradition of warning against dangers - a rare function in the Mediterranean and one that predates the story of the Eddystone. Even today, the function remains, as I described on p237. Port-zone towers were used as control plus cues that led to the inward bearings to steer. Porto Pisano is described in later summaries as having multiple towers - even a chain at the entrance. These are indicators of a port that is simultaneously militarised, regulated, and guidance-dependent. Later, as the harbour basin and usable approaches migrated due to sediment build-up, Pisa's best solution was redundant vertical markers, structures that could be used as daymarks and, when needed, also display fire. rather than one expensive, permanently staffed lighthouse that could not easily be moved.

The defeat at Meloria and further Genoese attacks present us with the reasons why there was an intensification of watch-and-warning signalling along the same coastline that also served commercial arrivals.

In summary, Pisa's "lighting policy" is best described as a distributed, pilot-compatible, hazard-aware visual environment that include hazard identification. A plethora of towers is interpreted as multi-use nodes that could show signals and fires as circumstances required.

Some final thoughts are now due concerning the schism between east and west versions of Christianity. As Rome decayed, Byzantium flourished. So what happened to navigation? The decline of navigational lights following the transformation of Roman power was far more pronounced in the western Mediterranean centred on Rome than in the eastern Mediterranean oriented toward Constantinople, and this difference reflects contrasting patterns of institutional survival. In the Latin West, the fragmentation of imperial administration after the fifth century dismantled the fiscal, legal, and urban frameworks that had quietly sustained harbour lights as routine civic services. Ports declined, long-distance trade thinned, and lighting reverted to episodic, locally maintained fires or disappeared altogether as municipal continuity collapsed.

By contrast, Constantinople inherited not only Roman administrative forms but also Roman assumptions about maritime control, sustaining imperial harbours, customs regimes, naval logistics, and ceremonial sea approaches that preserved the logic of harbour lighting even when individual installations changed. While the Byzantine world did not replicate Alexandrian monumentality, it maintained a functional continuity of lights and beacons, often embedded in fortifications, palatial complexes, and ecclesiastical landscapes, often supported by monastic or military communities. The contrast is therefore not one of decline versus survival, but of systemic attenuation versus institutional adaptation. Rome's lighting culture withered as urban life itself contracted, whereas Constantinople's persisted precisely because the city remained a maritime capital, where navigation, defence, and imperial presence continued to demand controlled nocturnal visibility. This divergence helps

explain why the eastern Mediterranean retained a recognisable pre-modern lighting ecology into the medieval period, while the western Mediterranean experienced a deeper and more prolonged rupture until the modern era.

These considerations of the contrast between east and west come strongly into focus when we compare Ostia with Byzantium. Ostia, Rome's principal port, possessed substantial harbour infrastructure and almost certainly employed routine harbour-mounted lights in the high Roman period, embedded in moles, towers, and port buildings.<sup>51</sup> Its fate was inseparable from that of Rome itself, for as Roman imperial administration fragmented, so the Tiber silted. Ostia's commercial relevance collapsed, harbour maintenance ceased, and with it the institutional context that sustained navigational lighting. By the early medieval period, any lights that survived were sporadic, local, and non-specialised, reflecting the broader contraction of urban life and maritime throughput in the western Mediterranean.

The Golden Horn presents the inverse case. As the primary harbour complex of Constantinople, it inherited Roman harbour practice but was sustained by an unbroken sequence of imperial administrations, Roman, Byzantine, and then Ottoman. As one administration segued into another, the sequential strategies continued to treat maritime access as a strategic and fiscal priority.

Navigational lighting was never dependent on a single monumental structure, but persisted as a distributed system with fires and lanterns mounted on sea walls, towers, chains, palatial complexes, and ecclesiastical sites, all serving navigation, defence, and ceremonial display.<sup>52</sup> Even as individual installations changed, the logic of controlled nocturnal visibility endured, because the city itself remained a political and naval capital.

This great contrast between the great ports of Ostia and Constantinople reveals that a decline of lights in one location or the success of lights in another was not driven by technological regression or cultural indifference, but by the loss or survival of harbour-centred institutions. Where Ostia became an archaeological landscape, the Golden Horn remained a living maritime system—and lights persisted accordingly.

It has been a persistent thread of thought throughout this treatise as to just how much the two seemingly very different and competing cultures of Christianity and Islam affected the medieval history of lighthouses. I have already touched on this to some degree in earlier pages.

Before 1700, differences between navigational lights under Islamic and Christian rule lay not in technology, for technology was not really at issue during the entire period of this book. In essence, there was none! Since it could easily be argued that culture was not at the root of a sailor's needs, the answer must surely reside in differences of institutional framing and administrative purpose.

In Islamic ports, lights were typically managed as part of integrated systems of coastal surveillance, port regulation, and fiscal control, rather than as stand-alone navigational services. Fires and lanterns were embedded in fortresses, ribats, customs posts, and river-mouth controls, and were tended by soldiers, guards, port officials, or religious-military personnel, with visibility often deliberately limited to ensure controlled access.

In contrast, Christian-ruled ports, particularly in Byzantine and Latin contexts, were more likely to inherit or maintain explicit harbour-light traditions, sometimes framed as civic or ecclesiastical services, and occasionally entrusted to monastic communities or dedicated keepers, especially where imperial or urban continuity existed. This distinction reflects administrative priorities rather than doctrinal difference: Islamic regimes emphasised regulated entry and defensive awareness, favouring near-field lights and signal systems, while Christian polities, drawing on Roman precedent, more readily sustained harbour-mounted pilotage lights in ports oriented toward commercial throughput.

Yet the boundary between these two approaches was porous. In practice, both systems relied on multifunctional lights serving navigation, identification, and warning simultaneously, and both showed a marked reluctance to invest in monumental lighthouse towers outside exceptional cases. The contrast is therefore best understood not as a religious divide, but as a difference in port governance

and risk management, shaped by inherited infrastructure, military context, and patterns of maritime traffic.

The great enmity that arose between the two religions of course came to a head during the Crusades and a few words of summary relevant to the provision of lights are appropriate. The period in question did not introduce new navigational lights to the Mediterranean, but resulted in a recalibration of their importance and governance. This, in turn, created a new momentum that particularly benefitted maritime powers such as Venice.

From the late eleventh century onward, sustained long-distance maritime logistics in the form of troop transport, supply convoys, pilgrimage traffic, and naval warfare placed unprecedented pressure on reliable harbour access. Regulated night entry into ports was demanded and predictable coastal signalling was highlighted. In this context, lights increasingly ceased to be merely local, situational aids and became instruments of control, coordination, and trust within expanding maritime systems.

The Venetians were especially well positioned to exploit this shift. Drawing on Byzantine precedents and their own commercial institutions, they developed a formalised, rule-based approach to harbour lighting, integrating lights into port statutes, convoy regulation, and state oversight.<sup>53</sup> Study shows that Venetian-controlled or influenced ports, whether in the Adriatic, Aegean, or eastern Mediterranean, exhibit a clearer tendency toward regulated harbour lights, often tied to customs, naval administration, or fortified infrastructure.

More broadly, the Crusader period marks a transition of ideology in which lights begin to be understood less as ad hoc fires and more as part of a managed maritime environment, even if still embedded in fortresses, monasteries, and port towers. This was not yet a Mediterranean-wide system, nor did it erase Islamic or Byzantine practices, but it reshaped expectations.

After the Crusades, major maritime nations increasingly assumed that important harbours should be lighted in some regularised fashion, yet still not with lighthouses!

# Conclusions

A tradition of showing lights for mariners continued during the 5-8th centuries in some locations where it had already been established by Roman practice. Whether it did so was determined by a balance of need and available resources. Where it did not, Roman structures were either destroyed or fell into disuse.

Very few new structures that might be described as lighthouses were built during the entire period of study.

Lights shown during these centuries were limited by the primitive technology available to make them.

Apart from the type of fuel and the mass of it that had to be burnt to create the amount of light needed, there were few options available to those seeking to assist mariners with lights.

Once the focus of the Catholic Church had moved to Constantinople, the growth and expansion of their Byzantine fleets played a significant role in the provision of harbour lights.

Most Mediterranean ports with sufficient activity showed basic lanterns or torches at quaysides but casually and with no pre-determined community policy.

We can be confident about the showing of navigational lights only where there was an agreed policy, approved and managed by an institution within the local, regional or national community.

Military control of signals, where it could be implemented, almost always took precedence over civilian needs.

The earliest national civic institutions were not formed until after 1700.

The earliest institutions showing lights for navigators were ecclesiastical from around the 5th century onward.

The earliest local civic institutions appear to have been those at Genoa, Venice and Pisa from around the 12th century.

The Lanterna of Genoa is a most historic and important medieval lighthouse operating today much as it was throughout the past five centuries.

For more than two centuries it was paired to a second, smaller lighthouse. It has been suggested that these were leading lights but this is not supported by geo-positional data.

When most other navigational lights were fuelled by coal or wood fires, or the burning of candle wax, these lighthouses were certainly the most important to have been lit with olive oil burning lamps because of its availability in the region.

The Lanterna is the longest functioning lighthouse in the same overall structure. (The lighthouse at La Coruna is the longest surviving functioning structure, but in a more recently modified form.)

It is my assertion that the motivation for the original construction of the Lanterna was Genoa's involvement in the First Crusade, clues to which are provided in the city coat-of-arms and its essential inclusion on the exterior of the lower tower, facing landward.

There are a number of loosely defined periods during which we can assign different levels of navigational aid provision:

(1) Antiquity: pre-400

(2) Ecclesiastical: 400-1200

(3) Byzantine: 400-1200

(4) Islamic: 700-

(5) City State: 1100-1400

(6) Ottoman: 1200-

(7) Pre-Modern: 1600-1700

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## Notes

1 See my analysis of Dover harbour on p79.

2 Casson, Ships and Seamanship in the Ancient World (Baltimore, 1995), 218–225.

3 Rougé, J: Navigation et commerce dans l'Antiquité (Paris, 1966), 213–215.

4 The full details of these events leading to Ostia's decline and Portus silting are to be found in Volume 1, p202.

5 A detailed description of this is given in Volume 1, p202.

6 Signalling will be discussed in detail later. See p326.

7 L. Ugolini, "Coastal Towers of the Early Middle Ages," *Mélanges de l'École Française de Rome* 122.2 (2010).

8 It is curious that neither Venice nor Pisa are especially noted for using lighthouses as much as Genoa where we find one of the greatest contributions to medieval lighthouse history.

9 The Lombards (or Longobards) were a Germanic people who ruled parts of Italy from the 6th to the 8th century AD. Their kingdom was a major political power in early medieval Italy.

10 Even today there remain some modern City-States. For example, Singapore, Monaco and the Vatican City. In history, City-States were also Athens, Sparta, Venice and Carthage.

11 Here I am in hope that it was pre-planned but the call to show a light into port may have been made by those arriving from afar and finding none.

12 Since around 2015, the lighthouse can now be accessed, although it was very difficult to find during my visit in 2016.

13 The Molo Vecchio ("Old Pier") in Genoa refers to the old breakwater and dock that formed part of the historic Port of Genoa. It was originally constructed in the 13th century to protect the harbour and facilitate maritime trade, making it one of the oldest parts of Genoa's port infrastructure.

14 The author is implying that the two lights were set up to be leading lights. This is a very old instance - possibly the first - of lights being used in this way, anywhere in the world.

15 Claudia Baghino, Translated by Daniele Canepa: <http://www.guidadigenova.it/en/genoa-history/history-lighthouse-genoa/> 20160718

16 Leading lights (also called range lights) are two fixed lights —one behind the other—that help mariners align their vessel on a specific bearing or course, usually into

a harbour or along a safe channel. They must be in line, such that when a ship sees both lights vertically aligned, it is on the correct approach. The rear light is taller or set on higher ground so it can be seen over the front one.

17 Wikipedia

18 The transition from olive oil to paraffin oil in lamps was driven largely by efficiency, brightness, and practicality. The energy content of olive oil is ~8,800 kcal/liter (36.8 MJ/l) whilst that of paraffin oil (kerosene) is ~10,300 kcal/liter (43 MJ/liter).

19 A full description of the use of oil in lighthouses will be given in Volume 3.

20 <https://www.bimbeinviaggio.com/en/italy/liguria-en/genoa/lighthouse-lanterna-genoa-history-legends-curiosities/> "Lighthouse (Lanterna) of Genoa: history, legends and other curiosities - Bimbe In Viaggio"

21 <https://woc2026.com/history-of-a-lanterna-de-zena-symbol-of-genoa/> "History of 'A Lanterna de Zena', symbol of Genoa - WOC2026"

22 <https://docslib.org/doc/1333562/la-lanterna-lighthouse-of-genoa-liguria-italy-by-annamaria-lilla-mariotti> "LA LANTERNA LIGHTHOUSE of GENOA, LIGURIA, ITALY by Annamaria "Lilla" Mariotti - DocsLib"

23 <https://djwulfenden.wordpress.com/2014/03/27/the-lighthouse-genoa/> "The Lighthouse – Genoa | da Zêna"

24 <https://www.guidadigenova.it/en/genoa-history/lighthouse-genoa/> "Lighthouse Genoa: history"

25 [https://en.wikipedia.org/wiki/Lighthouse\\_of\\_Genoa](https://en.wikipedia.org/wiki/Lighthouse_of_Genoa) "Lighthouse of Genoa"

26 [meetingvenice.it](http://meetingvenice.it)

27 Yet another example of the adoption of St Nicholas for mariners.

28 The faro is described as magnum e pulcherrimum. Comuni Virtuosi.

29 Comuni Virtuosi

30 Marina Militare, Servizio Fari e Segnalamento Marittimo for contextual, not medieval evidence. marina.difesa.it

31 As per the reported 14th-c. tradition: Comuni Virtuosi

32 [meetingvenice.it](http://meetingvenice.it)

33 Europeana

34 "Il faro di Piave Vecchia, sentinella della Venezia Orientale." 2024. (For 1855 Malamocco fanali; 1863 Chioggia.) (giragiralagune.org); "Quando i fari di Trieste proteggevano il (conteso) Adriatico..." 2021. (Corroborating the Deputazione programme; includes

1855 Malamocco and 1863 Chioggia.) ([triesteallnews.it](http://triesteallnews.it))

35 <https://www.lokrum.hr/en/cultural-heritage>

36 Ema Žile, Benediktinska opatija sv. Marije na otoku Lokrumu (PDF). ([darhiv.ffzg.unizg.hr](http://darhiv.ffzg.unizg.hr)); Igor Fisković, "Prvi figuralni kapitel u dubrovačkom srednjovjekovlju," Starohrvatska prosvjeta (2019) (PDF). (Hrčak); Ivan Ostojić, Benediktinci u Hrvatskoj i ostalim našim krajevima, vol. 2, Benediktinci u Dalmaciji (Split, 1964), as cited in Fisković. ([ipu.hr](http://ipu.hr))

37 "Daksa," Hrvatska enciklopedija (LZMK). (Hrvatska enciklopedija); Sanja Miljan, Organization and Activities of the Franciscans of Dalmatia... (PhD diss., Central European University, 2025), noting Daksa within the provincial constellation of strategically placed friaries. ([etd.ceu.edu](http://etd.ceu.edu))

38 Eleonora Kountoura Galaki, "A Light in the Darkness: Monastery Lighthouses in the Aegean Sea and Surrounding Coastal Regions," in Johannes Preiser-Kapeller, Taxiarchis G. Kolias, and Falko Daim (eds.), Seasides of Byzantium (Heidelberg: Propylaeum, 2022), 131–142. ([books.ub.uni-heidelberg.de](http://books.ub.uni-heidelberg.de))

39 This is a major conclusion of Volume 1.

40 Once again, I refer to my arguments and observations of the city of Dover, p79 for the fundamental explanation..

41 Bosphorus is an Anglicized spelling of the name Bosporus.

42 I should make it clear that today the use of the name Istanbul covers a wide regional area that is much larger than the typical use in Byzantine and medieval times.

I shall use the following definitions for the historical periods under discussion:

Byzantine period: c. 330 – 1453. From the refoundation of Byzantium as Constantinople by Constantine I (330) to the Ottoman conquest (1453).

Latin / Venetian period (in Constantinople): 1204 – 1261. From the Fourth Crusade and sack of Constantinople (1204) to the Byzantine reconquest under Michael VIII Palaiologos (1261). Note: This is sometimes loosely called "Venetian," but more precisely the Latin Empire period, with strong Venetian political and commercial dominance.

Ottoman period: 1453 – 1922. From the Ottoman capture of Constantinople (1453) to the abolition of the Ottoman sultanate (1922).

Republican / Modern period (for completeness): 1923 – present. From the founding of the Republic of Turkey (1923).

43 It is here that a modern suspension bridge has been built to span the gap between Europe and Asia.

44 The official name of the bridge is the 15 July Martyrs Bridge (15 Temmuz Şehitler Köprüsü). Commonly it is called Bosphorus Bridge (Boğaziçi Köprüsü) or First Bridge (Birinci Köprü). It links Ortaköy (Europe) and Beylerbeyi (Asia) in Istanbul and was opened in 1973.

45 This site was discussed at length in Volume 1

46 Casson, Lionel: Libraries in the Ancient World (New Haven: Yale University Press, 2001), 124–130; J. McKenzie, The Architecture of Alexandria and Egypt (New Haven: Yale University Press, 2007), esp. 45–60.

47 Once again, you are referred to my early study in Volume 1 where the classical history and analysis of these sites is discussed in more detail.

48 Adam, J.-P: Roman Building: Materials and Techniques (London: Routledge, 1994), 278–281; D. Blackman, "Ancient Harbours in Cyrenaica," International Journal of Nautical Archaeology 17, no. 4 (1988): 299–320.

49 Raymond, André: The Great Arab Cities in the 16th–18th Centuries (New York: NYU Press, 1984), 15–20; Christophe Picard, La mer et les musulmans d'Occident au Moyen Âge (Paris: PUF, 1997), 73–90.

50 I should qualify that rash conclusion by reminding you that, when lightstructures *were* built, they often adopted similar structural elements, most notably the multi-section tower.

51 See my detailed descriptions in Volume 1.

52 It is this very feature that has made the identification of lightstructures so difficult in this city.

53 Perhaps this was the origin of notorious Italian love of bureaucracy! Who knows?