

THE HISTORIC LIGHTHOUSES OF THE ITALIAN COASTS

Fabrizio Beninicasa, Matteo De Vincenzi, Gianni Fasano

Abstract: The tall tower building with an intense light source on the top, visible far away, called a lighthouse in English, takes its name in the Romance languages of *farò*. The fuels used to produce lighting have progressively adapted to the times: bundles of dry wood, olive oil, wax candles, sperm whale fat, paraffin oil, acetylene, arriving to electricity. The lighthouses didn't only have positive aspects; in fact, they not only facilitated bearings during night navigation, but also indicated to the pirates the coastal towns to plunder. This gave rise to a kind of "land piracy" since "prankster" characters lit "fake beacons" on reefs, shoals, etc. waters where ships stranded and were therefore more easily plundered.

This paper shows the current number of lighthouses in Italy, giving greater emphasis to the Italian historic lighthouses, which, by definition, are those that meet at least three of the characteristics established by IALA. As in other European nations, also in Italy the lighthouse lantern was often placed on the top of the bell towers of the churches along the coastline. The oldest Italian lighthouses are on the Tyrrhenian coast the lighthouse of Rome Port and on the Adriatic coast the lighthouse of Ravenna Port.

Obviously, we will only mention the lighthouses, which in our opinion are the most important and given the historicity of these we will only deal with the "bright" lighthouses, outlining the historical-geographical context within which they were built.

Keywords: Ancient lighthouses Navigation; Ancient Meteorology; Sailing techniques.

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1. Introduction

Virgil¹ and Ovid² trace the origin of the lighthouse to the myth of the secret lovers Hero and Leander; myth also remembered by Francesco Petrarca³. Leander, a young man from Abydos, was the lover of a young priestess of Aphrodite, called Hero, who lived in Sestos, a city located on the other bank of the Hellespont, opposite Abydos, about 1350 meters away from it. (fig. 1). Every night Leander swam across the strait, guided by the light of a lamp that Hero lit at the top of the tower of his house. On a stormy night the lamp was extinguished, and Leander, in the darkness, lost his way, could not find the coast, and drowned. The next day Hero saw Leander's corpse that the sea had thrown at the foot of the tower, and, not wanting to survive her lover, she jumped to her death from the tower [15]. The myth of Hero and Leander is the first representation of the light of *fire that guides those traveling by sea in the darkness of the night* [25].

In ancient times, navigation was mainly coastal and diurnal but then human beings also learned to navigate at night by orienting themselves with the stars; but this was not enough to avoid shallow waters, rocks, sandbanks, etc.⁴ Thus, the first lighthouses were born, i.e. beacons made by wood stacked and lit in critical places to signal danger along the route to sailors.



Figure 1 – On left Stretch of sea, approximately 1350 m long, between Abydos and Sestos that Leander swam across every night to reach Hero (Graphic elaboration of G. Fasano from [101]). At right Hero drowned, lying on the beach (etching, print maker: J. van de Velde (II), after design by: W. P. Buytewech, 1621) [102].

¹ Virgil (Publius Vergilius Maro 70 - 19 BC) Third Book of *Georgics* (vv. 219-282) [39].

² Ovid (Publius Ovidius Naso 43 BC - ca 18 AD) in *Heroides* epistle XVIII (Leander to Hero) and epistle XIX (Hero to Leander) [27].

³ Francesco Petrarca (1304 - 1374) in *Trionfi - Trionfo dell'amore* (in english *Triumphs-Triumph of Love*) chap. III vv. 19-21 “*Altra fede, altro amor: vedi Ipermestra, / Vedi Piramo e Tisbe insieme a l'ombra, / Leandro in mare et Ero a la finestra.*” (See *Hypermnestra, faithful in hernlove;/ See Pyramus and Thisbe in the shade, / Leander swimming, Hero at window.*) [28], [29].

⁴ For other problems that arose during navigation, see [4].

The darkness posed a mortal danger, so bonfires had to be fuelled with fuel that produced a bright flame. For this purpose, dry bunches of erica or broom were preferably used. Probably for such a burdensome task slaves or prisoners were employed [25].

Over time, special metal containers were created which, with burning wood inside, could be lifted from the ground using ropes and pulleys to make them more visible, becoming real daymarks⁵, to which Homer compares Achilles' shield: [Achilles] *he took the shield, / Massive and broad, whose brightness streamed as far / As the moon's rays. And as at sea the light / Of beacon, blazing in some lonely spot / By night, upon a mountain summit, shines / To mariners whom the tempest's force has driven / Far from their friends across the fishy deep (Iliad book XIX vv.450-456 [16]).*

But if the lighthouses, on the one hand, facilitated the bearings of the sailors during night navigation, on the other they also indicated to the pirates the coastal cities to plunder, along routes still unknown to them. This stimulated the creativity of "land pirates" who lit "false lighthouses" on reefs, shoals, rocks, beaches, and shallow waters where ships got stranded and thus became easy prey [2] [24].

During the Roman Empire, the first stone towers were built on top of which fire was lit. In order to distinguish their fires from the deceptive ones visible on the coast, the braziers were equipped with perforated metal domes so as to make the univocal radiated light signal [3] (fig. 2). As reported by Pliny the Elder (23-79 AD) in *Naturalis historia* (Liber 36, 18) [31], the inhabitants of the islet of Pháros in front of Alexandria, Egypt, lit bonfires at night to signal the presence of their island. and to increase the light intensity, since 650 BC, they used burning mirrors⁶ [3].



Figure 2 – Brazier for signalling shoals, rocks, shallow waters, etc.

The name of the island probably derives from the word *phanós* (torch in ancient Greek) assonant to *pháros*, considering the customs of its inhabitants. Precisely on this island in the 3rd century BC. an imposing tower structure was built for light signalling, which was called "Pharos" like the island. The Pharos of Alexandria was damaged and renovated several times until the earthquakes of 1302 and 1323 destroyed it definitively. Its everlasting memory remains in the name that all Greek Latin languages give to this type of building (*faro*, in Italian and Spanish, *phare* in French, *farol* in Portuguese), while Anglo-Saxon countries call it lighthouse (house of light) and the Germanic *leuchtturm* (lantern tower).

One of the problems of lighthouses has always been how to produce lighting: after wood, both natural and impregnated with resins, coal was used, which however did not provide a sufficiently bright light. In both cases, atmospheric events, wind

⁵ Daymarks are all those natural and artificial elements of remarkable size and height which have characteristics clearly visible and recognizable from the sea. For example, daymarks are mountains, promontories, buildings along the coast (towers, lighthouses, bell towers, etc.).

⁶ Burning mirrors are parabolic mirrors that concentrate light radiation into a beam, which reaches them from various ways; this radiation, thus intensified, is projected in a predetermined direction.

and rain, could interfere negatively. Therefore, around 1200, it was thought to protect the flame with a glass lantern. This solved some problems but introduced others: for example, the need for continuous cleaning of the glass. Other fuels were experimented with the lantern: olive oil, wax candles, sperm whale fat⁷, paraffin oil, acetylene, etc. The electrification of lanterns began only between the late 1800s and early 1900s. For a detailed history of the evolution of lighthouses, see [2], [24].

There are currently around 20000 active lighthouses in the world. There are 147 lighthouses located along the 800 km of Italian coastline [23]. Over time, due to the structural and functional differences in *light signalling devices*⁸, it has become necessary not to use the term lighthouse for everyone, but to specify the nature of the device depending on whether it can be a lighthouse or a beacon. On the Italian coasts there are 727 lights, (including daybeacons⁹ and buoys) [23]. These terms have a sub-classification established by *International Association of Lighthouse Authorities* (IALA-AISM) [17] [103]; for a summary on this aspect, please refer to [3] where there are listed the national and international institutions that defined them.

These terms have a subclassification that defines historic structures as those that meet at least three of the following characteristics established by the IALA-AISM:

- the station has been designed to be manned,
- the range of the light should be greater than 15 nautical miles and the height of the tower should be greater than 10 m above the ground,
- historic architectural interest (design, use of material, etc.),
- the station is over 100 years old,
- the station is protected by the local Cultural Heritage Authority,
- Archaeological importance.

As regards this class of signalling structures, we will limit ourselves to showing the historical and geographical context within which the lighthouses were built, which we consider more significant due to their very "complex" history or the very "particular" environments in which they were located.

2. The Italian Lighthouses

The first maritime signalling devices, with or without lighting, date back to the Phoenicians between 1200 and 300 BC. The Greeks and Romans inherited this

⁷ The sperm whale (*Physeter macrocephalus*) is a large marine cetacean (the mature male can reach 26 m and weigh 50 tonnes). The head is enormous and contains, in a cavity above the jaw, an oily and transparent substance called spermaceti (in the past it was believed to be the sperm of the cetacean). The sperm whale, a cosmopolitan species also present in the Mediterranean, was hunted for its fat, meat, spermaceti and ambergris. The latter is produced by the animal's digestive system and was used in ancient pharmacopoeia and in the production of perfumes.

⁸ The clarification is due since there are signalling systems that do not use light; see footnotes 9 about *daybeacon* and 19 about *radio beacon*.

⁹ Daybeacon is an unlighted fixed signal emerging from the sea, of various shapes (small triangles and small squares) and materials. It is placed to signal to sailors both particularly dangerous points, such as rocks, shoals, etc., and reference points for the landing of boats and for their entry into the port access channels [6].

tradition and built numerous lighthouses in the Mediterranean.

With the fall of the Western Roman Empire (5th century) there was a clear reduction in navigation, a block in the construction of lighthouses and the progressive abandonment of existing structures. This also was due from the need to hide the ports accesses to limit the Barbary incursions. Signalling with lighthouses was abandoned and the use of beacons on the hills returned. New lighthouses were built only starting from the 11th century, with the development of the Maritime Republics, in particular Genoa and Pisa [3], and the resumption of maritime trade, such as the reconstruction of the Tower of Genoa, the lighthouse of Porto Pisano (Livorno), the Tower of Capo Peloro (Messina). Furthermore, as later happened in other countries, lanterns were placed on top of the bell towers of coastal churches. Probably no country in the world has more ancient lighthouses than Italy. Over time the light signalling systems have been modernized, but most of the structures were built totally or partially between the 1200s and 1300s [2].

In figure 3, the lighthouses described (in roughly chronological order) in this work¹⁰ are indicated with a blue symbol while the lighthouses, mentioned but not described, are indicated with a red symbol. The latter define the geographical limits



Figure 3 – Map of Italy with the "current" regions and lighthouses described in the text (blue) and the "extreme" ones (red).

¹⁰ The lighthouses are listed by writing in italics the historical name of the location at the time of their construction; the current name and the Italian region in which it is located are indicated in brackets.

within which there are, or were, lighthouses. We can observe that all the lighthouses are enclosed in the rectangle between the latitude 45° 40' N on which the lighthouse of Trieste (Friuli Venezia Giulia), the northernmost, is located, and the latitude 35° 31' N of the lighthouse of Lampedusa Island (Sicily), the southernmost.

The other two sides of the rectangle are the meridian passing through the *Punta Palascia* lighthouse (Capo d'Otranto, Apulia), longitude 18° 31' E, the easternmost, which sees the sun rise first; and the meridian of the *Capo dell'Arma* lighthouse, in *Capo Verde* (in Liguria between San Remo and Imperia), longitude 7° 50' E, the westernmost. As regards the "*saying good night to the Sun*" in the West, the situation is more complex than the "*saying good morning to the Sun*" that is given in the East.

The lighthouse of Capo Caccia (Sardinia) has a longitude (8° 10' E) slightly higher (i.e. further east) than that of Capo Verde (7° 50' E) but it is also much further south (latitude 40° 34' N versus 43° 49' N of Capo Verde). All this means that Capo Verde is the last lighthouse to see the sunset in the spring - summer period (specifically from mid-March to mid-September) when in the north the days are longer. In the rest of the year the days are shorter in the north than in the south and therefore Capo Caccia, although slightly further east than Capo Verde, is able to see the sun for longer than the other place.

In summary, to quantify the phenomenon, we can say that at the Summer Solstice the daytime length in Cape Verde is approximately 12 minutes longer, while at the Winter Solstice the daytime length in Capo Caccia is approximately 9 minutes longer more. compared to the other lighthouse. For more information on procedures for calculating daytime length, see [5].

2.1 Ancient Lighthouses in Roman period

Messana (Messina - Sicily)

The lighthouse was about 14 km from the city on the Peloro Cape promontory; it is shown on the coins of the Proconsul of Sicily Sextus Pompeius Magnus Pius (fig. 4).



Figure 4 – Sextus Pompeius Denarius with on the obverse the *Messana Pharos* (Messina lighthouse) adorned with a statue of Neptune placed on a trireme with *aquila* (eagle in Latin), sceptre and trident, and the legend MAG PIUS IMP ITER (Magnus Pius emperor for the second time); on the reverse the Scylla sea and the legend PRAEF CLAS AT ORAE MARIT EX SC (Prefect of the Fleet and the Maritime Coast by Decree of the Senate) [104].

The lighthouse was built in 40 - 39 BC to replace a previous signal tower on Peloro Cape and a similar one on the opposite side of the Strait. Strabo (before 60 BC - 20 AD ca) wrote in *Geographica* (in english Geography) [...] *it was a custom in early times to set up landmarks like that. For instance, the people of Rhegium [Reggio Calabria] set up the column—a sort of small tower—which stands at the strait; and opposite this column there stands what is called the Tower of Pelorus [...].* ([32] 3, 5, 5). Among his activities, Sextus Pompeius also carried out piracy which allowed him to "control" merchant ships transiting the Strait of Messina.

Capreae (Capri - Campania)

The Roman lighthouse of Capri, on Mount Tiberius, was built by the Emperor Tiberius next to his villa (*Villa Jovis*). The structure was used not only as a lighthouse, also for light signalings (also done with mirrors) to communicate with the military outpost of Punta Campanella (Sorrento Peninsula) and, through this, with Cape Miseno, in the Gulf of Pozzuoli. From here the messengers on horseback, reached Capua through *via Campana* and then, traveling along the *via Appia* (Appian way), arrived in Rome where they communicated Tiberius' orders, or, with the opposite route, brought the "latest news" to Tiberius. In this way the emperor, while remaining in his splendid villa, was always in contact with the capital of the Empire. Unfortunately, as Suetonius (ca 69 - after 122 AD) wrote in *De vita Caesarum* ([32], liber III, 74) *A few days before his [Tiberius] death the lighthouse at Capreae was wrecked by an earthquake* in 37 AD. Emperor Domitian (51 - 96 AD) restored the lighthouse between 91 and 96 and it continued to function until the 17th century.

Puteoli (Pozzuoli - Campania)

It was a centre of the *Campi Flegrei* (Phlegraean Fields) of greatest importance. In the Roman period the city became, for political, military, and commercial reasons, one of the main ports of the Lower Tyrrhenian Sea, equipped with a lighthouse, built Octavian Augustus epoch. The lighthouse may have been destroyed by an earthquake and dragged into deeper water. In fact, there are several written references in the classical literature to a lighthouse on the end of the mole [20] [35] The Puteoli port, for several years, was the sea base for Roman expansion in the East, but its fortune began to decline both with the establishment of the port of Ostia, at the mouth of the Tiber and because of the problems of silting due to the bradyseism [21]. Despite this, the port continued to be, until the end of the empire, the main port structure in Campania as evidenced by important archaeological remains [21].

Ravenna (Emilia-Romagna)

The first settlement, of what was a lagoon site with direct contact with the sea, was very probably Etruscan (5th century BC) and subsequently Umbrian. In the 3rd century BC. it obtained the status of federated city from the Romans and in the 1st century BC. the inhabitants obtained Roman citizenship. Octavian Augustus established near Ravenna, the home port of naval fleet that was to control the eastern Mediterranean. The choice was suggested by the ease of both connections and supplies towards the hinterland, via the *Via Popilia* (North), and exchanges between sea and land, via river-lagoon routes on which large basins opened up suitable for the shelter of

ships. The chosen place (about 4 km south of the town) took the name of Classe (from the Latin *clāssis* = fleet) and developed with impressive urban and productive structures that promoted the economy of the hinterland. The development of Classe continued in the 2nd and 3rd centuries but then the town began to decline due to the unstoppable siltation of the port channel, into which river waters laden with alluvial debris flowed. The abandonment of Classe was a consequence of its economic decline, which also led to the destruction of the buildings to recover the construction material.

Pliny the Elder noted in *Naturalis Historia* (Liber 36, 18) [31] about the importance of Ravenna lighthouse (the first in the Adriatic) that compared for relevance to Alexandria Pharos [14]. A mosaic, in the *Basilica of Sant'Apollinare Nuovo* (6th century AD) in Ravenna, for some scholars, attest to the existence of a lighthouse in the port of Classe. It is not known where exactly the lighthouse was sited although various hypotheses have been made about its location and various studies are underway [14] [20] [37]. Archaeological excavations conducted in the 2000s have identified, near the mausoleum of Theodoric north of Ravenna, another lighthouse built in late ancient times [12] [14].

The decline of Ravenna also began in the 9th century; the branches of the Po that descended to Ravenna dried up due to the shift north of the Po axis; the still waters besieged the city, the coastline was moving away (in the 11th century it was already 3 km from the walls) the port capacity was miserably reduced; the functional crisis of Ravenna deprived it of its primary role of connection with East [13].

Portus - Port of Ostia (Latium)

The most important lighthouse in the Tyrrhenian Sea, documented in some way, is that of the *Portus Romae* (in English Port of Rome), built in 50 AD by Emperor Claudius (10 BC – 54 AD). It is depicted in a mosaic of the Baths of Ostia Antica and is described by Suetonius in *Vita Divi Claudii*, ch 20 [34]: [...] *He [Claudius] constructed the harbour at Ostia by building curving breakwaters on the right and left, while before the entrance he placed a mole in deep water. To give this mole a firmer foundation, he first sank the ship in which the great obelisk had been brought from Egypt, and then securing it by piles, built upon it a very lofty tower after the model of the Pharos at Alexandria, to be lighted at night and guide the course of ships.* In other words, it was created an islet where the lighthouse was built¹¹. The works were completed during the reign of Nero and the port complex was called *Portus Augustus Ostiensis* [19] [20]. The name Ostia derives from the Latin term *ostium* (river mouth) in reference to the mouth of the Tiber, which once lapped the city before flowing into the then much closer Tyrrhenian Sea; in 1575 a flood shifted the course of the river, causing it to bend northwards. The excavations of the ancient city, probably commissioned by Ancus Marcius (7th century BC), have brought to light a fortified citadel, the *cāstrum*, with solid walls made of tuff blocks, dating back to the 4th century BC, which became a military and commercial port of

¹¹ Geoarchaeological investigations carried out at the beginning of this century seem to have identified the "islet" where Claudius' lighthouse was built [14].

great importance only in the time of Claudius. At the beginning of the 2nd century the port was enlarged by Trajan who built a more internal hexagonal basin and made it more sheltered from sea storms [14] [19] [20]. Ostia acquired growing importance in the first three centuries of the Roman Empire until obtaining administrative autonomy as *Portus Romae* with Constantine the Great at the beginning of the 4th century. In these centuries the lighthouse was mentioned with admiration by various writers such as Dio Cassius. With the barbarian invasions, the decline of Rome, neglect and depopulation reduced the city to imposing ruins; these too were destined to disappear due to the siltation caused by the advancement of the coast [8].

Centumcellae (Civitavecchia - Latium)

Ancient Roman artificial port founded in 106 AD. by Emperor Trajan and equipped with a lighthouse, in 120 by his successor Hadrian. The construction of this new port was due to the need to reduce the intensity of goods traffic in the port of Ostia and to overcome the silting problems of this port, due to the Tiber [14]. During the Roman empire the city prospered and expanded considerably, its port always remaining fully efficient. After the political-military events that followed the fall of the Western Roman Empire, the city was occupied by the Byzantines in the 6th century and was destroyed by the Saracens 828. This latter event forced the population to move to a new settlement in a safer place inland which was built by order of Pope Leo VII around 854 [26]. Once the Saracen threat ceased, the population returned to the ancient city on the sea in 889 to rebuild it, calling it *Civitas Vetula*, hence Civitavecchia, which in 1431 became part of the Papal State [2].

2.2 The Lighthouses after the first millennium

In Italy, lighthouses began to be restored and reconstructed from the 12th century, with the development of the Maritime Republics and the resumption of maritime trade, for example the reconstruction of the Tower of Genoa, the lighthouse of Portus Pisanus (Livorno), the Tower of Capo Peloro (Messina). This latter lighthouse of fundamental reference for the navigation of the Crusaders towards the Holy Land [18].

Genoa (Liguria)

Until the 10th -12th century, the current port area was a natural landing place, also used in Roman era. In 1128 the construction works began to realize the docks and the stocks for commercial activities. Among the first works we must obviously mention the lighthouse, called late *Lanterna*, which is still functioning today albeit with frequent maintenance and continuous structural and technological updates. It is not certain when the first tower was built (some sources report 1128 [1] others 1139 [14]), on the promontory of San Benigno, a place where light signals were already used for boats in ancient times. The Tower was slightly lower than the current one; at its top, beacons were lit fed by bundles of dry heather or broom stems. In 1326 (according to others from 1329) the first olive oil lantern was installed, whose light was concentrated in a beam thanks to transparent crystals produced by Ligurian and Venetian master glassmakers [1] [22]. The heavy structure of the lighthouse rests on the last remaining rock of the promontory of San Benigno, which was demolished to obtain the boulders

necessary for the maritime works of the port. In 1513 during the clashes between the French army, which occupied Genoa, and the Genoese insurgents the lighthouse was irretrievably damaged and remained so until 1543 when it was completely rebuilt with its 77 m high tower, making sure the lantern is located at 117 m above sea level [2].

Livorna (Livorno - Tuscany)

The site *Livorna*¹² located at the southern end of the Arno alluvial plain, is already mentioned as a hamlet of *Portus Pisanus* in a parchment manuscript from 1017. In 1150 the Pisans built a tower with a lighthouse, on the surfacing rocks of *Secche della Meloria* west of Livorno, to make navigation safer [14]. In 1163, the first light called the *Torre del Magnale* was built at the entrance to the port, which had the lantern at the top and the port commander's house at the bottom [14]. Near this there was a smaller tower while chain was stretched between the two to close the port. In 1286, two years after the battle of *Meloria*, the Genoese demolished the tower that signalled the *Secche*. After its destruction, in 1304 the Pisans built a lighthouse (designed probably by Giovanni di Nicola Pisano), about 300 m away from the port. It was consisted of two overlapping cylindrical (12 m in diameter) towers for a total height of 57 m including the lantern (figure 5) [36].

Francesco Petrarca also wrote about the monumentality of the Livorno lighthouse in *Itinerarium Syriacum* (1358) [30]: [...] *et fere contiguum Liburnum, ubi prevalida turris est, cuius in vertice pernox flamma navigantibus tuti litoris signum prebet* [...] (tr. *and almost adjoining with Livorno, where a very strong tower stands, on top of which in the night a flame shows sailors the safe coast*) [14] [36].

After various changes of dominion, in 1421, the Port was sold to the Republic of Florence which chose it as its seaport. Within a century and a half, with the expansion of the port, the city of Livorno was also built from scratch (in particular with the advent of the Medici lordship). From there, by means of an artificial canal, it was able to transport the goods by means *navicelli*¹³, from the Medici Port to Pisa and from here, navigation on the Arno River, to Florence. In 1423 the Florentine Republic had the *Torre del Marzocco*¹⁴ built at the entrance to the port, so called due to the shape of the gilded



Figure 5 – Lighthouse of Livorno: built in 1304 destroyed in 1944, during the Second World War, but faithfully rebuilt in 1956.

¹² For a study on the etymology of the toponym *Livorna* and its evolution in Livorno, see [10].

¹³ The *Navicelli* were characteristic Tuscan boats of small dimensions, with a flat bottom, which were used for the river transport of goods.

¹⁴ Marzocco is a heraldic lion, symbol of the Republic of Florence.

bronze weathervane placed on its top. The Torre del Marzocco was only a daymark clearly visible during the day while the light signalling was entrusted to the lighthouse. The lighthouse was destroyed in 1944, during the Second World War, but was faithfully rebuilt in 1956 [36].

Messina (Sicily)

In addition to the most famous roman lighthouse of Peloro Cape (see par. 2.1), the closest point in Sicily to the Peninsula, since 1557 there has been a second lighthouse on the Strait of Messina: *Torre della Lanterna* or *San Raineri* designed by Angelo da Montorsoli. The structure was built on the ruins of the monastery (13th century) dedicated to San Raineri, to allow the Spanish sovereigns to control traffic along the Messina coasts. A popular tradition has it that the hermit Raineri, a 12th century saint, lit bonfires at night to show the way to sailors. In some documents from the end of the 13th century it is reported that the Tower of San Raineri already existed, and bonfires were lit there as an aid to sailors; some friars took care of this [22] [105] [106].

Palermo (Sicily)

In June 1567 Carlo Aragona Tagliavia Prince of Castelvetrano, President¹⁵ of the Kingdom of Sicily, laid the foundation stone for a new pier *Molo nuovo*, in the part of the *Tonnara di San Giorgio*. The new engineering work was called the *Molo d'Argento* (in Italian “Silver Pier”), due to its huge cost, and over the centuries it was equipped with further buildings and fortifications for its protection. In 1593 it was built a lighthouse, known as *Lanterna del Molo*, that was second only to that of Messina among the Sicilian lighthouses. In 1680 the *Lanterna* was equipped with batteries of cannons capable of firing broadsides at the surface of the water to hit opposing ships along the waterline. The port complex was so well fortified that it was practically impregnable from any attacks from the sea. The lighthouse remained active until 1943 when it was destroyed by Allied bombing during the Second World War [9] [11].

San Cataldo di Lecce (Apulia)

In Roman times the location (known as *Molo Adriano*, because for Pausania, it was built by the emperor Hadrian in 130 AD) was the port of the *Lupiae* colony, then became *Licea* and at present-day Lecce, about ten kilometres away, to which it was connected by a road [20]. The colony was also connected via the *Via Traiana* to the port of Brindisi, the main port on the Adriatic. Parts of a pier and a quay made of large stone blocks remain from the ancient Roman port; most of the remains were destroyed at the end of the 19th century for the construction of the quay of the new port of San Cataldo. The current structure of the small lighthouse (built in 1869) is typical of southern lighthouses [1] [23] [107].

¹⁵ Viceroys of Sicily ruled the Kingdom of Sicily as the representative of the Aragon and Spanish Kings who acquired the title of King of Sicily from 1412 to 1713. The Viceroy could appoint a President of the Kingdom, i.e. a vicar performing viceregal functions in the event of impediment, prolonged absence or illness. The figure of Viceroy and President of the Kingdom remained active throughout the 18th century, when Sicily was under the House of Savoy, the Habsburg Monarchy of Austria and the House of Bourbons.

Portoferraio (Elba - Tuscany)

In the period 1778-89 the Grand Duke of Tuscany Pietro Leopoldo Habsburg-Lorraine had erected a tower with a lantern, 25 meters high, built on the northern bastion of *Fort Stella* (in Italian "Fort Star" built in 1540 - 1548 by the Medici, and so called due to its five-pointed plan). With the unification of Italy (1861), the lantern was adapted to new needs and the tower became one of the many lighthouses built on pre-existing fortifications [1].

Scoglio Mangiabarche (Sardinia)

The island of *Sant'Antioco* is connected to Sardinia by an artificial isthmus about 3 km long, probably built, by the Carthaginians and completed with a bridge by the Romans. The current port was built in 1936-38 and is equipped with a lighthouse; it is in the immediate vicinity of today's road route, which runs alongside the ruins of the Roman bridge. The main town (*Sant'Antioco*) on the island is 2 km from the port. Not too far from *Punta della Tonnara*, on the western coast of the island, detached from the island, is the rock *Scoglio Mangiabarche* (lit. "rock eats boats"). It is in a very dangerous stretch of sea due to the large number of outcropping rocks from which sailors, especially on stormy days, must keep well away; from this derives the toponym of the place. A small lighthouse has been active on this rock since 1935, one of the few not located on the mainland [1] [23].

Mal di Ventre Island (Oristano - Sardinia)

The island is a narrow and long granite rock, flat, with a surface of about 0,80 km², with a maximum length of 2 km and a maximum width of 1 km, with highest point, 18 m a.s.l. The name of the island, in Sardinian *Malu Ventu*, meaning "bad wind", became in Italian *Mal di Ventre* (meaning stomach-ache) due to a very approximate translation by the Piedmontese cartographers of the Kingdom of Sardinia. But this name also represents the island well since, due to the strong Mistral winds, which blow for most of the year, the crossing from the Oristano coast to the island (about 9 km) is never very calm so much so that many sailors suffer seasickness. The island was already frequented in prehistoric times, as evidenced by a nuraghe on the beach facing Sardinia. Other ruins date back to the Punic and Roman periods. In the Middle Ages the island became a safe haven for Saracen pirates. Since 1955 there has been a lighthouse in the highest area of the Mal di Ventre Island; its tower brings the lantern to 26 m a. s. l. [23]. This lighthouse and *Scoglio Mangiabarche* one are not historical lighthouses in the strict sense, but since they are located on islets surrounded by large areas of outcropping rocks and, especially the latter, in the open sea, we have not considered the few years missing to make them centenary.

Aquileia-Grado (Friuli-Venezia Giulia)

We conclude this short list of lighthouses by mentioning a *non-lighthouse*. Aquileia city founded by the Romans in the 2nd century BC, which became a municipium in 89 BC, expanded in successive phases until it became a political-administrative centre. The city was also a rich emporium, thanks also to an important river port system, on the Natissa river, which connected it to the Grado lagoon; the seaport of Aquileia was located on the main island (Grado) of the lagoon, figure 6. No source

mentions that there was a real lighthouse in the lagoon or in Aquileia, that is decidedly useless for indicating the more than one hundred islands and the countless outcropping rocks which were better identified with fires lit on low towers¹⁶. Some scholars have hypothesized the presence of at least one traffic signal tower at the mouth of the harbour given the importance of the Aquilia emporium and that its port hosts a detachment of the fleet (*classis*) of Ravenna [14]. Over time the fires on towers were replaced by day beacons¹⁷. Aquileia was repeatedly devastated by barbarians, but the fatal blow was given in 452 by Attila, king of the Huns, therefore the city was abandoned by the population who took refuge on the islands of the lagoon. It was the patriarchal seat until the Longobards invasion (568 AD) who chose Grado promoting it into a new port city [14]. At the beginning of the 11th century, attempts were made to give dignity and prestige to Aquileia but in fact it increasingly declined. In 1420 it was occupied by the Venetians. In 1509 it passed into the dominions of the Habsburgs of Austria whose events it followed, except for the Napoleonic period (1805 - 1815), until 1915.



Figure 6 – Map of the Grado and Marano lagoons. The *right route* towards Grado is indicated by a sequence of daybeacons (orange stars on the map) due to the presence of numerous shallow waters and outcropping rocks, that is impossible to signal with a lighthouse. The only lighthouse (purple star on map, since 1913) is in Lignano Sabbiadoro where it signals the narrow passage between Lignano and the Island of Marinetta; a passage that requires continuous maintenance to avoid silting up.

¹⁶ For the aforementioned reasons there is currently no lighthouse in the lagoon. The island of Grado, in fact, is marked by a system of daybeacons 17 anchored to the seabed capable of oscillating and moving vertically, to keep the signal visible even with significant wave motion. Specifically, the daybeacon float is surmounted by a 5 m pole which supports both a light source, powered by a photovoltaic system for night-time signalling, and signboards. The latter are arranged to form conventional geometric figures, to indicate the type of danger and the path to take to avoid it. The other dangerous points present in the lagoon are highlighted with simpler structures.

¹⁷ Daybeacon: any of various unlighted structures serving as a daytime aid to navigation. In other words, fixed signal emerging from the sea, of various shapes and materials, placed to signal to sailors both particularly dangerous points, such as rocks, shoals, etc., and reference points for the landing of boats and the entry of these into the canals access to ports.

Starting from the early Middle Ages, Grado, with its port, acquired considerable economic and commercial importance. From the 12th century, with the affirmation of Venice as the dominant centre of the Upper Adriatic the city began its slow decline until it was reduced to a minor hamlet and became definitely part of the Serenissima, whose fate it followed until 1797.

3. Conclusions

It is quite clear that this review is a short significative representation of the coastal Italian historic lighthouses: there are many more important ones, there are both in perfect activity and in "Eternal Rest"; there are refurbished ones in their specific function and other used for completely different purposes. With reference to this last aspect, many lighthouses are that due to their location, architecture, and history have been transformed into museums, tourist attractions, or worse, resorts for wealthy tourists.

In this work we wanted to highlight how lighthouses, from mere beacons, purely functional to signal dangers to sailors, over time, while maintaining this function, they have evolved into buildings to which often, in ancient times, it was associated the symbol or statue of a protector deity, in which during navigation rely on. Therefore, it came the architectural and artistic development of the towers and lighthouse lanterns. On these aspects there is a boundless world literature. We have pointed out to some less conspicuous ones that for geographical and historical reasons have performed their task and that today is codified by navies all over the world who tell us: *the function of lighthouses is to signal dangerous areas such as rocks, shallows, floating wrecks or other isolated dangers, as well as to indicate the entrance to ports*; statues and various frills are not required.

As already mentioned, many coastal church steeples were at the same time lighthouses; it cannot be excluded that this has led to giving the lighthouse not only the concrete function of saving human lives but also a function of saving souls and of "guiding in the darkness of the world" as some passages from the New Testament might suggest¹⁸. For example, considering *Christ the lighthouse who in the darkness of sin, with his light, guides the boat of the Church towards salvation* [7].

With the advent of radio beacons¹⁹ which transmit electromagnetic waves (Morse signals) in every direction with a range of up to 200 miles, light beacons have lost some of their importance. Moreover, with current technology including radar, GPS and satellite phone is the classic lighthouse itself which is losing its importance even if in many cases it is still very active especially in a small sea like the Mediterranean.

¹⁸ For example, see *John*, 8,12; 9,5; 12,35; 12,46; and *1st John* 1,5 [38].


¹⁹ *Radio beacon*: a fixed radio transmitting installation that allows a receiving station, installed on a ship or aircraft, to determine its position. *Non-Directional Beacons* (NDB) are medium wave radio transmitters with an omnidirectional antenna that emit, with equal intensity in every direction, a signal with the name of the station. On board the signal is received by a radio direction finder (*Automatic Direction Finder*) which determines the direction of origin; the position of the beacon is shown on nautical and aeronautical charts. In 2002 the system was replaced by the GPS satellite system.

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