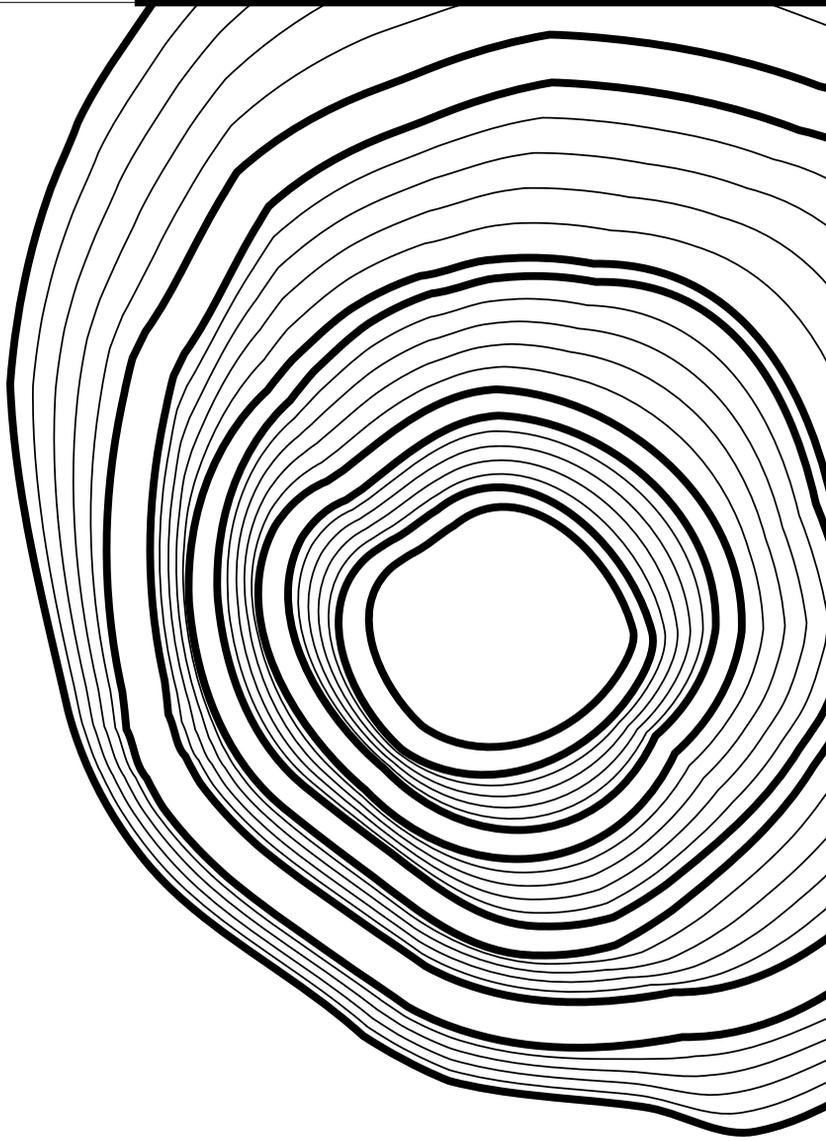


1998-**20**18
XPONIA
YEARS

MILOS MINING MUSEUM







MILOS MINING MUSEUM



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PREFACE

A mining museum in an area rich in geological activity of millions of years and with a long mining history, such as Milos, is a reference point for the island's visitors but also for the local community, especially the educational one.

Milos Mining Museum's (MMM) history begins with a request by the local community itself which, to its credit, recognizes, appreciates and wishes to highlight one of the island's main economic pillars throughout the centuries, namely mining. The intermediate stages of MMM's journey can be tracked down in the Museum's history.

The visitor's interest though focuses on the museum's contribution and participation in the tourist, educational, and cultural life of the island, from the moment of its inauguration in 1998, at the expense of Silver & Baryte Ores Mining Co. S.A., later on S&B Industrial Minerals S.A. and nowadays Imerys Industrial Minerals Greece S.A., one of the most important mining companies operating on the island since 1934.

This contribution refers not only to the function that each museum has by definition, but mainly to MMM's pioneering educational and cultural activities through publications, significant exhibitions, educational programs and tourist excursions to historical, natural and geological/mining destinations on the island.

This Museum Guide is included in this very context aiming to facilitate the visitor in a "guided tour" to the museum's areas and exhibits but also to the history of the island itself, geological as well as mining.

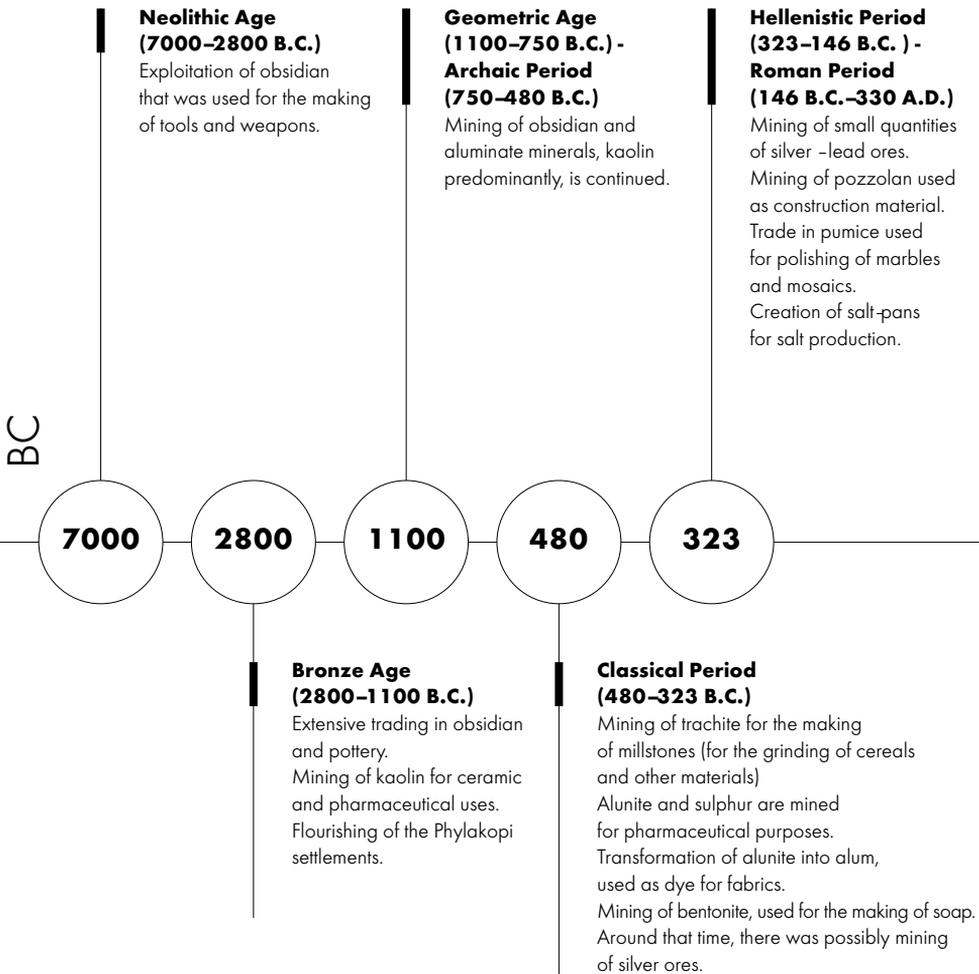
Thanks are due to Dr. Eleftheria Dimou-Chorianaki, mineralogist, for her willingness to contribute to the creation of this Guidebook with simple, clear and comprehensive texts.

We wish the MMM's visitor, young or old, an expert or not, pupil or student, teacher or professor, child or parent, this Guidebook to be his/her personal tour guide to the age-old as well as contemporary tale of the geological and mining history that the fascinating island of Milos is about to tell!

MMM Management Committee

May 2018

MINING ACTIVITY TIMELINE



AD

**Byzantine Period
(330–1204 A.D.)**

Continuation of operation in clay minerals, millstone, alum, pumice and salt, and of pottery production.

**The Turkish Domination
(1566–1821 A.D.)**

Limited activities on the island, mainly kaolin exports for porcelain production.

1934

Beginning of baryte exploitation at "Voudia" location.

1952

Beginning of bentonite exploitation.

1954

Beginning of perlite exploitation.

1984

Beginning of pozzolan mining at "Xylokeratia" location.

330

1204

1566

1862

1934

**The Frankish Rule
(1204–1566 A.D.)**

Beginning of gypsum exploitation.

1862

Concession of the sulphur exploitation at the "Paliorema" location. The right later extended to other locations as well. Works were interrupted in 1958.

1884

Beginning of silver bearing galenite exploitation, at "Triades" location. Termination of works at the end of the 19th century.

1890

Beginning of manganese exploitation at "Vani" location. Works stopped in 1928.

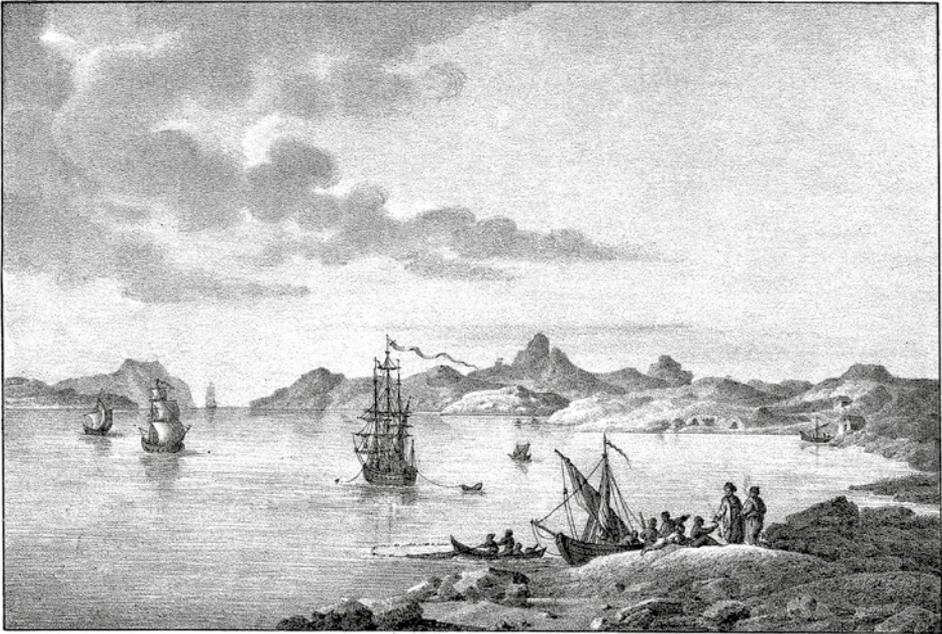
1899

Beginning of kaolin exploitation, and later in 1925, setting up of a processing plant.

AN APPROACH TO THE HISTORY OF MILOS AND ITS MINING PAST

Vue de la Grèce

N. 4



VUE DU PORT DE MILO.

If there is a place where the existence of a mining museum is considered self-evident, this is definitely Milos, the island in the Aegean Sea, since its mining activity goes as far back as the Stone Age and continues uninterrupted until the present day.

Milos is a small volcanic island of the Cyclades with a surface area of 151 square kilometers, and a coastline length of 125 km with countless beaches and a magnificent bay that forms a natural harbor, one of the biggest in the Mediterranean, that played an important role in the island's history.

Its strategic location at the crossroads of waterways, already since antiquity, was the cause for the early development of a culture, that gave great impetus to arts, mainly pottery, thanks to the exploitation and trade of its mineral wealth.

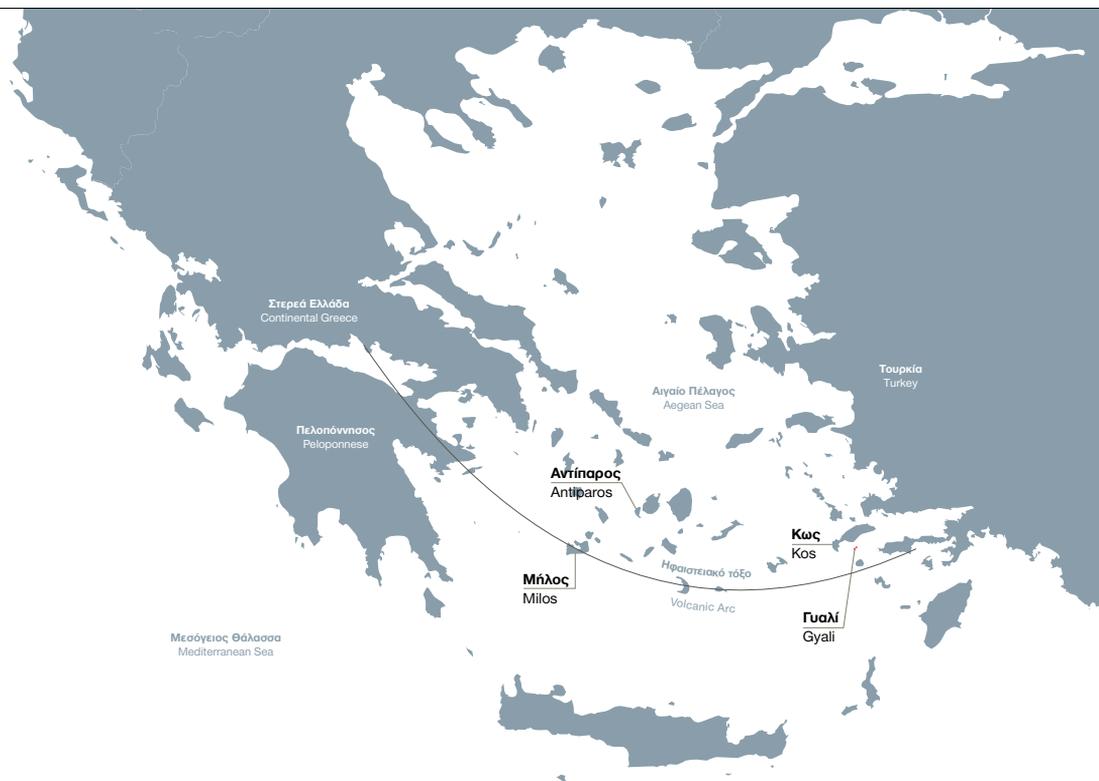
Milos in antiquity is mentioned under various names such as Vivlis by Aristides Grammaticus, Zephyria by Aristotle, Mimallis by Kallimachus, Akytos by Heraclides Grammaticus. Throughout its historical ages though, the island has always been referred to as Milos. Only this name has been used until today preserved in inscriptions and ancient coins. It is said that the island took this name from its first settler, a hero of royal descent, sent from Cyprus to Milos by goddess Aphrodite.

Milos is every geologist's dream since, through the unparalleled variety of its rocks, tells part of the tale of the Earth's creation by the gigantic forces of Nature.

Milos belongs to the "Attica-Cyclades mass" geological unit, and forms part of the "South Aegean volcanic arc" consisting of the Soudaki, Aegina, Poros, Methana, Antimilos, Milos, Kimolos, Thira, Antiparos, Kos, and Nisyros volcanoes.

It is located on the Eurasian plate, about 220 km away from the present collision boundary and subduction of the African beneath the Eurasian continental plate, with a speed of 2.5 cm per year and at an angle of approximately 35°.

GEOLOGICAL HISTORY OF MILOS



Everything must have started 200 million years ago, a period of massive fragmentation of the primordial continents and of the formation of large oceans around the Mediterranean. It was the same period, when the African plate first collided with the Eurasian one and deformed the archipelago cracking the sea-floor into pieces. The African began to submerge below the Eurasian plate melting a part of it. As a result, gigantic volcanic eruptions throughout the geologic ages tormented the region that was later named Aegean.

The intense volcanic activity in the southern Aegean which led to the creation of Milos started 3.5 to 2.7 million years ago. Volcanic explosions took place at the area, which today is the island of Milos, covering it with volcanic ejecta and substratum materials of 64, 33, and 5 million years, formed when the Mediterranean was continually "opening" and "closing" as the collision of the two plates was going on. The island was covered with ash layers of enormous thickness. Blast material that fell on land created low mountains of andesite, while the material that fell in the sea formed, due to the shrinkage during the solidification of hot rocks, the famous pillar-like formations (Glaronissia).

As eruption gases were emitted through melted rocks, a "foam" of lava containing countless air-bubbles was formed which, while cooling, produced pumice with its vesicular texture in the place of bubbles, while underwater lava overcooled on the seabed gave the large layers of perlite.

The rift zone formed during this first period of volcanic activity was reactivated 2.7 to 1.8 million years ago, when the island was almost completely formed, through the ejection of fused rocks, gases and ash. About 2 million

years ago, new violent explosions took place from three partially overlapping craters, resulting to the formation of Milos' great bay.

But the island, once again, did not calm down.

1.8 million to 700,000 years ago, a new volcanic surge on land and at sea created lava domes formed by the violent influx of new material under the older volcanic rocks (1.71 million years ago in Bombarda, 1.6 million years ago in Korakia, 880,000 years ago in Demenegaki).

700,000 to 400,000 years ago, a new eruption covered the island with hot mudflows, while 90,000 years ago two submarine volcanoes exploded and their lava formed perlite, a rock rich in water trapped within its structure (Trachilas - Fyriplaka).

The depths of the Earth in Milos communicate steadily with the surface through the fumaroles and its hot springs, while the South Aegean volcanic arc is still active, and molten material along with superheated gases are found at a relatively shallow depth.

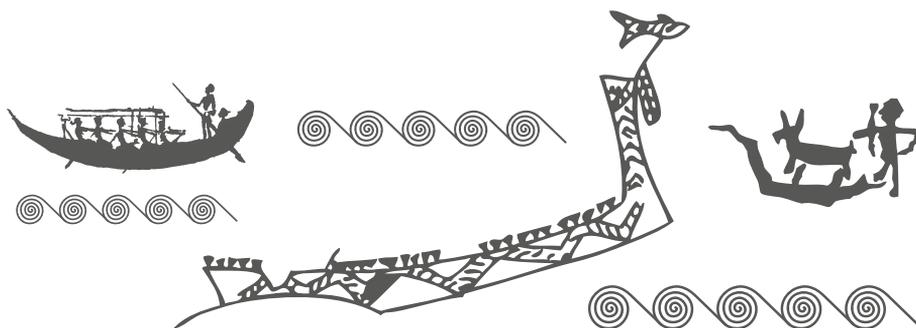
Almost all Milos minerals and rocks are of volcanic origin. But the continuous effect of seawater mixed with warm acidic or alkaline volcanic solutions, turned them into today's "Industrial Minerals" either by washing them off or through the precipitation of part of their elements or deposition of new compounds on them.

This way, acid solutions created white kaolin by "washing out" the volcanic rocks, while bentonite was created by hot volcanic alkaline solutions mixed with sea water.

Alunite and native sulphur were formed by the intense wash out of rocks with hot sulfuric acid while precipitation of baryte, silver, and manganese occurred when hot sea water was mixed with cold water.

Thus were created rocks with unexpected color contrasts and strange shapes that excite the artists' imagination as well as the scientists' curiosity.

Milos is geologically very young. At the time when the "Petalona Man" (500,000 years ago) lived in the caves of Northern Greece, Milos was still a little, inhospitable place with earthquakes and volcanic explosions, like those of the two submarine volcanoes that created the Fyriplaka and Trachilas perlite some 90,000 years ago.



A SUMMARY OF MILOS' ANCIENT HISTORY AND THE EXPLOITATION OF ITS MINERAL WEALTH

The history of the first human settlements on the island begins in the Neolithic Age. Previous human communities are not archaeologically documented. Some passing fishermen from the mainland may have been the first to discover the island and its precious black stone (obsidian), before it was inhabited.

As the island is geologically young, the hypothesis that its first settlers arrived on the island from the mainland by primitive seafaring means may be justified.

Numerous reports by the ancient writers Aristotle, Theophrastus, Pliny as well as the archaeological evidence imply that exploitation of Milos' subsoil first started around 7,000 BC, with obsidian, the black, shiny, and hard stone found on the island, which was much sought-after and traveled all around the mainland and the islands of Greece, widening the waterways network of navigation and trade that started 10,000 years ago.

The obsidian of Milos with its unique texture is a significant archaeological testimony for the detection of the early Neolithic trade waterways in the Aegean.

Therefore, the island's and its exploiters' mining history begins with a stone.

During the **Neolithic Age** (7,000-2,800 BC) the development of Milos was exclusively dependent on the exploitation of obsidian, and its first settlers gained reputation as excellent craftsmen of tools such as scrapers, arrow-heads, saws, axes, thus setting the basis of the Neolithic civilization on the island.

Even in the **Bronze Age** (2,800-1,100 BC), obsidian was still a significant but cheap material for the manufacture of stone tools and weapons until the discovery of iron.

Besides the two well-known obsidian mining sites on Milos, Nychia and Demenegaki, the existence of treated stone blades in various other sites indicates that settlements and obsidian workshops were created there (in Pilos, Embourio, Samari, Plaka).

- During the period 3,300-2,300 BC (Pre-residential era), for which minimal traces of houses are saved, trade with other Cycladic islands was not limited to obsidian but was also extended to ceramics, thanks to the large amounts of kaolin on the island, also used for pharmaceutical purposes.

Plan view of Phylakopi
at the Late Bronze Age



Between 2,300 –2,000 BC (1st residential period - Phylakopi I) simple stone houses are built around the Phylakopi settlement, and exports of obsidian and ceramics are booming.

- During the period 2,000 –1,600 BC (2nd residential period - Phylakopi II) pottery was developed with refined decoration, while, in parallel, trade relations with Crete were established. Nevertheless, Phylakopi gets destroyed by fire by an unknown invader, who leaves traces of fire everywhere, but not of his identity.
- During 1,600 –1,400 BC (3rd residential period - Phylakopi III) the settlement of Phylakopi was rebuilt with the help of the Cretans with impressive protective walls and big houses, perhaps two-storey ones, with frescoes of Minoan art (depicting flying-fishes and lily flowers). Trade was further developed with vases of naturalistic decoration (plants, birds, dolphins) indicating the Minoan civilization's influence. Once again, Phylakopi gets destroyed by invading enemies (probably Mycenaeans) as well as by the eruption of the volcano of Santorini.



- At the beginning, obsidian's frequency on the mainland is low: the area of obsidian transportation is limited to eastern Greece and Crete, in a radius of up to 300 km from Milos (A - inner circle).

- After the 4th millennium BC, obsidian consumption in the Aegean increases and the radius of distribution expands to 400 km. from the source of production. Obsidian of Milos was found in the NE Aegean and the coasts of Asia Minor. In these areas, besides the obsidian of Milos, obsidian from Cappadocia or the Carpathians was also found (B-outer circle)

- During the period 1,400-1,100 BC (4th residential period - Phylakopi IV) the city is rebuilt and the fortification walls strengthened, public buildings and sanctuaries like in Mycenae are built, and small scale ceramics with clay figurines flourishes.

The Mycenaean civilization seems to prevail, while the Minoan influence declines. Around 1,100 BC Phylakopi IV suddenly gets also abandoned, because of natural reasons (probably due to soil sliding because of erosion) as alleged by the fact that part of it is now under the sea surface.

During the **Archaic Ages** (1,100 - 480 BC) a new city is built in the area around today's Klima village. This area ranges from the sea to the NE all the way to the village Tripiti to the N and the outskirts of Plaka.

A strong wall is built, traces of which have survived to this day. The Milians get subjected to and assimilated with the Dorian invaders.

Pottery, at that time, reaches perfection with the "Milian Amphorae" being unique in their kind.

In the **Classical Ages** (480-320 BC), extraction of clay for pottery continues intensively, as well as of the rock andesite for the construction of millstones. At the same time, alunite is also extracted, as documented by the presence of ancient alunite mines in Lagada and of alum production tanks in Agia Kyriaki.

During the Peloponnesian War, Milos refused to join the "Athenian Alliance" (or Delian League) and preferred to stay neutral but the revenging Athenians invaded Milos twice (426, 416) slaughtering almost all of the inhabitants and settling 500 Athenians on the island.

The references made by the ancient Greek authors on the exploitation and use of Milos' rocks in antiquity are numerous, in particular during the Classical Age:

Kaolin: referred to as "Milian Earth" by Theophrastus and mainly used for the manufacture of high-quality ceramics, but also for the treatment of wounds. In Agia Kyriaki, there are obvious indications of a pottery workshop.

Native Sulphur: was used as an antiseptic as well as for the manufacture of medications, in particular for arthritis. In the Archaeological Museum of Milos, one can see the molds for the melting of sulphur carrying the characteristic inscription "of the Athenians".

Alum: was considered a chemical compound of great importance since it was used as medicine. When turned into stypteria, it was used for the dyeing of clothes. There are ancient alum mines in Lagada, while in Agia Kyriaki there are remains of tanks for the conversion of alum into stypteria.

Bentonite: without being clearly referred to by ancient literary sources, it is conjectured that the ancient Greeks and Romans were mining it for its detergent properties, using it as soap.

Hematite: was used for the manufacture of dyes as well as a cosmetic product.

Millstones: the volcanic rock andesite (or trachyte) was mined mainly in Agia Kyriaki during the Classical period. It was principally used for milling cereals as well as harder materials such as ores. The millstones of Milos were used for grinding silver ores in ancient Lavrio.

Pumice: was used for grinding and polishing mosaics, ceramics, statues. An example of the use of pumice as an excellent polishing material in antiquity is the famous statue of the Louvre Aphrodite of Milos made of Parian marble.



The «Venus of Milos» is printed on the paper bags used for the packaging of barytes which «travels» around the world (1950)

The Milians who survived abandoned the island returning only after the Athenians were defeated by the Spartans in 405 BC at the Aigos Potamoi (i.e. Goat Streams).

During the **Hellenistic Period** (323 - 146 BC) the island falls under the sovereignty of the Macedonians and later on of Alexander the Great's successors, namely the Antigonids and the Ptolemies of Egypt.

Peace prevails and the conditions are once again created for the extraction of small quantities of silver and lead ores, while the trade of the island's mineral wealth is developing anew as well as the arts.

Milos flourishes again and its riches are documented by the masterpieces that decorated various buildings, like the statue of Aphrodite (today at the Louvre museum), the over life-size statue of Poseidon, and a general's statue on horseback (National Archaeological Museum of Athens).

During the **Roman Period** (146 BC - 330 AD), Milos is occupied by the Romans and its population grows to 20,000 people! Besides the ancient city of Klima, remnants of buildings can

be found scattered all over the island, indicating that the inhabitants, probably farmers, breeders or miners, lived outside the city walls. The marble theater of Milos is constructed (of which the cunei - kerkides - are excellently preserved, as well as six stairways - klimakes), statues of officials are being sculpted, imperial coins circulate, all examples of a great cultural development.

Mining activity and trade are intensified. The Romans are supplied with sulphur, alum, kaolin, bentonite mainly for pharmaceutical use, pumice for polishing marble and mosaics, as well as pozzolan used as a binder or plaster as documented at the Roman quay platform in Klima.

Moreover, salt is being produced at the island's saltworks. When the Milians converted to Christianity, they also got involved in underground rock-cutting creating catacombs of outstanding technique for protection purposes against the Romans, but also for their religious and burial practices.

In the **Byzantine Ages** (330-1204 AD) the island forms part of the "Theme of the Aegean", a byzantine province based in Rhodes. Milos continues to prosper thanks



to the trade of clay minerals, millstones, alum, pumice, salt (from its own saltworks), sulphur, as well as to pottery production.

During the **Venetian domination** (1,204 - 1,566), Milos, along with the other Aegean islands, is subject to the Venetian rule, even though the Milians defended strongly their right of freedom. It is this period, when the exploitation of gypsum -among other minerals- begins.

During the **Ottoman ages** (1,566 -1,821), except for a short period of Russian rule (1,771 - 1,774) in-between, Milos is under Turkish domination, not occupation, as no Turks actually settled on the island.



German soldiers at the installations of Silver & Baryte Ores Mining Co. at Voudia, Milos, 1943
(G. Xydous photo archive)

Mining of minerals never ceased in Milos, despite the application of high taxation rates on trade which resulted in a reduced production for the island's mineral products. Kaolinite finds at the time a further application in the production of porcelain and its exports accrue. Chora, today's Zephyria, having flourished in the 16th and 17th centuries, is abandoned by its residents in 1767, due to various reasons such as earthquakes, malaria, hydrogen sulfide gas leakage.

These residents move and settle down in Kastro (Castle) and the surrounding area, today's Plaka.

During the **Greek War of Independence** (1821), Milos' contribution to the revolution against the Turks was significant in both, funds and fighters. The first naval warfare success of the War of Independence took place in Milos, on April 11th, 1821.

In **WW I**, the port of Milos was used as a naval station by the English and the French, and Adamas hosted the Allies' Aegean Naval Command.

In **WWII**, Milos was occupied by the Germans on May 6th, 1941 and liberated on May 9th, 1945.

EXPLOITATION OF THE MINERAL WEALTH OF MILOS IN MODERN TIMES



A panoramic view of the Voudia bay first installations of Silver & Baryte, 1935

After the liberation from the Ottomans with the Greek War of Independence of 1821, the first Greek State is getting organized and attempts to exploit its mineral wealth. In this context, the first official license for the exploitation of sulphur in Milos' Paliorema is assigned to Vasileios Melas, which later on is expanded to cover other sites as well.

The exploitation of sulphur ceased in 1905 to resume 25 years later, in 1929, until it was definitely terminated in 1958.

As of that point, an interest begins to develop for the industrial minerals and ores of Milos, mainly by I. Serpieri.

- In 1886 Sifnos-Euboea Company undertakes the exploitation of the sulphur deposits of silver ore galenite-sphalerite in Triades, but not of the contained silver, for

which long-lasting researches are done but without any satisfactory results.

In 1932 the exploitation of silver is conveyed to the entrepreneurs K. Papavasileiou and D. Palaeologos and one year later is transferred to Euripides Mavromatis. Work was discontinued at the end of the 19th century, without Milos silver having been mined successfully, at least in modern times.

- In 1893 the first mineral deposits map of Milos is published and later on, in 1924, the geologic map of Milos follows it.
- After several attempts since 1871, the exploitation of the manganese deposits with a 32-41% content in MnO_2 is intensified at cape Vani in 1898 by the french company Serpieri & Cie.



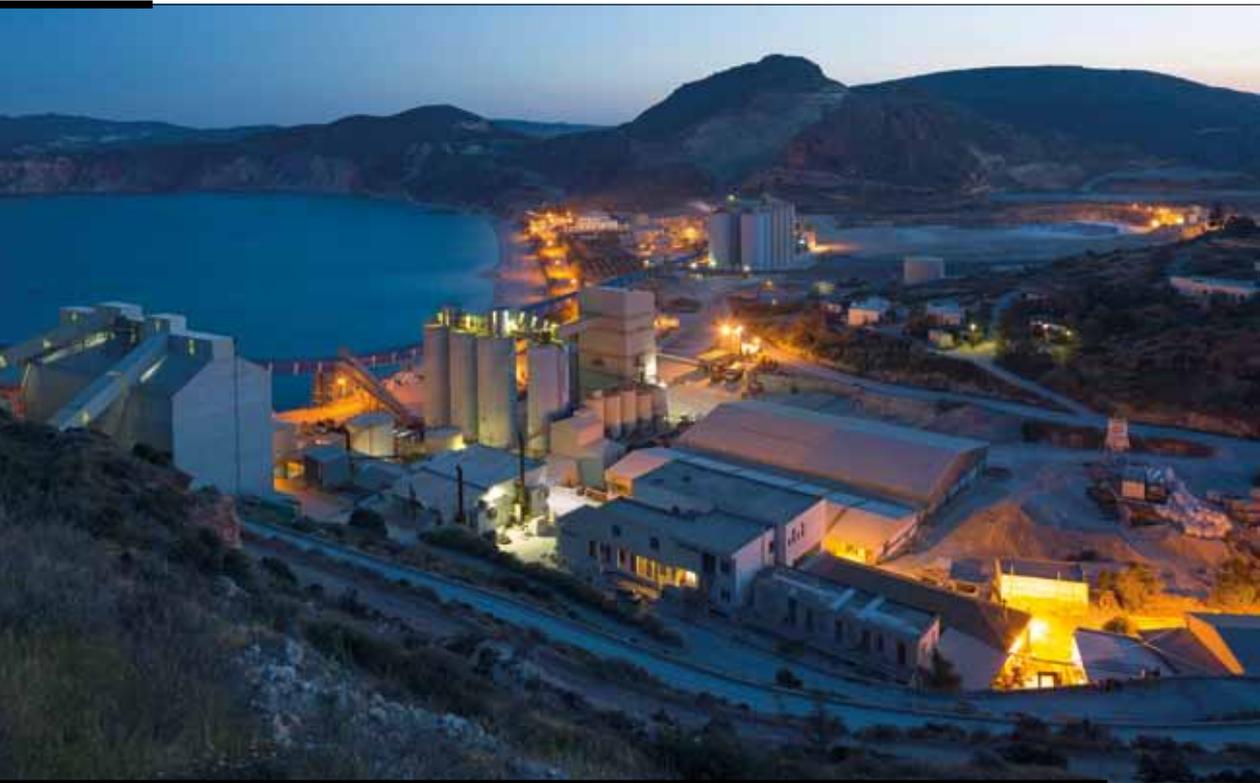
At the time when production reached its peak, 250-300 people, men, women and children were occupied at the mine, which, though, stopped operating in 1928, because of the global economic crisis, after having produced more than 220,000 tonnes of manganese.

Very small gypsum deposits were also exploited at the time.

- In 1899, the kaolinite mines of Milos no longer belong to the State, and their ownership passes to a private owner. The exploitation of kaolin is intensified and, in 1925, the processing plant is being built by Klonaridis, which in 2000 was renovated by Mrs. Kitty Kyriacopoulos and has since been operating by the company ORYMIL S.A. as Milos Conference Center - "George Eliopoulos".

- The exploitation of barytine starts in 1934 at the location Voudia in Milos.
- After WWII, the destroyed cities need to be rebuilt, a fact which led to increased demand for mineral raw materials. Thus, big companies are being established in the '50s and '60s (TITAN, Mykobar, G. Bourlos as well as Silver & Baryte Ores Mining Co. S.A., since 1934), but also smaller local businesses, which did not last long.

The exploitation of industrial minerals starts in 1952 with bentonite, followed by the exploitation of perlite, in 1954. In 1984, pozzolan mining also begins at Xylokeratia and elsewhere in Milos. The companies TITAN, AGET-HERCULES are now involved in pozzolan mining. The most important mining company active to this day on the



Premises of the then Silver & Baryte Ores Mining Co. (nowadays IMERYS Industrial Minerals Greece), Voudia, Milos, 2000

island is IMERYS Industrial Minerals Greece S.A. (after the acquisition of S&B Industrial Minerals S.A., former Silver & Baryte Ores Mining Co. S.A.), holding the world's leading positions for the production and exports of perlite and bentonite, by exploiting large deposits of these industrial minerals.

Another field of natural resources' exploitation in Milos, beyond mining, is the island's high geothermal field and abundant hot springs known since antiquity and surveyed in 1970. The whole attempt though did not proceed further than the conducted surveys.

The long list of Milos'exploitable natural resources does not end here.

Its geological environment, as serious studies by Australian geologists have shown, is extremely favorable and promising for the exploitation of gold! Who knows.... Maybe some day... as long as we do not wait too long to uncover all the hidden wealth of this "treasure island".

Milos, "the island of Aphrodite," is a place of numerous geological treasures supplying many cultures with basic raw materials for thousands of years. Still in our days, Milos is an important global supplier of bentonite, perlite, kaoline. An open-air geological museum in itself, the island has its own MILOS MINING MUSEUM promoting its mining wealth and justifying its presence to the full on this "island of treasures"!



Bentonite mine, Aggeria

BIBLIOGRAPHICAL SOURCES

Dimou, E., Konti, H. and Drandakis, E., 2003: *The Sulphur Mine of Palioremma*. Scient. Milos Conference: Historical Mines in the Aegean, 19th-20th c. (in Greek)

Koritsi, I. and Mallis, I., 2003: *A record of historical mining facilities on Milos*. Scient. Milos Conference: Historical Mines in the Aegean, 19th-20th c. (in Greek)

Liakopoulos, A., 1987: *Hydrothermalisme of mineralisations metalliferes del' ile de Milos*. Thesis, Univ. Paris 6.

Loukas, I., 1993: *The Aegean Sea*. Papazisis Publ, Athens. (in Greek)

Belivanakis, G., 2001: *The History of Milos*. A publication of the newspaper "MILOS", Athens. (in Greek)

Belilvanakis, G., 2004: *The Sulphur Mine of Milos*. A publication of S&B Industrial Minerals S.A., Athens. (in Greek)

Economopoulos, I., 1998: *The Mining History of Milos*. Oryktos Ploutos magazine, 108, 59-64. (in Greek)

Pavlidis, S., 2007: *PAN-GAEA*. Leader Books, Athens. (in Greek)

Plimer, I., 2000: *MILOS. Geologic History*. KOAN Publ., Athens.

Fytiakas, M., 1977: *Geology and Geothermy of Milos*. Thesis, Univ. of Thessaloniki. (in Greek)

Hatzidakis, I., 1972: *The History of the Island of Milos*. Ένωση Μηλιών εν Αθήναις, Athens. (in Greek)

Xydous, G., 2006: *The Mining History of Milos Island*. Oryktos Ploutos magazine, 139, 35-40.



ΜΟΥΣΕΙΟ ΜΗΛΟΥ
MINING MUSEUM

MILOS MINING MUSEUM

Milos Mining Museum (MMM), a non-profit organization, is located in Adamas, the port of the island. Its construction began in 1994, and the museum opened his gates to the public on May 23, 1998.

Creating a mining museum on the island was the idea of the Milos Fraternity which, as of 1982 started collecting objects related to the age-old mining history of Milos.

After six years and with the support of the Association of Industrial and Exporting Companies of Milos (E.B.E.E.M.) the collection is exhibited for two years at a place especially rented for this reason. In 1991, S&B Industrial Minerals S.A. buys from Milos Agricultural Cooperative a warehouse in Adamas, the aim being to house the mining collection.

Later on, the warehouse was deemed insufficient and it was demolished. The construction of a completely new building in its place to house the museum was decided and started in 1994. When completed, in 1998, the new museum building housed the mining collection as well as various other objects related to the island's mining activity, donated by individuals and companies as well.

The new building consists of the ground floor and the first floor, the main exhibition areas, as well as of the auxiliary areas of the basement and two atriums.

IMERYS Industrial Minerals Greece S.A. supports today the function of the museum without any State fundings. MMM is not just a thematic museum, as maybe indicated by its name, presenting exclusively the mining history and activities of Milos. Its main goal is to record memories and to present the creation of the island itself, as documented by its unique and diverse geological history.

Furthermore, the human communities that lived on the island exploiting its mineral wealth, and left their mark on ancient civilization, navigation and trade, are also revived through the museum's exhibits. The Archaeological Museum of Milos in Plaka, with its own exhibits, completes the history of man as "sapper".

MMM is a modern museum, and as such it is a cultural and educational center in a constantly evolving society, not just an exhibition place but an experience. An ark of information about the past, the present, and the future.



GOAL of the Museum is to highlight the rich geological and mining history of Milos as well as Man's age-old relationship with the Rock, from the moment he first appeared on this Promised Land. Moreover, the dissemination of knowledge about the contribution of Mineral Wealth to the evolution of man and civilization, as well as the diffusion of information to the broader public about the infinite uses of minerals in our everyday life, many of which can be found on Milos, are also goals of MMM.

The Museum's activities revolve around two main axes, aiming at promoting the geological/mining history (of the past and present) as well as the people who labored on this island. They are addressed above all to the young people, aiming to take them on a journey of knowledge on the significance of raw materials and minerals for man's life and culture. To this end, the museum organizes annual educational programs, geological walks through the "Miloterranean Geo Walks" initiative, periodical exhibitions and scientific conferences, while it has also developed significant publishing activity.

VISITING THE EXHIBITION AREAS



Guided tours around the exhibits are also done through the Audio Guide System in five languages Greek, English, French, German, Italian

Ground Floor

Unit A

A1. Information - Secretariat

A2. Museum Shop

Unit B

Social, economic and technological aspect of the mining activity on Milos

- B1.** The history of the Milos Mining Museum
- B2.** Geological map of Milos
- B3.** Mining history of Milos
- B4.** Mineral production processes
- B5.** Slides from the Sulphur Mines and Vani
- B6.** Sulphur Mines - Vani
- B7.** Various objects from the Milos Sulphur Mines S.A. and Silver & Baryte Ores Mining Co. S.A. (later S&B Industrial Minerals S.A. and nowadays IMERYS Industrial Minerals Greece S.A.)
- B8.** Tools and photographs from past mining activities on Milos
- B9.** Wagon cart (scoop-car)

Atrium 1

Educational activities

Atrium 2

Land reclamation

Stairway

Volcano model - diagrammatic section of the earth's crust

First Floor

Unit C

The mineral wealth of Milos

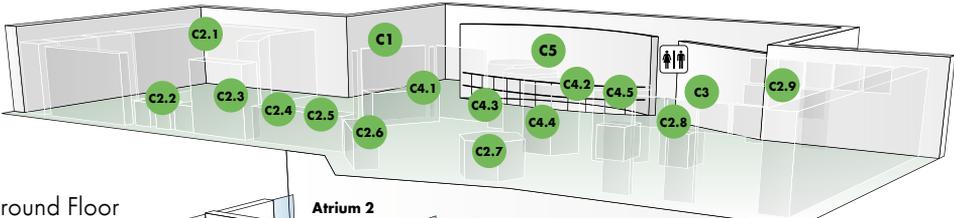
- C1.** The creation of Milos
- C2.** The mining activity of Milos
 - C2.1 Obsidian
 - C2.2 Millstones
 - C2.3 Kaolin
 - C2.4 Sulphur
 - C2.5 Manganese
 - C2.6 Pozzolan
 - C2.7 Baryte
 - C2.8 Perlite
 - C2.9 Bentonite
- C3.** Getting to know the minerals (interactively)
- C4.** The mineral wealth of Milos with references to the rest of Greece
 - C4.1 Epithermal gold
 - C4.2 Fossils
 - C4.3 Minerals
 - C4.4 Rocks
 - C4.5 Minerals
- C5.** Landscapes of Milos as geological sights

Basement

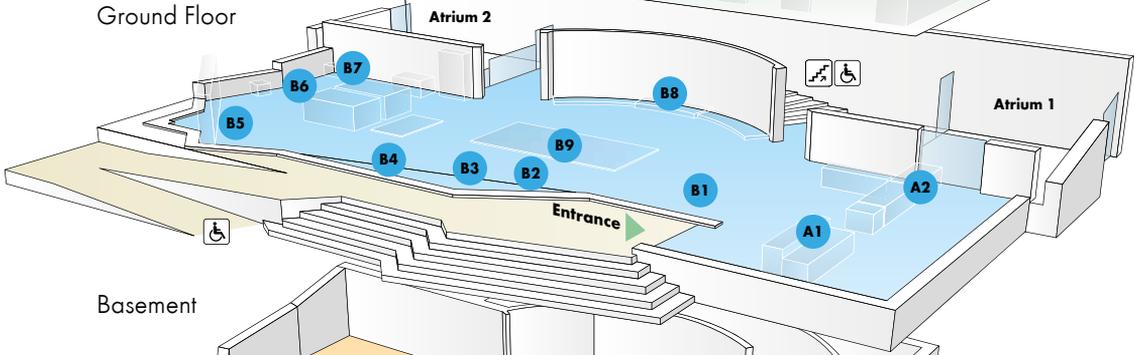
Unit D

- D1.** Hall of temporary exhibitions and educational programs
- D2.** Projection and lecture hall

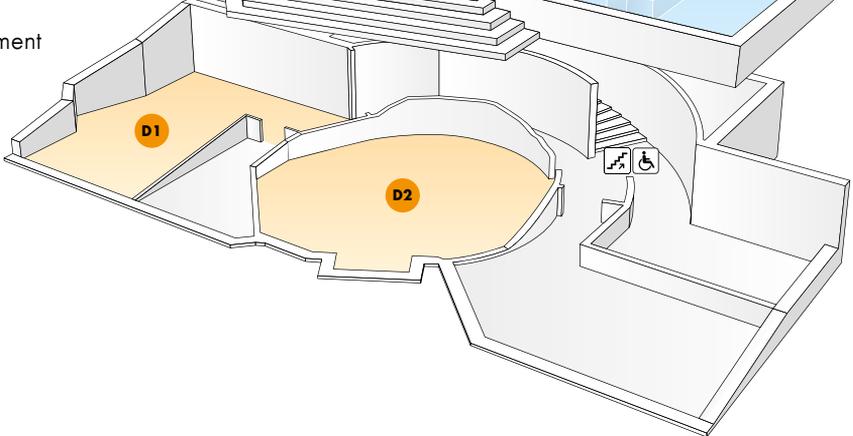
First Floor



Ground Floor



Basement



GROUND FLOOR

The ground floor exhibition is dedicated to the mining history and activities of Milos at various times. Emphasis is given on old obsolete mines that wrote their own history, providing financial support and social development in difficult times for the island. It is important for a local museum to give young people the opportunity to get to know their parents' and grandparents' history and labor as documented and "carved" on the rocks of their own home place.







Geological and mineral research, for determining the quantitative-qualitative characteristics and the exact location and form of the deposit with the help of geophysics and geochemistry.

Techno-economic analysis, for ascertaining that the deposit's exploitation is cost-effective, and if so, for determining the appropriate mining method.

Detailed planning of all exploitation phases and of all measures for reducing its impact on the environment and for ensuring safety for the miners and the project itself.

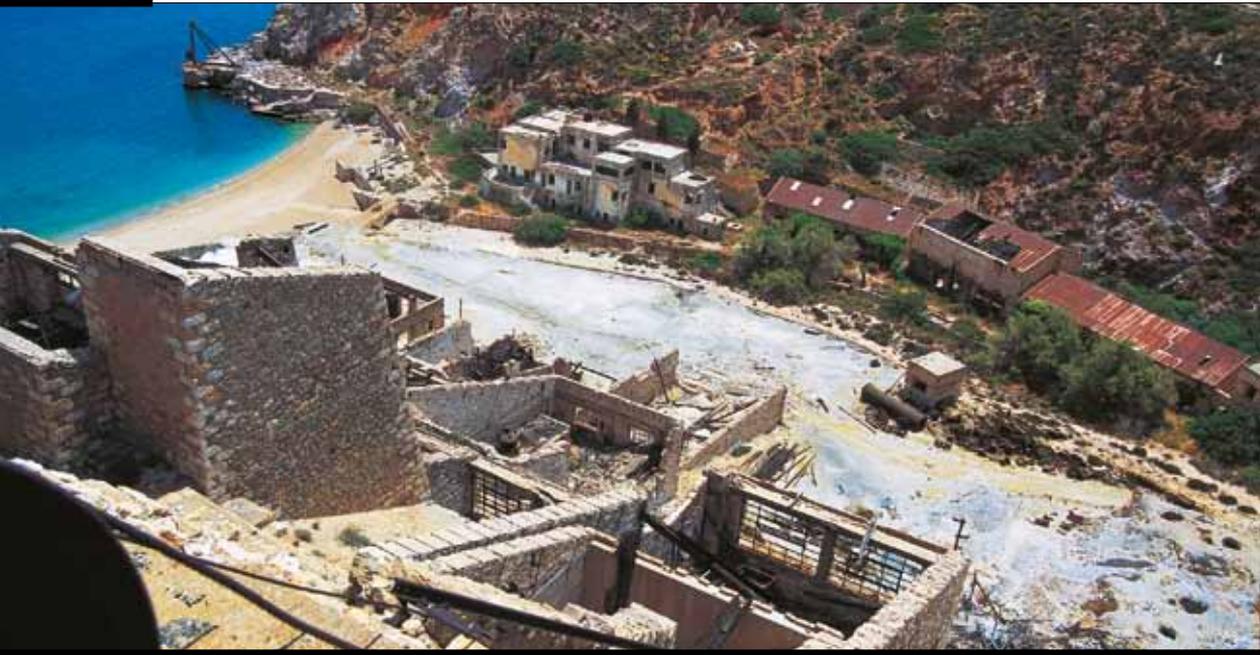
Extraction and transportation of the mineral to the industrial processing plants.

Processing according to the mineral's nature and the customer's specifications (breaking, sieving, drying).

Loading and transportation to the site of consumption (individual customer-industry).

Finally, the whole procedure is completed with the rehabilitation of the mining site that has been affected by the extraction activity. Goal is to restore nature back to the mines and to establish a sustainable biodiversity.

This is achieved with the appropriate restoration of the land relief with soil covering and planting or sowing of local and endemic flora species.



Panoramic view of the Sulphur Mine buildings in Palioemma, 2002

- Further on, we are getting acquainted with the most recent mining past of Milos, through the two obsolete mines in Palioemma (sulphur mine) and Vani (manganese mine), for which the memories of the local miners have not yet faded away. Here, we can see photos and slides from both mines which, although no longer functioning, left their mark on Greece's mining history in difficult times for the country's economy.

When looking at the photos of the Sulphur Mine, the ruined plant seems to dominate the hill's natural slope with the remains of the old Dekoville mine cart track. Inside the ruins of the buildings (warehouses, machine or repair stations, etc.) there are still remains of heavy machinery that Time and History seem to have respected (various objects/tools from this site are now exhibited at the MMM). On the other hand, the slides from cape Vani open-air manganese mine show the magnificent geologic landscape with its grey-brown or red-brown rocks competing with the blue shades of the sea, of this very sea that once upon a time created them. In the same area, we are given brief historical facts and other information about the two obsolete industrial plants.



Coins made of aluminium («token-coins»). They were used by the workers to buy various products from the Sulphur Mine's canteen in the '50s.

So, we learn that, million years ago, cape Vani formed the muddy bottom of an underwater crater, where rocks rich in manganese were gradually formed.

The first attempts to recover the ore began in 1871, and when mining by the French company Serpieri & Cie reached its production peak in 1898, 250 people were employed at the worksite. At the end of the 19th century the annual production reached 18,000 tons 70% of which was exported and the rest 30% was transported to the foundries of Lavrion.

In 1928 the mine at Vani closed, after having produced over 220,000 tons of manganese.

The Sulphur Mines at Palioremma is an extraordinary case, since in 1860 it was assigned the first official license (concession) for the exploitation of sulphur provided by the newly established Greek State. In 1893, 220 miners were employed at the Sulphur mine, and annual production reached 2,000 tons, most part of which was exported to France.

The mining activity continued with few intervals until, due to limited demand, it was finally closed in 1958, having mined about 125,000 tons of the ore, that is only part of the existing deposits.



At the same exhibition unit, we can see the original price list of the canteen of the Sulphur mine which served the needs of the miners. Any transactions were done with conventional 'token-coins' made of aluminum, which were used in the '50s and are now also exhibited here.

- Completing our "stroll" at the Sulphur mine, a significant monument of industrial history included among the most important early processing plants in Greece, we can see various objects, tools, and machines used in the production process of that time, and exhibited here to remind the younger, under which conditions and with which means, the mining activity started on the island.

These objects once belonged to the lab of the Milos Sulphur Mines S.A. that was active there, while in the same showcase, exhibits from the activity of Silver & Baryte Ores Mining Co. S.A. (today IMERYS Industrial Minerals Greece S.A.) are displayed as well.



Among them, the visitor can see laboratory tools (lab scale, test tubes, sieves, a Bunsen burner, etc.) calculators, collective agreements, a 1940 labor law document, books of accounts, payroll documents and more.

Here, various machines, such as a load lift and a heating/drying oven can also be seen, while several other objects and tools are exposed in glass display cases. Among them, fragments of clay molds into which molten sulphur was poured, dated around 505-415 BC. At the Archaeological Museum of Milos, clay molds are also displayed bearing the inscription "of the Athenians" thus highlighting the presence of the Athenians in Milos, at that time.

- The semi-circular area at the ground floor is occupied by various testimonies of the mining activity in Milos during the previous century, representing the miners' way of living and working as well as paying tribute to those who labored and contributed to the development of the island.

Some original, "primitive" tools that the workers at the mines used trying to "tame" the rock, as well as items from their everyday routine constitute a somewhat "folklore" collection complemented by two museum mannequins wearing the typical work clothing of the time.



Finally, a series of photographs hanging on the wall depict typical snapshots from the mining activity in the recent past.

- Our tour of the ground floor area concludes with the large tools that still bear the characteristic natural wear of time and use, like an iron mine scoop for the transportation of minerals on a minecart railtrack, with various other tools scattered around it on the floor, as well as a heavy weighing scale in the middle of the room.





Η δημιουργία της Μήλου

The creation of Milos

Η δημιουργία των ορυκτών

Text describing the geological formation of Milos, detailing the volcanic processes and the resulting mineral composition.



Additional text explaining the volcanic activity and the formation of the island of Milos, mentioning the eruption of the volcano Milos.

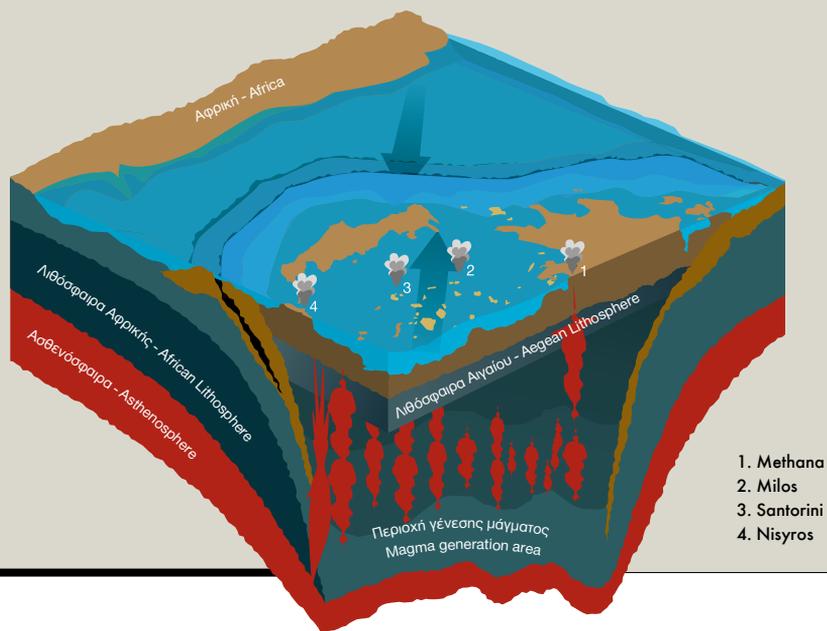


1st FLOOR



On the first floor, the mineral wealth of Milos as well as the current mining activity on the island is presented, and information is given on how minerals are processed and what their multiple uses in our everyday life are.

And since minerals are inextricably intertwined with volcanism -as is the creation of the island itself- here, the island's creation and geological evolution is also very vividly presented.



1. Methana
2. Milos
3. Santorini
4. Nisyros

This floor consists of five distinct Units.

The Creation of Milos

When leaving the stairway to the first floor, a model presents the various phases of volcanism, and a diagrammatic cross-section of the Earth's crust with its various layers shows the way the magma climbs up, then creates a lava chamber, before it appears on the Earth's surface in the form of an erupting volcano.

Below and in front of the volcano model, large samples of rocks associated with the volcanic activity are exhibited.

When entering the first floor, informative signs present schematically the creation of Milos and of minerals. A three-dimensional image represents the area of the South Aegean volcanic arc, where Milos once emerged from sea by the gigantic clash and titanic forces of two continental plates.



The limits of the two plates are depicted, as well as the direction of the submergence of the African under the Eurasian plate and the beginning of volcanic activity at the point where the African plate reaches the Earth's mantle and melts. In parallel, a full depiction of the South Aegean volcanic arc, starting from Korinthia and ending in Asia Minor, is shown on a map.

Then, the visitor will see minerals that are present on the island (kaolin, sulphur, pozzolan, baryte, perlite, montmorillonite, andesite, manganese ores), that have either been extensively used in antiquity and greatly contributed to the promotion of culture, or constituted and still constitute main income sources for the island's inhabitants, like perlite and montmorillonite.

Moreover, they support the economy of the country as well, since they hold leading positions both, in the European and the global market.

The creation of these useful minerals is due to the intense volcanic and hydrothermal activity in the region of the South Aegean, especially in the area which today is the island of Milos.

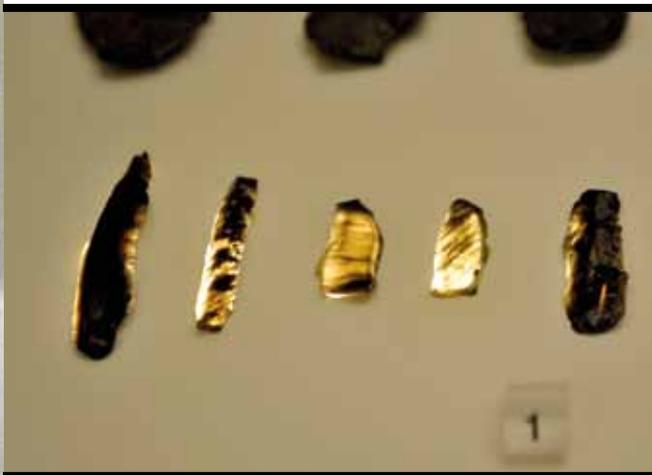
Except for andesite which is a purely volcanic rock, the other useful minerals were produced by the transformation, disintegration, illuviation of volcanic rocks by hot solutions combined with seawater that turned them into the minerals they are today.



The mining activity of Milos

This Unit includes minerals and rocks that are mined today in Milos, as well as those that were extracted in the past, and constitute the island's diverse mineral wealth.

Obsidian. In the Obsidian display cases the collection of the Milian folklorist and collector Zafiris Vaos is exhibited, which was bought in 2009 by the Kyriacopoulos family with the approval of the Greek Ministry of Culture. In 2011, it was donated to the MMM supplementing its permanent collections, thus returning to its place of origin, which was also the wish of the collector. The Obsidian collection consists of numerous artifacts from the prehistoric obsidian quarries of Milos and various surface locations of the island.



Obsidian is a volcanic glass produced from the rapid cooling of acidic siliceous magma, resulting from the volcanic explosions of the Quaternary, 1.4 million years ago. In two cases, one can see the sources of obsidian in the Mediterranean and the Aegean during prehistory, as well as its trade routes in thorough graphs. The two following cases present the archaeological sites of obsidian and the ancient quarries in Nychia and Demenegaki, as well as a thorough reference in Fylakopi, the main trade center of obsidian in prehistoric times.

Then the obsidian knapping techniques are presented through graphs and sketches representing the various ways of cutting and splitting blades with pressure or percussion. For all of the aforementioned ways of processing, there are characteristic samples of obsidian, such as nuclei, flakes, blades in a variety of types, as well as in their final form as utility articles, scrapers, saws, arrowheads, drills, and so on.

This unit concludes with a chronological diagram, where the use of obsidian in the Aegean is presented, from the Upper Palaeolithic to the 1st millennium BC.



Millstones. Andesite is a volcanic rock found in several locations in Milos and, due to its hardness and porosity, was used in ancient years for the creation of millstones for grinding cereals and other materials.

During the Classical period, andesite mining was carried out in Aghia Kyriaki and andesite was exported to Lavrion for the grinding of silver ore, but also outside of Greece, in Egypt, Italy and elsewhere.

The relevant table illustrates the various stages of andesite carving until turned into millstone, while in museum pedestals natural samples of this volcanic rock are exhibited, two of which in the process of being carved, and the third in the completed phase, as a millstone.



Kaolin mine galleries in Kastriani

Kaolin. Here, the history of kaolin and its use from antiquity to the present day is presented, as well as of its creation, while information is also given about its occurrences on the island. On small stepped glass display cases natural samples of kaolin show us successive phases of its processing, through small or smaller, trimmed or non-trimmed samples, until the final step of processing, i.e. ceramics, famous artifacts in antiquity.

Kaolin is a rock made up from a mixture of aluminum silicon oxides (chemical type $2\text{SiO}_2\text{Al}_2\text{O}_3\cdot 2\text{H}_2\text{O}$) and includes mainly kaolinite, halloysite, allophane. Theophrastus and Dioskorides report that kaolin (Melian earth) was extensively used in painting dur-

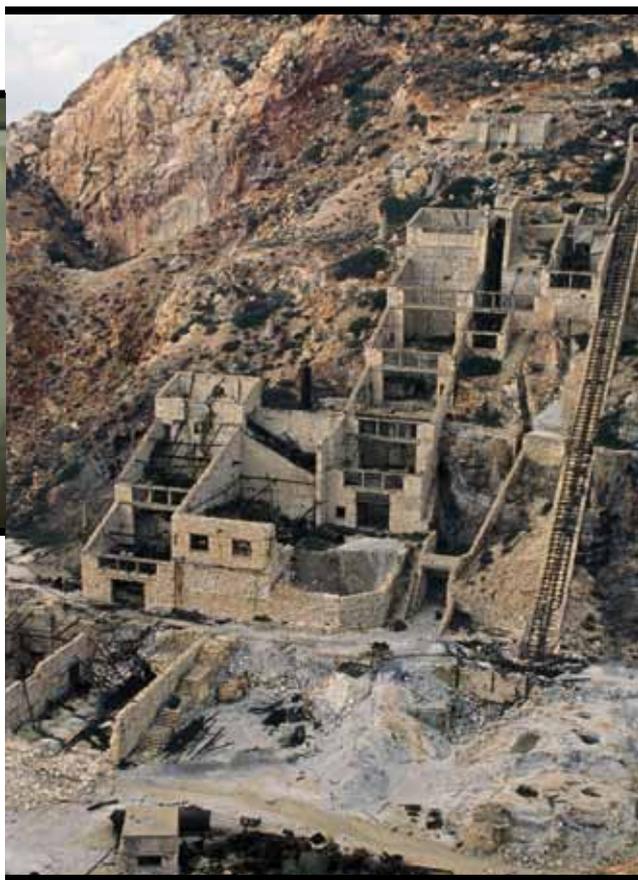
ing antiquity. It is also known that kaolin was used as early as the Neolithic Age for the manufacture of clay pottery, figurines, ancient oil lamps, and house coatings in Milos and elsewhere.

Unprocessed kaolin is used in the cement industry for white cement production, while the white finely ground kaolin is used in the paper industry as a filling and for ensuring the paper's whiteness and opacity.

It is also used in the paint industry (plastic paints), in the cosmetics and drugs industry, while excellent quality kaolin is used in the production of porcelain.



► The obsolete plant of the Sulphur Mines in Palioremma, Milos



Sulphur. The first reference to its use is made by Homer, in its Iliad and Odyssey epics. Its healing and disinfectant properties were known at the time of Hippocrates. Sulphur was also used for polishing metals.

In our days, it is mainly used in the production of fertilizers, pesticides, paints, explosives, matches, fireworks. It is also used in metallurgy for the treatment of iron and other metals, as well as in the textile industry.

Systematic exploitation of sulphur on Milos started in 1862 at Palioremma which though stopped in 1958, due to the fact that, during the desulphurization process of petroleum

and natural gas, a more cost-effective sulphur production method was found, which is in use until today.

The numerous ruins of the Palioremma Sulphur Mine buildings by the sea, are testimonies of the past intense mining activity on the island, and are awaiting to be revived and serve a new use in the future.

In the same display case, the visitor can see natural samples of native sulphur as extracted, and admire its shining yellow in all its shades and intensivities.



Generic view of the manganese mine in Vani

Manganese. Already in antiquity, it was used in painting along with the other ochres. It may have first been used in metallurgy alongside with iron without the knowledge of the ancient blacksmiths, as manganese coexists in most iron ores.

Manganese does not exist in nature as an element on its own, but is contained in various minerals, when these are being formed, such as in manganese minerals, hausmanite, rhodonite and pyrolusite (MnO_2).

Its uses are numerous: in iron metallurgy, steel and batteries industries, glass industry, in the manufacture of purple colored glass, as well as in decoloring (removing tints) glass melts, from which use it derives its ancient greek name, "pyro-lusite" i.e. "fire-wash".

As a trace-element, its contribution to the food chain of animals and plants is also very important. The exploitation of Milos manganese deposits started with good omens in Vani but stopped definitively in 1928, due to the global economic crisis.

Various manganese ore specimens complement our knowledge about this very useful ore, also recovering memories for all those who worked there as miners, in difficult times.



Pozzolan. The presence of pozzolan (Theraic Earth) in the hydraulic mortars of the ancient tanks for the “beneficiation” of silver ores in Lavrion, especially in Classical times, implies that its use was already known in antiquity. In Strabo’s Geography, reference is made to the use of Theraic Earth in Italy, and it is known that it was used in the roman mortars. The Romans discovered the properties of pozzolan in a village by mount Vesuvius, Pozzoli, from which it derives its name.

Pozzolans are volcanic rocks (tuffs), rich in silicon dioxide (60-70%), and aluminum oxide (12-15%), mainly of tracheitic-andesitic origin.

Pozzolan powder, in the presence of moisture or water, reacts chemically with carbon dioxide forming various compounds with hydraulic properties.

Today, pozzolans are mainly used in the production of cements with pozzolan (containing pozzolan up to 20%) and pozzolanic cements (containing 20-48% pozzolan). In smaller scale, they are also used in the production of hydraulic mortars and insulation blocks.

Pozzolans abound in areas of volcanic origin. In Greece, large quantities can be found in Milos (Xylokerathia), as well as in Kimolos, in Aspronissi, Gyalí, and in Thera (Santorini), hence the name Theraic Earth.

In the same display case, besides the photos showing the mining sites of pozzolan in Milos, a small collection of large pozzolan specimens of various types is also exhibited.



Baryte. It is barium sulphate with the chemical formula $BaSO_4$. In the Greek mining industry, however, the argentiferous baryte ore poor in silver content is known by the name barytine.

Baryte is mainly used (up to 80%) in the production of oil drilling muds, as it increases the muds' specific weight. It is also used in the glass, tire, and paper industries (for the production of luxury cardboard), in the manufacture of paints, fireworks, as well as an aggregate in heavy cements. In medicine, it is given to patients undergoing x-ray examinations, in the form of solution. Furthermore, it is also used in nuclear reactors as a shield protection against radiation.

In Milos' Voudia bay, an argentiferous baryte (barytine) deposit was mined in the past, but such deposits exist in other Greek islands, too, such as in Mykonos, Kimolos, Polyaeos, Kos, Thasos.

Baryte occurrences exist also in mainland Greece, mainly in the Peloponnese and Macedonia (Kilkis). The old photo on the wall shows a snapshot from the ore's transportation, with primitive means, in Voudia bay.

A large and heavy specimen of baryte, with its characteristic orthorhombic crystal system, is placed on a pedestal, while in a low display case nearby, smaller pieces of baryte from Milos and other places in Greece as well, such as from Serifos and Lavrion, are exhibited.



Perlite. It is a glassy volcanic rock containing a high percentage (70-76%) of silicon dioxide (SiO_2) and 2-6% crystallization water. Its ability to “swell” when heated is due to its high content in water, since the steam formed during heating gets trapped in the form of bubbles in between its granules, resulting in significant increase, up to twenty times, in volume.

Expanded perlite is used as sound-insulation in the construction industry, in the production of light concrete, plasters, as substratum in hydroponic cultures, and as soil improver, but also as pet litter. It is also used as additive in drill muds, as abrasive in detergents, soaps and polishing products. One of its main uses is as filtration means for the separation of liquids (beer, wine, water, olive oil) from solid inclusions (impurities).

Perlite is mined in Milos, and is exported to many countries around the world. Greece is the global leader in the production of perlite. It is mined in Gyali as well, and is also to be found on the islands of Kos, Lesvos, Antiparos. In the same unit, many of the uses of perlite are very explicitly presented, and the visitor can come in contact with it.



Bentonite. It is a rock consisting of phyllosilicate minerals, especially montmorillonite. Its uses are numerous; following are the most important ones: Due to its high adsorption and ion-exchange capacity, and its plasticity, it is used in the drilling muds for the research and production of petroleum and natural gas, as well as in water drillings (as sealer, borehole wall coating).

Its use in the foundries is significant. It is used as a mold cover for precise casting, and in iron production as binder in iron ore pelletization.

It is, furthermore, used in sealing cement injections, as sealer in landfills, lakes and dams, in the fertilizer-pesticides industry, in pet litter, in pottery, in pharmaceuticals and cosmetics, in the production of photocopy paper. Its use as filter aid in the clarification of liquids (wine, juices, olive oil) from unwanted proteins and other substances is significant.

In this unit, the visitor will get detailed information about the uses of bentonite through pictures and graphs, and will watch a video screening dedicated to these two minerals, Perlite and Bentonite, which dominate today's mining activities on the island.

Milos is the main producer of bentonite, with an extraordinary mining and exporting activity. Greece comes first in the production of bentonite in the E.E. and second globally. Bentonite exists also in the islands of Kimolos, Lesvos, Chios.



Getting acquainted with the minerals (interactively)

Here is the Interactive Contact Unit (ICU), where the visitor comes in direct contact with the minerals that were once or are today mined on Milos. Goal of the ICU is to allow the visitor to recognize these useful minerals, but also to get to know the various locations of their mining or processing on the map of the island.

It is a pleasant game for young and old alike offering further knowledge, which supplements the museum's annual educational programs. It's all about the mineral wealth of Milos with further references to the rest of Greece, too.



The mineral wealth of Milos with references to the rest of Greece

The museum's mineral collection is important and counts over 2,000 specimens, 90% of which are representative of Milos. In the middle of the room, samples of minerals, rocks, and fossils from Milos and other regions of Greece are exhibited. In the section dedicated to epithermal gold, characteristic samples of rocks with a relatively low content in gold from various areas of Milos are in display. For instance, a tape-like textured quartz sample and a specimen of chalcedony with gold from Profitis Elias, one piece of rhyolite with low content in gold from Chondro Vouno,

a gold-bearing vein of quartz with iron dioxides from Profitis Elias, a gold-bearing amethyst vein from Chondro Vouno.

In spite of the above, a gold-bearing deposit has never been found in Milos, although the island's geological conditions have been deemed favorable by geologists.



The most probable cause for this is that, since Milos is geologically very young, there hasn't still been enough time for its gold deposits (from the washing off of volcanic rocks) to be deeply corroded, and the gold carried away by groundwater, condensed, and coagulated. Maybe after many, many (!) years... who knows!!



The visitor will find the fossil's display case of special interest as well, because of their impressive variety on this volcanic island.

Animal fossils prevail. Especially in Sarakiniko, where many shells of crustaceans (scallops, oysters) have been buried in the volcanic sand. Bivalves of the *Ostrea* family, *Pectinidae*, *Echinoderma*, and *Scaphopoda* of the *Aporrhaidae* family were recognized, and much more.



In the cases dedicated to the minerals, many impressive collector pieces from Milos (sulphur, gypsum, opal, salt), but also samples with interesting uses, such as zeolite and diatomite, are exhibited, supplemented by minerals from various other regions of Greece (gypsum from Ierapetra in Crete, amianthus from Zidani in Kozani, talc from Askos in Chalkidike, iron pyrite from Chalkidike).

In the case dedicated to the rocks, characteristic samples from Milos, as well as from other regions in the mainland and the islands are exhibited, presenting a general idea of the country's geology (emery from Naxos, laterites from Kastoria, bauxites from mount Elikon, sulfuric ores from Chalkidike, chromites from Kozani).



Milos landscapes as geological sights

Our “guided” tour of the 1st floor completes with impressive pictures from natural landscapes formed by geological processes, with characteristic samples from Sarakiniko, Vani, Arkoudes, Kleftiko and Glaronissia.

Geosites that stir up the attention of both, geologists and tourists alike, about Nature’s rare beauties.

OTHER AREAS OF THE MUSEUM



Basement

The two main rooms of the basement function in a supplementary way to the museum's goals and activities.

The **Projection and lecture Hall**, with a capacity of 40 people, is equipped with audiovisual means for the screening of material related to the museum's themes and for hosting various events.

The **Hall of Temporary Exhibitions and Educational Programs** hosts the museum's educational programs, special periodical exhibitions, etc.

Atriums

The museum's two atria are dedicated to the Land Reclamation and the Educational Activities. Here, innovative educational programs and various activities take place, with an aim to raise awareness of the children and the local society regarding environmental issues, and to update them on the minerals' numerous uses in our everyday life.

THE MUSEUM'S ACTIVITIES



Educational Programs

One of the museum's main achievements is the close relationship built with the educational community, since it offers a multi-faceted education and entertainment to young people and children of all educational levels, and to adults as well.

The museum has developed and constantly renews a series of educational programs, which implements successfully within its premises and exhibitions or in the Hall of educational programs, with the necessary educational and audiovisual material. Through interactive games, museum-educational events and competitions, the MMM offers a unique recreational experience having knowledge as its ultimate goal. It also offers the teachers accompanying the students the necessary training for a better approach of the educational themes within the classroom.

The activities implemented at the Land Reclamation atrium aim at raising awareness of the local community's young people in issues that concern the protection of the environment.

A typical example is the program "*Transplanting local plants*", implemented since 2005, where the participant, using peat and perlite, can plant a Milos endemic flora species in a pot, and then take it home as a souvenir of his visit to the MMM.

The program "*From Millstone to Bread*" is implemented towards the same direction. The children learn the contribution of Milos' millstones in the economic development of the island, as well as their usefulness in man's life, in the past.

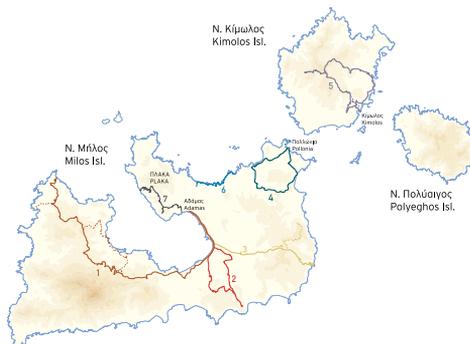


The MMM organizes also practical workshops addressed mainly to the local community, such as internet courses, pottery, painting etc.

Following are a few indicative titles of Educational Programs that have either been completed or continue to be implemented:

- "Tracing Prehistory. The Obsidian of Milos"
- "All around us"
- "From Millstone to Bread"
- "The Minerals in our Life"
- "Colors and Aromas"
- "Discover the Treasures of Milos"
- "Transplanting local plants"

The programs are designed and implemented in cooperation with specialized museum-educational and cultural organizations, taking into account the needs of the local educational community.



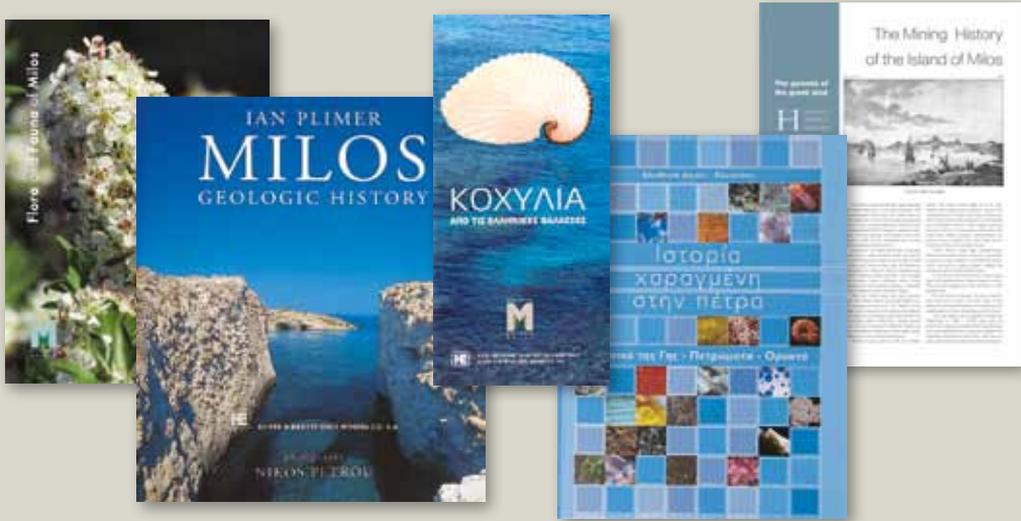
Geological Walks - Miloterranean Geo Walks

The MMM is a living workshop, the themes of which cover all aspects of the island's history. Thus, it leaves its premises organizing pioneering educational programs through its Miloterranean Geo Experience.

Through seven selected routes mapped in detail and accompanied by comprehensive texts, the travelers discover the island's unique

geology, its rich mining history and future, as well as its exceptional natural environment.

Starting from the MMM and following the selected routes (Vani, Volcano, Sulphur Mines, Aggeria, Kimolos, Sarakiniko, Nychia), the travelers will see unique miracles of Nature chiseled by the gigantic natural forces that created the island, such as Sarakiniko, Papafragas, or the pillar-like occurrences in Glaronissia.



Parallel Activities and Events

Aiming at the broader public's educational and recreational needs, the MMM organizes and carries out:

- **Periodical exhibitions** of painting, photography, works of art, artifacts, samples of mineral wealth, etc. having as first priority the works of the local artists of Milos. Examples of exhibitions that received excellent comments:

- "Minerals, Fossils, Rocks from around the World", 2000
- Exhibition of Minerals "On Rocks", 2001
- "Faces of Stone" exhibition of photography, 2002
- "Shells from the Greek Seas", 2003

- **Publications of books** related to the mineral wealth and mining activity of Milos, such as:
 - "Milos, the Geologic History"
 - "Milos, Faces of Stone"
 - "A History chiseled on stone"
 - "The millstone of Milos"
 - "Metallic minerals under the microscope"
 - "Flora and Fauna of Milos"
 - "The Mining History of Milos"
 - "The main uses of Bentonite"
 - "The main uses of Perlite"
 - "The History of the Kaolin of Milos"
 - "Aphrodite of Milos is crying"
- **One-day conferences and specialized workshops, lectures and book presentations.**
- **Visits of scientific or student groups to industrial sites, mines, and areas of geologic interest.**



MUSEUM SHOP

The Information - Secretariat desk along with the Museum Shop constitute the main informational center on the museum's activities. At the Museum Shop, the visitor will find printed material (books, studies, maps, posters, lithog-

raphies, cards), CD-Roms, museum souvenirs, educational board games, collections of minerals, artifacts, jewelry made of semi-precious stones, rocks and minerals from around the world.

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Publication Editor: **Anna Vogli**

Texts editor: **Christina Traitoraki**

Photographs: **Mady Lykeridou-Veleta**

Design: **3 in a box**



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