

The pyramids of Greece: Ancient meridian observatories?

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Abstract. Pyramids, "Dragon Houses" ("Drakospita") and megalithic structures in general create always a special interest. We postulate that, as happens with the Drakospita of Euboea, the pyramid-like structures of Argolis (Eastern Peloponnese) were constructed by the Dryops. It is known that, in addition to Euboea and some Cyclades islands, this pre-hellenic people had also settled in Argolis, where they founded the city of Asine. We also propose that the pyramids of Argolis and in particular the pyramid of Hellinikon village were very likely, besides being a burial monument or guard house, might be served also for astronomical observations.

Key words: Archaeoastronomy, Greek pyramids, Hellinikon, Drakospita, Dryops

Пирамидите на Гърция – древни меридианни обсерватории?

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Пирамидите, "драконовите домове" ("дракоспити") и мегалитните структури предизвикват винаги специален интерес. Ние приемаме, че както при дракоспита на остров Еубоа, пирамидовидните структури в Арголис (Източен Пелопонес) са били построени от Дриопите. Известно е, че освен в Еубоа и някои от Цикладските острови, този пред-елински народ е пребивавал и в Арголис, където е основал град Азин. Ние предполагаме че пирамидите в Арголис, и в частност пирамидата в селището Хелиникон, без да са погребални монументи или охранителни постройки, са твърде подобни помежду си и са могли да служат и за астрономически наблюдения.

Introduction

The existence of pyramids, or rather pyramid-like buildings, in Greece has not been widely known, as most people, even most researchers worldwide know only of the Egyptian pyramids. Yet, it seems that there are several ancient pyramid-like buildings in southern Greece, the most impressive of which is the structure near the village Hellinikon in Argolis (Eastern Peloponnese). Some of these buildings have suffered major and irreparable damages, as their large stones were used through the centuries as raw material for the construction of other buildings, such as churches, or even for the production of lime in limekilns.

In the literature for this topic, the following pyramids are mentioned in Greece (Lazos, 1995):

	Name	Locality	Remarks
1.	Hellinikon	Hellinikon and Kephalaria	The best-preserved one
2.	Ligourio	Epidaurus	Only its base exists
3.	Dalamanara	Epidaurus	Only traces remain
4.	Kambia = tower for fire-signaling	Nea Epidaurus	Preserved to some height
5.	Sikyon (?)	Corinthia (?)	Only traces remain (?)
6.	Viglafia	Neapoli (Laconia)	Only its base exists
7.	Amfio	near Thebes (Thiva)	scalar

In addition to the above, two other singular structures have been referred to as pyramid-like buildings: the cone-like pyramid in Khania (Crete), and the Rock Pyramid forming the peak of Mt. Taygetos; however, the latter is just the natural peak of the mountain, the tallest in Peloponnese (2,407 m). Prof. I. Liritzis (1995 & 1997), assiduous researcher of such ancient megalithic structures, supports the view that there are over 20 ancient Greek pyramids; they refer to pyramid-like structures in Astros (in Kynouria, to the south of Argolis), in Neochori of Phthiotida (they even date it in 11,000 BC), in Agios Andreas of Mt. Parnassos, in Vathy (of Avlis, in northern Boeotia), and in other places.

From all the above structures, only the Hellinikon pyramid to the south-eastern edge of Argive plain is preserved in a relatively good condition. For some of these structures, the data used in this study come from descriptions and references by ancient travelers, for example the description and comments of Pausanias (1985) for the Hellinikon pyramid, or from foreign travelers of the 19th century AD (Blouet A. and Ravoisié, A., 1831, Curtius, E.R., 1851).

1 References, studies and excavations

Although the pyramid-like buildings of Argolis stand out due to their form and shape, the references to them, even from Greek antiquity, are rather scarce.

Only the Greek traveler and geographer Pausanias (1985), writing in the 2nd century AD, mentions the Hellinikon pyramid in his *Corinthiaka* (2, 25, 7):

”Traveling from Argus to the region of Epidaurus, there is a building to the right that resembles very much a pyramid and bears relief carved shields of the shape of the Argolic shields. In this place Proetus had battled with Acrisius for the throne and they say that the battle ended without a winner; for this reason they were later reconciled, as none could achieve a decisive victory. It is said that this was the first time that men and armies equipped with shields clashed; for those that fell in this battle from both armies, since they were compatriots and even relatives, a common tomb was built in that place.”

Thus, according to Pausanias, the pyramid was a common tomb, built most probably by Proetus and Acrisius for the soldiers who died in a battle

between them; a battle in which soldiers used shields for the first time. This reference to mythical figures (Proetus, Acrisius) indicates that the building was considered to be very old.



Fig. 1. The Hellinikon pyramid. Prof. E. Theodossiou (left) and the physicist N. Saridakis (right)

Pausanias also mentions (*Corinthiaka* 2, 24, 7) that in adjacent areas there were some polyandria (mass tombs) of the Argives killed in the battle against the Spartans that was held in Hysiae (an acropolis next to the modern village Akhladocampos) in 669 BC:

"And polyandria exist here for Argives who won in a battle against the Lacedaemonians near Hysiae" (*Corinthiaka* 2, 24, 7).

So the ancient author considered the 'pyramid' as one of these burial monuments. Other researchers have suggested different possible uses (Lord, 1939, pp. 78-84).

The pyramids found in Greece are the only cases of pyramidal architecture in the broader European region. The shape of the pyramid-like buildings, their static and architecture, probably classify some of them in the pre-Pelagic period (Lazos, 1987 & 1995). However, in a country rich in archaeological findings the ruins of these structures did not attract the interest of researchers. Thus, their study is almost nonexistent and a mystery surrounds them due to lack of adequate knowledge. There is still a chance that some reference could still be discovered in Byzantine texts. Currently, the next known reference to the 'Greek pyramids' after Pausanias (2nd century

AD) is from the first decade of 19th century. William Martin Leake toured Peloponnese in 1806, when Greece was still under the Ottoman rule, and he mentions the Hellinikon pyramid, which he visited on March 14, 1806, in his book *Travels on the Moréa* (vol. II, pp. 340, 344). In it, he gives two drawings, front view and top view of the buildings.



Fig. 2. The entrance of the Hellinikon pyramid with the eastern side. The entrance is next to the SE corner. The width of the entrance is 1.35 m, while its top consists of two converging stones that form a large capital Greek letter Λ .

In 1829 the French Scientific Mission in Moreas (Peloponnese) studied the two pyramids (in villages Hellinikon and Ligourio) and published the results in 1831 - in the three tomes of Abel Blouet and Ravoisié, Amable: *Expedition Scientifique de Morée*, vol. II, 107.

In 1901, Th. Wiegand conducted a preliminary excavation (the first one, 1901, pp. 241-246) of the Hellinikon pyramid. Wiegand removed all the fill from the floor of the pyramid, while the first Greek scientist who studied it was the archaeologist Apostolos S. Arvanitopoulos in 1916 (pp.72-99). Apostolos Arvanitopoulos believes that the monument dates to the Mycenaean era (1600 BC-1100 BC), while the archaeologist Christos Tsountas (1857-1934),

the founder of Greek prehistoric archaeology, believes it is from the 6th century BC (1893).

More excavations followed in the Hellinikon pyramid by R. Ehrich and Mrs. Ann Hoskin-Ehrich, on August 1937, of the American School of Classic Studies and Archaeology in Athens, while at about the same time R. Scranton (1938) was excavating the Ligourio pyramid. Louis Lord, then director of the American School of Classic Studies in Athens, edited the report (1938, pp. 481-527) of these excavations based on the conclusions of the three archaeologists mentioned above, while he subsequently researched himself and discovered several buildings in Argolis, mainly square archaic towers, which were most probably the *polyandria* of Pausanias (Lord, 1939, pp. 78-84). Amongst the findings in the pyramid of Hellinikon were a big pithos, the floor of the long corridor and the room, re-carved from repairs entrance door and parts of the wall, infill from earlier excavations, some ceramics of Protohellenic II period (2800-2500 BC), also room foundations and mortars from later uses of the pyramid, as well as mixture disturb sediments with ceramics of classical period, such as lamps, house ware and few coarse shards of doubtful age and some roman lamps. The infill at the floor varies between 20-60 cm (Lord, 1938, pp. 508-538).

Louis Lord considers that the pyramids were not tombs, because their doors were opening from inside; nor were they towers for fire-signaling, as they were not built in elevated positions with a view. Lord believes they were posts capable of housing a guard of a few men, which could control the road to Tegea. However, he stresses that the peculiar pyramid-like construction is a fact that remains unexplained (1938). There wasn't a reason to build this form of structure for this purpose, as an outpost with a small wall would be the normal thing to do. What could be the purpose of these singular, pyramid-like constructions? Also, Lord supports the idea that the pyramid was from the early Hellenistic era, more specifically late 4th century BC.

The topic appeared to close from an archaeological point of view, as the American archaeologists had done a good job. The German archaeologist S. Oppermann, with a relative publication in German (1971, pp. 45-52), made known the two pyramids, in Hellinikon and Ligourio, to a wider German-speaking public, without adding something to the topic from a research point of view.

After about 15 years followed the researcher and author Christos Lazos, with two publications on Greek pyramids (1984, 1987), and an article by Helena Fracchia of the University of Toronto (1985, pp. 683-689), in 1986 Professor I. Liritzis published his book *Archaeometry - Methods of dating in archaeology*, and in 1994 the civil engineer V. Katsiadramis made a static study of the two pyramids and the corresponding figures (1994, pp. 9215-9236). In 1994 appear a paper by Professor Ioannis Liritzis and another one by the academician Theocharis *et al.* (1994, pp. 399-405) and the two books, again by archaeometrist Professor Ioannis Liritzis (1995) and by author C. Lazos (1995), which exhaust the topic from the descriptive point of view. Finally, Professor Ioannis Liritzis, in 1997, published an article about the mystery of these pyramids and similarly Professor Theodore Spiropoulos (2003).

In practical, the real research work on the Greek pyramids started under the supervision of the archaeometrist Professor Ioannis Liritzis and his group. The dating of the pyramid was approached through five sub-projects:

1) Geophysical prospection inside and around the two main pyramids at Hellenikon and Ligourio, where buried monuments were discovered (Theocharis *et al.*, 1997, pp. 593-618).

2) The results of the above team directed the archaeological excavations carried out by archaeologist A. Sampson (1996, pp. 56-61) and archaeologists of the Archaeological Museum of Nauplion (Pikoulas, 1996, pp. 60-63; Piteros, 1995, pp. 11-13, and Piteros, 1998, pp. 344-394). Amongst the new findings were foundations of rooms, ceramics of Classical, Hellenistic, Roman and Protochristian periods, and Protohelladic II in the exterior foundations of Hellenikon pyramid above the bedrock. A comparative study of masonries was also made (Liritzis, 1995 & 1997, pp. 32-34).

3) Astronomical orientation of the long entrance corridor was found related to the rise of Orion's belt occurring in *circa* 2000-2400 BC (Liritzis, 1998, pp. 10-21).

4) The dating of some parts of the over lied large megalithic blocks in the wall, with the novel thermoluminescence dating method of rock surfaces. Sampling was chosen for their firmness and lack of sun exposure of internal contact surfaces, by removing a few milligrams of powder from pieces in firm contact. Seven pieces gave an age range of *circa* 2000-2500 BC. Liritzis, 1994a, pp. 603-604; 1994b, 361-366; Theocharis *et al.* 1994, 399-405), while two ceramic shards of non-diagnostic typology one from Hellenikon and one from Ligourio pyramids dated by TL (ThermoLuminescence) and OSL (Optically Stimulated Luminescence) gave concordant ages of 3000 ± 250 BC and 660 ± 200 BC respectively (Liritzis *et al.*, 1994, pp. 189-198). The novel dating method has been well published by the initiator and others Liritzis *et al.* 1997, pp. 479-496); Liritzis and Galloway, 1999, pp. 361-368; Habermann, 2000, pp. 847-851; Greilich *et al.* 2005, pp. 645-665; Morgenstein *et al.* 2003, pp. 503-518; Liritzis and Vafiadou, 2005, pp. 25-38).

5) The mythological genealogy of Argolid has been cautiously interpreted. It involves Inachus and his deluge and his descendants of Proetus and Acrisius that according to ancient traveler Pausanias (2nd c. AD) they fought for domination but had a draw and erected Hellenikon pyramid, shown to be at c. 2800 BC (Zangger, 1993; Liritzis and Raftopoulou, 1999, pp. 87-99)

2 The use of the pyramids

Pausanias, as is evident from his text, acknowledges that the purpose served by the pyramids had been forgotten in his age (*circa* 150 AD) and for this reason he writes about what the people were 'saying' about it, mentioning the hypotheses of being tombs and small military outposts.

The construction of these buildings, their dimensions and inclination, being added to the fact that no tomb-associated findings (such as bones or death ornaments) were found, lead to the conclusion that these structures were rather a kind of small fort or an observatory (Kalleyia, 1995).

The pyramids are dated by some archaeologists (Leake, 1846; Lord, 1938; Fracchia, 1985; Piteros, 1998), based on their wall structure, in the 4th century BC; the same archaeologists consider that they indicate the relations between Egypt and Argos, a tradition reinforced by the mission of 3000 Argive mercenaries in Egypt in 349 BC.

However, the Greek pyramids seem to have no relation to Egyptian ones (interior plan, masonry, slope, size), though there were trade contacts between the people of SE Mediterranean evidenced at least by the early presence of Minoans, Myceneans and later on Greek colonizations, in the West, Asia Minor and the Levant and Egypt, e.g. Tel Kabri, Avaris, Meggido etc. (Barbara and Wolf-Dietrich Neimeier, 1997, pp. 763-802).

Leake (1846, pp. 334-483), Vischer Wilhelm (1857, pp. 325-328) and others support the burial monuments theory, which is rejected by Wiegand (1901, pp. 241-246), who suggests that they can't be tombs because of the mortar used in their construction, a material hinting for him a building date in the 1st century BC. Other researchers, though, suggest that the mortar probably does not belong to the original building but to a posterior conservation work.

The Egyptian pyramids were Pharaohs' burial monuments, but they also served for astronomical purposes: Cheops Pyramid was a huge meridian instrument, the largest ever constructed, while its main passage's direction was towards the pole star of its age, Thuban or Alpha Draconis (α Dra).

Helena Fracchia (1985) supports the view that the Argolis pyramids were erected for the defense of the region, as fortifications incorporated into some large farms, as she believes from her research of ancient farms in Attica.

Civil engineer V. Katsiadramis (1994), after his static study of the whole Hellinikon monument, draws the conclusion that this building was in its initial form most probably a truncated pyramid 3.60 m high. He suggests that it was never complete up to its projected summit with stones or a roof of some kind, not being an Egypt-like, mathematical pyramid. He adds that the truncated pyramid shape *'is a very ancient worshipping tradition in Greece... this exact shape of the Elliniko building was intentionally chosen, as it combined static and aesthetic requirements with the Greek worshipping tradition'* (Katsiadramis, 1994). He, thus, considers a worshipping use for the building; in his view, it was a roofless sanctuary.

The Argolis pyramids continue to attract the interest of researchers. Professor I. Liritzis in his book (1995) argues that their megaliths were used as construction materials for churches and for lime production, in order to explain the reason for the disappearance of the Astros, Sikyon and Viglafia pyramids, which were reported by foreign travelers in early 19th century. C. Lazos, an author specialized in the research and recording of the feats of ancient Greek technology, in his book *Pyramids of Greece* (1995), provides a complete list of the Greek pyramid-like structures.

Our team visited the Hellinikon and Lygourio pyramids and photographed them; the architect, Marcos Katsiotis measured the dimensions of the Hellinikon pyramid and drew the top view, a section and perspective drawing of this pyramid, which is the best preserved one. But, finally, we used the drawings made by the civil engineer Vassilios Katsiadramis, which exist in the current Bibliography (1994, p. 9222).

1995; G.A. Pikoulas, 1996) that both pyramids were built in late 4th century BC and that they were guardhouses or outposts. Th. Wiegand (1901) dated the Hellinikon pyramid in 1st century BC. However, these datings must not create a bias toward a more recent period, as archaeologist and Professor of Prehistoric Archaeology at the University of Athens Theodore Spiropoulos (1981), who discovered a pyramid in the shape of the Ampheio hill in Thebes, dates it *circa* 2500 BC.

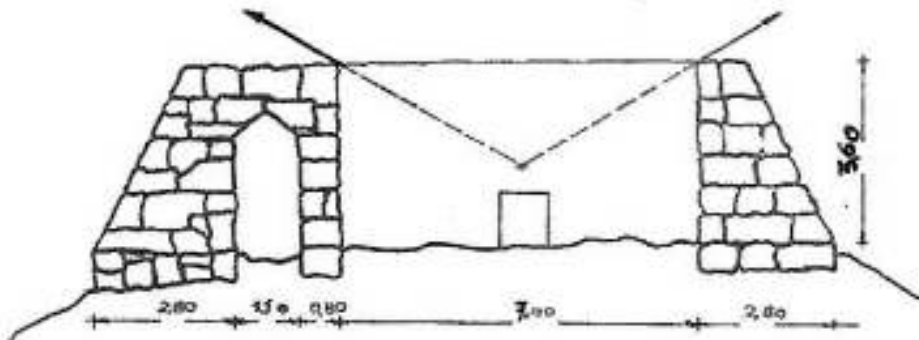


Fig. 4. Drawing of the truncated pyramid of Hellinikon, made by the civil engineer Vassilios Katsiadramis (1994, p. 9222).

4 The Ligourio pyramid

The Ligourio pyramid is located in the foot of Mt. Arachnaeo, to the left side of the road leading from Argos to Epidaurus, 1.5 km West of the village of Ligourio. Its dimensions are approximately 14 (north side) x 12 x 12 x 12 m. Pausanias does not mention this pyramid at all and the first reference to it comes from the "French Scientific Mission in Moreas" (Blouet, A. and Ravosié, A., 1831). In the years that passed since the early 19th century the pyramid, made of sandstone blocks, deteriorated to the point it is now almost leveled. Only a couple of building stones have remained in their original positions; the rest were used for the construction of other buildings in Ligourio, while some stones are incorporated in the Byzantine church of Agia Marina (St. Marina).

The first excavations in the region were conducted by the American School of Classic Studies of Athens, from 9 to 18 December 1936 and later from 1 to 9 August 1937.

Among the findings of the 1937 excavation, led by R. Scranton (1938, 7.4, pp. 528-538), was a stone axe (*keltis*) dated in the Neolithic Age, that is prior to 3000 BC, a most intriguing fact that created certain connotations. Scranton writes that "*the keltis, an isolated prehistoric artifact, does not prove the existence of a Neolithic settlement at the site. It was probably just transported there from a distant place as something curious*".

However, some researchers are skeptic about this view: How is it possible for the Neolithic axe to have been preserved at a different site for 2500 years,

to have been transported as something curious to the Ligourio pyramid in the 4th century BC and subsequently preserved at its new position for another 2300 years? It is a difficult question.

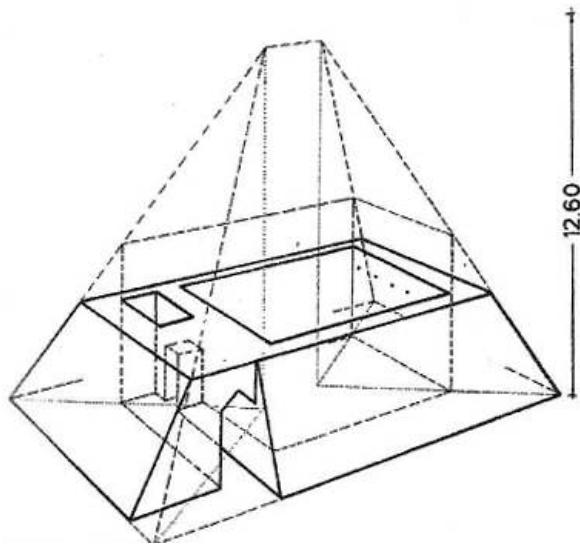


Fig. 5. Drawing of the truncated pyramid of Hellinikon, made by the civil engineer Vassilios Katsiadramis (1994, p. 9222).

Nevertheless, most researchers date the Ligourio pyramid along with the Hellinikon pyramid, around the 4th century BC.



Fig. 6. The Ligourio pyramid, as imaged by the *French Scientific Mission in Moreas* (Expedition Scientifique de Morée, 1831).

In 1995 academician Petros Theocharis and his colleagues announced that the optical thermoluminescence method gives an age for the Ligourio pyramid of 4100 ± 600 years, that is it was built *circa* 2100 BC or about 600 years 'younger' than the Hellinikon pyramid as dated with the same method, although as far as it can be discerned the two pyramids are very similar. The same researchers supported the view that both theses pyramids were astronomical observatories!

On the contrary, archaeologist Christos Piteros, curator of antiquities in Nafplio, supports (1995) a dating of the pyramids in the 4th century BC - definitively no older than 450 BC. As for their purpose, he believes that they were fortified out-posts-military observatories. Piteros is especially critical against the views of Theocharis *et al.* (1995). He strongly argues that their views are misleading(!), since they reject consolidated views of archaeologists simply based on a 'magical unproved physical method for a purely archaeological issue'.

The archaeologists excavators are reserved to accept without doubts the Classical or Hellenistic age, while A. Sampson (1996, pp. 56-61) supports such a younger age but his reserve to reject an earlier age is apparent.

So, up to now, there is no satisfying explanation of the reason behind the construction of several reported small sized pyramids in Greece and about the choice of their shape as a message tower or else. To summarize, the following views have been supported about the Greek pyramids:

a) Purpose

1. Burial monuments - polyandria (Pausanias, 2nd century AD; Leake, 1846; Vischer, 1857).
2. A 'tomb identifier', indicating the existence of an important person's tomb at a nearby site (hill), or even under it (Arvanitopoulos, 1916).
3. Fortified military outposts-guardhouses (Lord, 1938 & 1939; Wiegand, 1901; Fracchia, 1985; Spathari-Piteros-Pikoulas, 1995 & 1996).
4. Towers for fire -or smoke- signaling (Curtius, 1851).
5. Astronomical observatories - with an evident astronomical orientation, after a relative study (Theocharis *et al.*, 1994 & 1997; Kalleyia, 1995; Theodossiou *et al.*, 2002).
6. Sanctuaries (Katsiadramis, 1994).

b) Dating

1. 1600 to 1100 BC (Pausanias, 2nd century AD; Arvanitopoulos, 1916).
2. 6th century BC (Tsountas, 1893; Curtius, 1851).
3. 4th century BC (Leake, 1846; Lord, 1938 & 1939; Fracchia, 1985; Spathari-Piteros-Pikoulas, 1995 & 1996).
4. 1st century BC (Wiegand, 1901).
5. 2100 BC for the Ligourio pyramid and 2730 BC for the Hellinikon pyramid (Theocharis *et al.*, 1994 & 1997).

5 Conclusion

When excavations were made around the Greek pyramids in the early 1900s, pottery fragments from the 4th century BC were found, and it was presumed that the pyramids were also constructed then; that is, about the time of Alexander the Great. Recent dating of crystals from internal surfaces of the limestone blocks using thermoluminescence puts the construction times back two millennia. The Hellenikon pyramid dates to 2730 B.C.; the Ligourio, to 2100 BC. This means that the Greek pyramids were built in roughly the same time frame as the Egyptian pyramids (Hammond, 1997).

Why would the ancient Greeks want to build miniature pyramids? The classical scholar Pausanias wrote in the 2nd century AD that the Hellenikon pyramid was a cenotaph for the dead fallen in a fratricidal battle 4,000 years ago. Nobody believed his story until now (Corliss, 1998).

The date and the purpose of even the two main Greek pyramids are not known with any certainty. What it can be said is that these are carved and not scalar; moreover they also differ from the Egyptian ones in the slope inclination.

Archaeologists suggest that the Hellenikon pyramid can't be a building of the 3rd millennium BC; it must have been constructed at least after 2100 BC. The later corollary follows from a finding of the excavation conducted for the Academy of Athens' research: a proto-Hellenic ditch in the foundations of the building. The proto-Hellenic period conventionally ends in circa 2100 BC, therefore archaeologists conclude that the pyramid was built definitely after 2100 BC.

Archaeologists also stress that not even one ceramic fragment was discovered in the pyramid sites dated from the two subsequent periods, the meso-Hellenic and the Mycenaean period. If the pyramid was indeed a 3rd-millennium construction, then the lack of ceramics would be a unique case.

The vast majority of archaeologists support the view that the pyramids are buildings of the 4th century BC.

The disagreement among the experts extends to the purpose these structures served. Our team expresses its agreement with professor Theocharis and his colleagues that the Greek pyramids could have an astronomical significance, probably in addition with their use as burial monuments or military outposts. We have also propose that the pyramids of Argolis and in particular the pyramid of Hellenikon village were very likely, besides being a burial monument or guard house, one of the first meridian observatories (Theodossiou et al., 2002).

To support this view there is the case of another Greek megalithic structure, the 'Drakospito' (= dragon house) on top of Mt. Oche, which was studied by our team and was shown to have an ancient Sirius-rise astronomical orientation (Theodossiou et al. 2009). Besides, several astronomical connotations have been proved in the case of the Egyptian pyramids.

For the Greek pyramids, the case is still open. We believe that a coordinated effort of archaeologists, historians, astronomers, architects and archaeometrists is needed in order to reach definite conclusions as far as the use of the pyramid-like structures in Greece is concerned.

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