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THE GEOTECTONIC EVOLUTION OF OLYMPUS MT. AND ITS MYTHOLOGICAL ANALOGUE

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Abstract

Mt Olympus is the highest mountain of Greece (2918 m.) and one of the most important and well known locations of the modern world. This is related to its great cultural significance, since the ancient Greeks considered this mountain as the habitat of their Gods, ever since Zeus became the dominant figure of the ancient Greek religion and consequently the protagonist of the cultural regime. Before the generation of Zeus, Olympus was inhabited by the generation of Cronus.

In this paper we shall refer to a lesser known mythological reference which, in our opinion, presents similarities to the geotectonic evolution of the wider area of Olympus.

According to Apollodorus and other great authors, the God Poseidon and Iphimedia had twin sons, the Aloades, namely Otus and Ephialtes, who showed a tendency to gigantism. When they reached the age of nine, they were about 16 m. tall and 4.5 m. wide. Having then realized their powers, because of their gigantic proportions, they decided to climb Olympus and fight the Gods, exile Zeus and the others, and wed two Goddesses. Otus was to marry Hera and Ephialtes Artemis.

But they did not know how to climb such a high mountain, so they decided to construct a "ladder", by putting mount Ossa on top of mount Olympus and mount Pelion on top of Ossa. This description coincides with the geological and tectonic evolution of the wider Olympus area. But, these complex tectonic processes were completed about 8 – 10 m.a., i.e. millions of years before the appearance of humans, therefore it is impossible that these morphotectonic processes were witnessed by man, so the similarities between the myth of Aloades and the tectonic evolution of the area must be purely coincidental. But are they, or is there more here?

Key words: *Aloades, Otus, Ephialtes, Pilion, Ossa.*

Περίληψη

Ο Όλυμπος, το υψηλότερο όρος της Ελληνικής Χερσονήσου (2918 μ.) είναι ένας από τους πιο γνωστούς τόπους στο σύγχρονο κόσμο, επειδή εδώ οι αρχαίοι Έλληνες είχαν τοποθετήσει την κατοικία των θεών τους, από τότε που ο Δίας έγινε η κυρίαρχη προσωπικότητα της αρχαιοελληνικής θρησκείας. Στην εργασία αυτή θα αναφερθούμε σε μια αναφορά της Ελληνικής μυθολογίας που παρουσιάζει μεγάλες ομοιότητες με την γεωτεκτονική εξέλιξη του Ολύμπου.

Σύμφωνα με τον Απολλόδορο, η Ιφιμέδεια, που ήταν παντρεμένη με τον Αλωέα, απέκτησε με τον Ποσειδώνα δύο γιους, τον Ωτο και τον Εφιάλτη, που τους ανέθρεψε ο Αλωεύς, γι' αυτό και πήραν το όνομα «Αλωάδες». Οι δύο αυτοί γιοι του Ποσειδώνα είχαν τάσεις γιγαντισμού, με αποτέλεσμα όταν έγιναν εννέα ετών να έχουν αποκτήσει εννέα πήχες πλάτος και εννέα οργιές ύψος (≈ 16 μ.). Συνειδητοποιώντας τις διαστάσεις και τις δυνάμεις τους, αποφάσισαν να ανέβουν στον Όλυμπο, να διώξουν τον Δία και τους άλλους θεούς, και να γίνουν κυρίαρχοι του κόσμου. Για να ανέβουν στον Όλυμπο αποφάσισαν να κατασκευάσουν μια κλίμακα, τοποθετώντας το Πήλιο πάνω στην Όσσα και αυτήν πάνω στον Όλυμπο, ενώ παράλληλα άρχισαν να μετατρέπουν τμήματα της ξηράς σε θάλασσα κ.λπ.

Η περιγραφή αυτή του Απολλόδορου συμπίπτει με την γεωλογική και τεκτονική δομή και εξέλιξη του Ολύμπου που, ως γνωστό, αποτελεί ένα τεκτονικό παράθυρο, αφού λόγω αναθόλωσης, έχουν διαβρωθεί οι ενότητες της Όσσας και του Πηλίου που είχαν επωθηθεί. Όλες αυτές οι διεργασίες όμως είναι πολύ παλαιότερες από την εμφάνιση του ανθρώπινου γένους και συνεπώς ο άνθρωπος δεν μπορεί να υπήρξε μάρτυρας αυτών. Άρα πρόκειται για απλή σύμπτωση. Είναι όμως:

Λέξεις κλειδιά: Αλωάδες, Ωτος, Εφιάλτης, Πήλιο, Όσσα.

1. Introduction

Mountains as physiogeographical units are among the most significant factors that shaped the Greek civilization. Many features of Greek civilization and its historical development are related to these Mountains and their geographical distribution.

In Greek Mythology and according to Theogony of Hesiod (8th-7th century BC) the Gaia (Earth) gives initially birth to Uranus, who protects Gaia by covering her from all sites, and afterwards shapes her form by giving birth to the Mountains (Ούρα). That is why Sophocles (496-406 BC) describes Gaia as “..Mountainous who feeds everything”, (Ορεστέρα παμβώτι Γα, Φιλ. 394).

Although the Greek Mountains are not very high, their predominance in the landscape couldn't be ignored by the Greeks and their Mythology. The Greek Mountains, not only were not hostile against humans, but they also hosted the Gods of Ancient Greeks. The Mountains do not cause natural disasters like the rivers with their flooding, or the Sea when she is “enraged” and particularly with her climate-related eustatic level rises that deprived large and fertile lands from the pre-historic humans. The Mountains are hostile only to those that climb them under adverse conditions. According to Theogony of Hesiod (8th-7th century BC) but also other ancient sources, the Mountains are not personified, as it happens with rivers. Although there are some exceptions, like Mt Olympos and Mt Kissavos who according to later folk poetry “were fighting”. Why these Mountains are “fighting” is something that needs further investigation.

One of the interpretations relates to the flow of Peneios river through the Tempe Valley in conjunction to, or as a result of, an earthquake event. In this case the rockfalls from both Mountains would have had been a tremendous physiogeological process, and together with the produced noise, it should definitely have left traces in the historical memory of the pre-historic settlers of the area; as it is well established the area has been occupied continuously from the Pre-historic times from tools that were discovered in the Peneios terraces (Schneider, 1968, 1979). However and beyond the initiation of Peneios flow, the whole area is tectonically active and hence every earthquake, even of small magnitude, would have been accompanied by rockfalls.

According to the Authors' opinion, the most important reason that the Mountains were not personified is attributed to the fact that the Mountains do not “intervene” and do not disturb human lives. Any impact seems to be a result of a passive interaction.

Mt Taygetus for example is a morphotectonic structure, an outcrop, which due to its volume and height, prevents the contact among inhabitants of the Eurotas Valley of Lakonia and of Messinian plain. This situation though is passive and does not alter. The Mountains are indeed dynamic systems since their formation is controlled by large boundary faults, which in most cases are seismogenic. Such re-activations though, do not occur daily or periodically every year. A marginal neotectonic active fault can be actually inactive for many thousand years.

On the contrary, the rivers, beyond the fact they are essential for the daily human survival, they represent rather dynamic physiogeographic systems, which display annual periodicity. River dynamics are so intense both in terms of lateral distribution and flow that have an immanence and direct impact on human lives. How many times we do not hear for humans being drowned after a thunderstorm due to river floods? The river Kephissos for example, displays totally dry periods, during which humans and farming are endangered by drought, alternating with wet periods after heavy rains, when it is not unusual for the water to escape the embankments and cause casualties among people and animals. Hence, it is absolutely reasonable to refer often to Kephissos, and its tributaries or to Ilissos and Asopos rivers. Why is it necessary to refer to Mt Aegaleo, the small mountain that crops close and north of Kephissos river? The mountains of Aegaleo or Hymettus do not disturb the pre-historic humans. Therefore, only rivers were personified and not the mountains.

The great Goddess Gaia (Γαία) – our Mother Earth – created the mountains and left them quietly, so that they can deliver only prosperous goods to the humankind; it is in the mountains that humans hunt, it is there that water springs, there are the caves to protect us, and there we can find timber and metals to develop our societies.

The Mountains however, played an additional important role in the cultural development of the pre-historic civilizations. Due to the Mountains height and thus being closer to the skies, they were, and still are, the places where humans try to get in touch with the Gods; particularly when the apexes are within the clouds.

Therefore, the twelve Gods had their residence in Mt Olympus, the highest Greek Mountain.

After all, Zeus was born in a mountain, which according to the tradition is Mt Dicte, and was raised on a different mountain, that of Mt Ida (Ιθάιο Άντρο, Cave of Zeus) both in Crete island. In a different version, Zeus was born in Arcadia in Peloponnese and not in Crete, but still on a mountain, that of Mt Lycaeus, with its apex called Cretaea; there according to the Myth Rhea gave birth to Zeus.

2. Mt Olympus

Mt Olympus (+ 2918 m) is the highest mountain of Greek Peninsula and one of the most important and well known places of the modern world.

This results from its enormous cultural value, since here the ancient Greeks placed the residence of the twelve Gods, from the time that Zeus set aside the firstborn Poseidon, and became the Ruler of the ancient Greek Religion, and subsequently the Leader of the mainstream cultural development, not only of the Historic but also for a large timespan into the Pre-historic Period.

Everything was virtually starting off and ending in Mt Olympus; there were the most important decisions taken, and there was the ethos and ethics of the ancient Greek world developed. Mt Olympus was actually the decision-making center during the course of the Pre-Historic humans.

Nevertheless, Mt Olympus was not the God's Residence from the beginning, due to the fact that it couldn't sustain life during the ice ages, since it was covered with snow or ice during the period before the climatic Optimum of the Holocene.

As a result Mt Olympus must have been declared as “Heaven Residence” once the ice retreated and melted. Zeus, as a God of the Eastern Mediterranean cannot reside in a place covered by ice. Zeus is not a God of Northern Europeans; He is a God of the Aegean.

And this is the main reason that Mt Olympus is not the birth place of any significant God. Poseidon for example was born in the hillsides of Mt Alisio opposite the village of Nestani, in Mutinia (Arcadia).

Olympus should have become the God’s Residence when the climate ameliorated significantly and the conditions were similar to nowadays. This took place approximately 6,000 y BP. The period between 6-4 ky BP, known as Holocene Climatic Optimum, coincides also to the end of the Neolithic Era and the beginning of the Copper Age.

Mt Olympus of Macedonia (N. Greece), is the residence of Zeus, as well as the residential place of all Gods, hence it is termed “Heaven Residence” («Ουράνια Κατοικία»). Mt Olympus has a central role in Greek Mythology, as it is the location where Zeus throws away Hephaestus, when the later wants to intervene in favour of Hera. From Olympus Zeus throws his lightning against the Titans, and it is there that he decides upon the fates of Achilles and Hector. Moreover, Mt Olympus was the residence of Cronus that was the leader of the Titans generation.

Other mountains of the same name occur in Elis, Arcadia, Attica, etc.

Mountains with this name exist in many other parts of the world, such as in the State of Washington in the USA. The name of that Mountain was envisioned by the first Greek who arrived in the area, after Columbus, Juan de Fuca (Ioannis Fokas) from Cephalonia.

Mountains named Olympus exist elsewhere also, as for example in Cilicia of Asia Minor, in nowadays Turkey. In an effort to prove that the cradle of Western Civilization lies in Turkey various parties claim that the “Heaven Residence” is not located in Mt Olympus in Macedonia of Greece but in Mt Olympus of Cilicia. However, these claims are at least groundless, since they fail to explain how the Twelve Gods could fight against the Titans during the War of Titans (Titanomachy), who were located in Mt Othrys, from an Olympus too far away like the one in Cilicia.

2.1. Designation of Mt Olympus Name

Markos Mousouros (1470-1517), a great scholar and professor during the Renaissance, in his dictionary “Etymologicum Magnum Lexikon” mentions that the name Olympus means the Sky (Ουρανός) and the very high Mountains, and it derives from the word “ολολαμπής” that reflects to the Sky or from the phrase “ολλύειν τους ώπας δια του κρύους” (meaning “infects the ears from the cold”) that suits to the mountains.

The German philologist and linguist Georg Curtius (1820-1885), in his book “Grundzüge der Griechischen Etymologie”, mentions that the word Olympus (Ολυμπος) derives from the root –λαμπ (lamp) – which is interpreted as “bright” or “white” (he considers the letter «ο» being Aeolic).

The linguist and writer Menos Filintas (1870-1934) in his book “Glossognosia and Glossographia Hellenic” rejects the derivation of the word “Olympus” from the root –λαμπ-ω (lamp –ing) and argues that many names of mountains, rivers and general location of ancient Greece is of Semitic origin, such as Helicon, Elatia, Alpheus, Aliakmon etc. and have as first syllable the Semitic article EL or AL. According to M. Filinta the words Olympus or Oulympos, are of Semitic origin quoting the words ULUWEN - ULUEN or ULU, meaning “tall”, and the words BAS or BOS that mean “power” and actually the “divine”. Hence, ULUENBAS or ULUBOS - Oulympos - Olympus (Ολυμπος) means “at high altitude” or “power”, meaning “soaring” or “heavenly power”, “divine power” the “supreme power”. In many places additionally to the name Olympos the ancient Elympos name has been preserved in the collective memory.

Archaeologist Eutychia Poulaki during a presentation in 1985 in the series "Archaeologists discuss about Pieria" argued that the form of the word reveals a pre-Hellenic origin that means mountain or sky. And this is the reason that the name still exists in other places –apart the Divine Olympus in Macedonia – in Greece but also in Cyprus, Ionia, Bithynia, Lycia.

It is however, absolutely certain that the residence of Zeus and the other Gods during the ancient times was Mt Olympus in Pieria (Macedonia, Greece) as it is clearly identified within the first and most well-known written document of the Greek Language, the Iliad of Homer.

The Academician Agapitos Tsompanakis, in his presentation in 1995, during the "2nd Conference on Olympus" suggested that "Olympus" meant high mountain, and that wherever the Aeolians went, e.g. in Bithynia, the high mountains were called "Olympus".

In the wider Aegean there are many mountains with that name. The most famous and glorious though is the one that stands on the border between Macedonia and Thessaly.

The largest and highest mountain on planet Mars has also been named "Olympus". It is the largest in our Solar System, with a height of 24,000 feet above the surface that surrounds it, and with a diameter of more than 500 km.

3. The Mythology

As expected, Mt Olympus is repeatedly referred in the Greek Mythology. Perhaps today is the most famous mountain in the world, along with the Himalayas because of Mt Everest, and Mount Sinai, because of its direct connection to the Jewish initially and the Christian religion afterwards, as is the place where God gave the Ten Commands to Moses.

But certainly Olympus was the most famous in antiquity, especially during the Pre-Historic Period, and of course long before the Exodus of the Jews from Egypt. And this is supported by the fact that the Gods of the ancient Greeks must have inhabit Mt Olympus since the Holocene Climatic Optimum (i.e. approx. 4,000 BC), meaning a few thousand years prior to the birth of Moses.

Indeed, taking into consideration that Mt Olympus, prior to the Twelve Gods, was the home of the Titans, then Mt Olympus is probably the oldest mountain Gods lived.

In this paper however, we will refer to a largely unknown mythological reference, which in our opinion, represents similarities to the geotectonic evolution of the wider area of Mt Olympus.

3.1. The Aloades (Οι Αλωάδες)

According to Apollodorus (Book. 1.7.4) and other great writers, the great God Poseidon acquired from Iphimedeia two sons, Otus and Ephialtes. Iphimedeia, was married to Aloeus, who was also a son of Poseidon. Iphimedeia however, who had fallen in love with Poseidon, walked many times to the seaside and taking water with her palms from the waves, she was throwing it once in her chest and sometimes in her vagina. In the end, Poseidon responded to her love and gave her the above mentioned two sons, whom Aloeus raised; hence they were named after him as Aloades.

Otus and Ephialtes, however, were prone to gigantism, that is why every year they grew a cubit wide and a fathom in height. At the age of nine they became nine cubits wide and nine fathoms high, i.e around 16m tall. Having realized their forces, due to their gigantic dimensions, and knowing that the center of decisions was Mt Olympus, home of the Twelve Gods, they decided to climb Mt Olympus and, after fighting with the Gods, to persecute Zeus and the others and take over the kingdom of heaven as well as the God's wives, for Otus he wanted Hera, and for Ephialtes he wanted Artemis. How would they climb Mt Olympus though, such a high mountain?

To climb they decided to set Mt Ossa on Olympus and Mt Pelion on Mt Ossa. In this way, they constructed a ladder. Simultaneously, they were thrown into the sea other mountains so that to

transform the sea to land, whereas other land parts they transformed them to sea. Thus, began a war that rocked the Gods (Table 1, in greek).

Nowadays the above described story is regarded as figments of the imagination, and certainly, according to the modern science of Geology, as geologists, we cannot imagine that the activities of Otus' and Ephialtes', may symbolize any geodynamic processes.

But, quite coincidentally (?), the description of the myth coincides with the geological and the tectonic structure of the regional Mt Olympus area, particularly the area between the mountains Olympus, Ossa and Pelion. Let's see how this occurs in more detail.

Table 1 - Apollodorus (Book. 1.7.4).

<p>... Κανάκη δὲ ἐγέννησεν ἐκ Ποσειδῶνος Ὀπλέα καὶ Νιρέα καὶ Ἐπωπέα καὶ Ἀλωέα καὶ Τρίοπα. Ἀλωεύς μὲν οὖν ἐγημεν Ἰφιμέδειαν τὴν Τρίοπος, ἣτις Ποσειδῶνος ἠράσθη, καὶ συνεχῶς φοιτῶσα ἐπὶ τὴν θάλασσαν, χειρῶν ἀρουμένη τὰ κύματα τοῖς κόλποις ἐνεφόρει. συνελθὼν δὲ αὐτῇ Ποσειδῶν δύο ἐγέννησε παῖδας, Ὄτον καὶ Ἐφιάλτην, τοὺς Ἀλωάδας λεγομένους. οὗτοι κατ' ἐνιαυτὸν ἠΰξανον πλάτος μὲν πηχυαῖον μήκος δὲ ὄργυιαῖον ἑννέα δὲ ἐτῶν γενόμενοι, καὶ τὸ μὲν πλάτος πηχῶν ἔχοντες ἑννέα τὸ δὲ μέγεθος ὄργυιῶν ἑννέα, πρὸς θεοὺς μάχεσθαι διεννοοῦντο, καὶ τὴν μὲν Ὀσσαν ἐπὶ τὸν Ὀλυμπον ἔθεσαν, ἐπὶ δὲ τὴν Ὀσσαν θέντες τὸ Πήλιον διὰ τῶν ὄρων τούτων ἠπειλοῦν εἰς οὐρανὸν ἀναβήσεσθαι, καὶ τὴν μὲν θάλασσαν χῶσαντες τοῖς ὄρεσι ποιήσειν ἔλεγον ἠπειρον, τὴν δὲ γῆν θάλασσαν, ἐμνάντο δὲ Ἐφιάλτης μὲν Ἥραν Ὄτος δὲ Ἄρτεμιν.</p>	<p>... Canace had by Poseidon Hopleus and Nireus and Epepeus and Aloeus and Triops. Aloeus wedded Iphimedia, daughter of Triops; but she fell in love with Poseidon, and often going to the sea she would draw up the waves with her hands and pour them into her lap. Poseidon met her and begat two sons, Otus and Ephialtes, who are called the Aloeads. These grew every year a cubit in breadth and a fathom in height; and when they were nine years old, being nine cubits broad and nine fathoms high, they resolved to fight against the gods, and they set Ossa on Olympus, and having set Pelion on Ossa they threatened by means of these mountains to ascend up to heaven, and they said that by filling up the sea with the mountains they would make it dry land, and the land they would make sea. And Ephialtes wooed Hera, and Otus wooed Artemis;</p>
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4. Geological Structure of Mt Olympus

From a geological point of view, Mt Olympus, represents a complex Alpine geological and tectonic structure. The term Alpine Structure characterises both the type of the rocks and the palaeogeographical depositional setting but also the metamorphic events, and the tectonic deformation and evolution.

Mt Olympus, the greatest tectonic window of Greece, was first described in detail by Godfriaux (1968). The Olympus geotectonic unit and comprises a continuous series of non metamorphosed to slightly metamorphosed neritic carbonate rocks, with ages ranging from Triassic to Eocene terminating in a late Eocene flysch (Kilias, 1996). Over these formations, a series of geotectonic units are emplaced, namely the HP/LT metamorphics of the Ossa Unit, and the Pelagonian Unit, which also builds Mt Pelion (Pelion Formation).

From a tectonic point of view (Figure 2), the last two geotectonic units are overthrusting each other, and more specifically Pelion Unit thrusts over Ossa Unit, and these two Units together over the first, which is the Olympus Unit of Olympus, which in Geology is termed "autochthonous", while the other two Units that have been overthrust, we call them "allochthonous".

Today, the physiogeological processes that followed the tectonism of thrusting, particularly the gradual dome-shaped uplift of Mt Olympus, associated with faults and the subsequent erosion of

the overlying thrusting Units, led to the uncover of the “nucleus” of Olympus. This “nucleous”, which consists of rocks of the lower Units, is called "tectonic window" because it allows us to see what is inside of a geological structure.

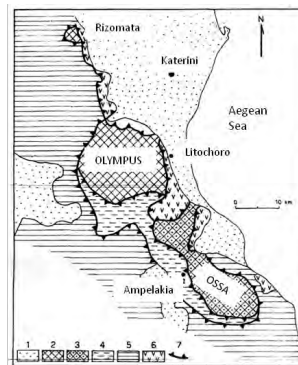


Figure 1 – Geological sketch of the wider area of the Olympus tectonic window. 1: Neogene and Quaternary deposits, 2: Autochthonous series of Olympus, 3-4: Ossa tectonic unit (3: underlain carbonate horizon, possibly analogous to the Olympus series, 4: “Ampelakia” series), 5: Pelagonian zone formations, 6: ophiolites and phyllites of the Axios zone, 7: thrusts (after Mountrakis, 1985).

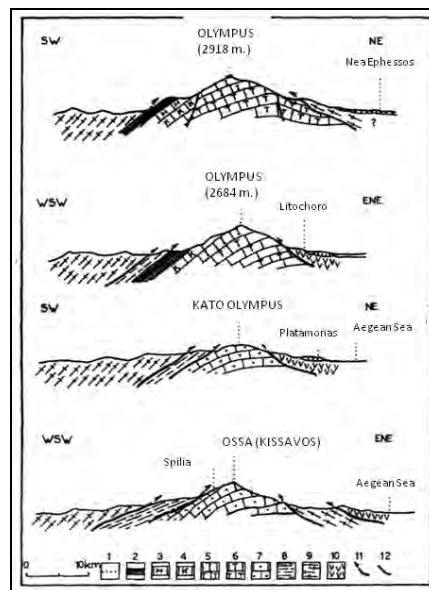


Figure 2 – Successive schematic geological sections of the Olympus – Ossa area, showing the complex nappe structure. 1: Neogene and Quaternary deposits, 2-6: 2: Autochthonous series of Olympus, 3: Eocene flysch, Eocene limestones, 4: Cretaceous limestones, 5: Jurassic limestones, 6: Triassic limestones, 7: Ossa carbonate formations, 8: “Ampelakia series”, 9: Pelagonian zone formations, 10: ophiolites, phyllites, 11: thrusts, 12: normal faults (after Mountrakis, 1985).

5. Discussion - Conclusions

These geodynamic processes, which in reality are much more complex than those described in a simplified way here and from what is shown schematically in Figures 1 and 2, belong to the oldest cycle of tectonic deformation, known as Alpine. These Alpine deformations though were completed some 8-10 My ago, meaning many millions of years before humans appeared on earth.

Therefore, the humankind could not have witnessed such morphotectonic processes. Hence, the current analogy between the activities of Aloades and the tectonic evolution of the area of Olympus should be just symptomatic.

But is it? Or is there something else?

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