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The Possible Relation Between Ancient Monuments and Geophysical Anomalies

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Abstract: The location and concomitant potential geophysical properties of monumental sites is rarely considered in archaeology. In a previous paper by the same authors, the types of various geophysical anomalies are analyzed: geoelectrical, hydrogeophysical, geological. These anomalies originate mainly a) from the crystalline content of the geological environment being under stress due to seismogenous faults, b) from the flow of charged underground water passing through porous material c) from conductivity discontinuities. Their effect on biology is also examined and is found to be negative over a long term exposure. This paper constitutes a tentative attempt to open a discussion on the possible connection of geophysical anomalies and ancient monuments, so that more detailed studies, statistically robust, can be carried out in various countries. The study's objective is to research the possible relationship between ancient monuments' location and of the pre-existing geophysical anomalies in that location prior to the construction of the temple, which is not taken into account by archaeologists and/or historians. The geophysical properties of various selected temples around the world are examined. Geomagnetic, radioactive radiation, acoustic and electromagnetic measurements of other researchers within the location of ancient monuments are presented. The concept of hormesis and its possible relation to the function of ancient monuments is being addressed: the beneficial or not effect on the human biology of the geophysical anomaly within the area occupied by the monument depends on the intensity of the geophysical anomaly and a person's exposure time. Various geophysical maps, including radon, seismic faults, hydrogeological and geological maps, were used superimposing the location of important ancient monuments in Europe, to examine whether they are placed on a geophysical anomaly of some type. Megalithic monuments of Portugal, Spain, UK, and France are included, as well as important temples of Greece. Various Ancient Greek Temples are examined in detail. In UK, France, Spain and Portugal, most megalithic monuments seem to be placed in areas with high radon levels; important Ancient Greek temples seem to be placed on faults, as well as on conductivity discontinuities and over underground water. There seems to be some indication that ancient people had some awareness of magnetism; maybe they were led to built temples upon what we can recognize today as geophysical anomalies. Following this study, 50 ancient Greek monuments including temples of Asclepius, Oracle centers and other temples will be analyzed in detail through in situ measurements of geophysics and biomedicine and the produced data will give substantial statistical results.

Keywords: Geophysical Anomalies, Geopathic Stress, Temples, Hormesis, Magnetism, Radiation, Healing

1. Introduction

Hippocrates, the father of medicine, in his work "Concerning Nutrition", mentions that the geographic location and ground typology are equally important health factors as nutrition. He states: "The success of proper diagnosis lies in the fact that the physician must know the nature of man as a whole. Human health, in order to be achieved and maintained, needs proper nutrition in proportion to gender, age, work, yearly season, climatic change, in sync with the geographical location of the place where one lives and the prevailing conditions, the typology of the soil, and finally the influences of the sun, moon, and universe in our lives" [60].

The analysis of Hippocrates gives us a clue as to whether people in ancient times were aware of the impact of location and its geophysical parameters had an impact on health. But there is little consideration in archeological circles regarding any possible geophysical aspects of ancient sites, even though there is some evidence of conscious siting of certain monuments on seismic faults – certainly, there seems to be some link between ancient Greek temples and fault lines. Examples include the temple of Hera in Perachora, the Mycenae temple complex, the temple of Apollo (figure 2) and the temple of Athena in Delphi (figure 1), the temple of Athena in Priene, the temple of Apollo in Sagalassos, the temple of Apollo in Ephesus, the temple of Demeter and Kore in Cnidus, the temple of Apollo and sanctuary of Hades and Kore in Hierapolis (figure 2) [122, 142, 32, 101, 2, 3, 118, 117, 113, 122, 94].

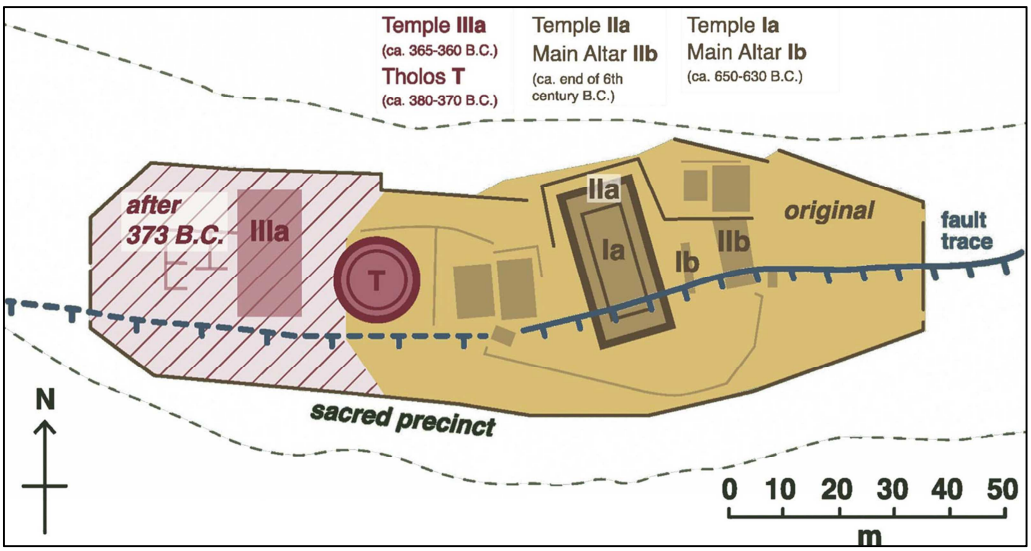

Figure 1. *Map of the lower sanctuary of Delphi, central Greece, where a fault break cuts through the oldest temples and altars inside the shrine of Athena. (after Stewart, [121]).*

These examples already point at a subject that has hardly been researched hitherto -namely, the possible correlation of ancient monuments with geophysical anomalies.

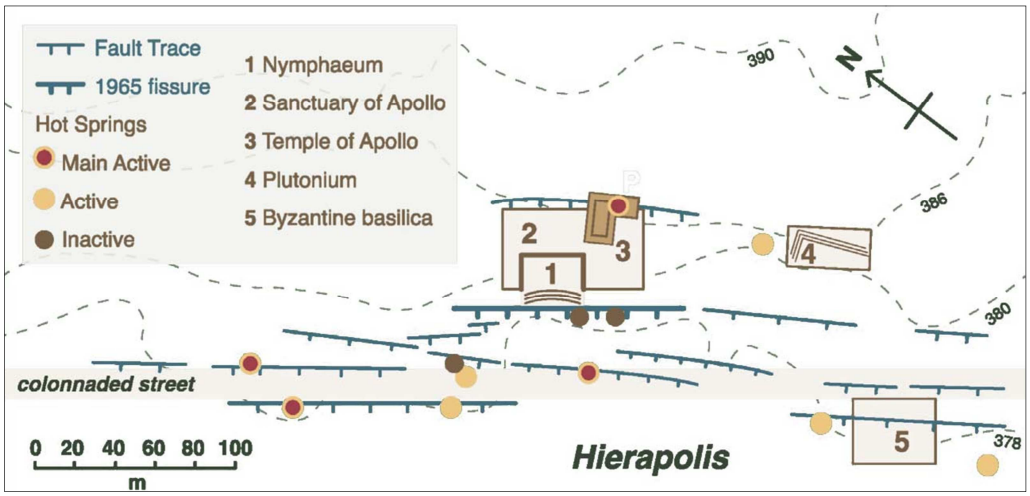

Figure 2. *Map of Hierapolis showing the trace of the active fault strands cutting through the Temple of Apollo and the Plutonium. (after Stewart, [121]).*

2. Geophysical Anomalies

There are also other geophysical parameters that could be considered apart from seismic faults, which occur at and around these sites. These are the zones within which significant changes take place in the parameters of various fields, such the magnetic, gravitational and other fields. These are locally distorted due to underlying geological causes and the resulting anomalies are measurable. The existence of some local differentiation of the subsoil can be scientifically analyzed.

The connection between oracular temples and caves and gaseous emissions has begun to be researched, though as yet not widely considered in archaeology. According to Ustinova, special geological conditions, including the

emission of toxic gases having psychotropic effects, aided in altering states of consciousness in ritual or oracular activities [132]. She concludes that oracular temples and caves were specifically located in, or selected from areas with geochemical anomalies.

For example, among many, the oracular caves of Bura and Aigeira are both located on the Corinthian Gulf fault line in Greece [119, 121, 122]. The oracular caver of Hercules Buraicus was located in Bura (mentioned by Herodotus i. 145) was chiseled out of sandstone conglomerate rocks [62].

Mariolakos directly links the seismic faults, and thermal springs with the proliferation of oracular sites in Evia, Greece [82].

Natural and artificial grottos had in important role in antiquity, especially those at Delphi, Lebadeia, Ptoion, Oropus, Olympia, Lycosoura, Delos, Hierapolis, and Claros.

Light phenomena can occur as a result of activation of geophysical fields in zones of faults and rock heterogeneity by intensive pulse ionospheric events, and especially low frequency EMF [140, 35].

These phenomena can be triggered by ionospheric phenomena, generation of electrical charges on surfaces of splitting rocks, solar and seismic activity, sharp changes in hydrostatic pressure, air temperature and pressure, and geomagnetic field.

There are various recordings of such phenomena, such as the luminous phenomena that occurred starting nine months before the 6 April 2009 earthquake in Aquila and continued for five more months [44]. According to Fidani, there seems to be a correlation between electrical discharges and asperities.

Another example includes the 1965-1967 Matsushiro earthquake, where the occurrence of complex seismo-electromagnetic phenomena of the geomagnetic intensity, unusual earthquake lights and atmospheric electric field (AEF) variations were noted [37].

Blue and white lights were recorded at the 2010 New Zealand M7.1 earthquake, and red glows were observed in the 1999 earthquake in North West Turkey [138, 123].

3. Biological Effects

In a previous publication by the same authors of this paper, the interaction of these geophysical anomalies and human was analyzed, showing the potential mechanisms that can trigger diseases, such as those of the blood, nervous, respiratory, genitourinary systems, as well as cancer [49].

In the same paper, it was also shown that geophysical anomalies not only affect humans, but all species of animals, plants, fungi and bacteria. For example, diverse animals use the earth's magnetic field for navigation, therefore geomagnetic anomalies can influence their functions.

Plants also seem to be affected by these anomalies; results confirm the correlation of geoanomalies with dry seed metabolism and show suppression of germinative capacity of seeds within geoanomaly zone with positive charges [80].

4. Hormesis

Various electromagnetic therapies, low radiation treatments, hot-cold exposure, are all based on the principle that low levels of stress *in short exposure* time can been extremely healing. Short term low dose stress can increase the number of mitochondria per cell, whereas long term stress of the same source can be extremely damaging and induce chronic disease. This effect is called *hormesis*: the same external agent can cause low-dose stimulation and high dose suppression of a living organism. Calabrese has done extensive research on the application of hormesis on pharmacology with very consistent results amongst a wide spectrum of substances and diseases [20, 21].

Terrestrial radiation is one of the possible reasons for speciation and biological evolution. Looking at hormesis linked to other fields, Zwaardemaker explains that:

> "the energy of bio-radioactivity may have a decisive influence on the living system. Applied in heavy doses radium destroys the tissues, but applied in micro doses radioactivity may cause revival" [143].

Also, according to Olson and Lewis, Babcock and Collins, natural terrestrial radiation is one of the possible reasons for speciation and biological evolution [95, 8].

Various experiments showed that an environment with artificially depleted natural radiation can possibly cause suppression of vital functions, whereas low doses of gamma radiation can activate enzyme activity and growth [30, 27, 102]. According to epidemiological research, areas with increased levels of terrestrial radiation experience decreased rates of cancer morbidity [92, 55, 89, 26].

Luckey developed the concept of radiation hormesis, according to which only high doses of radiation (higher than five times the natural background radiation) can cause a biological damage, and on the other hand, low doses of natural ionizing radiation are necessary for biology, since they activate various functions of the human body and especially the immune system. [77, 112].

Furthermore, gamma radiation can negatively affect human health [131]. Regarding the potential beneficial effects of low dose radiation, possible explanations include stimulation of DNA repair, detoxification of free radicals, production of stress proteins, activation of membrane receptors, release of growth factors, and compensatory cell proliferation [41, 78].

For example, radon, has well known cancerogenic effects as well as healing effects as a bath treatment [29, 38].

5. Ancient Monuments

Were temples around the world placed on various geophysical anomalies? And if so, what was the reason?

Burke, carrying out measurements in various megalithic monuments and temples in America, found that all of them where situated on magnetic or gravitational anomalies and exhibited various anomalous readings in electromagnetic parameters [19].

Recent studies also link pyramids in Latin America with underground water faults or manmade tunnels. Chavez et al., found that the main pyramid in Chicen Itza is directly located on top of an extensive underground water body (a cenote), through the use of electric tomography (Figure 3) [23].

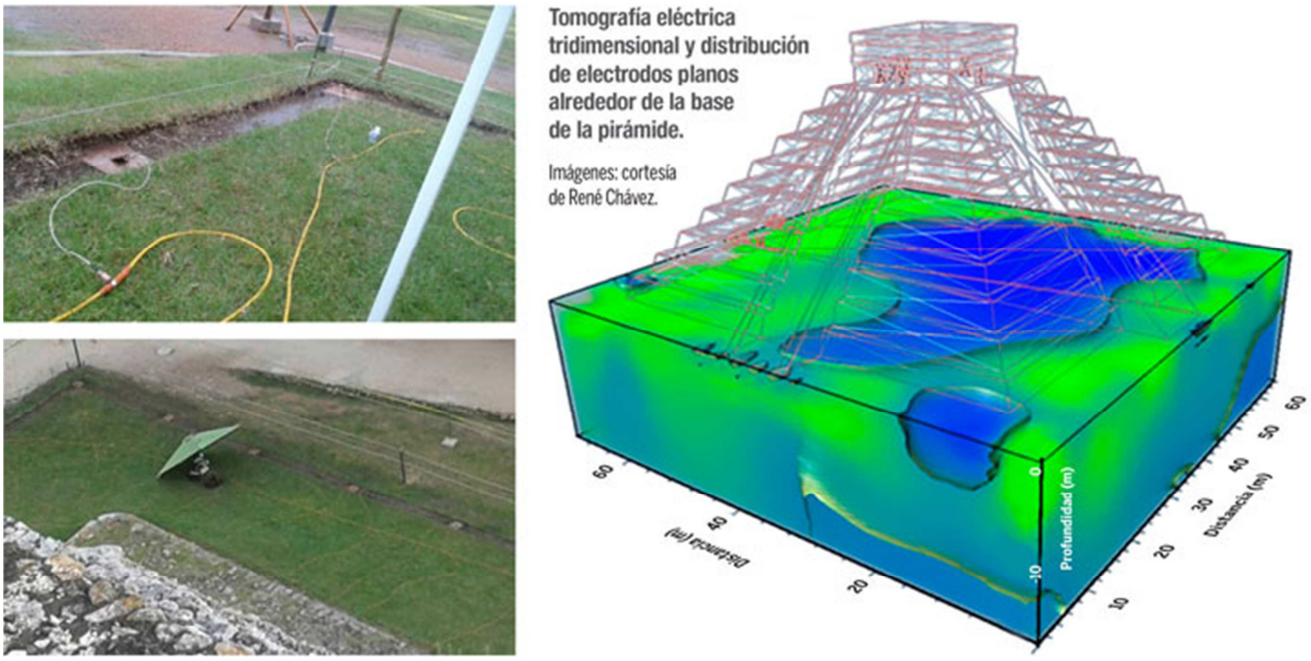

Figure 3. *Electric tomography carried out at the pyramid of Chichen Itza showing the presence of underground water underneath it [23].*

Mereaux found that four major megaliths are located straight along a fault line, as seen in figure 10 [87]. He used magnetic gradiometer and ground electrodes to perform measurements and found anomalies in Carnac megaliths from -400 to + 1,100 nT.

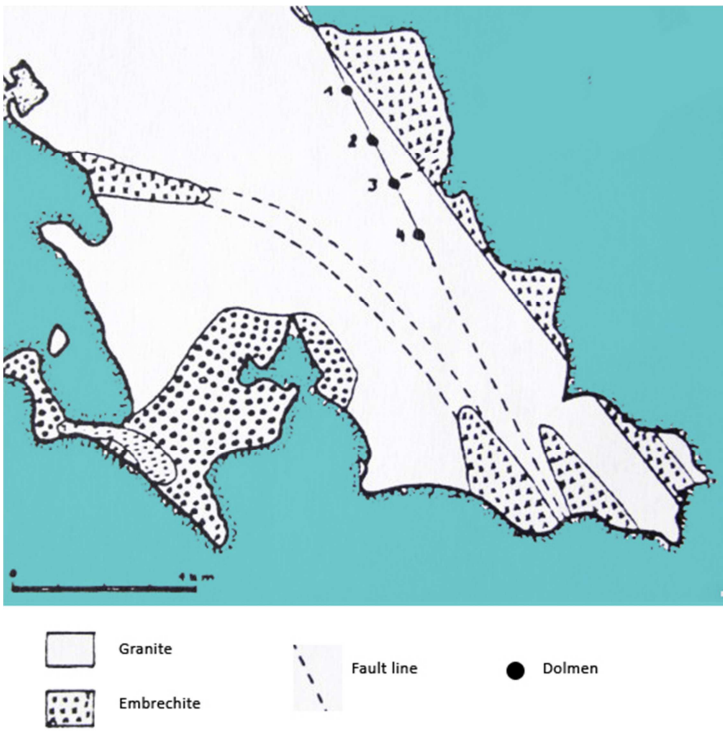

Figure 4. *Megaliths in Carnac built directly in line above a fault (redrawn after Mereaux, [87]).*

Florinsky in his research regarding the location of 104 monasteries in the Crimea Peninsula found that almost all of them were located along faults of various ranges or at their intersections, most are placed within earthquake intensity zones of VII-VIII degrees as well as within regions with decreased geomagnetic intensity (Figure 5) [45].

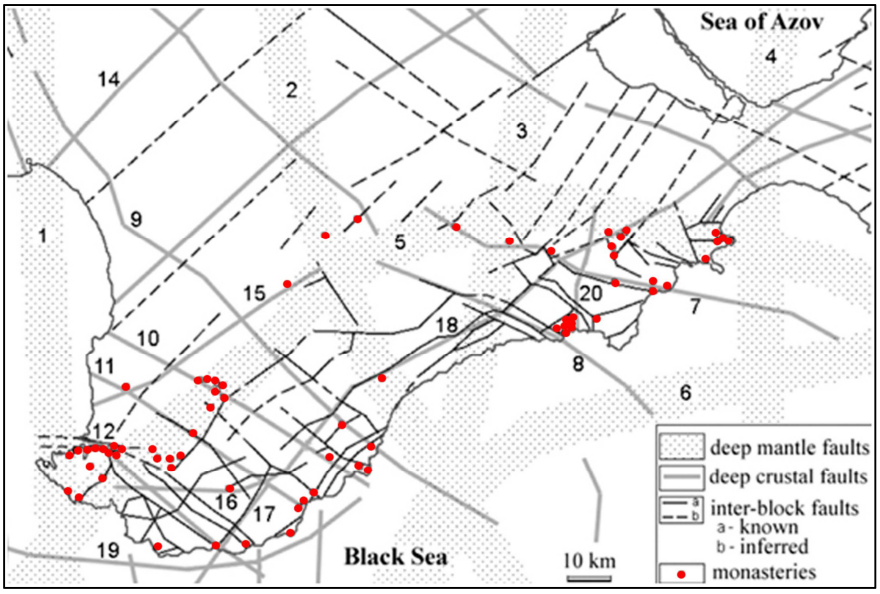

Figure 5. *The Crimea: faults and monasteries, redrawn after Florinsky [45].*

Burke drew geomagnetic maps at several Native American monuments, and noticed that they were placed with great exactitude on negative (Figure 6) or positive magnetic anomalies (Figure 7) [19].

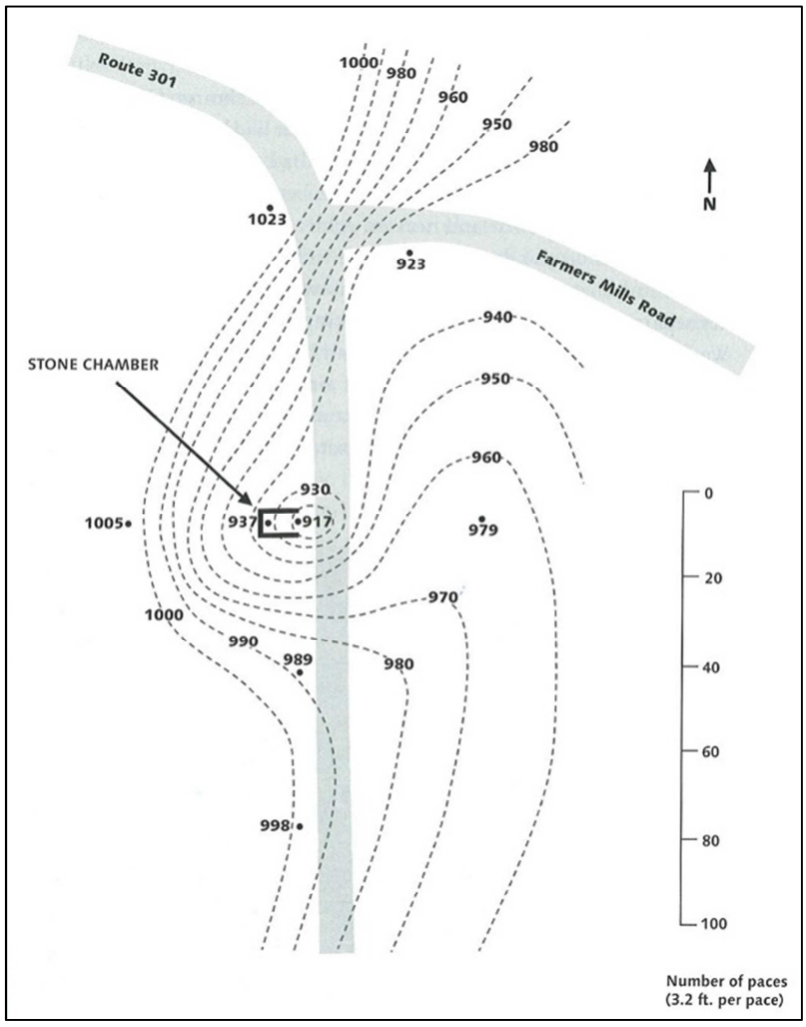

Figure 6. *Geomagnetic map of a Native American rock chamber in Kent Cliffs, NY [19].*

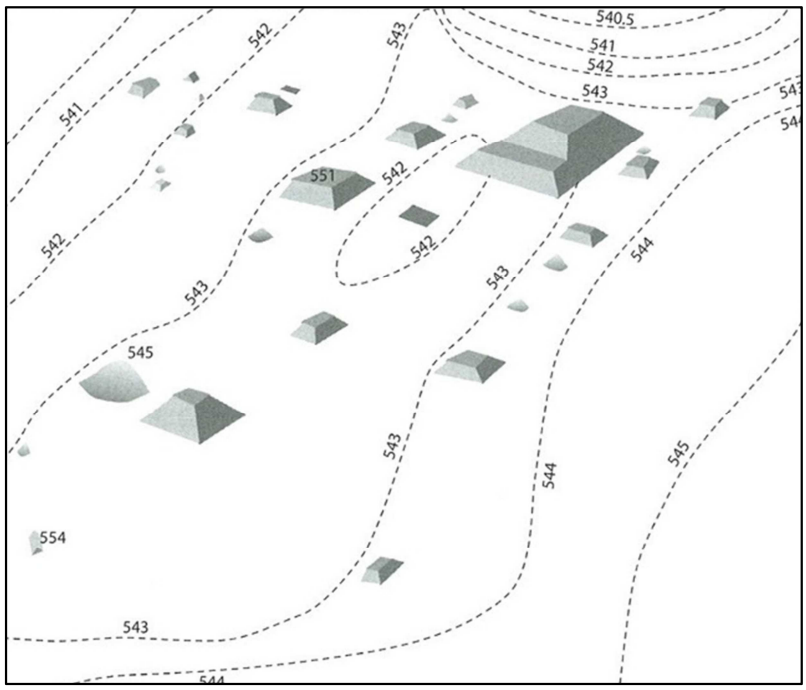

Figure 7. *Geomagnetic map of a Native American Great Mound Chamber complex in Cahokia, Illinois [19].*

6. Materials and Methods

Various geophysical maps from IGME, British Geological Survey, Institut de Radioprotection et Surete Nucleraire, Geological Survey of Portugal, including radon, seismic faults, hydrogeological maps, were used superimposing the location of important ancient monuments in Europe, to examine whether they are placed on a geophysical anomaly of some type.

7. Results

In UK, France, Spain and Portugal, megalithic monuments seem to be placed in areas with high radon levels (figures 8-10). This could be simply a granite connection, but is nevertheless worthy of note.

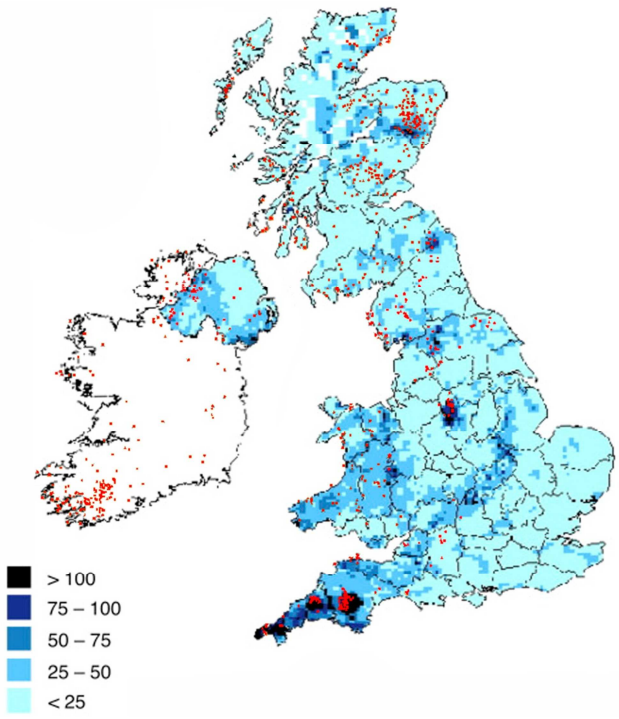

Figure 8. *Radon map of UK, with the location of megalithic monuments in red. (Map constructed by Authors, according to radon data from British Geological Survey).*

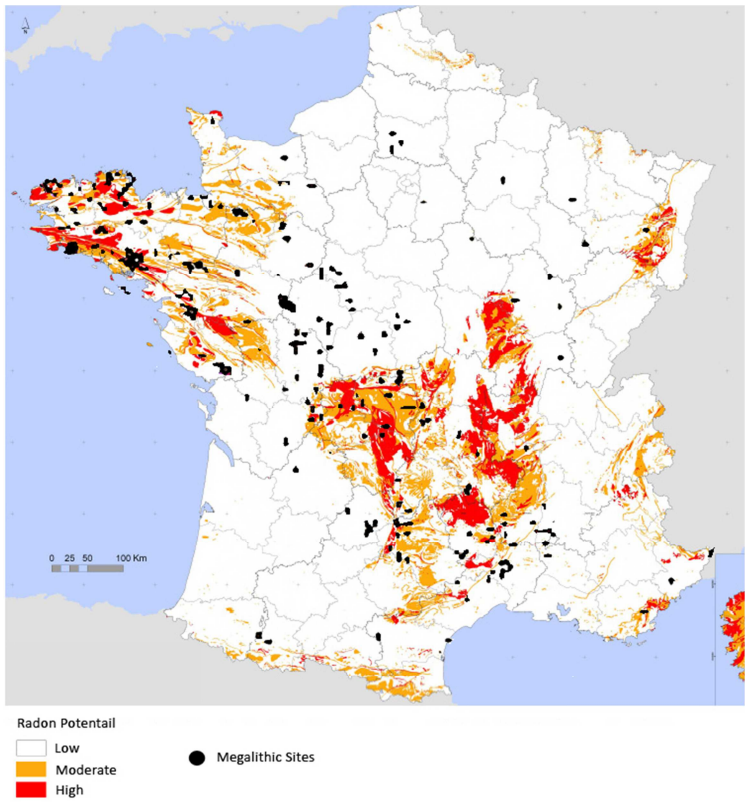

Figure 9. *Radon levels in France, with the location of megalithic monuments in black. (Map constructed by Authors, according to radon data, Institut de Radioprotection et Surete Nucleraire).*

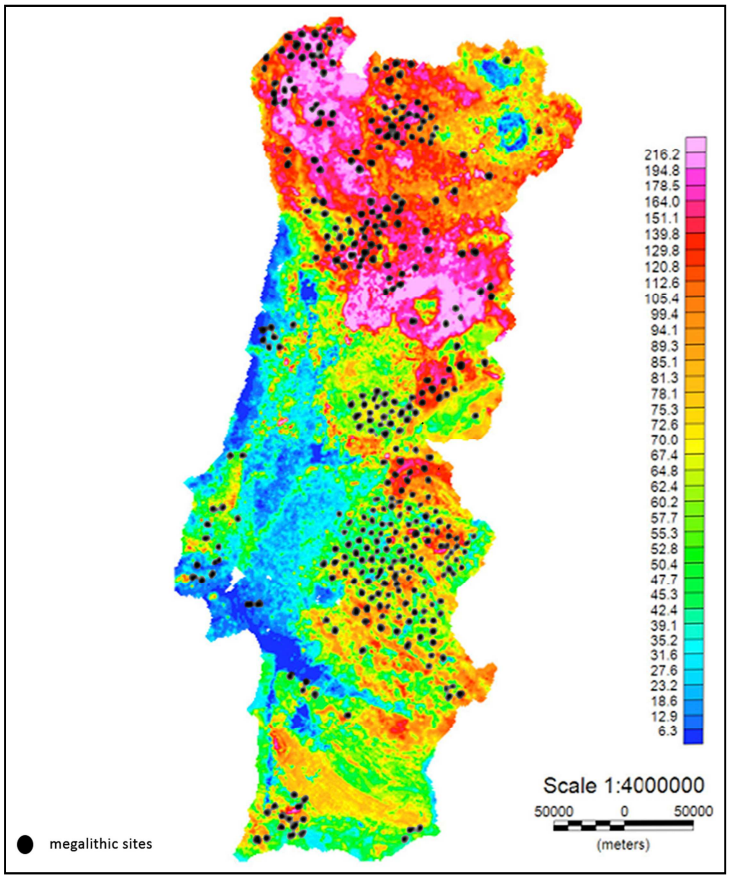

Figure 10. *Radon map of Portugal, with the location of megalithic monuments in black. (Map constructed by Authors, according to radon data from Geological Survey of Portugal).*

Also, looking into the geological map of Crete, the important temples fall on conductivity discontinuities and almost all fall on fault lines. Both phenomena, as seen in previous chapters, are responsible for generation of ground electrical currents and various geophysical anomalies.

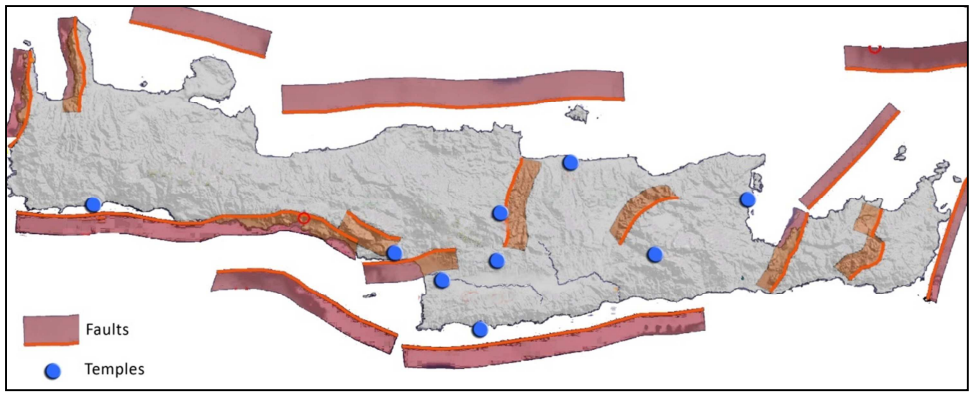

Figure 11. *Faults map and locations of temples in Crete, Greece (Map constructed by Authors, according to faults data from the Greek Database of Seismogenic Sources).*

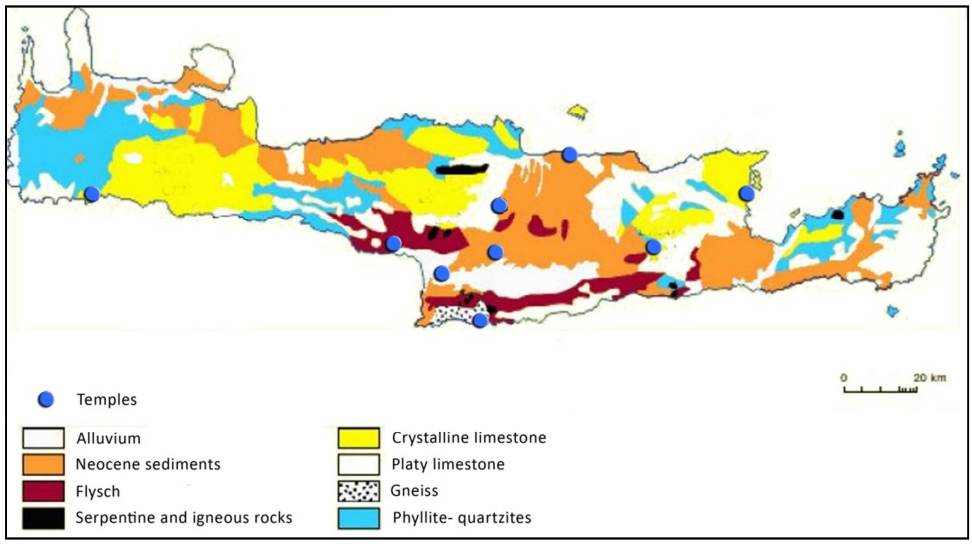

Figure 12. *Geological map and locations of temples in Crete, Greece (Source of geological data redrawn after Zulauf [144]).*

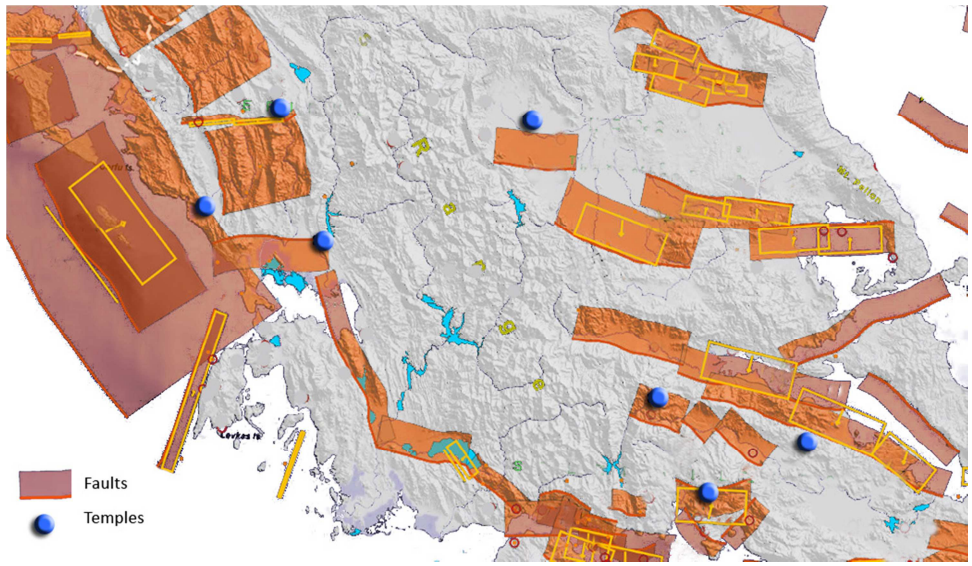

Figure 13. *Faults map and locations of temples in mainland, Greece (Map constructed by Authors, according to faults data from Greek Database of Seismogenic Sources).*

Delphi, a principal oracular centre of antiquity, is located on a geological discontinuity, as seen in the following figure.

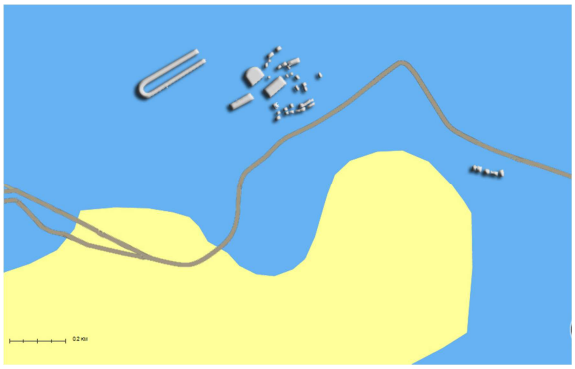

Figure 14. *Geological map of Delphi temple area (redrawn data from IGME). The location of the temple, shown in grey, is placed in an area of intense geological change -a conductivity discontinuity- between elastic sediments (shown in yellow) and impure carbonate rocks (shown in blue).*

The sanctuary of Apollo in the upper terrace is cut by several NW-SE faults, inferred mainly from spring lines, and passes through the main temple itself [32]. The underground water currents can be seen in figure.

Figure 15. *Hydrogeological map of the Delphi temple area (redrawn data from IGME).*

Epidaurus was also a very important center for healing, including a temple of Asclepius and a Temple of Apollo. As seen previously, it is located on a fault zone. The site sits on a conductivity discontinuity, as well as on various underground streams, as it can be seen in the figures.

Figure 16. *Geological map of Epidaurus temple area (redrawn data from IGME). The location of the temple, shown in yellow, is placed in an area of intense geological change -a conductivity discontinuity- between glaucophane lawsonite epidote metamorphic rocks (shown in green), marble (shown in dark blue) and gypsum rocks (in light blue).*

Figure 17. *Hydrogeological map of the Epidaurus temple area (data from IGME).*

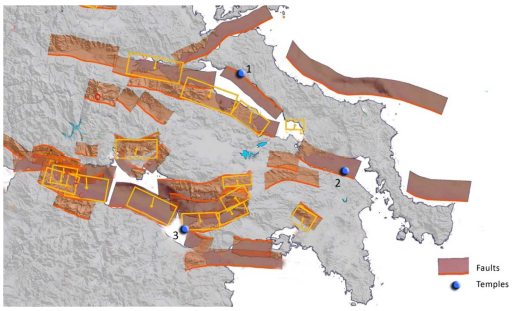

Figure 18. *Fault and locations of temples in mainland, Greece. 1. Oracle of Apollo, Oroviai 2. Oracle of Amphiaraus, Oropos 3. Temple of Hera, Perahora (Map constructed by Authors, according to faults data from Greek Database of Seismogenic Sources).*

Figure 19. *Hydrogeological map of the Oracle of Apollo temple area in Evia shown in black (data from IGME).*

Figure 20. *Geological map of the Oracle of Apollo temple area in Evia (data from IGME) The location of the temple, shown in black, is placed in an area of intense geological change -a conductivity discontinuity- between glaucophane lawsonite epidote metamorphic rocks (shown in green) and exotic alkaline rocks (shown in purple). The sea is indicated in light blue.*

8. Discussion

There are various parameters that constitute a geophysical anomaly. Amongst them are: intense change in the magnetic and/or gravity field, change in radiation or radioactivity levels, conductivity discontinuity of the ground material, presence of fault and/or subterranean water.

We are raising this subject as it has been bypassed by archeology. While there certainly are various reasons for the siting of temples, one could be of a geophysical nature. One might bear in mind that quote form Tesla: “the earth is found to be alive with electrical vibrations”. The Radcliffe tower he created was an energy generator that would not function if it did not “grip the earth” [126].

The question lies, were people in ancient times able to sense these anomalies? Could the human body or other organisms pick up the changes in the various natural fields?

As I have tried to indicate, the placement of some, if not many, prehistoric and proto-historic monuments appears not to be random, but located with precision where the following take place: an intense change in the magnetic and/or gravity field, the change in radioactivity levels, a conductivity discontinuity of the ground material, the presence of fault and/or underground water. The aforementioned parameters morph these areas into stress zones. Whenever there is a fluctuation in the above fields, it results in the generation of ground DC electric currents, which are measurable. It seems like most basic characteristic of ancient monuments and temples is the concentration of natural geomagnetic and electric fluctuations.

With regards to the human body, the brain is especially great electrical conductor, so these fluctuations can create DC electric fields in our brain, which can have intense mental effects. Magnetoreception in the human body, including transduction processes, can be mediated by: magnetite, photopigments, electromagnetic induction induction, melanin, biological free radicals [66, 72, 61, 73, 114].

In Sedona, USA, research concluded that there is close correlation between the magnetic anomalies and spontaneous brainwave changes in frequency and amplitude, which is additionally modulated by Schumann Resonance and can induce psychophysical and psychosensory phenomena [75]. Sudden magnetic events can result in spontaneous geomagnetic brainwave synchronization. Biofeedback experiments with EEG in Rollright stones demonstrated that deep-theta and delta waves were induced in people close to some stones in the circle [33].

A database of 343 trials demonstrated that geomagnetic fluctuations can induce extra-sensory perception in people; it was strongly correlated with the 0.2–0.5 Hz band [111]. Local fluctuations of the geomagnetic field and pulsating magnetic effect the brain and can lead to a mystical experience [45]. Variations in the brain’s electrical activity have been noted during geomagnetic storms including unstable states, acute attacks of mental illness and epilepsy [35, 105, 12, 109, 47, 100, 98, 97]. The probability and intensity of a mystical experience increase if the high frequency geomagnetic fluctuations increase by 10-40 nT [100, 17]. The effects depend on the intensity, exposure time, and dose of short period fluctuations [12].

Natural and artificial magnetic fields influence all functional systems of the human organism [36, 96, 141]. Magnetic fields manifest their biotropic properties in narrow frequency and amplitude ranges [1, 105]. The effect of magnetic fields can be both positive and negative, depending on intensity, frequency, exposure time, radiation, source location, and individual health condition [3, 83].

Nowadays, electromagnetic fields are used with the scope of healing in various medical applications. Especially the use of low-intensity extremely low frequency electromagnetic fields has been shown to be very effective in clinical applications. They have been shown to be effective in treating conditions of disease at very low energy levels [22].

On the other hand, the concept of hormesis, regarding low/high doses and exposure time of parameters, seems to show contradictive results. A parameter that has long-term negative effects can have positive effects on health in short-term exposure.

Temples seem to be linked to various geophysical anomalies and their properties conduct and amplify the resulting fields of these anomalies. Polimenakos states there is "possibility that seismic faults may have constituted the fulcrum of major sanctuaries" [103].

These data in combination with the fact that hormesis also applies to radiation, can lead us to a possible conclusion that temples might have been built for short term exposure of people to these amplified anomalies with the scope of healing. There seems to be a healing aspect in sacred sites, as pilgrims spend a short time in them, which is in resonance with the effects of hormesis.

Many ancient temples, including the temples of Asklipeios as well as Oracular centers had a main function to be the hospitals of the time, were people would follow fasting, use of herbs, magnet applications as well as have therapeutic sleep, to ask that their cure would appear in their dreams. In that aspect, it makes sense that these temples were strategically placed on geophysical anomalies.

Therapeutic sleep had a very significant role in the healing protocol that took place in the temples of Asclepius in Ancient Greece. Experiments showed that nocturnal exposure of extremely low frequency pulsed weak magnetic fields (7 Hz, 25-50 nT) for several consequent nights can suppress a hyperactive immune system [28, 29]. The exposure time and dose of the pulsed magnetic fields are responsible for positive or negative health results of visits to sacred sites, based on the concept of hormesis; both low dose stimulation and high dose suppression can occur by the same external agent [20, 21].

As seen previously, along faults and their intersections there are fluids and gas emanations and geochemical anomalies [61, 129, 65]. Geological products related to active faults and anomalies can also be sources of healing- the use of mineral waters and muds. These temples are very often

found to be located in proximity to thermal springs, which were also used for healing.

Therefore, based on the concept of hormesis, various agents such as magnetic fluctuations, ground electrical currents, background radiation anomalies as well as geochemical gas emissions can act therapeutically on humans, which gives the temples built over them the same properties.

It is possible that ancient people, not saturated by the noise of modern electromagnetic pollution were more sensitive to the small fluctuations of natural fields and could sense them. After all, animals use very consistently the natural fields for their navigation; it would make sense that humans might have similar mechanisms.

At these times, people seem to have had some awareness of magnetism; in China and Mexico evidence has been found regarding the usage of lodestones as compasses [22]. In Ancient Greece, Aristotle talks about Thales the Mathematician, in his book On the Soul - De Anima, 405a19, "Thales, too, to judge from what is recorded about him, seems to have held soul to be a motive force, since he said that the magnet has a soul in it because it moves the iron."

Phenomena occurring in these areas with geophysical anomalies can be accompanied with light emissions, and that may have resulted in people honoring these places as special and ascribing the phenomena to deities or spirits.

Since ancient times, people have been looking for healing mechanisms, so if a place was observed for such a potential due to its location, a spring or thermal waters it would have been noted and transmitted to the tribe. Over time, that could become a location for erecting sacred structures and even temples.

Also places that induced visionary experiences would have been recognized as special or sacred, such as caves with geochemical gas emanations, or other places with similar features that later transformed into the first oracular centers.

There are many places around the world where people have been looking for inspiration, insights, healing or mystical experiences, such as the springs at Lourdes or California hot springs; many European cathedrals were built over ancient ritual sites and sacred springs. In the Chilean Andes, glows and flashes have been observed along with various sounds, are still nowadays attributed to spiritual location [83]. Similar phenomena have been observed in other places sacred to the Native Americans, such as Uinta in Utah, the Tucumcari in New Mexico, and the Black Hills in the Dakotas.

9. Conclusion

There seems to be some indication that ancient people had some awareness of magnetism; maybe they were more sensitive to field fluctuations as we are today, and that led them to recognize "special places" that either had some effect on them, or other phenomena took places such as flashing lights. Attributing these to deities or spirits, could have led them to built temples upon what we can recognize today as geophysical anomalies.

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