Deciphering the beliefs embedded in the design of megalithic constructions

Photo of stones' alignments with sun on 13 Mai 2022

Written by Pierre Maigne on 06.10.2023 as Independent Researcher for WHD World History Discovery gUG (info.whdgug@gmail.com). Copyright 2023 by the author and WHD.

1 Introduction

Numerous megalithic stones were systematically erected in Europe, with the Carnac alignments being the most renowned and intriguing among them. The megalithic' constructions consist of isolated large vertically erected stones (menhirs), erected stones aligned (Carnac stones' alignments), flat stones arranged in a corridor-like manner (passages tombs), portals tombs (dolmen), passages tombs covered by stone in conical form (cairns), and stones positioned in semi-circular and circular formations (cromlechs). While the primary structures have been identified, a substantial number of additional stone arrangements remain concealed within the forests and under the soil, awaiting discovery. The main cairns are located in Brittany, in Irland and in United Kingdom. Concerning the island of Malta, the megalithic constructions have similarities with cairns but they are temples.

The selected cairns and temples, as well as the Carnac stones' alignments, will be studied in relation to the commonly agreed beliefs of the megalithic people which would have influenced the design of the constructions.

In this study it is presumed that menhirs, passages tombs, cairns, and cromlechs constructions have been built in Neolithic with heritage from Mesolithic period and modified by next civilizations e.g. Celtics. Hypotheses presented in this study revolve around the knowledge possessed by the megalithic inhabitants, their capacity to observe celestial objects, and potential beliefs during their epochs. Regarding the intricate construction of "Gobekli Tepe" described in the chapter "Gobekli Tepe", one could speculate whether Carnac might have been erected earlier than 4000 BCE.

The heritage from the megalithic civilization consists of painting, graves, cemetery and constructions but no writing. The question remains on what was the intention of building the Carnac alignments "Le Ménec", the cromlechs and the various cairns?

In September 2022, Tucker for BBC recorded the following commentary from Agogué[1] about the Carnac site (1):

> There are plenty of interesting theories, some with examples that seem to fit in certain circumstances, but there's always more to disprove them than to prove them. … The Carnac Alignments are not straight, they meander and follow a ridge that separates the coastal plain from the interior, land-based world, likely acting as a kind of symbolic border between the two. Of course, it did not prevent people from passing between them, but it marks a geographical separation between land and sea that isn't random. … Kneeling next to a menhir with serpentine carvings at its base that sparked its own set of theories, he added, But, its ceremonial or religious significance is open to interpretation.

This study is an attempt to present another interpretation based on commonly agreed megalithic people beliefs, which influenced the forms and the positioning of erected stones, and also the design of the constructions of the cairns, the temples and the stones' alignments.

This study might not follow a standard scientific formulation and will cover:

- Review of beliefs related to celestial objects and stones
- Assessment of alignments to celestial objects at "Le Ménec" and others places
- Review of Shaman rituals based on latest scientific researches including effects of earth magnetic field

[1] Administrator at the Centre of National Monuments, and Curator of the Museum of Prehistory at Carnac

In addition, the following chapters will cover:

- Recording and analysis of earth magnetic field intensity at Carnac “Le Ménec”
- Comparison of orientations and layout of nearby sites
- Analysis of the schematic sky view of the site
- Additional detailed information (“Gobekli Tepe”, Shaman, studies on drugs and magnetic field impacts on brain, festivals dates, technical details)
- and conclusions

To highlight the phrases or key words in the document, their fonts are changed in bold, and this applies also to citations’ text.

2 Analysis of Carnac site, Gavrinis and Newgrange cairns, La Roche aux fées portal, Stonehenge and Ggantira temple

Banning (2) and Harding (3) explained that from the beginning of humanity, people created sacred and ceremonial places. Herity noticed a kind of cosmology since some megalithic tombs are oriented to capture the sun rising or setting (4).

Nowadays, the previous civilizations’ beliefs embedded in sites are recovered by the archeoastronomy interdisciplinary, which study how people in the past inserted in their culture and beliefs the celestial objects observed in the sky. Such disciplinary is great help to reveal practical and sacred use of the site, and any particulars orientations selected for the design of the constructions. The easiest celestial objects to observe are the brightness ones named the Sun, the Moon and Venus. Hence the orientations of corridors and stones’ alignments towards the celestial objects will be assessed. It is expected that such orientations towards celestial objects represent their beliefs, and influenced the design of the megalithic constructions.

At Carnac “Le Ménec” on the West side, there are alignments of stones and a cromlech. The cromlech has missing stones and hence the orientation assessment will be limited to one place near the three big stones close together. The orientations of the stones’ alignment and the cairns’ corridor will be reviewed in chapter “Celestial objects Alignments”.

Skychart software will provide the location of celestial objects in the sky at a defined date. The software generates celestial bodies on a map with the theoretical horizon. To take into account obstructions in the field of view, the local horizon altitude will be estimated and used to calculate the rising time of the celestial objects.

This study contains several hypotheses based on relevant statements taken from academic documents related to megalithic people and later civilizations e.g. Sumerian or Egyptian. It’s a fact that knowledge has been transferred amongst civilizations, hence hypotheses based on later civilizations can be applied backward to the megaliths people under the condition they are compliant and coherent with the epoch concerned, and the megalithic people beliefs. The actual generation of hypotheses follows a reasoning by inference and works as follows: if statement “a” includes elements “b” and “c”; if statement “d” includes elements “b” and “c”; then the new statement generated (“a” is similar to “d”) will be the hypothesis. Such demonstration is not added in this study but implicit.

The history of civilizations shows that sub goddesses were created on extracting representative attributes of the Mother Goddess, supplemented by antonyms attributes and adding minor local

attributes. As a simple example, the Mother Goddess was also known as e.g. White goddess or Great goddess. The academic documents refer to goddesses but, in a lot of cases the statements' authors focus on goddesses' attributes they need. The baseline of the reasoning will consist in getting back to the root goddess which is the Mother Goddess. Hence any goddess will be scrutinized to identify the representative attributes of the Mother Goddess, which have been selected to highlight a main concept of belief, to identify the missing representative attributes, to remove the unneeded antonyms of attributes and also to exclude minor attributes locally created. Keeping in mind that the results shall be compliant with the beliefs of megalithic people, such process is not added in the study but implicit.

In the next chapter, the myths, worship and relation with ancestors of megalithic people will be analysed in relation with the 3 brightest celestial objects the sun, the moon and Venus.

2.1 Beliefs related to the Sun

The sun is essential to sustain life, bringing warm weather for humans as well as animals and to activate the growing of plants and crops. megalithic people observed the effects of the Sun and remarked similarities between the fertility and maturity process in the life and nature, and the fertility of women and the birthhood.

Particular sun positions were known by megalithic people to correspond to e.g. the start of fertility period, animals mating and the start of collecting crops or fruits. Such sun positions played the role of time markers, and were essential for the tribe to survive and master the life and nature.

When Celts came to Brittanny with the same human basic needs, they included the time markers of the megalithic people in their festivals. It is also possible that such time markers were already known by the Celts since they are important events for surviving. Sermon provides an explanation of the Celtic festival:

> the Celtic civilization focused on the start of seasons named cross quarter days (5):

The Celtic calendar included two festivals in May and in August which are of interest for the study (6)

- 1 May [2] for start of **Beltane** which is close to the middle of Spring Equinox and Summer Solstice, and
- 1 August for start of **Lughnasa** which is close to the middle of Summer Solstice and Autumn Equinox.

It is presumed that megalithic people did not know the terminology of solstices and equinoxes, and similar megalithic events in BCE are described in chapter "Dating specific sun events in BCE".

Later on, several past civilizations had also worshiped the sun by e.g. Egyptian (in particular Akhenaton), Indus, Sumerians, Akkadian, Maya and Celts.

2.2 Beliefs related to the Moon

The phases of the moon have been considered by a lot of cultures. More intriguing for Neolithic or Mesolithic people were the feminine menstrual cycles mystery, the reproduction and the birth. By observing the moon phases and events related to women natural process, a relation with the moon

[2] The day 1rst is certainly a later convention

and women fertility was established. Further scientific information on human physiology and the moon phases can be read in the Helfrisch-Foerster report “Menstrual cycles with luminance and gravimetric cycles of the moon” (7). The report points out, in particular, the following relations with:

- the new moon: with an increase of kids born during the day, the start of the most fertile phase, ovulation happened predominantly during that phase, onsets of menses, …
- the full moon: with an increase of kids born during the night, …

Therefore, in the mind of megalithic people the moon phases became associated with the menstrual cycles, women fertility and birthhood which was essential for the perennity of the tribe.

2.3 Beliefs related to Venus

Venus is the brightest planet in the sky and was considered by a lot of cultures. This chapter is the longest and contains the key concepts to understand the influence of megalithic people beliefs in their constructions.

2.3.1 Venus known alignments

One of the known alignments is located in the Temple 22 at Copán (Honduras) where a window was used by the Maya to indicate the onset of the rainy season and the planting of the maize (8).

2.3.2 Venus Myths

In the mythology Venus was the goddess of love, beauty and fertility. The Greek associated it to the goddess to Aphrodite-Pandemia and for ceremonial events to Aphrodite-Urania as the goddess of **divine love**. The second association to Aphrodite-Urania conveys a kind of sacred and ceremonial concept. The association to **beauty** comes from the reflection of the sun on its surface as a blue-white colour which was associated to a sense of beauty in regards to sky and sea colour.

In relation with the nature, Gimbutas presented the goddess as a water bird.

> … the cosmic myth of the goddess as a **water bird**, carrying an egg or a double-egg, in her body … (9)

Megalithic people observed the rise of Venus from the sea and the fly in the sky, which initiated in their minds the association of the planet with **water** and the **waterbird**, while the transported eggs were associated to birth. Regarding the cycle of appearance and disappearance of the planet Venus, megalithic people associated it with the birth life’s events, generating the association to concepts of **fertility, birth, rebirth, regeneration and reincarnation**.

The word **reincarnation** is commonly used, but it is difficult to give a unique definition since it depends on the meaning associated by the religions or the philosophical associations. They all agreed that the soul comes back in the living world. The word **rebirth** could be defined in the context of this study as:

1) a symbolic rebirth after a simulated death, being part of a ceremony led by Shamans,
2) a mystical change of the personality resulting from a ceremony led by Shamans.

All next calculations are based on days, notion which is likely unknown by megalithic people. Such notion of days was presumably replaced by the coincidence of events, see chapter “Basic clock to observe celestial objects”.

The full time of conception of a human baby is about 39 weeks (266 days solar) which is about 9 moon months calculated as 9*29.5. Its cycle of visibility is about 263 solar days, then 50 days invisible, then 263 days visible, then 8 days invisible giving 584 days cycle, and so on. Another cycle is related to planet returning at same location in the sky every 8 solar years, called “octaeteris”, or to 99 moons the synodic months.
By observing Venus visibility of 263 days and the pregnancy time of 266 days, megalith people came to the conclusion of a strong link between the cycle of the planet and the birth event, the emerging force of the life and waters of conception since babies grow in water.

The concept of birth and rebirth could be compared to the live after death of Egyptians’ beliefs which is described in the book "Book of the Dead". The title should have been translated by "Formula for coming out in the daylight", where the word “daylight” would suggest the notion of rebirth to light and might be under the sun.

The concept of birth and rebirth is one of the key concepts embedded in the constructions.

2.3.3 Venus worship as goddess

Archaeologists found figurines related to Venus in several places from Upper Palaeolithic to Magdalenian. Haviland, Prins, Walrath and McBride interpreted such figurines as the Great Mother or **Mother Goddess** (10). The figurines represent goddesses and would let assume the existence of a worship, and the emerging concept of **feminine sacred**[3].

Another reference to Mother Goddess is included in the poem “Epic of Gilgamesh” translated from Akkadian to English by Stephen Mitchell. The poem narrates the story of Gilgamesh, and it is dated from at least from 2100 BCE. On the tablet 1, there is a reference to Aruru which is defined by Mitchell as “… Lady of the Gods. **Mother Goddess** who created humanity with hep of Ea. Aruru is the sister or spouse of Enlil; and might be Anu’s lover …”. In addition, the poem refers to Ishtar goddess and also to the temple of Ishtar. The glossary of Mitchell’s book, provides the following definitions of the gods: Ea is the water or oceans god, Anu is the skies’ god, and Enlil is the winds or air god and might also the earth god.
The Sumerians’ gods and the Egyptians’ gods have similarities and are depicted hereafter: Ea and Tefnut representing moisture and water, Anu and Nut representing the sky, Enlil and Shu representing the air, Enlil and Geb representing the Earth.
Correspondences in gods’ descriptions would let suppose an exchange of beliefs between past civilizations, or beliefs transfer from one past civilization to another. Hence megalithic beliefs could have as well been transferred to future civilizations.

Collins dictionary defined “**Great Mother**” as “… deity symbolizing maternity, the fertility of the earth, and femininity … also called: **The Great Goddess** “. The maternity and fertility attributes of the goddess are also associated to the **Mother Goddess,** which has several sub naming.

Two figurines will be reviewed: “The Venus of Laussel” and “The Venus of Willendorf”

- “The Venus of Laussel” is described by Neumann as the **Great goddess** (11).

[3] The wording “feminine sacred” comes from the association of Mother with feminine and Goddess with sacred.

> … with long pendant breasts and massive hips delineate her purpose as container of life exemplar of her elemental character while the crescent-shaped Aurochs horn that she holds delineates her dominant purpose as keeper of female cycles and lunar time.[4]

Neumann showed that **the figurine is associated the Moon and Venus**, and therefore associated to Mother Goddess by Venus.

- "The Venus of Willendorf" found in Germany by archaeologists and dated from Palaeolithic (BCE 25000 to BCE 20000) differs from other figurines by having, in particular, no facial features. For that case Witcombe provided a method to interpret the meaning of such figurine:

> … the **focus** shall be made **on the symbolic or suggestive meaning rather than its visual representation**. The subjective meaning would be an emphasis on the female body signifying fertility, pregnancy, and birth. He also assumed that women could have played an important role in Paleolithic culture. (12)

According to the Witcombe method of interpretation, the figurine of Willendorf can be associated to fertility and birthhood, hence the debate on the name of the figurine "The Venus of Willendorf" should not be necessary.

The notion of Mother Goddess and all its sub names is still debated. An example of debate is the theory of Gimbutas including the Willendorf figurine, against the report made by Holder on iconic feminine statues discovered by James Mellaart in 1961 and located at Çatalhöyük. (13) (14). Looking at the figurines' heads and applying the Witcombe method of interpretation, the Willendorf having no facial features would be a symbolic figure of the Mother Goddess, and the figurines in Çatalhöyük (Turkey) having very good facial features would be rather a human representation.

For megalithic people the birthhood was hoped and might be revered but not understood. The tribe needed children to ensure its survival which required the fertility of woman. For thousands of years, people have worn talismans, for good luck, to get magic power, and also to ensure fertility. The Willendorf figurine is an example of talisman used by women to worship the Mother Goddess for its intercession to make them fertile.

Malta has a lot of megalithic temples; a huge statue of Mother Goddess (3000-2500 BCE) was found under one temple. The huge size of the statue manifests a highly sacred place where believers came to worship the goddess. On the altar pedestal and inside the site a lot of spiral motifs are found like a flattened triskele, which are similar to the ones found in Newgrange Cairns.

In her book, Veen presented the feminine aspect of the Neolithic cultures in "The Goddess of Malta, the **Lady of waters** and earth" (15). The word water makes the link to Venus and then to the Mother Goddess.

For Gimbutas, old European civilizations believed that **death** was followed by **rebirth**. Hence the concept of birth and rebirth would stand for **regeneration and reincarnation:**

> These shrines were ancestral, in both architecture and function, to the later temples. Rock-cut tombs were the other ancestors of the temples. The earliest **egg-shaped** rock-cut tombs were found at the Zebbug and Xemxija tombs (4000 BP). Their shape prefigures the later **temple's lobed 'apse'** interiors, and show similarity to those found in Sardinia and southern Italy. Grave goods and figurines that were found in these tombs represent early portrayals of a divinity associated with the tomb: a **Goddess of death and regeneration**.

[4] This text is also included in a Venus document written by Benigni Helen (67)

> For the ancient Maltese, death was believed to be followed by rebirth, and religion was about reconciling humans with their mortality. The burial rites of the temple building people did not change much during the period. As with other Old European civilisations, their tombs were **reminiscent of a womb**: **graves were made in the shape of eggs;** often a simple egg-shaped pit or a rock-cut tomb to which the dead were placed in a contracted foetal position and sprinkled with red ochre. Newborn babies were buried in egg shaped pots. The placing of red ochre in graves and niches of subterranean tombs was an almost universal feature;
>
> their tombs were **reminiscent of a womb**: graves were made in the **shape of eggs**; often a simple egg-shaped pit or a rock-cut tomb to which the dead were placed in a contracted foetal position and sprinkled with red ochre. Newborn babies were buried in egg shaped pots. (16)

The worship of the Mother Goddess inside various sites will be presented in the following chapters.

For the Malta temples, Trump explained that they combine shrine and ancestral tomb structure (17). The inside structure shows **egg** shape bulges arranged around a central temple's entrance, with the egg-shaped form likened to the goddess's **womb**. The layout of the Ggantija temple consists of a set of 2 bulges followed by a set of 3 bulges, separated by a corridor. It is a double temple like the temple of Kom Ombo in Egypt.

The **Triple goddess** was also associated by Graves (18) and Harvey (19) to the Triple Muse. Graves[5] reported that the "White Goddess" has several names and titles including the mother of all living, the love goddess, the birth goddess, the death goddess, the moon goddess … which is very similar to the representative attributes of the **Mother Goddess**.

On the other hand, Pike (20) associated the triple goddess to the three phases of the moon (waxing, full, waning) and the stages of life (child, adult, elder).

Several thousand years ago the Akkadian civilization located in Mesopotamia worshiped the goddess Ishtar. Britannica encyclopaedia defines Ishtar as follows:

> Ishtar's primary legacy from the Sumerian tradition is the role of **fertility** figure" …. The Akkadian Ishtar is also, to a greater extent, an astral deity, associated with the planet Venus. With Shamash, the sun god, and Sin, the moon god, she forms a secondary astral **triad** (Venus, Sun, Moon) …. In later myth she was known as **Queen of the Universe** …

Ishtar being associated to Venus and accordingly is associated to the Mother Goddess.

Hence the Mother Goddess can be associated to the symbolism of Venus via the feminine fertility, the birth, the rebirth and to the triad composed of the sun, the moon and Venus.

A simple representation of a triad would consist of the Π-shaped door of the cairns, which is made of one horizontal flat stone supported by two vertical stones. Such Π-shaped doors are visible in Creevykeel passage tomb. At Carnac "Le Ménec" a major part of the cromlech on the West side is missing including likely the Π-shaped door[6].

The concept of "Queen of the Universe" referred by Encyclopaedia Britannica for the goddess Ishtar is close to the definition provided by Grave for "White Goddess" as mother of all living, the birth goddess and the death goddess. The attributes reported previously include birth and death which are antonyms.

---

[5] Graves, 2013, pages 11, 24-25

[6] It should be investigated for any traces of such door in the West cromlech at "Le Ménec" representing the triad.

The birthhood was certainly astonishing for megalithic people, and it is likelihood that similar concept emerged in their minds about their own creation as well as questions about their origin and the aims of their existence. Facing multiple birthhoods, they imagined a womb belonging to a "Mother" as a spirit which gave birth to megalithic people. Nowadays instead of Mother as spirit, the wording Divine Mother would be used.

The notion of spirit has been addressed by Gimbutas and Price which provided the following explanations:

> … the spirituality of megalith people was focusing on power and strength of animals, of their spirits and ancestors … (21)

> … Shaman appears as being the intermediate to communicate with the spirits … (22)

So, it is presumed that certain megalithic people wanted to understand the notion of birth and rebirth, to communicate with ancestors' spirits and the Mother Goddess spirit or Divine Mother spirit. For that purpose, ceremonies were held by Shamans in sacred places e.g. representing symbolically the womb of the Mother Goddess, and later on they would have built similar forms of the womb within stones constructions (23).

2.3.4 Venus symbolism in Tombs and temple

During megalithic epoch some people were buried near the living area (24), and in some cases the body of the deceased was laydown in the gestation position (25). In the first case megalithic people wanted the protection from ancestors' spirits, against whatever afraid them, and in the second case they were expecting a future rebirth of the ancestors' spirits similar to the regeneration and reincarnation.

Cunlife explained that as part of the cosmology linear and circular setting of standing stones were erected, and some stones were carved and painted (24). [7]

In addition to graves in egg-shaped form, four main types of megalithic tombs will be considered in this study:

- Court tombs e.g. Creevykeel Court Tomb,
- Portal tombs, named nowadays dolmen, a door was likely at the entrance of the chamber,
- Passage tombs e.g. Loughcrew, Dowth, Newgrange, Gavrinis, Dooey. When covered with earth it is a burial mount, and covered with stones it is a cairn e.g. Newgrange, Gavrinis, Dooey,
- Wedge tombs are like tomb with a sloping roof, and are the youngest tombs e.g. Altar Wedge Tomb near Schull in County Cork (Irland)

The Portal tombs and Wedge tombs are constructed with large heavy stones and could be covered with soil or not. Eliade reported that in the context of warfare, the remains of certain soldiers were placed in a grave inside portal tomb. This was associated to the belief that the souls of the dead soldiers were incorporated in these stones as a substitute body independent of the wear and tear of time, and symbolizing the continued existence of the soldier. The portal tomb would be a reminiscent of the war memorials commemorating national heroes who sacrificed their lives for the nation. (25). Eliade therefore suggests that the constructions played the role of a memory of and connection to the ancestors, embedding their beliefs of **a link between stones, the dead and their**

[7] the researchers should check whether some stones in Carnac "Le Ménec" were engraved and painted

souls. She also described a story about a huge rock called Eratipa (Georgia) with an opening, where the souls of babies lie in wait for passing women to inhabit them. This put forward the **idea of the reincarnation of souls** in the minds of animist communities. (26).

Gavrinis and Newgrange cairns have identical layout. Externally they are made with smaller stones stacked in conical form, and internally they are made with huge stones consisting of an Π-shaped door, and a corridor terminated by a chamber.

Concerning Dooey cairn tomb, the layout differs from Gavrinis and Newgrange since the burial place is not made with big stones. Looking at the standing stones placed in front of the entrance in half circle this would presume a kind of passage tomb.

The layout of Loughcrew Passage Tomb and Creevykeel Court Tomb brings interesting information about the use of standing stones. The standing stones are placed around the buried place forming a circle or semi-circle, and additional circle or semi- circle of standing stones are added aside. Creevykeel is the most impressive and includes the Π-shaped doors.

Loughcrew Passage Tomb layout brings additional knowledge by showing a cairn surrounded by Passage tombs. The Passage tombs, being a burial place, are surrounded by circles of stones. It should be noted that the cairn has huge stones around it to counteract the lateral forces of all the stones piled in a conic form. It could be stipulated that the cairn was used for ceremony related to those being buried in that area. This organisation is similar to that of a European place of worship with its cemetery comprising tombstones or chapels where the deceased are buried. It does not exclude that important megalithic group or family would build a tomb similar to a cairn which makes the study more complex. The practice of having a **standing stone** or more complex construction near or above the **burial place** is still use in Christians, Muslim and Jewish cemeteries. Nowadays graved stones with names are used to remember people which died for the country or others causes without any burial near to them.

Therefore, standing stones placed in a circle or semi-circle outside a burial place would represent the ancestors' spirits.

Examining the various burial places, it could be stipulated that passage tombs would be real tombs for a group of people or influent families, and cairns would be temples in regards to the associated symbolism. The particular orientations of cairns' corridor will be presented in the chapters on alignments. The constructions express the will of megalithic people to build remarkable places based on their beliefs, in order to communicate with ancestors' spirits, worship the Mother Goddess and to represent the concept of rebirth.

It could be summarized that any megalithic place symbolizing a womb would have been used for following goal:

- Expecting a future rebirth of the deceased person via the reincarnation,
- Experimenting a kind of personal rebirth as re-generation, or to contact Ancestors' spirits, or to contact with Mother Goddess as related to the beliefs about Venus.

It is likelihood that megalith people came periodically to the buried places for honouring their ancestors as spirits during ceremonies led by Shamans inside the cairns and cromlechs, as nowadays a lot people commemorate the faithful departed at beginning of November in Europe.

The internal construction of the cairns could also be compared to the internal construction of the tombs of the Egyptians' pharaohs which include a chamber, a corridor and a Π-shaped door. The Egyptians beliefs included also the concept of rebirth to the light.

2.3.5 Venus worshipping traces in cairns

The cairns' corridors at **Newgrange** (Ireland) and **Gavrinis** have similar orientation. Newgrange has specific engraving in form of addition spirals. The Gavrinis' corridor has numerous engraving, and Gimbutas interpreted the engravings in relation with a goddess as follows:

> … the masterfully decorated orthostats of the Gavrinis passage grave (on an island in the Gulf of Morbihan in Brittany). Here concentric arcs, piled on top of each other in vertical columns, constitute her image. Concentric arcs radiating from a central vulva-shaped opening flank this rising "life column". Another image emphasizes the goddess' rectangular shape, made up of **concentric arcs and central vulva, surrounded by a flowing stream of water**. This imagery exudes the goddess' inexhaustible **generative force**, rising from the depths of the waters. (27)

The goddess presented by Gimbutas is linked to the symbolism of Venus, and accordingly to the Mother Goddess.

Concerning the centres of the arcs, a visual check on my own photos shows that the carved centres are small lines and effectively not points.

Figure 1: "vulvar" instead of point reported by Gimbutas (photo 90° counter clockwise)

Some engravings stop on a straight line, creating conical curves. Such conic forms are similar to the **day trajectory of the Venus** in the sky presented later on, and some carvings have 8 circumscribed carved curves including the centre line which could represent the **8 years cycles** when Venus appears at the same position in the sky, or the 8 years cycle when Venus rises just followed by the sun. In the next chapters a particular orientation of the cairns' corridors will be presented showing that the corridors are aligned to a sequence of Venus just followed by the sun, and at a time of a particular phase of the moon.

Figure 2: engraving with 8 curved lines (photo 90° counter clockwise)

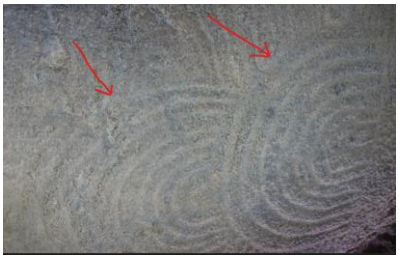


Figure 3: engraving with 8 curved lines (photo 90° counter clockwise)

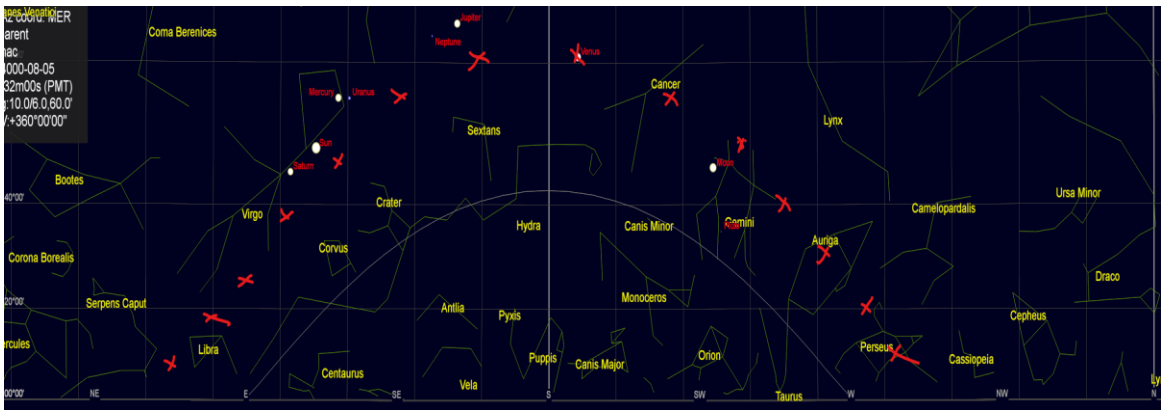
There is common agreement nowadays that the semi-circle or circles represent the water. That interpretations fit with the beliefs related to Venus rising from the sea, to the water liquid in the womb for the baby, and the moisture in the womb of Mother Goddess. Therefore, it is likelihood that the beliefs influenced the design of the constructions and the engravings.

Such belief would explain the presence of moist or recipient containing water in the temples' chambers.

2.3.6 Venus symbolism with ancestors' spirits rebirth and stones' shape

The notion of birth and rebirth represented by Venus has been described previously. In this chapter the conical trajectory of Venus will be compared against the various erected stones to identify the megalithic people belief of rebirth.

Hereunder the trajectory of Venus during a day is depicted for BCE 5 August 4000 from 2h22 UT to 15h22 UT with a mark every hour. The others object visible on the picture are those at 2h22 UT. The planet Venus moves in the sky from North-East to North-West. Looking at the picture, South is in the middle, East is in the middle of the half left, and West is in the middle of half right.



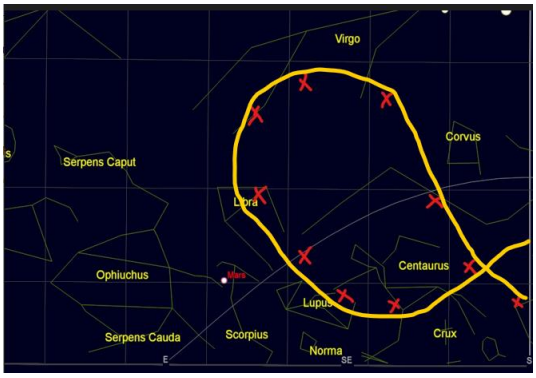
The trajectory shows a conical curve similar to the top of stones as shown below on the picture.

In the mind of megalithic people, Venus represented the strong concept of birth and rebirth, and the stones were associated to buried places and ancestors' spirits. Previously it was reported that stones were used for representing ancestors' spirits or marking buried places. Therefore, without buried people they would represent only ancestors' spirits, but the concept of birth and rebirth is missing. Then, they shaped the top the stones in a conic form representing the Venus trajectory which represented the belief of birth and rebirth. In the same way cairns have also a conic form.

The standing stones with conical top would represent ancestors' spirit with the associated belief of birth and rebirth, and constructions having a conical form would correspond to worship places.

One could argue that the present form of granite stone is due to weather erosion, but the granite is extremely hard and the weather erosion will slightly alter the original form.

Another Venus trajectory is the position of Venus per month at the same time. The image records the positions from BCE 5 February 3999 12h00 UT until 5 December 3999 12h00 UT. The first Venus position is at the bottom right.



The trajectory could look like a stone but there is uncertainty on the feasibility by megalithic people to record Venus position each month at the same time without clock. Although recording the position at mid-day could be achievable by recording each time the Venus' position with sticks but the sun shall not be near to Venus.

Megalithic people build also a lot of circle or semi-circle of standing stones without buried person, and the circles are named by cromlech. It is presumed that megalithic people gathered inside such cromlech during a ceremony with Shamans to benefit from the protection of their ancestor's spirits and to communicate with them.

Hence a cromlech or stones erected in circle outside buried area would be a place where megalithic people expect protection from ancestor's spirits and possibly a place to enter in contact with them.

Not all cromlechs are circle-shaped, and few cromlechs are **egg-shaped** like at Carnac "Le Ménec". Gimbutas explained that such specific shape would represent a **womb** and indirectly will be linked to Mother Goddess[8].

Previously the symbolical association of the Mother Goddess with the triad was presented. At Carnac "Le Ménec" the surrounding stones of the West cromlech are tied together with no way to pass through, but a lot of stones have been removed including the doors. The Creevykeel Court Tomb, on a smaller scale, gives an idea of the Π-shaped doors. A GPR would be needed to find the exact location of the door, and it is stipulated in this study that the Π-shaped door was near the 3 stones close together. This does not exclude there was more than one door. This Π-shaped door would have symbolically represented the central point of the Mother Goddess from which the divine flow of water emerges at birth. The Egyptian hieroglyph "born of" would represent that concept with 3 lines starting from a point.

2.3.7 Venus symbolism of birth and water flow

A strong link exists between Venus and the birth and rebirth, and has been included in the design of constructions. The associations can be summarized as follows: the womb with the chamber, the birth canal with the corridor, and the point of the emerging flow with the Π-shaped door. What remains to be represented is the flow of water. It might possible to find such representation by looking at the ancient Egyptian hieroglyphs. The water is represented by 3 horizontal wavy lines (a), and the plural is represented by 3 vertical parallel small lines (b). In the context of the birthhood, the verb "born of" is represented by the sign (c).

(a) (b) (c)

[8] Gimbutas, *The living goddess, p. 18*

It would be expected that earlier civilizations would have use similar drawing concepts of water flow represented as lines. Such lines would represent the water expulsed during birthhood and also the moisture as well as the water inside the women womb.

Gimbutas[9] interpreted various stripes on Mother Goddess figurines and objects in her book as follows:

> … Streams in the form of 'comets' or parallel lines in diagonal, vertical, or meander bands, are frequent motifs of Upper Palaeolithic and Mesolithic mobiliary and parietal art ... These comet streams are found on female images symbolizing the "divine moisture within the body of the Goddess"
>
> … that the goddess is the single source that took the energy from the sun (as masculine power) and the moon and the life on earth in a cosmos that was represented by cyclical and not linear time …

Hence any notion of flow of water or being in a flow of water, could be represented by lines of objects, and for example by alignments of stones.

2.4 Celestial objects alignments

This chapter will describe various orientations and the related symbolism.

2.4.1 Dating specific sun events in BCE

The Summer Solstice, and Winter Solstice were not known by megalithic people, and such events were replaced by others sun events observable with eyes. For the Summer Solstice, it was replaced by the event of the sun being in the middle of the sky at its highest position above horizon. For the Winter Solstice, it was replaced by the event of the sun being in the middle of the sky at its lowest position above horizon. Looking at the sun path, the Spring Equinox was replaced by the event of the sun rise in its maximum position on the left side of the observer, and Autumn Equinox was replaced by the event of the sun rise in its maximum position on the right side of the observer. Megalithic people after several observations and utilizing sticks could get such events.

2.4.2 Sun – dates when the sun rises in Carnac alignment

Carnac alignments start of construction is currently dated between 4000 BCE to 3500 BCE, which is in the Neolithic period with possibly heritage from Mesolithic period, and was later modified by the following civilizations e.g. Celts.

The altitude of celestial objects is computed based on the centre of the objects. Therefore, the sun will be visible few minutes before due to its brightness. It should be reminded that observations were made visually by megalithic people with an accuracy of +/- some degrees and +/- some days.

The sun has a large beam of light and the same alignments could be visible at "Le Ménec" during few days. Being on site, it is confirmed that the sun rises in the alignments in May 2022.

In this study you will find accurate positions of celestial objects, this is intentional for the reader's verification where needed.

---

[9] Gimbutas, M. (1989). The language of the Goddess: Unearthing the Hidden Symbols of Western

Figure 4 Sun and one alignment of stones lined-up with observer position behind one stone

Figure 5 shadows well aligned also on the right of the observer position

The observer location at "Le Ménec" alignments is at GPS Latitude 47° 35' 31.41" North and longitude 3° 5' 3.60" West. The eyes altitude is estimated at 28.6 meters (27+1.6). The average heading axis of the alignments is towards 71° geographical. Thw alignments were visually tested to be aligned towards the sun rising. All headings are verified with year CE 2022, and BCE 4000, the later year is the proposed dating from Giles (28).

The above photos show shadows well aligned with stones' alignments, further research would be required to assess the distance between stones and the shadows, or with the grouping of the stones per family's ancestors.

The software **Skychart** generates the azimuth, the elevation, the date and the UT time, in the past and future, of any alignment with celestial objects.

The Carnac horizon is selected at 5° above the theoretical horizon, therefore any change will shift the dates by few days.

Within Current Era (CE) – dates when the sun rises in alignments

The following CE dates have been found.

- CE 5 May 2022 at 5h26 UT (Looking at future dates in CE, the sun rises all years near the same heading)
  The moon phase is waxing crescent.

- CE 7 August at 5h34 UT
  The moon phase is waxing gibbous.

Note*: Being early on site the 13-05-2022 the sun rose at about 68° on the left of the average alignment heading and just after the sun was in the average heading of 71°. After the 5 May the sun rising azimuth moves towards North-East.*

Before Current Era (BCE) – dates when the sun rises in alignments

The following dates BCE have been found.

- BCE 8 June 4000 at 5h15 UT
  The moon phase is waning crescent.

- BCE 9 September 4000 at 5h35 UT

The moon phase is new moon. This phase emphasizes and intensifies the symbolism associated to birth, fertility, renewal and regeneration.

In BCE, the change in the month is due to the precession which is the wobbling of the Earth's rotational axis.

Note: Various times conversion are provided: CEST= TU + 2h in summer time within Europe, UK excluded, at time of check; CET= TU + 1h in winter time within Europe, excluding UK excluded; and PMT= TU + 0h9'21'; The abbreviations mean TU: Time Universal, CEST: Central European Summer Time, Central European Time, PMT: Paris Mean Time.

In CE 2022, at Carnac the Spring equinox was on 20 March, the Summer solstice was on 21 June, the Autumn equinox was on 23 September, and the Winter solstice was on 21 December.

In BCE 4000, at Carnac the maximum position of the sun towards North from East is on 22 April, the highest position above the local horizon is on 26 July, the maximum position of the sun towards South from East is on 23 October and the lowest position above the local horizon is on BCE 19 January 3999.

It is firstly concluded that the Carnac "Le Ménec" alignments with heading towards 71° are not pointing to the sun positions at equinoxes and solstices in CE or the similar positions in BCE.

Knowing that Celts civilization have festivals, it is expected that Celts re-used or embedded megalithic events in their festivals:

- Beltane corresponds to megalithic people markers for the return of fertility, to mark the mating season for most species, to the blooming of flowers, to the collection of local vegetables growing in soil, and to the start of warm season. The heat felt by the megaliths people was similar to the wood fire used during cooler seasons.

- Lughnasa corresponds to megalithic people markers for collecting of crops and fruits, to hot temperatures via the power of the sun, and with long days of light.

The chapter "Dating specific sun events in BCE" describes the approach to replace equinoxes and solstices in BCE. For simplicity of comparison the terminology of equinoxes and solstices will be used.

The Beltane and Lughnasa festivals start dates can be estimated based on the dates of the Spring equinox, the Summer solstice and the Autumn equinox. After having such estimated dates, they can be compared against the dates of sun alignment at Carnac "Le Ménec" in the same period.

In CE 2022:

Beltane is in the middle between 20 March (Spring Equinox: SE) and 21 June (Summer Solstice: SS).
Lughnasa is in the middle of 21 June (SS) and 23 September (Autumn Equinox: AE).

The corresponding calculations are in the chapter "Estimating Beltane and Lughnasa dates".

For Beltane an estimated start of festival is on **5 or 6 May** and the sun is aligned with "Le Ménec" alignments on **5 May.**
For Lughnasa an estimated start of festival is on **7 August** and the sun is aligned with "Le Ménec" alignments on **7 August**.

The maximum difference is up to 1 day, which is fairly acceptable although it is necessary to look in the past at BCE 4000 where the site could have been built.

In BCE 4000:

It should be recalled that the alignments with the Sun were made visually at 4000 BCE, and knowing that the sun provides a large light beam any alignment with the sun would last few days. For simplification and comparison matter the Celts festivals names are kept but it refers here to the fertility, mating period, … and collecting of crops seasons.

Beltane should in the middle between 22 April (similar to SE) and 26 July (similar to SS).
Lughnasa should be in the middle of 26 July (similar to SS) and 23 October (similar to AE).

For Beltane an estimated start of festival is on **8 to 9 June** and the sun is aligned with "Le Ménec" alignments on **8 June**.
For Lughnasa an estimated start of festival is on **8 to 9 September** and the sun is aligned with "Le Ménec" alignments on **9 September**.

The maximum difference is of up to 1 day for Beltane and Lughnasa which are markers for life and nature events. It is very likelihood that "Le Ménec" alignments of stones are a calendar. Since the azimuth were made visually and the sun has a large light beam, the sun will be in alignment for few days.

There are a lot of crops collected in August (resp. in September for BCE 4000), and megalithic people would have associated also the cycle of growing seeds with pregnancy period and the rebirth concept. During megalithic epoch the inhabitants needed stable marks in time, as example, beginning fertility, mating period and collecting crops seasons. Therefore, alignments were markers to fit such events corresponding to sun rising with azimuth 71°.

It can be restated that the needs of megalithic people are mainly physiological needs as defined in Maslow's hierarchy of needs.

The Celts arrived in Britanny at about 1000 BCE and have incorporated alignments of stones and cromlechs in their myths and festivals, and might have modified parts of the alignments and cromlechs. It would be also likely that Celts had known such life and nature events before moving to megalithic places. Such alignments and cromlechs would have been reused by Druids for their ceremonies as sacred places, unfortunately there is no confirmation except the alignment fitting with the Celts festivals.

It can be concluded that "Le Ménec" alignments towards the average azimuth of 71° are markers for the beginning of fertility, mating season for animals and collecting crops seasons which are crucial to feed the tribe. Later on, the Celts civilization has reused such alignments in the festivals of Beltane and Lughnasa.

In the later chapter related to Venus, it is reported a particular recurrent event of the rise of Venus followed by the sun accompanied by the phase of the moon full or new. Such event would give a preferred alignment the with the period corresponding to collecting crops, which is close to the Lughnasa festival.

2.4.3 Satellite Moon – dates when the moon rises in Carnac alignment

The alignments with the moon will be investigated, although in regard to the previous explanations on beliefs, it is possible that megalithic people were focusing on moon's phases.

The Carnac horizon is selected at 5° above the theoretical horizon.

Within Current Era (CE) – dates when the moon rises in alignments

CE 9 February 2022 at 11h31 UT, the moon crosses the axis but with 9° to 10° above the theoretical horizon.
The moon phase is waxing gibbous.

Before Current Era (BCE) – dates when the moon rises in alignments

BCE 19 May 4000 at 9h26 UT, the moon crosses the axis but with 9° to 10° above the theoretical horizon.
The moon phase is waxing crescent.

It is not possible to provide significant conclusions, and instead searching an alignment, **the phases of the moon should be interpreted together with the sun and Venus alignments**.

2.4.4 Planet Venus – dates when the planet Venus rises in Carnac alignment

The Carnac horizon is selected at 5° above the theoretical horizon.

Within Current Era (CE) – dates when Venus rises in alignments (as morning start)

- CE 19 June 2022 at 3h18 UT with elevation 6.5° very close to local horizon
- CE 23 August 2022 at 4h34 UT with elevation 6° very close to local horizon

Venus alignment appears after the sun set.

Before Current Era (BCE) – dates when Venus rises in alignments (as morning start)

- BCE 30 July 4000 at 2h18 UT
- BCE 14 October 4000 at 3h42 UT
- *BCE 16 July 6978 at 4h017 UT*

Venus alignment appears before the sun rise.

From the selected observatory place, the planet Venus is not rising above the local horizon in the orientation of "Le Ménec" stones' alignments before the Sun rises.

It should be noted that the selected observer position with azimuth 71° is identical to an observer position near the 3 stones together of the cromlech West side.
A mock-up in wood of a Π-shaped door similar to those in the Creevykeel Court Tomb could be made to assess the visibility of the rise of Venus from that door. From the previously select observer position near the 3 stones close together, Venus is aligned with the stones' alignments on BCE 9 September 4000 at 2h41 UT but with an altitude 16°15.

Nevertheless, there are two cromlechs and another observer position should be assessed near the **East cromlech**. The position selected will be between the two big stones located at GPS 47 35' 42.7'' N, and 3 04' 25.98 W. The local horizon is estimated at 5° above geographical horizon, and the eyes altitude at 18.6m (17+1.6). At this position an observer will see Venus rising on BCE 9 September 4000 at 2h18 UT with azimuth 58°33', and altitude 5°04'. It should be noted that Venus does not rise towards that direction of the sky on BCE 8 June 4000. The stones' alignments have two orientations 71° on the West side and 65° on the East side. An observer placed at the crossroad of axis 71° and 65° for BCE 8 June 4000 and 9 September 4000, will see the sun rising towards 65° just above the theoretical horizon at 0°33. This might be an explanation for changing the stones' alignments.

In CE 7 august 2022 Venus rises at 3h47 with azimuth 63°18' and altitude 5°18', and this means the rise of Venus is shifting towards East. The initial symbolism of the site might be lost for any date in the future.

The moon phase is new moon, it corresponds to the increase of kids born during the day and the fertile phases of women. The symbolism of the moon would help to rebirth during the day.

With the two cromlechs, Venus rising can be observed from the East cromlech, and the sun rising from the West cromlech. Once again, the concept of Venus rising followed by the sun is there on the site, but with a longer interval between the two rises at the scale of the alignments. Such long interval could have been useful for the Shamans to organize the procession inside the stones' alignments.

The orientation of the cromlechs could be explained by the nature. Effectively eggs shall be put with tip down for incubation, and at the end of incubation they shall be put with tip up. A ceremony related to the belief of rebirth could start in the West cromlech egg-shaped having the tip down as start of incubation, and will be completed in the East cromlech egg-shaped having the tip up as end of incubation where the birth or rebirth is expected.

It shall be reminded, although this is not related to alignments, that **Venus rises just before the Sun shortly every 8 years at the same heading when the sun is at its lowest position above the local horizon.** The following dates of occurrences are given as examples:

BCE dates: an occurrence on BCE 19 January 3999 implies the next occurrence is in 3991.
CE dates: an occurrence on CE 21 December 2017 implies the next occurrence is in 2025.
This will be recalled during the reviews of the orientation of cairns' corridor.

Megalithic people built the site to include the beliefs about Venus followed by the sun and the new moon phase. The beliefs are related to the birth and rebirth, vitalized by the energy of the sun. The new moon phase during the event would emphasize and boost the symbolism associated to birth during the day. A ritual associated to a ceremony could include a rebirth of the participants.

2.4.5 Constellations and stars – date when they rise in Carnac alignments

For the Egyptians, the first appearance of the star **Sirius** in the morning sky indicated the beginning of the inundation of the Nile. Located in Urfa Turkey, the megalithic enclosures of "**Gobekli Tepe**" are the most ancient sacred structures build with stones, known so far, dating back to the 10th or 9th millennium BCE. The possible presence of astronomical targets for these structures were analysed, and they may have been oriented, or even originally constructed, to celebrate and successively follow the appearance of a brilliant star in the southern skies: **Sirius**. (29)

The **Newgrange** cairns might have also a view on **Sirius** at particular time. (30)

Within Current Era (CE) – dates when Sirius rises in alignments
No date found

Before Current Era (BCE) – dates when Sirius rises in alignments
No date found

It is not possible to provide significant conclusions, and further investigations are required.

2.4.6 Identification of recurrent events Venus rising just before the sun

This is a very particular event occurring every 8 year, when the days are cooler and almost all the leaves have fallen from the trees. To catch such event the sun shall be in the middle of the sky at its lowest position above the local horizon. The observer shall look at the sky from its left side to the middle of the sky in order to find the following suite of celestial objects Venus, then Moon and sun. In addition, the phase of the moon shall be the new moon which is after the waning crescent. When the suite occurred including the new moon phase, at the same period in the following year when the sun is the nearest to the local horizon, Venus will be rising just followed by the sun, and the moon will be in its full moon phase. By observing the occurrence of the events, the megalithic people could notice that the suite of celestial objects triggering the event occurs near at the same period of the year than the occurrence of Venus followed by the sun in the next year.

2.4.7 Celestial objects alignment at Gavrinis

The Gravrinis structure fit with all similar cairn's constructions although stones of the corridor are fully engraved. The structure is composed of an Π-shaped entrance, and a corridor terminated by a chamber covered by a big rock. The construction date is about BCE 3500. The stone covering the squared chamber comes from a huge menhir, built about BCE 4300 where another part is also used for the roof stone of the "Table des marchands" chamber. Therefore, the passage tomb was built at a later stage compared to the quarry menhirs.

Figure 6 Gavrinis view of the squared place from the corridor.

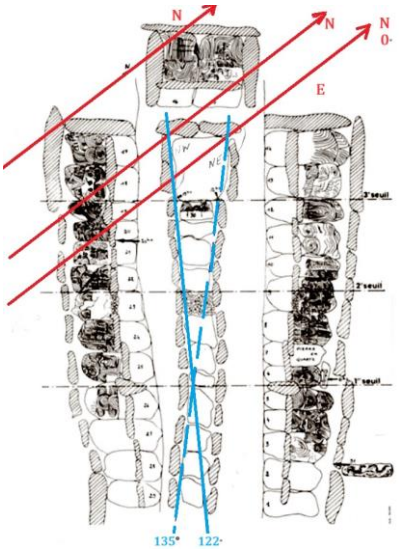


Figure 7: Gavrinis view from above and transversal with azimuths added. Figure extracted from Guillaume report (31).

The azimuths have been calculated based on paper documents. The full red lines show the orientation South to North. The full blue line is a theoretical ray of light coming from the east side

border of the entrance and through the corridor without being interrupted by any stone to the chamber on west part. The dashed blue line is a theoretical ray of light coming from the west side border of the entrance and through the corridor without being interrupted by any stone to the chamber on east part. Hence the chamber can be lighted by theoretical rays of the sun between azimuths 122° to 135°, but the roof and corridor slope of -4° will limit such view since the Sun and Venus will increase in altitude. The angle of the corridor visibility for a person sitting in the chamber at the back-end is estimated at 6°. Due to the mount located few kilometres away, the local horizon is between 1° and 2° above the geographical horizon. In order to view Venus, the observer located inside the chamber would have to move from one side to another.
The observer position in "Gavrinis" chamber is located at 47° 34' 18.89'' North, 2° 53' 54.54'' West. The eyes altitude is estimated at 24 meters.

The abbreviations used for the visibility of the celestial objects are as follows: Az means Azimuth, and Alt means Altitude.

In CE 2022:
The horizontal view from the chamber is 122° up to 135°, and the middle is 128.5°.
The Winter solstice occurs on 21 December 2022.

Sun visibility above local horizon

- 2° Az 128°34', Alt 2°03 at 8h16 UT
- 1° Az 127°05, Alt 1°05 at 8h08 UT

Venus visibility above local horizon

- 2° Az 129°09', Alt 2°02 at 9h22 UT
- 1° Az 127°40, Alt 1°04 at 9h14 UT

The moon phase is half waning crescent. The moon rises before the sun, and Venus rises afterwards.

The sun would not be visible from the chamber at 8h49 UT, and Venus at 9h52 since the azimuth is bigger than 135°. Sun and Venus rose near the middle of the corridor entrance. Venus might not be visible since the Sun rises before.

To get Venus followed by the sun, the next occurrence will be in 2025 in line with the 8 years cycle. In the previous year triggering the event, the moon phase is near new moon, but for the year of event the moon phase will be the new moon. Hence it could be concluded that in future dates the site might loss part of its symbolism.

In BCE 4000:

The horizontal view from the chamber is 122° up to 135°, and the middle is 128.5°.
The lowest position of the sun above local horizon occurs at about 19 January 3999.

Sun visibility above local horizon

- 2° Az 129°40', Alt 2°01 at 8h33 UT
- 1° Az 128°10, Alt 1°03 at 8h25 UT

Venus visibility above local horizon

- 2° Az 131°37', Alt 2°00 at 8h06 UT
- 1° Az 129°37, Alt 1°04 at 7h58 UT

The moon phase is full moon after the rise of Venus followed by the sun.

The sun would not be visible from the chamber at 9h00 UT, and Venus at 8h26 since the azimuth is bigger than 135°. Sun and Venus rose near the middle of the corridor entrance. The Sun rises just after Venus as important event in the beliefs of megalithic people, and such event occurs every 8 years.

In the context of megalithic people beliefs, the lowest position of the sun above local horizon was an important event marking the increase of sunlight and hence bringing more vitality to earth.

It was noticed on IGN geographical map that a line crossing Gavrinis centre and the "Grand-Menhir de Locmariaquer" will be oriented at about 90° meaning, with a small error, that the two sites are at the same latitude.

The Gavrinis' corridor is going up by steps from entrance to the chamber which is similar to accessing the sacred Naos in the Egyptian Temples.

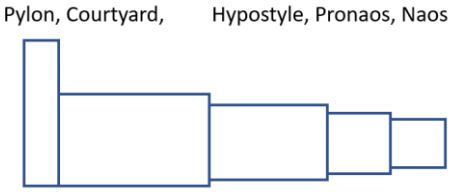


Figure 8: schematic cross-section of an Egyptian temple

Previously it was reported that engraved curves or circles on the stones are representing the water. Hence a site having such signs can be associated to the Mother Goddess which is also associated to water. The engravings would indicate that such a site would had been used for worshiping the goddess, in line with Venus Myth related to water and the megalithic people beliefs.

In addition, any corridor's alignment with the planet Venus followed by the sun would convey the Venus associated beliefs on birth and rebirth and would define the site has being a sacred place used for ceremonies. The engraved forms on the stones would help to recognize such sites.

The cairn is a ceremonial site associated to the beliefs in birth and rebirth and the worship of the Mother Goddess by megalithic peoples, in relation with the celestial objects events of Venus just followed by the sun. The moon phase at that time emphasizes and intensifies the symbolism associated to birth during the night. A ceremonial could include a simulated death in darkness of the chamber, with a rebirth under the brightness of the sun.

It does not exclude that inhabitants lost the knowledge of the symbolism of the site, and use the cairn as a tomb.

2.4.8 Celestial objects alignment at La Roche aux Fées

The structure is composed of a Π-shaped entrance, and a corridor with a chamber at the end. The passage is covered by several huge stone. The construction dates are between 3000 BCE and 2000 BCE.
The observer position in "La Roche aux Fées" chamber is located at GPS 47° 56' 11.21'' North, 1° 24' 17.62'' West.

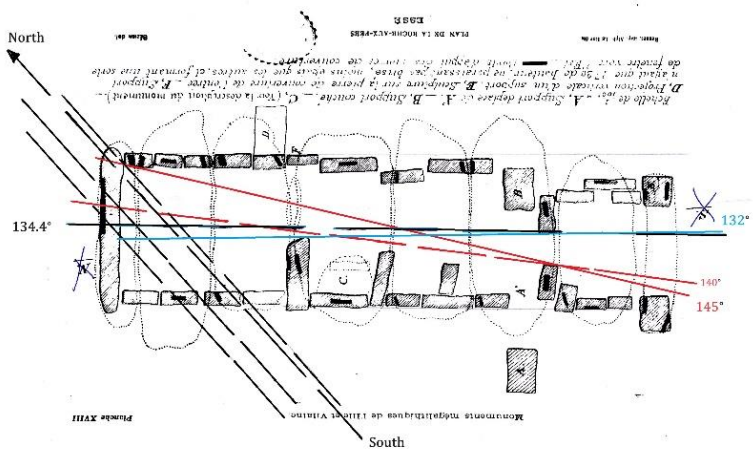


Figure 9: La Roche aux Fees view from above with azimuths added
Picture extracted from the original plan made in 1886 "Monuments mégalithique de l'Ille-et-Vilaine (France) planche XVIII". The North-South orientation is adjusted.

The azimuths have been calculated based on paper documents. The dashed black lines show the orientation South to North. The blue line is a theoretical ray of light coming from the east side border of the entrance and through the corridor without be interrupted by any stone to the chamber on west part. The red line is a theoretical ray of light coming from the west side border of the entrance and through the corridor without be interrupted by any stone to the chamber on east part. There is a dashed red line because there is a leaning stone which could obstruct the lower part of the entrance. The chamber is lighted by theoretical rays of the sun between azimuths 132° to 145°. The azimuths were calculated based on paper documents since the estimated middle axis is not available and reported as blue dashed line. The external size in length is 19.5 meters, which means an inside corridor of about 18.8 meters. The entrance has an heigh between 1 meter and 1.5 meters after removing sediments heaped up. Therefore, the angle of visibility from the chamber back-end towards the entrance would be between 3.5° to 5°, which is a limitation since the Sun and Venus will increase in altitude. The local horizon is estimated between 3° and 6°. The eyes elevation is estimated to 76 meters. In order to view Venus, the observer located inside would have to move in the chamber from one side to another.

In CE 2022:
The horizontal view from the chamber is from 132° up to 145°, with middle at 138.5°.
The Winter solstice occurs at about 21 December 2022.

<u>Sun visibility above local horizon</u>

- 3° Az 132°01', Alt 4°01 at 8h28 UT
- 6° Az 135°20, Alt 6°01 at 8h45 UT

The sun rises in the middle of the corridor with Az 138°56, and Alt 8°03 at 9h03 UT. It might not be visible due to its altitude.

<u>Venus visibility above local horizon</u>

- 3° Az 132°45', Alt 4°05 at 9h35 UT
- 6° Az 138°06, Alt 6°04 at 9h52 UT

Venus rises in the middle of the corridor with Az 138°54, and Alt 7°38 at 10h06 UT. Venus might not be visible due to its altitude.

The moon phase is a quarter of the waning crescent. The moon rises before the sun, and Venus rises afterwards.

Venus might not be visible since the Sun rises before.

To get Venus followed by the sun, the next occurrence will be in 2025 in line with the 8 years cycle. In the previous year triggering the event, the moon phase is near new moon, but for the year of event the moon phase will be the new moon. Hence it could be concluded that in future dates the site might loss part of its symbolism.

In BCE 4000:

The horizontal view from the chamber is from 132° up to 145°, with middle at 138.5°.
The lowest position of the sun above local horizon occurs at about 19 January 3999.

Sun visibility above local horizon

- 3° Az 132°08', Alt 3°21 at 8h40 UT
- 6° Az 136°37', Alt 6°01 at 9h03 UT

The sun rises in the middle of the corridor with Az 138°49, Alt 7°14 at 9h14 UT. It might not be visible due to its altitude.

Venus visibility above local horizon

- 3° Az 133°12', Alt 3°04 at 8h11 UT
- 6° Az 138°16', Alt 6°00 at 8h37 UT

Venus rises in the middle of the corridor with Az 138°51, and Alt 6°20 at 8h40 UT. Venus might not be visible due to its altitude.

The moon phase is full moon after the rise of Venus followed by the sun.

The sun would not be visible from the chamber at 9h34 UT, and Venus at 9h00 since the azimuth is bigger than 143°. Sun and Venus rose near the middle of the corridor entrance. Venus rises just followed by the Sun which fits the beliefs of megalithic people, including the moon phases.

The lowest position of the sun above the horizon is the day when the number of hours of sunlight increase then bringing more vitality to earth. The Sun rises just after Venus as important event in the beliefs of megalithic people, and such event occurs every 8 years.

The passage tomb might be linked to the beliefs in birth and rebirth and the worship of the Mother Goddess by megalithic peoples in relation with the celestial objects events of Venus just followed by the sun. The moon phase at that time emphasizes and intensifies the symbolism associated to birth during the night. A ceremonial could include a simulated death in darkness of the chamber, with a rebirth under the brightness of the sun. This assumption about a ceremonial place is valid under the condition that the passage tomb is not covered with soil.

2.4.9 Celestial objects alignment at Newgrange

Newgrange (Irland) construction is dated about 3150 BCE. It consists of an Π-shaped entrance, a long sinusoid corridor terminated by a chamber with three smaller alcoves. The chamber differs from other cairns since it has a big roof conic-shaped. A 3D model of the corridor reveals that several stones near the chambers have tilted reducing the view from the chamber towards the entrance. Looking the 3D model, the very tilted stones can be identified: 5 stones on West side and 2 stones son the East side. These inclinations can be excluded from the original design, for two reasons: 1) they do not follow the design of the beginning of the corridor and other megalithic constructions 2) an inclination of the vertical stones creates lateral forces that would have led to immediate collapse at the time of assembly. The most likely scenario is the unstable ground, which has led to the tilt of the stones amplified by the vertical weight. This could explain the need of an opening above the entrance with quartz which might play the role of a mirror (to be investigated).
https://sketchfab.com/3d-models/newgrange-co-meath-8fd7eb2762304af88b7745b98924b4e9

The observer position in "Newgrange" chamber is located at GP 53° 41' 40.97 N and 6° 28' 31.98 W. The azimuths have been calculated based on paper documents, and taking into account the tilted stones the chamber should have been lighted by theoretical rays of the sun between azimuths 132° to 137°. The roof and long corridor slope -3° will limit such view since the Sun and Venus will increase in altitude. The local horizon is estimated near 1° above geographical horizon. The eyes altitude is estimated at 50 meters in the chamber. The lower view is a little obstructed by the stone laid down near the entrance, although the stone might have been placed later in that position since such design is not found in other cairns.

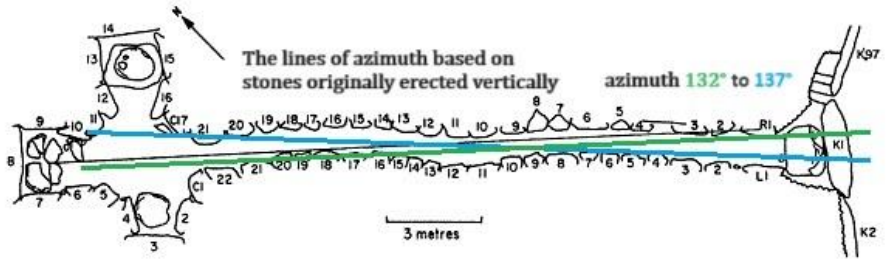


Figure 10: Newgrange view from above with azimuths added

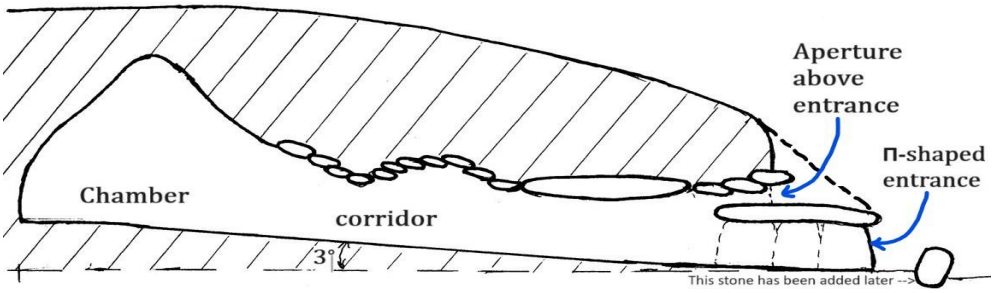


Figure 11: Newgrange transversal view towards East

In CE 2022:
The horizontal view from the chamber is from 132° to 137°., with middle at 134.5°.
The Winter solstice occurs at about 21 December 2022.

Sun visibility above local horizon

- min Az 133°18', Alt 0°59 at 8h54 UT
- max Az 136°59, Alt 2°43 at 9h12 UT
- Middle Az 134°56, Alt 1°46 at 9h02 UT

Venus visibility above local horizon

- min Az 133°52', Alt 0°54 at 10h00 UT
- max Az 136°55, Alt 2°19 at 10h15 UT

- Middle Az 134°53, Alt 1°22 at 10h05 UT

The moon phase is a quarter of waning crescent. The moon rises before the sun, and Venus rises afterwards. The sun would not be visible from the chamber at 9h12 UT, and Venus at 10h15 since the azimuth is bigger than 137°. Sun and Venus rose near the middle of the corridor entrance. Venus might not be visible since the Sun rises before.

To get Venus followed by the sun, the next occurrence will be in 2025 in line with the 8 years cycle. In the previous year triggering the event, the moon phase is near new moon, but for the year of event the moon phase will be the new moon. Hence it could be concluded that in future dates the site might loss part of its symbolism.

In BCE 4000:

The horizontal view from the chamber is from 132° to 137°. with middle at 134.5°.
The lowest position of the sun above the local horizon occurs at about 19 January 3999.

Sun visibility above local horizon

- min Az 134°39', Alt 0°57 at 9h13 UT
- max Az 136°53', Alt 1°59 at 9h24 UT
- Middle Az 134°51, Alt 1°03 at 9h14 UT

Venus visibility above local horizon

- min Az 136°17', Alt 0°52 at 8h47 UT
- max Az 136°53', Alt 1°09 at 8h50 UT
- Middle not applicable

The moon phase is full moon after the rise of Venus just followed by the sun. The Sun rises after Venus and that fit the beliefs of megalithic people.

The sun would not be visible from the chamber at 9h24 UT, and Venus at 8h50 since the azimuth is bigger than 137°. The sun near the middle of the corridor entrance and Venus is not so far.
On BCE 19 January 4995, Venus and sun will rise in the middle of the corridor: Venus at azimuth 134°55 and elevation 0°59 at 8h34 UT, the sun at azimuth 134°16 and elevation 0°55 at 9h10 UT.

The lowest position of the sun above the local horizon is the day when the number of hours of sunlight increase then bringing more vitality to earth. The Sun rises just after Venus as important event in the beliefs of megalithic people, and such event occurs every 8 years[10].

The cairn is a ceremonial place for the beliefs in birth and rebirth and the worship of the Mother Goddess by megalithic peoples, in relation with the celestial objects events of Venus just followed by the sun. The moon phase at that time emphasizes and intensifies the symbolism associated to birth during the night. A ceremonial could include a simulated death in darkness of the chamber, with a rebirth under the brightness of the sun.

[10] The position of Venus occurring every 8 years in the sky, as well as the event when sun is as its maximum and minimum position of above local horizon every year, will change due to the wobble of the earth' axe, and these shifts shall be kept in mind.

2.4.10 Celestial objects alignment at Stonehenge

The construction of Stonehenge with stones placed in circle was built around 3000 BCE. The details of the layout can be consulted at the provided link (32).

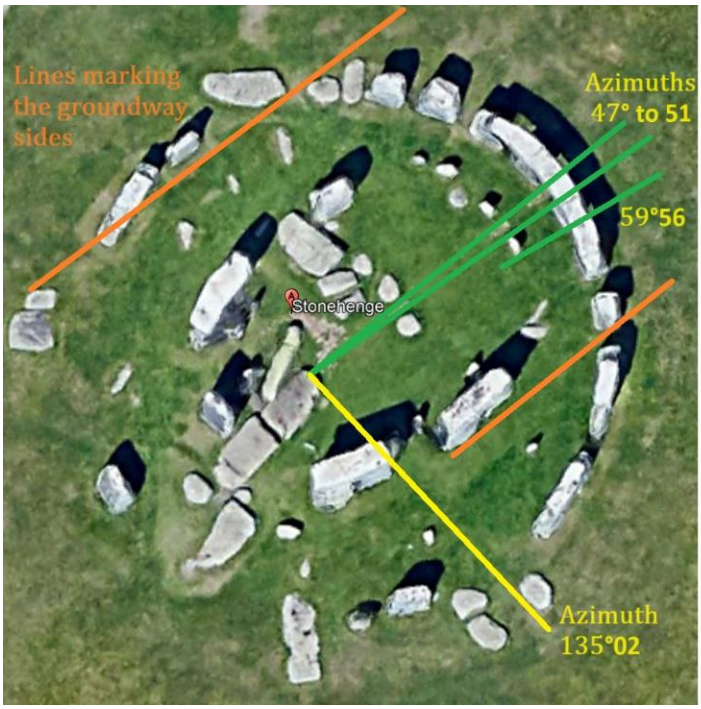


Figure 12: Stonehenge view from with azimuths added

The observer position is located in front of the alter at GPS 51° 10' 43.94'' N, 1° 49' 34.34'' W.
The azimuths have been calculated based on paper documents. The sun rays could pass between the sarsens' stones from azimuth 47° to 51°, and the middle axis of the groundway has the azimuth 50°. The eyes altitude is set at 103.6 meters. The slope of the ground is -7° and will provide a good view to towards North-East.

The year BCE 2995 is select to fit with the visibility of the rise of Venus and it belongs to the 8 years cycle when Venus comes back at the same position, which is not the case in BCE 3000.

On BCE 2995 the highest position above the local horizon would be on 18 July.
With a local horizon at 0° the sun will light the altar centre at 3h43 UT with its azimuth at 48°43 and its elevation 0°04'. The sun will be in the middle axis of entrance path at 3h48.
The Sun could also light the alter centre at 4:42 UT with azimuth 59°56 and elevation will be 7°08.

On BCE 2995 the lowest position of the sun above the local horizon would be on 12 January.
Venus will rise just before the sun at 8h23 with azimuth 135°02 with altitude 02°07. The axe of visibility is located as follows: count 12 sarsens' stones still standing from the North, after add one additional missing Sarsens' and on the South of that missing stone it is possible to observe Venus rising just followed by the sun. The moon phase will be in the first quarter towards full moon. The phase of the moon, of the previous year triggering the event, is close to new moon.

In order to get a similar celestial objects configuration, like at "Gavrinis" and "Newgrange", it is necessary to go back to BCE 12 January 3027.

On the 21 June 2022, the sun will light at 3h57 UT with azimuth 50°17 and its altitude 0°18, but the moon is rose and its phase is third quarter. Venus rises after the sun, and Venus will be difficult to see.
On the 21 June 2025, the sun will light at 3h55 UT with azimuth 49°53 and its altitude 0°05, but the moon is rose and its phase is waning crescent. Venus rises after the sun. The initial symbolism of the site might be lost for any date in the future.

At Stonehenge the sun can pass through between sarsen's stones on the day when the sun will be at its highest position above the local horizon. To get the symbolism of Venus just followed by the sun, it is necessary to go back in BCE 3027 which is before the considered site was built, but the phase of the moon is full moon phase which might not fit with an open-air site. Further analysis will be required to assess the alignment with Venus or others celestial objects.

2.4.11 Celestial objects alignment at Malta Ggantija temple

For further details, Evans made a description of the site in his book (33).
The observer position in "Ggantija" is located at GPS 36° 02' 50.02'' N and 14° 16' 08.29 E, in the bulge aligned with the corridor of the left temple. The observer eyes altitude is 129.5 meters.

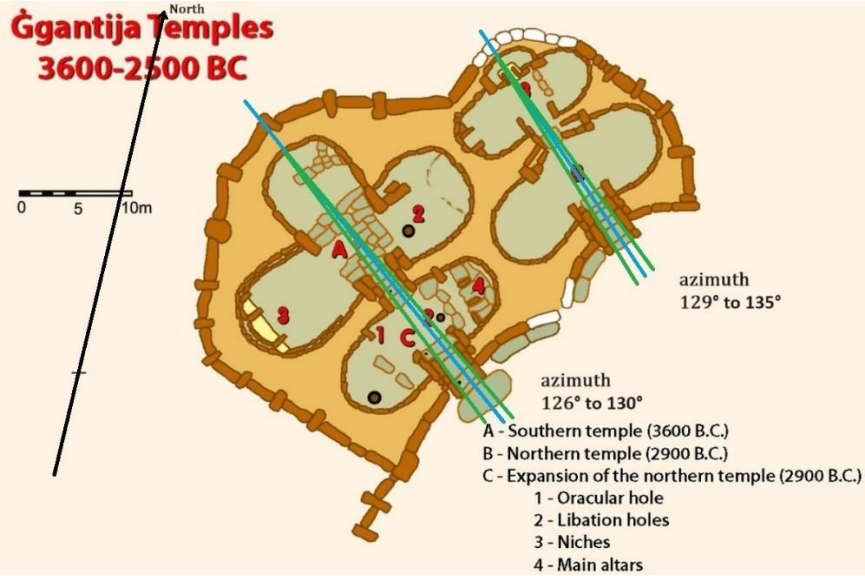


Figure 13: Schematic view of Ggantija temple from above extracted from Wikipedia with North and azimuths added

The azimuths have been calculated based on paper documents. At "Ggantiga" West temple (Malta), an observatory placed at the back of the latest **egg-shaped** bulges and in the middle of the corridor axis, will have a view between azimuth 126° to 130°. The corridor slop was difficult to estimate and will be considered inferior to -1°. But in the corridor axis outside the temple, there is a small mount which will implies a local horizon estimated between 4° and 6°. If the observer moves on the sides, the visibility becomes 120° to 137°. The following azimuths are calculated when the azimuth is superior or equal to 126°, and the altitude superior to 4°.

In BCE 3506, the lowest sun position above local horizon is at BCE 16 January 3505. BCE 3505 is a year where Venus is just followed by the sun.

Venus is visible at 6h29 UT with azimuth 126°01' and altitude 5°28'.
Sun is visible at 7h08 UT with azimuth 126°08' and altitude 6°34'.

The moon phase is half waxing moon, going towards full moon. The full moon would be on BCE 19 January 3505. In year 3506 which is triggering the event in the next year, the phase of the moon is new moon.

In BCE 4000, the lowest position of the sun above the local horizon is at BCE 19 January 3999. BCE 3999 is a year where Venus is followed by the sun.
Venus is visible at 6h29 UT with azimuth 126°01' and altitude 5°45'.
Sun is visible at 7h07 UT with azimuth 126°02' and altitude 6°29'.
The moon rises after the disappearance of Venus and the sun, and its phase is full moon.
In year 4000 which is triggering the event for the next year, the phase of the moon was new moon.

In 3505 and 3999 Venus appears in the corridor axis followed by the Sun, and fits the megalithic people beliefs.

In CE 2022, the winter solstice is at CE 21 December 2022
Sun is visible at 6h57 UT with azimuth 126°02' and altitude 7°21'.
Venus is visible at 8h00 UT with azimuth 126°08' and altitude 6°57'.
The moon is close to new moon.

Gantija is a double temple. In the East temple an observatory placed at the back of the latest **egg-**shaped bulges and in the middle of the corridor axis, will have a view between azimuth 129° to 135°. If the observer moves on the sides, the visibility becomes 128° to 137°. That temple will provide a little bit more visibility but the celestial objects will have higher altitudes.

To get Venus followed by the sun, the next occurrence will be in 2025 in line with the 8 years cycle. In the previous year triggering the event, the moon phase is near new moon, but for the year of event the moon phase will be the new moon. Hence it could be concluded that in future dates the site might loss part of its symbolism.

On the sites of Malta temples, no trace of roof has been found, it is likelihood they had used removable roof made with skins with a timber frame. In sunny places it is near impossible to stay permanently under the sun, and shade is needed which would lead to find simple roofs for the worship areas e.g. made with skins.

Ggantija temple has a corridor alignment related to the beliefs in birth, rebirth and the worship of the Mother Goddess by megalithic people, in relation with the celestial objects events of Venus just followed by the sun. The moon phase at that time emphasizes and intensifies the symbolism associated to birth during the night. A ceremonial could include a simulated death in darkness of the chamber, with a rebirth under the brightness of the sun.

2.4.12 Conclusion on orientations towards celestial objects

The following conclusions refer to orientations towards celestial objects in each of the studied areas:

Carnac "Le Ménec" site:

The west side of "le Ménec" alignments points towards the rise of the sun at time of collecting crops which is similar to a rebirth for the plants. This event is synchronous with

the rise of Venus before the sun, and the new moon phase. The moon phase emphasizes and intensifies the symbolism associated to birth during the day. This event repeats every 8 years.

The beliefs of Megalithic people in rebirth of the ancestors' spirits are integrated in stones' alignments and cromlechs laid down over a large and adjustable area which will be visible far away.

The alignments would include:

- **the concept of Mother Goddess womb as egg-shaped cromlech,**
- **a door which is not visible nowadays, near the 3 big stones, playing also the role of corridor as birth canal,**
- **a Π-shaped door symbolizing the triad as the outside starting point of flow of water during the birthhood, which will cover and encompass the alignments of stones representing the ancestors' spirits waiting for rebirth,**
- **stones having a conical top symbolizing the birth and rebirth,**
- **the orientations towards the sun at particular events**
    - **representing the crops maturity, as rebirth for the plants,**
    - **being at its maximum power of energy and vitality for the rebirth,**

The site is of multiple purposes:

- **ceremonies to honour and to contact their ancestors' spirits, and to help them in the rebirth process,**
- **ceremonies for participants involved a ritual simulating their rebirths.**

The cairns:

Cairns can be found surrounded by tombs or isolated. All temples studied have corridors aligned towards the rise of Venus just followed by the sun, and the moon being in its full moon phase. The moon phase emphasizes and intensifies the symbolism associated to birth during the night. The event occurs during colder season when the sun achieves its lowest position above the local horizon, nowadays similar to winter solstice. This event repeats itself every 8 years, and it also happens at time of the year when luminosity overwhelms darkness. A ceremony could simulate a death in the darkness of the chamber, followed by the exit through the corridor to the brightness of the sun, similar to a birth or like in this case a rebirth into the light.

The cairns would include:

- **a chamber as the Mother Goddess womb,**
- **a corridor as birth canal,**

- **an Π-shaped door, mainly made of 3 stones representing the triad, as an outside starting point of flow of water,**

- **a conical outer shape, symbolising birth and rebirth,**

- **corridors oriented towards Venus rising followed by the sun with the full moon phase**

The cairns are sites with multiple purposes:

- **holding ceremonies to contact ancestors' spirits and to worship the Goddess Mother,**

- **holding ceremonies for participants involved in a ritual simulating rebirth into the light.**

It can be concluded that the megalithic constructions incorporate beliefs related to ancestors' spirits, Mother Goddess and rebirth.

2.5 Shamans

This chapter provides hints on Shaman activities and possible ceremony lead by Shaman.

2.5.1 Shamans and ceremonies

Athanassakis described a transfer of beliefs from Shamans to Greeks, by pointing out similarities between events in the "odyssey of Ulysses" and the symbols, practices and cosmology of Siberian's shamans (34).

Shamans have a role in the social organization of the megalithic tribe, or clan during that epoch.

McKay and et al. reported in the book "Understanding World Societies" the following explanation (35):

> In the Palaeolithic era, social hierarchy was determined by multiple factors such as position in the family, gender, age, and favourable personality traits. Titles were given to establish positions within each band. Titles could include, mother, father, husband, wife, brother, sister, child, etc. The higher the position in the band came power over others.

Lewis-Williams confirmed that in Upper Palaeolithic cave art have had a shamanistic purpose (36).

Within the tribe, or clan, certain members were capable ofhallucinatory states and visionary experiences, and were assigned the title, or role, of Shaman.

The activities performed by the Shamans are described in chapter "Activities performed by a Shaman". One of the main roles of the Shamans were to perform ceremonies in places considered sacred. For example, in Mesoamerica those were held up on the temple itself or near the temple. It is also reported that Shamans consumed hallucinogens before the ceremony to enter in the altered states of consciousness. Additional details on Such state are provided in chapter "Understanding scientifically the modified conscience state of Shaman". Being at a sacred place and consuming hallucinogens the Shaman would have been in a state to contact spirits. The places

selected by the Shamans for hosting ceremonies are considered sacred by the symbolism. in regard to the impact on brain of areas having low earth magnetic field intensity it could be speculate that such areas belong to the group of sacred places. The later would have been created by the stones' alignments and the geology of the site.

Lewis-Williams described activities of the Shamans which are fitting with the study: communication with spirits, communication with the gods, and participating ceremonies of symbolic death (37).

A ceremonial at Carnac could be depicted as follows:

- Participants assembled in the cromlech West side, as the Divine womb, before the rise of the sun and Venus
- At the time the moon is in its new moon phase favouriting the birth during the day light.
- The Shaman might have consumed drugs beforehand, then moved to a place with low earth magnetic intensity having additional effect on the human brain.
- The Shaman starts the ceremony to get protection from ancestor's spirit, and to get inspiration from the Mother Goddess.
- The Shaman guides the group of people via the Π-shaped door, playing the role of a corridor, near the 3 standing stones, representing the birth canal and the starting point of the flow of water coming from Mother Goddess womb
- The Shaman then also led the group of people through the stones' alignments, which are covered by the symbolism of the birth flow of water, facing to the sun rising and inside path where the earth magnetic field intensity is low.
- The ceremony is accompanied with music and songs
- The Shaman ends the ceremony inside the next cromlech at the East side. The ceremony being an external representation of megalithic people beliefs, and would consist of helping the rebirth or reincarnation of their ancestors' spirits with support of the Mother Goddess. This ceremony is not excluding being a ritual of the symbolic rebirth of the participants.

A ceremonial inside cairn could be depicted as follows:

- few participants gather in the chamber with the Shaman during the night
- the Shaman held a simulated death inside the chamber, as a rebirth in the womb
- the initiation ceremony includes contacts and communion with spirits and the Mother goddess
- After the Shaman led the participants through the corridor, as the birth canal
- the Shaman and participants exit at time Venus rose into the sky followed by the sun when the brightness overwhelms the darkness. In a similar way they came from the darkness of the womb to live in the brightness of the sun. A kind of birth or rebirth to the life.
- when the sun is rose the ceremony is ended

2.5.2 Conclusion on Shamans activities at Carnac and cairns

It is likelihood that Shamans led ceremonies at Carnac “Le Ménec” followed by processions. Those were performed at the time of Venus rising just before the sun and in the course of the new moon phase.
Such ceremony could represent their blessings to their ancestors by helping their spirits in the process of rebirth, similar nowadays to the ceremonies at the beginning of November in all Europe. It might also be a ritual for candidates involved in simulating their rebirth.

The Shamans also led ceremonies inside cairns as temples, to worship the Mother goddess, to contact the ancestors’ spirits and to simulate a kind of rebirth for participants at the time of Venus rising just before the sun and in the course of the full moon phase.

2.6 Earth magnetic field survey at Carnac “Le Ménec”

This chapters will describe the rational to perform earth magnetic field survey, and a conclusion.

2.6.1 Earth magnetic field survey rational

A first hypothesis is the inheritance of knowledge from the megalithic civilization by the Celts civilization. It is reported that Celts Druids were meeting at sacred groves, sacred place of oaks and near sacred water such as wells and springs, although there is no exact location recorded.
Collins dictionary defines grove as “a small wood or group of trees without undergrowth”, and Koch provided information about the groves (38).

A second hypothesis is the existence of particular geological places with low earth magnetic field intensity natural of handmade, which would act on brain during movements. Such places would have been considered sacred places in regards to the end result on the brain. A study describing the effect of low earth magnetic field intensity on brain is depicted in chapter “Effects of earth magnetic fields on human brain”.

A third hypothesis is the use of the perturbed earth magnetic field by the Shamans during ceremonies. Such perturbations in forms of places or bands with low earth magnetic field intensity would have been generated also by the stones’ alignments.

Therefore, a survey of the earth magnetic field intensity over selected areas at “Le Ménec” alignments was performed to identify areas or bands having such particularity. The survey is described in chapter 4.

2.6.2 Conclusion on low earth magnetic field intensity areas at Carnac “Le Ménec”

Figure 14: overall view of lower vertical earth magnetic intensity lines (orange colour)

The above figure shows the bands of low vertical earth magnetic field intensity reported as lines in orange colour. To avoid overlaying the blue lines (measures lines), the orange lines have been drawn close to the blue lines. A bigger figure is provided in the chapter “Overall view of lower earth magnetic field bands”.

On the figure the lines which are close to the north side of the alignments correspond to low earth magnetic field and technical explanations are provided in chapter “Change of vertical intensity of Earth Magnetic Field when crossing a stone with paramagnetic components like Carnac granite stones”.

Bands of lower value can be noticed in between the alignments up to the cromlech and the West side of the alignments.

Having no writing from megalithic epoch, it is impossible to know whether megalithic people know the method to create bands of lower earth magnetic field intensity.

It has been measured permanent lower earth magnetic field intensity bands inside the cromlech and between the alignments, and knowing nowadays the effect on human brain, hence it could be concluded that such bands were the preferred paths for the Shaman to perform and to lead ceremonies for people having the same beliefs.

Where stones are missing in alignments the low earth magnetic field intensity is still present, this would raise the question of long-distance West-East perturbation by alignments of stones or the possible placement of stones on particular earth magnetic path?

Further investigation on the presence of buried geological formations can also affect local magnetic readings and would need to be further studied.

2.7 Final conclusion on stones' alignments, cromlechs and cairns purpose

This study deciphers certain beliefs of the megalithic peoples inscribed in their constructions.

Regarding the stones' alignments at Carnac "Le Ménec":

- **The heading points to the sun rising during two events of life and nature. First of which is encompassing in particular mating, and cultivated plants growing-fast, and as second encompassing in particular crops achieving maturity**

- **The event of crops achieving maturity is the preferred event due to the strong symbolism of the rebirth of plants associated at the same time with the abundance of energy and vitality from the sun.**

- **The stones alignments are facing, every 8 years, a sequence of celestial objects being Venus rising followed by the sun and at the same time the new moon phase emphasising the birth during the day**

- **The site was used periodically for ceremonies led by Shamans, to honour ancestors, to communicate with ancestors' spirits, to facilitate ancestors' spirits rebirth, to worship Mother Goddess and likely be the place of rituals symbolizing the rebirth of the participants**

- **The orientation is not pointing to the sun at solstices and equinoxes, or similar positions**

- **There are bands of lower earth magnetic field intensity which could have been used by the Shamans during their ceremonies**

Regarding the cairns:

- **Cairns are temples holding ceremonies to honour ancestors' spirits, to communicate with ancestors' spirits, to worship Mother Goddess and likely be the place of rituals with participants linked to the symbolism of rebirth,**

- **Cairns corridors are oriented to a sequence, happening every 8 years, of celestial objects to a being Venus rising just followed by the sun and at the same time the full moon phase emphasising the birth during the night,**

- **For cairns, the sequence of celestial objects occurs at the colder season when the sun is at its lowest position above the local horizon, which is similar to the winter solstice where the brightness will overwhelm the darkness. A ceremony with participants could simulate a symbolic death followed by the rebirth into the light.**

Regarding cromlechs:

- **Those having an egg-shaped form would symbolically represent the Mother Goddess womb, and would be included into the ceremonies led by Shamans.**

- **Those having a circular form would represent:**
    - **with buried people: a mark to indicate the buried place and representing ancestors' spirits,**
    - **without buried people: a place for ceremonies led by Shamans to get protection from ancestors' spirits, and to communicate with them**

Hence stones' alignments and cromlechs at Carnac "Le Ménec", as well as cairns, are places where ceremonies were held, which were associated with a particular configuration of celestial objects representing the megalithic people beliefs and also corresponding to major events in life and nature.

Like at Stonehenge, those sites can be considered as ceremonial, astronomical observatory and calendar places. A common symbolism is conveyed by all analysed sites, which are related to ancestors' spirits, Mother Goddess and rebirth.

Megalithic people hard coded their beliefs in stones' constructions to honour and to communicate with ancestors' spirits, to help ancestors' spirits to rebirth, to worship the Mother Goddess and also to simulate their own rebirth through a ritual. All such beliefs are included in the beautiful and impressive stones' alignments and cairns, which are visible from far away. Because their beliefs were built with stones, they withstood the ravages of time and were passed on as a legacy to future civilizations.

3 Earth magnetic field intensity measures at Carnac site "Le Ménec"

This chapter describes the measures made.

3.1 Recording and processing of earth magnetic field intensity at Carnac site "Le Ménec"

A survey on the West side of the alignment at "le Ménec" was performed utilizing a probe recording the vertical earth magnetic intensity. The recorded measures were processed revealing bands of lower vertical earth magnetic intensity going towards the end of alignments and the West cromlech, and this will be described in details.

Concerning the stones at "Le Ménec" they are about 1/10 of their height in the ground, and this might be due to the granitic ground (rocky ground) and the wish to build such alignments as quicker as possible. Over a long period of time this leads to stability problem and unfortunately some stones are falling and were easy to remove for others constructions.

The following zones were selected based on the time available, and in the study zone 4 is not used.

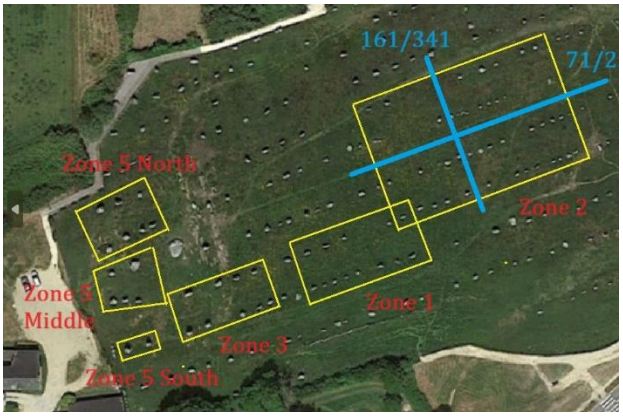


Figure 15: selected areas (in yellow) of the Carnac's alignments at "Le Ménec"

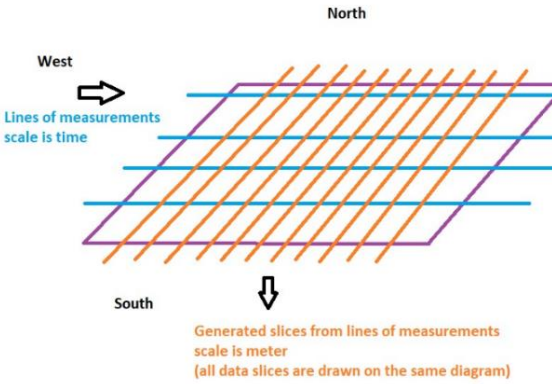


Figure 16: measurements lines (in blue colour) and generated lines (slice viewing in orange colour)

The vertical earth magnetic field was recorded by lines from North to South and each line from West to East scaled on time, represented on the right figure as horizontal blue colour lines, parallel to alignments with heading to East 71° geographical. The measurements West to East minimize the horizontal component of the earth magnetic field, and provides the best measurements with the equipment selected. The orientation of measure 71° is not perpendicular to the earth magnetic field although it does not have noticeable impacts on the measures. The magnetic field sensor was near perpendicular to ground at about 70 cm in average above the ground. On each line a measure was taken every 4 to 5 cm which is every 1/10 of second based on my walking speed. The next line of measurements was taken every time 1-meter, and few cases at 2 metres or more, south of the previous line, and the details are in chapter Annexes "Description of lines of measurement per zone".

To identify any low earth magnetic field pattern, the West to East recorded measures, scaled on time, were converted in measurements lines north to south, like slices, scaled with the line number of each measure. The conversion takes a measurement in each line at the same time and create a new data line like a slice giving a view from North to South of the measures looking at towards East. It is expected that small differences in initiating the recording data occurred at the start of each line of measure. Hence during conversion in slices some curves can be shifted and that was taken into account in the interpretation. The details of the shifts are explained in chapter "Example of time shift in measures". All lines corresponding to low earth electromagnetic field will be drawn with orange colour on the diagrams. The term band of lower magnetic field will be used because measures are taken every 1 meter in average, and the earth magnetic field intensity is considered equal on each side of the drawn line for some centimetres.

For the survey, the references on the vertical earth magnetic field values for the week of the 11 may 2022 were extracted from the web site: "*http://www.geomag.bgs.ac.uk/data_service/models_compass/igrf_calc.html*". The vertical earth magnetic field at Carnac during that week was between 42420 and 42421 nT and the inclination was 62.9°. The value **42420 nT**[11] will be used on the figures as a benchmark line in blue colour.

The vertical magnetic field intensity recorded on site will be compared against the average vertical magnetic field intensity known for the week of the survey. The vertical magnetic field intensity difference between the north and south of France will be used. For that week in May 2022, the vertical earth magnetic field difference between France south at south of Cerbère is 39187 nT, and France north at south of Uxem is 44784 nT, was 5597 nT for about 940 km. Therefore, any change in

[11] nT is nano Tesla

vertical earth magnetic field near 2/3 of **5597 nT** will be considered which is 3700 nT. During the test conducted at Caltec the generated magnetic field intensity was 5471 nT less that the local earth magnetic field intensity.

Notes: In the present study, it is imperative to understand the scales employed in the figures depicting the slice views. Specifically, the vertical scale of these figures is represented in units of nano Tesla (nT), while the horizontal scale corresponds to the line number of the measurements. The slice view provides data in a North to South orientation, directed towards the East. In instances where the figure needs to be divided, the splitting commences from the western side of the zone. Moreover, the measurement lines commence from number 1 from North towards South.

3.1.1 Zone 1 survey

Size of the zone: 35.8 meters West-East, and 22 meters North-South
Number of lines of measures: 20 with intervals of 1 metre (few cases at 2 meters), and includes lines close to the alignments (see figures below).

Figure 17: zone 1 view towards West

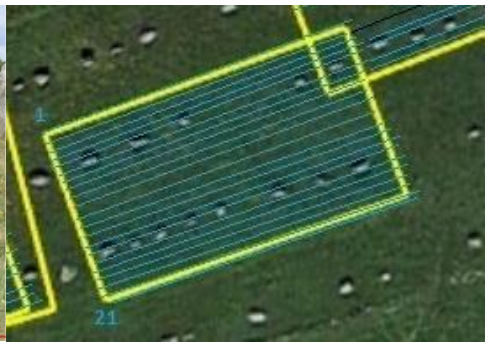


Figure 18: zone 1 lines of vertical electromagnetic field measures

The figures below correspond to magnetic field value extracted from the lines of measures to obtain a slice view North to South. In some cases, the diagram is split to interpret each part of the zone.

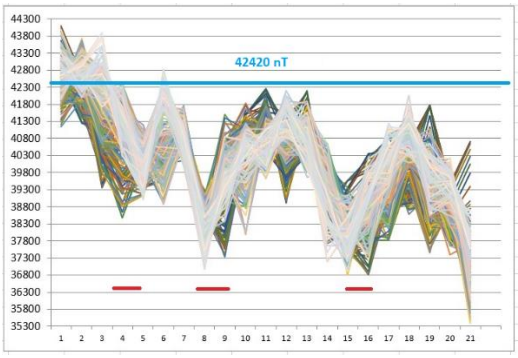


Figure 19: zone 1 slice view 1rst half

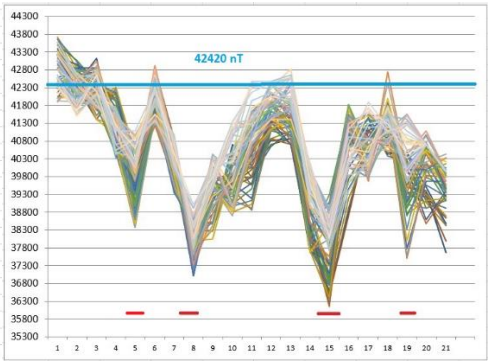


Figure 20: zone 1 slice view 2nd half

On the figures above 4 bands of lower vertical earth electromagnetic field values are noticeable.
On the right figure (2nd half of the zone) the bands are indicated by lines 5, 8 ,15 and 19.
On the left figure (first half of the zone) the bands are indicated by lines 4 & 5 (5 used), 8 & 9 (8 used), 15 & 16 (15 is used) and line 19 is also acceptable.
The difference in nT compared to site benchmark 42420 nT is within -3500 nT to -6000 nT which is relevant (difference of **3700 nT** is the benchmark level).
Therefore the 4 bands of lower vertical magnetic field will be reported as lines on the overall figure.

3.1.2 Zone 2 survey

Size of the zone: 58 meters West-East, and 38 meters North-South
Number of lines of measures: 22 with intervals of 1 metre (some cases with more than 2 meters), and includes lines close to the alignments. The figure below shows 21 lines which does not correspond to 21 meters, since 17 metres have to be added [about 4.5 meters between line 1 and line 2, about 7 meters between line 2 and line 3, about 5.5 metres between line 3 and line 4].

Figure 21: zone 2 North part view towards East

Figure 22: zone 2 South part view towards East

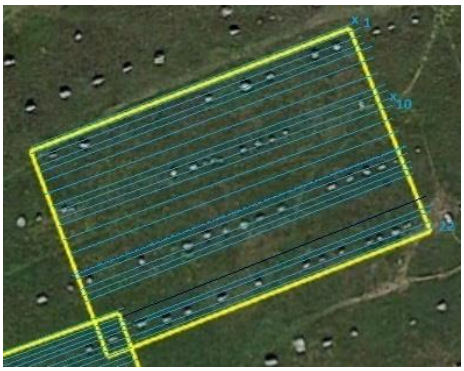


Figure 23: zone 2 lines of vertical electromagnetic field measures

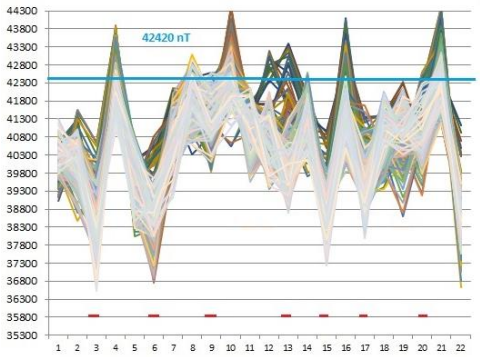


Figure 24: zone 2 slice view half

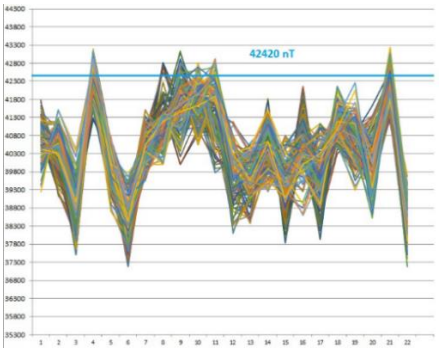


Figure 25: zone 2 slice view one quarter after West side half

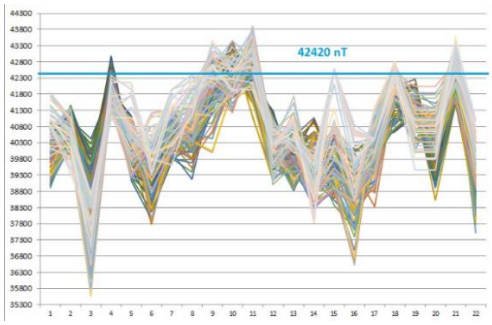


Figure 26: zone 2 slice view last quarter

To understand the vertical earth magnetic field values in that zone it was necessary to split in 3 figures. The figure ”Zone 2 slice view half” is the West part and half of the zone, figure “zone 2 slice view one quarter after West side half” is the quarter after towards east, and the figure “zone 2 slice view last quarter” is the last quarter.
The missing stones or stones in the ground seem to create perturbations in measures, which are noticed by lines not fitting with the ones in light-grey (lines superposed).

From all the figures above 7 bands of lower vertical earth magnetic field values are noticeable. On all figures the bands are indicated by lines 3, 6, 9, 13, 15, 17, 20.
The difference in nT compared to site benchmark 42420 nT is within -3500 nT to -5500 nT which is relevant (difference of **3700 nT** is the benchmark level).
Therefore the 7 bands of lower vertical magnetic field will be reported as lines on the overall figure.

A phenomenon shall be recorded here: in the row area without stone (red line) there is still low magnetic field. **An observed phenomenon is noteworthy in this context: within the row area lacking stones (indicated by the red line), there remains a persistently low magnetic field. This observation suggests two possible explanations: either the alignment of stones significantly perturbs the Earth's magnetic field over a considerable west-to-east distance, or the stones are intentionally placed in regions already characterized by low Earth magnetic values. Further investigation is required to validate either of these possibilities.**

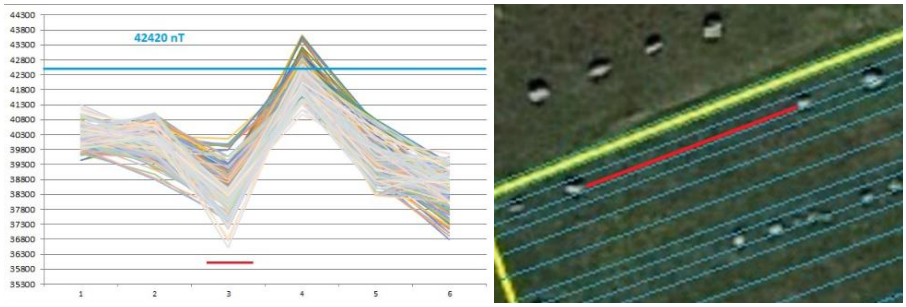


Figure 27: Zone 2 half west part, first row with missing stones, continuation of low earth magnetic value

3.1.3 Zone 3 survey

Size of the zone: 30 meters West-East, and 16 meters North-South
Number of lines of measures: 10 with intervals of 1 metre (few cases at 2 meters), and includes lines close to the alignments (see figure below).

Figure 28: zone 3 view towards West

Figure 29: zone 3 lines of measures

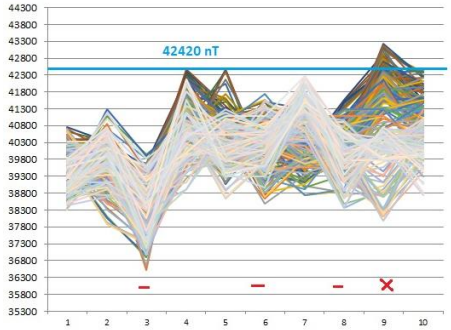


Figure 30: zone 3 slice view full

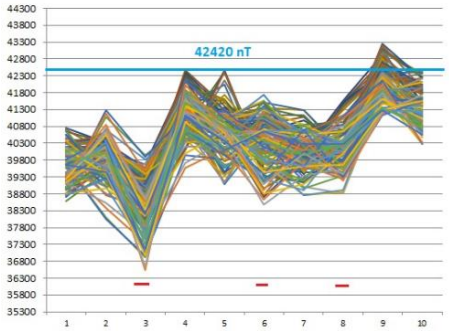


Figure 31: zone 3 slice view half West

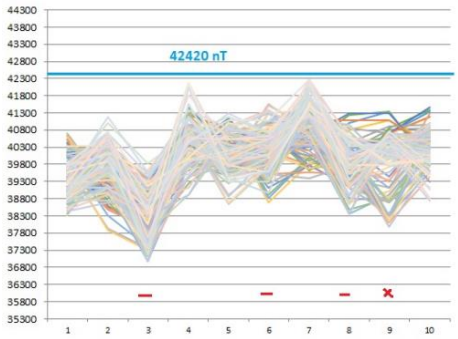


Figure 32: zone 3 slice view half East

On the figure above pattern of 3 bands of lower vertical earth magnetic field values are noticeable.
On the Figure "zone 3 slice view half East" the bands are indicated by lines 3, 6, 8.
After analysis it has been found that the measures of 9 have to be excluded. The missing stones of south row created perturbations in measures between the 2nd and 3rd stone from west (lower value in line 9), which is not the case of the north row.
The difference in nT compared to site benchmark 42420 nT is within -4000 nT to -6000 nT which is relevant (difference of **3700 nT** is the benchmark level).
Therefore the 3 bands of lower magnetic field will be reported as lines on the overall figure.
The line 10 does not correspond to 10 meters, since 6 metres have to be added between the alignments 4 and 7 see figure "zone 3 lines of measures").
For the right part of the figure, the earth magnetic field pattern is not similar to other measurements, which might be due to stones above the ground.

3.1.4 Zone 5 survey

Size of the zone: 14.5 meters West-East, and 41.5 meters North-South
Number of lines of measures: 25 with intervals of 1 metre (some cases more than 2 meters), and includes lines close to the alignments (see figure below).

Figure 33: zones 5 North, Middle and South lines of measures

It was not possible to identify exactly the lower bands on the figure including all lines of measures in zone 5 due to the different orientations of measure, therefore figures will be shown per sub zones.
Zone 5 has differences to be noted: the last stones are not aligned, and a big flat stone lay down on the east side. Zone 5 might contain stone changes and details are in chapter Annexes "Le Ménec" cromlech layout.

<u>Zone 5 North</u>

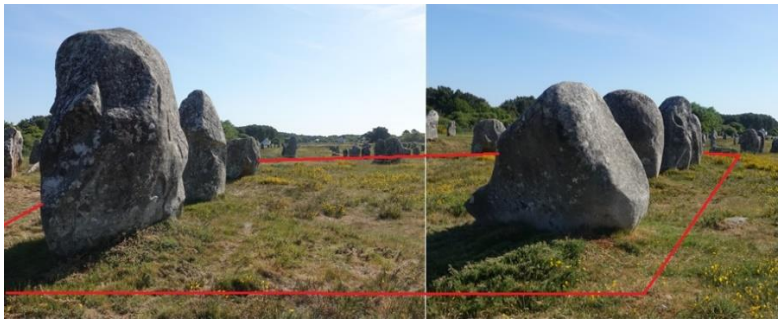


Figure 34: zone 5 North, North side and South side view to East

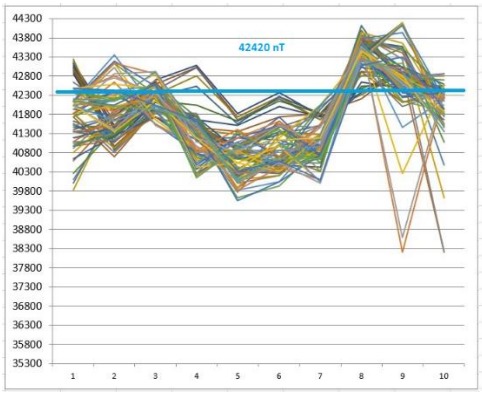


Figure 35: zone 5 North, first half from West

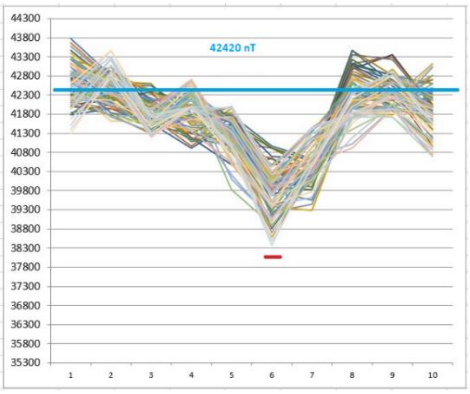


Figure 36: zone 5 North, 2nd half

First row has an azimuth 71° and the second row has an azimuth 61°.
On Figure "zone 5 North, first half from West" above which is the first half (Wets side) a trend of lower value at line 2, 7 and possible lines 4 and 5. Perturbation by one missing stone and a lot stones above the ground.
On the Figure "zone 5 North, 2nd half" above, 1 band of lower vertical earth magnetic field values is noticeable.
On the figure the band is indicated by line 6 in second half, which will be reported as one band close to north of the 2nd alignment.
The difference in nT compared to site benchmark 42420 nT is about -4000 nT which is relevant (difference of **3700 nT** is the benchmark level). Therefore the 1 band of lower vertical earth magnetic field will be reported as lines on the overall figure.

Zone 5 Middle

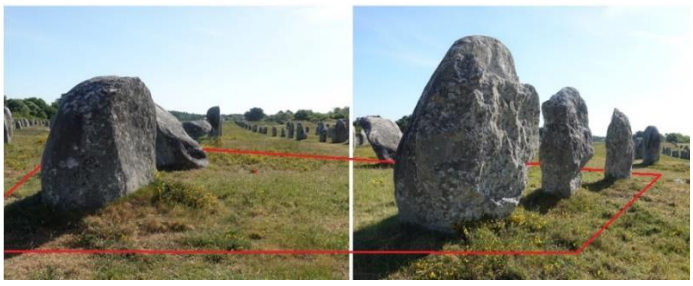


Figure 37: zone 5 middle view to East

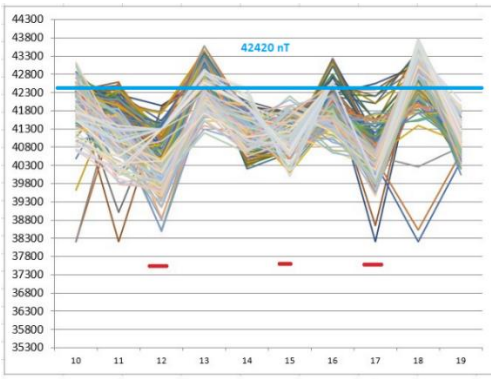


Figure 38: zone 5 middle slice view

First row has an azimuth 71° and the second row has an azimuth 93°.

On Figure “zone 5 middle slice view” above, a pattern of 3 bands of lower values is noticeable. The lower earth magnetic at -2000 nT in between of the alignment will be kept, this might be due to the stones above the ground. On the figure the bands are indicated by lines 12, 15 and line 17.
The difference in nT compared to site benchmark 42420 nT is within -3000 nT to -3500 nT which is relevant (difference of **3700 nT** is the benchmark level).
Therefore the 3 bands of lower magnetic field will be reported as lines on the overall figure.

Zone 5 South

Figure 39: zone 5 South view to East

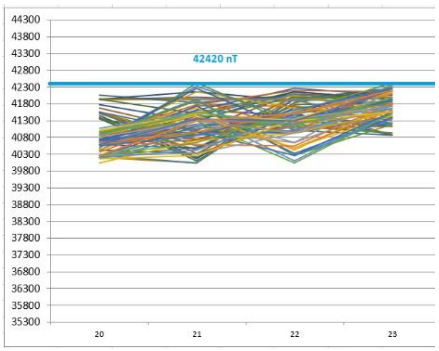


Figure 40: zone 5 South slice view 1rst half

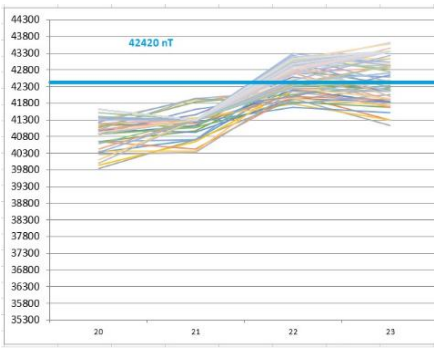


Figure 41: zone 5 South slice view 2nd half

The row has an azimuth 76°.
In Figure “zone 5 South slice view 1rst half”, it appears that there are potentially two bands of low magnetic value present in the first half, specifically on lines 21 and 22. However, the measurements in this region are somewhat confounded due to the intermingling of data points. The ground's abundance of stones contributes to these disturbances, along with the presence of three large stones perpendicular to the row. Consequently, repeat measures will be necessary to obtain more accurate data.

To address this issue, the group of lines 21 and 22, displaying a magnetic value of -2000 nT, will be depicted as a dashed orange line in proximity to the alignment. Moreover, a visual representation of that line of lower magnetic field will be incorporated as lines on the comprehensive figure to provide a clearer and more interpretable illustration.

3.1.5 Cromlech West side survey

A quick survey was made on the north side of the cromlech ‘s centre. A low earth magnetic band-oriented West-East over 5 meters was noticed (see Figure “Slice view towards East from the cromlech center”).

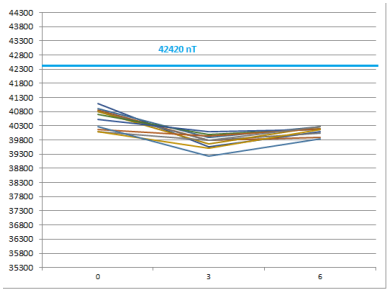


Figure 42: Slice view towards East from the cromlech center

4 Analysis of the schematic layout of Carnac West side

Interpretation 1

Like for Nazca figures which were identified when looking at them from the sky, a satellite view has been used with schematic lines to represent the alignments and the cromlech.

The ground contains mainly Variscan granite, and the west past is not flat compared to the flatter east part, which is not identifiable from a sky view.

Regarding the Carnac' environment, Agogué reported during his interview with BBC 2022

> "*When the Alignments were constructed, the landscape would have been open, without the trees that now divide and flank the sections, and the sea would have been further away.*" (1)

The cromlech location is near to the stones' alignments and confirmed from satellite picture.
In order to help the visualisation, some lines in green colour are added. The cromlech is represented as part of an egg-shaped and the missing part is represented as dashed green line. The 3 stones grouped together are surrounded with a green line to indicate the likelihood position of a Π-shaped door near to them. The forms of the cromlechs are assessed in chapter "Le Ménec" cromlech layout".

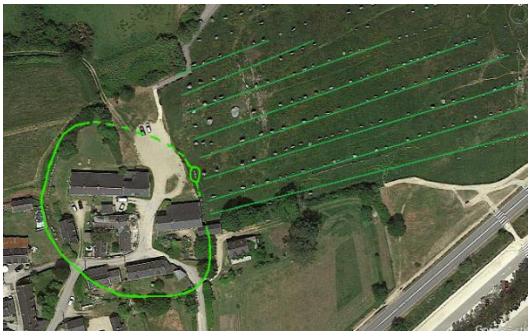


Figure 43 Schematic view of cromlech and alignments West side at "Le Ménec"

Three simple visual interpretations are presented hereafter:

1) it would correspond to a flow of something exiting and expulsed from the egg-shaped area or recipient. The decreasing height of stones from west to far east could represent the reduction of intensity[12].
2) it would correspond to lighting rays towards East, for example generated by a bright celestial object like the sun, coming from the egg-shaped area or recipient. The decreasing height of stones from west to far east could represent the reduction of intensity. But megalithic people saw every morning the sun rising on East side, and the construction of the symbolic rays should have been towards West.

The sun and its rays could be compared to a similar representation in relation with Aton god in Egypt at the time of pharaoh Amenhotep IV in the tomb of the Vizier Ramose. The original photo is rotated anticlockwise by 90°. On the picture the sun is a circle and its rays are lines.

Figure 44 Representation of God Aton in tomb of Ramose (photo rotated 90% counter clockwise)

[12] The small stones could be also a practical decision since big stones where difficult to move and install. The big stones compared to the small stones could represent also important persons in the megalithic people hierarchy.

3) It shows something coming inside the cromlech on the West side.

Interpretation 2

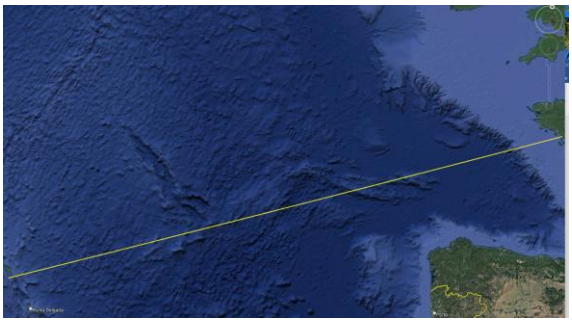


Figure 45 Perfect route having the alignments heading crossing the Azores towards South Brittany

Brittany is a country of sailors, and the alignments could represent a direct path from where the builders came by sea, excluding navigating near the coast. Drawing a route taking into account the roundness of earth with google earth backwards in Atlantic Ocean with geographic heading 251°, same as 71° alignments, will cross Azores between Terceira and Sao Miguel islands (Azores).

It should be noted that the Azores sea current and North Atlantic sea current will bring any boat to any place on the coast from South Britany coast to Portugal coast. Therefore, if the alignments at "Le Ménec" indicates a sea path then such people crossed the Azores before arriving to Europe. It is assumed to be good navigators to keep the heading with boats which can afford off-shore navigation. Unfortunately, no shipwreck has been found but investigation for finding stone anchors could be initiated.

Koch (linguistic), Mikhailova (author) and Cunliffe (archaeologist) following separate lines of investigation concluded to the same novel hypothesis: Neolithic inhabitants and later Celtic probably evolved in the Atlantic Zone during the Bronze Age and colonised the Europa Western part. (39) (40) (41).

Beale build of a replica of a Phoenician merchant boat and sailed from Syria along the east coast of Africa, then crossing Atlantic towards the Gulf stream, back to the Azores, and finally passing Gibraltar for a return to Lebanon from 2008 to 2010 (42). Beale made a second travel departing from Carthage, via the Canary Islands, crossing the Atlantic towards the Dominican Republic. Afterwards Beale went to Fort Lauderdale, then back via the Azores, then to Gibraltar and finally to Carthage from 2019 to 2020 (43). Such travel demonstrated the possibility to cross the Atlantic and return via the Azores with a Phoenician merchandise boat.

People leaving the Mediterranean with enough foods and drinks, with a boat to navigate off-shore and following winds and sea currents would arrive in Azores by crossing Atlantic, after restocking provisions they will continue their way by following winds and with sea current they would arrive in the west side of Europe and possibly in Britanny.

A final conclusion will require additional investigations.

5 Carnac nearby sites and a short presentation of Gobekli Tepe

A short visit of nearby sites to study the constructions was performed. Orientations of construction resemblances were found, but there was no time to investigate in details the earth magnetic fields.

5.1 Surveys made in nearby sites

5.1.1 Short survey made at Mané Kerioned

The site consists of 3 passages: one west side oriented towards about 341°, one in the middle oriented about 251°, and one east side which is underground and oriented about 341°. The orientations are similar to the ones found at "Le Ménec" alignments.

Figure 46 Mané Kerioned passage in the middle oriented to 251°

Figure 47 Mané Kerioned passage on West side oriented 341°

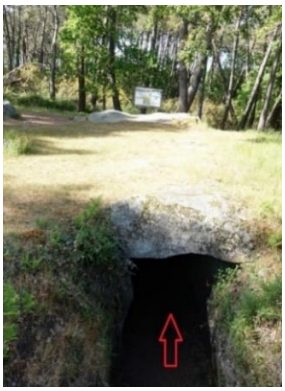


Figure 48 Mané Kerioned underground passage on East side oriented 341°

The underground passage shows a remarkable change of the earth magnetic field between the South entrance and the chamber to the North. Inside the chamber there is a location where the earth magnetic field is of lower intensity, which could be the place used by Shamans and would need to be further investigated.

Some perturbations might be present due to the wired concrete used to sustain part of the roof flat rock.

Figure 49 Mané Kerioned underground dolmen on East side, corridor leading to the squared place

The passages at "Mané Kerioned" have similar average orientation than the alignments at "le Ménec". Two passages have the entrance towards the chamber with an orientation of about 341°, and one of with 251°[13] towards west.

[13] *341° orientation is perpendicular to 251° orientation.*

The mean orientation of alignments at Carnac at “le Ménec” where measures were taken from West to East is 71° which is also 251° towards the West cromlech. The mean orientation when passing South to North between the stones during measures is about 341°.

It can be concluded there was an intention to construct “Mané Kerioned” with known megalithic alignments. The layout could be interpreted as 2 tombs over the ground level, and one worship place under the ground level.

5.1.2 Short survey made at Geant du Manio

On the North side, the rectangle of stones is oriented 251 degree towards West, and on its east side there is a kind of small half cromlech. Such orientation is also fitting with “Le Ménec” and the cromlech is on the East side (see Figure “Geant du Manio, half cromlech (green colour) …”).

Figure 50 Géant du Manio, rectangular place oriented about 251°

Figure 51 Géant du Manio Menhir, view towards south

On the slice cut from North to South of recorded measures of vertical earth magnetic field intensity from West to East, on each side of the menhir higher values on each side of the menhir being above the site benchmark by 1200 nT. The line 6 is the menhir not represented. On the diagram there are 3 groups of lower value are noticeable on line 2, 4 & 5 and 9, corresponding to a difference compared to site benchmark from -3000 nT to - 5000 nT located at about 2 meters of the menhir (see Figure “Geant du Manio Menhir slice view North towards South”).

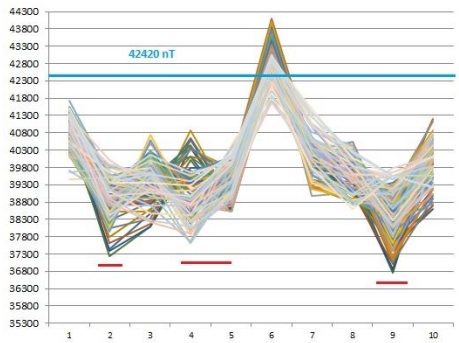


Figure 52 Geant du Manio Menhir slice view North towards South (North on left side)

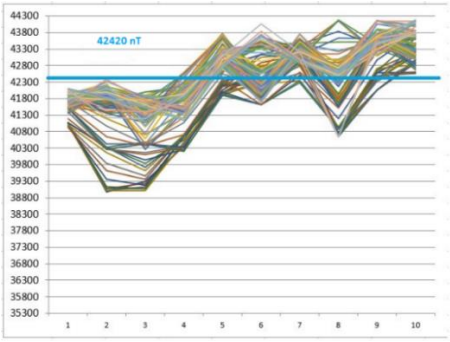


Figure 53 Géant du Manio Menhir, slice view West towards East (West on the left side)

For comparison with one alignment at “Le Ménec”, the earth magnetic field intensity near the alignment has a high value on the South side and a low value on the North side. However, the menhir has two high values on each side North and South (see Figure “Geant du Manio Menhir slice view North towards South”).

Additional measures of the earth magnetic field between the menhir and the half cromlech, will be needed since only data near the menhir were recorded (see Figure “Géant du Manio Menhir, slice view West towards East”). With the current data recorded a trend of two possible groups of lower earth magnetic field could be possible North-South.

There is also a lower group of magnetic field intensity in the middle of the rectangular of rocks which crosses the half cromlech. Further study will be required to complete investigation since the ground contains a lot of stones.

Figure 54 Geant du Manio, half cromlech (green colour) near the rectangular place with straight line of lower earth magnetic field coming from the rectangle (in red color)

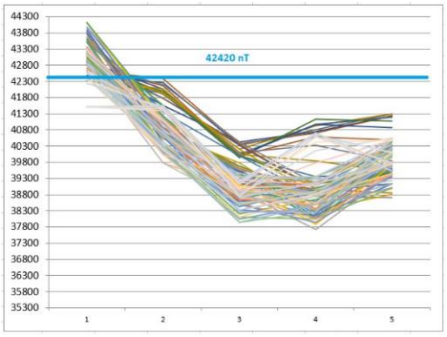


Figure 55 Géant du Manio, slice view North to South of the rectangular place (East side)

The Figure “Géant du Manio, slice view North to South of the rectangular place” shows two lines 3 and 4 are lower earth magnetic field, but they are reported as one red line on Figure “Geant du Manio, half cromlech (green colour)”.

Further investigation is required to make a final conclusion.

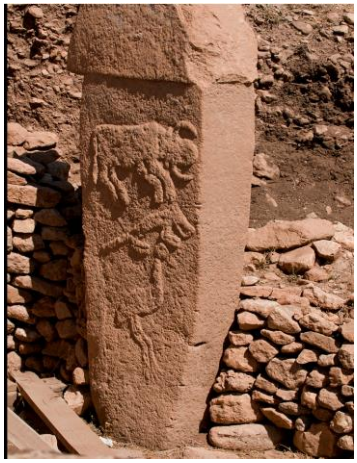
5.2 Gobekli Tepe case

The Carnac megalithic were built about BCE 4000 to BCE 3500 and should be compared to the site of “Gobekli Tepe” (turkey). It is located at GPS 37°13’23”N 38°55’21”E] and was built between the 10th and 9th millennium BCE.

The constructions at Carnac utilizes massive rough stone constructions with Granit like the alignments of erected stones, passages stones, cairns and circular erected stones. The megalithic stones are covered by more or less basic engraving. Regarding the stones, the main difference is the hardness of the granite which is higher than the limestone one, making granite difficult to format and to engrave without proper tools.

At “Gobekli Tepe” site there are several circular or semi-circular structures with typical T form pillars. The pillars have near flat surface with engraved figures in relief (e.g. animals, arms and fingers, objects like bags used by Assyrian gods, animal skin around the hips certainly for priests like Egyptian priests with leopard skin.
The “Gobekli Tepe” site's original excavator, German archaeologist Klaus Schmidt, described it as the "world's first temple: a sanctuary used by groups of nomadic hunter-gatherers from a wide area, with few or no permanent inhabitants”. Schmidt suggested also that the site was a burial ground or the centre of a “death cult represented by the engraved vultures, the dead laid out on the hillside among the stylized gods and spirits of the afterlife”. (44). Regarding the association with a sanctuary, Gobekli Tepe would be similar to Stonehenge and would be a site holding ceremonies (45).

Like in Ggantija temple no roof trace has been found, since they likely had used removable roof made with skins with a timber frame supported by the T pillars. In sunny places it is near impossible to stay permanently under the sun, and shade is needed which would lead to find simple roofs for the worship areas e.g. made with skins or materials obtained from nature.



(46)

6 Acknowledgments

A particular thanks to Mr Olivier Agogué, Curator of the “Musée de la Préhistoire de Carnac” which authorised the earth magnetic field survey on the sites, as well as Mr Laurent Régniau, Mrs Claire Feuillet, Mr Guillomar and all others staff. For the excellent condition of the sites Mr Agogué shall again be felicitated.

Thanks also to the restaurant owner or manager “Crêperie au Pressoir” which authorises me to take few measures inside the cromlech and near the remaining part of standing stones.

Thanks to Mrs Aude Chambodut Aude (EOST) for providing references on the vertical magnetic field intensity on earth, based on a location and a date.

Thanks to Google for the use of Google earth for the aerial images.

Thanks to Wikipedia for the free access to photos.

Thanks to friends Félix, Gérard, Dominique and Claudia for their comments.

Finally, thanks to all archaeologists, archaeoastronomists, historians and psychanalysts which have written books and papers on the subjects.

7 Further investigations

A complete survey of the magnetic field intensity with a three-axis sensor of several sites including stones’ alignments, cromlechs, portal tombs, passage tombs, and cairns would provide additional data.

A GPR analysis of the sites would be of interest to identify any change on stones, and the location of missing ones. As well as aerial photos in monochromatic and infrared mode. In addition, some stones should be photographed with various light spectral length to reveal engraving or colours.

The forecasted alignments of celestial objects should be assessed in year 2025.

8 Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this study.

9 Annexes

9.1 Analysis of few cromlechs

There are 2 cromlechs located at the West side and at the East side.

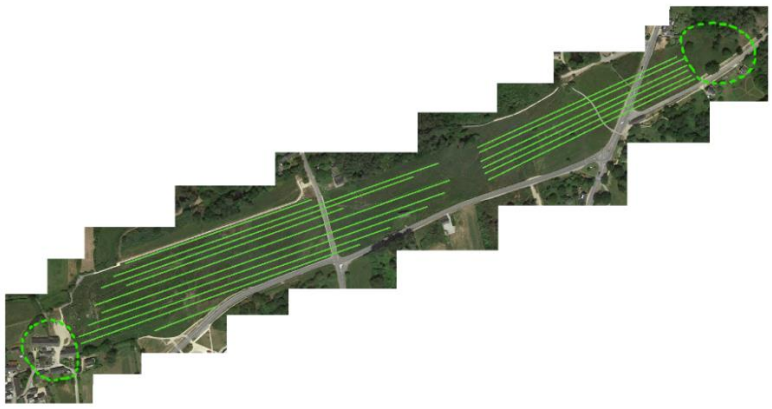
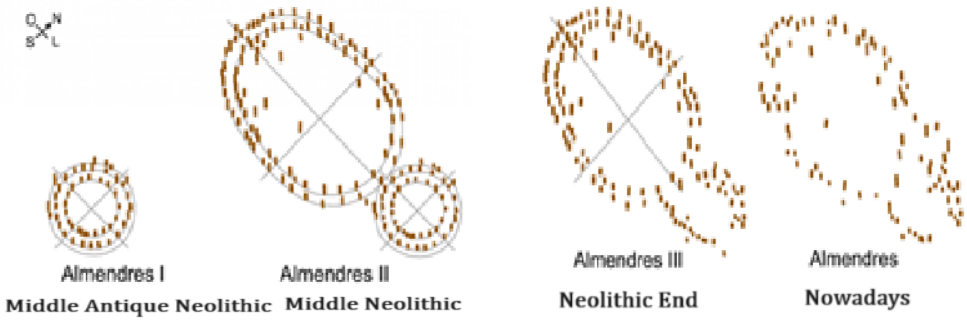


Figure 56: "Le Ménec" cromlechs and alignments drawing of West side and East side

Looking at the above drawing and taking into account the information provided by Thom & Thom, the cromlechs would be egg-shaped (47). The cromlechs have a particular orientation since the West cromlechs has its tip oriented to Sout-East, and the East cromlech has it tip oriented North-West. The stones of the cromlechs are tightly packed together with no space between them.

Therefore, a comparison with others sites is required to get a better understanding.

<u>At the cromlech "Dos Almendres" located in Portugal dated to the 6th millennium BCE</u>



(48)

The first cromlech built consists of 2 concentric circles of stones. Later, the added construction has also double row of stones, and consists of two semi-circles linked with straight lines of stones but it is not an egg-shaped. The cromlechs are built with space between stones.

At Stonehenge built from about 3000 BCE

The photo from Google Earth show circles or semi-circle layout. A lot of stones have flat surfaces, and above the outer circle of sarsens' stones, there are large stones laid down on them. More details on Stonehenge are available in Darvill's report "Research Activity in the Stonehenge Landscape" (49), and the Stonehenge' changes are described in Darvill and et al. report (50).

At Carnac "Le Ménec"

A John Cassell gravure of Carnac alignments, shows in front of the alignment a circular cromlech with a stone in the middle (51). This would suggest that the site might have another layout which has been changed later on, consisting of an egg-shaped cromlech and an additional cromlech not far away.

It is concluded that the cromlech at "Le Ménec" has a specific form egg-shaped with stones tight together, and would have another meaning. According to the megalithic people beliefs previously described, it would represent the womb of a goddess in a schematic form. The two cromlechs are positioned in near opposite direction which has a relation with the nature.

A ground analysis with a GPR will help clarifying the initial structure and the construction phases.

9.2 Activities performed by a Shaman

The term Shaman, although the word comes from Asia, has been selected since their activities are well known and cover counselling, medical support and provision of medicines, contact with spirits, protection of the group and so on. The function of shaman is also more appropriate for earlier civilization. Later civilization of Celts has Druids which were kind of Shamans.

Pratt, Lee and MacDonald described the Shaman roles to interact with spirits when in trance, to be mediator between gods and human and to get 'visionary' information (52) (53) (54). A ritual executed by a Shaman could contain all or part of the following aspects:

- Selecting place considered sacred
- Performing dances and moves the body
- Using of songs or pronunciation of repetitive sentences, accompanied with repetitive music rhythm (example is drums)
- Executing the ritual from sun set to sun rise, including Venus rise and a particular moon phase like full moon.
- Organizing the rituals outside or inside covered area

- Consuming of hallucinogenic beverage like ayahuasca containing dimethyltryptamine (DMT) which is a psychoactive component to achieve the altered states of consciousness leading to visionary state

9.3 Understanding scientifically the altered state of consciousness of Shaman

Studies on Mesoamerican Shamans report consumption of hallucinogens cactus, plants and mushrooms for spiritual healing, spirit interaction, ancestral communication, spiritual illumination and acquire the wisdom. Still nowadays Shaman in Mesoamerica uses hallucinogens in ritual ceremonies. More details are provided in the following books which covers the hallucinogen drugs: (55) (56); and in the following book which describes the states of shamanic and ecstatic possession induced by ingestion of mind-altering drugs: (57)

A recent study in UK wanted to understand the effects of DMT (Dimethyltryptamine), included in hallucinogens products, by injecting DMT to patients and recorded the effects under strict medical control. All details are reported in the study (58)

The following summary is extracted from the study:

"*The study found a profound alpha suppression (reducing awake mode), combined with normalized/increased delta and theta under DMT may relate to the experience of feeling profoundly immersed in an entirely other world. The emergence of theta/delta oscillations, particularly in medial temporal lobe sources, has been classically associated with Rapid eye movement (REM) sleep dreaming and related 'visionary' states.*
The study's findings significantly advance our understanding of the brain basis of one of the most unusual and intense altered states of consciousness known – previously likened to dreaming and the near-death experience."

In regards to the mentioned studies, a Shaman consuming hallucinogen would reach an altered state of consciousness and might obtain a 'visionary' state used during the ceremonies.

In the next chapter the additional effect of earth magnetic field on the brain will be covered.

9.4 Effects of low magnetic fields on human brain

A lot animals are sensitive to magnetic field and use it permanently to find direction. It is likelihood that humans are also sensitive to such magnetic fields.

Kirschvink of California Institute of Technology (CalTech) presented during a congress of the Royal Institute of Navigation in UK the result of a study "Transduction of the Geomagnetic Field as Evidenced from alpha-Band Activity in the Human Brain" showing that human have function magnetoreceptor. (59). The following publications provide addition details on human brain and magnetism (60) (61) (62).

A patient was placed in an isolated and radio frequency-shielded chamber at CalTech where a constant electromagnetic field of 35000 nT was applied to the head. The earth magnetic field intensity at that time in the area was 47230 nT with inclination of about 59° meaning 40471 nT vertical intensity. The thick aluminium panels, forming the walls, floor and ceiling, of the electrically-grounded Faraday shielding provided an electromagnetically "quiet" environment. Any earth magnetic field perturbations, if any, will have been recorded by the Fluxgate magnetometer model "Applied Physics Systems 520A" with three-axis magnetic field sensors.

When the magnetic field turned around the patient brain, it resulted in decrease of the alpha power wave of the brain.

Moini and Piran described the brain alpha wave as follows

> "*Alpha waves in healthy, awake adults occur while resting with the eyes closed. They disappear during sleep and vanish when there is concentration on a specific task. The alpha power wave decreases when reaching the state between awake mode and sleeping mode*" (63).

A similar brain effect described above could be used by the Sufi whirling practiced by the Sufi Dervishes which enter in active meditation by spinning one's body in repetitive circles. The spinning imitates the planets of the Solar System which are orbiting around the sun.

However, in the study "Human EEG responses to controlled alterations of the Earth's magnetic field" (64) the field intensities used was 90 µT or 90000 nT, which was far above the magnetic field in Kansas City of 56.7 µT on 7 April 1972 with inclination 68.6°. Th strong magnetic field generated alterations known to cause birds to ignore geomagnetic cues as described in the paper "Magnetic compass of European robins" (65). Another study showed that electromagnetic noise perturbs magnetic compass orientation of migratory bird (66).

This means that higher magnetic field intensity alters the earth magnetic perception, and therefore low range earth magnetic field intensity should be preferred to get the results on the brain presented by Kirschvink in his study.

It is possible to make a hypothesis where the sacred places used by Druids, would be the places having lower earth magnetic field intensity.

It could be speculated that a Shaman moving in low earth magnetic field will reduce the alpha wave power of the brain reaching a mode just close to sleeping, which would be added to the effect of the hallucinogens.

Further investigation about interaction of earth magnetic fields with human and nature should be performed.

9.5 Description of equipment used for measures

The equipment consists of a probe, a data receiver and a computer. The Fluxgate probe measures the vertical intensity within a range +/- 150,000 nT (***nT*** *nano Tesla*), with a resolution at 50 nT. The data receiver sends a measure every 0.1 second to the computer. The support of the probe consisted of a 2 meters wooden pole attached to soft straps passing over the shoulder to absorb part of the body movement during the walk. Two wooden masses at each extremity were used to minimize the lateral and up-down movements. The Fluxgate probe was located at a minimum distance of at least 1.5 meters to any metal object, and was kept at about 70 cm above the ground.

For the magnetic directions, a marine compass model Iris 50 was used. During the survey from 10 to 17 may 2022, the magnetic declination was 0.1333 West, and we can consider that the magnetic direction is similar to the geographic direction. The average of the geographical orientation noted was 71° which fits with the average orientation of the alignments measured on google earth.

9.6 Details on measures per zone

The table below describes how the measures were made.

	line from west to east, then next line from north to south						
line #	z1	line #	z2	line #	z3	line #	z5
1	0	1	2 m	1	2 m	1	1 m
2	+1 m	2	1 m	2	+1 m (close) to +2m east side	2	(close)
3	+2 m	3	(close)	3	(close)		O O O O O stones
4	+3 m		O O O O O stones		O O O O O stones	3	(close)
5	+ 4.5 (Close at 0.5 m) to +3 m at east (close)	4	(close)	4	+2.5 (close) to 1m east side	4	+1 m
	O O O O O stones	5	+1 m	5	+7 m	5	+2 m
6	close	6	+3 m	6	+9 m	6	1 m
7	+1 m	7	+7 m	7	+11 m	7	(close)
8	+2 m	8	1 m	8	+12 m (close)		O O O O O stones
9	+3 m	9	(close)		O O O O O stones	8	(close)
10	+4 m		O O O O O stones	9	+14 m (close)	9	+1 m
11	+5 m	10	(close)	10	+15 m	10	middle
12	+6 m	11	+1 m			11	1 m
13	+7 m	12	+3 m			12	(close)
14	+8 m	13	+5 m				O O O O O stones
15	+9 m (close)	14	1 m			13	(close)
	O O O O O stones	15	(close)			14	+1 m
16	(close)		O O O O O stones			15	middle
17	+ 1 m	16	(close)			16	1 m
18	+2 m	17	+1 m			17	(close)
19	+3 m	18	+2 m				O O O O O stones
20	+4 m	19	+5 m			18	(close)
21	+5 m	20	(close)			19	+1.5 m
			O O O O O stones			20	1 m
		21	(close)			21	(close)
		22	+1 m				O O O O O stones
						22	(close)
						23	+1 m

9.7 Description of time shift effects on measures

The example shows 4 identical lines of measures firstly without time shift at start of recording and secondly with time shift.

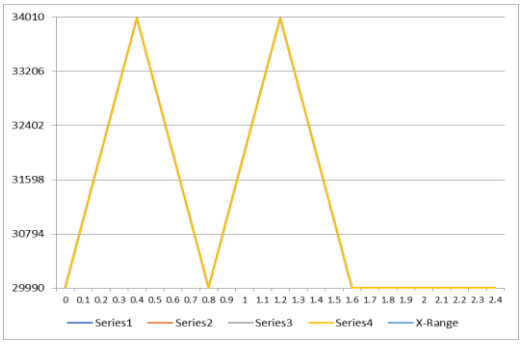


Figure 57: time shift, 4 curves overlayed

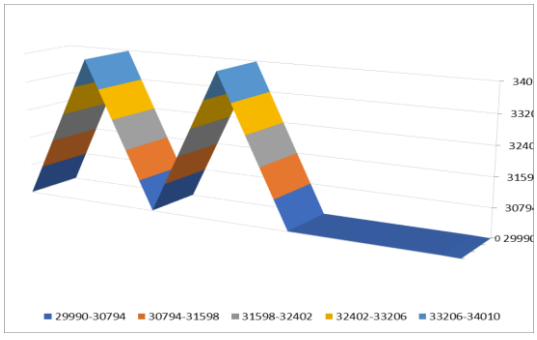


Figure 58: time shift, 3D slice view of 4 curves overlayed

In the above example, all recorded data have no shift in time at start of recording and all curves fit together.

By shifting the departure time for taking measure by few seconds new curves are obtained. The Serie 1 is the reference. Serie 2 has a start shifted by 0.2s, Serie 3 has a start shifted by 0.4s, and Serie 4 has a start shifted by 0.6s.

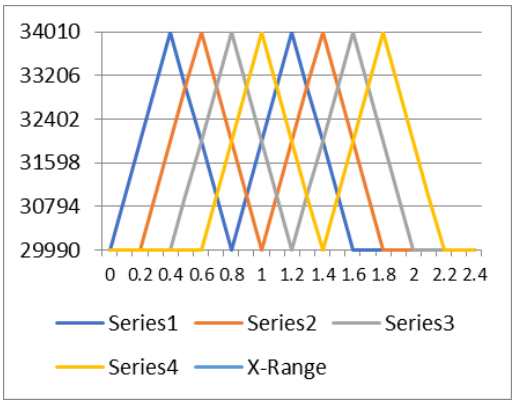


Figure 59: time shift, 4 curves shifted

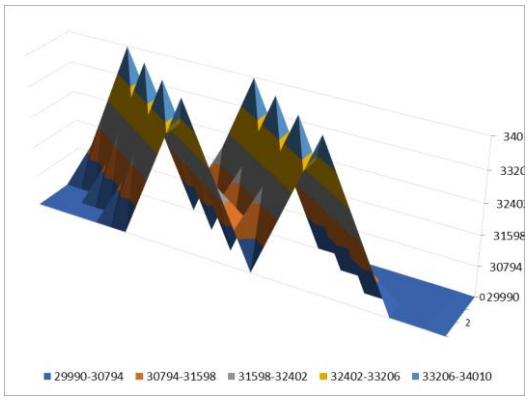


Figure 60: time shift, 3D slice 3D view of 4 curves shifted

The left figure is the view of the series with shifts. The right figure is a 3D view of the slices taken from series and separated by 1 unit. The shifts of the start time of recording data are exaggerated to magnify the effect. Hence to overcome such cases the data interpretation shall focus on patterns.

9.8 Estimating Beltane and Lughnasa dates

The dates for equinoxes and solstices in CE, and the corresponding dates in BCE, are based on a local horizon estimated at 5 degrees above the theoretical horizon. See chapter 2.1.4 for the terms which are replacing solstices and equinoxes in BCE. For simplicity and for ease of comparison, the same terms are used in CE and BCE.

Beltane dates

		current calendar						current calendar			
		CE	2022					BCE	4000		
			nb days	nb days to count					nb days	nb days to count	
Spring Equinox	20	march	31	11		East	Spring Equinox	22	april	30	8
		april	30	30					may	31	31
		may	31	31					june	30	30
Summer Solstice	21	june	30	21			Summer Solstice	26	july	31	26
				93							*95*
Beltane date is in the middle			at	46.5	days		Beltane date is in the middle			at	47.5 days
from SE the date is			between	5	in may		from SE the date is			between	8 in june
				6							9

Lughnasa dates

		current calendar						current calendar			
		CE	2022					BCE	4000		
			nb days	nb days to count					nb days	nb days to count	
						Maximum					
Summer Solstice	21	june	30	9		elevation	Summer Solstice	26	july	31	5
		july	31	31					august	31	31
		august	31	31					september	30	30
Aumun Equinox	23	September	30	23		East	Aumun Equinox	23	october	31	23
				94							89
Lughnasa date is in the middle			at	*47*	days		Lughnasa date is in the middle			at	*44.5* days
from SS the date is			between	7	in august		from SS the date is			between	8 in september
				7							9

The column “nb days” gives the number of days per month in the current calendar. The column “nb days to count” is the number of days to be accounted e.g. from the 20 March to the 21 June there is 93 days. The festival is in the middle of Spring Equinox and Summer Solstice, then the number of days between the two dates is divided by 2 and will be 46.5 days (93/2=46.5). Taking the 20 March as the starting date and adding the 46.5 days, this gives a Beltane date between the 5 and 6 of May. It shall be recalled that Celtic festivals of Beltane and Lughnasa could correspond to markers inherited from megalithic people corresponding to fertility, animals mating … and collecting of crops.

9.9 Perturbations of Earth Magnetic Field by paramagnetic stones at Carnac

The following drawings are schematized to the maximum since stones might not contain a homogeneous paramagnetic component. Carnac stones of granite contain paramagnetic components will be the preferred way for earth magnetic fields to path through the stone. On the diagram the paramagnetic components are schematized as a vertical parallelepiped. When the earth magnetic fields arrive to the stone a lot of fields will join the vertical path of the paramagnetic components contained in the stone and will not exit on the other side. The electromagnetic fields are curbed towards the stone which results in increasing the vertical intensity, and explains the higher intensity of the south side and the lower intensity on the north side of the stones.

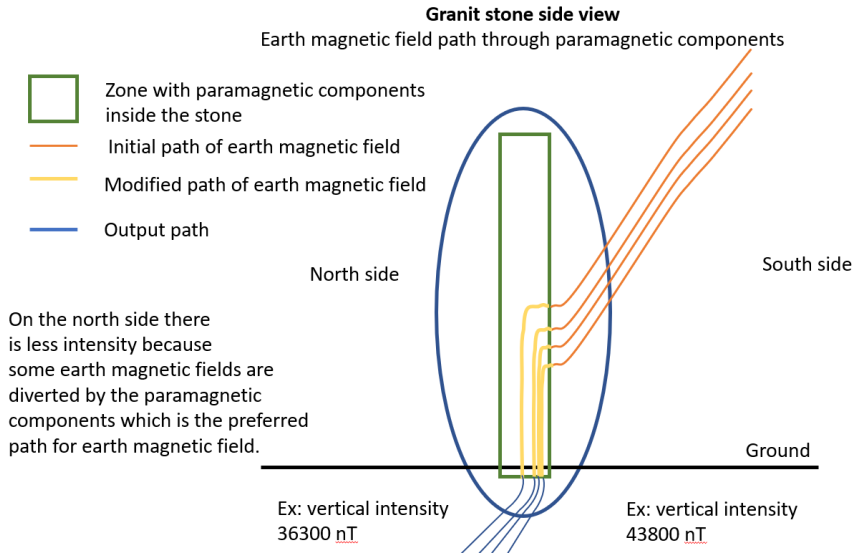


Figure 61: Earth magnetic field through Carnac stone – view transversal

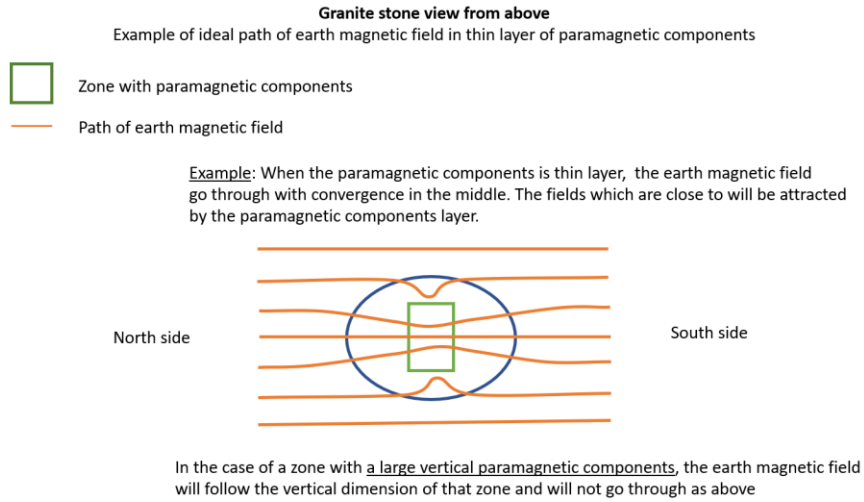


Figure 62: Earth magnetic field through Carnac stone - view from above

9.10 Possible benchmarks used by megalithic people to observe celestial objects

Megalithic people noticed the reoccurrences of seasons and the various positions of the sun as well as the others celestial objects. When they monitored the constellations, in particular “Ursa Major” and “Ursa Minor”, they noticed relations between the constellations’ positions in the sky and the next configurations of celestial objects. Hence constellations, seasons, sun and the others known nature phenomena would have been used as a kind of calendar and clock.

9.11 Overall view of low earth magnetic field bands

North on the left side, and east on the top.

10 Bibliography

1. The mystery of France's 'Stonehenge'. Tucker, Hugh. s.l. : BBC, 2022, Vols. Culture & Identity, History, France, 15 September 2022.

2. Banning, E. B,. So Fair a House - Göbekli Tepe and the Identification of Temples in the Pre-Pottery Neolithic of the Near East. s.l. : The Wenner-Gren Foundation for Anthropological Research, 2011. Vols. Current Anthropology, Volume 52, Number 5, October 2011.

3. Harding, D. W. Rewriting History: Changing Perceptions of the Past - Stonehenge and Avebury: A Ritual and Ceremonial Landscape? Oxford : Oxford University Press, 2019. pp. 165–184. Vols. online edn, Oxford Academic, 23 Jan. 2020.

4. Herity, Michael. Irish Passage Graves: neolithic tomb-builders in Ireland and Britain 2500. Dublin : Irish University Press, 1974. ISBN: 0716521679, 9780716521679.

5. Sermon, Richard. The Celtic Calendar and the Anglo-Saxon YearThe Celtic Calendar and the Anglo-Saxon Year. 2002, Vols. 3rd Stone No: 43, Page 32-39.

6. Quintela, Marco Garcia and Gonzalez-Garcia, A. Cesar. Archaeological Footprints of the "Celtic Calendar"? 2017, Vol. Journal of Skyscape Archaeology · March 2017.

7. Women temporarily synchronize their menstrual cycles with the luminance and gravimetric cycles of the Moon. Helfrisch-Foerster, C. and et al. 5, s.l. : Science Advance, January 27, 2021, Science Advance, Vol. 7.

8. Closs, Michael P., Aveni, Anthony F. and Crowley, Bruce. The Planet Venus and Temple 22 at Copán. 1984, Vols. Volume: 9 (1984), 1 january 1984, Pages: 224-225.

9. Gimbutas, Marija. The "Monstrous Venus" of Prehistory of Goddess Creatix. Los Angeles : Comparative Civilizations Review, 1981. p. 12. Vols. Article 2, Volume 7, fall 1981.

10. Haviland, William, et al. Anthropology: The Human Challenge. 13. s.l. : Cengage Learning, 2010. ISBN 0495810843, 9780495810841.

11. Neumann, Erich. The Great Mother : An Analysis of the Archetype. s.l. : Princeton University Press, 1974.

12. Witcombe, Christofer. Venus of Willendorf. s.l. : Christofer L.C.E. Witcombe, 2013.

13. Holder, I. Çatalhöyük The Leopard's Tale: Revealing the mysteries of Turkey's ancient 'town'. London : Thames and Hudson, 2011.

14. Gimbutas, Marija . The language of the Goddess: Unearthing the Hidden Symbols of Western Civilization. New York : Thames and Hudson, 1989.

15. Veen, Veronica. The Goddess of Malta: The Lady of the Waters and the Earth. Haarlem, Holland : Inanna-Fia, 1992.

16. Gimbutas, Marija .. The Civilization of the Goddess: The world of Old Europe. New York : Harper San Francisco, 1991. p. 174.

17. Trump, David H. Malta: Prehistory and Temples. Malta's living heritage. s.l. : Midsea Books ltd: Italy, 2002. p. 70.

18. Graves, Robert. The White Goddess. New York : Faber & Faber (UK), 2013. p. 390. ISBN 978-0374289331.

19. Harvey, Graham. Introduction to "The Triple Muse". s.l. : In Clifton, Chas; Harvey, Graham (eds.). The Paganism Reader. Routledge, 2004. p. 129 ff. ISBN 978-0-415-30352-1.

20. Pike, Sarah. Gender in New Religions. s.l. : in Bromley, David G. (ed.)(2007). Teaching New Religious Movements. Oxford University Press US, 2007. p. 214. ISBN 0-19-517729-0, ISBN 978-0-19-517729-9.

21. Gimbutas, Marija ... The gods and goddesses of old Europe, 7000 to 3500 BC;: Myths, legends and cult images. s.l. : Thames & Hudson, 1974. ISBN-10 : 0500050147; ISBN-13 : 978-0500050149.

22. Price, Neil. The Archaeology of Shamanism. s.l. : Routledge, 2001. ISBN-10 : 0415252555; ISBN-13 : 978-0415252553.

23. Archaeology and Fertility Cult in the Ancient Mediterranean. Bonanno, Anthony and Lobel, Mimi. s.l. : B.R. Gruener publisher company, 1986. First International Conference on Archaeology of the Ancient Mediterranean, university of Malta, 2-5 September 1985. Vol. Ancient Religions in the Context of Cultural Types., p. 146.

24. Shaw, Garry. Stone-age Italians defleshed their dead - Ritual burials were meant to separate the dead from the living. Science. 3 27, 2015.

25. Early Neolithic burials from Grumăzeşti – Deleni, Neamţ County, Romania. Annamaria, Diana, et al. 15, s.l. : Academiei Romaene, Institutuia de Archeologie Vasile Pervane, 2019, Materiale şi cercetări arheologice (Serie nouă), pp. 15 - 25.

26. Cunlife, B. W. Europe between the oceans. s.l. : Yale University Press, 2008.

27. Eliade, Mircea. A History of Religious Ideas, Volume 1: From the Stone Age to the Eleusinian Mysteries. s.l. : University of Chicago Press, 1975. ISBN 9780002153119 ; ISBN10: 0002153114.

28. Eliade, Mircea . A History of Religious Ideas: Volume 1, from the Stone Age to the Eleusinian Mysteries. s.l. : University of Chicago Press, 1981. ISBN-10 : 9780226204017; ISBN-13 : 978-0226204017.

29. Gimbutas, Marija .... The living goddess. Berkeley : University of California Press, 1999. p. 120. ISBN 0-520-22915-0.

30. The Celts: Origins, Myths and Inventions. By John Collis. Giles, Melanie. Issue 1, s.l. : online, December 20, 2014, Archaeological Journal, Vols. Volume161, 2004, pp. 242,243.

31. Magli, Giulio. Sirius and the project of the megalithic enclosures at Gobekli Tepe. 2016, Vols. NO 18, Pages 337–346, Issued: July 2016.

32. Murphy, Anthony and Moore, Richard. Island of the Setting Sun: In Search of Ireland's Ancient Astronomers. s.l. : The Liffey Press; 2nd ed. Edition (15. September 2008), 2008.

33. Guillaume, M. Etudes et Travaux - understanding the Gavrinis chambered cairn. s.l. : AAK's (Association Archéologique Kergal), 1977. Vols. volume: 1, may 1977, pages: 45-51.

34. English Heritage. HISTORY OF STONEHENGE. [Online] https://www.english-heritage.org.uk/visit/places/stonehenge/history-and-stories/history/#footnote-3.

35. Evans, J. D. The Prehistoric Antiquities of the Maltese Islands. London : The Athlone Press, 1971.

36. Athanassakis, Apostolos. Proteus, the Old Man of the Sea. Recherches & Rencontres. 2002, Vol. 17, pp. 45 - 46.

37. McKay, John P., et al. Understanding World Societies, Volume 1: A Brief History. Boston, New-York : Bedford/St. Martin's, 2012. p. 13. Vol. 1, ISBN 10: 1457618737; ISBN 13: 9781457618734.

38. Lewis-Williams, David. A Dream of Eland: An Unexplored Component of San Shamanism and Rock Art. World Archeology. october 1987, Vols. 19, No 2, pp. 165-177.

39. Lewis-Williams, David . The Mind in the Cave: Consciousness and the Origins of Art. London : Thames & Hudson, 2002. p. 281.

40. Koch, John T. Celtic Culture: A Historical Encyclopedia. s.l. : ABC-CLIO, 2006. p. 1350. ISBN-10 : 1851094407; ISBN-13 : 978-1851094400.

41. Celtic origin: location in time and space? Reconsidering the "East-West Celtic" debate. Mikhailova, Tatyana A. s.l. : Mikhailova T.M, 2015, Vols. Journal of Language Relationship, Linguistic affinity issues (Вопросы языковогo родства), No13/3 (2015), Page 260.

42. Facing the Ocean: The Atlantic and Its Peoples 8000 to AD 1500. Cunlife, B. W. s.l. : Oxford University Press, 2001, Vols. 28 June 2001, ISBN 9780199240197 (ISBN10: 0199240191).

43. Celtic from the West. Alternative Perspectives from Archaeology, Genetics, Language and Litterature. Cunlife, B. W. and Koch, J. T. s.l. : Oxbow Books, 2010, Vols. Celtic Studies Publications, Volume: 15.

44. Beale, Philipp and Taylor, Sarah. Sailing Close to the Wind. s.l. : The Lulworth Press, 2012. Vols. ISBN 978-1-908913-04-3.

45. Beale, Philip. Atlantic B.C. An epic recreation of a Phoenician voyage 2000 years before Columbus. s.l. : The Lulworth Cove Press, 2022. Vols. ISBN 978-1-911098-00-3.

46. Göbekli Tepe. wikipedia. [Online] November 2022. https://en.wikipedia.org/wiki/G%C3%B6bekli_Tepe.

47. History.com Editors. Stonehenge. HISTORY. [Online] A&E Television Networks, June 1, 2010. https://www.history.com/topics/european-history/stonehenge.

48. photos from wikipedia. Göbekli Tepe. wikipedia. [Online] 3 19, 2013. https://de.wikipedia.org/wiki/Göbekli_Tepe.

49. Thorm, Alexander and Thorm, Archibald Stevenson. MEGALITHIC REMAINS IN BRITAIN AND BRITTANY. s.l. : Clarendon Press, 1978.

50. Photos from Wikipedia. Dos Almendres. wikipedia. [Online] 12 31, 2021. https://en.wikipedia.org/wiki/Almendres_Cromlech.

51. Darvill, Timothy. A Research Framework for the Stonehenge, Avebury and Associated Sites World Heritage Site - Research Activity in the Stonehenge Landscape 2005–2012. s.l. : Historic England, 2012.

52. Darvill, T., et al. Stonehenge remodelled. s.l. : Cambridge University Press, 2015. Vols. Journal Antiquity, Volume 86, Issue 334, Pages 1021-1040, 2 January 2015.

53. Cassell, John. Cassell's Illustrated History of England. 1865. Vols. From the earliest period to the reign of Edward the Fourth., volume: 1, page: 3.

54. Pratt, Christian. An Encyclopedia of Shamanism. s.l. : The Rosen Publishing Group Inc, New York, 2007. Vols. Volume 1 A-M, Volume 2 N-Z.

55. Lee, Jung Y. Korean Shamanistic Rituals - Divination and Shamanistic Rituals. Berlin, Boston : De Gruyter, 1981. Vols. pages 132-152.

56. MacDonald, Mary N. THE STUDY OF SHAMANISM: LOCAL AND UNIVERSAL DIMENSIONS. s.l. : Journal of Ritual Studies, 2002. Vols. Volume 16, No 2, page 88-107.

57. Carod-Artal, F.J. Hallucinogenic drugs in pre-Columbian Mesoamerican cultures. s.l. : Neurologia (English Edition), Elsevier, 2015. Vols. Volume 30, Issue 1, January-February 2015, page 42-49.

58. Gordon Wasson, R. The Wondrous Mushroom. Mycolatry in Mesoamerica. s.l. : Mycologia, Taylor & Francis Ltd, 1981. Vols. Volume 73, No 4, July & August 1981, pages 789-792.

59. Ruck, A. P., et al. Entheogens. s.l. : Journal of Psychedelic Drugs, 1979.

60. Timmermann, C., et al. Neural correlates of the DMT experience assessed with multivariate EEG. s.l. : Scientific Reports, 2019. Vols. No 9, article No: 16324 (2019), 19 November 2019.

61. Kirschvink, Joseph L., et al. Transduction of the Geomagnetic Field as Evidenced from alpha-Band Activity in the Human Brain. s.l. : Journal of Society for Neuroscience, 2019. Vols. eNeuro, No 6(2), 18 March 2019.

62. Chae, K. S., et al. Human magnetic sense is mediated by a light and magnetic field resonance-dependent mechanism. s.l. : Scientific Reports, 2022. Vol. Article: 8997 (2022).

63. Johnsen, S. and Lohmann, K. The physics and neurobiology of magnetoreception. s.l. : nature reviews neuroscience, 2005. Vols. No 6, pages 703-712.

64. Gilder, S. A. and Kaub, L. Distribution of magnetic remanence carriers in the human brain. s.l. : Scientific Reports, 2018.

65. Moini, Jahangir and Piran, Pirouz. Functional and Clinical Neuroanatomy - A Guide for Health Care Professionals. s.l. : Academic Press, 2020. Vols. Chapter 6 - Cerebral cortex, pages: 177-240, ISBN 9780128174241.

66. Sastre, A., et al. Human EEG responses to controlled alterations of the Earth's magnetic field. s.l. : Clinical Neurophysiology, 2002. Vols. Volume 113, Issue 9, September 2002, pages 1382-1390.

67. Wiltschko, Wolfgang and Wiltschko, Roswitha. Magnetic compass of European robins. s.l. : Science, 1972. Vols. volume 176, Issue 4030, pages 62-64, 7 April 1972, PMID: 17784420.

68. Engels, S., et al. Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird. 2014, Vols. Nature No 509, pages: 353-356, 15 May 2014.

69. Benigni, Helen. The Mythology of Venus: Chapter One The Emergence of the Goddess: A Study of Venus in the Paleolithic and Neolithic Era. 2013.

11 Table of Figures

Figure 1: "vulvar" instead of point reported by Gimbutas (photo 90° counter clockwise) *11*
Figure 2: engraving with 8 curved lines (photo 90° counter clockwise) *11*
Figure 3: engraving with 8 curved lines (photo 90° counter clockwise) *11*
Figure 4 Sun and one alignment of stones lined-up with observer position behind one stone *15*
Figure 5 shadows well aligned also on the right of the observer position *15*
Figure 6 Gavrinis view of the squared place from the corridor. *20*
Figure 7: Gavrinis view from above and transversal with azimuths added. Figure extracted from Guillaume report (31). *20*
Figure 8: schematic cross-section of an Egyptian temple *22*
Figure 9: La Roche aux Fees view from above with azimuths added *23*
Figure 10: Newgrange view from above with azimuths added *25*
Figure 11: Newgrange transversal view towards East. *25*
Figure 12: Stonehenge view from with azimuths added. *27*
Figure 13: Schematic view of Ggantija temple from above extracted from Wikipedia with North and azimuths added *28*
Figure 14: overall view of lower vertical earth magnetic intensity lines (orange colour) *34*
Figure 15: selected areas (in yellow) of the Carnac's alignments at "Le Ménec" *37*
Figure 16: measurements lines (in blue colour) and generated lines (slice viewing in orange colour) *37*
Figure 17: zone 1 view towards West *Figure 18: zone 1 lines of vertical electromagnetic field measures* *38*
Figure 19: zone 1 slice view 1rst half *Figure 20: zone 1 slice view 2nd half* *38*
Figure 21: zone 2 North part view towards East *Figure 22: zone 2 South part view towards East* . *39*
Figure 23: zone 2 lines of vertical electromagnetic field measures *39*
Figure 24: zone 2 slice view half *39*
Figure 25: zone 2 slice view one quarter after West side half *39*
Figure 26: zone 2 slice view last quarter *39*
Figure 27: Zone 2 half west part, first row with missing stones, continuation of low earth magnetic value *40*
Figure 28: zone 3 view towards West *40*
Figure 29: zone 3 lines of measures *40*
Figure 30: zone 3 slice view full *40*
Figure 31: zone 3 slice view half West *40*
Figure 32: zone 3 slice view half East *41*
Figure 33: zones 5 North, Middle and South lines of measures *41*
Figure 34: zone 5 North, North side and South side view to East *42*
Figure 35: zone 5 North, first half from West *Figure 36: zone 5 North, 2nd half* *42*
Figure 37: zone 5 middle view to East *42*
Figure 38: zone 5 middle slice view *42*
Figure 39: zone 5 South view to East *43*
Figure 40: zone 5 South slice view 1rst half *43*
Figure 41: zone 5 South slice view 2nd half *43*
Figure 42: Slice view towards East from the cromlech center *43*
Figure 43 Schematic view of cromlech and alignments West side at "Le Ménec" *44*
Figure 44 Representation of God Aton in tomb of Ramose (photo rotated 90% counter clockwise) ... *44*
Figure 45 Perfect route having the alignments heading crossing the Azores towards South Brittany *45*

Figure 46 Mané Kerioned passage in the middle oriented to 251° *46*
Figure 47 Mané Kerioned passage on West side oriented 341° *46*
Figure 48 Mané Kerioned underground passage on East side oriented 341° *46*
Figure 49 Mané Kerioned underground dolmen on East side, corridor leading to the squared place . *46*
Figure 50 Géant du Manio, rectangular place oriented about 251° *47*
Figure 51 Géant du Manio Menhir, view towards south *47*
Figure 52 Geant du Manio Menhir slice view North towards South (North on left side) *47*
Figure 53 Géant du Manio Menhir, slice view West towards East (West on the left side) *47*
Figure 54 Geant du Manio, half cromlech (green colour) near the rectangular place with straight line of lower earth magnetic field coming from the rectangle (in red color) *48*
Figure 55 Géant du Manio, slice view North to South of the rectangular place (East side) *48*
Figure 56: "Le Ménec" cromlechs and alignments drawing of West side and East side *50*
Figure 57: time shift, 4 curves overlayed *54*
Figure 58: time shift, 3D slice view of 4 curves overlayed *54*
Figure 59: time shift, 4 curves shifted *55*
Figure 60: time shift, 3D slice 3D view of 4 curves shifted *55*
Figure 61: Earth magnetic field through Carnac stone – view transversal *56*
Figure 62: Earth magnetic field through Carnac stone - view from above *56*

12 Table of Content

1 Introduction 2

2 Analysis of Carnac site, Gavrinis and Newgrange cairns, La Roche aux fées portal, Stonehenge and Ggantira temple 3

2.1 Beliefs related to the Sun 4

2.2 Beliefs related to the Moon 4

2.3 Beliefs related to Venus 5

2.3.1 Venus known alignments 5

2.3.2 Venus Myths 5

2.3.3 Venus worship as goddess 6

2.3.4 Venus symbolism in Tombs and temple 9

2.3.5 Venus worshipping traces in cairns 11

2.3.6 Venus symbolism with ancestors' spirits rebirth and stones' shape 12

2.3.7 Venus symbolism of birth and water flow 13

2.4 Celestial objects alignments 14

2.4.1 Dating specific sun events in BCE 14

2.4.2 Sun – dates when the sun rises in Carnac alignment 14

2.4.3 Satellite Moon – dates when the moon rises in Carnac alignment 18

2.4.4 Planet Venus – dates when the planet Venus rises in Carnac alignment 18

2.4.5 Constellations and stars – date when they rise in Carnac alignments 19

2.4.6 Identification of recurrent events Venus rising just before the sun 20

2.4.7 Celestial objects alignment at Gavrinis 20

2.4.8 Celestial objects alignment at La Roche aux Fées 22

2.4.9 Celestial objects alignment at Newgrange 24

2.4.10 Celestial objects alignment at Stonehenge 27

2.4.11 Celestial objects alignment at Malta Ggantija temple 28

2.4.12 Conclusion on orientations towards celestial objects 29

2.5 Shamans 31

2.5.1 Shamans and ceremonies 31

2.5.2 Conclusion on Shamans activities at Carnac and cairns 33

2.6 Earth magnetic field survey at Carnac "Le Ménec" 33

2.6.1 Earth magnetic field survey rational 33

2.6.2 Conclusion on low earth magnetic field intensity areas at Carnac "Le Ménec" 34

2.7 Final conclusion on stones' alignments, cromlechs and cairns purpose 35

3 Earth magnetic field intensity measures at Carnac site "Le Ménec" 36

3.1 Recording and processing of earth magnetic field intensity at Carnac site “Le Ménec” ... 36
3.1.1 Zone 1 survey ... 38
3.1.2 Zone 2 survey ... 39
3.1.3 Zone 3 survey ... 40
3.1.4 Zone 5 survey ... 41
3.1.5 Cromlech West side survey ... 43
4 Analysis of the schematic layout of Carnac West side ... 43
5 Carnac nearby sites and a short presentation of Gobekli Tepe ... 45
5.1 Surveys made in nearby sites ... 46
5.1.1 Short survey made at Mané Kerioned ... 46
5.1.2 Short survey made at Geant du Manio ... 47
5.2 Gobekli Tepe case ... 48
6 Acknowledgments ... 49
7 Further investigations ... 49
8 Conflicts of Interest ... 50
9 Annexes ... 50
9.1 Analysis of few cromlechs ... 50
9.2 Activities performed by a Shaman ... 51
9.3 Understanding scientifically the altered state of consciousness of Shaman ... 52
9.4 Effects of low magnetic fields on human brain ... 52
9.5 Description of equipment used for measures ... 53
9.6 Details on measures per zone ... 54
9.7 Description of time shift effects on measures ... 54
9.8 Estimating Beltane and Lughnasa dates ... 55
9.9 Perturbations of Earth Magnetic Field by paramagnetic stones at Carnac ... 56
9.10 Possible benchmarks used by megalithic people to observe celestial objects ... 57
9.11 Overall view of low earth magnetic field bands ... 58
10 Bibliography ... 59
11 Table of Figures ... 63
12 Table of Content ... 65