

## **Astronomy and Intentionality in the Temples of Mnajdra.**

---

Essay by Tore Lomsdalen ©

### **Introduction**

The specific aim of this paper is to argue whether the Neolithic Mnajdra Temple was deliberately built as a sacred site for religious worship and to pay respect and obeisance to the power of cosmos. It will particularly investigate solar alignments at the time of the Equinox and the Solstice to establish if it was built intentionally as a temple for estimating time and seasons. In order to include the Mnajdra site into a larger context of a prehistoric temple period, the essay will also look into other relevant megalithic civilizations. The paper shall put emphasis on investigating how and why this culture emerged in Malta, within an historical context of coherent cultures.

### **Research methodology**

Besides studying relevant literature on Malta and its temple period history, this archaeoastronomical research programme was conducted as a field study at the megalithic site of Mnajdra, located on the south-eastern Maltese coastline. The site was visited on two different occasions – once at the time of the Vernal Equinox (18<sup>th</sup> - 23<sup>rd</sup> of March 2010), and the Summer solstice (22<sup>nd</sup> – 30<sup>th</sup> of June 2010). On both occasions, naked-eye astronomy and celestial observations were the fundamental research methods. As technical equipment, a hand held GPS (Garmin 12), a compass (Geonaute C500), a 30 metre measuring tape and a Nikon digital photographic camera were used.

During the first site survey in March 2010, the following megalithic structures were visited: Ggantija, Hagar Qim, Mnajdra, Ta'Hagrat, Skorba, Tarxien and the 200 metre long cave of Ghar Dalam. Sites of the mysterious so-called Chart Ruts were visited, as well as the National Museum of Archaeology in Valletta. On the trip in June 2010, the main attention was given to Mnajdra. The near by man-made water tanks were also visited as well as the prehistoric sanctuary and cemetery of the Hypogeum catacombs. The database of the Naval Oceanography Portal was used to establish the position of the celestial bodies.<sup>1</sup> All times are listed in UT times.

### **The Megalithic temple culture**

What is generally known as the Maltese Temple Period of freestanding constructions, occurred between 4100 and 2500 BCE.<sup>2</sup> Zammit suggests that around 1000 years after

---

<sup>1</sup> Portal Naval Oceanography, (The U.S. Naval Observatory (USNO)), <http://www.usno.navy.mil/astronomy>, [hereafter Naval].

<sup>2</sup> Reuben Grima David Trump, Frank Ventura, Anthony Pace, Anthony Bonanno, Ann Monsarrat, Alex Torpiano, Daniel Clark, Michael Hughes-Clarke, Richard England, *Malta before History*, ed. Daniel Cilia (Sliema, Malta: Miranda Publishers, 2004), [hereafter Trump, History], pp. 20-5.

the first settlers arrived in Malta, probably from Sicily around 5000 BCE,<sup>3</sup> 'these religious people started with the erection of megalithic temples which at that time were as unique as they are today'.<sup>4</sup> According to Giulio Magli, naming these megalithic structures as 'temples', has no written source in support of this assumption.<sup>5</sup> Naming them 'temples' is circumstantial, as there is a lack of reliable evidence as to why these monuments were erected. The temple period lasted for approximately a millennium – then suddenly went into inexplicable decline around 2500 BCE.<sup>6</sup> How and why this culture came to an end and why nothing survived the temple period besides the megalithic structures is as much a mystery as to how and why it began. According to Parker, there are no traceable links between the temple period inhabitants and the newcomers.<sup>7</sup> Pottery, tools, weapons, burial practises and even the shape of the inhabitants' heads, differ. Originally there may have been approximately 40 temples on Malta and Gozo of which 20 remain today.<sup>8</sup> Most temples remain in an acceptable physical condition for the research into astronomical orientation and alignments, as executed by both Frank Ventura<sup>9</sup> and John Cox,<sup>10</sup> although Heggie finds it improbable that the physical condition of the structures remain preserved well enough to merit the claimed accuracy of one minute of arc for the azimuth.<sup>11</sup> On the other hand, their assumptions raise further unanswered questions. From where and how did the Neolithic Maltese Man acquire the knowledge, inspiration, and skills to construct monuments of such magnitude? Transporting and erecting trilithon limestone blocks, some of them six metres long, three metres wide and one metre thick, with an estimated total weight to be in excess of 30 tons, is not only a matter of hard labour, but of idealism and vision, belief in a final cause, focused dedication and above all, a social infrastructural organization and as Renfrew suggests, 'considerable managerial resources'.<sup>12</sup> The Neolithic societies did not, in general, leave much trace of the individuals involved, but a form of collective work through group achievement.<sup>13</sup> Stone monuments played a conspicuous role among group-oriented prehistoric societies to which the temples of Malta are further evidence.<sup>14</sup> Eliade, a historian of religious studies, maintains that stone is a manifestation of power and its sacred value is due to its being part of

---

<sup>3</sup> Trump David H., *Malta Prehistory and Temples* (Malta: Midsea Books, 2002), [hereafter Trump, Malta], p. 23.

<sup>4</sup> Zammit, *Temples*, pp. 5-6

<sup>5</sup> Magli Giulio, *Mysteries and Discoveries of Archaeoastronomy from Giza to Easter Island* (New York: Copernicus Books, 2009), [hereafter Magli, Archaeoastronomy], pp. 49-50.

<sup>6</sup> Magli, *Archaeoastronomy*, p. 49

<sup>7</sup> Parker, *Ancient*, pp. 42-4.

<sup>8</sup> Parker, *Ancient*, p. 2.

<sup>9</sup> Frank Ventura Michael Hoskin, Giorgia Fodera Serio, "The Orientations of the Temples of Malta," *Science History Publications Ltd.* xxiii(1992): pp. 107-19.

<sup>10</sup> Cox John, "The Orientations of Prehistoric Temples in Malta and Gozo," *University of Texas Press* xvi(2001): [hereafter Cox, Orientations], pp. 24-37.

<sup>11</sup> Heggie D. C., *Archaeoastronomy in the Old World*, ed. D. C. Heggie (Cambridge: Cambridge University Press, 1982), p. 132.

<sup>12</sup> Renfrew, *Human Mind*, p. 152.

<sup>13</sup> Renfrew, *Human Mind*, pp. 151-2.

<sup>14</sup> Renfrew, *Human Mind*, pp. 152-3.

something beyond itself, never its own actual existence.<sup>15</sup> 'Above all, stone *is*', concludes Eliade, suggesting that due to its never changing existence, grandeur, and hardness, it manifests the presence of predictability in its absolute mode of being, which transcends human uncertainty.<sup>16</sup>

As suggested by several authors, the assumption that the first Maltese settlers came from Sicily and yet there are no megalithic temples in Sicily bears further intrigue.<sup>17</sup> Generic stone structures of a later date can be found in Sardinia and Menorca, however, an orientation towards the southeast is apparently to be lacking.<sup>18</sup> So from where could this Maltese megalithic culture possibility have originated? This question becomes even more intriguing taking Renfrew's opinion into account, that the Maltese temples, 'can now be recognized as the earliest surviving free-standing stone structures in the world'.<sup>19</sup> From more recent excavations in the 1990's, in Göbekli Tepe, situated in Southern Turkey, part of Upper Mesopotamia, the German archaeologist Klaus Schmidt claims that the whole area was used for the construction of megalithic architecture serving regular ritual functions, with no claim for domestic use.<sup>20</sup> According to Andrew Curry, Schmidt claims these artefacts to be the world's oldest monumental structures, retro dating megalithic construction back to 11.000 BCE,<sup>21</sup> however, this paper has not been able to provide evidence for any intentional alignments or orientation towards celestial bodies from the Göbekli Tepe site.

Apparently the Maltese megalithic culture did not come from the west and north suggesting the east or the south, or conversely, the early Maltese inhabitants invented the culture themselves, although this is questionable as traces of similar temples and religious symbolism can be found within several other prehistoric societies throughout the Neolithic world.

In limiting these observations solely to the geographical, anthropological and cultural West, we find a culture of cosmic theology in Babylon, temples used for religious practices and the *Ziggurat*, literally cosmic mountains.<sup>22</sup> According to Baigent, in the Sumerian city of Eridu, archaeological excavations reveal temples used for religious practices from as early as 5000 BCE.<sup>23</sup>

---

<sup>15</sup> Eliade Mircea, *Patterns in Comparative Religion* (London: University of Nebraska press, 1958), [hereafter Eliade, *Patterns*], p. 216.

<sup>16</sup> Eliade, *Patterns*, p. 216.

<sup>17</sup> Parker, *Ancient*, p. 35.

<sup>18</sup> Milone David H. Kelly Eugene F., in *Exploring Ancient Skies: An Encyclopedic Survey of Archaeoastronomy* (New York: Springer, 2005), p. 201.

<sup>19</sup> Renfrew, *Human Mind*, p. 49.

<sup>20</sup> Schmidt Klaus, "Göbekli Tepe, Southeastern Turkey: A Preliminary Report on the 1995-1999 Excavations," *Paléorient* 26, no. 1 (2000): [hereafter Schmidt, Göbekli, pp. 44-8.

<sup>21</sup> Curry Andrew, "Seeking the Roots of Ritual," *Science* 319(2008): p. 278.

<sup>22</sup> Eliade Mircea, *The Sacred and the Profane: The Nature of Religion*. (Orlando: Harcourt, Inc., 1959), [hereafter Eliade, *Sacred*], p. 40.

<sup>23</sup> Baigent, *Babylon*, p. 27.

Another area of prehistoric civilization where megalithic structures were built is Nabta Playa in southern Egypt.<sup>24</sup> McKim Malville suggests that Nabta began to function as a regional ceremonial centre during the Middle Neolithic period (6100-5500 BCE), conducting complex ideology relating to death, earth, water, skies and cattle and had an advanced organizational and social system not previously seen.<sup>25</sup> The megalithic period lasted for approximately 800-900 years from 4500 to 3600 BCE, whereupon the area was abandoned due to drought and climate change. Malville concludes that there is substantial evidence of astronomical observations of their megaliths. Human and cattle burial places were often oriented towards the northern region of the sky.<sup>26</sup> In separate writings Campion<sup>27</sup> and Malville<sup>28</sup> both indicate that members of the advanced civilization of Nabta Playa may have settled further north on the African continent, possibly as far as the Mediterranean region. They might have been ancestors not only to the Egyptian solar state, but heirs to megalithic constructions in the Mediterranean region and the West.<sup>29</sup> It is worthwhile observing that the Nabta Playa megalithic culture came to a decline around the same time as a similar culture emerged in Malta at the first half of the third millennium BCE.<sup>30</sup>

### **Cosmic Megalithic temple religion**

The very first inhabitants of Malta may have dwelt in caves as indicated by the excavation of pottery and utensils.<sup>31</sup> According to Lewis-Williams and Pearce, Upper-Palaeolithic cave peoples', 'physical travel through caves was probably identical to psychic travel through the tiered cosmos'.<sup>32</sup> When the Neolithic societies became sedentary, they started farming and settled into villages, constructing exemplars of the cosmos above the ground in order to gain greater control and better understanding of it. In this way they could adjust their beliefs of the universe in line with their social and personal requirements and needs. For them, cosmos was not just a concept, however, but a live, explored reality.<sup>33</sup> The temples constituted an element of upward direction to ensure their communication with the gods,<sup>34</sup> and the link between heaven and earth.<sup>35</sup> As Eliade suggests, 'the ritual taking procession must repeat cosmogony', and continues, 'everything that is not "our world" is

---

<sup>24</sup> J. McKim Malville et al., "Astronomy of Nabta Playa," *African Cultural Astronomy - Current Archaeoastronomy and Ethnoastronomy Research in Africa* (2008), [hereafter Malville, Nabta Playa], p. 134.

<sup>25</sup> Malville, *Nabta Playa*, pp. 132-3.

<sup>26</sup> Malville, *Nabta Playa*, p. 141.

<sup>27</sup> Campion, *Dawn*, pp. 20-1.

<sup>28</sup> Private correspondence from Malville to Lomsdalen, dated 26th of May 2010.

<sup>29</sup> Campion, *Dawn*, p. 21.

<sup>30</sup> Kröpelin Rudolph Kuper and Stefan, "Climate Controlled Holecene Occupation in the Sahara: Motor of Africa's Evolution," *Science* 313(2006): p 806.

<sup>31</sup> Trump, *Malta*, p. 31.

<sup>32</sup> Pearce David Lewis-Williams and David, *Inside the Neolithic Mind: Consciousness, Cosmos and the Realm of the Gods* (London: Thams & Hudson Ltd., 2005), [hereafter Lewis-Williams and Pearce, *Neolithic Mind*], pp. 84-5.

<sup>33</sup> Lewis-Williams and Pearce, *Neolithic Mind*, p. 11.

<sup>34</sup> Eliade, *Sacred*, p.26.

<sup>35</sup> Eliade, *Sacred*, p.39

not yet a world'.<sup>36</sup> This paper argues that one of the fundamental reasons behind archaic societies trying to understand the cosmos, may have been an urge to transform chaos into order. By understanding the universe through attempting to fix its limits, man was able to establish an order of the world. The setting up of an altar, is, on a miniature scale, the act of reproducing the Creation, making it part of a new territory and 'cosmicizing it', as Eliade claims.<sup>37</sup> Eliade further maintains that human beings cannot live in chaos. By settling in unknown territories gave credence to establishing a new order.<sup>38</sup> People who understood this concept had power in their hands and were more than likely the archaic societies' priests, leaders and ruling class.<sup>39</sup>

In Malta, evidence of celestial observation is found in a fan-shaped stone slab at the Tal Qadi site, with radiating lines, stars and a crescent moon, which could have been a broken part of a circle.<sup>40</sup> At the site Hagar Qim, a next door neighbour to Mnajdra, a slab indicating a solar wheel has been excavated.<sup>41</sup> The carving at the Tarxien temple of a bull over a pig with 13 suckling piglets associated with the 13 lunar months suggests another manifestation of cosmic orientation.<sup>42</sup> According to Campion, the Mnajdra temple appears to be aligned towards the heliacal rising of the star group Pleiades, correlating to the same imagery of the bull and Pleiades, as found in the cave of Lascaux in France,<sup>43</sup> dated around 15,000 BCE.<sup>44</sup>

There is evidence to suggest that women played an eminent role in prehistoric Maltese religion as many female figurines have been found in the temples. They were often shown with curvaceous body parts, exaggerated hips, breasts, buttocks and sometimes with pubic triangles. Most interpreters regard them as earth-mother goddesses related to fertility and life renewal.<sup>45</sup> In the Tarxien temple, a triple phallic carving was found in addition to other objects regarded as 'occult', however, no evidence of sexual practices have ever been found, though Parker hypothesizes that it could have been part of a religious temple religion, blessing fertility.<sup>46</sup> According to Krupp the Maltese temple culture incorporated the same themes of death and renewal as the prehistoric passage tomb Newgrange (3200 BCE) in Ireland, and that the alignment with the sky and the sun may have played an active fertility role, and that the affiliation with the temple, and that the spirits of the dead can be associated with the sanctuary and cemetery catacombs of the

---

<sup>36</sup> Eliade, *Sacred*, pp. 31-2.

<sup>37</sup> Eliade, *Sacred*, p. 30.

<sup>38</sup> Eliade, *Sacred*, p. 34.

<sup>39</sup> Aveni Anthony, *People and the Sky: Our Ancestors and the Cosmos* (London: Thames & Hudson, 2008), [hereafter Aveni, *Sky*], p. 210.

<sup>40</sup> Parker, *Ancient*, p. 19.

<sup>41</sup> Trump, *History*, p. 120.

<sup>42</sup> Campion, *Dawn*, p. 21.

<sup>43</sup> Campion, *Dawn*, p. 21.

<sup>44</sup> Campion, *Dawn*, p. 11.

<sup>45</sup> Krupp E. C., *Skywatchers, Shamans & Kings: Astronomy and the Archaeology of Power* (New York: John Wiley & Sons, Inc., 1997), [hereafter Krupp, *Skywatchers*], p.129.

<sup>46</sup> Parker, *Ancient*, pp. 16-7.

Hypogeum in Malta<sup>47</sup> where according to Evans, Zammit estimated a total number of 7000 individuals may possibly have been buried.<sup>48</sup> Further symbolism found on the Maltese temple walls used by several prehistoric societies, are the engravings of the spirals, which may represent everlasting continuance, the renewal of life and fertility.<sup>49</sup> Martin Brennan concludes a more cosmological interpretation to the symbolism and suggests that, in archaic astronomy, the heavens were usually viewed as spiralling as the sun moves in a clockwise spiral and the stars revolve anti-clockwise. Both of these directions are seen on the stone engravings.<sup>50</sup> The phases of the moon gave the reassurance of survival and rebirth, as it was its rhythmical movements that enabled mankind to connect and relate to birth, becoming, death, water, plants, women, fecundity and immortality. The sun on the other hand, does not share the same symbolism in becoming as the moon, as its rhythmical behaviour never alters.<sup>51</sup> The solar symbolism is often, in prehistoric cultures, connected to autonomy, power, sovereignty and, as Eliade says, 'a process of solarization of the supreme beings'.<sup>52</sup> The movements of the two luminaries gave the archaic man confidence of resurrection, that the world would be recreated, reborn and an assurance that a new period of time and life would begin again. Since the temple represents the image of the world, it can also imply a temporal manifestation, with the erection of a fire altar to sanctify the world and to place it within a sacred time frame.<sup>53</sup> For the religious man, every creation and every existence begins in time, and before a thing prevails, its particular time could not exist. To quote Eliade once more, 'Time gushes forth with the first appearance of a new category of existence'.<sup>54</sup>

### **Construction and layout of the Mnajdra temple**

A prominent striking feature of these pre-historic Maltese temples is the curvaceousness of their walls. It is hard to find an ordinary corner anywhere as chambers and apses are arranged in semi-circles appearing as cloverleaves with a central corridor as the stem. What seems to be intentionally constructed in a rectangular space, is the niche of the altar, centrally erected in the temple hallway or in one of the apses. The soft and workable Globigerina limestone was the material used for the interior walls, while the hard and sharp Coralline limestone blocks were used for the outside skirting. Gerald Formosa suggests that the monuments in Malta are laid out with exact precision, complicated geometrical constructions, and reflect a knowledge of advanced mathematics.<sup>55</sup> Formosa refers to Alexander Thom's type of research of the prehistoric unit length of a megalithic yard (MY = 829 mm), and insists that the Mnajdra slab is 'exactly three megalithic yards long and

---

<sup>47</sup> Krupp, *Skywatchers*, pp. 132-3.

<sup>48</sup> Evans, *Prehistoric*, p. 58.

<sup>49</sup> Parker, *Ancient*, pp. 20-1.

<sup>50</sup> Brennan Martin, *The Stars and Stones* (London: Thames and Hudson Ltd., 1983), p. 189.

<sup>51</sup> Eliade, *Sacred*, pp. 156-7.

<sup>52</sup> Eliade, *Sacred*, p. 157.

<sup>53</sup> Eliade, *Sacred*, pp. 73-4.

<sup>54</sup> Eliade, *Sacred*, p. 76.

<sup>55</sup> Formosa Gerald J., "The Megalithic Monuments of Malta," (Vancouver, Canada: Skorba Publisher, 1975), p. 21.

Sophia Centre for the Study of Cosmology in Culture, The University of Wales, Lampeter, UK  
measures one and a half megalithic yards to the centre of the carved-out circle.' This survey has not been able to verify these allegations.

The Mnajdra monument consists of three temples and according to this survey, fits into the above-mentioned general description of the physical layout of Maltese temples. Most Maltese temples seem to be placed on a southeast facing slope, Hagar Quim on a hill top and Mnajdra in a valley some 600 metres below Hagar Qim, nevertheless, being by the sea, probably placed emphasis on the importance of water and fertility.<sup>56</sup> Zammit dates the monument at the end of the third millennium BCE,<sup>57</sup> The site consists of three distinct buildings as shown in Fig. 1,<sup>58</sup> constructed in various time phases, and according to Evans, of the two main buildings, the southern is the oldest, dating back to the Tarxien period (3000-2500 BCE),<sup>59</sup> however, its construction could have been initiated during the Ggantija phase.<sup>60</sup> Trump considers the smaller and simpler north-east temple as being the oldest, from the Ggantija phase (3600-3000 BCE).<sup>61</sup>

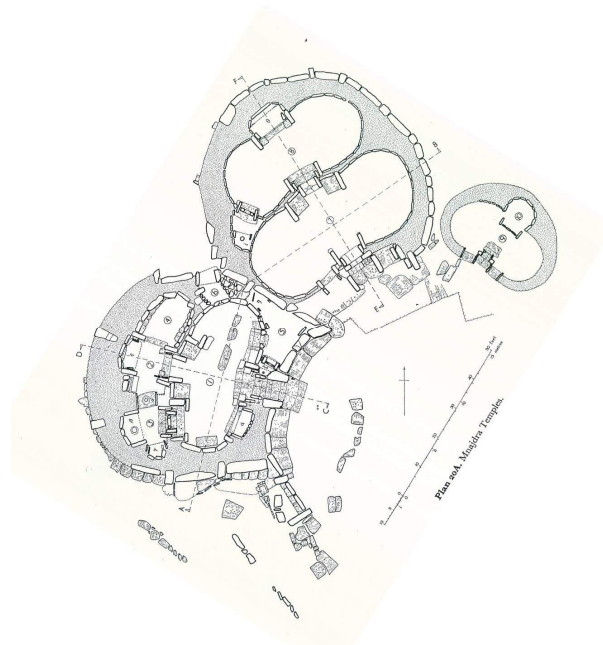


Fig 1, Plan of the Mnajdra Temple enclosure.

Of the three temples, this survey will concentrate on the south temple, sometimes called the Sun Temple due to its apparent alignment with the sunrises of the Equinox and

<sup>56</sup> Vassallo Mario, "Sun Worship and the Magnificent Megalithic Temples of the Maltese Islands," *The Sunday Times of Malta*, no. 23rd January 2000, pp.40-1, 30th January 2000, pp. 44-5, 6th February 2000, pp.36-7. (2000): p. 1.

<sup>57</sup> Zammit, *Temples*, p. 49.

<sup>58</sup> Evans, *Prehistoric*, Plan 20A. Mnajdra Temples

<sup>59</sup> Evans, *Prehistoric*, p. 103.

<sup>60</sup> Trump, *History*, p. 128.

<sup>61</sup> Trump, *Malta*, p. 148.

Solstice.<sup>62</sup> The entrance to the south temple as measured by GPS delivered a mean geographical position of 35°N49'600" and 14°E26'179".

### Mnajdra South - Solar Orientation

It is worthwhile noting that all three Mnajdra temples have undergone several phases of restoration work.<sup>63</sup> To what extent this has altered the original layout of the enclosure, remains an open question. The word 'orientation' has, in archaeoastronomy, taken the meaning of a direction along the main axis of the temple and out through the doorway,<sup>64</sup> while 'alignment' means the axis of an archaeological site's orientation towards an astronomical target.<sup>65</sup> According to Ventura, out of 26 studies, temple axis orientations on Malta and Gozo, 20 had a clear concentration of azimuth 120° and 230° - roughly between southeast and southwest.<sup>66</sup> Trump on the other hand, maintains that an orientation can be found in 25 monuments altogether, and that 'Clearly the builders saw some significance in their alignments.'<sup>67</sup> The south Mnajdra temple differs from the other two, by having an orientation facing due east towards the Equinox sunrise, whereupon Venura raises the question whether the temple was deliberately or accidentally constructed as such.<sup>68</sup> According to Cox, the Mnajdra South Temple remains 'the only candidate for an open orientation towards the direction of a significant sunrise or sunset (meaning solstice or equinox)', as shown in Fig. 2.<sup>69</sup> Cox maintains further that in the period 3000 BCE the heliacal rising of the Pleiades would have aligned close to the sunrise of the spring equinox, 'a remarkable astronomical coincidence in itself',<sup>70</sup> as previously assumed by Campion.

---

<sup>62</sup> Trump, *Malta*, p. 151.

<sup>63</sup> Trump, *History*, p. 138-9.

<sup>64</sup> Cox John, "Observations of Far-Southerly Moonrise from Haga Qim, Ta'hagrat and Ggantija Temples from May 2005 to June 2007," *Cosmology Across Cultures, ASP Conference Series* 409(2009): p. 344.

<sup>65</sup> Frederic P. Miller Agnes F. Vandome, *Archaeoastronomy*, ed. John McBrewster (Beau Bassin, Mauritius: Alphascript Publishing, 2009), p. 7.

<sup>66</sup> Frank Ventura Michael Hoskin, Giorgia Fodera Serio, "The Orientations Fo the Temples of Malta," in *NASA Astrophysics Data System*, ed. xxjii JHA (Science History Publications Ltd, 1992), [hereafter Ventura, Orientations], p. 109.

<sup>67</sup> Trump, *Malta*, pp. 199-201.

<sup>68</sup> Ventura, *Orientations*, pp. 109-111.

<sup>69</sup> John Cox Tore Lomsdalen, "Prehistoric Cosmology: Observations of Moonrise and Sunrise from Ancient Temples in Malta and Gozo " *Journal of Cosmology* 9, no. July (2010).

<sup>70</sup> John Cox, "Temples."



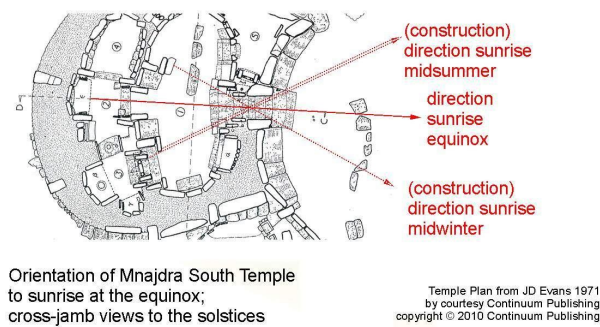


Fig. 2, Solar alignments of Mnajdra South to sunrise.

Mnajdra south, a four-apse construction, has an open orientation towards an angular eastern horizon at a distance of about 600 metres, with an elevation of about 60 metres according to GPS measurements and was mathematically calculated to be,  $\alpha = 4^{\circ} 42' 52,82''$ , Appendix 1, which correlates to Cox's suggestion, 'about  $4^{\circ}$  elevation'.<sup>71</sup>

Sunrise above Eastern horizon at Mnajdra South. Data service of Naval Oceanography Portal (USNO)				
	UT time	Alt.	Az.	Dec.
<b>19MAR10</b>				
Sunrise	05:08	-0.8°	90.2°	-0.36°
Upper disk	05:31	4.1°	93.5°	-0.36°
Full disk	05:40	5.8°	94.9°	-0.36°
<b>23JUN10</b>				
Sunrise	03:47	-0.8°	60.0°	+23.26°
Upper disk	04:22	5.6°	65.0°	+23.26°
Full disk	04:34	7.8°	66.6°	+23.26°

Fig. 3. Astronomical data for Sunrise in Malta, upper and full sun disk above Mnajdra horizon.

### Spring Equinox

On the day of the Equinox the world is divided into four parts; east and west, due to the position of the sunrise and sunset, while north and south establish when the sun stands highest in the sky, which was significant to pre-historic sky watchers in establishing the cardinal directions.<sup>72</sup> During the equinox there is rapid movement of the sun along the horizon; one solar diameter or half a degree each day.<sup>73</sup> During the site survey, on three days out of four, the altar in the back niche, was fully illuminated due to good weather conditions. The altar itself is topped with a slab measuring 2.46 metres wide, 1.4 metres

<sup>71</sup> Cox, *Orientations*, p. 30.

<sup>72</sup> Malville J. McKim, *A Guide to Prehistoric Astronomy in the Southwest* (Boulder, CO.: Johnson Books, 2008), [hereafter Malville, *Astronomy*], pp. 36-7.

<sup>73</sup> Cox, *Sunrise*, p. 10.

deep, 30 cm thick, reaching a total height of 1.35 metres above ground, while the total width of the back niche is 2.77 metres. The distance from the front entrance to the back of the altar niche is 15.4 metres. When the upper part of the disk of the sun becomes visible above the horizon, the first rays hit the southern part of the altar, through the doorway, Fig. 4; when the full sun disk becomes visible, the entire corridor, as well as the altar, are illuminated, Fig 5. The event lasts around 20 minutes. Paul Micallef, a Maltese government land surveyor and cartographer, claims that 'the niche is fully illuminated by the rising sun at the equinoxes'.<sup>74</sup> With the help of GPS, the azimuth due east at 90° was identified at the elevated horizon. When the upper part of the sun disk was visible on the Mnajdra horizon illuminating the altar and the corridor, it could be established by means of observational astronomy, probably similar to the prehistoric astronomer, that the sun had moved about six disk diameters, or about 3° further south,<sup>75</sup> corresponding to azimuth 93°, equivalent to Naval Oceanographic Portal's data service of Azimuth 93.5°, Fig. 3.<sup>76</sup> Cox maintains that casual observation of the sun rising towards the centre of the field, would be sufficient to fix the time of the equinox within a day or two.<sup>77</sup>



Fig. 4. 19MAR10, Sunrise from the altar at 05:31 UT.  
Photo by M. Vassallo



Fig. 5. 19MAR10, illumination of the altar at 05:38 UT. Photo by T. Lomsdalen

### Summer Solstice

The word Solstice means 'stand still'; at the Summer Solstice the sun rests at its most northerly position on the horizon.<sup>78</sup> The sunrise held more or less the same position for the entire week of the field survey. The distance from the entrance to the left hand vertical orhtostat measured 9.2 metres being symmetrical to the apparent illumination of the right hand vertical orhtostat for winter solstice. Due to the obstruction of divisional stone walls

<sup>74</sup> Micallef Paul I., "Mnajdra Prehistoric Temple: A Calendar in Stone," (Malta: Union Print Co. Ltd, 1990), [hereafter Micallef, Mnajdra], pp. 24-5.

<sup>75</sup> Malville, *Astronomy*, p. 36.

<sup>76</sup> Naval, accessed 12 June 2010.

<sup>77</sup> Cox, *Sunrise*, p. 10.

<sup>78</sup> Malville, *Astronomy*, p. 37.

constructed by local landowners, an attempt to identify the sunrise position at the Mnajdra horizon was hampered. From the investigation, the azimuth at upper sun disk was visually estimated to be about  $66^\circ$ , based on compass and GPS readings. Albrecht maintains the Summer solstice azimuth to be  $65^\circ$ ,<sup>79</sup> and correlates to data in Fig. 3. This research programme concluded that at the time of the sunrise over the local horizon, the southern edge of the left hand vertical orhtostat was illuminated by the sun, Fig. 6 A & B. From this position, the sunrise could also be seen in a cross-jamb view, Fig 7. A small light (Fig. 6B) hit the niche of the chamber behind the orhtostat. However, in investigating the position of the supporting stones of the lintel between which the light passed, it is difficult to conclude whether or not it was the desired intention of the temple architects to illuminate the niche.



Fig. 6A. Offset illumination of the left hand side orhtostat, cross-jamb view from the entrance at 04:27 UT.

Fig. 6B. Offset illumination of the orhtostat and the back niche from the left apse at 04:32 UT.

Fig. 7. Cross-jamb view of the sunrise from the edge of the left hand orhtostat at 04:25 UT.

All pictures by T. Lomsdalen.

### Winter Solstice

This research programme does not include the winter solstice sunrise. Nevertheless, the moon on the June 26<sup>th</sup>, 2010 at 18:36 UT rose at a declination of  $-24.05^\circ$ ,<sup>80</sup> which is the same as the winter solstice sunrise in 3000 BCE.<sup>81</sup> The investigation carried out was to see whether the light of the moonrise would illuminate the north side of the right hand vertical orhtostat. By GPS measurements the moon rose at an azimuth of about  $119^\circ$ , which is equivalent to Albrecht's alignment of  $120^\circ$ ,<sup>82</sup> was visually established through this field research, from a cross-jamb view inside the temple to an previously recognized

<sup>79</sup> Albrecht Klaus, *Maltas Tempel: Zwischen Religion Und Astronomie* (Wilhelmshorst, Germany: Sven Näther, 2004), [hereafter Albrecht, Malta], p. 56.

<sup>80</sup> Naval, accessed 12 June 2010.

<sup>81</sup> Private talks with Cox in Cambridge, UK on 14MAY10 and various email correspondance.

<sup>82</sup> Albrecht, *Malta*, p. 56

position on the horizon at bearing 119°. <sup>83</sup> However, due to haze and still daylight (sunset at 18:25 UT), the actual moonlight was not strong enough to illuminate the orhtostat, therefore this observation remains indicative and not conclusive. Further research should be conducted in order to make a statement related to this alignment.

### Intentionality

Whether the solar orientation was intentionally minded by the temple builders in order to keep track of time and seasons, or religious festivals, burials and sacrifices, has not been proven through this study. The question of whether it was used for dwelling seems unlikely, as nothing of general personal comfort or privacy supports such a view. <sup>84</sup> It is unlikely to have been utilised as a tomb as no burial sites have been discovered. <sup>85</sup>

According to Zammit, everything appears to facilitate animal sacrifices, burnt offerings and ritual oracles, and through excavating highly decorative pottery, gives the monument an impression of a place of worship. <sup>86</sup> That the first apse on the right hand side has what Trump calls, 'an oracle hole', could back up the theory that Mnajdra was used as a multi purpose temple. <sup>87</sup> Based on the hypothesis that the solar alignment of the equinox and the solstice were as evident in 3,000 BCE as they are today, and that the temple builders intentionally oriented the monument towards the rising of the sun at these periods, the question still remains – for what was their purpose ? Micallef suggests that the temple 'is a solar observatory which predicts the equinoxes and solstices,' <sup>88</sup> a statement supported by Magli. <sup>89</sup> Aveni suggests a question of keeping track of time. <sup>90</sup> When the Neolithic Maltese man became sedentary farmer-herders, the need for following the celestial cycles, time and seasons became important in harvesting and agriculture. <sup>91</sup>

As previously analyzed in this essay, time also has a higher sacred value than a physical interval between one moment and the next. As Eliade suggests, time could also indicate, through the rhythms of the celestial bodies, a revelation and a manifestation 'of a fundamental sacred power behind the cosmos.' <sup>92</sup> Renfrew claims that archaic Malta could have been a 'chiefdom' society, identified by a marked hierarchy serving a social group of between 500 and 2,000 per temple. <sup>93</sup> If these enclosures were temples, then probably, there would also have been a priestly class, which assumed, or was granted, a superiority

---

<sup>83</sup> Trump, *History*, p. 137.

<sup>84</sup> Zammit, *Temples*, p. 61.

<sup>85</sup> Zammit, *Temples*, p. 61.

<sup>86</sup> Zammit, *Temples*, p. 61.

<sup>87</sup> Trump, *Malta*, p. 150.

<sup>88</sup> Micallef, *Mnajdra*, p. 41.

<sup>89</sup> Magli, *Archaeoastronomy*, pp. 62-3.

<sup>90</sup> Aveni, *Sky*, p 193.

<sup>91</sup> Magli, *Archaeoastronomy*, p. 3.

<sup>92</sup> Eliade, *Patterns*, p. 388.

<sup>93</sup> Renfrew Colin, *Before Civilization: The Radiocarbon Revolution and Prehistoric Europe* (London: Pimlico, 1973), [hereafter Renfrew, *Civilization*], p. 170.

in society,<sup>94</sup> a priesthood that specialized in ceremonial rituals,<sup>95</sup> and the promoter of centralized redistribution of cosmic influence to the population. This paper suggests that by observing the sunrise of the Summer solstice and the Spring equinox, the local priest of Mnajdra would gather his local congregation around these times, to demonstrate his cosmic power through the illumination of predetermined sacred area from the rays of the early morning sun crossing the eastern horizon. This moment in time, was probably as magical 5,000 years ago, as it is today.

## Conclusion

Given the evidence argued through this field study and research programme, there remain more questions than answers regarding the Maltese temple period; who were the builders, how it came about, its intent and why it inexplicably ended abruptly, without leaving any further evidence than the structures themselves. Artefacts retrieved through archaeological excavations have not only been useful for historical dating, but also in establishing an anthropological imagery of the Maltese Neolithic man's pattern of social behaviour, lifestyle, religious and cultural perceptions, as well as cosmological awareness and orientation. Based on observations of the sunrises at the Spring Equinox and the Summer solstice, the Mnajdra south temple, has an orientation towards the East. The sunrise alignments in question illuminate specific areas of the temple which may have had sacred connotations, indicating their use in implementing religious rituals and sun worshipping. For modern man, these specific sunrise alignments and observations herald the beginning of a new cycle of the seasons of the year. Nevertheless, to conclude that the Mnajdra south temple was built as a solar calendar, as well as proving its true intentionality, necessitates further research.

## Bibliography

- Albrecht. *Malta's Temples: Zwischen Religion Und Astronomie*. Wilhelmshorst, Germany: Sven Näther, 2004.
- Aveni. *People and the Sky: Our Ancestors and the Cosmos*. London: Thames & Hudson, 2008.
- Brennan. *The Stars and Stones*. London: Thames and Hudson Ltd., 1983.
- Cox. "Observations of Far-Southerly Moonrise from Haga Qim, Ta'hagrat and Ggantija Temples from May 2005 to June 2007." *Cosmology Across Cultures, ASP Conference Series* 409 (2009): 5.
- Cox. "The Orientations of Prehistoric Temples in Malta and Gozo." *University of Texas Press* xvi (2001): 24-37.
- Cox John, Lomsdalen Tore. "Prehistoric Cosmology: Observations of Moonrise and Sunrise from Ancient Temples in Malta and Gozo " *Journal of Cosmology* 9, no. July (2010).
- Curry. "Seeking the Roots of Ritual." *Science* 319 (2008): 278280.
- Eliade. *Patterns in Comparative Religion*. London: University of Nebraska press, 1958.
- Eliade. *The Sacred and the Profane: The Nature of Religion*. Orlando: Harcourt, Inc., 1959.
- Formosa. "The Megalithic Monuments of Malta." Vancouver, Canada: Skorba Publisher, 1975.

---

<sup>94</sup> Parker, Ancient, pp. 18-9.

<sup>95</sup> Renfrew, *Civilization*, p. 172.

Tore Lomsdalen

Archaeoastronomy, Summer 2010

Sophia Centre for the Study of Cosmology in Culture, The University of Wales, Lampeter, UK

Frank Ventura. "The Orientations Fo the Temples of Malta." In *NASA Astrophysics Data System*, edited by xxjii JHA: Science History Publications Ltd, 1992.

Frank Ventura. "The Orientations of the Temples of Malta." *Science History Publications Ltd*. xxjii (1992): 107-19.

Frederic P. Miller. *Archaeoastronomy*. Edited by John McBrewster. Beau Bassin, Mauritius: Alphascript Publishing, 2009.

Heggie. *Arachaeoastronomy in the Old World*. Edited by D. C. Heggie. Cambridge: Cambridge University Press, 1982.

Kröpelin. "Climate Controlled Holecene Occupation in the Sahara: Motor of Africa's Evolution." *Science* 313 (2006): 803-07.

Krupp. *Skywatchers, Shamans & Kings: Astronomy and the Archaeology of Power*. New York: John Wiley & Sons, Inc., 1997.

Magli. *Mysteries and Discoveries of Archaeoastronomy from Giza to Easter Island*. New York: Copernicus Books, 2009.

Malville. *A Guide to Prehistoric Astronomy in the Southwest*. Boulder, CO.: Johnson Books, 2008.

Micallef. "Mnajdra Prehistoric Temple: A Calendar in Stone." Malta: Union Print Co. Ltd, 1990.

Milone. In *Exploring Ancient Skies: An Encyclopedic Survey of Arcaeoastronomy*. New York: Springer, 2005.

Pearce. *Inside the Neolithic Mind: Consciousness, Cosmos and the Realm of the Gods*. London: Thams & Hudson Ltd., 2005.

Portal. The U.S. Naval Observatory (USNO).

Renfrew. *Before Civilization: The Radiocarbon Revolution and Prehsitortic Europe*. London: Pimlico, 1973.

Reuben Grima. *Malta before History*. Edited by Daniel Cilia. Sliema, Malta: Miranda Publishers, 2004.

Schmidt. "Göbekli Tepe, Southeastern Turke: A Preliminary Report on the 1995-1999 Excavations." *Paléorient* 26, no. 1 (2000): 45-54.

Trump. *Malta Prehistory and Temples*. Malta: Midsea Books, 2002.

Vassallo. "Sun Worship and the Magnificent Megalithic Temples Fo the Maltese Islands." *The Sunday Times of Malta*, no. 23rd January 2000, pp.40-1, 30th January 2000, pp. 44-5, 6th February 2000, pp.36-7. (2000).

## Appendices

Appendix 1. Calculation of the angel of the Eastern horizon at Mnajdra.