Mnajdra Was Not Built in a Day

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Abstract
Based on archaeological evidence the Mnajdra complex, which consists of three distinct structures, seems to have been built and used throughout the Ggantija (3,600 – 3,000 BC) and Tarxien (3,000 – 2,500 BC) periods. As chronology is mainly based on typological and not on stratigraphic evidence, the precise dating of the Mnajdra buildings is not free of difficulty. It is generally acknowledged that the small trefoil temple was the first to be built, due to its simplicity, and that the middle temple was the last. The lower temple would have been constructed in a time span between the other two. However, this temple shows signs of more than one building phase and part of it could have been constructed before, or contemporarily to, the small trefoil temple. Based on field observations and horizon astronomy, this paper proposes a redefined building sequence for the lower temple, which was conceived of and built over a thousand year period. Where archaeology alone does not provide any conclusive evidence or indication, archaeoastronomy can provide supplementary data to help establish a possible building chronology.

KEYWORDS: archaeoastronomy, Malta, Neolithic, temples, orientation, chronology

POVZETEK
Na podlagi arheoloških dokazov se zdi, da je bil kompleks Mnajdra, ki ga sestavljajo tri ločene strukture, zgrajen in uporabljan v obdobjih Ggantija (3600 do 3000 pr. n. št.) in Tarxien (3000 do 2500 pr. n. št.). Ker kronologija temelji ne tipoloških in ne na stratigrafskih dokazih, je natančno datiranje zgradb v Mnajdri težavno. Splošno mnenje je, da je bil – glede na njegovo preprostost – najprej zgrajen mali tridelni tempelj, nazadnje pa srednji. Spodnji tempelj naj bi bil zgrajen v obdobju med obema. Vendar pa so v spodnjem templju vidne različne gradbene faze, zato je bil morda deloma zgrajen hkrati z malim tridelnim templjem ali celo pred njim. V članku na podlagi terenskih opazovanj in horizontske astronomije predlagamo spremenjeno zaporedje izgradnje spodnjega templja, ki je bil načrtovan in grajen skozi tisočletno obdobje. Kjer sama arheologija ne daje dokončnih dokazov ali podatkov, si pri ugotavljanju verjetne kronologije izgradnje lahko pomagamo z arheoastronomijo.

KLJUČNE BESEDE: arheoastronomija, Malta, neolitik, templji, usmerjenost, kronologija

Introduction

This paper aims to investigate whether archaeoastronomy can provide supplementary data to establish a possible building sequence of the Maltese Mnajdra temple where archaeological excavations and observations seemingly fail to provide clear chronological evidence. The question of whether Mnajdra was intentionally constructed to face specific predetermined objects in nature or aligned to celestial bodies is addressed. This study is based on archaeoastronomical fieldwork and photographic documentation. Distances were measured via a hand-held GPS (Garmin 12), whereas given azimuths and horizon altitudes were measured using a Suunto compass and clinometer tandem. Naked-eye astronomy at certain times throughout the year, close to the equinoxes and solstices, proved to be of special importance throughout this study.

Mnajdra is probably the most atmospheric of all the temples on Malta (Trump 2002: 148). It is situated in a gentle depression formed by converging hill slopes on the southern cliffs in the south-eastern sea lines. There are no modern buildings or constructions in sight and it has a scenic view over the sea and the rocky islet of Filfla. A first impression might be that the landscape where Mnajdra is built is barren and inhospitable; however, it offered all the resources necessary for a community 5,500 years ago (Stroud 2010: 5). The temples are built from both the harder Lower Coralline Limestone which one finds on nearby cliffs dropping into the sea and the softer Globigerina Limestone which is available less than 200 meters from the site. Mnajdra, like the nearby Hagar Qim temple, has never disappeared since the time it went out of use in prehistory, though it seems to have suffered disorder and damage, as can be seen in old photos and drawings. Mnajdra has gone through considerable restoration work since the first known excavations in the beginning of the 20th century. However, its central features are fundamentally well preserved and the overall feeling one has when visiting it, is of an archaic structure (Evans 1971: 96).

The temple period in Malta goes from the Early Neolithic (4,100 BC) until the Early Bronze Age (2,500 BC), however, when it comes to the Mnajdra complex the core time frame is the Ggantija (3,600 – 3,000 BC) and the Tarxien (3,000 – 2,500 BC) phases (Trump 2004: 230). The Mnajdra temple complex consists of three distinct temples or structures, as seen in figure 1.

The first decision that the prehistoric builders would have taken was the orientation of the axis along which the portal structures were to be erected (Torpiano 2004: 360). As it seems the builders put considerable work, effort and skill into the axis of orientation of their enduring megalithic temples, it could indicate a directional intentionality and Torpiano concludes that the concave façade present in most temples confirms the importance of the axis of orientation. Evans (1959: 125) on the other hand, claims that orientation seems not to be an important factor to the temple builders, though he maintains that mostly the entrances face in some direction between south-east and south-west. When it comes to the Mnajdra temple complex, Trump (2002: 148-51) agrees with Evans' point of view on temple orientations and only goes as far as stating that an 'astronomical alignment has been suggested'. The first authors to mention a possible celestial orienta-

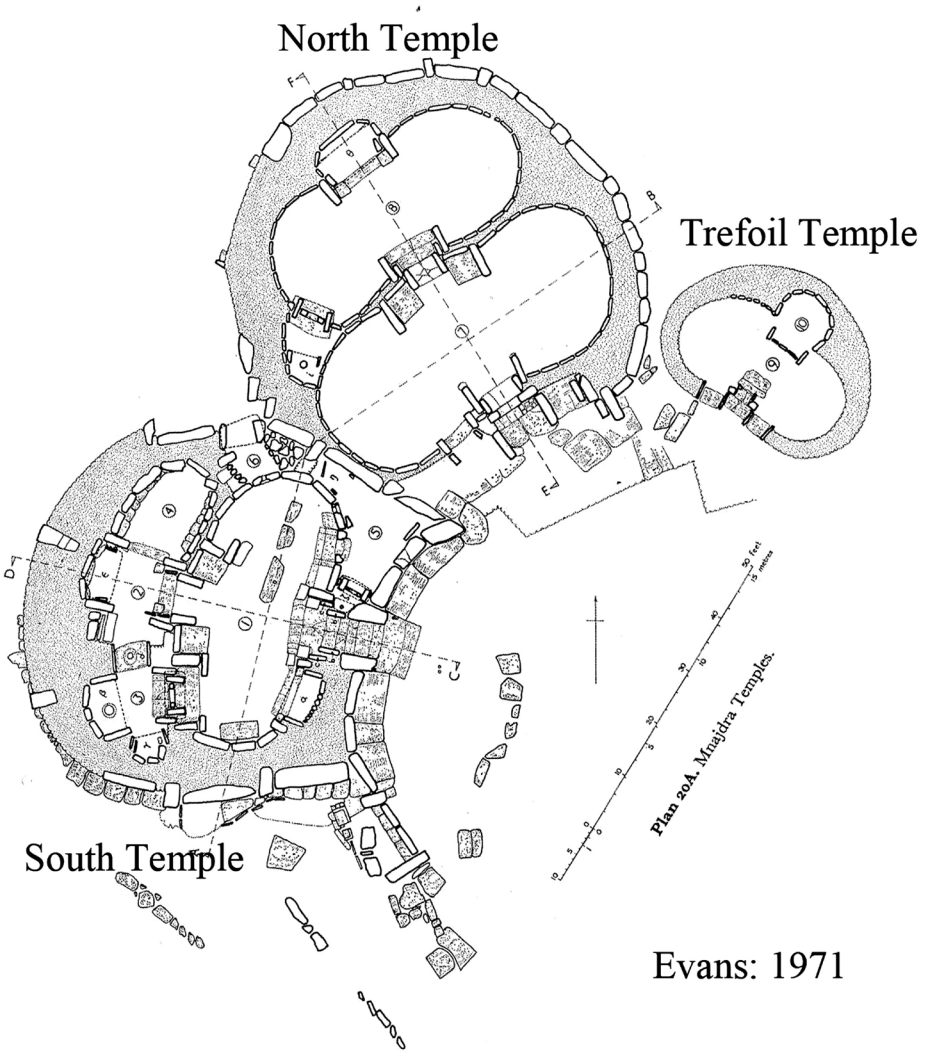

Figure 1: Plan of the Mnajdra temple complex, with the small trefoil temple at the right, the north temple at the top, and the south temple in the bottom-left. Adapted from Evans (1971).

tion were Ugolini (1934: 128, translated from Italian by the present author) and Zammit (1929b: 13). Studies conducted by Agius and Ventura (1980: 9) and by Cox and Lomsdalen (2010) concluded that most temples are in the south-east to south-west orientation range and show consistency of bearing, suggesting that some temples were intentionally constructed to face particular directions. On a survey of 14 orientations, Ventura *et al*.

(1992) found them all within the range 125.5° to 204°, less than a quarter of a circle, and concluded that, 'such a concentration of axes cannot have come about by chance.' When it comes to the Mnajdra complex this author (2011) argued that the three temples seem to have a well-defined orientation along the central axis. The small trefoil, or East temple, has a southerly orientation, whereas the five-lobed middle, or North, temple is orientated towards south-east. The five-lobe lower, or South temple, is oriented towards an eastern horizon that slopes down towards the sea which is 500 meters away as estimated by the present author through GPS readings. The South temple is atypical in the sense that it is the only extant temple on Malta with a well-defined orientation towards the east.

Building Chronology

Firstly one should emphasise that the chronology of Mnajdra is, according to Grima (2012), 'on shaky ground'. Its construction chronology is mostly based on typological observations and not on stratigraphic trench excavations (e.g Evans (1971: 102). The first person to have considered chronology was Fergusson (1872: 41) who maintained the middle, or North temple, to be the earliest due to its simple architecture and the fact that it was placed on higher ground than the other two. Mayr (1901: 663) agrees with Fergusson that the Mnajdra complex is not constructed within a single architectural layout, but instead claims the lower building, the South temple, to be the oldest.

Ashby (1913: 93) agrees with Mayr that the North temple is younger than the South one as the foundation of the former is piling up against the northern external wall of the latter and is thus structurally supported by the South temple. This strong argument is fully in accordance with Evans (1971: 102-3) who stated that the North temple was clearly added later in the Tarxien phase, constructed all at once and not subsequently altered. Evans dug only a single trench in the North temple, in room 7, where a large number of pottery shards, all of advanced Tarxien types, were recovered. This indicates that the temple was being used during the Tarxien period and, since no pottery from previous phases was found, suggests that it would have been built in the same period. Since the beginning of the 20th Century the archaeological consensus has therefore been that the North temple is the most recent one and that it was built and used in the Tarxien period.

The small trefoil temple does not feature in these chronological debates until well into the 20th century, after Ashby (1913: 91) re-erected the Western fallen pitted central pillars and reconstructed part of the temple wall (Ashby *et al.* 1913). Extensive restoration work was also completed by the Museum department in 1952 and 1953 (Pace 2004b: 129). According to Evans (1971: 101) as the monument stands today, it gives an impression of a trefoil temple, but it might have originally consisted of two pairs of apsidal rooms, of which the front has completely disappeared. The whole area around the trefoil temple seems to be part of a non-standard building lay-out with an irregular collection of rooms of which an overall plan is difficult to establish. Nevertheless, Evans (1971: 103) suggests that the small trefoil temple was the earliest to be constructed and this point is generally acknowledged by scholars today (Trump 2002: 148). In effect, Evans retrieved Ggantija type pottery in a trench excavated in front of this temple (1971: 103). However, it must be noted that this doesn't constitute clear evidence that the trefoil

temple was first to be built. Shards from the earlier Zebbug and Mgarr periods (4,000 – 3,600 BC), in addition to Ggantija pottery, were retrieved in front of the entrance to room 3 in the South temple which, following the same reasoning, would suggest an even earlier building stage for this temple (Evans 1971: 102).

The most complex temple to assess the chronology of is the lower South temple as it shows sign of more than one building phase. Mayr (1901: 663) claims that 'the south building is the most important and so the oldest' (translated from German by the present author). Pottery shards from the Neolithic Zebbug (4,100 – 3,800 BC) up to the Bronze Age Borg in-Nadur (1,400 – 800 BC) periods have been retrieved there (Evans 1971: 102). According to this author this does not necessarily mean that the temple had been constructed during the Zebbug period, neither that it was completed about 2,500 year later in the Borg in-Nadur phase. The earlier pottery might indicate that the site was used as a dwelling or religious site prior to the construction of the temple, much like the 'shrine' at Skorba from the Red Skorba period (4,400 – 4,100 BC). This was in use as a sacred hut within a village compound prior to the erection of the temple itself (Trump 1966: 50-1). The later Bronze Age pottery suggests that the site was still in use, or reused, in this period. As no bronze material has ever been found on Mnajdra and there are no indications of metal items being applied or implemented in the temple construction, it is suggested that the temple was completed before the Bronze Age. According to Pace (2004b: 129) the current version of the South temple was built during the Ggantija phase and it is 'highly probable that much of the original Ggantija temple still stands intact'.

There is evidence that the South temple was not built all at once, but either in phases or that, at least, changes were made throughout its usage history. According to Evans (1971: 102), Fergusson had already noticed that an apse had previously been altered to make space for room 3 with its niches (Fig. 1). Mayr (1901: 663) agrees with Fergusson on this point and further suggests that the back central room, room 2, with its original two apses (3 and 4) are the remains of an earlier structure. Room 3 would not only have been refurbished later, but, due to regularity in style and the presence of the same drilled and pitted decoration, this would have occurred at the same time that the front apse (room 1) was added on. Ashby largely agrees with Mayr's claims, but suggests that the back wall of the rear and left hand apse (room 3, β and y) still stood and formed the back wall of the rear left-hand niche (Ashby *et al.* 1913: 97). Based on this, it may be argued that room 3 could belong to the very earliest part of the temple. During Evans' 1954 campaign he excavated a total of ten trenches in various parts of the lower temple 'with varying successes'. He claims to have cut an important trench in front of the threshold of room 3 running to the south wall of room 1 which contained a mixture of shards, some of the Ggantija type and others appeared to belong to an underdeveloped stage of the Tarxien period (Evans 1971: 102). He further suggests that the front apse (room 1) was constructed in an early Tarxien phase and that rooms 2 – 3 are probably the oldest part, 'though now, unfortunately, unprovable,' and concludes that the presence of Ggantija type of pottery 'seems to show that there was a building on the site in the previous phase' (1971: 103). The northern walls of the L-shaped room 5 are supporting the foundation walls of the front apses (room 7) of the middle temple. Pace (2004b: 131)

claims room 5 to be from the Tarxien period, that the room was fashioned out of the wall of lower Mnajdra and that megaliths from the older building were used to structurally support the middle temple. Evans (1971) on the other hand, does not mention any possible refashioning of the wall of room 5. Evans(1971: 102) cut two trenches (E and F) in room 5 both containing Tarxien type pottery, whereas in one of them (E) Ggantija potshards were found at a deeper level. This author suggests that as: i) room 1 was built sometime in the Gganija period; ii) the Ggantija pottery was found in room 5 close to the outer wall of room 1; and iii) the room itself is most probably from the Tarxien period, as stated by Pace, this could indicate that the Ggantija pottery was there before the floor of room 5 was constructed and consequently the façade wall. Evans (1971: 103) on the other hand suggests, due to the presence of Ggantija pottery in the black level in trench E that there was a 'building on this site in the previous phase'. Due to its uncertainty, a guided and comprehensive analysis of the excavation data is needed before any conclusions can be drawn.

Although the precise dating of the Mnajdra building is not free of difficulties (Pace 2004b: 128), based on excavations, reports and the opinions of the archaeologists referred to above, the following chronology for the construction of the Mnajdra complex can be suggested:

1.) the small trefoil temple was built, probably in the Ggantija period as suggested by Evans;
2.) rooms 2, 3 and 4 of the South temple were built at some point in the Ggantija period (it is unknown whether this occurred before, during or after the small trefoil temple was constructed);
3.) the apses of room 1 may have been completed in later Ggantija or early Tarxien period and room 3 may have been refurbished at the same time. Room 6, however, could have been constructed in the first stage, and room 5 in the latter stage, of building the North temple in the Tarxien period, contemporarily with the concave façade of the South temple;
4.) the North temple was completed sometime into the Tarxien period.

Archaeoastronomy and Building Chronology

As the Mnajdra complex architecture stands today, it is primarily the South temple with its eastern orientation which has attracted most astronomical interest and speculation on whether it was intentionally constructed to face celestial bodies, especially the Equinox, Winter and Summer solstices sunrises (Ventura *et al.* 1992). Since the 1980's scholars, authors and enthusiasts have addressed the possibility that the temple was intentionally built as a calendar (Micallef 1990), an astronomical observatory (Micallef 2000: 3) or a time device to keep track of religious festivals and other events throughout the year (Cox & Lomsdalen 2010, Lomsdalen 2011). Some work on astronomical alignments has also been done on the North temple (Albrecht 2004: 50-9) and more extensive investigations were conducted by Ventura *et al*. (1993) regarding the two tally stones centrally placed in the small trefoil temple, which they suggest may have been used as a calendar for heliacal

rising of the Pleiades and other stars and asterisms, registering significant astronomical sequences of annually occurring events. An astronomical factor to take into consideration when comparing alignments towards celestial bodies in the temple period and today is that the heavenly bodies have changed positions, and due to the tilt of the Earth's axis, the Sun rise and set horizon range is about 3/4 of a degree further north and south than what it is today (Agius and Ventura 1980: 16).

The small trefoil temple

As this temple stands today it has a central axis of about 210°, however, due to heavy reconstruction and refurbishment, it is dubious whether this accurately reflects its original axis. It is too far off for claiming a true south alignment, but it may be close enough to intentionally be oriented towards the small islet Filfla, at about 220°, which can be seen from within the main apsis of this temple. That it probably was a sacred island is indicated by the finds of pottery, jars and bones of animals belonging to the temple period (Farrugia Randon 2006: 43). In 1343 a chapel dedicated to the Assumption of Our Lady was erected after a fierce storm that caused much damage on the mainland. During a 2011 survey, conducted by the present author and Fabio Silva, it was found that also one of the chambers of the nearby temple Hagar Qim, is also oriented towards Filfla island, a fact that was also noted by Tilley (2004: 130).

Assuming that the tally marks previously mentioned are contemporaneous to the temple period, this further indicates an awareness of heavenly events affecting human actions and behaviour on Earth. Further evidence comes from what is tentatively called a 'solar wheel': a small pottery shard retrieved at nearby Hagar Qim (Ventura 2004: 312). Another example may be the tal-Qadi Stone found at the temple site of the same name, suggesting stars and a crescent moon (Micallef 2001). Orientation arguments can't here help with the construction chronology for this temple, however it suggests that sea, land and sky with the islet Filfla as a horizon marker were important components of an islander's cosmology (Grima 2001: 48-65).

The middle, or North, temple

The middle temple is oriented towards south-east, with a central axis of about 140°, which could indicate that the builders intended to align it halfway between the central axis of the trefoil temple (210°) and the lower temple (93°). As stated above, there are many indications that the middle temple is the last to be constructed and belongs to the Tarxien phase. Evans (1971: 102) claims that this temple was constructed all at once due to its thoroughly homogeneous architecture. Nevertheless, it is here suggested that it could consist of two building periods: the first consisting of the back apses (room 8), which was subsequently extended at a later stage. This was a procedure that was commonly used by the temple builders (Evans 1959: 125-6). Room 8 has two altars, a small one at the left hand apse reachable through a porthole entrance in the temple wall with a central axis about 0° or true north, which is confirmed by Albrecht (2007: 29). The other, apparently the main altar, is the back niche of room 8. Standing at the south edge of this altar, two

orientations were measured through the approximately one-meter wide entrance (Fig. 3). Following an imaginary line through the north side of the entrance gives an azimuth of about 118° (declination of -22.4°). Following a line through the south side of the entrance gives an azimuth of about 126° (dec. -29.1°). This means that the Winter Solstice sunrise would be framed by the temple's entrance, as seen from the niche in room 8. In the same way, the major lunar standstill sunrise would be seen to rise close to the south side of this entrance. Cox (2009) made observations of the 'Far-Southerly Moonrise' of three Maltese temples from 2005 to 2007, however he did not include Mnajdra in his research programme, nevertheless, discussed in private conversations such a possibility. Consequently the present author's hypothesis cannot be observed and validated before around the years 2023 to 2025 when the far-southerly moonrise will again be visible. However, cross-jamb illumination of an altar seems to be a commonly desired feature used by the temple builders (Cox and Lomsdalen 2010). According to research by Vasallo (2000), a left hand cross-jamb illumination of demarcated areas inside the temples at Winter solstice sunrise seems to be prevalent in megalithic Malta.

When the temple was extended with the front apses, it would consequently block the illumination of the back altar and especially so if the temple was roofed (Trump 2002: 150). With the new apses, the major lunar standstill alignment continues through the north side of the 1.25 by 1.60 meter wide main porthole entrance to room 7, which is now partly destroyed. On either side of the entrance to the passage leading from room 7 to room 8 there are the usual altar-like arrangements (Evans 1971: 99). The present author can confirm that, at Winter solstice sunrise, the altar on the left hand side of the passage is illuminated (Fig. 4), a fact that was already noted by Albrecht (2007: 26). Based on archaeoastronomical considerations, it may then be suggested that the builders started with the back apses and at a later period extended the temple. In doing so, they would have intentionally kept the original astronomical alignments towards the sun and the moon intact, which would certainly suggest intentionality of directionality.

The lower, or South, temple

Most literature on astronomical alignments regarding the South temple seems to assume that the building was constructed all at once and only takes the present architecture and lay out into consideration. There are archaeological indications, as previously mentioned, that this temple might have expanded from the rear apses outwards. The question now is which part of the back apse was the very first to be erected. This paper argues that room 3 might be the first freestanding structure and the rest of the temple consequently has expanded from there. This hypothesis finds archaeological support from the trenches excavated by Evans, already discussed above. Further to this, Ashby suggests the back walls of the niches of this room are original and not refurbished. In addition, from this author's point of view, this structure does have all the elements of a free standing Maltese prehistoric temple in its own right: it has its own porthole entrance with rope holes for door closure, three niches, and a dressed altar stone for ritual purposes and received cross-jamb illumination during sunrise at the Solstices.

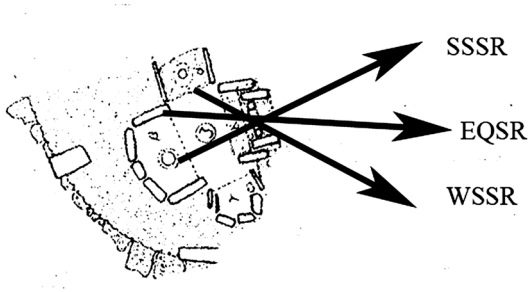

Figure 2: Room 3 of Mnajdra South temple. The three arrows indicate alignments to the Summer Solstice sunrise (SSSR), Equinoctial sunrise (EQSR) and Winter Solstice sunrise (WSSR).

Astronomically room 3 has alignments to the equinoctial and solstitial sunrises, during which specific areas inside would be illuminated (Fig. 2). These alignments are not as precise and demarcated as later parts of the South temple and may indicate an earlier period of horizon astronomy knowledge. The extension of this temple might have first been towards room 2 and 4. Astronomically room 4 seems to be of little interest, however, room 2 is highly central to the temple's overall axis of about 93° (dec. 0°) which aligns with the Spring and Autumn Equinoxes, fully illuminating the altar at its back niche (Campion and Malville 2011, Lomsdalen 2011). However, Ventura *et al*, (1992: 118) suggest the alignments might have been to the rising of the Pleiades and not the equinoctial sunrise. The altar of room 2 is also aligned to both Summer and Winter solstice and would receive cross-jamb illumination from both the Summer and Winter Solstice when room 1 was not yet constructed (Fig. 3).

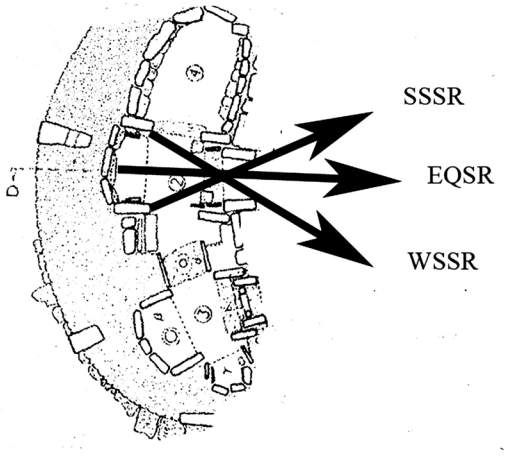

Figure 3: Stage 2 in the hypothetical construction sequence of the Mnajdra South temple.

The next construction phase in the sequence would be the extension to room 1 and the font apses, which seemed to be a normal temple building procedure as already mentioned. Room 1 has a similarity to the later built room 7 in which there is an altar on each side of the passage into the back room. At Summer and Winter solstice sunrise, the two altars in room 1 would receive a cross-jamb illumination before the building of the façade and the extension of the main entrance (Fig. 4). This is when also the rear part (room 8) of the North temple might have been constructed.

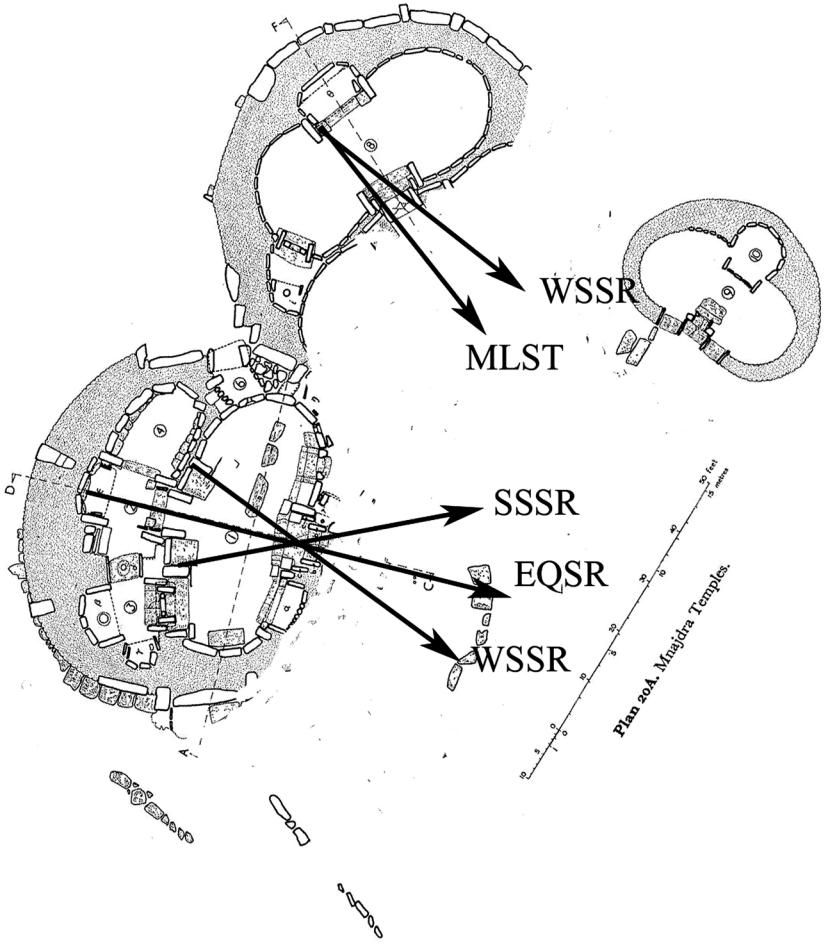

Figure 4: Third stage in the hypothetical construction of the Mnajdra South temple, and first stage of the North temple. The arrow MLST indicates the Major Lunar Standstill.

By building room 5 and completing the North temple (room 7), setting up the concave façade of the South temple and prolonging and narrowing its main entrance, the two altars just mentioned would be closed off from the sunlight at time of the solstice (Fig 5). It is here suggested that this was when the two vertical orthostats were placed on each side of the altars in order to receive the cross-jamb illumination at the Summer and Winter solstices, as can be observed today (Lomsdalen 2011).

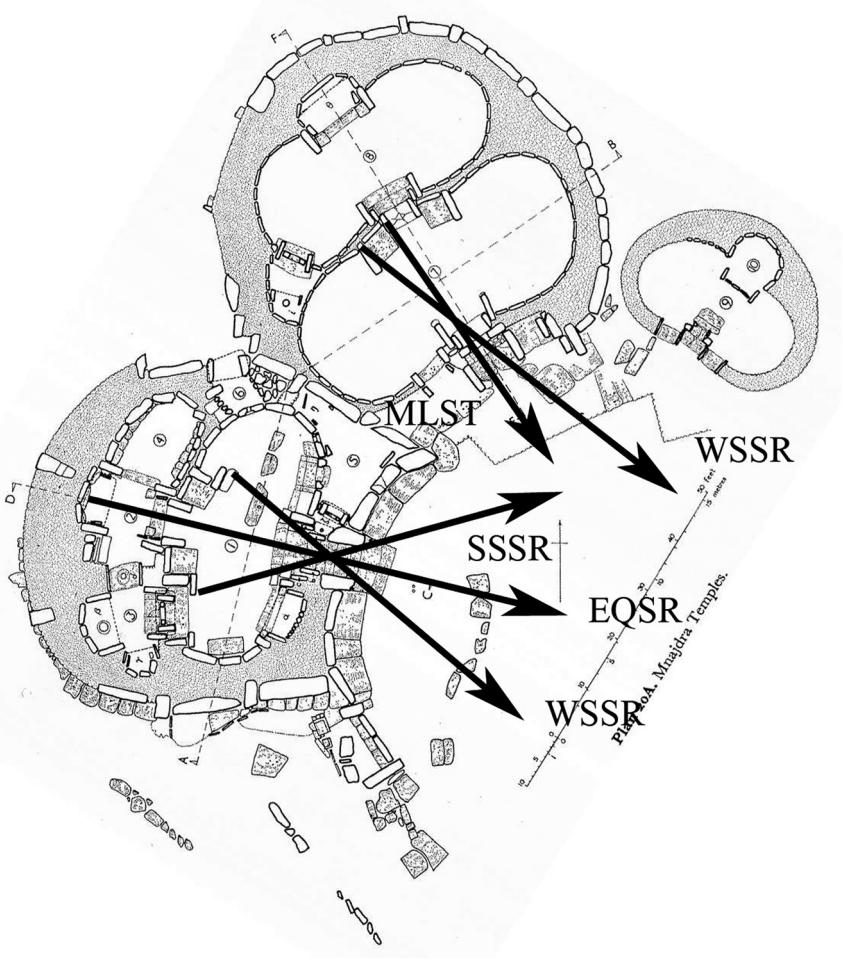

Figure 5: Final stage in the hypothetical construction of the Mnajdra temple complex.

Conclusion

This paper has suggested that the careful consideration of archaeoastronomical features embedded in individual rooms and sections of the Mnajdra complex can support and further the hypotheses of archaeologists regarding the building sequence of the three temples. Fieldwork has indicated that the key orientations and celestial alignments that are visible in the final, and present, form of the temples can already be identified in their earlier counterparts, as suggested by the archaeology. This can then be taken further and archaeoastronomy can be used to fill in the gaps by making suggestions.

Based on this the following redefined constructional chronology has been proposed:

1) The small trefoil temple might be the first to be constructed in early Ggantija period (3,600 – 3,000 BC). This is rooted in typological and archaeological considerations and, unfortunately, archaeoastronomy can add little.
2) The middle temple could have been built in two distinct stages, one in the middle and the other in the late Tarxien period (3,000 – 2,500 BC). Based on archaeoastronomical considerations its construction could have started with the back apses and later expanded by adding a new room to the temple.
3) The complex lower south temple may have been constructed in four rudimentary stages:
   3.1) Room 3 dates from the early Ggantija period and could be contemporary or even older than the small trefoil temple. It contains several characteristics of a temple in its own right, including the solstitial and equinoctial illumination displayed by the final version of the South temple.
   3.2) Rooms 2 and 4 could then have been added in the middle Ggantija period. Room 2 again replicates the same archaeoastronomical signature now in its final form (that is with the central axis oriented towards the east).
   3.3) Extending the temple with front apses (room 1) seems to be the third building stage and may have been completed sometime in late Ggantija or early Tarxien periods.
   3.4) The fourth and final building stage may have been when room 5 was built as a foundation support for the middle temple. To maintain architectural uniformity the entrance was then prolonged and its present concave façade established. In doing this, fifteen hundred years of off and on building was concluded, already well into the Tarxien period.

It is questionable whether astronomical alignments and orientations towards celestial bodies can provide reliable dating evidence. Nevertheless, archaeoastronomy might provide data that supplements the archaeological evidence and thus be an aid in the formulation and testing of hypotheses.

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