

Some Problems in Minoan Archaeoastronomy

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In our study of Minoan orientations we have found that the majority of monuments were oriented to major celestial events (e.g., sunrise and sunset at the solstices and equinoxes, and the heliacal risings and settings of bright calendar stars). There are, however, two buildings which raise the question as to whether or not they were oriented to other celestial events which, although not major, can still be understood to have had important calendric significance. These are the palace at Mallia and the villa at Vathypetro, which we present here.

The orientation of the tripartite shrine at Vathypetro is also presented.

Introduction

The Uppsala group investigating the character of astronomical observations in Bronze Age Crete has presented the results of its work in a number of articles (M. Blomberg & Henriksson 2002, 2001a, 2001b, 2000, 1999, 1996; Henriksson & M. Blomberg 2000, 1997–1998, 1996; P. Blomberg 2002, 2000), but the evaluation of all sites is not yet complete. For this reason we have excluded from Figure 2 the villa at Ayia Triada and the buildings at Gournia and on Modi.

We have measured the orientations of buildings at fourteen Minoan sites, using a digital theodolite (Figure 1). In a few cases more than one building at a site were measured, a total of eighteen. These include the four major palaces (Mallia, Knossos, Phaistos, Zakros), the six peak sanctuaries with adequate surviving walls (Gonies, Juktas, Modi, Petsophas, Pyrgos, Traostalos), five of the large villas (Ayia Triada, Gournia, Southeast House at Knossos, Tyllisos, Vathypetro) and three small shrines (Ayia Triada, Mallia, Vathypetro). Here we present our results from the villa and shrine at Vathypetro and the palace at Mallia.



Figure 1. Map of Crete with the sites included in the Uppsala Archaeoastronomical Project.

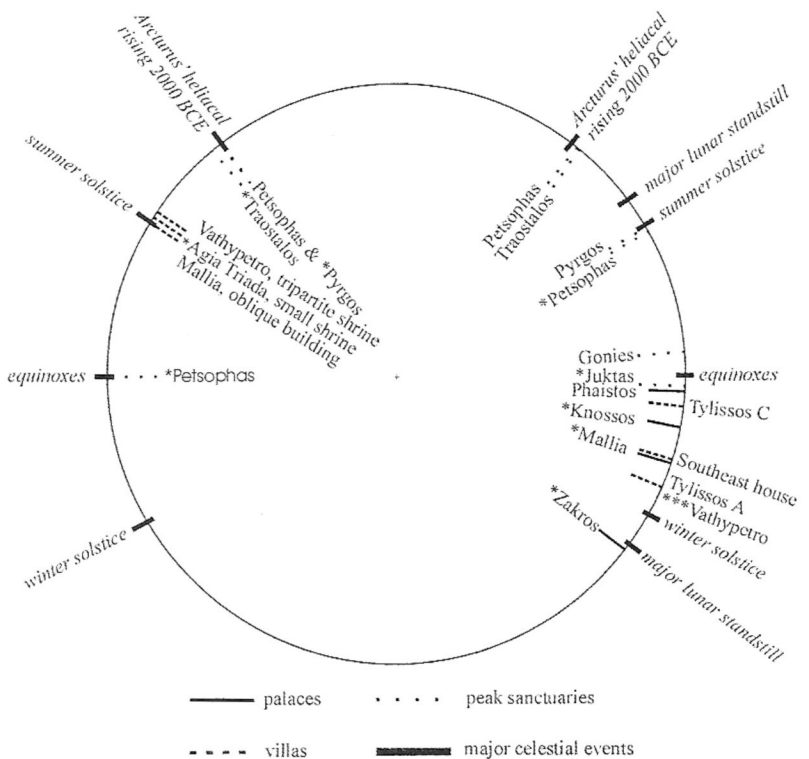


Figure 2. Orientations of 15 Minoan monuments. An asterisk before a site name denotes the presence of a foresight to mark the orientation.

Of the eighteen monuments included in our project (Figure 2), at least eleven have orientations to major celestial events, and four have orientations to more than one such event: sunrise at the summer solstice in two cases (Petsophas, Pyrgos), sunrise at the equinoxes in three cases (Juktas, Knossos, Phaistos), sunset at the equinoxes in one case (Petsophas), sunset at the summer solstice in three cases (shrine at Ayia Triada, oblique building at Mallia, tripartite shrine at

Vathypetro), sunrise at the winter solstice in one case (villa at Vathypetro), moonrise at the southern major standstill in one case (Zakros), the heliacal rising of Arcturus in two cases (Petsophas, Traostalos), and the heliacal setting of the same star in three cases (Petsophas, Pyrgos, Traostalos).

The eleven monuments have a total of seventeen orientations to major celestial events and eleven of these were marked by a foresight, indicated in Figure 2 by an asterisk. Note, however, that although the orientation of the palace at Mallia is marked by a foresight, it is not to a major celestial event (see further below). Seven of the foresights were natural and four were man-made. With respect to the four monuments with orientations to more than one major celestial event, these are: two each in the case of the peak sanctuaries on Pyrgos and Traostalos, three for the villa at Vathypetro and four in the case of the peak sanctuary on Petsophas. The orientation of the palace at Knossos was established in the Early Bronze Age (Catling 1973–1974: 34; Shaw 1977: 48) and

therefore our results indicate long-term systematic observations of the celestial bodies by the Minoans beginning probably no later than the second half of the third millennium BC.

We consider one of the most important results of our investigations to be the discovery of clear differences in the orientations of buildings constructed during the time when many scholars see a Mycenaean hegemony on Crete. These concern the oblique building built in the ruins of the palace at Mallia, the tripartite shrine at Vathypetro, and the small shrine beside the villa at Agia Triada. The date and nature of the Mycenaean hegemony is a very controversial issue in Aegean Bronze Age studies and this gives considerable significance to our discoveries, as it introduces a new element into the discussions. If we exclude the orientations of these three buildings then the only Minoan orientation to sunset is the one to equinoctial sunset at Petsophas and this seems to be a special case occasioned by the fact that Petsophas seems to have been a center for celestial observations. There

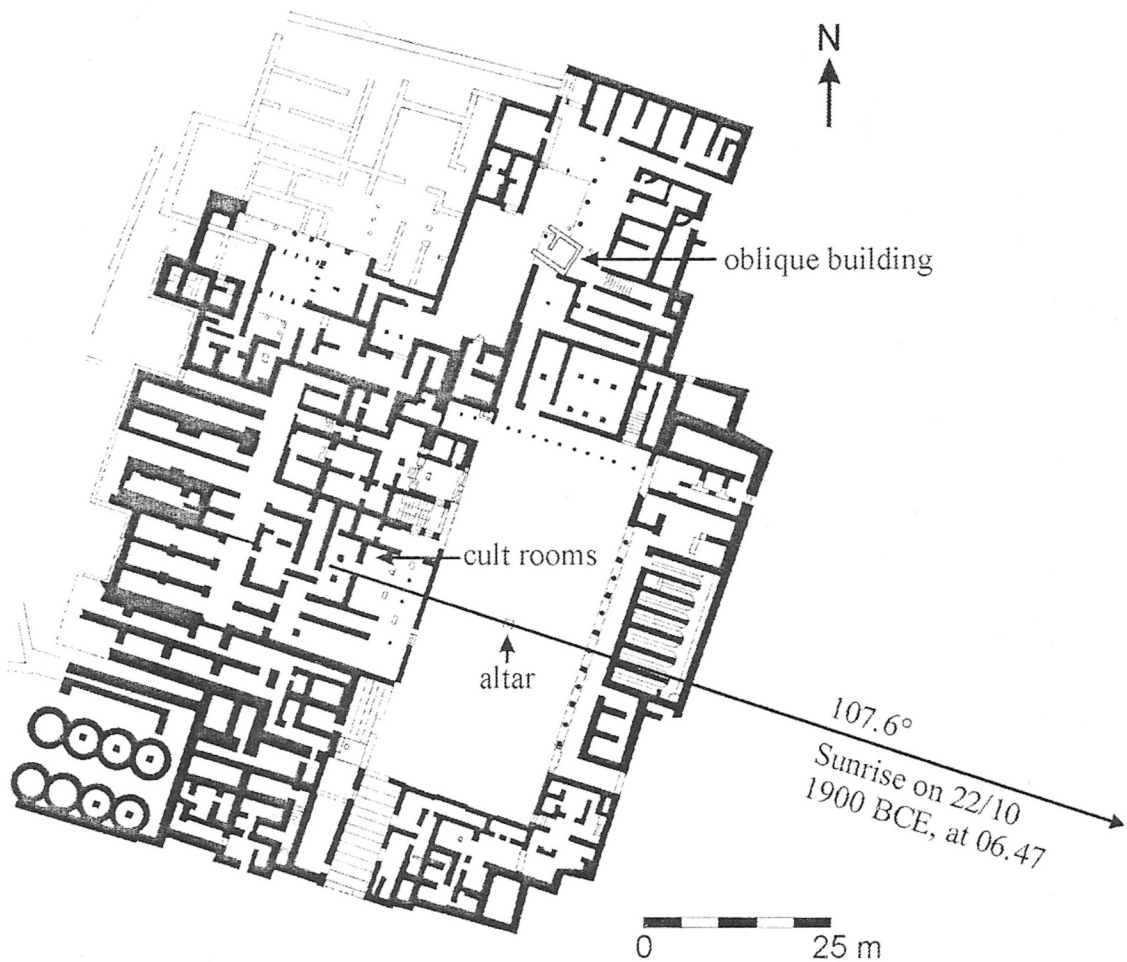


Figure 3. Plan of the palace at Mallia. With permission of J. W. Myres, E. E. Myers and G. Cadogan, editors of The Aerial Atlas of Ancient Crete.

are four orientations to major celestial events there, and this is more than for any other Minoan site.

If we consider the reasons for the Minoan observations, the concentration to major celestial events is best explained, we think, in connection with calendar regulation, and there are finesses in the arrangements at three sites which indicate that this was indeed a major concern. For example, simple techniques for determining when a month should be intercalated in the case of a lunisolar calendar existed at the palace at Knossos (Blomberg & Henriksson 2001a: 616) and the peak sanctuaries on Juktas (Blomberg & Henriksson 2002: 83–85) and Petsophas (Blomberg & Henriksson 2001a: 611–612).

We have argued also for Minoan proficiency in stellar navigation (Blomberg & Henriksson 1999), and this would have required detailed knowledge of the positions of the stars during the night, a need which would also have resulted in long term, systematic stellar observations. The orientations to the bright star Arcturus suggest the further calendric function of indicating the times of the year to begin economically important activities such as sailing. In our opinion the origin in the Aegean of the use of celestial bodies for such purposes lies with the Minoans. This use, of course, is well-known later from Hesiod and a number of other Greek authors.

As for a religious motivation for the orientations, there are many representations of the sun, the moon, and the stars on Minoan objects, and these may well indicate a religious interest in the heavenly bodies, but we can only speculate about the content of this interest. The orientation of the palace at Zakros to moonrise at the southern major standstill may have had primarily religious significance.

The Palace at Mallia

The palace at Mallia is the only Minoan palace which lies on a broad plain with no geographical restrictions on its orientation. None of the Minoan palaces was oriented to the cardinal points and, in our opinion, this was the result of the desire to establish relationships to specific celestial events in the mountainous landscape of the island. Our data give ample support for this.

The ruins of the palace at Mallia that we see today are primarily those of the second palace,

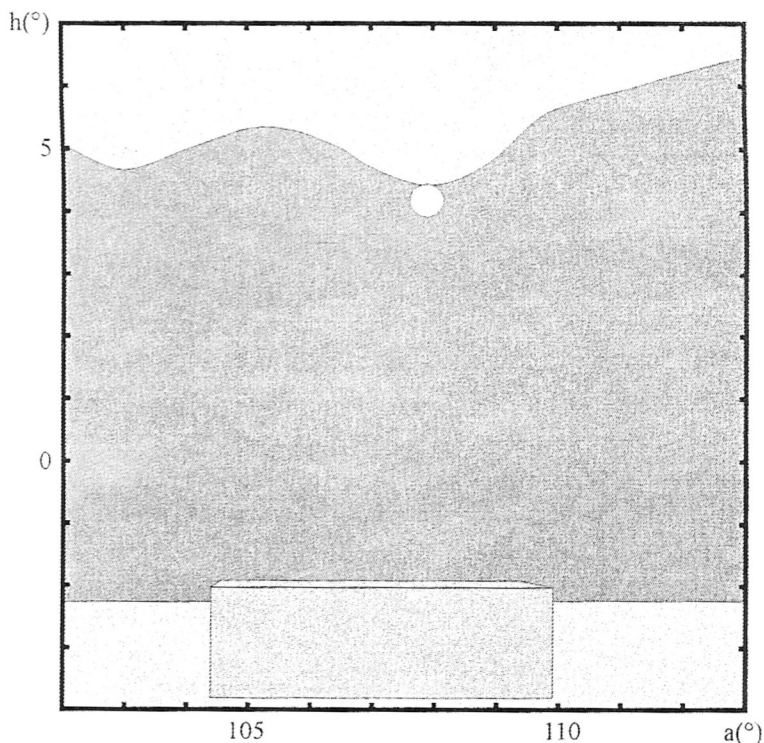


Figure 4. Mallia. Sunrise on 22 October 1900 BC at 06.47 local mean solar time as observed from the middle of the space between the pillars in the cult rooms and with eye level at 1.5 m above the floor. The base of the altar has survived; the height has been reconstructed to 0.5 m above the level of the Central Court.

which was rebuilt following a destruction of the first palace in the Late Middle Bronze Age, about 1750 BC. The major cult rooms in the Minoan palaces are generally agreed to have been on the west side of the central court (Shaw 1977: 56), and their location in this area in the new palace at Mallia is the same as it was in the old palace (Fig. 3). In the north court is the little oblique building with an orientation clearly different from that of the palace itself; it was to sunset at the summer solstice.

The main cult room of the palace originally had two pillars placed symmetrically with respect to the doorway and the columns to the east of it; the doorway was later made narrower. The altar in the Central Court was directly opposite the room. The orientation of the axis of symmetry of the room is 107.6° , which was to sunrise on the 22nd of October at the time when the palace was in use. This event occurred behind the natural foresight created by the intersection of two mountain ridges directly opposite the cult room (Figure 4). There is no strong evidence that the east wing opposite had more than one floor. In such a case the visibility of the sun at sunrise in the cult room would have been blocked.

This palace then, unlike the other three on Crete, is not oriented to a major celestial event. How are we to understand this? Can the date 22nd of Octo-

ber have an explanation that fits logically with our proposal for the calendric significance of Minoan orientations?

If we are correct that the Minoan New Year began with the first appearance of the new crescent moon following the autumnal equinox, as we have argued earlier (Blomberg & Henriksson 1996: 32; 2001a: 611–616; 2002: 82–83), then the 22nd of October is the earliest date when the second month of the year could begin. Another reason for the importance of this date has to do with the agricultural year in the Mediterranean. From Hesiod, writing in the 8th century BC and being one of our earliest Greek authors, we know that late in October was the time for ploughing, which was the first and most important event in the agricultural year (Evelyn-White 1914: lines 383–384; West 1978: 254). The appearance of the sun on the 22nd of October in a well-defined place opposite the palace at Mallia could have been the signal for preparations for this important activity. We should keep in mind that the Minoan economy was based on agriculture and that the palaces and country villas were the centers where storage and distribution of produce was managed. Mallia was built in a rich agricultural area.

The Villa at Vathypetro

If we turn now to Vathypetro, a country villa about ten kilometers south of Knossos, we encounter a most interesting situation in which the 22nd of October is one of several clearly marked orientations (Figure 5). It is also the orientation of the main room of the villa. If a Minoan had stood against the back wall at its center, at point 43, that person could have observed the following orientations (Figure 6): sunrise at the equinoxes appeared immediately to the south of the northernmost column, sunrise on the 22nd of October appeared just to the south of the middle column, and sunrise on the last days before the winter solstice appeared just to the north of the southernmost column (Figure 6). The axis of the room itself is oriented to sunrise on October 22nd as it appeared behind the ridge opposite the site. This is the same orientation as the main cult room at Mallia. It seems that the site of the villa and the proportions of the main room have been

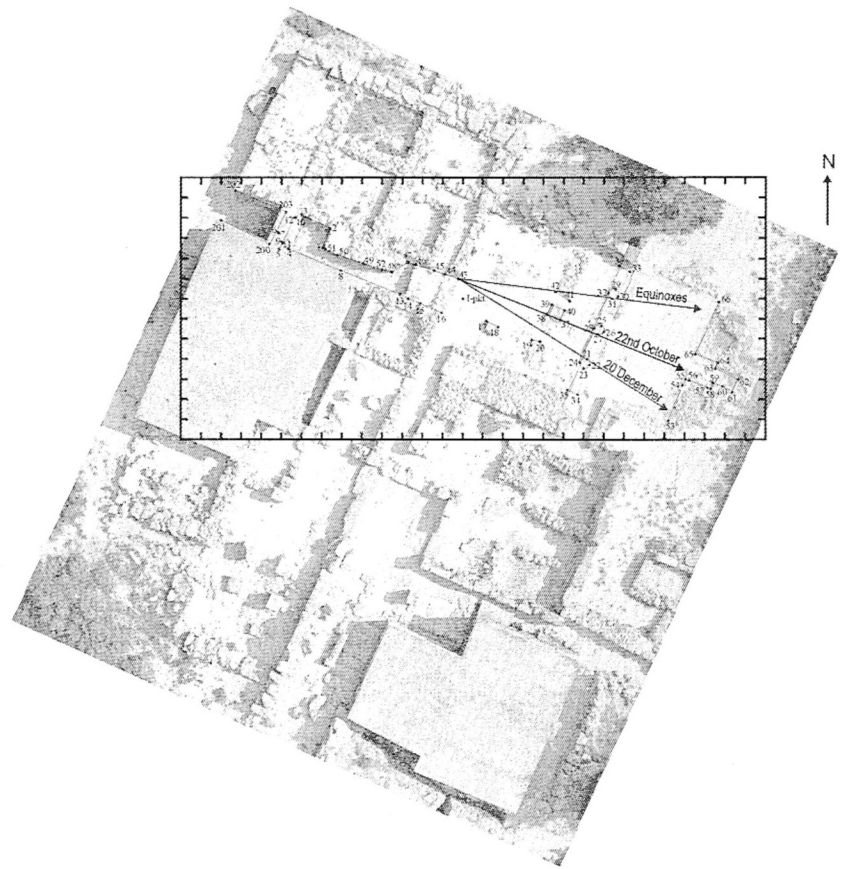


Figure 5. Vathypetro. Orientations from the centre of the main room (point 43). Orientation of the axis of symmetry of the room = 110.3° . With permission of J. W. Myers, E. E. Myers and G. Cadogan, editors of *The Aerial Atlas of Ancient Crete*.

carefully chosen to achieve these three orientations.

The orientation to the equinoxes is the one we have found most frequently in Minoan Crete (Figure 2) and special arrangements at three sites have

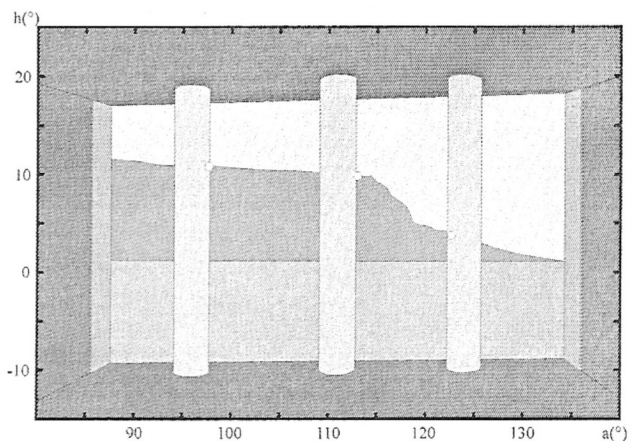


Figure 6. Vathypetro. In 1700 BC, a person standing at the centre of the main room could have observed sunrise at the equinoxes (left), sunrise on the 22nd of October (middle), and sunrise on the 20th of December (right). The orientation of symmetry of the room itself (110.3°) was to sunrise on the 22nd of October. The tripartite shrine, had it existed in the first phase of the building, would not have been in the way of these observations.

led us to argue for the beginning of the Minoan year in connection with the autumnal equinox. The orientation of the main room at Vathypetro to the 22nd of October duplicates that at Mallia and strengthens us in our opinion that this date was of calendric significance for the Minoans. We think it inaugurated the agricultural year by signalling the time for ploughing.

The Tripartite Shrine at Vathypetro

As in the case of the villa at Agia Triada and the palace at Mallia we must at Vathypetro distinguish between Minoan and possible Mycenaean orientations. Two architectural phases of the villa itself could be clearly identified, both from the Late Minoan I period, ca 1650–1450 BC (Figure 7). In the first phase – marked by the thick black lines – large well-cut ashlar blocks were used and the construction in general shows many features typical of Minoan palatial architecture. There is a most interesting separate building in the courtyard opposite the large hall with columned entrance. The building has been identified as a tripartite shrine and it has a westward orientation.

Such shrines are considered to be Minoan in origin, but they appear early in Mycenaean culture as well. The one at Vathypetro is the clearest architectural example that has survived, but several are shown on small objects (Shaw 1978: Figures 1, 2, 7, 8). Such structures may have been only facades, in front of which rituals were performed. We know very little about them.

Although the tripartite shrine at Vathypetro cannot be dated archaeologically, it is generally considered to have been built as part of the Minoan villa (Driessen & Sakellarakis 1997: 63; Fig-

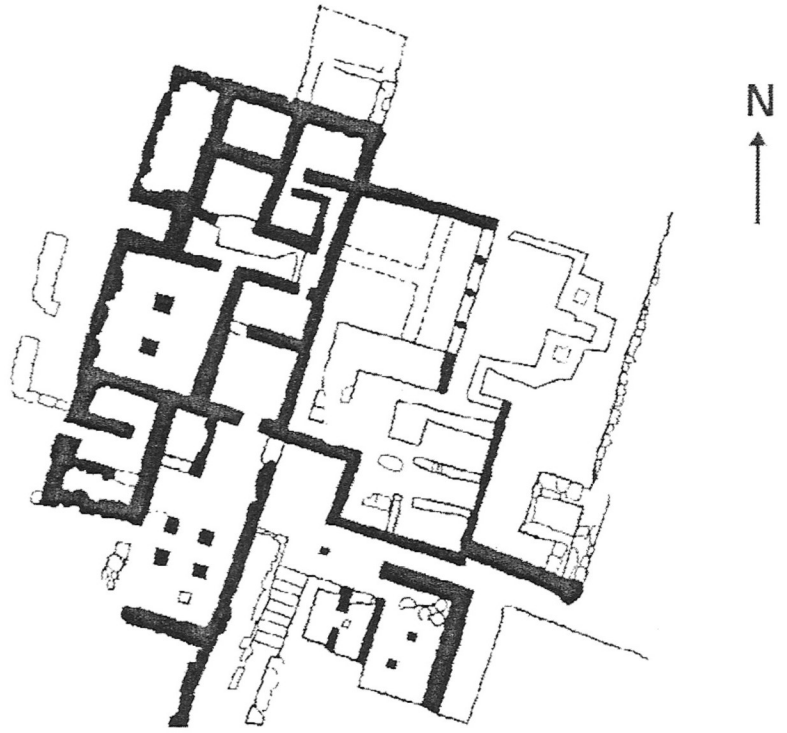


Figure 7. Plan of the villa at Vathypetro. With permission of J. W. Myres, E. E. Myers and G. Cadogan, editors of *The Aerial Atlas of Ancient Crete*.



Figure 8. Vathypetro. The orientation (296.0°) of the south wall of the niche in the tripartite shrine is to sunset at the summer solstice. The height of the horizon opposite is 5.2° . With permission of J. W. Myres, E. E. Myers and G. Cadogan, editors of *The Aerial Atlas of Ancient Crete*.

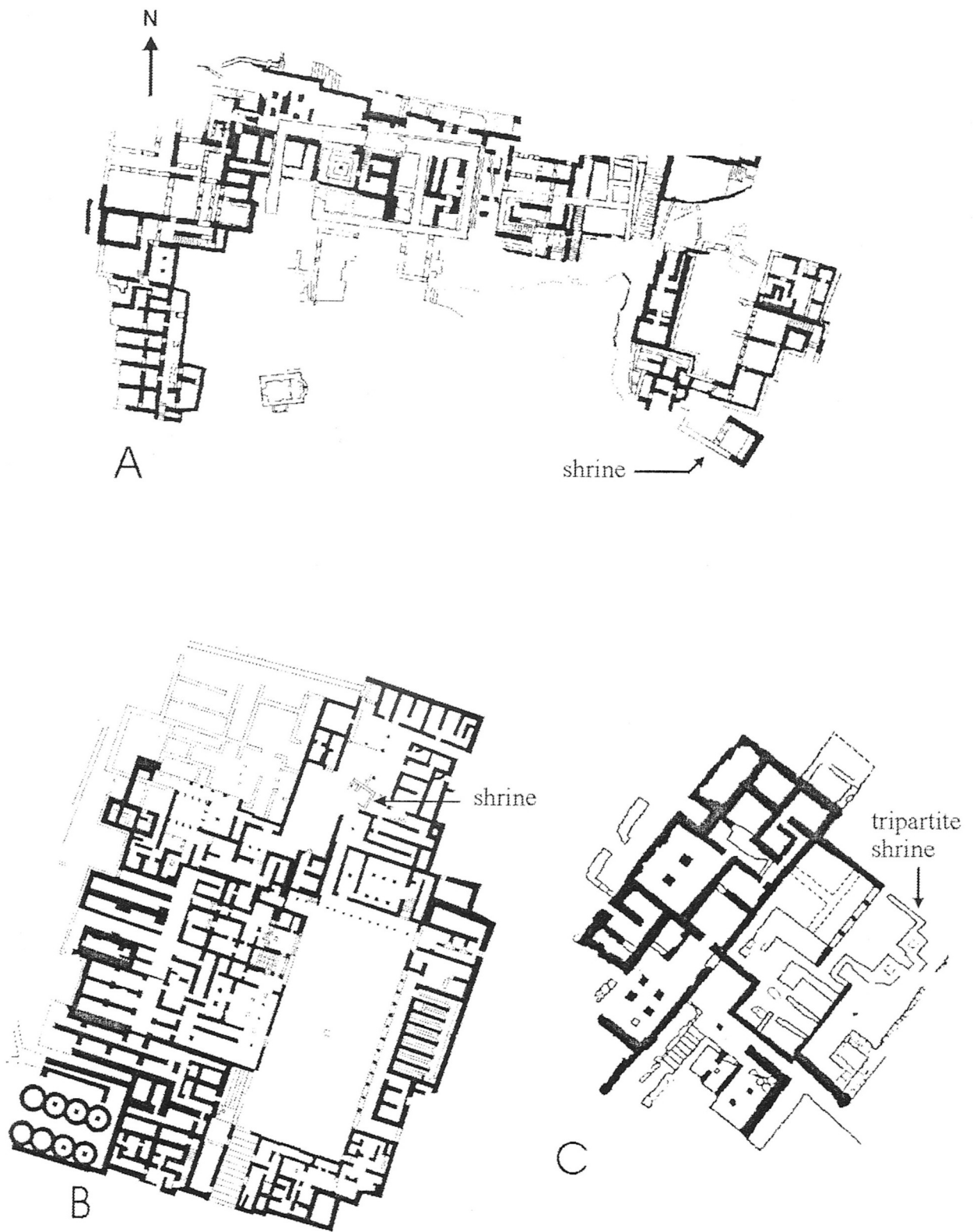


Figure 9. Plans of the shrines at Ayia Triada (A), Mallia (B) and Vathypetro (C). All three are oriented to sunset at the summer solstice. With permission of J. W. Myres, E. E. Myers and G. Cadogan, editors of *The Aerial Atlas of Ancient Crete*. Not to scale.

ure 6). There is disagreement only as to whether it belonged to the first or to the second phase. However, there were shards found at the site from the LM III period (Kanta 1980: 35), i.e. the period of possible Mycenaean control in Crete. Nearly all drawings of the plan of the site have been influenced by the view that the shrine is Minoan; there

has been a clear tendency to draw it as aligned with the Minoan building (Figure 7), although this is not the case. The difference is 1.5° (Figure 5), and the building technique is also different. Attention has been called earlier to its careless construction and to the fact that it was placed on the court surface (Shaw 1978: 442–443), but this has not affected the

widespread inclination to see the structure as Minoan and as belonging originally to the main building.

The tripartite shrine, in contrast to the main room of the villa, faces west and is oriented to sunset at the summer solstice (Figure 8) – this is the same orientation as the oblique building at Mallia and the small shrine at Agia Triada (Figure 9). At the time the shrine at Vathypetro was built, the Minoan villa opposite may well have been in ruins. Its material was used widely for later buildings in the area. Some of the later stones in the floor of the room opposite may have been part of an artificial foresight for sunset, as we reconstruct in Figure 10. The northern side of the block opposite the tripartite shrine (Figure 8: points 39 and 40) is aligned with the southern wall of the niche in the shrine. This block clearly was placed on an earlier wall (Figure 11). As in the case with the oblique building at Mallia, the southern wall of the niche is fully illuminated only at the summer solstice.

The three orientations to sunset at the summer solstice all seem to apply to buildings constructed only when the Minoan palaces – and indeed nearly all important Minoan buildings – had been destroyed. In our opinion these orientations are support for those who argue that the Mycenaeans had assumed power in Crete at that time.

Summary

To sum up – the orientation of the main cult room of the palace at Mallia to sunrise on 22nd of October has raised questions as to the significance of Minoan palatial orientations, since it is the only palace not oriented to a major celestial event. As observed from the cult room, sunrise on this date occurred where two mountain ridges overlap thus forming a prominent foresight for the event. The same orientation, also marked by a foresight, was established for the Minoan villa at Vathypetro.

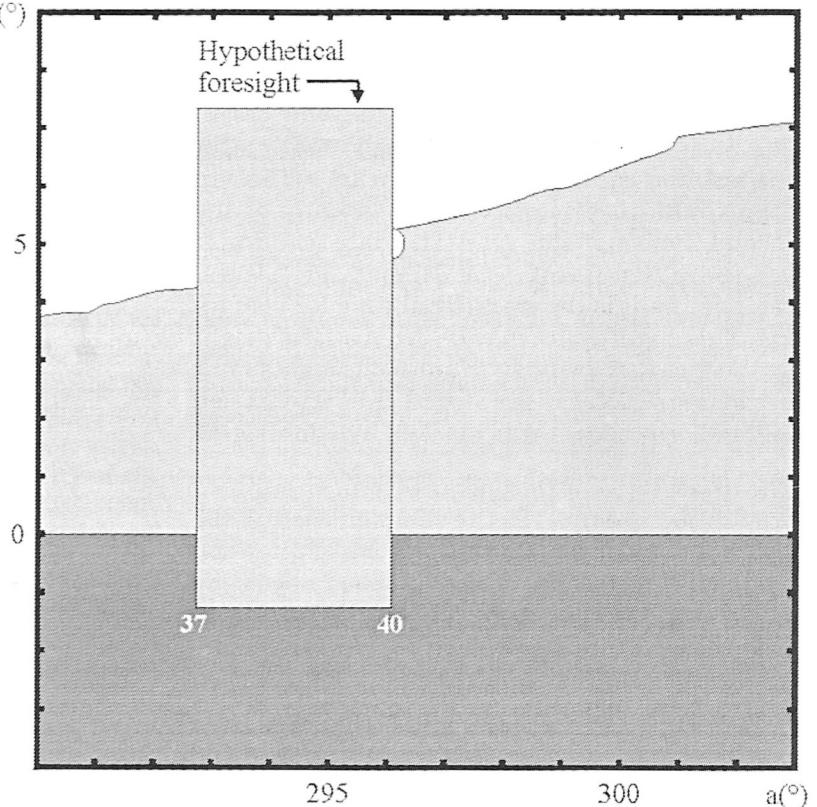


Figure 10. Vathypetro. Sunset behind the western ridge at the summer solstice, June 23, 1700 BC, 18.41.45 local mean solar time, as observed from the south-eastern corner of the niche of the tripartite shrine. The southern wall of the niche is fully illuminated down to floor level only at sunset at the summer solstice.

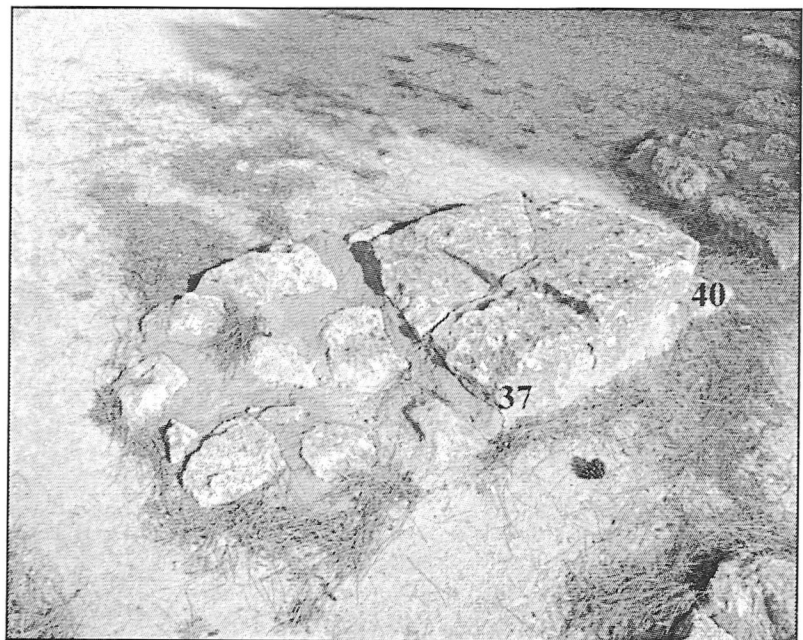


Figure 11. Vathypetro. The stone aligned with the southern wall of the niche in the tripartite shrine. It has been placed on an earlier wall.

In trying to understand the orientations to sunrise on this date, we have asked ourselves whether or not the 22nd of October could have been important in the Minoan lunisolar calendar. As it occurs exactly one moon month after the autumn equinox, the orientation to the sun then could have marked the beginning of the second month of the year. The date could also have been significant in the Minoan agricultural calendar, as it is the traditional time for ploughing. This significance may be given added weight by the fact that two important monuments built in rich agricultural areas had this orientation and in both cases it was marked by a foresight.

The discovery of a third structure in Crete with orientation to sunset at the summer solstice, the tripartite shrine at Vathypetro, focuses attention again on the question of a Mycenaean hegemony in Crete following LM IB. The two other examples, the small shrines at Ayia Triada and Mallia, are clearly later than LM IB, and the one at Vathypetro may possibly also have been built later.

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