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Summary of the Archaeoastronomical Study of Minoan sites

ABSTRACT

The Uppsala archaeoastronomical project is nearing completion and we thought it would be of interest to present a summary of our results. More detailed information can be found in our publications, listed in the references. We have presented at three earlier Cretological conferences individual sites but can now show a fuller picture of Minoan astronomy.

We use the classical methods of archaeoastronomy for investigating the ancient astronomy of cultures without scripts: We measured the orientations of the foundations of buildings with a digital theodolite and related them to positions of the sun, the moon, and the stars. We measured the same walls more than once in the beginning, and then calculated the margin of error with the least square method. We then compared the orientations with Henriksson's computer model of the sky, which has been shown to be correct to within two minutes as far back as 3000 BCE. We documented by video some of the important events, such as sunrise at the autumn equinox in the Central Palace Sanctuary at Knossos.

In the case of each of the buildings we found a very close orientation to a major celestial body (sun, moon, bright stars and distinctive constellations) at a major position (sunrise and sunset at the equinoxes, the solstices, the beginnings of solar months, moonrise at a major standstill, the heliacal risings and settings of bright stars). These alone prove the hypothesis of long term, systematic observation of the celestial bodies, but we also discovered important ways in which the Minoans were using their astronomical knowledge to establish a lunisolar calendar and for navigation. At four places (Petsophas, Juktas, the Central Palace Sanctuary and the Southeast house at Knossos) there is evidence of a lunisolar calendar which began in connection with the autumn equinox as well as a de-

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vice for knowing when to calibrate it in order to have synchronous cycles for the moon and the sun. At Knossos there was also a device with reflections that make it possible to know when a day should be added to the solar year in order to have a correct four-year solar cycle. We found also that twelve months of the solar year were marked by orientations of most of the monuments.

We think it possibly that the peak sanctuaries were places for studying the motions of the celestial bodies and that many of the finds from these places fit a hypothesis that they were used as symbols of the moon and constellations. We hope that other researchers will continue with a larger selection of Minoan sites. For example, the differences that we found between monuments built after LM I and those built before should be corroborated with more examples.

INTRODUCTION

We chose 15 sites, with 22 buildings at these sites, to test our hypotheses that the Minoans observed the motions of the celestial bodies in a systematic way over a long period of time. These sites were Petsophas, Modi, Traostalos, Juktas, Pyrgos, Philioremos, Chamaizi, Knossos, Malia, Phaistos, Zakros, Gournia, Agia Triada, Tylissos, and Vathypetro[1] (**fig. 1**). The goal of the project was twofold: the first was to understand something of the astronomy of the Minoans, since we thought it unlikely that they had not made strides like those of the Babylonians and the Egyptians. The Minoans, however, are at a distinct disadvantage in revealing their history since their script has not been deciphered. Our archaeoastronomical approach, however, has produced surprising discoveries. The second goal was to discover if Minoan astronomy could have been a source for Mycenaean and Greek astronomy. This goal was dependent, of course, on the positive outcome of the first.

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[1] We would like to thank the Greek Archaeological Service for permission to study the sites in our project and also Ch. Kritzas and Alexandra Karetsou, Ephors at Herakleion, for helping us in our work there. For efforts on our behalf we have been indebted to the late Berit Wells, former director, and also to Bodil Nordström, secretary, at the Swedish Institute in Athens.

Table 1: *Orientations and foresights of the buildings*

SITE	ORIENTATIONS	FORESIGHT
Agia Triada, building H	sunset, summer solstice	natural
Chamaizi	sunrise, winter solstice	artificial
	Arcturus's heliacal setting	artificial
Gournia, MM lA shrine	sunrise, 21 Aug., one month before and after equinoxes	
LM I shrine	sunrise, 21 Aug., one month before and after equinoxes	
LM III A shrine	sunset, equinoxes	artificial
Juktas	sunrise, equinoxes	natural
Knossos, palace	sunrise, equinoxes	
Southeast house	sunrise, equinoxes	artificial
Malia, palace	sunrise, 22 Oct., one month before and after equinoxes	natural
bâtiment oblique	sunset, summer solstice	
Modi	sunrise, 19 Nov., two months before and after equinoxes	
Petsophas	sunrise, summer solstice	natural
	sunset, equinoxes	natural
	Arcturus's heliacal rising	
	Arcturus's heliacal setting	
Phaistos	sunrise and sunset, equinoxes	
	Canopus's heliacal rising and setting	natural
Philioremos (Gonies)	sunrise, summer solstice	natural
Pyrgos	sunrise, summer solstice	
	Arcturus's heliacal setting	natural
Traostalos	Arcturus's heliacal rising	
	Arcturus's heliacal setting	natural
Tylissos A	sunrise, summer solstice	artificial
Tylissos C	sunrise, 21 May, one month before and after the solstices	artificial
	sunrise, 21 Aug., one month before and after equinoxes	artificial
Vathypetro, villa	sunrise, equinoxes	artificial
	sunrise, winter solstice	artificial
	sunrise, 22 Oct., one month before and after equinoxes	artificial
tripartite shrine	sunset, summer solstice	artificial
Zakros	moonrise, southern major standstill	natural

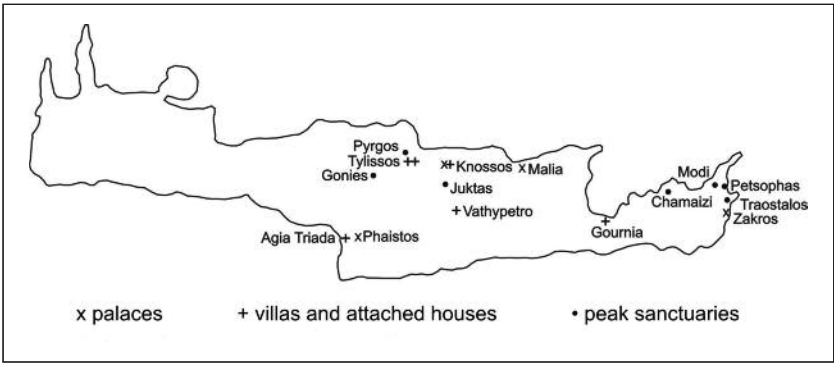


Fig. 1. Archaeological sites in the Uppsala University archaeoastronomical project.

Fig. 2. Sunrise at the summer solstice as seen from Petsophas.

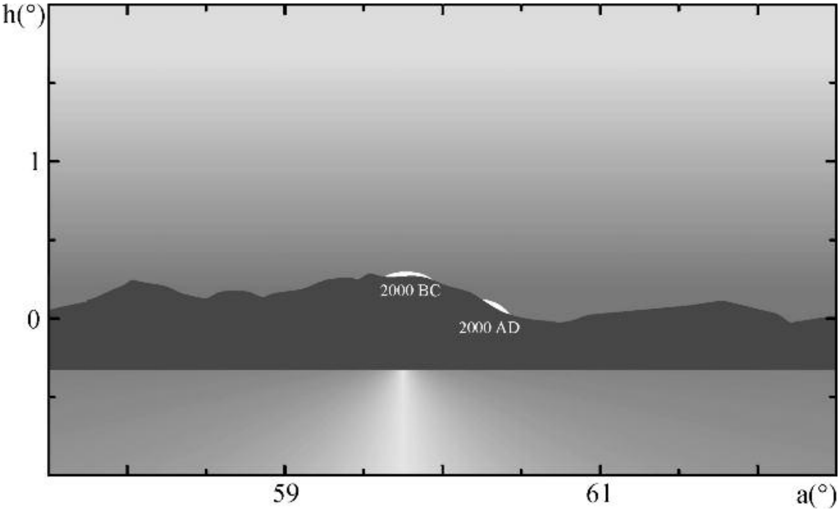
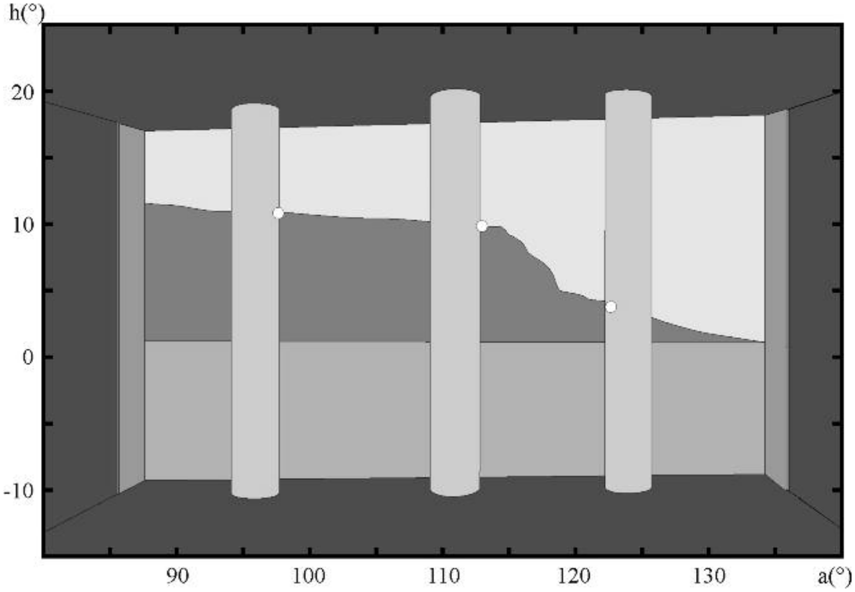


Fig 3. The villa at Vathypetro. he columns are artificial foresights for sunrise at the equinox (left), one month after the autumn equinox and before the spring equinox (centre), and the winter solstice (right). Calculations made for 1700 BCE.



THE ORIENTATIONS

All of the buildings had at least one close orientation to a major celestial event and several had more than one. The peak sanctuary on Petsophas had four and the villa at Vathypetro had three. All but four of the buildings had a natural or an artificial foresight marking the orientation (**table 1**). The highest peak on Karpathos is an example of a natural foresight marking sunrise at the summer

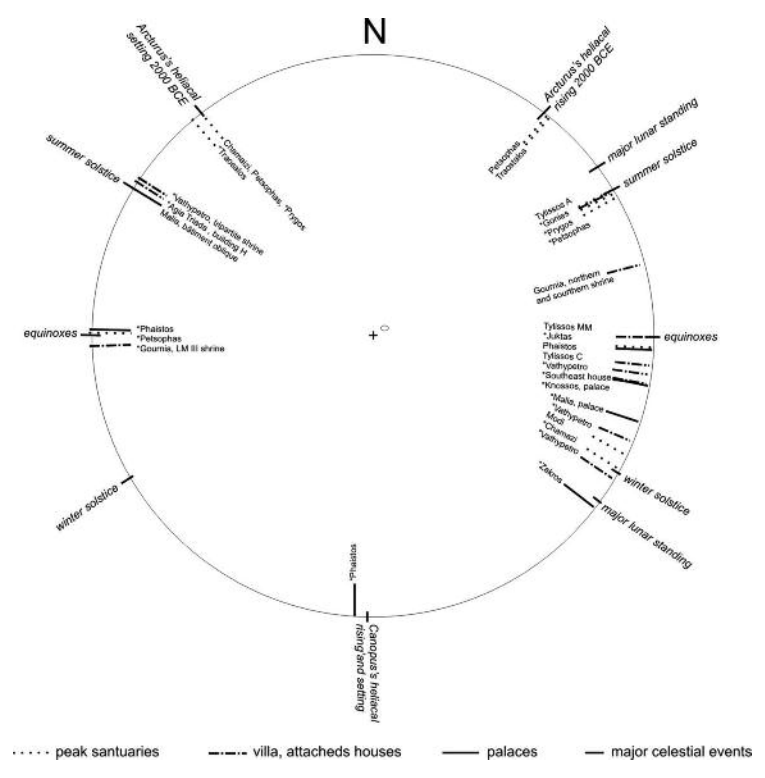


Fig. 4.
Orientations of buildings.
An asterisk indicates a foresight.

solstice (**fig. 2**). We must remember that these orientations are the result of many centuries of Minoan sky watching, and that the summer solstitial sunrise would have occurred earlier directly behind the highest peak on Karpathos. At Vathypetro artificial foresights are provided by the columns of the hall (**fig. 3**). This double emphasis on the relationships to celestial bodies shows that they were very important to the Minoans. Figure 4 is a diagram of all of the orientations in our project. The spread of azimuths the place for risings and settings at the horizon is due to the mountainous terrain.

Minoan or Mycenaean?

Four of the buildings in our project seem to date to Late Minoan II or III and thus may have been built for Mycenaeans: building H at Agia Triada, the oblique building at Malia, the tripartite shrine at Vathypetro and the LM III shrine at Gournia. All of them have orientations to the west: three to sunset at the summer solstice and the one at Gournia to sunset at the equinoxes. At Gournia, sunset at

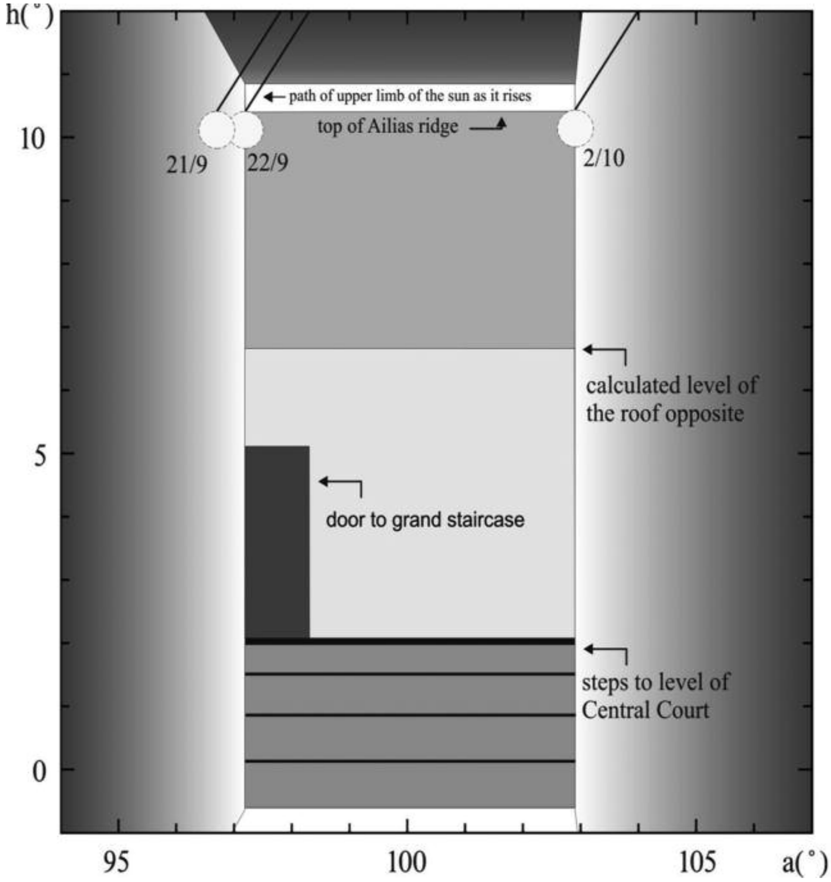


Fig. 5. Sunrise on the days before the autumn equinox, the equinoxes, and 11 days after the autumn equinox in the year 2000 BCE.

the equinoxes illuminated the northwest corner of the shrine where a number of idols with upraised arms were found[2]. No other Minoan building has an orientation to sunset at the solstices. Only two, Petsophas and Phaistos, are related to sunset at the equinoxes and this seems to be due to topography. The position of the equinoxes does not change appreciably over time, and their position was especially important for the Minoans since their year began in connection with the autumn equinox.

Graves

We have compared Mycenaean buildings and graves on the main land and have

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[2] Blomberg and Henriksson 2005c, fig. 9. Blomberg and Henriksson 2009, fig. 1.

not found the same interest in orientations, except possibly in graves. We evaluated the orientations of passage graves in Crete and in Hellas. We can be relatively certain that the graves in Hellas are Mycenaean, but the graves in Crete are not necessarily Minoan, for example the warrior graves are believed to be Mycenaean. Still the patterns are interesting. There was a decided tendency to orient graves in Bronze Age Crete to the east within the limits of sunrise and moon rise. This is not the case in Hellas. Instead, there was a tendency to orient graves to the southwest quadrant[3]. The graves of MM II at Mavro Spelio in Crete show the same orientation in the southwestern quadrant and one could suspect that they belonged to an early Mycenaean community at Knossos.

The calendar

At the palace and the Southeast house at Knossos[4], at Juktas[5] and at Petsophas[6] we found evidence of a lunisolar calendar with the beginning of the year in connection with the autumn equinox. At all of these places, the morning of the equinoxes was plainly marked by an orientation to sunrise and also there was a handy way at these places of marking the eleven days that are the difference between the lunar and the solar year (**fig. 5**). This is crucial in providing a simple way to regulate the lunar year so that it has even cycles commensurate with solar cycles within a larger time frame. The eleven days were marked with respect to the autumn equinox and not to the spring equinox.

The calendar device that we found at Knossos permitted calibration of both the lunar year and the solar year. It seems to have existed from the earliest phase of the Central Palace Sanctuary when the early west wing of the palace was oriented, and still is, to sunrise on the morning of the equinoxes. At that time, the rays of the sun cast a shadow on the southern wall of the Central Palace Sanctuary, just touching the top of one of the double axes on the wall. The rays struck the liquid-filled, bowl-shaped stone near the end of the corridor and cast a reflection on the lozenge-shaped indentation on the western wall. These are, of course, not in their original condition. The indentation probably identified the area on the wall that was repeatedly covered with plaster over the years. The reflection differs in size from year to year due to the varying distance of the sun from the

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[3] Blomberg and Henriksson 2001, figs. 6 and 7.

[4] Henriksson and Blomberg 2011, 59-68 in press.

[5] Blomberg and Henriksson 2002, 81-92.

[6] Blomberg and Henriksson 1996, 27-39.

1996-09-22 at 07.00.48

1997-09-23 at 07.01.45

1998-09-23 at 07.01.13

1999-09-23 at 07.01.07

Fig. 6. The size of the reflection varies due to the distance of the sun from the true equinox at the moment of sunrise.

Table 2: *Minoan orientations to major celestial events that determined the first day on which a solar month would begin in the proposed lunisolar calendar*

Site	Months
Petsophas, Phaistos, Knossos, Juktas, Vathypetro	first (autumn equinox)
Malia, Vathypetro	second
Modi	third
Chamaizi, Vathypetro	fourth (winter solstice)
Modi	fifth
Malia, Vathypetro	sixth
Petsophas, Phaistos, Knossos, Juktas, Vathypetro	seventh (spring equinox)
Gournia, Tylissos Villas A and C	eighth
Tylissos Villa A	ninth
Gonies, Petsophas, Pyrgos, Tylissos Villa A	tenth (summer solstice)
Tylissos Villa A	eleventh
Gournia, Tylissos Villas A and C	twelfth

true equinox at the moment of sunrise. It is larger the closer the sun is to the true equinox (**fig. 6**). The reflection is there for eleven days before the spring equinox and after the autumn equinox. If the new crescent moon appeared in this interval, it was time to add a lunar month to the calendar. This happened three times in seven years and seven times in nineteen years. The series of reflections also made it possible to adjust the solar year. A reflection appeared after 365 days for three years, but then did not appear within the lozenge until after 366 days. On that year, a day could be added to the solar calendar so that it followed the yearly rhythm of the sun's motion.

We should not exclude the interpretation that, instead of a solar calendar, the Minoans had a civil administrative calendar of 12 stable months of 30 days, which was based on the lunar calendar, as did the Babylonians and the Egyptians[7]. This was a bureaucratic accommodation to the irregularity of the lunar calendar and was not based on astronomy. It was for the sake of keeping records and we know that the Minoans kept copious economy accounts. This calendar of 12 months, containing 360 days, left out five or six days, and these were accounted for in different ways in Egypt and Babylonia. Still, the system of reflections in the palace at Knossos does make it feasible that the Minoans could have had a solar calendar with their own adjustments of days, like ours.

Other evidence of the possible existence of the solar calendar in Minoan Crete is orientations at nearly every site to one of the first days of a solar month (**table 2**). It could be that a certain month was sacred to a god in each area.

The techniques for calibrating a lunisolar calendar at several places and possibly also the existence of a solar calendar confirmed us in our first goal. The Minoans certainly had made strides in astronomy and probably to the same extent as their neighbors.

As for our second goal, the traces of orientations of Mycenaean monuments in Crete to significant celestial events could be evidence of the transmission of astronomical traditions to that culture, just as the influence of the Minoans on the Mycenaeans is clear in the transmission of a written script. There are a number of elements also that could be evidence that the Minoan calendar left its traces in the later Greek calendars. There is a Hellenistic inscription from Crete according to which the year at Knossos at that time was still at the autumn equinox[8].

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[7] Depuydt 2007, 38-40. Brack-Bernsen 2007, 93-98.

[8] Guarducci 1945, 79.

Navigation

The astronomical knowledge accumulated by the Minoans would have been useful not only for maintaining a calendar but also for navigation. A reliable method for navigation would have been mandatory for pilots plying the waters of the Aegean, and in the Neolithic and Bronze Ages there was no alternative to stellar navigation. The notion of island-hopping and finding the way by following the coast has entered the literature, but this is completely unrealistic. All of the inhabited islands are very mountainous and the winds near their shores can be treacherous. Many of them also have rocky coasts. When approaching, it would have been imperative to keep well at sea until heading in to land. Also the coasts would not have been visible at a safe distance at night. The fact that the Minoans settled Crete by the seventh millennium BCE means that some of them were sufficiently knowledgeable in stellar navigation acquired from long-term, systematic sky watching[9].

The evidence of Minoan astronomy as the source for Mycenaean and Greek navigation can be deduced from the writings of Aratos and Eudoxos. It has often been recognized that the positions of the stars given in the *Phainomena* of both authors, according to Hipparchos, were not those seen by them. Some positions are the same; some are only a little off, while others are wide of the mark. For example, the positions of the Heads of the twins, α and β Gemini, the two top rows in Table 3, are those for the late fourth millennium and not for the time of Aratos.

Using Aratos, Ptolemy's *Almagest* and a modern stellar atlas, we tried to identify the individual stars that, according to Aratos, defined the Tropics of Cancer and Capricorn and the Celestial Equator (**tables 3-5**). We ended up with a list of 111 stars, which is a conservative number, as we tried to select as far as possible the stars that we could be reasonably confident were meant. Our choices have been confirmed by another astronomer who tried independently to make his own identifications[10].

As we see at the bottom of Table 5, there are about twice as many stars near their respective circles from 2250 to 1750 BCE than in the interval 500 to 250 BCE, when Eudoxos and Aratos were writing. We asked the postgraduate seminar of the Statistics Department at Uppsala University to tell us what these fig-

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[9] Evans 1994.

[10] Bradley Schaefer, private communication.

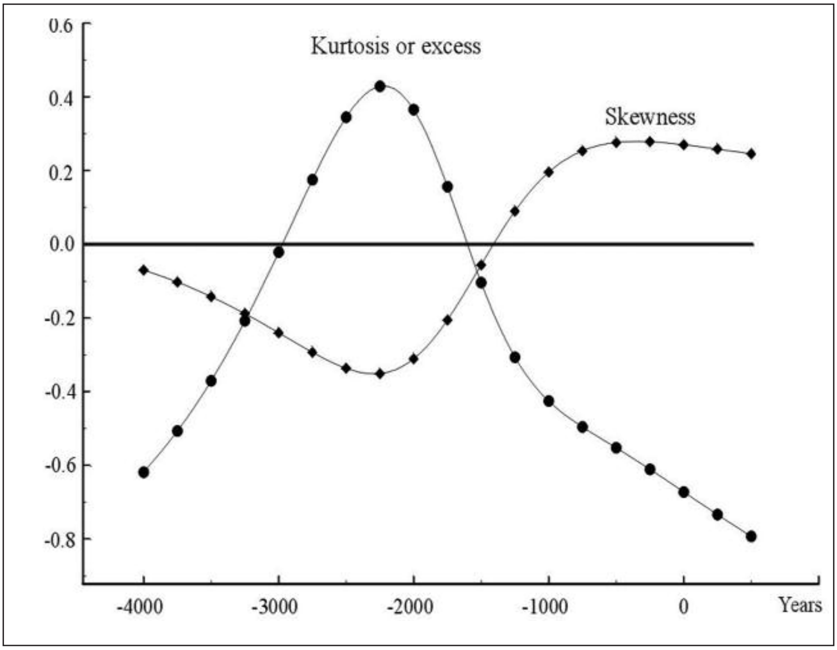

Fig. 7. The parameters kurtosis and skewness give information about the deviations from a normal distribution and is negative if it is flatter than a normal distribution. The figure shows that the greatest number of stars with small deviations can be found about 2250 BCE, which means that most of the stars on Aratos's circles were chosen at that time. The skewness has its greatest negative value about 2250 BCE, which means that the distribution of the declination error decreases more slowly on the negative side. There is the opposite situation about 300 CE. This can be interpreted as if all the stars were chosen within this interval.

ures meant. They used the sign test with appropriate assumptions and their result showed a systematic shift earlier in time from the year 350 BCE, and with 95% certainty that the initial selection of stars occurred before the year 600 BCE[11].

The variations in kurtosis and skewness were also determined. These are important quantities in statistical astronomy (**fig. 7**). The kurtosis curve gives the result of 2273±70 years, for the optimum time for the initial selection of stars. The skewness curve indicates that stars were added or deleted several times during the interval between 2250 BCE and 300 CE.

Our hypothesis is that the information in the *Phainomena* derives from a didactic tradition created by the Minoans for teaching the positions of the stars. One reason was for stellar navigation. When the Mycenaeans achieved hegemony

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[11] Henriksson and Blomberg 2000, 308, fig. 1.

in the Aegean, they updated the method, replacing some stars which, due to precession, had moved away from their circles with others that had moved closer. The Greeks, in their turn, made another revision for the same purpose. This would be another confirmation of the second goal of our project.

FURTHER REMARKS

It is quite certain that such a system of celestial bodies would have had a religious dimension, profoundly connected to Minoan cosmology. This would have counteracted any efforts for change. Because of the very slow rate of precession, the stars were considered to be fixed in a perfect universe. According to Aratos, *These you can see as the years pass returning in succession; for these figures of the passing night are all well fixed in the sky just as they are*. This, we think, is the cause of the archaic character of the poems. They were the products of an ancient tradition passed down in Hellas for those who had the same needs for a calendar and for navigation. They revered the old traditions but, along side of them, maintained a more realistic view of the motions of the stars.

Table 3: *Stars with no more than ± 2.5° deviation from the Tropic of Cancer at 250-years intervals from 3250 to the year 1 BCE.*

Star ID	**3250 BC**	**3000 BC**	**2750 BC**	**2500 BC**	**2250 BC**	**2000 BC**	**1750 BC**	**1500 BC**	**1250 BC**	**1000 BC**	**750 BC**	**500 BC**	**250 BC**	**1**
α GEM*	X	X	X											
β GEM*	X	X	X	X	X									
χ AUR								X	X	X	X			
θ PER*	X	X	X	X										
ξ PER*									X	X	X	X		
ι AND*				X	X	X	X	X						
κ AND*		X	X	X	X	X	X							
λ AND*	X	X	X	X										
χ AND					X	X	X	X						
ρ AND*										X	X	X	X	X
π PEG*											X	X	X	X
ε CYG*	X	X	X	X	X	X	X	X	X	X				
ι OPH*				X	X	X	X							
κ OPH*			X	X	X	X								
α OPH*				X	X	X	X							
ω HER									X	X	X	X		
β SER*												X	X	X
δ SER*								X	X	X	X			
λ SER*						X	X	X						
α SER*					X	X	X	X						
ε SER*			X	X	X	X								
η LEO*													X	X
α LEO*	X	X	X	X	X	X	X	X	X	X	X	X		
31 LEO*	X	X	X	X	X	X	X	X	X					
ν LEO*	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ρ LEO*	X	X	X	X	X	X	X	X	X	X				
53 LEO*					X	X	X	X	X	X	X	X		
ι LEO*									X	X	X	X	X	
η CNC*			X	X	X	X	X	X	X	X	X	X	X	X
θ CNC*						X	X	X	X	X	X	X	X	X
γ CNC*	X	X	X	X	X	X	X							
δ CNC*			X	X	X	X	X	X	X	X	X	X	X	X
	3250	3000	2750	2500	2250	2000	1750	1500	1250	1000	750	500	250	0
Total	10	11	15	17	18	19	17	15	14	14	13	12	9	8

Table 4: *Stars with no more than ± 2.5° deviation from the Equator at 250-years intervals from 3250 to the year 1 BCE.*

Star ID	**3250 BC**	**3000 BC**	**2750 BC**	**2500 BC**	**2250 BC**	**2000 BC**	**1750 BC**	**1500 BC**	**1250 BC**	**1000 BC**	**750 BC**	**500 BC**	**250 BC**	**1**
α ARI*			X	X	X	X								
β ARI*					X	X	X	X						
η ARI*					X	X	X							
Θ ARI*						X	X	X						
ν ARI*				X	X	X								
ε ARI*				X	X	X	X							
μ TAU*													X	X
90 TAU*							X	X	X	X	X	X		
β CRT*	X													
α CRT*	X	X	X	X	X	X	X							
γ CRT*				X	X	X	X	X	X					
δ CRT*							X	X	X	X	X	X		
α CRV*	X	X	X											
ε CRV*	X	X	X	X	X									
ζ CRV*		X	X	X	X	X								
β CRV*	X	X	X	X	X									
ι LIB*					X	X	X							
γ LIB*								X	X	X				
η OPH*			X	X	X	X								
ζ OPH*								X	X	X	X			
θ PEG*														X
ζ PEG*										X	X	X	X	X
ξ PEG*								X	X	X	X	X	X	
γ PEG*									X	X	X	X		
ψ1 PSC*				X	X	X	X							
ψ2 PSC*					X	X	X	X						
χ PSC*					X	X	X	X						
ν PSC*	X	X	X											
φ PSC*	X	X	X	X	X									
ψ3 PSC*						X	X	X	X					
Total	7	7	9	11	16	15	13	11	8	7	6	5	3	3

Table 5: *Stars with no more than ± 2.5° deviation from the Tropic of Carpicorn at 250-years intervals from 3250 to the year 1 BCE*

Star ID	3250 BC	3000 BC	2750 BC	2500 BC	2250 BC	2000 BC	1750 BC	1500 BC	1250 BC	1000 BC	750 BC	500 BC	250 BC	1
φ CAP*	X	X												
η CAP*	X	X	X	X	X	X								
δ AQR*														X
ι CET*									X	X	X	X		
α LEP*								X	X	X	X	X	X	
β LEP*											X	X	X	X
β CMA			X	X	X	X	X	X						
ξ1 CMA*									X	X	X	X	X	X
ρ PUP*	X													
ξ PUP*	X	X	X	X	X	X	X	X					X	X
o PUP*	X	X	X	X	X	X	X	X	X	X	X	X	X	X
α PYX*	X	X	X	X	X	X	X	X	X	X	X			
ν CEN							X	X	X	X				
φ CEN							X	X	X	X				
ζ CEN			X	X	X	X								
γ CEN	X	X	X	X										
τ CEN	X	X	X	X	X									
λ SCO*				X	X	X	X							
υ SCO*				X	X	X	X							
δ SGR*							X	X	X	X	X			
ε SGR*			X	X	X	X								
λ SGR*													X	X
ψ SGR							X	X	X	X	X	X	X	X
τ SGR					X	X	X	X	X	X				
ζ SGR					X	X	X	X						
ω SGR		X	X	X	X	X								
ε LUP				X	X	X	X							
λ LUP				X	X	X	X							
π LUP			X	X	X									
Total	8	8	11	15	16	14	14	11	10	10	8	6	8	7
Grand total	**25**	**26**	**35**	**43**	**50**	**48**	**44**	**37**	**32**	**31**	**27**	**23**	**19**	**18**

BIBLIOGRAPHY

BLOMBERG AND HENRIKSSON 1996: Blomberg, M., Henriksson, G., 'Minos Enneoros'. Archaeoastronomical Light on the Priestly Role of the King in Crete. Hellström, P., Alroth, B. (eds). *Religion and Power in the Ancient Greek World. Proceedings of the Uppsala Symposium 1993* (= *Boreas.* Uppsala Studies in Ancient Mediterranean and Near Eastern Civilizations, 24). Uppsala, 27-39.

BLOMBERG AND HENRIKSSON 1999: Blomberg, M., Henriksson, G., Evidence for the Minoan Origins of Stellar Navigation in the Aegean. Le Beuf, A., Ziólkowski, M. (eds). *Proceedings of the Meeting of the European Society for Astronomy in Culture* (*Gdańsk, 5-8 septembre 1997). Światowit* Suppl. Series H: Anthropology II. Warsaw, 69-81.

BLOMBERG AND HENRIKSSON 2000: Blomberg, M., Henriksson, G., Further Evidence for the Minoan Origins of the Greek Calendars. Καρέτσου, Α. (επιμ.), *Πεπραγμένα του Η΄ Διεθνούς Κρητολογικού Συνεδρίου (Ηράκλειο, 9-14 Σεπτεμβρίου 1996).* Α1, Α2, Α3. Ηράκλειο: Εταιρία Κρητικών Ιστορικών Μελετών, 109-128.

BLOMBERG AND HENRIKSSON 2001a: Blomberg, M., Henriksson, G., Archaeoastronomy: New Trends in the Field, with Methods and Results from Studies in Minoan Crete. *Journal of Radioanalytical and Nuclear Chemistry* 247, 609-619.

Blomberg and Henriksson 2001b: Blomberg, M., Henriksson, G., Differences in Minoan and Mycenaean Orientations in Crete. Ruggles, C., Prendergast, F., Ray, T. (eds). *Astronomy, Cosmology and Landscape Proceedings of the Meeting of the European Society for Astronomy in Culture (Dublin, Ireland, September 1998)*. Bognor Regis, 72-91.

BLOMBERG AND HENRIKSSON 2003a: The Minoan Peak Sanctuary on Pyrgos and its Context. Blomberg, M., Blomberg, P. E., Henriksson, G. (eds.), *Calendars, Symbols, and Orientations: Legacies of Astronomy in Culture*. *Proceedings of the 9th Meeting of the European Society for Astronomy in Culture (Upsala, 27-30 August 2001)*. Upsala Astronomical Observatory Report No. 59. Uppsala: Upsala University Press, 27-134.

BLOMBERG AND HENRIKSSON 2003b: Blomberg, M., Henriksson, G., Literary and Archaeoastronomical Evidence for the Origins of the Hellenic Calendar in the Aegean Bronze Age. Maravelia, A.-A. (ed.), *Ad Astra per Astera et per Ludum*: *European Archaeoastronomy and the Orientation of Monuments in the Mediterranean Basin*. 8th Annual Meeting of the European Association of Archaeologists (Thessaloniki 2002). *British Archaeological Reports International Series*, 1154, 53-70.

BLOMBERG AND HENRIKSSON 2005a: Blomberg, M., Henriksson, G., Elements of Greek Astronomy and Religion in Minoan Crete. Fountain, J. W., Sinclair, R. M. (eds), *Conversations across Time and Space: Selected Papers from the 5th Oxford International Conference at Santa Fe, 1996*. Current Studies in Archaeoastronomy. Carolina Academic Press, Durham NC, 371-392.

BLOMBERG AND HENRIKSSON 2005b: Blomberg, M., Henriksson, G., Orientations of the Late Bronze Age Villa Complex at Vathypetro in Crete. *Mediterranean Archaeology and Archaeometry* 5, 51-61.

BLOMBERG AND HENRIKSSON 2005c: Blomberg, M., Henriksson, G., Some Problems in Minoan Archaeoastronomy. Ktiva, M., Pustylnik, I., Vesik, L. (eds.), *Cosmic Catastrophies: A Collection of Articles. Proceedings of the European Society for Astronomy in Culture* 2002. Tartu, 15-22.

Blomberg and Henriksson 2006: Blomberg, M., Henriksson, G., Minoan Orientations in Context. Δετοράκης, Θ. και Καλοκαιρινός, Α. (επιμ.), *Πεπραγμένα του Θ΄ Διεθνούς Κρητολογικού Συνεδρίου (Ελούντα, 1-7 Οκτωβρίου 2001).* Α4. Ηράκλειο: Εταιρία Κρητικών Ιστορικών Μελετών, 319-331.

Blomberg and Henriksson 2007a: Blomberg, M., Henriksson, G., Orientations of the Minoan Palace at Phaistos in Crete. *Ancient Watching of Cosmic Observation of Astronomical Phenomena. Proceedings of the International Conference on Archaeoastronomy (Rhodes, 6-10 April, 2006).* European Society for Astronomy in Culture. Mediterranean Archaeology and Archaeometry 6, 185-192.

Blomberg and Henriksson 2007b: Blomberg, M., Henriksson, G., The Function of the Minoan Oval House at Chamaizi. Pásztor, E. (ed.), *Archaeology and Ethnography. Papers from the Annual Meeting of European Society for Astronomy in Culture* (Kecskemét, Hungary, 2004). British Archaeological Reports International Series 1647, 15-18.

Blomberg and Henriksson 2008: Blomberg, M., Henriksson, G., Crossing Geographical Borders from Minoan Crete. Gillis, C., Sjöberg, B. (eds), *Trade and Production in Premonetary Greece. Proceedings of the 7th, 8th and 9th International Workshops (Athens 1997-1999).* Studies in Mediterranean Archaeology and Literature. Pocket-book 173. Sävedalen, 191-210.

Blomberg, Henriksson and Papathanassiou 2002: Blomberg, M., Henriksson, G., Papathanassiou, M., The Calendaric Relationship between the Minoan Peak Sanctuary on Juktas and the Palace at Knossos. Potyomkina, T. M., Obridko, V. N. (eds.) *Astronomy of Ancient Societies. Proceedings of the Conference "Astronomy of Ancient Civilization"* of the European Society for Astronomy associated with the Joint European and National Astronomical Meeting (Moscow, May 23-27, 2000). Moscow, 81-92.

Blomberg 2000: Blomberg, P. E., An Astronomical Interpretation of Finds from Minoan Crete. Estaban, C., Belmonte, J. A. (eds.), *Astronomy and Cultural Diversity: Proceedings of the International Conference Oxford VI and European Society for Astronomy in Culture 99* (La Laguna, 21-29 June 1999). Tenerife: Organismo Autónomo de Museos del Cabildo, 311-318.

Blomberg 2002: Blomberg, P. E., An Attempt to Reconstruct the Minoan Star Map. *Proceedings of the Joint European and National Astronomy Meeting* (Moscow, May 23-27 2000). 99-101.

Blomberg 2003a: Blomberg, P. E., The Early Hellenic Sky Map Reconstructed from Archaeoastronomical and Textual Studies. Maravelia, A.-A. (ed.), *Ad Astra per Astera et per Ludum*: *European Archaeoastronomy and the Orientation of Monuments in the Mediterranean Basin.* Papers from Session I. 13, held at the European Association of Archaeologists 8th Annual Meeting in Thessaloniki 2002. British Archaeological Reports International Series 1154, 71-76.

Blomberg 2003b: Blomberg 2003b: Blomberg, P. E., The Northern most Constellations in Early Greek Tradition. Blomberg, M., Blomberg, P. E., Henriksson, G. (eds.), *Proceedings of the 9th Meeting of the European Society for Astronomy in Culture (Upsala, 27-30 August 2001).* Uppsala Astronomical Observatory Report No. 59. Uppsala University Press, Uppsala, 67-71.

BLOMBERG 2005: Blomberg, P. E., Did Bottes Drive a Wagon with Oxen on the Minoan Star Map? Ktiva, M., Pustylnik, I., Vesik, L. (eds.), *Cosmic Catastrophies: Proceedings of the European Society for Astronomy in Culture 2002.* Tartu, 23-26.

BLOMBERG 2006: Blomberg, P. E., A New Interpretation of the Figurines from Petsophas and Traostalos. Δετοράκης, Θ., Καλοκαιρινός, Α. (επιμ.), *Πεπραγμένα του Θʹ Διεθνούς Κρητολογικού Συνεδρίου (Ελούντα, 1-6 Οκτωβρίου 2001).* Α4. Ηράκλειο: Εταιρεία Κρητικών Ιστορικών Μελετών, 333-347.

BLOMBERG 2007a: Blomberg, P. E., How did the Constellation of the Bear Receive its Name. Pásztor, E. (ed.), *Archaeoastronomy in Archaeology and Ethnography*. Papers from the Annual meeting of European Society for Astronomy in Culture (Kecskemét, Hungary, 2004). *British Archaeological Reports International Series* 1647, 129-132.

BLOMBERG 2007b: Blomberg, P. E., On the Origins of the Modern Star Map. *Ancient Watching of Cosmic Space and Observation of Astronomical Phenomena (Rhodes, 6-10 April, 2006). Proceedings of the 14th International Conference on Archaeoastronomy*. Mediterranean Archaeology and Archaeometry 6, 193-200.

BLOMBERG 2009: Blomberg, P. E., Astronomical Rituals at the Minoan Peak Sanctuaries? *Cosmology Across Cultures. Proceedings of a Workshop (Parque de las Ciencias, Granada, 8-12 September 2008)*. Astronomical Society of the Pacific Conference Series 409, 436-441.

BRACK-BERNSEN 2007: Brack-Bernsen, L., Steele, J. M. (ed.), The 360-year year in Mesopotamia. *Calendars and Years: Astronomy and Time in the Ancient Near East*. Oxford: Oxbow Books, 83-100.

DEPUYDT 2007: Depuydt, L., Calendars and Years in ancient Egypt: The Soundness of Egyptian and West Asian Chronology in 1500-500 BC and the Consistency of the Egyptian 365-day Wandering Year. Steele, J. M. (ed.), *Calendars and Years: Astronomy and Time in the Ancient Near East*. Oxford: Oxbow Books, 35-81.

EVANS 1994: Evans, J. D., The Early Millennia: Continuity and Change in a Farming Settlement. Evely, D., Hughes-Brock, H., Momigliano, N. (eds), *Knossos, the History of a Labyrinth. Papers presented in Honour of Sinclair Hood*. Athens: The British School at Athens.

GUARDUCCI 1945: Guarducci, M., Note sul calendario cretese. *Epigraphica* 7, 000-000.

HENRIKSSON AND BLOMBERG 1996: Henriksson, G., Blomberg, M., Evidence for Minoan Astronomical Observations from the Peak Sanctuaries on Petsophas and Traostalos. *Opuscula Atheniensia* 21, 99-114.

HENRIKSSON AND BLOMBERG 1997-98: Henriksson, G., Blomberg, M., Petsophas and the Summer Solstice. *Opuscula Atheniensia* 22-23, 147-151.

HENRIKSSON AND BLOMBERG 2000: Henriksson, G., Blomberg, M., New Arguments for the Minoan Origin of the Stellar Positions in Aratos' Phainomena. Esteban, C., Belmonte,

J. A. (eds), *Astronomy and Cultural Diversity*. *Proceedings of the International Conference «Oxford VI and SEAC 99» (La Laguna, 21-29 June 1999)*, Teneriffe: Organismo autónomo de Museos del Cabildo, 303-310.

HENRIKSSON AND BLOMBERG 2008: Henriksson, G., Blomberg, M., Orientations at the Minoan Peak Sanctuary on Philioremos near Gonies (Maleviziou), Crete. *Astronomy and Cosmology in Folk Traditions and Cultural Heritage*. Archaeologia Baltica 10. Klaipėda, 125-130.

HENRIKSSON AND BLOMBERG 2009: Henriksson, G., Blomberg, M., Solar Orientations of Bronze Age Shrines in Gournia, Crete. *Cosmology Across Cultures*. *Proceedings of a Workshop (Parque de las Ciencias, Granada, 8-12 September 2008)*. Astronomical Society of the Pacific Conference Series 409, 430-435.

HENRIKSSON AND BLOMBERG 2011: Henriksson, G., Blomberg, M., The Evidence from Knossos on the Minoan Calendar. *Mediterranean Archaeology and Archaeometry* 11, 59-68.

HENRIKSSON AND BLOMBERG in press: Henriksson, G., Blomberg, M., The Elite at Knossos as Custodians of the Calendar. *Astronomy and Power: How Worlds are Structured*. BAR IS.