

GIS Modeling of the Minoan Peak Sanctuaries of East Crete

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Abstract: This paper presents the preliminary results of building a cultural landscape model of Minoan peak sanctuaries through a GIS approach. It is part of the wider framework project "The Topography of Power" in Minoan Crete.

The reconstruction of the peak sanctuaries' landscape was based on the accurate mapping of them and their surrounding settlements through high accuracy GPS receivers and the analysis of their spatial distribution within a SPOT generated DEM. Viewsheds were exploited in order to address questions related to Minoan peak sanctuaries with respect to their topographic settings. A relational database containing the existing archaeological information was implemented to the GIS in order to provide sufficient evidence for the formation of the ritual/cultural landscape of the Minoan period.

The peak sanctuary landscape is presented in two distinctive chronological acmes, roughly Proto- and Neopalatial, with the transition from the first to the second period, and in relation to nearby settlements and burial sites.

Key words: GIS, GPS, viewsheds, Minoan, Crete, peak sanctuaries

Introduction

The phenomenon of the Cretan Bronze Age peak sanctuary is approached in terms of its definition and distribution, its history, and the various interpretations of its activities, use, and meaning.

GIS is proposed to address specific questions related to the distribution of sanctuaries, their spatial characteristics and corresponding geomorphologic and environmental settings.

The first results of this approach are presented, with some methodological comments on:

- the usage of high accuracy GPS (Global Positioning

System) receivers,

- digitisation of land use and land capability maps and their related legends in a table,
- registration of all data to the same geodetic coordinate system (maps, DEM),
- creation of a relational database containing archaeological data on the sanctuaries, relating the sites, with finds, chronology and bibliography,
- viewsheds of different periods of the East Cretan peak sanctuary landscape.

These results are then evaluated to define the future prospects of the project.

General characteristics and environment

Definition

A peak sanctuary is generally characterized by its topographical location, on top or near the peak of a mountain, though reachable and within the area of human shepherding activity.

It is identified by the presence of finds indicating ritual action, such as terracotta figurines (human and animal), pottery (possibly broken on purpose) and a pebble scatter ². The presence of thick ash layers, architectural remains, bronze vessels, and Linear A inscriptions, is characteristic of a later phase of the peak sanctuary's history.

It has been empirically acknowledged that the topographical location of these sites was meaningful as well: "*The topography of known peak sanctuaries is the best guide in our search for new sites*" ³. Many of the sites are located on the edge of a steep cliff, but are accessible from one slope. Although peak sanctuaries are definitely isolated from settlements, the distance to the nearby settlements seems to be important. The survey of the Atsipadhes Korakias Peak Sanctuary Project has located some small contemporary settlements in the sanctuary's "parish", but no large town or palatial villa. A common pottery type fabric at these small settlements and the sanctuary further reinforced the topographical and optical link that exists between the peak and the settlements below it. The optical link between the peak sanctuary sites themselves is even stronger ⁴. For this reason proximity and intervisibility can be suggested to be some of the most promising features in a GIS approach. The previously mentioned ash feature (still under discussion) might further accentuate a possible communication role between the peak sanctuaries, as it could be a residual of fire signaling between sites.

Distribution

About 65 sites have been added to our database, including 22 sites (fig. 1, yellow with black) that conform to most of the criteria mentioned earlier. The other sites (fig.1. black) are of dubious nature: some turned out to be of a totally different period, others were later identified as settlements (with different archaeological features) or as open-air sanctuaries with different topographical nature and others again lacked the typical finds. Some may still be peak sanctuaries.

If we look at the general distribution of the discovered peak sanctuaries on Crete, a much thicker concentration is to be found in our pilot area, the East Cretan mountains.

A second concentration can be identified in central Crete, with Iuktas as the main sanctuary, the oldest, longest living and certainly the largest and most important one. In later sources, Iuktas was recognised as Zeus's tomb, and the profile of the mountain as seen from the west, does indeed resemble a human head ⁵. We emphasize this feature because the recognisable shape of the mountain itself as a marker in the landscape seems like another common factor for most of the sites.

In the municipality of Rethymnon, another three certain peak

sanctuaries were identified, two having common geographical and archaeological characteristics with their Eastern counterparts (Spili Vorizi and Atsipades Korakias). Further to the west some candidates were proposed, but thick vegetation and difficult access has not allowed us so far to further evaluate the peak sanctuaries of West Crete. It is one of the goals of the project to examine if these concentrations appear as the result of more intense research in the eastern part of the island or if they are indeed meaningful in the Minoan landscape.

Chronology and the peak sanctuaries in broader Minoan history

Our knowledge of the chronology of these sanctuaries is still limited, because up to very recently, hardly any detailed publication exists on the pottery. The lack of detailed publication is mostly due to the nature of the excavations: Some are more than 100 years old, while others were of a rescue nature, and hardly any detailed reports were kept. Exceptions are the publications on Atsipades, Iuktas, and Petsofas ⁶. The reinvestigation of the material of most of these sites is still problematic. Nowicki noted: "We mostly deal with coarse ware, and difficult to be dated. If the site is strongly exposed and the surface eroded, potsherds are considerably washed away"⁷. And Peatfield: "...the chronology is extremely difficult to ascertain"⁸. The combined knowledge of all these reports though gives a reasonably good picture of the history of peak sanctuaries⁹.

Origin: Most probably the peak sanctuaries developed in a prepalatial context. Peatfield argues that they evolved from the EM built tombs¹⁰.

It is in this period that there is an increase in pastoral farming, reflected by large flocks of figurines in bowls, recorded on the sites. Around 2000 BC, which falls more or less in MM IA, the Near East settlements flourish and a widespread systematic trade between Crete and the East influences Minoan life ¹¹.

MM IB-II (phase III): All peak sanctuaries are now in use, but show localised material, and a parochial character¹² (figure 2). From this period on, the Iuktas sanctuary is head of the hierarchy. This phase corresponds to the protopalatial period, and the peak sanctuary is in a period of expansion and prosperity.

Watrous suggests that due to the critical role Crete had obtained within the wider trade network in the Eastern Mediterranean, a new kind of sanctuary was initiated, namely the peak sanctuary. Some of the Petsofas figurines are Light on Dark, or Polychrome-on-Dark, and comparable to Kamares ware (MMI -II)¹³. Important for the peak sanctuary zone theory is that, in the same period, in the mountain chain west of Sitia, one can find only limited and defensible sites west of Sitia (Chamezi, Vrokastro, Katallimata, Chrysopigi, Korakia, and Tappes)¹⁴, which were all reused in LMIIC- Early Iron Age.

MM IIIA (phase IV): A big change on all levels can be observed from MMIII (second palace period) and onwards. Only 8 sanctuaries survive. These present recently built or at least rebuilt structures, and have much more varied and richer finds, often referred to as elite palace material (figure 3).

There is no more mention of ash-layers (possibly unstudied),

the figurines change in style (the 'regency style'), Linear A inscriptions are found on stone altars. Also in the palatial centres, the first representations of peak sanctuaries are reported, such as the Zakros peak sanctuary rhyton, the Knossos Gypsadhes serpentine vase fragments, and possibly the Petsotas terracotta model. Nowicki divides the MM III period in MMIIIA, which he recognises as the decline in numbers, and MMIII-LMI, corresponding to the neopalatial period¹⁵. This decline already had started in MMII. It has been frequently argued that the peak sanctuaries are here institutionalised by Knossos; a "deliberate centralisation of cult", or "part of the general process by which palatial elite used religion to maintain hierarchical position", or "they formalise in order to increase their prestige and social position"¹⁶.

MM IIIB-LMI (phase V): After MM IIIB a general decline in use of the sanctuaries is observed, and this could be due to the natural catastrophes of this period (earthquake, Theran eruption), but even if they were not very destructive, they certainly caused a strong religious response¹⁷. An increase of cave sites as religious centres could present a new shift in religious practise.

LM II-III (phase VI): Only Iuktas survives the end of the second palace period up to LMII¹⁸.

LM IIIC: The peaks are reused from LM III C and onwards as refuge settlements.

Unfortunately only three well-documented sites can be dated in such a detailed chronological scheme. In order to provide a correct representation of the peak sanctuary's chronology, and by lack of better data, the peak sanctuaries were categorized under two broader chronological periods, in which a big change can be identified, namely the protopalatial period (more specifically MM IB-II or phase III), and neopalatial period (MM IIIA or phase IV), the epoch of the so-called palatial peak sanctuaries.

Previous interpretations

After many years of research, a number of interpretations has been proposed for the function of peak sanctuaries. Most obvious is their religious character, due to the artefact assemblages which clearly indicate ritual offering. Table 2 summarizes the most popular identifications, the action that accompanies this identification, with archaeological and other arguments supporting the theory, and the hypothesized practical meaning of these sites' existence.

A GIS approach to peak sanctuaries

The implementation of GIS to the subject of Minoan peak sanctuaries offers us a way not only to analyze systematically the empirical observations, but also addresses new questions related to the broader function and distribution of peak sanctuaries, the use and perception of the Minoan landscape and the interaction of the peak sanctuaries with their surroundings.

The use of GIS

- First of all the exact mapping of these sites is essential, since already several of these sanctuaries have been destroyed, by either church construction, antennas, looting or army installations. Without having a detailed map of the location of the peak sanctuaries, it is impossible to analyse their spatial distribution, study their relation with other significant settlements and visualise them within their cultural and natural environment.
- Since a number of uncertain sites exist, the environmental characteristics of peak sanctuaries could possibly clarify their identification and improve the classification scheme.
- Analysis of the distribution of these sites is much easier and more accurate using GIS, especially if we want to compare a broad spectrum of data, such as the broader archaeological landscape, chronology, finds, geology, land use, land capability, proximity, accessibility and intervisibility.
- Cumulative viewsheds of the peak sanctuaries of different periods indicate specific tendencies related to areas of power of different categories (religious, social, economic, political, military).
- Cost distance analysis from and to the nearby settlements of the same period contributes to the study of proximity and accessibility of the peak sanctuaries.
- The creation of a predictive model might indicate candidates for undiscovered peak sanctuaries, or explain the existing gaps in the landscape, why the East has many more peak sanctuaries than the west.
- Capturing the characteristics of the peak sanctuary landscape, contributes to the whole of the Minoan land- and seascape, identifying possible humanized borders of religious influence zones, political, social or economic control areas, and the separation of the "tamed" land, such as agricultural area pasture land, settlement land, and sacred land from the "wild" area. This presumption is based on the presence of both domesticated and wild animal figurines at the peak sanctuaries.

Progress of the project and methodology

- RELATIONAL DATABASE: Basic archaeological data were collected through library research, archaeological and environmental observations made at the sites visited. The data were recorded in a relational database, including information on chronology, architecture, finds and environmental characteristics of the peak sanctuaries.

Since various opinions exist even on the general chronology of the sites, the database was formulated to include different chronologies, suggested by corresponding researchers. The database can thus be queried on the opinion of each researcher. Through lack of numerical data on the finds, the database is limited so far to the mention of absence or presence of specific types of finds. These types however can indicate in how far a site has a typical peak sanctuary artifact assembly and the way that this assemblage can be an indication of chronology²² (see figure 4).

Problems arose in the actual site definition and the construction of the basic list of sites. As we investigated the possible presence of unknown peak sanctuaries, it was decided that sites, which were once identified as peak sanctuaries, but later erased from the list of definite peak sanctuaries, be once again included. For the purpose of chronological evolution of the peak sanctuary landscape, it goes without question that we only use certain, and dated sites (although sometimes this chronology remains vague).

Furthermore, data included in the Digital Archaeological Map of Lasithi²³ were used for chronology and typology of settlements, burial sites, "sacred" sites (not peak sanctuaries), production sites, and guard posts. The sites dated securely to either the proto- or neopalatial period, are far outnumbered by the sites dated to the full "Minoan" period and need further research.

GPS & field survey

So far, the prefecture of Lasithi has been thoroughly investigated; almost all certain peak sanctuaries were visited, with the exception of Plagia and Korfi tou Mare, located close to military installations. A few others need to be revisited, such as Etiani Kefala, since the drawing in Rutkowski's article²⁴ locates the peak sanctuary on the actual top of the mountain, while other reports mention that the sanctuary is about a 100m lower and further to the north²⁵.

Viewshed analysis took such discrepancies as far as possible into account. Coordinates of sanctuary areas were taken with GPS receivers, using static differential positioning. A few others in the wider region of Crete were also visited and positioned. Although difficult to determine, it was attempted to measure the extent of the peak sanctuary area, by creating polygons based on GPS measurements.

The further site distribution (of Minoan settlements, burial sites, production sites, religious sites and guard posts) was once again deduced from the Digital Archaeological Map of Lasithi, which included the pinpointing of archaeological sites of the studied area with chronology and typology. The data included excavated sites, intensive and extensive surveys, where both actual GPS coordinates and digitized survey plans were combined to achieve the fullest possible ancient site distribution.

Digitization Of Maps – Creation Of Table With Attributes Of The Polygons

Land use and Land capability maps were **digitized**, and georeferenced to ΕΓΣΑ '87 projection system (Greek Geodetic Reference System of 1987). Each polygon of those digitized maps had a property record in an accompanying table, which can be queried on any field. (such as: geological layer, physiography, soil depth, erosion, slope, artificial vegetation, aspect, capability of soil from very fertile to not cultivable at all in percentage).

Digital Elevation Model

From 1:50000 topographical maps, the coastline was created to register the Digital Elevation Model to the same projection system, namely ΕΓΣΑ 87. The DEM was constructed by a series of SPOT ORTHO images, with a pixel size of 50 x 50m. Georeferencing of the 50 x 50m pixel DEM was based

on 42 reference points on the coastline of Crete, having a maximum residual of 47.431m. GPS measurements of the peak sanctuaries were also added to the DEM.

The DEM was then **resampled** with bilinear interpolation reducing the pixel size from 50x50m to 10x10m.

Pseudo Coordinates For Peak Sanctuaries

As a test, comparative viewsheds were created from the GPS points and the highest neighboring pixel (of 50 x 50m).

The viewsheds resulting from the highest pixel were much more accurate, and all further viewsheds were based on these viewpoints. The actual GPS measurements will therefore be much more valuable for analysis of aerial photographs, high-resolution satellite images (such as Ikonos), and smaller scale digitized maps (1:5000), unless if the DEM could be registered with a better accuracy.

Viewsheds

Individual viewsheds for all of the Lasithi peak sanctuaries were created, and compared to the field observations. Viewsheds were taken all from the highest pixel adjacent to the corresponding GPS points, with a maximum view distance of 25km, and at a height of 2m. The results of these viewsheds are satisfactory for general large distance observations, concerning coverage of certain areas, but not good enough for local scale landscapes. Test viewsheds and close-ups of better-known areas did not entirely cover the actual visible terrain as expected, which should cover a larger area of the fertile valleys. In order to compensate such discrepancies georeference of the DEM will be further refined by including internal reference points and using the highest-altitude pixels of the DEM, with the coordinates of known datum points. For micro-landscape analysis, it is planned to digitize some selected areas on 1:5000 maps, with 4m interval contour lines.

Furthermore, it is suggested to compare viewsheds from the highest-altitude pixel with viewsheds from the actual location of the sanctuary. A composed viewshed from the outer corners of the sanctuary would be considered as the representative view of the whole sanctuary area. As mentioned in the introduction, sanctuaries are not always on the actual top, and they could have had a directional preference in visibility. The results are hoped to clarify a difference between the religious influence zone (with possible limited visibility from the sanctuary) and the socio-economic, political or even military control areas (with the optimal visibility from the actual top).

Cumulative viewsheds of east Crete (Lasithi) and archaeological interpretations

The individual viewsheds were cumulated and evaluated by archaeological period, relevant to the peak sanctuary's history and contemporary neighboring sites. The cumulative viewsheds were based on a registered DEM with a resampled pixel size of 10 x 10m, GPS coordinates of the peak sanctuaries, relocated to the nearby highest pixel, and GPS coordinates of the main Minoan site categories.

Figure 5 is an accumulation of the viewsheds of all certain

peak sanctuaries of the Lasithi prefecture.

The first obvious observation is the high density of viewsheds in the far eastern part of the island. The highest visibility from peak sanctuaries can be found in the northeastern peninsula (Cape Sidero) and in the West Sitia mountain range. Cape Sidero might be more visible, because the topography does not obstruct visibility.

The West Sitia mountain range has the highest visibility, because these mountains are higher than the eastern ones. Remarkable though is the absence of any certain peak sanctuary in this range, but candidate sites are present (fig.1). Minoan archaeological sites are rare in this area, and this is due to either lack of archaeological investigation and/or the inaccessibility of the area itself.

The negative evidence is likewise significant: the South coast is almost invisible, and especially from Ierapetra towards the west, the area is extremely poor in visibility. This observation should be taken with precaution, since the peak sanctuary landscape to the west of our pilot area has not been added to the viewshed and once again, the eastern part is much better surveyed. The same observation has to be made for the area north of Agios Nikolaos.

Perhaps most important of all is the high intervisibility of the peak sanctuaries themselves. As already pointed out by several archaeologists (see footnote 4), the Lasithi peak sanctuaries never stand alone. The protopalatial ones have visual contact with up to six other peak sanctuaries, and eight out of twelve can be seen from at least four others. The abandonment of many peak sanctuaries in the neopalatial period (figure 6) reduces considerably their intervisibility and is rather a reflection of diminished centralization of power in this period.

Generally, it seems that the area of Sitia and especially the mountainous areas are well covered by these peak sanctuaries. This needs further verification, as field observation shows that most sanctuaries overview the fertile valleys below them.

Since all of the peak sanctuaries are protopalatial, figure 5 could be identified with the protopalatial peak sanctuary landscape. If we want to include other site categories, it has proven necessary to evaluate the numerical representation of the better-dated sites, in comparison to all Minoan sites.

Of 260 Minoan sites included here, 85 are certainly protopalatial and 75 neopalatial. Since one site can have a history in both periods, approximately one third of all sites is well dated.

Based on figure 7 the production and guard posts cannot be evaluated by period. The actual number of well-dated sites is too low and does not compare proportionally in either period. It seems relevant that of a total of 13 production sites, about half are visible in both periods from peak sanctuaries. In both proto- and neopalatial period there are only two visible production sites left.

The visibility/non visibility of all guard posts is again relatively well balanced. This is not reflected in either

protopalatial, or neopalatial guard posts.

The categories settlements, "sacred" sites and of course peak sanctuaries are relatively well proportioned for further analysis of both proto- and neopalatial period, but once again the well dated site does not compare well, proportionally to the total of all Minoan sites, except for the peak sanctuaries.

The high number of visible burial sites in the protopalatial period might seem strange, but might turn out to be archaeologically relevant, since it supports the idea of the peak sanctuary's origin in the EM period in these burial sites. This is even more striking in the evolution charts, where the visibility of burial sites drops dramatically in the neopalatial period (Figure 8). Once again, the absolute number of sites is low enough for drawing valid conclusions.

It seems remarkable that even the most important sites of the protopalatial period, Petras and Agia Fotia are visible from one or two peaks at the most (field observation and confirmed by viewshed). This is reinforced in the neopalatial period, in which the number of peak sanctuaries and consequently their cumulative viewshed drops. On the other hand, the important settlement of Kato Zakros cannot be seen from any known peak sanctuary or candidate site.

Conclusive remarks

The preliminary results indicate that the project still suffers from a variety of biases on both technical and archaeological part. The quality of the DEM and positioning of GPS measurements is essential to the study of peak sanctuaries. Some of the individual viewsheds were found to be in relative contradiction with field observations. Archaeologically, a further refinement of the chronological identification of sites would improve the statistical results considerably.

However, the results have provided us with valuable information. The total intervisibility of the peak sanctuaries has been confirmed, and encourages further viewshed analysis for the peak sanctuaries of the whole island.

Some significant points have been made concerning the visual contact between peak sanctuaries and other categories of sites.

The evolution of visibility of the burial sites from peak sanctuaries further supports the theory of the peak sanctuary's origin from burial sites. The low visibility of settlements, and especially large sites, such as Kato Zakro, is rather unexpected.

If the intervisibility of the peak sanctuaries is a reflection of power, the protopalatial central authorities (religious, socio-economic, or even political) controlled a much larger area than the neopalatial ones.

The abandonment of many peak sanctuaries in the neopalatial period and their reduced cumulative viewsheds could support the hypothesis that religion has been decentralized²⁶.

End notes

¹ Funded by the Institute of Aegean Prehistory and directed by Prof. Jan Driessen (Université Catholique de Louvain) and Dr. Apostolos Sarris (Institute for Mediterranean Studies-F.O.R.T.H.). The project aims to further investigate the role of peak sanctuaries on the macro scale of the whole Cretan landscape, while other subprojects of "The Topography of Power" project consist in a regional survey (Tim Cunningham), a study of political structures in Neopalatial Crete (Klaas Vansteenhuyse) and an study of Minoan architecture (Jan Driessen), all of the above investigating expressions of power on different scales in the topography of Crete.

² Rutkowski 1986, 11; Peatfield 1992, Nowicki 1994, 34-39.

³ Nowicki 1988, 191.

⁴ Faure 1967, 118-128; Idem 1969, 190 (recognises as a possible characteristic); Peatfield 1983, 275-276 (intervisibility is characteristic of peak sanctuary); Idem 1987, 91; Rutkowski 1988, 74; Peatfield 1990, 119-120; Nowicki 1991, *passim*; Idem 1994, 34-42; Peatfield 1994, 24-25; Peatfield 1994b.

⁵ Evans 1921, 153-154.

⁶ Peatfield 1994b, 14 peak sanctuaries have been excavated, only three extensively published; Petsofas: Rutkowski 1991, *passim*; Iuktas: Karetsou 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981a, 1981b, 1984, 1985, e.a.; Atsipadhes: Peatfield 1992, Morris & Peatfield 1995, Nowicki 1994, 41-42, Peatfield 1991, 1992b, 1993, 1994c, 1995, 1996.

⁷ Nowicki 1988, 190.

⁸ Peatfield 1990, 127, fn.54.

⁹ Nowicki 1994, 40-41: the phases are Nowicki's proposal.

¹⁰ Peatfield 1984, 89-90.

¹¹ Watrous 1994, 394-396.

¹² Peatfield 1990, 124-127; Peatfield 1994, 23.

¹³ Peatfield 1987, 92, n. 22.

¹⁴ Nowicki 1991, 144-145

¹⁵ Nowicki 1994, 41.

¹⁶ Peatfield 1990, 126-130.

¹⁷ Rutkowski 1968, 163-168; Peatfield 1983, 277-278.

¹⁸ Peatfield 1990, 131.

¹⁹ Rutkowski 1991, 52-57; Peatfield 1992, 74-80.

²⁰ Peatfield 1983, 277.

²¹ Faure 1969, 190; Faure 1972, 392; (on remarkable orientations); Henriksson & Blomberg 1996, 99-114.

²² Jones 1999, *passim*.

²³ This project is available on

www1.ims.forth.gr/maps/website/imsilasithi2001, and was carried out by the Institute of Mediterranean Studies, under direction of Dr. Apostolos Sarris.

²⁴ Rutkowski 1988, 78, Pl. X.

²⁵ Faure 1967, 121; Peatfield 1990, 119.

²⁶ Knappett & Schoep 2000, 365-371, this article more or less agrees with the idea that in neopalatial period at least some part of power expression diminished and was rather decentralised than centralised.

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Tables

Chronological period	Nowicki 1994, phases	Major periods
(FN – EM I ?) EM II	Phase 0	Hypothetical predecessor of PS
EM II - III	Phase 1	Probably first PS (Iuktas)
EM III – MM I	Phase 2	Early Period 1 , expansion of PS idea
MM IB - II	Phase 3	Period 1 = Protopalatial, acme for local PS
MM IIIA	Phase 4	Abandonment of local PS serving destroyed MM II settlements, Period 2 = Early Neopalatial, fewer PS, but richer and impressive architecture
MM IIIB – LM I	Phase 5	End of Period 2 , cult seems more centralized towards Iuktas
LM II- III	Phase 6	Only Iuktas seems to maintain its religious function, except for shrines in defensible LM IIIC settlements, on similar topographical locations (Karfi)

Table 1. Summary of chronology

Function	Action (arguments)	Meaning
Sanctuary ¹	Offers, Sacrifice, Processions, Initiation Rites (figurines, ashlayers...)	Health for vegetal, animal and human life
Communication Centres ²	Signaling with fire, smoke, towards settlement or other peak sanctuary (intervisibility, ashlayers)	Control over area and sea, reinforced by the divine function of the place.
Astronomical Observation Centres ³	Observing of winter and summer solstices, spring and autumn equinoxes, moon and sun (height, topographical relative location)	Organizing of the agricultural activities, shipping season, reinforced by the divine character of the peak sanctuary

¹ Rutkowski 1991, 52-57; Peatfield 1992, 74-80.

² Peatfield 1983, 277.

³ Faure 1969, 190; Faure 1972, 392; (on remarkable orientations); Henriksson & Blomberg 1996, 99-114.

Table 2. Interpretations

Figures

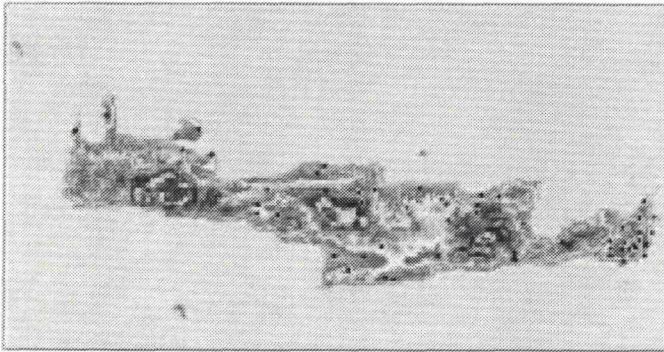


Figure 1. Topographical Map of Crete: certain (yellow) and possible (black) peak sanctuaries

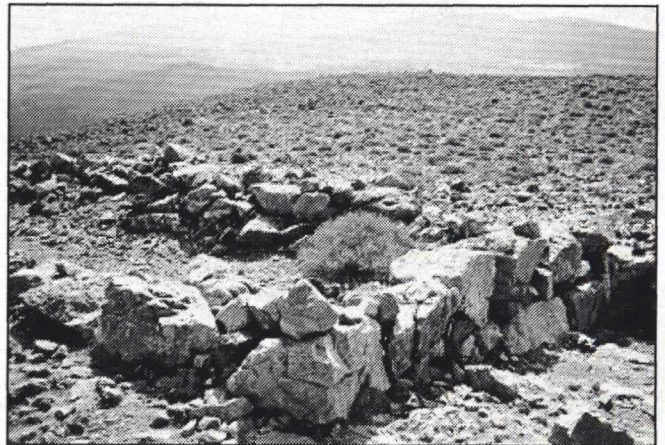


Figure 3. Petsofas, neopalatial peak sanctuary

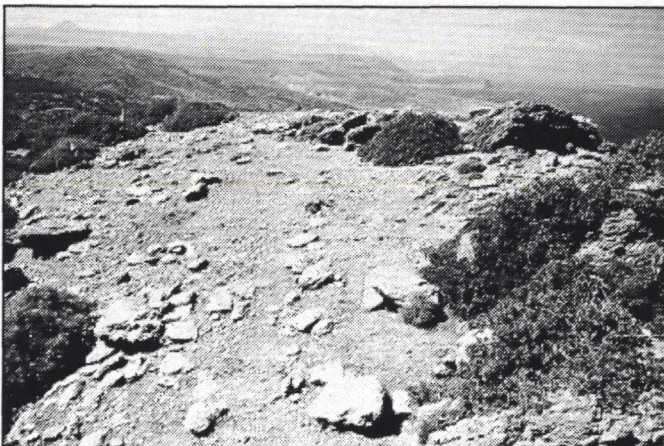


Figure 2. Atzikiari - Kalamaki, protopalatial peak sanctuary

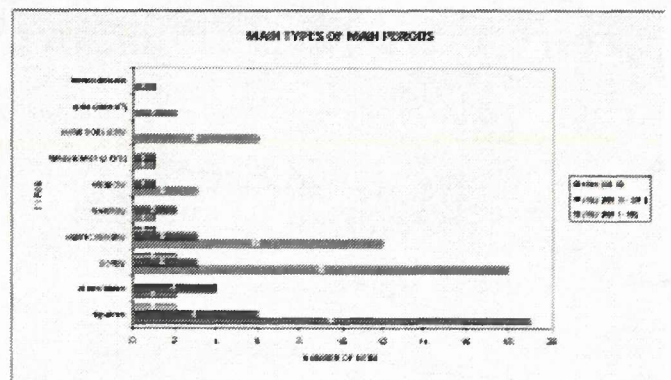


Figure 4. Main types of finds in major periods (based on Jones 1999, *passim*)

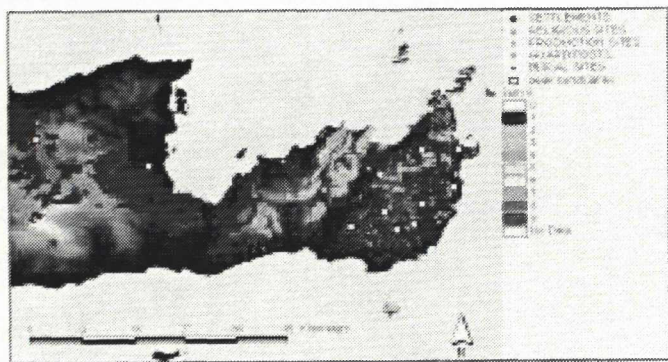


Figure 5. Cumulative viewshed of all (and protopalatial) peak sanctuaries

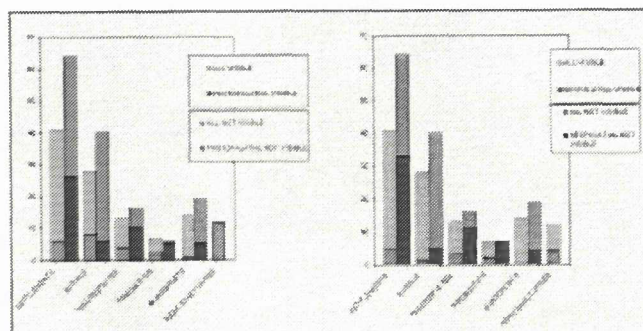


Figure 7. Visibility from peak sanctuaries: Protopalatial (left) and neopalatial (right) site categories both compared the same larger group of Minoan sites.

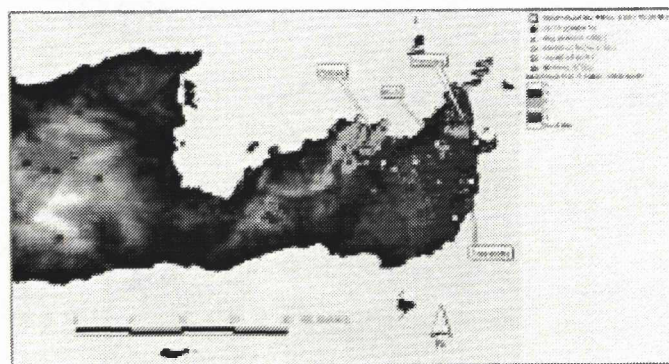


Figure 6. Cumulative viewshed of neopalatial peak sanctuaries and sites

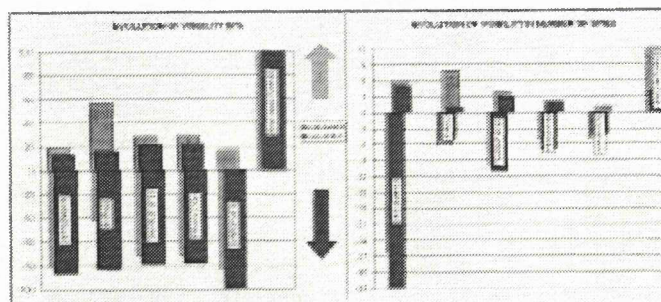


Figure 8. Evolution of the visibility from Protopalatial to Neopalatial site categories