

Joanne Cutler, Todd Whitelaw

Neopalatial and Mycenaean Knossos: urban expansion and collapse

ABSTRACT

While occupied as a major centre for almost eight millennia, the phase most thoroughly investigated, and for which Knossos is best known, both academically and popularly, is the Late Bronze Age. The earlier phase, the Neopalatial period, includes also the final phase of the Middle Bronze Age, beginning to receive more attention but still not as well known as its LM I successor. For this period, the survey data now documents that the site extended over approximately a square km. expanding considerably on recent estimates. This is twice the extent of any other Aegean Bronze Age centre, and on a par with very large contemporary urban centres in the East Mediterranean and Middle East. At documented LM I occupation densities, this should represent a population of around 25,000 individuals, representing a unique and challenging social environment within the prehistoric and early historic Aegean region.

The later Bronze Age phases at the site are not documented in the same detail, and the study of the survey data is still at an early stage. But our preliminary analysis suggests a considerable reduction in the extent of the site in the LM II-III A Final Palatial period, contemporary with the development of the mainland Mycenaean centres, and probably a further significant reduction in the LM IIIB-III C Postpalatial period. Yet even in this late phase, with some evidence of occupation over a minimum of 20 ha., the site would still have been a major centre, roughly comparable to contemporary mainland palatial centres. This is the least well understood prehistoric phase in terms of our survey data, as well as existing excavation data, but our preliminary work is beginning to point toward a significantly different perspective on Postpalatial Crete and the transition to the Early Iron Age.

KEYWORDS: Knossos, Crete, Aegean, Greece, Late Minoan, Neopalatial, Mycenaean, urbanism, surface survey, urban survey

NEOPALATIAL KNOSSOS

The Neopalatial period, at Knossos and in Crete as a whole, is the prehistoric period that is the best known, as a result of early extensive excavations at a number of sites, particularly in the centre and east of the island. At Knossos, this period was the focus of Arthur Evans' research,

* Cutler presented the original paper at the Cretological Congress and invited Whitelaw to develop it further for publication; she approved the final version before her death in January 2018. Cutler's participation at the Congress was supported by KULP project funds; Whitelaw's by The Institute of Archaeology, University College London. We are grateful for advice from Andrew Shapland in dating survey sherds, and from Colin Macdonald and Cristina Ichim in dating LM II-III sherds from rescue excavations at Knossos. All illustrations are by Todd Whitelaw; the graphs forming the basis for Figures 5 and 6 were prepared by Andrew Shapland.

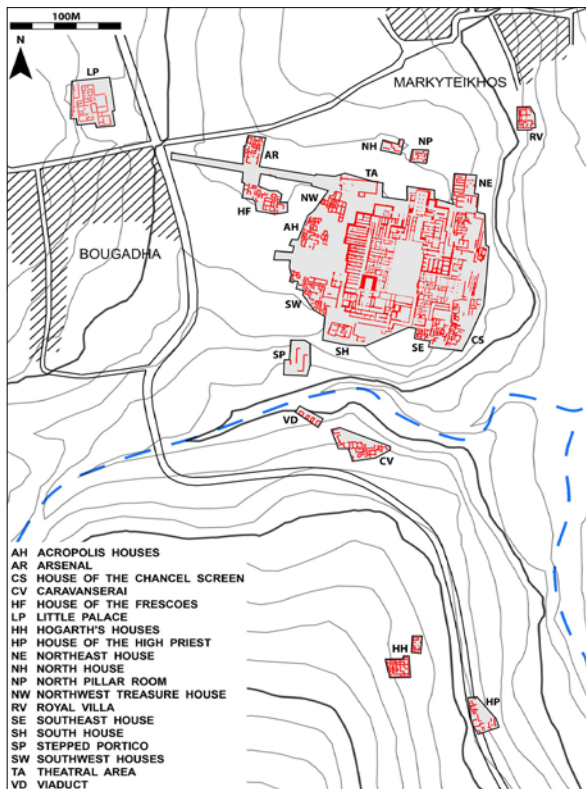


Fig. 1. Evans' and Hogarth's principal excavations at the core of the Neopalatial city.

in the palace and numerous grand houses surrounding it (Fig. 1). This focus has continued to the present, with most major research excavations focused on the later prehistoric phases in the area of the site close to the palace, and with the remains left exposed primarily dating to this period.

The Neopalatial period is generally considered to be the high point of Minoan civilisation (Warren 2012). During this period, the prehistoric city of Knossos reached its maximum extent, and is understood to have been the political and administrative centre of an extensive polity dominating at least north-central Crete (Warren 2004), indeed often argued to have ruled the entire island (*e.g.* Wiener 2007).

The layout of the urban settlement, established in the Protopalatial period, was embellished in the Neopalatial period, evident notably in the increasingly elaborate and differentiated elite houses in the vicinity of the palace (McEnroe 2010). Evidence from housing quarters further from the palace gives us an idea of the varied character of different parts of the city (Fig. 2), with a mixed public and elite core close to the palace, and smaller houses further away, with the density of occupation possibly decreasing with distance from the palace (Whitelaw 2004).

Since the early years of excavation at the site, estimations of the maximum extent of the city have varied widely. Subsequent to his major excavations in the vicinity of the palace and minor investigations by himself and David Hogarth throughout the Knossos valley, Evans considered that the dense urban core of the settlement covered an area of ca. 40 ha., with an additional ca. 120 ha. being occupied by more extensive suburbs surrounding it. However, in his assessment of the city's extent (Evans 1928, 559), he appears to have assumed that the overall distribution

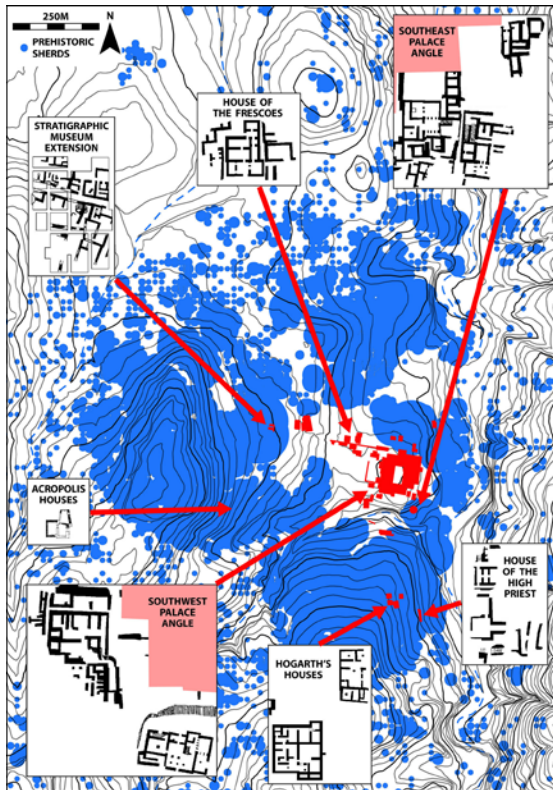


Fig. 2. Housing diversity in the Neopalatial city.

of sherds defining the archaeological site was related principally to the prehistoric settlement, not fully taking account of the extensive post-prehistoric occupation of the site, though his assessment was still excessive.

Later estimates of the city's size lowered Evans' initial assessment of the extent of the urban area. In R.W. Hutchinson's brief consideration of the question (1950), the limits of the city were contracted a little on all sides, with the exception of the eastern boundary, which was extended further beyond the Kairatos river. In Sinclair Hood's first edition of the Knossos Survey (1958), which included information from the rescue excavations that had been carried out during the development of the valley immediately following the Second World War, the urban area was reduced a little further. In 1972, despite the detailed evidence assembled by Hood, Colin Renfrew suggested that the town surrounding the palace was unlikely to have occupied more than 4-5 ha. (1972, 238). Hood's update of his Knossos survey, produced in collaboration with David Smyth (1981), and which incorporated the evidence from explorations in the valley up until mid-1978, extended the city size proposed in the first edition, although *contra* Evans and Hutchinson, it concluded that dense occupation did not extend east of the Kairatos river. They estimated that the settlement was likely to have covered around 75 ha., thus about half the area originally proposed by Evans (Hood and Smyth 1981, 10).

More recently, prior to the start of the intensive survey, Whitelaw estimated that the Neopalatial site covered between 60 and 80 ha., that is, up to approximately three-quarters of a square kilometre (Whitelaw 2000; 2004). This estimate was based on Hood and Smyth's work, updated for published discoveries until 2000, and supplemented by research in the archives of the British

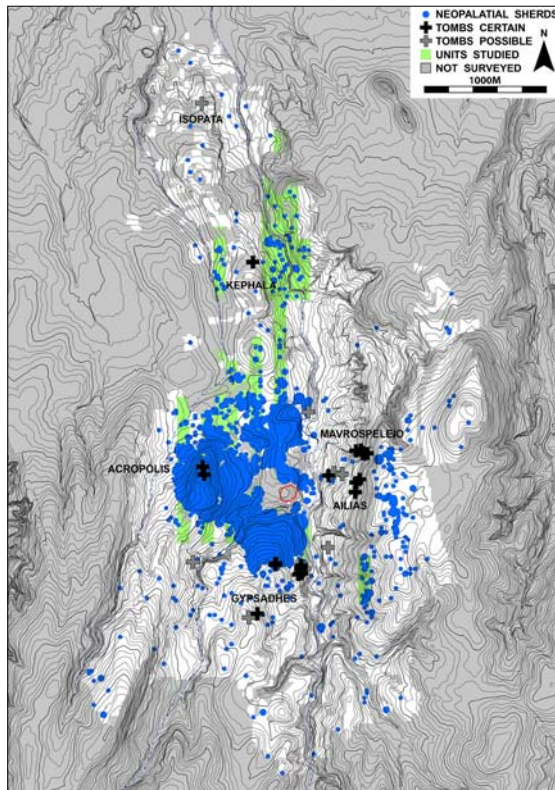


Fig. 3. Neopalatial remains in the survey area: studied units, Neopalatial sherds and known tombs.

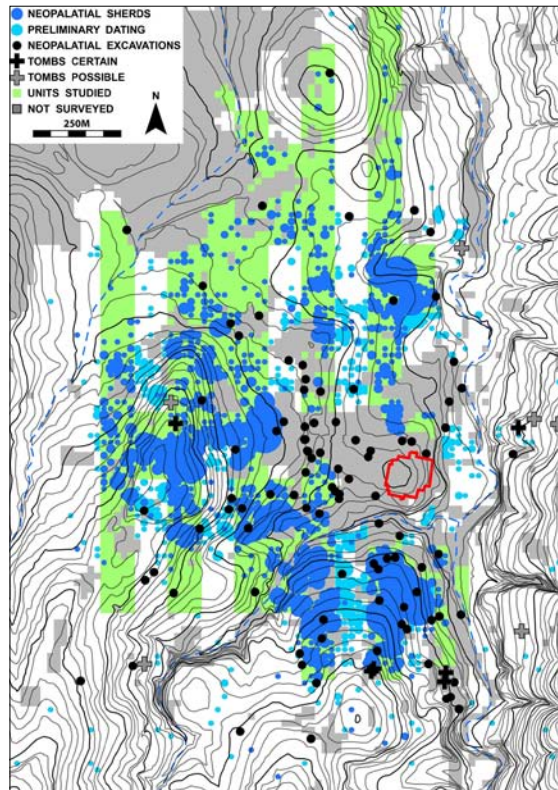


Fig. 4. Neopalatial remains defining the city: studied units, Neopalatial sherds, excavated locations with Neopalatial material and certain and possible tombs.

School at Athens (BSA), study of material retained from rescue excavations in the Stratigraphic Museum at Knossos, as well as a preliminary reconnaissance of the density of surface sherds of all periods across the site. The largest degree of uncertainty regarding the estimation of the maximum area covered by the city, in advance of the intensive survey, related to the extent to which the area to the north may have been densely occupied, and occupation in the west, both areas which had received very little investigation, usually only limited rescue excavations into the uppermost, Roman levels.

The Knossos Urban Landscape Project (KULP) surveyed all areas accessible within the Knossos valley and its immediate hinterland, to include all of the cemeteries associated with the city. This documented the extremely nucleated pattern of settlement in the Neopalatial period (Fig. 3). The study of the recovered material continues, with the areas so far studied in detail (by Cutler) indicated in Figure 3 in green. Study has concentrated on the city itself, with pottery from three outlying areas with low concentrations of sherds also examined.

As for other periods, detailed study started with alternating 100m wide transects south to north across the city (Fig. 4). The intervening and surrounding areas will be studied to address period-specific questions, and to clarify patterns established in this first stage of analysis.

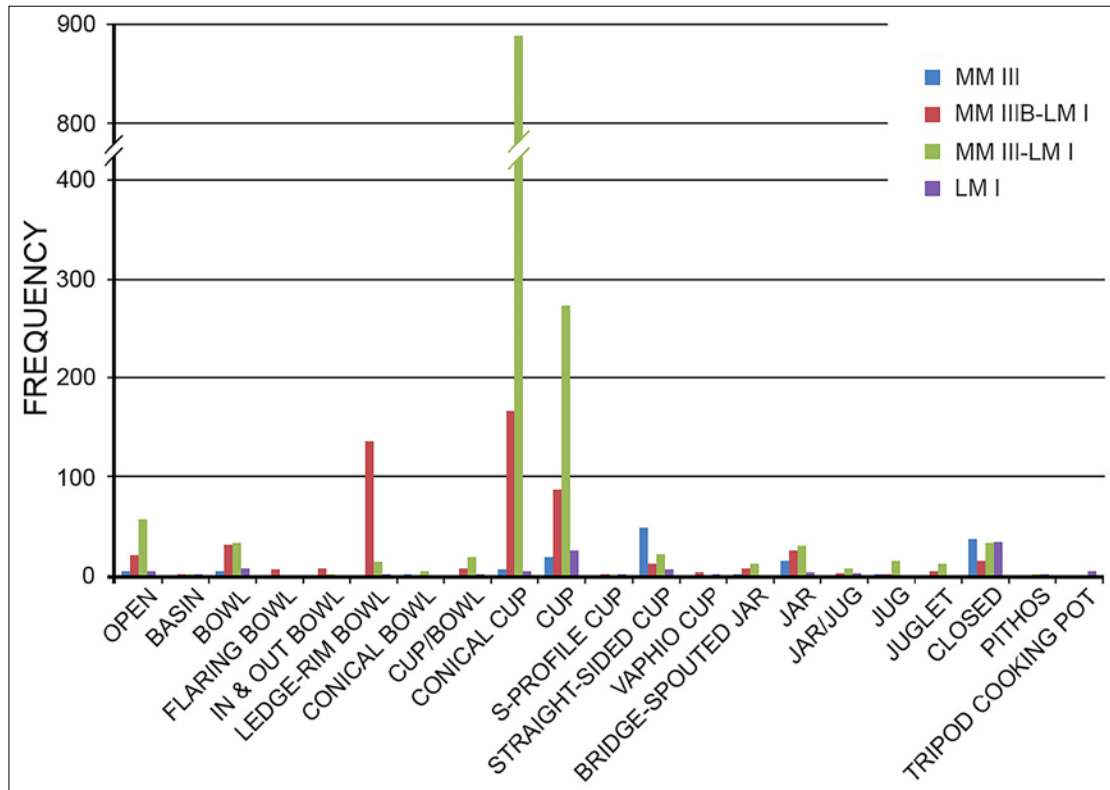


Fig. 5. Neopalatial sherds, by vessel shape and date.

In Figure 4, as in Figure 3, the collection units already studied in detail are indicated in green, with the sherds identified plotted by quantity in dark blue. Neopalatial sherds identified in preliminary dating (by Whitelaw) are plotted in light blue for the collection units not yet studied in detail; quantities recognised in these areas can be expected to increase with the final study. Also plotted in black are locations of excavations which have yielded Neopalatial material; the outline of the palace is shown for orientation.

Cups and bowls are the most frequent shapes among the identified Neopalatial survey sherds (Fig. 5). Much of the Neopalatial material – notably the most numerous category, conical cups – can usually only be dated to the broad MM III-LM I period, though for larger sherds, profile shape and the degree of internal rilling allow some chronological distinction. A more restricted number of sherds can be more narrowly dated within this period due to decoration or shape, based on the very well understood chronology of Knossian Neopalatial fine wares (Hatzaki 2007a).

The vast majority of the sherds that can be securely dated to the Neopalatial period are finer fabrics (Fig. 6). Most of the coarse fabrics are only broadly datable to the LM period, or more broadly yet to MM-LM. As for the other pre-Achaic periods (see papers in this volume by Legarra Herrero (2018), Shapland (2018) and Kotsonas (2018), which share the same fabric classification scheme), the fabrics have been defined macroscopically. Other than the very fine fabric A, the most frequent Neopalatial fabrics are B and C. The B fabric has dark inclusions ranging in colour

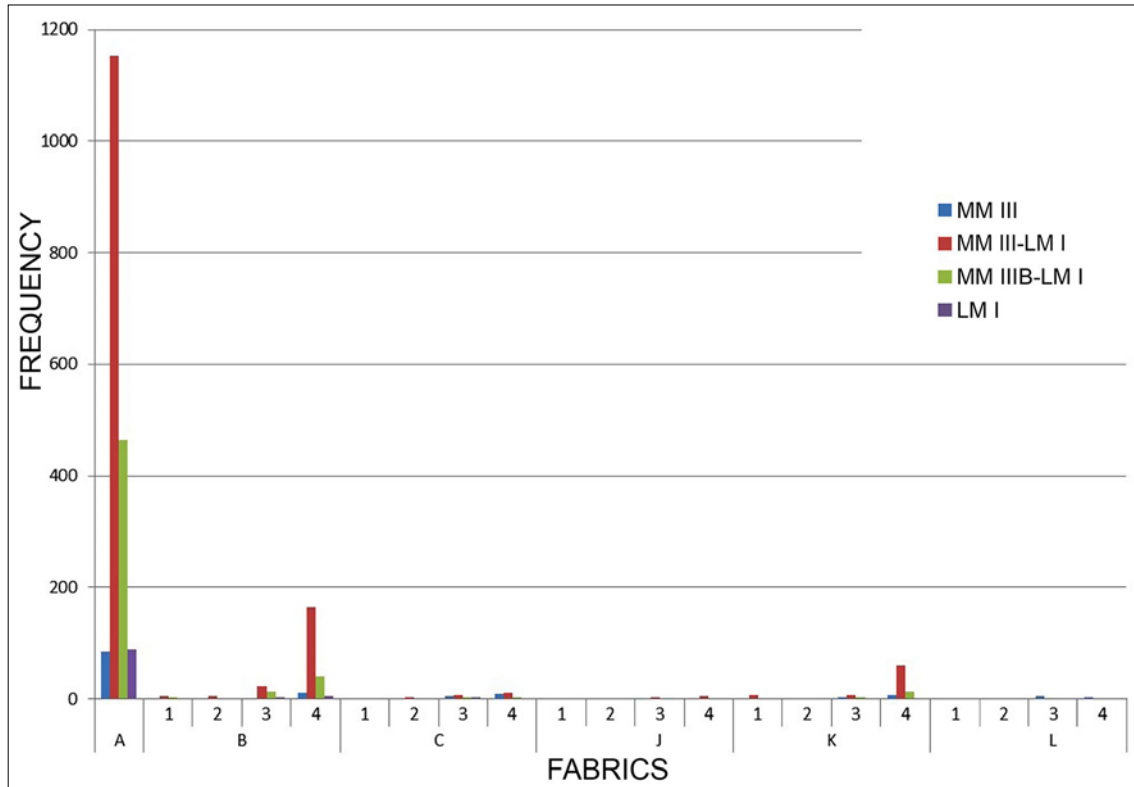


Fig. 6. Neopalatial sherds, by fabric and date.

from brown through to dark grey and black. The C fabric is the B fabric with added hard white inclusions – the latter seems to have been used from MM III onwards and appears frequently in coarser vessels that in the survey material cannot be more narrowly dated than Neopalatial or LM. Fabric K is a sandy fabric in use in MM and LM I, with distinctions based on shape and surface finish.

The Neopalatial sherd distribution gives a clear picture of dense, continuous occupation across the city. Major gaps or low counts in the distribution within the city are usually also seen in other period distributions, and appear to represent low sherd recovery due to poor surface visibility, recent land-use or surface modifications, so probably do not represent significant period-specific gaps in the original Neopalatial occupation.

On the basis of the dateable material across the site (Figs. 7-8), the Neopalatial period marks the greatest extent of the prehistoric city in all directions, so the overall prehistoric sherd distribution also mapped probably gives a clearer indication of the extent of the city in this period, based on a significantly larger sample of material, including the coarser, less chronologically diagnostic sherds, as well as smaller, less diagnostic fragments. In both figures, black dots represent the presence of Neopalatial material in excavations. While their distribution will help inform us about the extent of occupation, their distribution within the site tells us about the location of excavations, not the concentration of occupation in the past, highlighting the

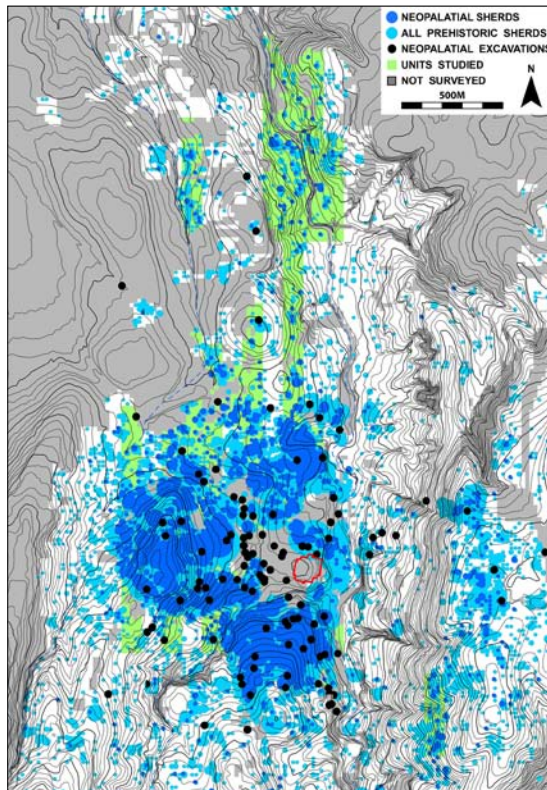


Fig. 7. Neopalatial sherds plotted on all prehistoric sherds, and excavated locations with Neopalatial material.

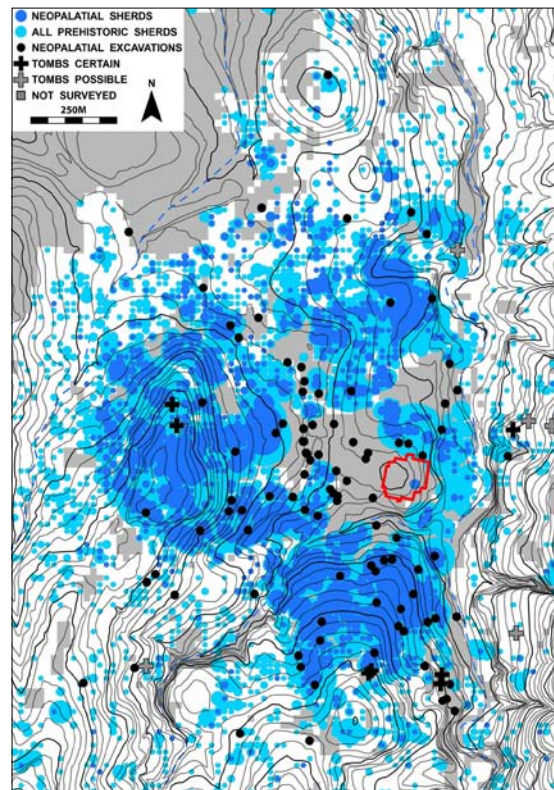


Fig. 8. Neopalatial remains defining the city: Neopalatial sherds plotted on all prehistoric sherds, and excavated locations with Neopalatial material.

complementary information provided by the continuous surface investigation. Also indicated in Figure 8 are the locations of tombs certainly (black crosses) and possibly (grey crosses) in use during the Neopalatial period.

On the summit of the northern half of the Ailias ridge, east of the Kairatos, Hood and Smyth noted a dense concentration of sherds at the northern end of the ridge, and a patchier scatter of sherds and architectural blocks to the south, across much of the western summit. These scatters can now be better defined by the survey sherd distribution (Fig. 7). This material has not undergone detailed analysis yet, but the preliminary analysis has identified a number of Neopalatial sherds as well as a full range of fine, coarse and cooking pot fabrics, suggesting that this area is likely to have been the location of a sizeable suburb of perhaps less dense houses during this period. Scattered low-density occupation appears to start in the Late Prepalatial period, but no evidence for LM II-III occupation was recognised by Hood and Smyth (1981, 11) or has been recognised in our as yet only preliminary study. Hood and Smyth identified traces of houses revealed in dug-outs for a military exercise and by deep-ploughing, including some ashlar blocks (1981, 10, KS2.266-75). On this basis they originally suggested scattered individual houses, but the survey evidence documents a large (ca. 3-5 ha.) and fairly continuous, though low density scatter, which must represent a substantial village,

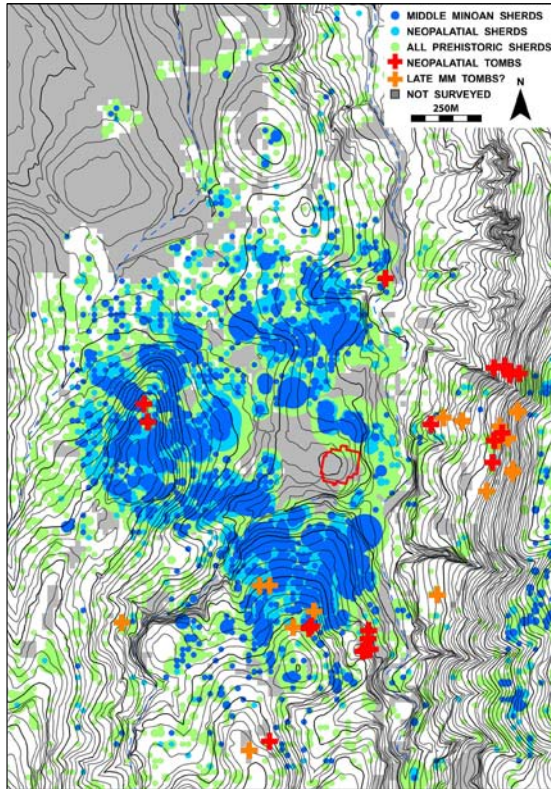


Fig. 9. Neopalatial sherds plotted on all Middle Minoan sherds, on all prehistoric sherds, Neopalatial tombs and possible and probable later MM tombs.

directly associated with Knossos, essentially a suburb of the city. The concentration on the exposed rocky northern point of the ridge is smaller (ca. 2.3 ha.) but somewhat denser. These occupations are additional to the city areas defined below, so will increase the population estimates for 'greater Knossos' in the MM and LM I periods.

The distribution of MM sherds across the city site broadly corresponds with the Neopalatial distribution, suggesting that much of the city's growth had taken place before the end of MM (see Shapland 2018, this volume). In Figure 9 the quantities of Neopalatial sherds are indicated in light blue, MMM in dark blue, and all prehistoric sherds in green. Tombs certainly and possibly in use in the Neopalatial period are indicated as red crosses, those possibly in the later MM period in orange. The MM sherd distribution is both slightly lighter and patchier than the Neopalatial distribution. This may be partly owing to the deeper burial of the earlier material, but this will

also relate to the relative diagnosticity of material from each period, particularly to the lack in the Protopalatial assemblage of large numbers of such highly diagnostic vessels as conical cups. But there are nevertheless indications that there was further expansion of the city in LM I. Our present best estimates are that the city may have extended over up to ca. 75-85 ha. by the end of the MM period and between 105 and 125 ha. in the Neopalatial period. This large uncertainty for the Neopalatial period is due to several factors, though helping to confirm the boundaries of Neopalatial occupation are the cemeteries which surround the city on the west, south and east.

There was at least one cemetery active on the northern summit of the Acropolis up until the LM IA period (Hood and Smyth 1981, KS2.139-40; Preston 2013a), represented by a MM IA rock shelter or chamber tomb, replaced after its collapse by pithos burials; a concentration of MM-LM pithos sherds at the southeastern corner of the Acropolis may indicate that much of the summit of the Acropolis was used for burials through much of the Bronze Age (Shapland 2018, Fig. 13, this volume). This is consistent with the MM and LM cemeteries on the slopes overlooking the city from the east and south. However, the continuous distribution of Neopalatial sherds across the Acropolis and down its northwest slope seems too dense and consistent to be a signature for cemeteries, given the low density and patchy sherd scatters usually recovered above known cemeteries elsewhere in the valley. This suggests that occupation spread over the Acropolis and

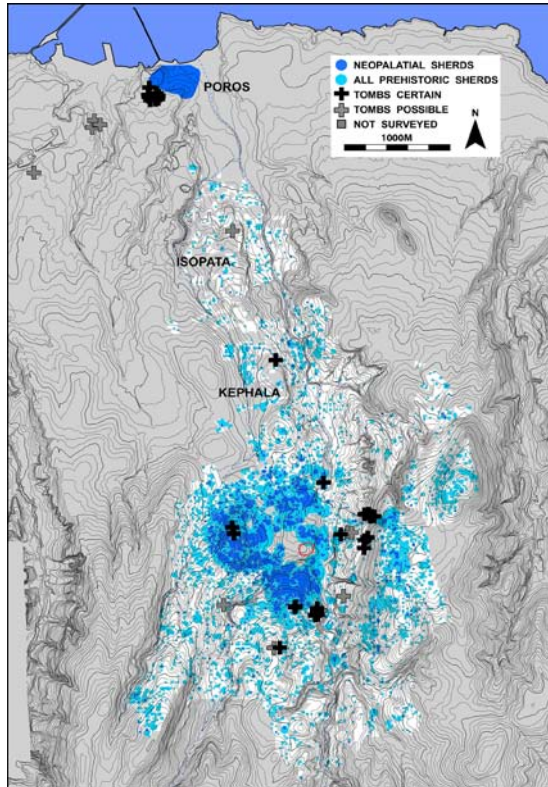


Fig. 10. Neopalatial sherds on all prehistoric sherds, Poros, and Neopalatial tombs.

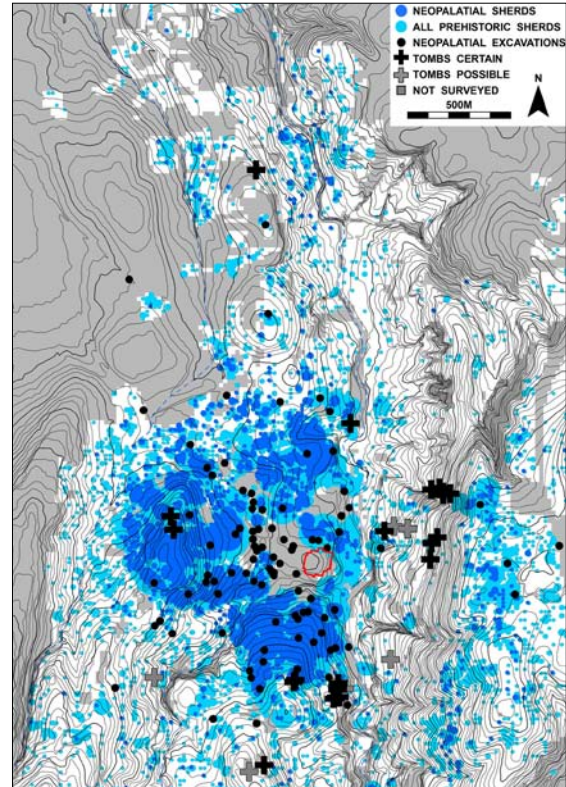


Fig. 11. Neopalatial sherds on all prehistoric sherds, excavations with Neopalatial material and certain and possible Neopalatial tombs.

down its further side during the course of the Neopalatial period. The cessation of burials at KS2.140 during LM IA might give a date for this expansion, but it must be noted that burials in many other tombs in the valley also cease during LM IA (*e.g.* Ailias: Hood 2010; Mavrospelio: Alberti 2004; Lower Gypsadhes: Hood and Smyth 1981, KS2.308). So the abandonment of the Acropolis tomb need not be linked directly to the settlement expansion. Evidence for a flexible and probably shifting boundary between occupation and burial seems to be documented also during the Neopalatial period at Kastri on Kythera (Preston 2007b). A similarly fluid boundary appears to exist at this time at the south of the city, where sherd densities are high enough to indicate occupation, right up to the area of the Lower Gypsadhes tholos tomb and its annex, which also went out of use in LM IA. Possible MM tombs on Lower Gypsadhes (KS2.313-15) and at the far northeast of the city (unpublished probable MM III tomb material excavated by R. W. Hutchinson at KS2.368), were also over-run by the expanding settlement in the Neopalatial period.

A second source of ambiguity about the boundaries of the city is the low density distribution of Neopalatial, and indeed all prehistoric sherds at the north of the site, extending almost to the shallow seasonal streambed which originally ran under the present car park immediately south of the hospital; its original bed is marked on Figure 9. A 200m wide band of much lower density sherds extends across the whole northern side of the site. This distribution is supported

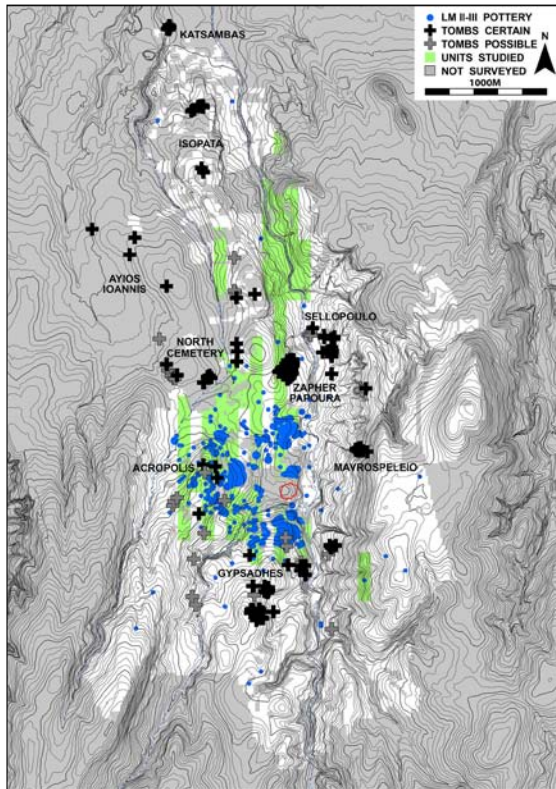


Fig. 12. LM II-III remains in the survey area: studied units, LM II-III sherds and certain and possible tombs.

by the larger numbers of prehistoric coarse and cooking fabric body sherds recovered from this area, which cannot be dated more closely than MM-LM. A similar lower density band is seen in the later Archaic to Hellenistic material, raising the possibility of some pre-Roman partial masking of deposits (stream flooding?), or excessive battering of sherds (reducing diagnosticity) through distinctive land-use in this part of the valley, perhaps reflected in the higher density of Post-Roman sherds. The possibility that this lower density distribution represented ploughed-out pithos cemeteries of MM-LM date immediately outside the city was considered, but there is no notable concentration of pithos or larnax sherds in this area. Another possibility still being considered is that this represents extra-mural refuse dumping, particularly as most other boundaries of the site would require carrying bulk refuse uphill to deposit it outside the city. But in such a case, we might expect the sherd distributions to be concentrated particularly along the natural routes out of the city to the northeast and northwest, not across the whole northern perimeter of the city. Another possibility under consideration is that this flat area may have been devoted to gardens immediately outside the city, and preferentially heavily manured with household refuse, including ceramics originally discarded in household middens. This may account for the low density distribution of sherds of earlier periods distributed outside the settlement but within the immediate valley (see Legarra Herrero 2018, this volume), and the consequences of such later Bronze Age manuring can be seen in the distributions of MM-LM off-site sherds dropping off in density with distance from the local centre, documented by the Pseira (Betancourt *et al.* 2005) and Gournia (Watrous *et al.* 2012, maps 24 and 26) surveys.

As in the preceding Protopalatial period, the Neopalatial city had cemeteries stretching out from its periphery, with, to the north, an outlying tomb on the east slope of the Kephala ridge

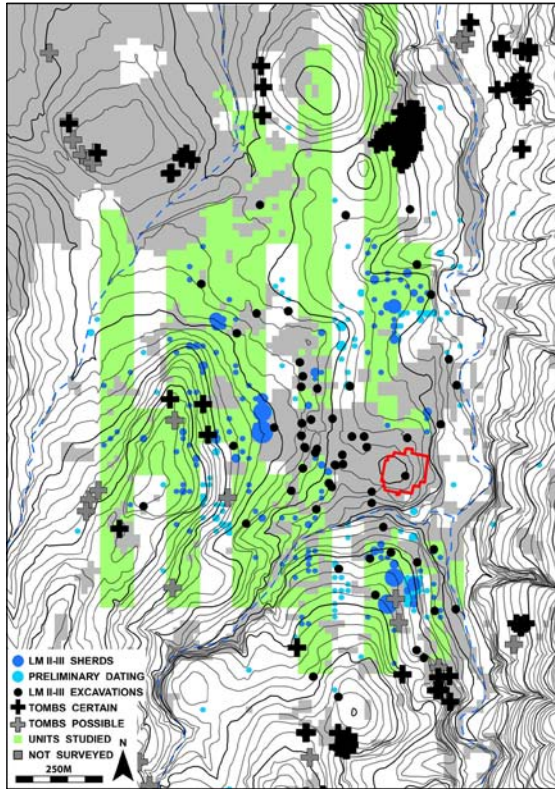


Fig. 13. LM II-III remains defining the city: studied units, LM II-III sherds, excavated locations with LM II-III material and certain and possible tombs.

(KS2.11), a probable tomb in the Isopata cemetery (Preston 2007a), and, further north, tombs on the south and west sides of the substantial harbour settlement at Poros (Fig. 10; Dimopoulou 1999), and possibly immediately east of Herakleion (Evans 1928, Fig. 131A). While the clear majority of tombs north of the city date to the LM II-III phase (Figs 12, 16; Preston 1999), some burials were already being made in these areas, though the main North Cemetery and Kephala hills immediately north of the city, at least as presently known, seem not to have been used in the same way as the hills ringing the city on the east, south and west.

Closer to the city (Fig. 11), we have noted the tomb and other evidence suggestive of burial on the Acropolis, and the excavated tombs at Ailias and Mavrospelio document burials from at least MM IB into LM IA. Three of the five tombs in use in MM at Mavrospelio may have continued in use through the LM I period (Alberti 2004), and additional empty tombs are known, suggesting the hillside had additional clusters of tombs, but their dates of use (potentially MM I-LM III) are not known. Below, on the gentler cultivated slopes, two MM pithos and one larnax burials have been excavated, and there is a possible tomb on the lower slope of southern Ailias (Preston 2013b). With these examples, and (confirming Hood and Smyth's earlier conclusions: 1981, 8) no clear evidence of settlement east of the Kairatos, the lower slopes of the entire ridge may have been used for burials. The survey picked up a continuous but low density scatter of prehistoric sherds, including material from EM III-MM IA to LM II-III, on the upper west slope of southern Ailias, an area never previously investigated. Survey on the summit, immediately upslope, revealed no occupation comparable to the suburbs on the northern summit of the ridge, so these sherds seem not to have eroded from occupation above. On this steep and extremely

rocky slope, they are most probably from eroded tombs, from one or more cemeteries used from the Late Prepalatial through LM III periods.

To the south, the edge of the dense sherd distribution, and the southern boundary of the Neopalatial city, is quite closely marked by the location of tombs, notably the Temple Tomb and nearby chamber tombs and the Lower Gypsadhes tholos and its annex. Further south, the LM IIIA2-Sub-Minoan Upper Gypsadhes cemetery saw initial use in MM III (Hood *et al.* 1956-57; Preston 2013b), though no later Neopalatial tombs were recovered. Interestingly, as with the few scattered Neopalatial burials along the Kephala-Isopata ridge, this indicates that cemeteries were moving beyond the facing slopes, out of direct visibility from the city, by the later MM period. Small sherd scatters, ca. 100-200m beyond the city, particularly on the south and west, are likely to represent additional clusters of MM-LM tombs.

If the summit of the Acropolis was still restricted to burial in the earlier Neopalatial period, the area of the city would have been ca. 105 ha. But in the later Neopalatial period, the incorporation of the Acropolis within the city and expansion over its northwest slope will have increased the city to ca. 115-130 ha. At an estimated occupation density of 200-225 persons/ha. (Whitelaw 2001; 2004), this would represent a population of ca. 24-28,000 individuals. The lower density suburbs on Ailias would add perhaps another ca. 6 ha. and 600 occupants to this total.

Following the widespread and not necessarily contemporary destructions during the LM IB period that affected settlements across Crete, Knossos appears to have recovered quickly, and in the subsequent Third Palace or Final Palatial period, it is presently the only documented functioning palace on the island. During this period, the palace was extensively modified or rebuilt. Although some of the Neopalatial elite buildings were not reoccupied, some at least, such as the Royal Villa, the Little Palace and the Unexplored Mansion, were reused (Popham 1970; Hatzaki 2005), and at least a few new mansions were constructed (*e.g.* Stratigraphic Museum Extension: Warren 1982-83; Southwest Houses: Coldstream *et al.* 1997).

LM II-III KNOSSOS

The Third Palace period is often known as the Mycenaean phase in Crete, since the large number of Linear B tablets dating to this period, written in an early form of Greek, suggest that a mainland Greek Mycenaean administration was in charge at the palace (Preston 2008). Based on the Linear B toponyms that can be identified with specific sites, the administrative records demonstrate that the palace at Knossos administered at least the central and western two-thirds of the island (Bennet 2011). There has been a great deal of debate over whether the date of the end of this administration, marked by the final destruction of the palace, should be placed in LM IIIA2 or LM IIIB, with the earlier LM IIIA2 date widely favoured (Preston 2008; Rehak and Younger 1998).

The LM II-III ceramics from the survey have not yet undergone detailed analysis, so the following observations and reconstructions are based on only preliminary analyses of the material, combined with the excavation evidence (Figs. 12-13). Recognising LM II-III sherds in the survey material is problematic, since our detailed typological and stylistic understanding of the

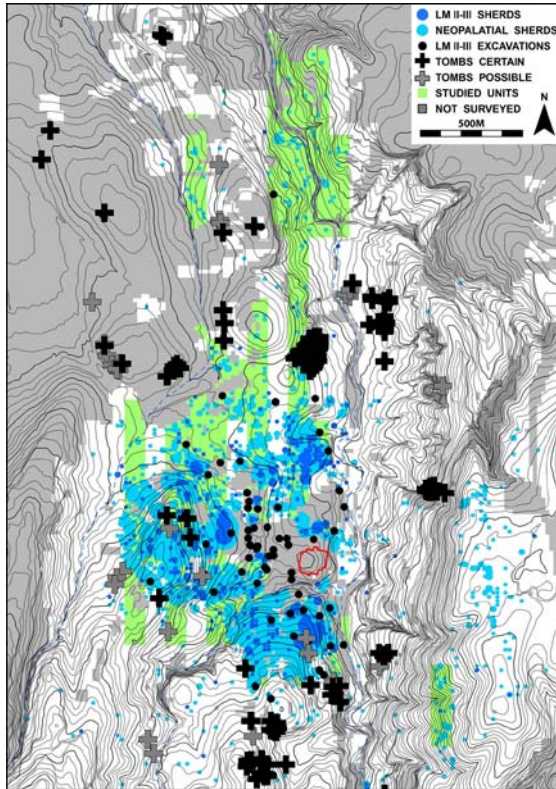


Fig. 14. LM II-III sherds on Neopalatial sherds, excavated locations with LM II-III material and certain and possible tombs.

ceramics of this period is mainly restricted to fine wares (Hatzaki 2007b). The possibility of more narrowly dating the survey sherds within this period, even to the LM II-III A Third Palace or LM III B-III C Postpalatial periods, is hampered by the fact that decorative motifs are often not well preserved on surface sherds, and generally not enough of the shape is preserved to be able to refine the dating on the basis of subtle variations in form of, for example, the kylix.

An objective for the project was to contribute new data and a new perspective to help resolve the current deadlock over the date of destruction of the palace and the political collapse of the polity it dominated, since the city should also contract markedly with a declining role as an administrative centre, and without such a large dependent territory to sustain it. But unless we can substantially increase the number of closely dateable surface sherds, by constructing more comprehensive chronologically sensitive typologies of coarse and cooking wares, we will not be able to contribute as decisively as we hoped to this debate.

At present, with only preliminary study, some LM II-III sherds have been identified over most of the area covered by the Neopalatial sherd distribution, as can be seen in Figure 14. This was the core area of the city in most periods from the Late Prepalatial through the Early Roman. As the city expanded, occupation spread outwards from the existing core, with probably lower density occupation on the fringes filling-in, and gradually moving outwards. Resisting this, particularly on the flatter, more easily watered and cultivated landscape immediately north of the city, would almost certainly have been intensively tended garden plots, where heavy vegetable crops, easily damaged in transit, would have been grown to provision the city. In periods when the city expanded after earlier contractions, this core area would again be preferentially occupied, not

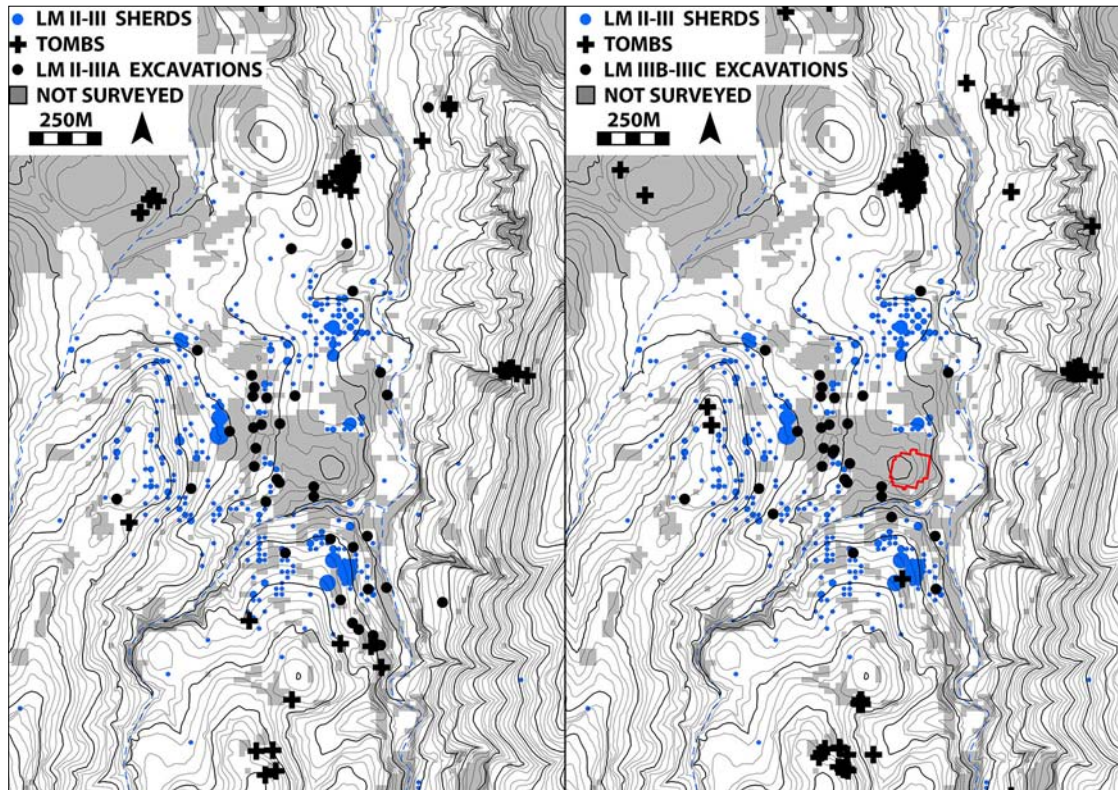


Fig. 15. Left: LM II-III sherds, excavated locations with LM II-III A material and LM II-III A tombs;
 Right: LM II-III sherds, excavated locations with LM III B-III C material and LM III B-III C tombs.

least because of the dense rubble from earlier ruins, which provided a ready supply of building material, but also would have made cultivation difficult. More problematic is defining the extent of occupation within this core area at specific times. For all periods, research excavations and rescue tests have concentrated predominantly on the south of the city, around the palace and under the modern villages. But because these tests drop off in frequency away from the palace, they provide less comprehensive indicators, and we have seen that estimates of site area based on such evidence (*e.g.* Hood and Smyth 1981; Whitelaw 2000; 2004) very significantly underestimated the extent of the Neopalatial city that can now be documented.

Excavated assemblages with LM II-III material have only been studied in detail for a limited number of major excavations at the core of the site (*e.g.* Popham 1970; Hatzaki 2005; 2007b). Preliminary re-examination of material retained from BSA rescue excavations from 1900-2001 as part of the KULP project, has identified considerably more LM II-III material than was previously documented, which is plotted as black dots in Figures 13-15, supplementing locations previously documented by Hood and Smyth (1981), but these often represent limited numbers of highly diagnostic sherds; this retained material also needs to be studied in detail.

For the survey pottery, we have not, to date, usually tried to distinguish sub-phases within the LM II-III period; with only ca. 500 identified sherds, this is too light and patchy a distribution

to produce meaningful patterns. If we consider this material along with the excavated contexts, we can suggest some contraction between the earlier and later segments of this period, treating LM II-III A as roughly representing the Third Palace period occupation, and LM IIIB-III C the Postpalatial period. We can anticipate that the surface sherds recognised to date will under-estimate the extent of the LM II-III A city, the excavated material even more so. But both types of evidence, in relation to the comparable Neopalatial evidence, suggest a significant contraction in the extent of the city after the Neopalatial period (Fig. 14). At present our best guess, almost certainly an under-estimate, would be that the LM II-III A city extended over at least 60 ha (Fig. 15A). Compared to our estimates of 115-130 ha. for the end of the Neopalatial period, even accepted as an under-estimate, this would represent a considerable contraction and substantial loss of population. This may seem counter-intuitive, since while the extent of the polity dominated by Knossos in the Neopalatial period is debated, the options range from north-central Crete (Warren 2004; 2012), to the island as a whole (*e.g.* Wiener 2007). In contrast, the toponyms identifiable in the Knossian Linear B tablets define more securely the administration of a polity extending over at least two-thirds of the island, on the more minimal reconstructions, a much larger polity than its Neopalatial predecessor. It is a fundamental tenet of economic and political settlement pattern models in geography that administrative centre size will relate fairly directly to the size of any dependent or administered territory (Smith 1976), extrapolated to ancient contexts with some justification (Johnson 1977; Butzer 1982; Whitelaw 2017). One corollary might be to argue that this putative contraction of the centre at Knossos supports the case for Neopalatial Knossos dominating the entire island. On the other hand, it could also reflect significantly different administrative systems in the two periods. In this respect, it is worth noting that none of the mainland Mycenaean centres, which administered very large territories, come close to even such a reduced Knossos in urban scale (Whitelaw 2017, Fig. 7.10).

For the Postpalatial period, away from the core of the city, we have to rely on the distribution of LM IIIB-III C sherds from largely unpublished minor excavations (Fig. 15B). With only limited amounts of material from poorly understood contexts, this is our most unreliable areal estimate for the Bronze Age. Preliminary identifications of excavated sherds map material over some 20 ha. Here, it is worth considering that the distribution of excavated LM II-III A sherds extends over only 25 ha., whereas the surface indications for all LM II-III sherds suggest a minimum area of 60 ha. So the evidence from very limited excavations, largely restricted to the core of the site, is likely to represent a significant underestimate, but we really cannot assess this realistically with so little reliable evidence. We can suggest that the post-Neopalatial history of the city witnessed a two-stage contraction from the Neopalatial maximum, to a Final Palatial city on the order of perhaps 60-80 ha., and a Postpalatial local centre of perhaps 20 ha. or more.

As in the earlier periods, cemeteries surrounded the settlement, which help to define the changing extent of the city, as well as forming an important component of the contemporary landscape. The identified tombs dating to this period are far more numerous than for earlier periods. After the late LM IB collapse, new tomb types dominate – single chamber tombs, occasionally seen earlier, are the most numerous, but corbel-vaulted tombs, shaft graves and pit-caves were also introduced. Cemeteries continued to ring the city on the facing slopes to

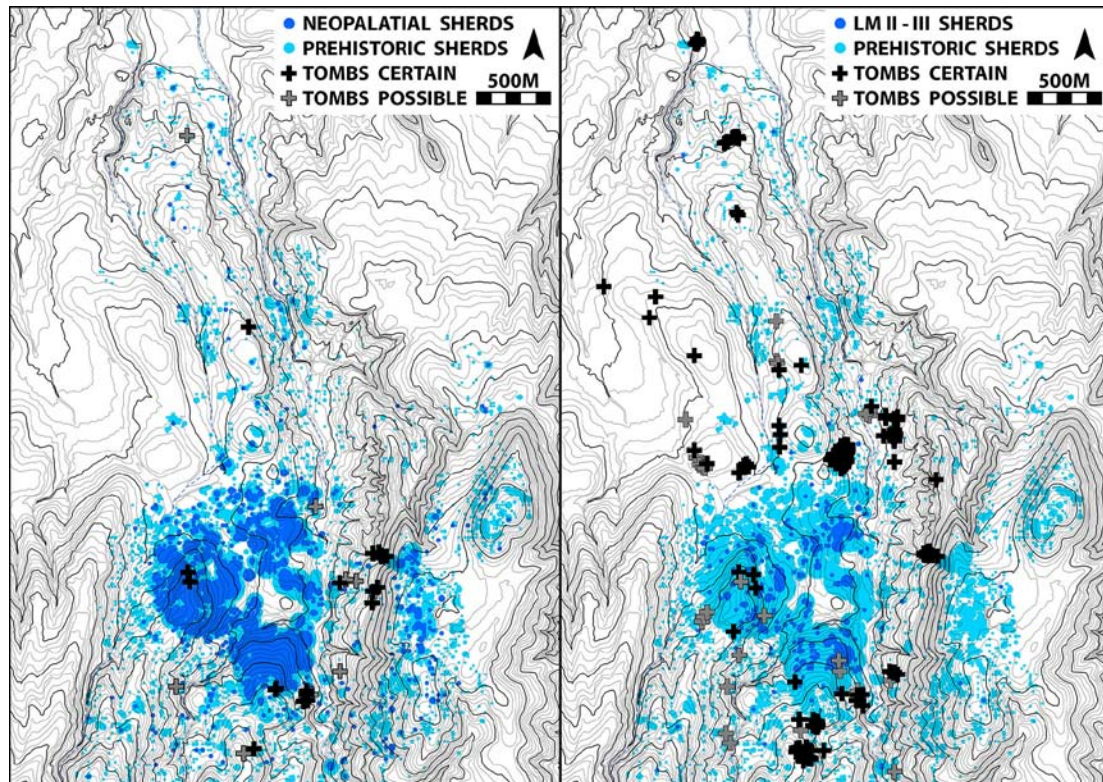


Fig. 16. The changing mortuary landscape: Left: Neopalatial sherds on all prehistoric sherds, certain and possible Neopalatial tombs; Right: LM II-III sherds on all prehistoric sherds, certain and possible LM II-III tombs.

the east and south, reappeared on the west, and consistently for the first time, north of the city, extending along the Kephala-Isopata ridge to Katsambas and the harbour town at Poros (Figs. 12, 16).

To the east, the slopes of the Ailias ridge were again used for chamber tombs, with re-use and new tombs at Mavrospelio (KS2.251), and south Ailias, and to the north, an extensive new cemetery at Sellopoulo (KS2.27-31). To the south, burial resumed at the Upper Gypsadhes cemetery and an extensive cemetery on the facing slope of Lower Gypsadhes (KS2.329, 330, and more recent excavations). On the north and east slopes of Lower Gypsadhes, tombs continued in use and new tombs were constructed near the Temple Tomb (KS2.323, 324), while others were introduced upslope, at the borders or within the area of earlier Neopalatial occupation (KS2.321; Popham 1980). On the west, the warrior grave excavated by Evans (KS2.149), according to Mackenzie's notes, was probably located further to the southwest on top of the ridge. Burial seems to have been resumed near the Monastiriako Kephali tomb, with larnax fragments from the nearby Deposit (KS2.139), and three single chamber tombs half-way down the east slope of the Acropolis. All three tombs are undated (KS2.371, the others (Fig. 13) are not noted in the literature). These will have been outside the city, and represent the contraction of the city on

the west, but unfortunately are undated, though as single chamber tombs and well within the Neopalatial city, they are likely to have been constructed in LM II-III.

To the north, there were early tombs outside the city toward the northeast in EM III-MM IA (unpublished, near KS2.123), and MM III (KS2.368), replaced in LM IIIA1 by the extensive cemetery at Zafer Papoura (KS2.36). To the northwest, the four warrior graves excavated under the hospital in 1951 (KS2.71) are supplemented by another dug more recently. No definite LM III tombs have been excavated in the North Cemetery (unless the Khaniale Teke tholos (KS2.46) was re-used), though several unpublished LM tombs of unspecified dates have been excavated in the area by the Archaeological Service. A number of the EIA tombs in the Fortetsa and North cemeteries have dimensions which are compatible with LM rather than EIA norms (Cavanagh 1996; marked on Figs. 12-14), though the complete absence of LM III pottery from the excavated tombs, other than re-used larnakes, makes re-use of LM tombs unlikely. Recent re-examination of the retained sherds from numerous tombs distributed throughout the North Cemetery recognised only three likely LM IIIA2-IIIC sherds among the several thousand examined.

Further north, the Kephala Tholos, Isopata Royal Tomb and other tombs toward the north end of the Isopata ridge indicate the development of high status burials along the entire ridge, ending at the north facing the cemetery at Katsambas (Fig. 12). Rescue excavations in the 50s-70s under the developing suburb of Ayios Ioannis, extending north from the North Cemetery hill, suggest there were extensive cemeteries on this parallel ridge as well (Fig. 12). If there were ever high status tombs equivalent to the Kephala Tholos and Isopata Royal Tomb on the summit of the western ridge, they have disappeared under recent development.

Complementing the excavated evidence, it may be possible to differentiate between LM II-III tomb and settlement material on the basis of the range of shapes present in the survey collections, since certain vessel types are particularly frequent in excavated burial assemblages of this period (Alberti 2004b). However the poor condition of the prehistoric surface sherds defining the large but low-density scatters along the Kephala ridge, Kairatos valley and west slope of south Ailias (Fig. 16) may not allow decisive identification as cemeteries, or clear dating to individual phases.

Combining the survey and excavation data, we can compare the evidence for the Final Palatial and Postpalatial periods (Fig. 15). The extreme uncertainty of the extent of the LM IIIB-IIIC settlement cannot be stressed enough, but it still raises two interesting challenges. First, even if only 20 ha. in extent, this will still have been, by a long shot, the largest centre in Postpalatial Crete and must still have served as a significant local centre for north-central Crete. Second, even if only 20 ha., this will have put it on a par with the contemporary LH IIIB palatial centres of the mainland, of which only Mycenae was substantially larger (Whitelaw 2017, 127).

THE END OF THE BRONZE AGE AT KNOSSOS

We presently have little clear idea what happens at Knossos at the end of the LBA. On the traditional model, the site was either abandoned or reduced to a hamlet, and only grew gradually during the EIA (Coldstream 1991; 2000). However, the surface pottery recovered by the survey indicates clearly that the community was at least 45, and possibly as large as 60 ha. during

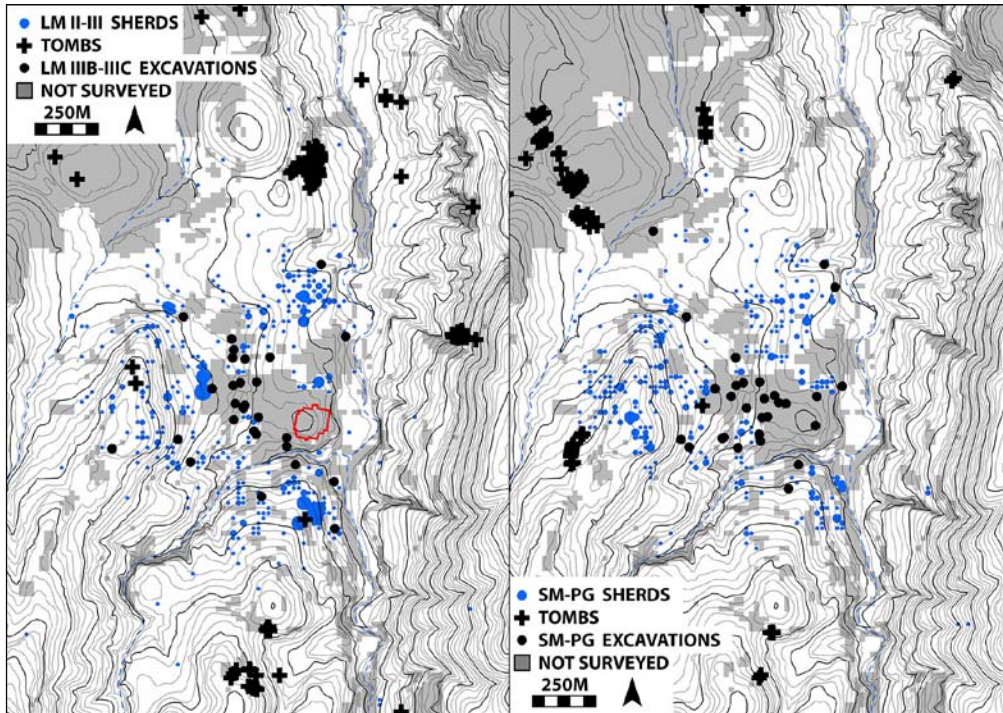


Fig. 17. Left: LM II-III sherds, LM III B-III C excavations and tombs; Right: Sub-Minoan-Protogeometric sherds, excavations and tombs.

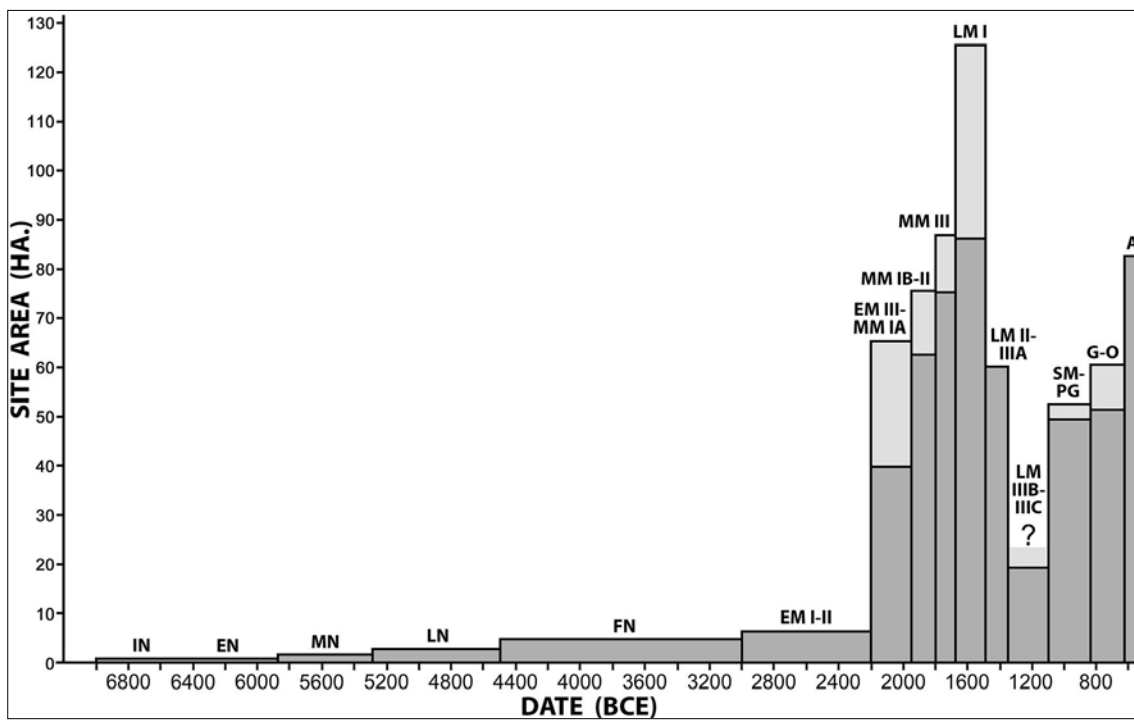


Fig. 18. Knossos: site size (minimum and maximum estimates) through the prehistoric periods and Early Iron Age.

the Protogeometric period (Figs. 17, 18; see Kotsonas 2018, this volume). Was there a further significant contraction or even short period of abandonment of the community between LM IIIC and Protogeometric? Given present difficulties in distinguishing the latest LM IIIC, Sub-Minoan and Early Protogeometric pottery (Popham 1992; Catling 1996; Coldstream 2001; Hatzaki 2007b), we will probably only ever be able to address this through very extensive excavations. At present, this is another of many challenges which emerge from the project.

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