Maltese Temples Landscape Project

First Interim Report

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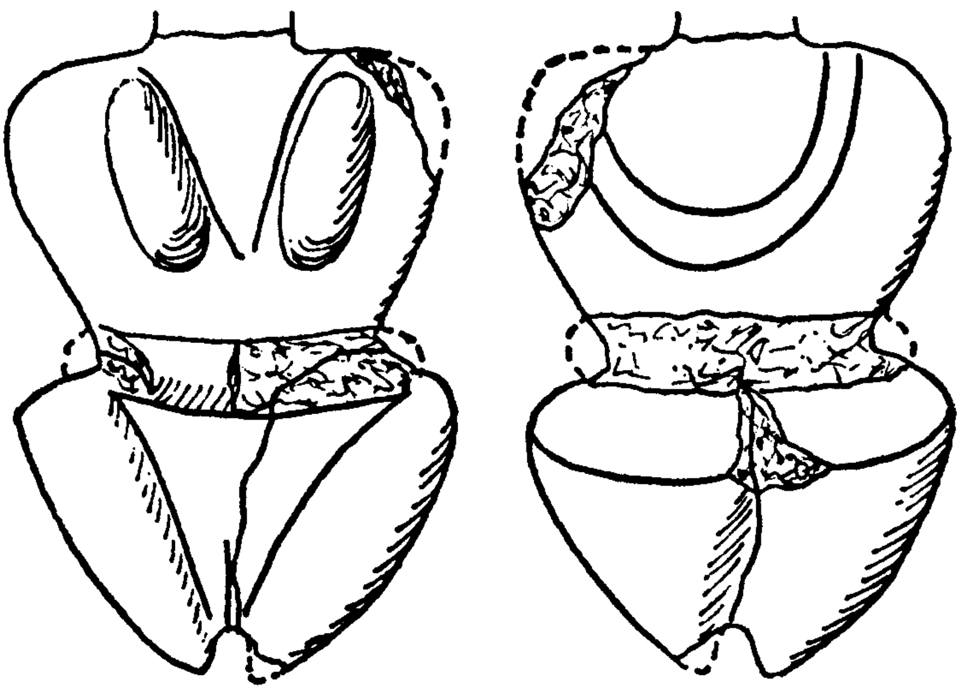

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Cover illustration shows a standing steatopygous female figure represented as a clay figurine found in the North Room of the Red Skorba Shrine at Skorba (from Tump 1966: fig.30a).

Introduction and background

The prehistoric temples on the islands of Malta and Gozo in the heart of the Mediterranean are widely recognized as amongst the earliest megalithic monuments the world, and have accordingly attracted the attention of generations of archaeologists, antiquarians, and scholars. The temples themselves have been the subject of intense investigation and speculation, chiefly as exemplars of early prehistoric architecture relevant to both Mediterranean and European traditions. About 24 individual temples at 14 sites are known across the two main islands (Trump 2008: 89). Eight sites were selectively excavated during the twentieth century (Tarxien, Kordin, Debdieba, Ħal Ġinwi, Tas-Silġ, Borġ in-Nadur, Ta'Ħaġrat, and Skorba) and have defined a progression of temple building over five cultural phases (Żebbuġ, Mġarr, Ġgantija , Saflieni, and Tarxien) spanning the period 4100 BC through to 2500 BC. Many of the better preserved temples are now major attractions and host thousands of visitors each year. The significance and global importance of the monuments was recognized between 1980 and 1992 with six of the temples being inscribed on the UNESCO World Heritage List (Ġgantija, Ħaġar Qim, Mnajdra, Skorba, Tarxien, and Ta'Ħaġrat); these have since been the subject of conservation and management programmes

Numerous studies of temple architecture, construction, decoration, orientation, situation, content, use of space, and ritual have been undertaken (see Barrowclough & Malone 2007 with earlier references), but very little is known about the wider social, economic, or environmental context of the temples and the people that built them. Burial places of the Temple Period in the form of hypogea are known at Ħal Saflieni (Zammit, 1928) and the Xagħra Circle (Malone *et al*. 2009), but the evidence for contemporary settlement is even less well understood with the discovery of contemporary domestic houses at only two known sites: Skorba (Trump 1966: 14-15) and Għanjnsielem (Malone *et al*. 2009: 41-52).

Early work on trying to develop a greater understanding of the social and political context of the Temples was undertaken by Colin Renfrew (1973: 161-182) who promulgated the idea that Maltese society at that time was organized as a chiefdom with six geo-spatial territories with the clustered temples serving as a 'central place' for each. Such modelling is now compromised by subsequent discoveries and also by a greater awareness of the complexity of factors that interplay in land use decisions made by societies who occupied island landscapes. The need to develop a greater understanding of the temples in relation to the landscape in which they are found was recently aired by Grima (2004: 327–345; 2008) who looked at the influences on the location of temples via their association with aspect, hydrology, topography, and articulation with the sea.

In essence, further debate on the wider social, political, and environmental contexts of Temple Period occupation of the Maltese archipelago is hampered by the limited data available for the territory around the temples. Where are the settlements, field systems, agricultural infrastructure, quarries, and burial grounds that filled the ancient landscape and supported their construction? How do such components relate to each other? And how do the cosmologies and world views of temple-builder communities relate to the social use of space? These are pressing and timely questions that need answering in order to make sense of the temples, their interpretation, and their presentation. They are the questions that lie at the heart of the Maltese Temple Landscape Project (MTLP).

In developing and planning the MTLP it is necessary to assess the potential of possible techniques of landscape archaeology and evaluate the likely contributions that different methodologies can make to the mapping and interpretation of Neolithic settlement patterns. It was anticipated that project planning would require two phases of preliminary fieldwork. This report covers the first of those two phases: a field assessment carried out in April 2010.

The Study Area

The initial study area for the MTLP is a linear zone about 3.5km wide running roughly southwest to northeast from Il-Pellegrin to Bugibba (Figure 1). The starting point is land in the middle, centred on the Skorba complex that was excavated by David Trump in 1961-63 (Trump 1966). This site lies on the Baida Ridge of Upper Coralline limestone with river valleys to both north and south. To the southwest are the temple sites of Ta'Ħaġrat, Ta'Lippija and Baħrija, while to the northeast are the temples of Tal-Qadi, Buġibba, and Magtab.

April 2010 Fieldwork Programme

The first season of fieldwork was undertaken between 25 and 30 April 2010. The aims were simply to: (1) provide a walk-over survey of the Skorba area to identify land holdings and potential sample area; (2) create a small topographic model to assess the practicality of integrating GPS data with available GIS models; (3) auger-sample soil profiles on a transect from the hilltop above Skorba to the valley floor to the south recording soil stratigraphy, soil content, and basic soil chemistry; and (4) making a preliminary assessment of fabric composition amongst ceramics recovered from the 1960s excavations at Skorba. All were four aims were satisfactorily completed; the results are discussed in the following sections.

Topographic Surveys and Walk-over Surveys

The area around Skorba was quartered and subject to a fairly detailed walk-over survey noting down the presence of terraces, walls, and current land-use. These details will used in planning the second stage evaluation work. Several different types of wall construction were noted in the Skorba area, and these form the basis for a simple classification that is now being developed. Various types of terrace in terms of their plan structure and elevational construction were noted. Some appear to conjoin with features forming part of the temple complexes.

A GPS survey of the immediate environs of Skorba confirmed the potential for mapping surfaces and deposits. Figure 2 shows a terrain model of the immediate surroundings of Skorba while Figure 3 shows the model set within a broader landscape context.

Auger Survey

Nine sample sites were selected in order to sample the form, content, and geochemistry of the soil and related sediments. The sample sites (referred to below as auger holes AH 1-9 producing profiles 1-9 respectively) formed a transect from the hilltop above Skorba to the valley floor to the south (see Figure 4 for locations). Each was sampled using a hand-auger, the soil profiles being logged and characterized using a portable XRFA (see below). Appendix A provides a detailed record of each soil profile; Figure 5 summarizes the implications and results.

Background

The karst landscape is essentially largely barren of soils. Today thin azonal rendzina-form terra rossa soils exist over the hard, slow-weathering limestones. The valleys contain alluvial deposits and other footslope and dry-valley locations contain varying depths of colluvial deposits of differing nature character and age. The ancient terraces also provide soil and sediment archives, and may bury prehistoric land surfaces denuded from elsewhere on the Island. The definition of the soils, former soils, and erosion episodes will aid in developing the history of human and agricultural use of the catchment and landscape packet around the Skorba Temple.

The Upper Corralline Limestone aquifer at this point comprises the Baida Ridge (on the southern slopes of which is Skorba), and the Pwales Valley and the Wardija Ridge to the south. The soils on the slopes of Mġarr/Skorba/Żebbiegħ (i.e. the Biada Ridge) are typical young immature raw soils with low humic content and characterized by an A horizon over a C horizon or parent material of typical rendzinas or xerorendzinas (Lang 1961; Kubeina 1953). In the Pwales Valley thicker alluvial soils overlie what may be alluvial sequences many metres thick. If the Marsa Valley can be used as a comparator, then Holocene deposits may exist to depths of 7-11m (Fenech 2007). Soils in the Pwales Valley itself are now partly salinized as a result of seawater intrusion into irrigated land and over-abstraction of groundwater. This gives rise to salt crystal formation that can be observed on the soil surface (Vella 2001).

Aims

The initial aims were be to undertake geoarchaeological prospection and reconnaissance in the environs and catchments around Skorba, extending where possible to other temple sites in the Study Area in order to determine the presence and location of sediment reservoirs. Rapid field examination would aim to:

- Isolate the presence of sediment reservoirs (i.e. in footslope locations, valley bottoms, terraces, and other isolated landscape pockets);
- Determine the character, depth and nature of these deposits;
- Define a typical caternary sequence (providing the basis for reconstruction of the prehistoric soil catena);
- Provide a crude predicative model for the both the location and type of deposits; and
- Test the presence of palaeo-environmental proxy indicators.

This would enable the formulation of more detailed targeted methodology of limited intervention fieldwork to examine, map and samples appropriate locations within the catchment of defined study-site locations.

Augering and the examination of natural exposures enabled:

- A preliminary caternary sequence to be outlined;
- A preliminary indication of the nature of the terrace soils (and their potential to seal and preserve ancient land surfaces);
- An indication of the nature and depth of deposits in the Pwales Valley;
- An outline palaeo-environmental and geoarchaeological potential of the Skorba environs to be established; and
- An evidence-based review the methods and equipment deployed in this preliminary work to be carried out with the aim of modifying methods and equipment as necessary.

Methods

The slopes of Skorba provide exposed and terraced karst limestone geology above and below the temple complex, which overlook the Pwales Valley containing floodplain deposits. A series of 11 auger holes were recorded at nine locations (Figure 4). Augering was undertaken by hand using a 7cm diameter Edleman combination auger. The sediment profiles can be divided into to those on the terraced Skorba/Żebbiegħ slope, with AH 5a, 5b and 6 north and upslope of Skorba, and AH 7a, 7b, 8 and 9 south and downslope of Skorba; the valley footslope, AH 1, 2 and 3; and the valley itself, AH 4. The results are summarized in these topographical groups, but full auger records are provided in Appendix A.

Results

<u>Terraced Slopes above Skorba</u>

Profiles 5 and 6: Soils were typical xerorendzinas of 0.27 to 0.35m thickness over limestone. The terrace deposits (AH 6) contained stratified colluvial or ploughwash deposits up to 0.70 m thick, with fine comminuted charcoal and pottery sherds. Basal deposits were more clear-rich, and had better structure and may indicate the presence and preservation of relict, albeit transformed, former soil profiles.

<u>Terraced Slopes immediately below Skorba</u>

Profiles 7, 8 and 9: Once again shallow xerorendzinas were present to thickness of 0-30 to 0.41m. Although these are only known through three auger holes (AH 7a, 7b, & 9), it is noticeable that soils here were thicker rendzina-forms than those higher up the slope above Skorba. The profile through the terrace deposits (AH 8) revealed deeply stratified deposits 1.11m deep. While the stony upper profile may represent collapse of the terrace the wall the lower deposits were clearly both artefact-rich and in soil/sediment terms were slightly more clay-rich. This horizon is possibly a relict pre-terrace soil.

The valley footslope

Profiles 1, 2 and 3: Deeper colluvial brown earth were recorded at the footslope and low terrace deposits on the valley margins. Once again the terraced field produced deeply stratified colluvial and ploughwash deposits up to 0.77m thick. Many containing artefacts such as pottery and fine comminuted charcoal fragments. There are hints of clay-enrichment of the basal horizon by clay translocation (Bt horizons) during the existence of possibly previous argillic brown earths (brown forest soils). There is, however, some limited potential for high water overbank flood events to supply alluvial sorted minerogenic material on the this field terraces along the floodplain margins.

The Pwales Valley

Profile 4: The location on the edge of the profile could only be cored to a depth of 1.15m (i.e. single auger without extension rods). Nevertheless, a deep colluvial/alluvial profile of *c.* 1m, overlay the top of a brown floodplain alluvium (augered to 1.15m). We have no indication of the depth or nature of deposits below this but full Holocene sequences to in excess of 10m depth have been recovered from Marsa. The Pwales Valley has less of a marine and strong fluvial and hydrological aspect than Marsa, but the potential for very deeply stratified deposits containing geoarchaeological and palaeo-environmental information relating to the temple-building phases is high.

Palaeo-environmental potential

Two proxy palaeo-environmental indicators were briefly assessed; pollen and land snails. The presence of land snails in highly calcareous archaeological deposits and soils on Malta is documented at Tas-Silg (Schembri *et al.* 2000) and Xagħra Circle (Shembri *et al*. 2009), where land snails have recently been used to examine the lived-in and local environments and past ecologies of archaeological sites. Similarly, deep alluvial floodplain and valley deposits at Marsa contained mollusc in suitable numbers to enable some palaeo-environmental comment (Kenech 2007). Snails shells and shell fragments were clearly observed using a field hand lens in the soils and terrace deposits especially on the Żebbiegħ slopes, but also in the deposits considered to be the upper sequences in the Pwales Valley (AH 4).

The potential of pollen survival in the highly calcareous biotically active soils and sediments of the terrace deposits is considered low (see for instance Scaife 1987, 126-7), but pollen may survive in the basal relict soils of the terraces, and in the long stratified alluvial sequences in the Pwales Valley, as has been demonstrated, for instance, in the Marsa Valley (Fenech 2007). One spot sample from the Pwales Valley sediments (at 115cm, AH 4), which although considered to be near the top of a long stratified sequences (see above), was tested for pollen. Processing used advanced techniques for potentially pollen-poor strata; an analytical development by Dr Scaife of the standard methods of Moore & Webb (Moore & Webb 1978; Moore *et al.* 1992) in which he employed micromesh sieving (10 µm) to aid with removal of the clay fraction where present in these sediments.

From the results of this preliminary test, Dr Scaife reports that pollen was present, but was Compositae dominated, especially Taraxacum, indicating differential preservation. The pollen spectra also included some Chenopodiacea, conifers, and a single cereal-type. Few unidentified degraded pollen spores, and other identifiable types were present, but not identified. This indicates the potential for pollen survival in the potentially deeply stratified Pwales Valley sequences, just as Fenech demonstrated at Marsa (2007).

Conclusion and summary

A summary catenary profile was recorded and the potential for both geoarchaeological and proxy palaeo-environmental data was clearly established (Figure 5). Ancient soils and sediments are preserved within and potentially beneath the terraces of the Żebbiegħ slopes and footslopes. The potential for deeply stratified deposits of geoarchaeological and palaeo-environmental in the Pwales Valley potential covering the temple building period is very high. The variation of soil and sediments distribution along catenary profile (Figure 4) provides a basis for starting to reconstruct the past soils, land-use, and local environment within the Skorba landscape packet. Proxy palaeo-environmental indicators (pollen and snails) survive in the deposits.

The soil and sediment sequences indicate the presence of thin xerorendzinas on the terraced slopes, thicker soils on the footslope, and deep sediment sequences in the Pwales Valley. Examination of these indicates the presence of former thicker soils on the slopes, possible rendzinas (or brown earths) with higher agricultural potential for the soils than exist today. There is a likelihood of both greater and more evenly distributed soil-cover in prehistory. Human activity has resulted in colluviation and alleviation, and the infilling of the valley as a result of soils eroding into the valley system both directly (colluviation) and indirectly (alluviation via overbank flooding across the floodplain).

The terraces have indicated a very high potential for examining the soils and local land-use histories. At present there is exceptionally little work on the construction of these terraces both in terms of the wall construction (a number of subtly yet significant different walling methods were noted in the Skorba area), and in terms of soil infill. The augering indicates stratified sequences, but whether these are entirely infilled with derived soil material, or developmentally built up with soil material, or have phases of colluviation as a result of cultivation is not clear (see for instance French & Whitelaw 1999). The operation of these fieldsystems in prehistory has not been fully examined and thus their archaeological characteristics remain to be defined. In addition, the potential for persevering ancient land surfaces is high, and this may indicate whether former soils had been depleted or truncated by agriculture prior to terracing.

Overall, there is a very high potential, via geoarchaeological and palaeo-environmental approaches, to examine and reconstruct the changing land-use of this karst landscape through prehistoric times (cf. Allen & Lewison 1987). The aim is not only to develop models and methodologies that can be used in the present research but which are also relevant for other sites on the Islands and beyond.

Environmental reconstruction will also help define the nature of the pre-temple landscape; its vegetation, resources, and wood availability in the prelude to the construction of stone-built temples. The land-use, food supply and agricultural development associated with the temples and the communities who built and used them may be defined. This, with the other archaeological approaches proposed, has the potential to examine the wider non-temple activities of these prehistoric communities not previously examined in depth on the Maltese Islands.

Review of geoarchaeological methods and the assessment fieldwork April 2010

We thank the Superintendence of Cultural Heritage for allowing us to test and confirm methodological approaches. It is clear that simple augering and test-pitting, whilst being minimally intrusive can provide a significant level of new information and interpretation to the study area which are applicable elsewhere.

It is clear that hand augering is possible, though not without its difficulties. The dry and highly silty nature of the Maltese soils makes hand augering difficult but not impossible. The 7cm diameter combination auger is ideal for silty-clays and stony soils, but would be better replaced by a 5cm diameter combination Edleman auger for highly silty deposits. The depth and nature of the deposits was largely established enabling the development of appropriate minimally intrusive methods (hand-excavated test pits) for recovering and the maximising archaeological, geoarchaeological, and palaeo-environmental information.

Hand augering the Pwales Valley is not possible. Some form of hand-held mechanical coring is, therefore, considered necessary to realize the high geoarchaeological and palaeo-environmental potential here. Large-scale mechanical boring was undertaken by Fenech at Marsa (2007) and at present we are investigating the use of a hand-held petrol-driven percussion auger to recover sediments that we would hope embrace the temple building phase at least.

The construction of a surveyed profile is possible, but the accuracy of the vertical scale records of hand-held GPS is not suitable and does not provide the level of accuracy required. Full geo-referencing will be conducted with a total station.

Chemical Analysis of Skorba Soils

A hand-held portable XRF analyser was used to record major, minor and trace elements in soils recovered from the auger holes. Samples taken at approximately 10cm intervals through each profile were measured where the soil matrix was recovered relatively complete. Figure 6 shows a summary of the elements represented by depth for a selection of profiles; Figure 7 shows a Principal Components Analysis (PCA) of the data which clearly illustrates the presence of two main deposit groups. Looking at the profiles, distinct horizons are present within the sequence, especially in those where cultural deposits are represented such as AH 6 and AH 8. Further work is needed to determine the causes of these variations, and additional analysis is underway to establish key chemical indicators and significant ratios of elements.

Chemical Analysis of Skorba Ceramics

A selection of ceramic sherds from Skorba (Ghar Dalam, Grey and Red Skorba phases) was chemically tested by means of a portable XRF. This method is non-invasive and therefore ideal for investigating archival materials. Eight potsherds of Ghar Dalam ware (labelled Sk AF5, SB4 and SB6), 6 sherds of Grey Skorba ware (labelled Sk CE2, XD2, TE4, MD2, VE2 and QC2), and 10 sherds of Red Skorba ware (labelled Sk QC1, IE3, LD5, PC5, GA8, OB8 and SB6) were tested. In most cases, three measurements were done on each sherd (the outer and inner surface of the vessel and on an a fresh break where available). The results of the analyses are shown in Figures 8 and 9. According to this first small test series, it seems that the three ceramic phases Ghar Dalam, Grey and Red Skorba are not easily recognisable through the chemical composition of the ceramic matrix. It may be that the manufacturing technique applied by the potters near Skorba did not undergo such considerable changes (i.e. choice of the raw material, the temper, or burning methods) that would result in clearly different chemical compositions. However, the chemical pattern shows some variation, but its significance can only be ascertained by increasing the data volume.

Looking forward

It is clear from this initial assessment that there is identifiable vertical and areal variation in the distribution of cultural material and environmental indicators. Deposits with considerable potential exist in the Skorba area, and with various adaptations to suit local conditions these can be recovered through the techniques of conventional landscape archaeology. There is clear potential to explore the development of the landscape as a three-dimensional set of structured relationships articulated through boundary works, terraces, and preserved deposits. It looks as if the temple buildings and their associated structures are tied into the wider landscape, thereby allowing the possibility of exploring earlier relationships.

The first phase of assessment described here needs to be expanded through a programme of structured evaluation. Building on the results of the fieldwork discussed here it is proposed to:

- Evaluate the potential of extensive geophysical survey (esp. Ground Penetrating Radar (GPR), magnetometry, and earth resistance);
- Evaluate the potential of extensive geochemical surveys (esp. Magnetic Susceptibility (MS) and XRF);
- Evaluate the preservation and potential of cultural material, structural remains, and environmental indicators in the landscape beyond the temple site through a series of hand-excavated test-pits on a transect from the hilltop to the edge of the valley floor; and
- Evaluate the sedimentation sequences, deposit survival, and the preservation of pollen, mollusc and other environmental indicators through further augering on the hillslopes and valley floor.
- Evaluate the ceramic fabrics from key deposits at Skorba and other sites through further detailed XRFA analysis matched to typological and contextual studies.

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APPENDIX A

Terraced Slopes above Skorba (AH 5a, 5b and 6)

Profile 5a 33 S 0443807 3975392, elevation 120m

Top of the courgette field, top of the augered sequence above Skorba

Ploughed surface and harrowed/hoed surface

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-27	Ap; ploughsoil (Rendzina)	Dark brown (7.5YR 3/3) humic silty clay loam (will take slight polish), contains some medium sand, many very small limestone pieces, few medium subangular limestone pieces, very weak ?subangular blocky/prismatic structure, abrupt boundary on to limestone bedrock (or large stone)	
27+	C; limestone	Parent material	

Profile 5b Repeat of profile 5a at 33 S 0443811 3975391, elevation 119m

Approximately 2.5-3m north of terrace wall

Ploughed surface and harrowed/hoed surface

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-35	Ap; ploughsoil (Rendzina)	Dark brown (7.5YR 3/3) humic silty clay loam (will take slight polish), contains some medium sand, many very small limestone pieces, few medium subangular limestone pieces, very weak ?subangular blocky/prismatic structure, becoming moister (due to irrigation but also possibly higher clay/silt content) at base, abrupt boundary on to limestone bedrock (or large stone)	
35+	C; limestone	Limestone; Parent material	

Profile 6 33 S 0443833 3975375, elevation 117m

Lower courgette field, immediately above Skorba

Ploughed and prepared surface

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-22	Ap; ploughsoil	Dark yellowish bown (10YR 3/4) humic stone-free silty clay loam, structureless, clear boundary	192 @ 0cm 193 @10cm 194 @ 20cm
22-48	B1; colluvial B	Brown to dark brown (10YR 4/3-3/3) silty clay, some very small limestone pieces, rare medium limestone pieces, rare fine charcoal flecks, clear boundary	195 @ 30cm 196 @ 40cm
48-61	B1; colluvial B	Dark brown (7.5YR 3/3) stiff silty clay (takes a polish), some very fine stones, rare small and medium limestone pieces, probably small blocky subangular or prismatic structure fragments of very fine charcoal, burnt clay and ?weathered small pottery fragment throughout, clear boundary	197 @ 50cm 198 @ 60cm
61-70	B1/Cw	Dark brown (7.5YR 3/4) silty clay loam with few to many small and medium subangular limestone pieces, rotted limestone and burnt clay still present	199 @ 70cm
70+	C; limestone	Medium limestone pieces and limestone; Parent material	

Terraced Slopes immediately below Skorba (AH 7a, 7b, 8, and 9)

Profile 7a 33 S 0443833 3975375, elevation 118m

Downslope from Skorba, in triangular field, 3-4m north of southern boundary terrace wall

Loose stony ploughsoil

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-16	Ap; ploughsoil	Brown (10YR 4/3) very loose stone-free humic silty loam, clear to gradual boundary	161 @ 0cm 162 @ 10cm
16-39	A;	Brown (10YR 4/4 – 7.5YR 4/4) loose friable silt loam with common very small and rare small limestone pieces. From 30cm pottery sherds (2-3cm) and modern tubers, clear boundary	163 @ 20cm 164 @ 30cm
39-41	Cw	(10YR 4/4-5/4) calcareous silt loam with common medium stones	165 @ 40cm
41+	C; limestone	Limestone; parent material	

Profile 7b 1.5m east of AH 7a

Depth (cm)	***Horizon/Deposit***	***description***	***XRF***
0-16	Ap; ploughsoil (Rendzina)	Brown (10YR 4/3) very loose stone-free humic silty loam, clear to gradual boundary	
16-30	A;	Brown (10YR 4/4) friable silt loam with common very small and rare small limestone pieces.	
30+	C; limestone	Limestone; parent material	

Profile 8 33 S 0443861 3975271, elevation 111m

One terrace south of triangular field south of Skorba (next to water melon field), next to terrace wall and through terrace deposits

Loose dry silty ploughsoil some stones

Depth (cm)	***Horizon/Deposit***	***description***	***XRF***
0-15	Ap; ploughsoil	Dark yellowish brown (10YR 3/4) loose powdery silt loam, almost stone-free, but with rare medium stones and pottery on the surface, clear boundary.	204 @ 0cm 205 @ 10cm
15-38	A;	Dark yellowish brown (10YR 3/4) silty clay loam, some medium sand, few stones, clear boundary	206 @ 20cm 207 @ 30cm
38-53	B; stony colluvium (?terrace collapse)	Dark yellowish brown (10YR 3/4) stony horizon with pottery, with silty clay loam (as above) matrix, common medium limestone pieces, including burnt examples, and 2 sherds of cbm/early modern pottery, clear boundary	208 @ 40cm 209 @ 50cm
53-62	B; stone-free colluvium	As above but stone-free	210 @ 60cm
62-97	B: stone-free colluvium – with pottery	Brown to dark brown (10YR 4-3-3/3) moist plastic and pliable silt loam, almost stone-free, contains many small black and red pottery fragments; e.g. @ 65cm, 66cm, 68cm, 74cm, 77cm, 84cm, 85cm, 86cm, 97cm. Clear to gradual boundary	211 @ 70cm 212 @ 80cm 213 @ 90cm
97-111	B; colluvium	As above but common small and medium subangular stones, small eroded pottery fragments (e.g. @ 110cm), and fine ?charcoal fragments, over limestone	214 @ 100cm 215 @ 110cm
111+	C; limestone	Limestone; parent material	

Profile 9 33 S 0443833 3975375, elevation 118m

South of Skorba, field at base of slope above Trio Il-Vantlja

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-27	Ap; ploughsoil (Rendzina)	Brown (10YR 4/3) dry humic silt (clay) loam, common very small limestone pieces, some medium subangular to subrounded stones. Pottery on surface. Clear boundary.	170 @ 0cm 171 @ 10cm 172 @ 20cm
27-37	A/C;	Brown (10YR 5/3) calcareous silt with common very small subrounded/rounded limestone pieces.	173 @ 30cm 174 @ 37cm
37+	C; limestone	Limestone; parent material	

The valley footslope (AH 1, 2, and 3)

Profile 1 33 S 0444220 3975059 ±3m, elevation 81m

In field to the west of the Mġarr Road beneath Żebbiegħ, next to track below terrace.

Recently cut wheat, very loose and friable cultivated soil

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-21	Ap; ploughsoil	Brown (7.5YR 4/3) slightly humic silty loam, many very small limestone pieces and common medium subrounded limestone pieces, clear boundary	8 @ 20cm
21-24	transition	Transition	
24-42	B1a	Brown (7.5YR 5/4) silt, almost stone-free, with rare small to medium rotted limestone pieces becoming stonier with depth	9 @ 40cm
42-48	B1b; stony colluvial B	Brown (7.5YR 5/4) silty clay loam, with common medium subrounded to subangular limestone pieces stones, rare fine charcoal pieces, clear boundary. At 45cm very small fragments of charcoal and burnt stone	15 @ *c.* 45cm
48-62	B1c; colluvial B	Strong brown (7.5YR 5/4) dense firm compact silty clay loam (takes a polish), many very small limestone pieces, rare to no other stones, clear boundary	16 @ 55cm 19 @ 60cm
62-72	B1d/Bt;	Brown (7.5YR 4/4) compact, darker silty clay, common very small limestone pieces, (many medium limestone pieces not recovered), pseudomycelium present on inter ped faces, very fine charcoal fragments throughout, becoming more clay rich with depth, and being reddish brown (5YR 5/4) on inter ped faces and against stones, but still very calcareous throughout. Clear boundary	20 @ 65cm 21 @ 70cm 24 @ 75cm
72-75	Cw	Stony horizon with silty clay matrix	45 @ 77cm
75-77+	C; Limestone	Limestone – parent material	

Profile 2 33 S 0444204 397500, elevation 84m

On the next terrace down, *c.* 8m in front of the terrace wall (approximately 1m below the previous terrace (AH 1) and 1.7m above the next.

Recently harvested wheat (stubble), firm dusty stony soil surface

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-22	Ap; ploughsoil	Brown (7.5YR 4/4) almost stone-free loose slightly humic silty loam with few small and very small stone pieces and occasional dine fibrous roots. Becoming densely packed, almost stone-free silt, gradual boundary	29 @ 20cm
22-47	B; colluvial B	Brown (7.5YR 5/4) Silty loam (almost pure silt) with very small limestone/chalky pieces, at depth (30cm) starts to take a slight polish (possible silty Aeolian component) in colluvial/alluvial soil	30 @ 30cm 32 @ 35cm 35 @ 38cm 38 @ 40cm (ceramic)
47-50	?Bt;	Brown (7.5YR 4/4) to reddish brown (5YR 5/4) stone-free silty clay, slightly darker (?rubified), over limestone	44 @ 50cm
50+	C; Limestone	Limestone – parent material	

Profile 3 33 S 0444204 3975001, elevation 83m

Same field as AH 2, but *c.* 2m from the back of the terrace wall. Fields on very gradual slope which seems to level of 5m southwards.

Recently harvested wheat (stubble), firm dusty stony soil surface

Compact sediment making augering difficult and recovery poor and description/interpretation unsatisfactory

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-22	Ap; ploughsoil	Brown (7.5YR 4/4) almost stone-free loose slightly humic silty loam with few small and very small stone pieces and occasional dine fibrous roots. Becoming densely packed, almost stone-free silt, gradual boundary	48 @ 10cm
@ 40	B1a; colluvial B	Brown (7.5YR 4/4) compact stone-free firm silt loam,	50 @ 40cm
@40-3	B1b stony colluvial B	Brown (7.5YR 4/4) loose compact silt loam, with many small and medium stones	51 @40-3cm
@43-5	B1c; colluvial B	Brown (7.5YR 4/4) loose compact silt loam, with some medium stones	52 @ 43-5cm
@45-7		Brown (7.5YR 4/4) loose compact silt loam, with some medium stones	53 @ 45-7cm
@47-9		Brown (7.5YR 4/4) loose compact silt loam, with some medium stones	54 @ 47-9cm
@49-51+	Cw; weathered parent material	Brown (7.5YR 5/2) lighter in colour than above with more clay; silty (clay) loam, common small and medium limestone pieces, and ‘peagrit’	56 @ 49-51cm

The Pwales valley (AH 4)

Profile 4 33 S 0443837 3974055, elevation 83m

In the valley floodplain

Ploughed surface

Depth (cm)	***Horizon/Deposit***	***Description***	***XRF***
0-25	Ap; ploughsoil	Dark yellowish brown (10YR 3/6) to dark brown (7.5YR3/4) loose, stone-free humic silty clay loam, clear boundary	191 @ 10cm
25-52	B; colluvial/alluvial B	Dark brown (10YR 3/3), stiff and compacted almost stone-free silty clay with weak small blocky or prismatic subangular structure, rare small stones, some very small stones, clear boundary	
52-59	B; colluvial/alluvial B	Dark brown (10YR 3/3), stiff and compacted stone-free silty clay with weak small blocky or prismatic subangular structure, small stones, some very small stones, clear boundary	
59-72	B; colluvial/alluvial B	Very dark greyish brown (10YR 3/2-3/3) firm silty clay with some very small and rare small limestone pieces, clear boundary	
72-102	B; colluvial/alluvial B	Brown (7.5YR 4/3), lighter in colour, stiff silty clay loam with common very small and rare medium limestone pieces, rare small charcoal flecks @88cm and small pottery sherd @ 88cm, Clear boundary	
105-115+	B2; overbank floodplain alluvium	Brown (7.5YR 4/3) to dark brown (7.5YR 3/3) firm silty clay, few small subangular stones, pseudomycelium present @103cm pottery fragment (on boundary) This = top of the Marsa sequence (Fenech 2007)	

Figure 1: Location of the Study Area and the focal site of Skorba (after Grima 2008, fig. 3 with additions).

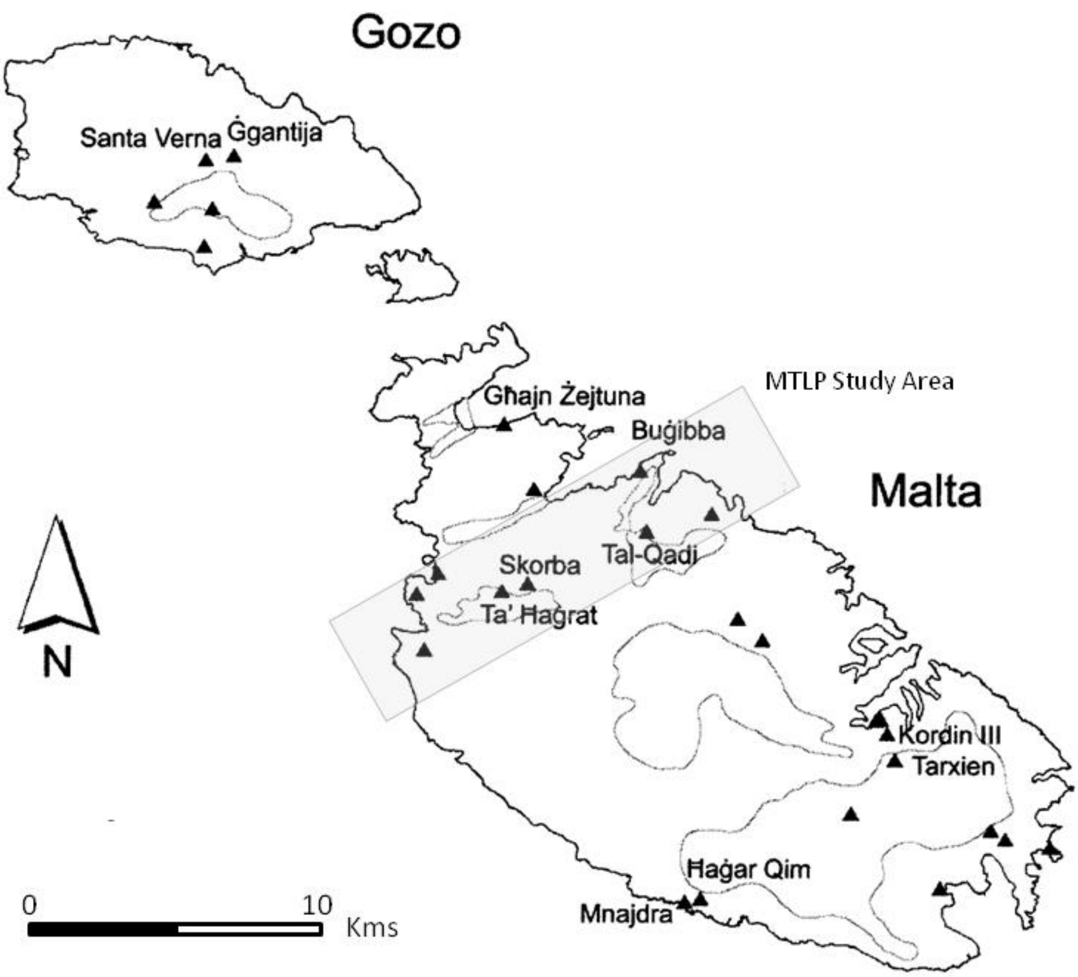

Figure 2: Digital Terrain Model (DTM) of the Skorba area.

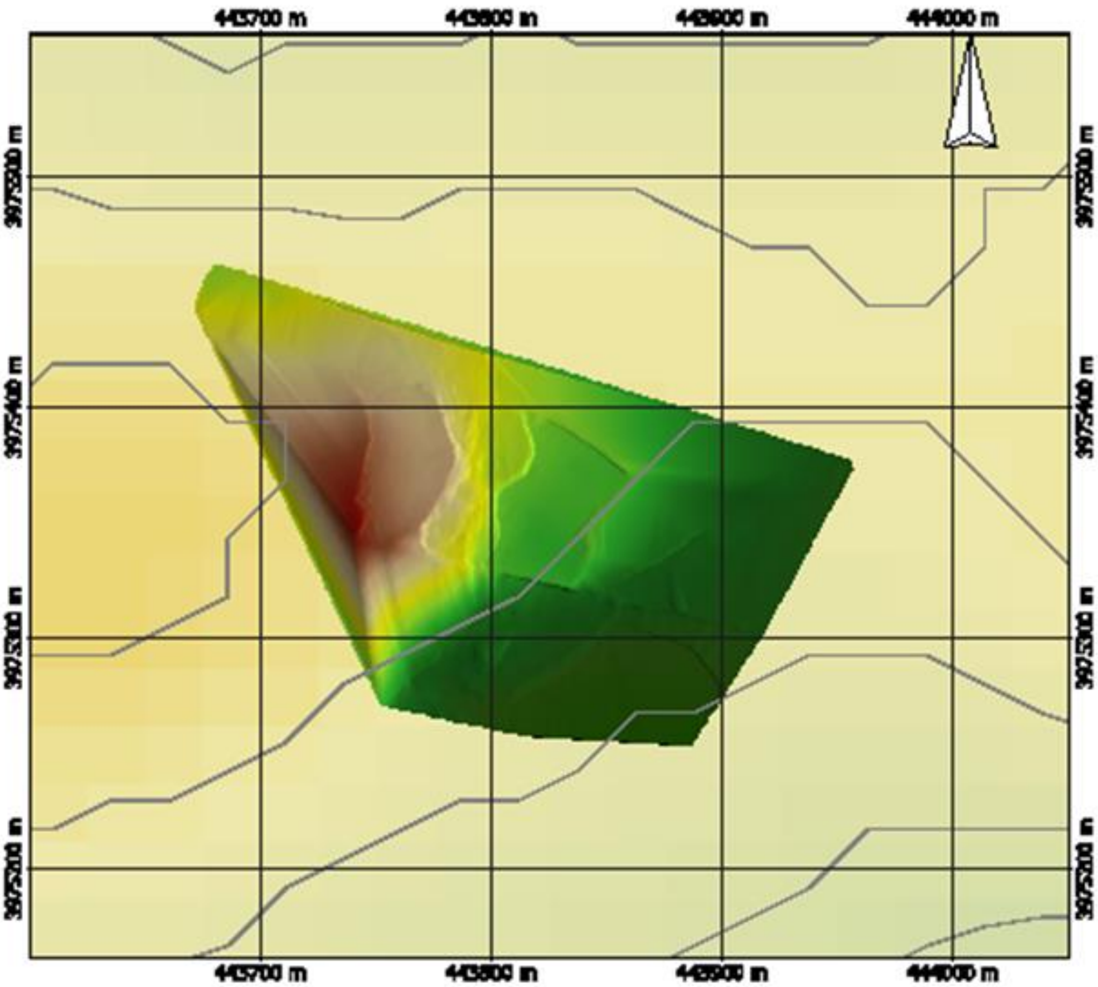

Figure 3: Contoured landscape model showing the position of the Skorba survey in its wider context.

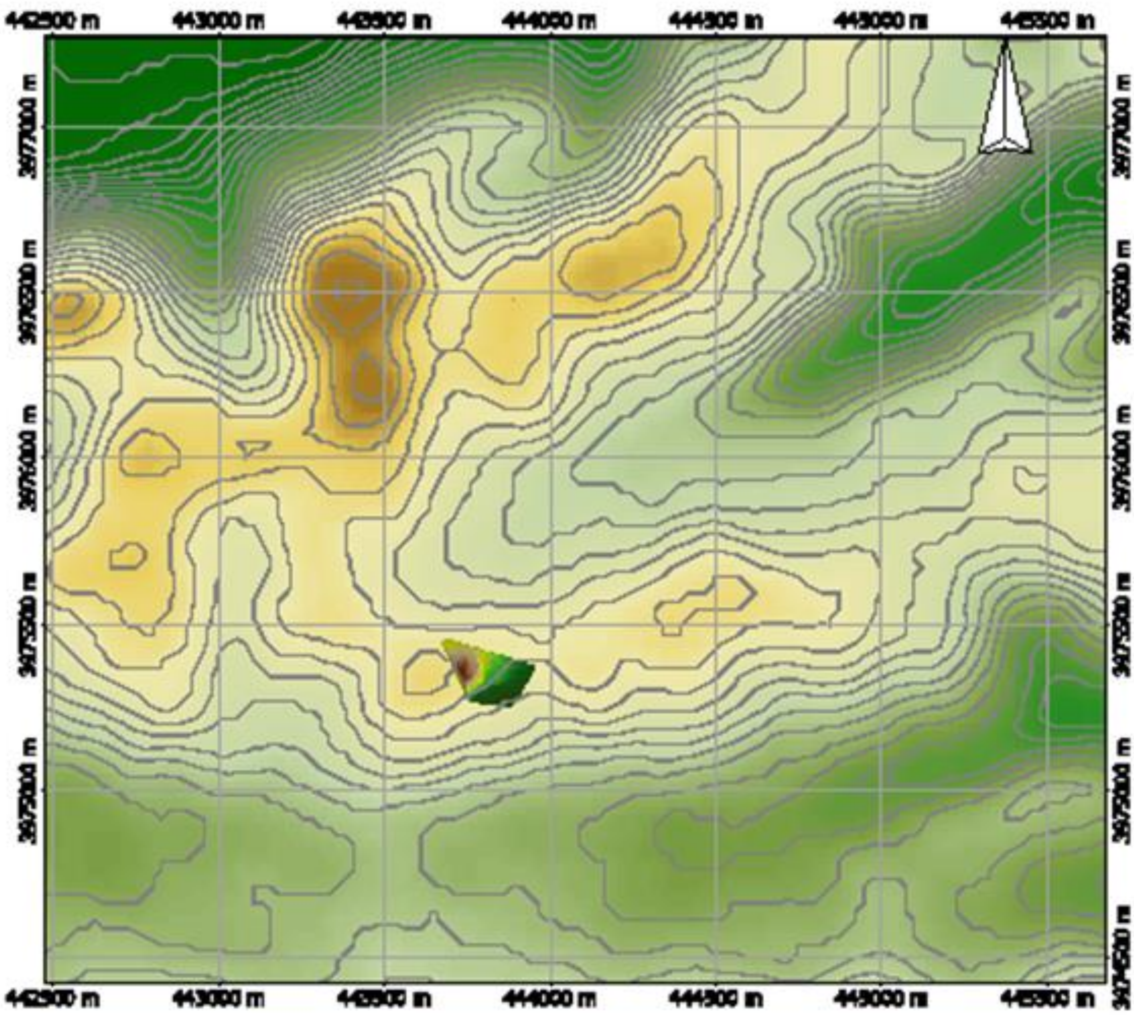

Figure 4: Skorba area with the position of the auger holes indicated.

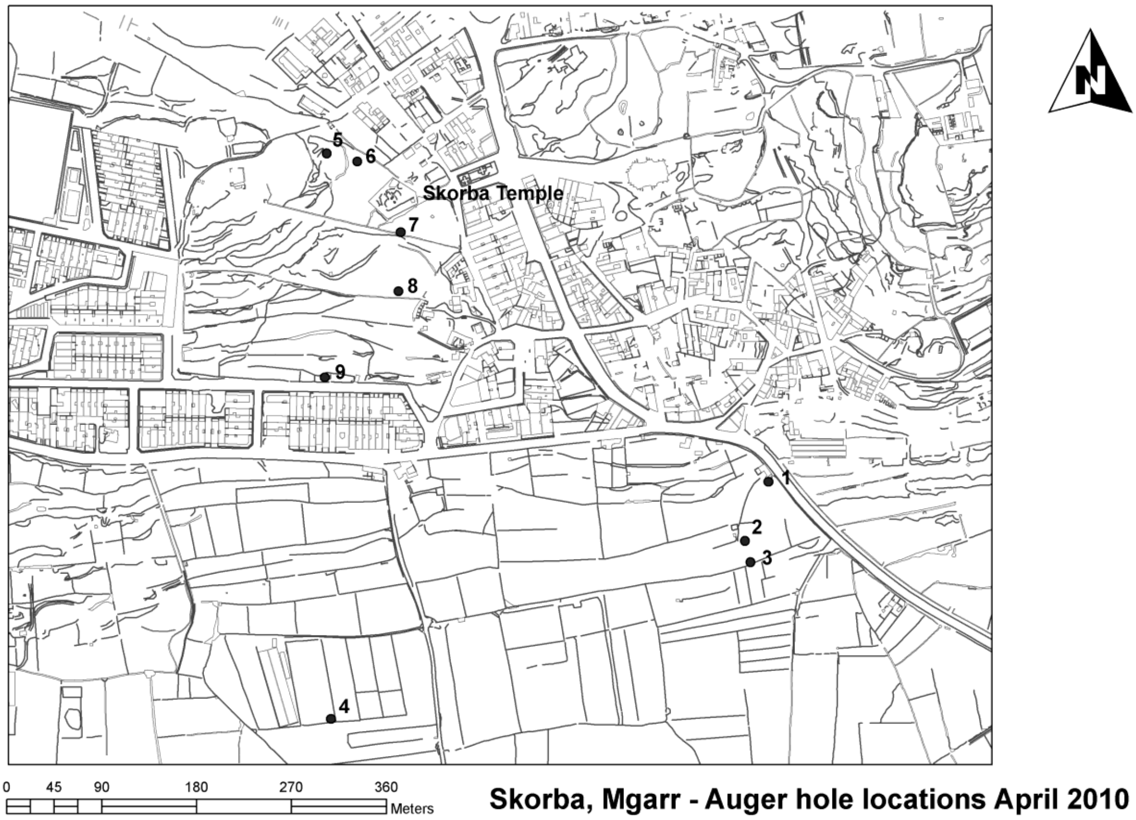

Figure 5: Summary soil profiles recorded during the auger survey.

	Terraced Żebbiegħ slopes (Biada Ridge)	***Żebbiegħ footslope***		***Pwales floodplain***
Zone	Slope	Terraces	Footslope	Floodplain
Topography (slope etc)	Convex gentle to moderate slope, with exposed Upper Coralline Limestone at is crest. Terraces with narrow to moderate terraces	Level terraces of varying width	Level to gentle slope, broad terraces	Level broad floodplain
Current land-use	Agriculture (cereal crops, melons etc), and open ground	Agriculture (cereal crops, melons etc),	Agriculture, largely cereals	High intensity agriculture and horticulture;
Soil/Sediment character	Bare exposed geology on crest with shallow xerorendzinas on slopes where not terraced	Sediment of about 1m thickness immediately behind terrace walls, thinning upslope to thin xerorendzinas and bare rock		Deeply stratified sediment sequences
Palaeo-environmental potential	Limited to nil	Moderate to high potential for determining construction and age of the developing agriculture and land-use. Also for determining the nature of past soils during prehistoric phases (incl. Temple-building phase), and changing/ developing soil history	Low but undefined	High potential for long stratified geoarchaeological and palaeo-environmental (pollen, snails) sequences with great time depth a relating to the temple-building period
Significance on a Malta-wide scale	Limited (but the archaeological investigations are largely centred in this zone)	Very high potential to commence comprehension of development and land-use history for the Skorba landscape packet and develop models applicable to other temple environs	This zone includes the temples of Ta'Ħaġrat, but this seems to be a more unusual location for temples (Grima 2008)	This has the potential to provide long and wide land-use histories relevant to the development of the islands history (cf. Schembri 1993; 1997)
Prehistoric activity	Temple complex and Terracing		? terracing	Unknown and buried

Figure 6: Preliminary results of the XRFA-analysis of soil samples around Skorba. Major and minor trace elements in ppm (not normalized; logarithmic view). The sequence from foreground to background equals the succession of samples by depth in each auger hole.

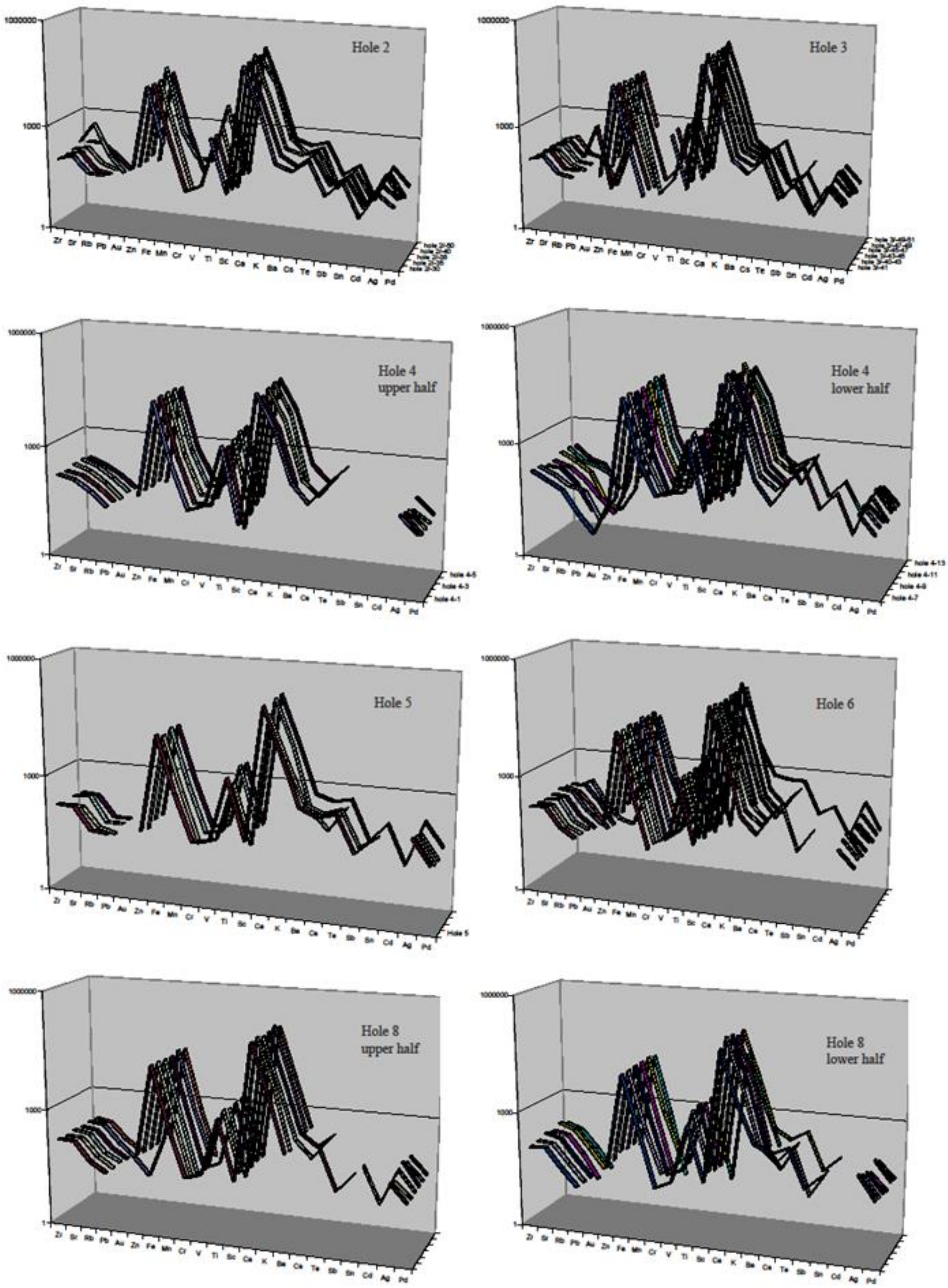

Figure 7: Principal components analysis of the results from XRFA-analysis of soil samples around Skorba.

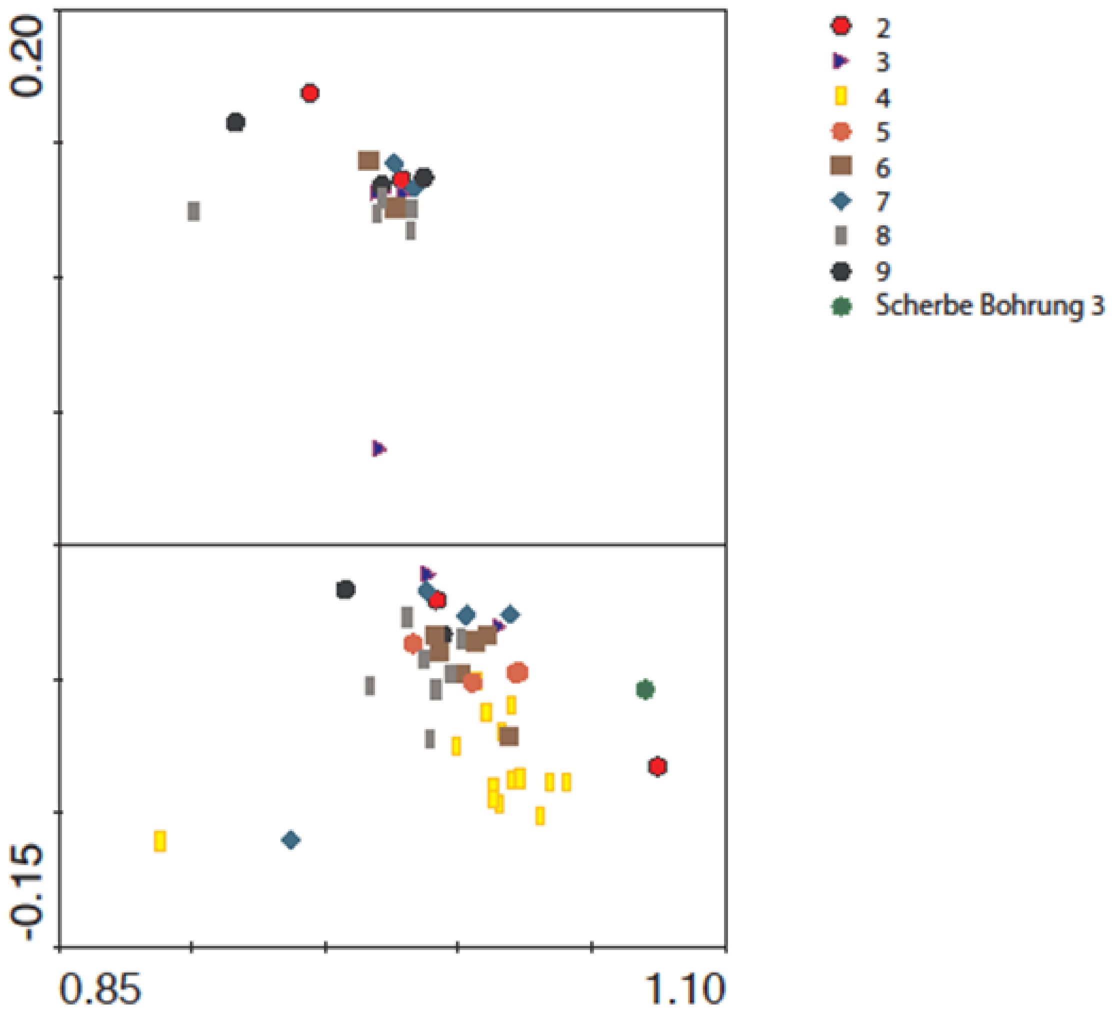

Figure 8: Results of the XRF-analyses of ceramic sherds from Skorba (in ppm, logarithmic).

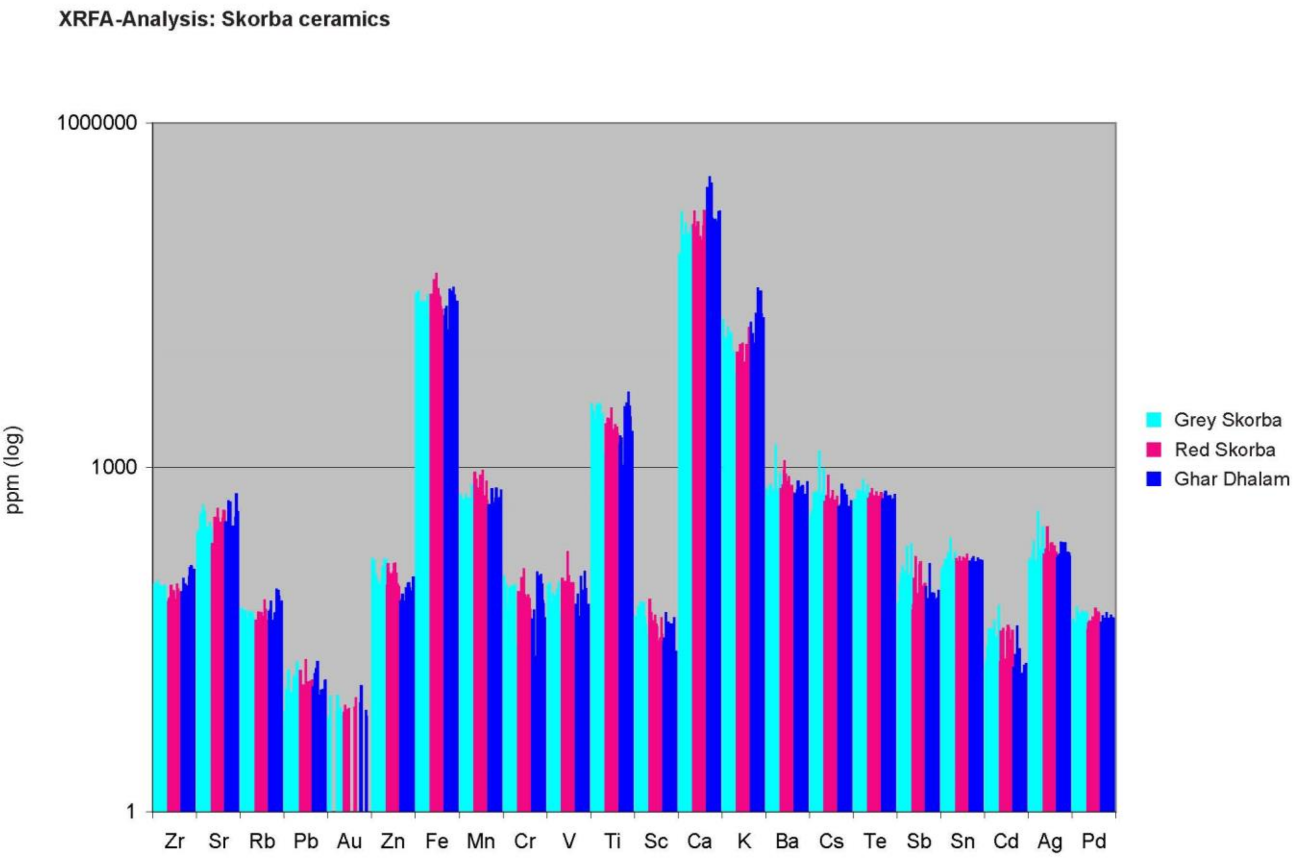

Figure 9: Results of the XRF-analyses of ceramic sherds from Skorba: Principal component analysis, excluding the major elements Ca, K and Fe. (Phase 1= Ghar Dalam, Phase 2= Grey Skorba, Phase 3= Red Skorba).