Introduction

Since 2007, a joint scientific partnership has been established between the Italian Archaeological School in Athens, directed by Emanuele Greco, and the local Ephoria, directed by Maria Bredaki (currently director of the Institute of Cretan Studies) in order to improve our understanding of the Phaistos settlement area. The objective was to draw up a land exploration plan based on surface surveys, archive research, analysis of archaeological materials, and geological-geomorphological and geophysical researches. The field work is was to be carried out by a team directed by Fausto Longo of the Salerno University. The final purpose is to investigate the history of the ancient landscape and environment of Phaistos since the beginning of human settlement in the area.

To this end, over the years we have put together a team of specialists coming from different disciplines, and activated collaborations with other research organizations and institutions, including the University of Padua for topographic surveying, the University of Naples for geophysical investigations, and the CNRS, within the framework of the ANR DIKIDA research program directed by Daniela Novaro-Lefèvre, and with Matthieu Ghilardi supervising the palaeoenvironments task for the CEREGE team.

The surface survey program encompasses an overall area of ca. 60-70 hectares around the hills of Phaistos. One of the main results achieved during the first years of work was the drawing up of a new, detailed archaeological map of the entire area of the Phaistos settlements and all the archaeological remains within this area. This map will be the fundamental starting point for future studies.

The present essay provides some preliminary results of our integrated multidisciplinary studies. More specifically, we illustrate the application of palaeo-landscape archaeology and geomorphological and archaeo-stratigraphical methods to the detection of changes that occurred in the Messara plain, and especially in the Phaistos area, from the Minoan age onward.

The Project and the Context

Although strictly centered on the study of the settlement near the hills of Christos Effendi and Aïya Photini, our research also included a more far-ranging investigation of the surrounding area as a necessary complement to our understanding of Phaistos and its history of occupation (Fig. 1). The area has already been extensively investigated over more than a hundred years. In particular, the systematic surface investigations conducted from 1984 to 1987

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by the Western Mesara Field Project (WMFP)\textsuperscript{2} directed by Vance Watrous, Hadzi-Vallianou and Blitzer have been especially useful for our research. The WMFP’s investigations covered an area of 22 km\textsuperscript{2}, which did not include the area of Phaistos stricto sensu. The resulting book, in spite of some shortcomings,\textsuperscript{3} is a fundamental starting point for any who would wish to study the ancient landscape of this region. It is thus very useful for our current investigations, whose main although not exclusive purpose is to shed further light on the area south of the hills of Phaistos.

The first stage of our work consisted, on the one hand, in systematically collecting all existing documentation—literary and epigraphic sources, archaeological literature, and archive documents, especially those of the Ephoria—containing topographically accurate records of excavations and finds, on the other, to start drawing up new maps based on an aereophotogrammetric survey of 1994, from which we will extract a Digital Terrain Model (DTM) and the corresponding orthophotograph. A preliminary version of this cartographic work is presented here (Fig. 2). We included in this map all available topographic, archaeological, geological and geophysical information in order to build a georeferenced database. The field archaeological investigation, instead, consisted of a surface survey of the west strip of the plateau, the hill of Christos Effendi, and the area immediately south of the village of Ayios Ioannis, encompassing an overall surface of ca. 34.7 hectares. We excluded from the survey the slopes of the Middle Acropolis and the ‘Palace’, and the plateau at their foot, because they are strewn with rocks and have a very high density of archaeological material, partly slid down from the southern slopes of the hill, where the earth of past excavations was accumulated.\textsuperscript{4}

Limiting ourselves to the Bronze Age, in the present state of our research—we still have not completed our quantitative, typological, functional and chronological study of the materials, and we yet have to relate these data to the parameters of quality and visibility—there appears to be an evident concentration of materials of the Minoan age in the area immediately below the hill of Christos Effendi and the area north of the modern cemetery of Ayios Pavlos. This concentration is especially high in an area not far from the remains of a Protopalatial building brought to light by the Greek antiquities service in the Manousidakis property at the edge of the street leading from the archaeological area to the village of Ayios Ioannis.\textsuperscript{5}

The spatial distribution of the pottery—if this is confirmed by our ongoing systematic study—indirectly points to a rather diffuse occupation of the plateau in the period between AM I and MM II. The structures on the southwest slope of Christos Effendi must have been significant, judging from ongoing studies and especially from a well-visible exposed section (Fig. 2, n. 2) extending for about 30 meters along the Phaistos-Matala road.\textsuperscript{6} All the sherds retrieved in 2010 after an accurate cleaning of the section are datable from the late Prepalatial period through the end of MM IA – with a small but nevertheless significant number of sherds – to MM IA, to which the great majority belong.\textsuperscript{7} Even at a cursory examination, it is clear that these finds are


\textsuperscript{5} On its location, see BREDAKI, LONGO, BENZI et alii (supra n. 1) loose plate, n° 19.

\textsuperscript{6} This section is already reported in WATROUS, HADZI-VALLIANOU and BLITZER (supra n. 2), 277. On its location, see now BREDAKI, LONGO, BENZI et alii (supra n. 1) loose plate, n° 9. A study of the section, conducted by a team of the University of Padua (Prof. A. de Guio) and the “La Sapienza” University in Rome (Prof. A. Greco), will be presented as a separate study. The section is also briefly mentioned in BREDAKI, and LONGO forthcoming (supra n. 1).

\textsuperscript{7} The attested pottery shapes are representative of just about the whole repertoire of early Protopalatial shapes. It includes fine pottery with polychrome or light-on-dark decoration, pottery for more strictly domestic uses such as food consumption or storage, and cooking vessels, most notably three-footed pots. Especially remarkable are some fragments of red plaster and fragments of murex shells, which were widely employed
indirect evidence of the presence here of a building of a certain importance, because they have parallels in materials found inside or near the ‘Palace’. Taramelli recovered materials from the same chronological horizon (Kamares pottery) slightly uphill of the section (Fig. 2, n.1), which he ascribed to one or two buildings. Remains of other structures datable to the Protopalatial period have been brought to light between the slopes of the Middle Acropolis and those of the ‘Palace hill’. These buildings — both those on the southeast slope of Christs Effendi and those south of the Middle Acropolis — apparently stood along a road that may have partially coincided with the old road from Ayios Ioannis to the church of Ayios Georgios in Phalandra. This road evidently went on to the western façade of the ‘Palace’ along an axis that probably ran slightly south of the present access ramp for tourists. Other housing areas were arranged around the ‘Palace hill’ (Ayia Photini, Chalara, Ayios Ioannis as deduced from Levi’s old excavations and from the recent investigations of the Ephoria in the Manousidakis property) and extend right up the hill to the west of Christs Effendi, as suggested by the dispersion of sherds in the surveyed strip east of the Phaistos-Matala road. As we have observed elsewhere, in the present state of the investigation we still have no elements to hypothesize the modes and forms of the occupation of the plateau —clusters? an extensive settlement?— in the Protopalatial period. Our ongoing research would require greater continuity and greater financial resources than those available in the last few years. The decrease of pottery in the Neo-Palatial period seems to indicate a decline in population, at least as regards Christs Effendi hill and the systematically surveyed areas.

The ongoing research of the Italian-Greek survey has been going hand in hand with the study and publication of the old excavation campaigns, which we will now be able to set within a broader territorial context and, above all, to position more precisely on the map.
also need to start some specific studies, notably on the city walls,\textsuperscript{15} the urban organization of the settlement—aerotopographical studies are already beginning to reveal differently oriented sectors from the last phase of the settlement’s life, if not earlier—\textsuperscript{16} and the function of the hill of Christos Effendi, which is a remarkable palimpsest going from the Protopalatial period to Hellenistic and possibly proto-Byzantine times.\textsuperscript{17} 

In the framework of the same project, a new mapping of the ‘Palace’ is under way, to be based on a new aerophotogrammetric survey.\textsuperscript{18} On this new plan, we intend to show—taking care to distinguish the different phases—not only the visible remains, but also no longer extant structures removed in Pernier and Levi’s excavations, especially the superimposed structures in the western square, destroyed in the 1960s,\textsuperscript{19} and structures that have emerged in recent excavations, like the south ramps of the central square, dated to the Protogeometric and Geometric period, east of the paved street that Levi assigned to the Geometric period,\textsuperscript{20} but which La Rosa, after recent excavations (2002), dated to the Hellenistic period.\textsuperscript{21} New maps of the ‘Palace’ phase, especially in the light of La Rosa’s team’s recent reconsideration of the evidence, would help to form a clearer picture of the structures occupying the hill and improve our current understanding of the characteristics of the Pre-, Proto-, Neo- and Post-palatial phases. Notably, they could shed light on the extension and characteristics of the settlement area at the top of the hill from Mycenaean times to the Hellenistic age. The traces of the latter period have been largely erased today, but it must have put a significant stamp on the urban landscape with its houses arranged on the low plateau and up the slopes of the ‘Palace hill’, all the way to its top.\textsuperscript{22} Today all that survives of this Hellenistic settlement at the top of the hill is
house in the upper square (the so-called Prytaneum)\textsuperscript{23}, the vestiges west of the central square, and scarce remains of walls and shafts visible here and there among the rooms of the earlier ‘palatine complex’.

The reconstruction of the historical phases of the settlement we have undertaken will have to take account of the results of our project’s palaeoenvironmental reconstruction of the area, and hence also of the geological and geomorphological analyses we have concomitantly begun to try to shed light—certainly not for deterministic reasons—on the characteristics of the local landscape between the Neolithic and Late Antiquity. This is of course a work in progress, some of whose results we illustrate in the following pages.

**The Geological and Geomorphological Setting**

**The Geology of the studied Area**

The Messara plain lies in the southern sector of Crete Island (Fig. 3a). It is an elongated plain, oriented east/west. It is drained toward the Lybian Sea by the Yerootamos river, which runs between the Psiloritis Mountains to the north and the Asteroussia Mountains to the south (Fig. 3b). The plain is 2 to 5 km wide in its central part, while westward it is first hemmed in by the Phaistos hills and then spills into the alluvial coastal plain of the Timbaki Gulf.

From a geological standpoint, the Messara plain is a west-east oriented tectonic depression (grabren) bordered and intersected by steep faults, embedded between Mesozoic, Miocene and Plio-Quaternary deposits (Fig. 3b). These deposits are mainly constituted by:

- metamorphic rocks (ophiolites, gneiss, shales) and flysch deposits of Mesozoic-Cenozoic age, outcropping only in small areas on high mountain slopes;
- marls and marly limestones, sandy and gravelly deposits of Miocene and Plio-Pleistocene age, outcropping mainly along the borders of the basin and in the Phaistos hills;
- alluvial, fluvial, marshy, scree and marine deposits of the Pleistocene and Holocene, constituted by an alternation of loose gravels, sands and clays.

These last deposits constitute the greater part of the infilling of the Messara plain. Here, sequences of alluvial deposits alternate with riverine marshy deposits as well as buried soils usually containing substantial archaeological evidence ranging in date from Minoan to modern.\textsuperscript{24} In the final stretch of the alluvial-coastal plain of the Yerootamos river, the alluvial successions lie at the top of coastal marine deposits of the last transgressive cycle of the sea level, which reached its peak about 6000 years ago,\textsuperscript{25} and partially in heterotopia towards the sea with transitional deposits (marine, dunal, lagoonal) of the subsequent progradational phase of the coastline.

Along the sides of the valley, at the foot of the hills of Phaistos and of the Psiloritis and Asteroussia mountains, the alluvial succession show heterotopic relationships with the deposits of the foothill aggradation strip, whose formation was certainly favored by tectonic activity along the bordering slopes and Holocene climatic variations, as well as manmade land-use changes.

**Geomorphological Setting**

The heterogeneity of the outcropping rocks and sediments is the result of the coexistence of arguments about the visibility of the Minoan ruins in historical times; see, most recently, N. CUCUZZA 2012 (supra n. 14).\textsuperscript{23} Cf. LA ROSA and PORTALE (supra n. 14), 269 (with further bibliography), fig. 65 and plate V.


of several different morpho-stratigraphical units, each with its distinctive morpho-dynamical process (erosional and/or depositional). These units have been active during the Holocene, and have thus been affected by human activities in the area.

The main morpho-stratigraphical units of the Messara are shown in Figure 4. They include:

**Hilltops**

Planar palaeo-surfaces at the top of the Messara hills. These are formed of small to large flat areas bordered by steep and gentle slopes. They evolved from the interplay between Late Quaternary tectonics and climatic changes, along with man-induced land changes beginning in the Holocene. The main active processes are erosion and, locally, eluvio-colluvional deposition. The width of the hilltops was reduced, mainly from the Minoan age onward. In this sector of the Messara landscape, archaeological traces are more superficial. Whenever present, archaeological materials are found in situ where they were deposited, or were carried only for short distances. On most hilltops and on upper slopes, soil is practically absent, the rock of the Cenozoic and Quaternary substratum having been exposed by erosive processes that may have made it impossible to ever find archaeological materials here.

**Aggradation**

Many of the slopes of the hills of the Messara plain are structural slopes evolved by recession starting from a fault scarp. At their base are the broad deposition zones of alluvial fans, rock-falls and debris cones, formed as a result of Late Quaternary climatic changes and man-induced land changes in the Holocene. We mainly recognized depositional and reworking processes. Thick aggradational successions surface on the lower slopes, indicating that over the last few thousand years deposition has been polyphasic, as the deposits are generally very rich in datable archaeological evidence and alternate with multiple buried soils. In this morphostratigraphic unit, archaeological vestiges are usually buried, whereas the presence of surface archaeological material could indicate tampering with the upper slopes.

**The alluvial plain**

Two orders of alluvial terraces are present, formed by the fluvial morphodynamical changes resulting from climatic changes, land-use changes and tectonics, and correlated to the two Holocene aggradation periods. One contains mainly Minoan remains, the other mainly remains from the Classical period onward. The stratigraphic sequences of the alluvial terraces show at least two periods of higher aggradation of the valley during the Holocene: one containing mainly Minoan remains, and another mainly containing remains from the classical period onward. In this sector, archaeological traces are buried or eroded, and the presence of surface archaeological material may indicate that it was carried along the river valley or slid down from the valley slopes. Photointerpretation of the larger sector of the valley, east of the hill of Phaistos, revealed several ancient riverbeds, traces of the shifting of the course of the Yeropotamos river and of some of its tributaries. They are quite well preserved and could hence be rather recent.

**The coastal alluvial plain**

Three generations of sandy dunal barriers, partially covered and interfingering with riverine marshy deposits, are observable in the coastal alluvial plain of the Yeropotamos River. The Holocene evolution was due to the interplay between rising sea levels and tectonics. The coastal alluvial plain shows a transgressive trend for the first part of the Holocene (10-6 ka BP) followed by a progradational trend (barrier-lagoon system) (6 ka BP-present). During the transgressive phase, it is possible that the shoreline was very close to the Phaistos hills.

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27 FYTROLAKI, PETEREK and SCHRODER (supra n° 24); PETEREK and SCHWARZE (supra n° 24).
28 FYTROLAKI, PETEREK and SCHRODER (supra n° 24); PETEREK and SCHWARZE (supra n° 24).
29 FYTROLAKI, PETEREK and SCHRODER (supra n° 24).
Palaeoenvironmental Investigations: Methods employed and some Preliminary Results

Geological and Geomorphological Methods

This initial phase of our study will attempt to reconstruct landscape-change dynamics in the Messara plain as related to its ancient peopling. Our investigation relies on surface surveys, traditional documentary sources (literary sources, maps, historical aerial photographs), photogrammetric maps, and satellite images. We have used remotes sensing and historical maps, especially of the more recent historical phases, to document in detail the transformation of the palaeoenvironment and the agrarian landscape, and the landscape’s structural evolution from ancient times to the present day. We have compared our remote-sensed data with archaeological and topographical data from stratigraphic excavations, and with geoarcheological and palaeoenvironmental data.

The main geological characteristics of the pre-Quaternary depositional outcropping in and around the Messara plain are recorded in the Geological Map of Greece,30 while the Upper Pleistocene and Holocene deposits are illustrated in several studies.31 In the Phaistos area, these data are supported by detailed geological field work (at a 1:10.000 scale) and by seven new boreholes drilled into the Grya Saita tectonic depression. Our geomorphological study, using a topographic map and aerial photos at different scales, and detailed field surveying, followed two different approaches. The aim of the first was to identify the main morpho-stratigraphical units of the Messara plain. The second focused on the territory of Phaistos, with the aim of identifying the main physiographical characteristics of its palaeolandforms in relation to the extension and layouts of the settlements that succeeded one another from the Minoan age onward.

Remote Sensing

The examination of aerial photographs documenting remarkable environmental change in the Western Messara from the 1940s onward have contributed significantly to our geomorphological and palaeoenvironmental investigations. Our study of the photograms of 1945, besides highlighting the permanence of ancient features in the contemporary landscape, has revealed some hitherto overlooked morphological and palaeohydrographical aspects.32 Notably, photograph no. 128 of 1945 shows that the area south of the plateau where Phaistos lies, although densely cultivated, went through progressive stages of waterlogging. This is clearly visible in all aerial coverages, until the images of 1987, where the first significant land reclaiming works can be made out. The marshy habitat clearly visible in the images of 1945 seems to be dominated by the Yerootamos river and even more by its tributary, the Grya Saita. Photointerpretation shows that in ancient times these two rivers followed different courses than today. In the photograph of 1945, for example, one notices a broad and extensive linear anomaly south of the present course of the Yeropotamos river. The trace visible in the image, which runs parallels to the river for long stretches, is largely constituted of damp and crop marks, and soil-sites. There are also traces of shadow sites and survivals (Fig. 7).

Our study partially relied on automatic interpretation routines to enhance the results of traditional photointerpretation. Automatic routines allow standardization of analysis and the use of quantitative controls to check the accuracy of results. Pattern recognition tries to emulate a process typical of the human mind. It singles out systems for the automatic recognition of objects among remote-sensed data and assigns them to the same class on the basis of similarity or association. In our case, we applied both supervised and unsupervised classification to the 1945 photographs. Supervised classification singled out some specific types of spectral classes, related to land use and to the definition of representative pixels for each type of information.

31 FYTROLAKI, PETEREK and SCHRODER (supra n° 24); PETEREK and SCHWARZE (supra n° 24).
32 Part of the present study will be published in A. ROSSI forthcoming (supra n° 1); cf. also A. ROSSI in BREDAKI, LONGO, BENZI et alii (supra n° 1).
class (humidity, vegetation, anthropic activity). In unsupervised classification, classes were not manually defined beforehand. We used an automatic routine to analyze the data and subdivide them into the most common spectral clusters. The use of these two different image classification systems—the study was conducted on a panchromatic historical image—allowed us to check the reliability of the information deduced from traditional photointerpretation (Fig. 8). We supplemented this image-processing study with a three-dimensional analysis of aerial images and a comparison between sections generated on a DEM model of multi-spectral SRTM images. These investigations seem to confirm the presence of a fossil riverbed with broad overflow areas and swamps, especially in the area south of Ayios Ioannis. The morphological sections, in particular, show the presence of this riverbed between the present courses of the Grya Saita and Yeropotamos. After descending along the valley to Moires, the paleo-riverbed is incorporated by the current land-reclaiming canal of the Grya Saita near Chalara, southeast of the Phaistos ‘Palace’. From here it then runs into the Yeropotamos. In the present state of our research, we cannot accurately date this ancient river. We can only note that between Moires and the ‘Palace hill’ the current course of the Yeropotamos appears to cut through farming plots visible in the 1945 photographs. Thus, at this stage of our research the only hypothesis we can put forward is that the riverbed shifted, probably in a comparatively recent period, due to causes yet unknown.

Core Sampling

Seven boreholes up to a maximum depth of 8.40 m have been drilled at the foothill of Ancient Phaistos (Fig. 2: C1-C7). They are currently under study at CEREGE as evidence of paleoenvironmental changes in this sector over the last few thousand years. Laboratory analyses included sedimentology (LASER grain size distribution and loss on ignition), palaeontology (diatoms) and vegetation history (pollen analyses). Grain-size distribution was measured with a Beckman Coulter LS 13 320 laser granulometer with a range of 0.04 to 2000 microns, in 132 fractions. The calculation model (software version 5.01) was based on Fraunhöfer and Mie theory. For the calculation model, we used water as the medium (RI = 1.33 at 20°C), a refractive index in the range of that of kaolinite for the solid phase (RI = 1.56), and absorption coefficients of 0.15 for the 780-nm laser wavelength and 0.2 for the polarized wavelengths (Buurman et al., 1996). Samples containing fine particles were diluted, so that we measured between 8 and 12% of obscuration and between 45 and 70% PIDS (Polarization Intensity Differential Scattering) obscuration. Magnetic susceptibility measurements were performed using the MFK1 magnetic susceptibility meter (Agico) of the CEREGE (Aix en Provence, France). The sediment cores were sampled (at ~ 5 cm resolution, except in levels including reworked material), yielding 70 samples in total. These samples were placed in 10 cm3 plastic boxes, dried, and weighed. In addition to low-field magnetic susceptibility, usually measured at a 976 Hz frequency, measurements were taken at a 15616 Hz frequency. The sensitivity of the MFK1 susceptibility meter is ~3 x10⁻⁸ SI at 976 Hz. In addition, we will be able to provide a solid chronostratigraphy based on 15 radiocarbon dates from organic matter and charcoal sampled in the different facies.

Preliminary results indicate that the lowlands of Messara plain, in the vicinity of ancient Phaistos, were affected by rapid landscape changes along the recent Holocene, where fluvial dynamics alternate with freshwater lake depositional environments from Minoan Times onward. Until now, there is no evidence for a marine occupation. Only the lowermost part of the boreholes record typical features of calm deposition environment where clays are predominant. These fine particles contain different types of bio-indicators such as pollens and diatoms that can help to reconstruct both the facies and vegetation history of the Messara area. The recent diatoms determination seems to indicate that we had a strong fluctuation of the water body from Minoan times onward where mainly freshwater species were found.

33 The farm plots east of Moires have the same orientation as those east of Ayios Ioannis. This suggests that the current layout of the farmland is the result of a comprehensive plan encompassing the whole Messara plain.
Pollens are rare due to the high proportion of carbonate rocks found within the Yeropotamos drainage basin and just one peat layer, found 6.20 m deep in all boreholes, contained sufficient samples for accurate reconstruction. Radiocarbon dating performed on this layer will help to precisely reconstruct the vegetation in the area. Overlying the freshwater environments, layers composed by coarse material (pebbles, gravels and sands) alternate with thin silty clay sections. This helps to identify fluvial dynamics later than Minoan times and probably influenced by human action (dredging, reclamation of the swampy plain for agricultural purposes). The dating (radiocarbon method) of the different facies is under progress and results should help to precisely date each environment.

**Landscape Reconstruction: Preliminary Results**

We adopted a detailed integrated geomorphological and archaeological approach for our study of the Phaistos settlement area (Fig. 5).

The settlement area of Phaistos prevalently extends over the tops of Christos Effendi, Acropolis and 'Palace Hills', and over part of their south and southeast slopes. The south slopes of these hills evolved by recession and substitution, and hence have a concave-convex profile, with a higher and steeper part where erosive phenomena have prevailed and accumulations are only local, and a less acclivitous part with a prevalence of detritic-colluvial layers. The latter are extremely rich in archaeological material, both on the surface and underground. This sector connects to a level sector in the depression of the Grya Saita through a ca. 1 to 5 m drop in height. The depression has a flat central surface where one can clearly see a recently built drainage system laid out in a nearly geometric and orthogonal grid. One also notices traces of shifting riverbeds, indicating that until fairly recent times the environmental conditions of the depression were riverine marshy. The depression hemmed in by slopes that clearly mark it out, can be interpreted as a graben (or semigraben). It may have been affected by subsidence during the Holocene and may thus have had a lacustrine marshy habitat at times when subsidence was fastest and/or in climate periods that were generally more humid than the present one. Palaeoenvironmental and geochronological studies of some layers sampled in the stratigraphies we drilled into have allowed us to form a more detailed picture of the sequence of flooding, marshification and drainage of the graben. The southeast, northeast and north slopes of the hills of Phaistos are very steep, having evolved by recession from fault scarps, and displaying very little substitution. The foothill aggradation strip is generally narrow, having been eroded by the Yeropotamos and Grya Saita rivers. The lower slope bordering the depression of the Grya Saita connects to the plain with an arched bulge delimited by a significant drop in height. Since this drop cuts into a thick footslope sequence containing archaeological materials from Minoan to Hellenistic times, it must been formed by post-Hellenistic fluvial erosion.

A more in-depth geomorphological analysis should reveal present-day landscape formations that could conceal or derive from ancient landscape features that may have influenced the layout and extension of the settlements that succeeded one another in the Phaistos area.

In the west and southwest sectors of the south slopes of the hills of Phaistos, we identified some anomalies due to water flows (paleochannels?). These are visible in our geomorphological map, and as damp marks in aerial photographs. In our field survey, we only noticed slight depressions in the ground, probably due to the radical manmade transformations of the last few years. One of the paleochannels emerges from the saddle between the Christos Effendi hill and the hill west of it. It runs across the foothill aggradation strip, where at least two sinuous paleochannels can be recognized. These paleochannels converge and flow together into the depression of the Grya Saita.

The current landscape still preserves ancient morphologies (Fig. 6), mainly linked by fluvial and fluvio-denudational processes, such as those identified in the west sector, with two riverbed traces flowing within the tectonic depression of the Grya Saita.

These landscape boundaries may have been influenced by the expansion of the Minoan and historical settlements. Indeed, the western walled enclosure of the historical town—whose
presence here we had already hypothesized after our archaeological survey, remote sensing campaign, and geophysical prospection—was excavated from under ca. 50-cm-thick colluvial deposits of sandy silts, a few dozen meters east of the fluvial traces.

Fluvial terrace rims are recognizable close to the Ayios Ioannis village, 1-1.5 m above the fluvial-marshy depression of the Grya Saita river in the sud and sud-east sector of the Phaistos area. The one immediately south of Ayios Ioannis has an almost rectilinear profile, whereas the one to the southeast has a semicircular profile arching towards the Grya Saita plain, and must hence be later than the first. These terrace rims could have influenced the south-south-east boundary of the Minoan and historical settlements, as surface archaeological investigations have borne out.

The conformation of this terrace rim may have been influenced by the south-south-east boundary of the Minoan and historical settlements.

These two paleolandscape features, along with the very steep north and northeast hill slopes, formed a rectangle enclosing the Archaic-Classical and Hellenistic settlements, and very probably also influenced the layout of the Minoan settlement (Fig. 6).

As to the areas mainly affected by erosional processes, these lie at the top of the hills and on their steeper slopes.

On the north-northeast steep slope, such areas can be interpreted as fault-line scarps affected by rapid morphodynamics contributing to fast slope recession. Slope recession must have already been in progress in the Minoan age, on the evidence of several paving stones of the square in the Phaistos 'Palace' area found at the foot of the slope. This suggests that the top of the erosional glacis, where the Phaistos 'Palace' stood, used to be wider and was reduced during the last few thousand years. The several earthquakes that have impacted the Messara plain since the Minoan age may have influenced this slope recession, judging from the rock strata of the Phaistos hill, which are tilted and dissected by coseismal faults.

Several such faults can be recognized in the Phaistos area (Fig. 5). They usually have northeast-southwest or northwest-southeast orientations. Some of them have been active since the Minoan age, as shown by Monaco and Tortorici in their study of the effects of the Minoan earthquake at Phaistos, and by Galli and Galadini in their study of the effects of seismicity at the settlement of Chalara in late antiquity. The impact of twentieth-century seismic activity on the buildings of the Ayios Ioannis village are further proof that the main cause of changes in the Messara plain is the tectonic.

The sectors affected primarily by depositional processes and secondarily by reworking of Holocene deposits extend between the foot of the hill slopes and the more depressed sectors of the Grya Saita. Here there is a prevalence of alluvial, colluvial and scree deposition frequently containing archaeological strata and remains.

Several phases of scree deposition and reworking of ancient colluvial deposits cover the foot of the south-south-east slope. Two main generations of aggradation are recognizable within the Chalara archaeological excavations: an older fill containing mainly Minoan remains, and a younger fill covering the Chalara settlement. An interesting geo-archaeological cross-section, outcropping in the high part of the foothill area of the Christos Effendi Hill, was studied in detail in order to determine whether the hill was inhabited during the Minoan age (recent research seems indeed to confirm this hypothesis). The stratigraphy shows an alternation of colluvial deposits and erosional phases interacting with several phases of manmade slope terracing. The preliminary chrono-stratigraphical data confirm that this rapid morphodynamics (depositional/erosional) was especially intense during the Minoan age, probably as an effect of land-use changes and climatic variations impacting a hill constituted by an alternation of loose clayey marls and lithic marl layers.

34 V. AMATO, in BREADAKI, LONGO, BENZI et alii (supra n° 1).
37 V. AMATO, in BREADAKI, LONGO, BENZI et alii (supra n° 1).
The upper part of the slope of the ‘Palace’ hill also went through several phases of colluvial deposition, which covered the Minoan structures. In the distal part of the foothill area between the Christos Effendi hill and the Grya Saita depression, the aggradation was mainly due to archaeological depositional processes and the subsequent reworking of the deposits, as is frequently observable on the ground surface of this sector, bearing witness to intense and long-term occupation.

Another sector showing strong aggradation during historical times is the tectonic depression of Grya Saita. Our geomorphological study and preliminary stratigraphic considerations suggest that the Grya Saita depression is a structural sunken zone, with lacustrine marshy and riverine marshy habitats during the Holocene. This because it appears as a concave-bottomed basin that does not drain towards the sea, but only artificially towards the Yeropotamos river. There may very well have been an aquiferous basin here in Minoan times, and this may have been used as a natural water reserve, as we have already suggested in previous works.38 The results of our paleoenvironmental analyses of the core samples taken in the more depressed sectors of the Grya Saita conch will allow us to shed further light on the environmental evolution of this sector and the causes for the extinction of this lake basin, which may have been tectonic, climatic and/or anthropic.

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38 V. AMATO, in BREDAKI, LONGO, BENZI et alii (supra n° 1).
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Fig. 2 Archaeological Map of Phaistos (processing by M. Fabris, F. Longo, A. Rossi).

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Fig. Messara plain. Photointerpretation of the aerial photograph of 1945 (photograph. 129 at the average scale of 1:42,000) (processing by A. Rossi).

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