Archaeology of former and historical urban landscapes in the Mediterranean world: current trends and future perspectives

Università degli Studi di Napoli Federico II | Centro Interdipartimentale di Studi per la Magna Grecia

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Temi, contesti, materiali

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Naus Editoria
2021

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Archeologie. Temi, contesti, materiali
Collana del Centro Interdipartimentale di Studi per la Magna Grecia
Università degli Studi di Napoli Federico II

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www.naus-editoria.it

ISBN 978-88-7478-059-4

Progetto grafico
Naus Editoria

Indice

Gert-Jan Burgers, Luigi Cicala,
Gervasio Illiano

Introduction

In cities worldwide, urban expansion and renewal are increasingly accompanied by archaeological research. The massive presence of archaeological layers in many historical city centres, previously rather considered as an obstacle to urban growth, is now commonly perceived as an added value and a potential asset for development. The present book analyses the pitfalls and opportunities of this phenomenon, as well as the methods and procedures employed in the various steps involved, from data acquisition, documentation and storage to the integration of these data in heritage policies, urban planning and design. The book is the outcome of a 2 days' workshop, held at VU University Amsterdam on October 16 and 17, 2019 and organized by the VU University interfaculty research institute CLUE+ and the Humanities department (Dipartimento di StudiUmanistici) of the University of Naples "Federico II", in cooperation with Herity International. Following the workshop the book is divided into three sections, each focusing on a specific theme:

(1) Documenting archaeology. In this section attention is focused on the problem of data recovery and documentation in urbanized areas. The contributions discuss advanced approaches to archaeological excavation, survey, remote sensing and other methods in highly stratified and low visibility contexts.

(2) Data storage. This section investigates the complex task of storing archaeological data in modern cities. The different methods of archaeological investigation, from remote sensing to cartography, produce a multi-faceted set of data, requiring dynamic archives and databases. The section highlights innovative methods that allow the integration of different types of information and that facilitate the stage of data interpretation.

(3) Archaeology, heritage and urban planning. This section is dedicated to the integration of archaeology into urban planning and design strategies. Planners and policy makers are increasingly approaching archaeology, and more generally cultural heritage, as social, cultural or economic capital, with which to build sustainable future cities. In this section a series of case studies will be presented, to be accompanied by a discussion of the pros and contras of this development.

The focus of this book is on European cities. The

various case studies that will be discussed range from metropolitan areas to minor towns, and include amongst others Amsterdam, Athens, Patras, Rome, Siena, Newcastle and York. In the next paper in this volume, these studies will be framed in the context of the innovations in the relationship between archaeology and the city, as they have unfolded globally during the last decades. As a matter of fact, in many ways, these cases may be seen as exemplary for cities worldwide.

Bringing them together under one umbrella, we have aimed to make a significant contribution to the recent innovations in urban archaeology that are at the heart of this volume.

Stefano Campana

Archaeology of former and historical urban landscapes in the Mediterranean world: current trends and future perspectives

Abstract

The present contribution discusses archaeological survey, drawing attention to the gap between the development and implementation or archaeological research within former townscapes as compared with historical urban landscapes in the Mediterranean area. The first part of the discussion summarises the development of landscape studies and survey methods during the last century, critically highlighting the outcomes and limitations of past experiences. The paper then presents some results of the Emptyscapes Project based on two urban areas, at Veii and Rusellae in Italy. Among the first outcomes of the project we have made it possible to challenge past landscape and theoretical paradigms, moving towards a more complex and comprehensive understanding of ancient urban layout including transformations across time and the blurring of boundaries between urban and rural environments. Finally, the paper introduces a new research project named SOS which is aimed, to a certain extent, to build upon the experience developed in previous survey work in urban and formerly urban areas and within historical towns, with particular regard to a case study in Siena.

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1. Archaeology of former townscapes in the Mediterranean

Urbanized societies have been characteristic of most of the Mediterranean region from at least the later part of the fourth millennium BC in the Levant, from around 2000 BC in the Aegean and for the last two and a half millennia in the rest of the Mediterranean area. In Roman times there were as many as 430 known urban centres dotted across the whole of the Italian Peninsula, along with thousands of cities scattered elsewhere throughout the Empire.

Nowadays, from a slightly reductive point of view, it is possible to identify two contrasting types of urban setting. Firstly, there are cities that have been long abandoned and which are now defined by such terms as 'former urban areas' or 'one-time townscapes. Secondly there are cities that have been continuously occupied and which have become major centres of population in the present day ('historical urban landscapes'). Moreover, within the category of abandoned urban areas it is possible to recognize two different major types: now completely buried and invisible town and cities, in contrast to those still presenting clear evidence of standing structures. By virtue of their historical and monumental importance, combined with their artistic value and easy accessibility, the visible but ruined remains of ancient structures around the Mediterranean have always attracted fascination and study.

By contrast there are sites and landscape features outside the ancient monumental urban centres, most of them now completely buried and therefore invisible to the naked eye (including, at least in part, former townscapes lacking visible monumental remains); these have been investigated less frequently, leaving the overall structure and content of large tracts of the countryside, for many chronological periods, more or less unknown.

Following WWII a fresh interest in landscape studies developed in the Mediterranean area. It is possible to identify several reasons; however, one of the first purposes of landscape survey projects was the desire to place excavated urban sites in the context of their rural settings[1].

Some decades earlier a highly influential role in landscape archaeology had been played in Greece

[1] Bintliff, Snodgrass 1988.

and around the Mediterranean more generally by the *Messenia Expedition* of the University of Minnesota. This project was particularly interesting because of its pioneering in the late 1930s of attempts to resolve problems in the Homeric geography of the south-western Peloponnese[2]. Over time this line of research developed into a more general search for Mycenaean sites, then for sites of all periods from the Neolithic to the Middle Ages[3].

In the western Mediterranean in the post-war years a major stimulus, and a key role in Italy as a whole, was played by John Ward-Perkins and the British School at Rome, carrying out over the course of two decades between the 1950s and the 1970s a systematic survey of Southern Etruria with the aim of exploring and understanding the past landscape of the area through the discovery, documentation and interpretation of surface artefact scatters. *The Southern Etruria Survey* was particularly notable in that the work involved the systematic survey of landscape areas that showed no distinction between the cities themselves and their surrounding countryside - for example the work undertken in the 'vanished' city of *Veii* and its rural surroundings by Ward-Perkins when he was Director of the British School[4].

From the 1970s a new generation of increasingly intensive work brought about striking achievements in rural areas, refining the methods used but, in some senses, carrying out the work 'in isolation' from the urban contexts that lay at their core. These so-called 'New Wave' surveys marked a break with the pioneering projects of earlier years that had been based for the most part on identifying the largest urban and sub-urban settlements through 'intuitive' search procedures. Now the focus moved to the introduction of new methodological approaches to enhance the scope and reliability of the resulting information, especially as regards the open countryside[5]. This new phase of archaeological exploration, based almost exclusively on field-walking survey, played a leading role over virtually all of the Mediterranean area, invigorated by a keen attention to methodological approaches that sought to improve the reliability of the collected data while inevitably reducing the size of the landscape blocks that could be incorporated within the survey work[6].

Between the mid 1970s and end of 1990s this new wave of intensive survey work spread throughout the whole of the Mediterranean area, with particularly important projects in Greece and Italy but also, somewhat later, in Spain and France[7]. On the other hand, the southern flank of the Mediterranean Basin, as well as parts of the Levant, followed a rather different approach based on the compilation of inventories and catalogues of sites and monuments[8].

A peculiarity, or better perhaps a paradox, of this new phase of survey work has been pinpointed in a key paper on *Mediterranean survey and the city*, published in Antiquity by John Bintliff and Anthony Snodgrass[9]. The authors argued that field-walking survey as practiced at that time in a number of Mediterranean countries - involving intensive, multi-period investigations closely associated with rural landscapes and the rural sector of the economy. They pointed out that a clear gap had developed between urban research, mainly conducted through archaeological excavation, as against study of the rural landscape through intensive survey work. In practice the contextualization of urban areas had from the outset been one of the major aims of regional survey; indeed, without including these urban areas the picture of the rural landscape remains in many senses incomplete. In that context, this schism between the methodologies employed in urban as against rural areas, along with the progressive contraction in the size of the chosen study area, made comparison of the collected information from the two different environments problematic and its overall interpretation extremely difficult. As a result, new means had to be found for collecting and then reconciling the results from a variety of urban areas (former-townscapes and historical urban landscapes) by integrating the results from the urban areas with those from the open countryside.

The upshot was that from the late 1970s or early 1980s a number of archaeologists who were prom-

[2] McDonald 1942.
[3] Cherry 2003.
[4] Ward-Perkins 1961.
[5] Bintliff 2000.
[6] Terrenato 2004.
[7] Macready, Thompson 1985.
[8] Cherry 2003.
[9] Bintliff, Snodgrass 1988.

inent in the development of survey methods adapted to the rural context turned their attention, quite independently of one another, to applying those 'rural' methods of investigation in once-urban areas as well. After about two decades of intensive survey work of this kind, a series of unresolved problems and limitations began to attract attention and debate in the archaeological literature[10]. By the end of the 1990s leading experts in the field of landscape archaeology had begun to highlight some of these limitations, focusing their attention on basic improvements that they felt ought to be implemented in the following years. In summary, among the major limitations, most of the writers subscribed to the general idea that field-walking survey and surface collection were affected by inherent problems which could only be reduced or partially resolved by integrating them with other survey methods. Particular hopes in this respect fell on non-destructive techniques such as remote sensing, geophysical prospection and geochemical studies[11]. Moreover, the ever-increasing role of computer and spatial technology, in particular GIS and GPS, was considered crucial within the sphere of landscape research. The improvements that they could make to data collection, analysis, synthesis and presentation were considered almost from the beginning as much more than new tools but rather as an opportunity to bring the archaeology of surface collection and observation to a qualitatively higher level[12].

Around the turn of the millennium impatience with this situation, combined with discussion within the academic community about possible new approaches, was matched by a general improvement within the hard sciences. Among other influences, geophysical prospection played a central role. The efficacy of this technique improved dramatically in the 1990s but the authentic revolution has only materialised in the last few years with the application of very large-scale geophysical prospection in both landscape and once-urban contexts. In this context Simon Keay, Martin Millett and Frank Vermeulen, among others, played a primary role within the Mediterranean area.

As a consequence, there has been a significant upsurge in the use of non-destructive survey, notably in the formerly urban context of 'vanished' historical towns. From the very first years of their application it became clear that the opportunities and potential gains offered by these new techniques and instrumentation were enormous. Large and complex once-urban sites, previously studied for their monumental importance and historical or artistic value through field-walking survey, surface collection and exploratory or targeted excavation, could now be studied in the first instance through geophysical prospection, sometimes revealing the entire plan of the town before any intrusive method of investigation was put in hand. This was a truly significant transformation, allowing archaeologists to address specific questions in a way that had not been possible previously. Unsurprisingly, important improvement in the understanding of urbanism followed many of these survey projects. In particular understanding of urbanism in the Roman Empire benefitted hugely from the integration of remote sensing methodologies in partnership with GIS-based archaeological mapping and of course field-walking survey, artefact-collection and excavation. An important contribution was also made in a variety of cases by aerial photography, both from targeted exploratory flights and through the analysis of 'historical' photographs already available in regional and national archives[13]. The combined application of these essentially non-destructive techniques has greatly enhanced our knowledge of the scale, structure and chronology of specific buildings and the overall infrastructure within formerly urban contexts, allowing us to look at the wider phenomenon of urbanism from a valid and comparative viewpoint[14].

It would be worthwhile at this point to provide a general overview of the incidence of large-scale geophysical surveys on urban contexts, as implemented so far within the Mediterranean area and other parts of Europe. The summary presented in fig.1 has been compiled through a systematic scanning of relevant national and international journals and publications in the fields of archaeological prospection, urbanism and topographic studies, the author's own work on this aspect being aided

[10] Alcock, Cherry 2004; Papadopoulos, Leventhal 2003; Bintliff *et alii* 2000; Francovich, Patterson 2000.
[11] Keay *et alii* 2005.
[12] Gillings 2000; Cherry 2003.
[13] Musson *et alii* 2013.
[14] Vermeulen *et alii* 2012.

and enriched by generous assistance from colleagues throughout Europe and in the United States. The map does not, of course, claim to be a comprehensive representation of the full geographical spread of survey-based research in urban studies. No doubt there are omissions, in some cases perhaps important ones, but the picture is probably a fair representation of the current state of affairs as it stood towards the end of 2015. Even a cursory glance at the figure leaves one clear impression of the diffusion all around the Mediterranean Sea of the application of this approach.

The next two sections will focus on two particularly informative case studies, at *Veii* (in the province of Rome) and at *Rusellae* (near the present-day town of Grosseto). The results from these two contrasting contexts show very clearly the huge potential of this approach in obtaining a better understanding of both urban and suburban areas. Nevertheless it is particularly important to emphasize that both areas had been intensively studied for several decades before inception of the recent survey work. A second point is that these two contexts are particularly representative in a number of ways - at *Veii* in the sense that we are dealing with the almost invisible remains of one of the largest Etruscan cities, deeply stratified and in a continuous state of development across almost 15 centuries while *Rusellae* falls into the category of an abandoned city which by virtue of its still-visible ruins had already attracted the attention of scholars from as early as the second part of the 18th century AD. *Rusellae*, too, is deeply stratified by virtue of its development across almost 2000 years from the 1st millennium BC to the early centuries of the 2nd millennium AD. In the 20th century in particular it was the scene of many excavation projects. The more recent work has concentrated, by contrast, on the surrounding countryside, revealing major structures and infrastructure elements of enormous importance for our understanding of development and transformation in the city and its surroundings over a significant period of time.

1. 1. Completely buried former townscapes: *Veii*

The city of *Veii*, situated about 15 km N of Rome, occupied what is now a broad plateau of gently rolling countryside about 190 ha in extent. The best way to introduce *Veii* to any reader is perhaps to quote from the introduction by Christopher Smith to the volume dedicated by scholars of the British School at Rome to a reconsideration of the survey work conducted by John Ward-Perkins in the 1950s: "To understand *Veii* is in part to understand both what Rome might have been, had history not favoured her rise to power, and to understand better what made Rome the success she was, for in many respects *Veii* is Rome through a sort of looking glass. In their early history there were more similarities than differences between the two settlements, and *Veii* was more like Rome than she was like other Etruscan cities."[15].

Veii also occupies a privileged position in the history of archaeology itself. Investigation within the city really began with the work of a number of distinguished scholars from the second quarter of the 19th century onwards[16]. However, in the spring of 2009, the author and his team were invited by Prof. Guaitoli (University of Salento) and the CNR to undertake trials in the application of magnetic surveying within the area once occupied by the ancient city. The first results demonstrated the high potential of this technique at *Veii*, and it was therefore decided to extend the survey to cover the whole of the plateau once occupied by the city, eventually amassing almost 170 ha of magnetic measurements between the spring of 2011 and the winter of 2016. At the beginning of this work the aims and underpinning archaeological questions were set out as follows:

1. Although a very substantial amount of information has been collected in the last two centuries and a wide range of methodologies have been employed, the plateau of *Veii* still presents large areas where apparently no information is as yet available. It was expected that better information from these gaps may provide a better understanding of the transformation of the city across time and a better appreciation of post-depositional processes.

2. Magnetic survey - preferably integrated in specific areas by electrical resistance tomography (ETR) and/or ground penetrating radar (GPR) - may provide a detailed layout, or layouts, of *Veii* across the Iron Age, Etruscan and Roman periods, making

[15] Smith 2012.
[16] Campana 2018.

it possible to contextualize, integrate and combine this new information with that collected in the past, and thereby to substantially improve our understanding of the topography or the city, better defining its limits, its fortification structures, the location of its gateways, the length and orientation of its streets and the differentiation between built-up and open areas etc.

3. In some cases it is expected that there will be opportunities to go beyond the concept of 'wall-following' and, in addition, to begin analysing economic and social patterns within transformations of the urban layout and the expansion and contraction in the topography of economic activity: workshop areas, the religious centre, public areas, agricultural activity and stock areas, etc.

4. The implementation of this new approach and array of survey methods may make it possible to identify unexpected features that will shed new light on chronological phases that, on the basis of current evidence, appear to be 'empty'; for instance in the case of *Veii*, there is at present no evidence of Bronze Age or earlier cultural material having been found.

As noted above the survey work eventually collected a total of 169.7 ha of magnetic measurements within the plateau area. The interpretation work is still ongoing but has been based up to this stage on the identification of 1558 archaeological and other features. Figure 2 shows quite clearly the complexity and scale of the information provided by the magnetic data. The extraordinary density of the information makes it at first glance somewhat daunting. To achieve a good understanding of such a highly stratified context requires a strictly systematic approach and above all a well-defined starting point. The first step in the interpretation process was therefore the identification of the features that could be considered relatively stable across the long time span of the settlement activity.

Building on previous experience it was decided to start by identifying the urban road system and in particular the two main axes of communication, one running from NW to SE and the other from W to E, both suggested by previous studies to have been developed in the first instance during the Iron Age[17]. It can be seen on the magnetic map, and on the graphical representation of the features in Figures 1 and 2, that the main axes present clear evidence of what we have called 'arterial roads', in one case crossing the plateau from a gate at the NW to another at the SE, and in the other case from an access point at the W to another at the E. Likewise, it is easy to recognize a fairly regular pattern of linear features that start from the arterial roads and run for the most part in straight lines to cover most of the plateau with what have been designated as 'collector road'. In addition, it has in places also been possible to identify features connecting two or more collector roads, hence their classification as 'sub-collector roads'. Overall, the *Veii* road system fairly closely reflects the physiography of the landscape. It also indicates the high level of sophistication in the layout of the city; this can be seen as the result of a long-term process of gradual development that nonetheless preserved a strong consistency across the long history of the urban centre.

From visual analysis of the features it seems possible to recognise a single basic pattern which, in terms of its finer detail, probably developed gradually over a considerable length of time. Only a limited number of discontinuities within the general pattern have been detected up to now. A reasonable hypothesis is that the main axes took on their shape during a first occupation sometime between the end of the late Bronze Age and the beginning of the Iron Age, the period for which the first artefactual evidence is available[18]. The overlay of the field-walking data and magnetic map makes it probable that by the end of the Archaic period the road system, including collector and even sub-collector roads, had already been fully developed. Indeed, we know from the early survey by the British School at Rome and from the more recent work on behalf of CNR that the greatest development of the city took place and the built-up area of the city reached its largest extent in the Archaic period; artefact scatters from that time are present across the whole of the plateau. By contrast, after the conquest by Rome, during the late Republican and the Imperial Age the extent of the artefact scatters

[17] Guaitoli 2015.
[18] Cascino *et alii* 2015.

reduces substantially, in accord with historical sources and the excavation data.

The magnetic data provide quite strong support for the view, developed from more traditional sources, of the city's expansion and subsequent contraction over time. Indeed, there are large parts of the plateau where no Roman material has been recovered from areas that correspond on the magnetic maps to areas that display a pattern of collector roads and a dense distribution of buildings or other features. The consistency between the urban pattern revealed by geophysical prospection and the pottery distribution derived from field-walking survey leaves no room for doubt about this. Moreover, within seemingly built-up parts of the city it is possible to recognize in the magnetic data patterns of parallel ditches that can readily be attributed to the cultivation of vines. The distance between the rows varies, from one allotment to another, between 5 m and 8 m, closely matching excavation evidence from around Rome that has been dated to the mid and late Republic[19].

Another interesting point is the extraordinary *longue durée* of the road system. To better understand this point it might be useful to focus on what we know so far about the principal public buildings of the Roman period: the forum, theatre and thermal baths. None of these shows any consistent orientation with one another to form any kind of orthogonal or regular pattern. In fact, all of them clearly adopt orientations based on the system of roads laid out during the Etruscan period.

Among the first results of this present phase of the work, therefore, is the conclusion that almost the entire road layout of the largest and most important Etruscan city in Italy has been depicted through this application of geophysical prospection, in a way and with a clarity that has few if any parallels elsewhere in Italy. The closest comparable case is that of Vulci, where a fairly similar pattern is based on main axes curving across the plateau, supplemented by a system of radial collector roads[20]. Another interesting parallel can be found in a slightly different geographical and cultural context, in southern Latium, at *Gabii*[21]. In both cases remote sensing data played a major role in allowing archaeologists to identify the overall pattern of the urban layout, in Vulci thorough aerial photography and in *Gabii* through large-scale magnetic prospection.

The complexity of such a large and long-lasting urban area means that this analysis is necessarily a work-in-progress. Further investigation, particularly through test excavation and archaeometric analyses, are needed to extend the quantity and quality of the archaeological data gathered so far. In particular, magnetic data currently under further interpretation, in combination with the results of previous and current research by more traditional means, promises on the basis of preliminary results to shed light on many other issues, such as the pattern of settlement distribution across time, the types of dwellings, the fortification system, previously unknown public buildings and the ruralisation and exploitation of the plateau during the Roman period. Even at the present state of the analysis, however, it is worth emphasising the extreme complexity of the overall situation at *Veii*, involving an Etruscan layout that finds few parallels elsewhere, combined with a long-lasting development and taphonomic process from the Iron Age onwards, with the added difficulty of distinguishing the chronology of most of the detected features. Together with the interpretation and mapping of the magnetic data we strongly believe the need to gather high resolution ERT and GPR survey on carefully chosen areas of the site so as to achieve 3D data of subsoil deposits that will hopefully resolve a number of crucial issues. A parallel series of targeted but minimalist test excavations will also be needed to provide critical stratigraphical, artefactual and chronological evidence at key points in the layout of the city.

1.2. A once-urban landscape with standing structures: *Rusellae*, a city and its hinterland

Rusellae is situated in southern Tuscany on two hills a few kilometres inland from the Tyrrhenian Sea. The size of the site is approximately 60 ha, supporting a fairly important Etruscan and subsequently Roman and early medieval settlement, continuously inhabited until the Middle Ages before finally being abandoned in the 12th century.

Generic evidence of anthropic activity appears in the surrounding landscape from the upper Palae-

[19] Volpe 2009.
[20] Pocobelli 2004 and 2011.
[21] Mogetta, Becker 2014.

olithic onwards. From the Chalcolithic there are the first signs of settlement in the area of the future city, probably attracted by the local mineral resources and the favourable position close to the nearby docking and fishing opportunities. The Bronze Age saw population growth and an increase in trade and socio-economic distinction, and from the start of the Iron Age there is increasingly clear evidence of villages. In the later phase of the Villanovian period the two hills seem to have been occupied by different groups, probably separated from one another by an area of pasture and open areas. However, starting from the Orientalizing Period in around the mid 7th century there appear to have been city walls, a transformation in the topographic layout of the city and a generalised phase of public and private building activity. The process was continued and reinforced during the Archaic period, with a general growth of the city and the progressive development in the surrounding landscape of a network of dispersed settlements. In 294 BC the Etruscan city was conquered by the Romans and from the end of 3rd to the middle of the 1st century BC there ensued a long process of further building activity within the city. In the surroundings of the city, as in the rest of Etruria, later centuries saw a major restructuring of the landscape, introducing Roman villa settlement and productive systems aimed at improving agricultural productivity. In the 1st century BC *Rusellae* was designated as a Roman Colony and from the 1st century AD there began a major phase of building activity, both within the city and in the surrounding landscape: forum, amphitheatre, temple, *domus* within the walls and further Roman villas in the countryside. During the 4th century AD there is clear evidence of a further transformation including the conversion of public buildings into workshops and the abandonment and subsequent redevelopment of the public baths as a church. However, *Rusellae* maintained its role as an administrative centre with a complex urban topography. Documentary evidence shows that from at least 499 AD the bishopric had its seat at *Rusellae*, remaining there until a move to Grosseto in 1138 AD.

After the abandonment of the city the area was progressively reclaimed by scrub and woodland, recorded by by the middle 19th as being so dense as to make any kind of survey or research work extremely difficult. Nevertheless, it was in these years that more systematic excavation work was put in hand, firstly on the necropolis and then in the city centre and the immediately surrounding buildings. The research work has continued intermittently until the present day, almost exclusively through excavations carried out under the direction of a variety of institutions, notably the German Archaeological Instituute (DAI), the Archaeological Superintendence and the University of Siena.

The University has from the late 1970s onwards fostered a systematic programme of landscape archaeology within the Maremma area[22]. As a result of this work the area now has a substantial database and GIS, developed mainly through the examination and analysis of the relevant archaeological and ancient literature, documentary and epigraphic sources, place-name evidence and systematic field-walking survey, along with a significant number of open-area excavations. After about 35 years of rigorous research work it could be argued that this region is among the most intensively studied areas within the Mediterranean[23]. However, despite the large amount of information assembled and examined over the years, it is undeniable that many important archaeological questions still remain unresolved. In an attempt to respond to the unanswered questions and to fill what at present appear to be 'empty spaces', the author's *Emptyscapes project*, undertaken in 2016-2018 at Cambridge University in the UK, made an intensive study of a sample transect of the landscape between Grosseto and *Rusellae*, the size and location of which promised to fit these objectives. The area now under study is the faded trapezoidal area in Figure 4, placed so as to provide a diachronic perspective and to answer some major questions related to the three major cities of *Rusellae*, Grosseto but also *Vetulonium*: for instance, the urbanisation of the Etruscan cities and in particular their rela-

[22] The first research project was established by Prof A. Carandini under the title 'Ager Cosanus-Valle dell'Albegna' (Carandini, Cambi 2002). The same period saw the start of work by the late Prof R. Francovich, surveying Grosseto, Scarlino and the area of the Colline Metallifere. In more recent decades archaeological mapping and field survey has been continued, particularly by the author (Campana *et alii* 2005; Campana, Piro 2009) as well as by Bianchi (Bianchi *et alii* 2014), Citter (Citter, Arnoldus 2007) and Vaccaro (Vaccaro 2012).

[23] Campana 2018.

tionship with the surrounding countryside, the Romanization of the cities and the landscape, the process of Christianisation and finally the impact on settlement, society and economy of the end of Antiquity and the beginning of a new era, that of the Middle Ages.

It should be clear, even from this short introduction, that the area around *Rusellae* has the potential to illustrate the human and massive landscape/urban transformations/relationships that characterise the many centuries of the 1st and early 2nd millennia AD. In the attempt to improve our understanding of the sample area we have so far collected around 850 ha of geophysical survey (820 ha of magnetic and 30 ha of resistivity data); moreover, from as long ago as 2001 we have been undertaking exploratory aerial survey in the area and more recently have commenced fieldwork with the aim of collecting archaeological, geo-archaeological and bio-archaeological evidence within the chosen transect[24].

At this point we have to ask some crucial questions: after this amount of scientific effort have we in fact answered our research questions? Which new scenarios have been opened up? Which new questions are we now able to ask? Has our understanding of archaeological and landscape transformations within the sample area been substantially improved? Above all do the outcomes of the research work succeed in filling - at least in theory - the gap between urban and rural landscape studies? To answer these questions or at least to provide a partial response, bearing in mind that the project is still in progress, the following paragraphs and illustrations will present an example that will shed light on the present impact on our understanding of the area and the overall potential of the holistic approach developed and implemented within this study of a carefully chosen tract of ancient urban/rural landscapes.

Let us start with a quantitative remark. The systematic examination of past archaeological research, documentary sources, epigraphic material, place-name evidence and historical maps, combined with a long-lasting programme of field-walking survey, has produced a substantial amount of information on the *Rusellae* area - including around 80 archaeological contexts of various kinds within the transect now undergoing more intensive study. Caution is of course needed in making comparative quantifications of the results achieved by this 'traditional' research compared with the wider range of information that can now be collected through the use of sources such as remote sensing (mainly based on aerial photography) and ground-based magnetometer and electrical resistance survey. Nevertheless, the general increase in the 'visibility' of the archaeological evidence can be seen in the fact that these latter methods have so far produced 2746 previously undetected features within the sample transect. However, the aim here is not to make a simple comparison of numbers but rather to show that, taking all sources together, we have already collected a very substantial amount of information. With continuing survey and fieldwork we anticipate that this will soon reach what we might call a 'critical mass'. That said, we need to focus our attention not only on numbers but also on the *qualitative* contribution to the stated objective of holistic landscape interpretation. To illustrate the possibility of achieving that goal it might be useful to look at parts of the sample transect in closer detail, discussing some of the results achieved so far.

1.2.1. Blurring the boundary between town and countryside

As we have already seen, the city of *Rusellae* occupies the summits of two hills, the surrounding slopes of which are almost entirely covered in dense woodland. At the foot of the slope immediately beyond the woodland there is land that is easy to cultivate and to explore for archaeological purposes. The distance between the town walls - one of the widely recognised demarcating lines between town and coutryside - and the first arable fields on the lower ground amounts to little more than 200m. In that sense the area that we have been investigating around the city could be viewed both as a suburban and as a rural landscape. Aerial survey, and more critically magnetic prospection,

[24] It should be noted here that in the winter of 2016 a sample area of the woodland was used as a test-bed for the effectiveness of a high-end Riegl lightweight LiDAR system mounted on an UAV. The collected datasets are currently under processing and interpretation. A detailed report of the outcomes will be published once the results have been properly assessed.

has thrown up entirely unexpected results within this area.

Close below *Rusellae*, barely 220 m form the city walls, in an area of superficially undistinctive arable landscape, there is clearly visible in Figure 5 a mass of magnetic features representing a major road connecting the countryside with the city; the road is around 6 m wide at the bottom of the slope but is known to expand to a width of 14 m as it approaches the city itself. Along both sides of this road the magnetic data shows a dense concentration of ring-ditches and rectangular anomalies that can without doubt be interpreted as burials, in effect the remains of a major cemetery probably dating to both the Etruscan and Roman periods. Within the area so far subjected to magnetic survey a total of 34 ring-ditches and 37 rectangular anomalies have been recognized and mapped. The ring-ditches range from 13 m to 43 m in diameter, with an average of 19 m, while the square features are more standardised at about 4 m by 6 m. On the basis of comparative studies of other Italian contexts such as Cerveteri[25] this is clearly a major and previously unsuspected funerary landscape placed alongside one of the main roads entering and leaving the city. Moreover, on the southern (lower) edge of Figure 7 it is possible to recognize another road and an unusual structure showing as a round anomaly surrounded by a square of opposite magnetic polarity; the shape, articulation and size of this feature finds a convincing parallel in Roman mausolea[26].

If these interpretations were in due course to be confirmed by excavation it would be possible to envisage an interesting scenario of a funerary landscapes that with some changes due to alterations in the road system might show a substantial continuity across a long span of time from around the 7th to 6th centuries BC and on into the Roman period. This kind of continuity would be particularly interesting bearing in mind the various changes in the internal structure of the city between the Etruscan, Republican and Imperial phases of its development. Significantly, but surprisingly in the light of this very striking geophysical evidence, neither micro-morphological evidence nor field-walking survey undertaken in the past or in the summer of 2015 (apart from a very limited scatter of mainly off-site material) has presented any interpretable evidence of this kind of road system or long-lasting funerary landscape.

[25] Tartara 2003.
[26] Johnson 2014.

2. Historical urban landscapes: *the SOS project*

Urban archaeology as we know it today was developed in Great Britain in the period following WWII using stratigraphical excavation as its principal method of investigation, later supplemented by other techniques such as core-sampling and environmental analysis. Today, the most valued techniques in cities still under occupation can be distinguished in several respects from those that are appropriate for deployment in once-urban contexts that become wholly or partially buried following their abandonment. In ancient cities that have never lost their original urban function one can count on an ample supply of documentary information or archival material which preserve the memory of the past and accounts of previous archaeological discoveries. Among the major problems encountered in such contexts, however, there are the inevitable impediments of past and recent urban development. The systematic presence of buildings, especially those of some antiquity, can through their standing facades, cellars and foundations provide an important source of information, but at the same time they constitute a grave obstacle for the application of many of our standard diagnostic methods, not altogether excluding their use but certainly reducing, complicating and slowing down the possibility of carrying out survey work within the area of the buildings themselves and thereby interrupting the continuity of any analyses that can be made. The open areas free of buildings are limited to the often-busy streets, squares and parks along with the private and public gardens but little else. In these spaces it is equally difficult to deploy many of our usual investigative techniques. The great majority of the public spaces are covered in hard surfaces of one kind or another which preclude direct observation of the underlying deposits and therefore also prevent the use of non-destructive methods such terrestrial or aerial survey, even though this last technique been shown to have values in certain circumstances and situations. Even the methods of geophysics suffer in the urban con-

text; magnetometry in particular struggles in the face of the strong magnetic interference which is inevitable in living towns and cities. Without doubt the most effective method in such contexts falls within the sphere of Ground Penetrating Radar (GPR).

In the face of these difficulties but with the benefit of wide-ranging experience in the study of abandoned city landscapes, not only at *Veii* and *Rusellae* but also at Çatalhöyük[27], Vulci, Nisa in Uzbekistan and at Aistra and Amaya in Spain, the author and his team from the University of Siena initiated a prgramme of GPR data collection in the city's Piazza del Campo and in part of the Piazza Duomo.

The work carried out through use of a cutting-edge radar system designed by StreamX of Pisa implemented by Geostudi Astier of Livorno[28]. Within the previous decade experimental work with this instrument had been conducted in archaeological contexts by a variety of research organisations including the University of Siena, generating a significant related bibliography[29]. These earlier applications, in both urban and non-urban contexts, had clearly demonstrated the efficacy and robustness of the technique for large-scale data collection. In the heavily frequented Piazza del Campo the equipment was operated by hand rather than with a towing vehicle such as a quad bike, georeferencing of the scans being achieved through a robotic total-station instrument (fig. 6). The acquired data was then processed through the GPR Slice and GRED(HD) software.

As shown in Figure 7 the survey work revealed a series of subterranean channels crossing the Piazza in a variety of directions. The most significant group radiated from the present-day position of the Fountain of Gaia situated in a part of the piazza that is represented in fig. 7 by a black rectangle (denoting the inevitable absence of readings in that area). The detected features were interpreted as part of the system of so-called *Bottini*, underground channels aimed to water supply, in large part still functional today, excavated in the native rock and often lined in brikwork. Constructed for the most part during the 12th and 13th centuries, these are known to form a system of mostly accessible galleries running beneath the city to a total length of around 55 km.

The radar survey enabled the identification of the four principal branches of the *bottini* represented on historical maps, forming a more precise topographical location or their courses. In several instances these seem to diverge significantly from their expected routes, not only as represented in historical maps but also on the present-day cartography used by public service officials in their maintenance. Furthermore, the depth readings confirmed that the *bottini* beneath the piazza, unlike those in the rest of the city where they are for the most part high enough to allow human passage, are formed *just form so-called gorelli* which are rather than as simple brick-lined channels for the distribution of the water, set at depths of between 30 and 100 cm. A concentration of discontinuous anomalies detected at a depth of between 50 and 150 cm beneath the central part of the piazza can perhaps be attributed to continuous reworking of that area throughout the whole of the 12th century right up to the time when the system achieved its present pattern during the following century. As a final observation we cannot entirely exclude the possibility of the presence within the GPR data of occasional traces of ephemeral structures erected from time to time for fairs or ceremonial events such as the kind as the bull-hunting shown in a painting of the late 15th-century artist Francesco Rustici[30], the position of which seems to match a more or less circular anomaly at a depth of between 40 and 90 cm in the GPS data close to the Palazzo Comunale. The experimental work within the Piazza del Campo has amply demonstrated the potential of the georadar technique in this kind of context and on the basis of the results so far achieved a new research initiative has been launched under the title of *SOS* which is the international call for help by ships and sailors at sea - 'Save Our Souls' but in our case the acronym means, *SOtto Siena* (Beneath Siena, *SOS*).

The project, under the direction of the author in

[27] Strutt *et alii* 2020.

[28] The survey works, data processing and interpretation of the collected data was carried out in collaboration with Geostudi Astier of Livorno, in particular with Engineers G. Morelli and G. Catanzariti.

[29] Strutt *et alii* 2020; Persico *et alii* 2019.

[30] Barzanti *et alii* 2006.

collaboration with Prof. Stefano Camporeale of the Department of Classics at the University of Siena and Drs Andrea Muzzi and Jacopo Tabolli of the Soprintendenza Archeologica. It is designed to undertake an innovative study of the urban archaeology of the city based on three principal lines of research. The first entails the creation of a web-based 3D Archaeological Information System for the subsoil of the city, accessible by desktop, mobile and virtual reality devices. Alongside the development of this GIS a second line of research will entail the acquisition and refinement of STREAM X GPR data for all of the public spaces such as streets, squares, courtyards and gardens that are at least theoretically accessible within the city for the mapping of archaeological features (and underground services) down to a depth of about 3m; the technical cartography for the city suggests that (given the necessary permissions) this will make available an estimated 25 hectares of surveyable area as illustrated in Figure 8. The third element in the project will focus on identification of all existing archaeological, historical and geological information about the city and its representation in a GIS platform; this elementy of the project designwill also be devoted to the development of interpretative frameworks for the radar data, permitting its integration and progressive combination with of the documentation and future results from within the city.

3. Conclusions

The examples described above demonstrate very clearly the great opportunities created by the application of new integrated methods and approaches to urban and once-urban but now-suburban and rural landscapes, capitalising on the experience gained across the last two decades of archaeological prospection within these kinds of contexts. Moreover, in regard to the continuing debate about the relationship between city and countryside or urban spaces and the open countryside, we should bear in mind that the high density of evidence and the substantially increased quality of information that we can now obtain is progressively reducing the apparent dichotomy between these two contexts. In particular, the discovery of the cemetery close outside the city walls of Roselle, effectively in the suburbs, seems very significant in highlighting in this area previously unrecognized practices of social representation and ostentation of economic power on the part of the elite families within the city through the construction of imposing burial mounds along one of the major roads leading to and from the city - a realisation that substantially enriches the overall understanding of the archaeological framework by opening unsuspected scenarios, new comparative criteria, and indeed substantive new questions about this and other urban and suburban contexts within Italy. The results from Veio and Roselle also demonstrate that the kind of landscape investigation implemented so far within formerly urban contexts can (despite some intrinsic limitations) be equally effective in exploring the surrounding suburbs and open countryside, bringing about some degree of reconciliation between contrasting research environments which have been at least partly divorced from one another for far too long.

Finally, borrowing the experience of investigations conducted in former townscapes and in the open countryside to historical urban landscapes and particularly to Siena represents a new challenge full of innovative perspectives for a completely novel understanding of historical cities but also for a more rational daily management of their past.

The research for this paper would not have been possible without the financial support of the Marie Curie action for the author's Emptyscapes project (FP7-PEOPLE-2013-IEF n. 628338), the Culture 2007 ArchaeoLandscpes Europe project (Grant Agreement nr. 2010/1486/001-001) and Tuscan Region grants "Assegni di Ricerca in Ambito Culturale" - POR FSE 2014-2010 research proposal SOS.

I am particularly grateful to Prof. Martin Millett, Dr. Ken Saito, Prof. Marcello Guaitoli, Chris Musson and Prof. Dominic Powlesland for advice and assistance of various kinds. Sincere thanks are also due to the Archaeological Superintendency of Tuscany, especially Dr. Jacopo Tabolli and Dr. Matteo Milletti.

The SOS project would not be possible without the financial support of Regione Toscana and the University of Siena. SOS project is also co-financed and knowledge-based supported by three high-end Tuscan companies, Geostudi Astier, LDP and The University of Siena spin-off company ATS srl which are playing the crucial role of providing access to their expertise, infrastructures, hardware and software. Our gratitude goes finally to the Monte dei Paschi Foundation for supporting the SOS project.

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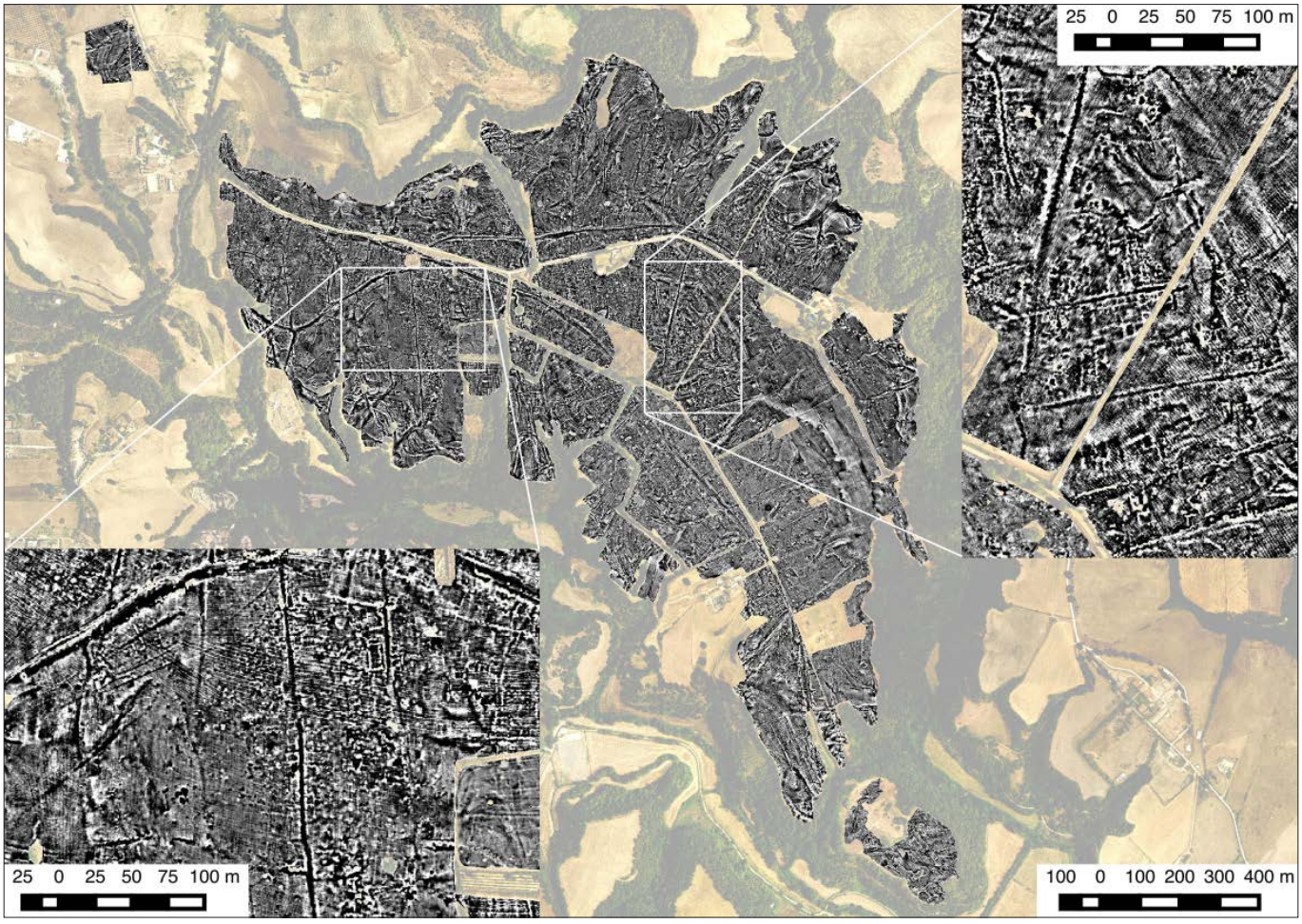
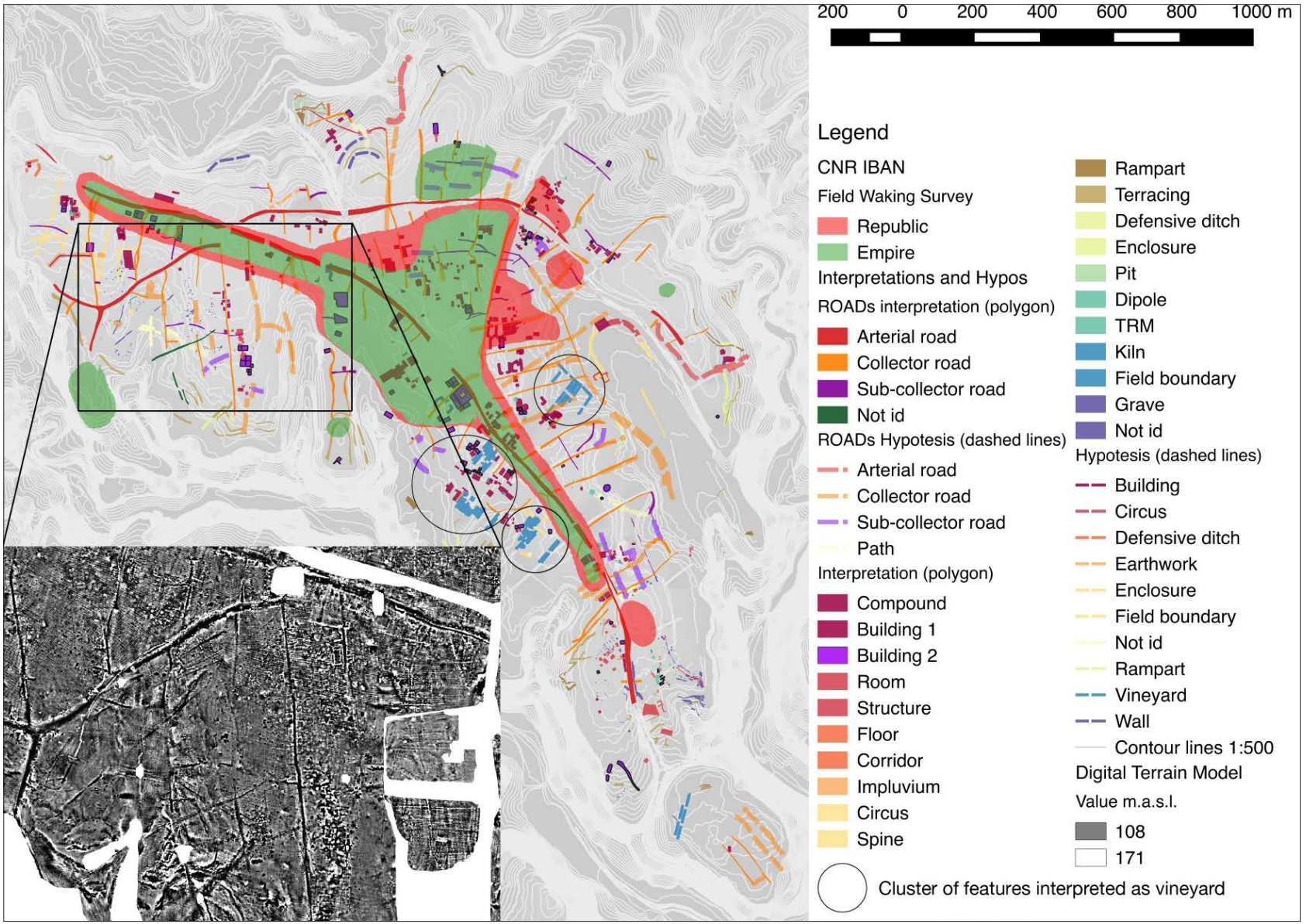
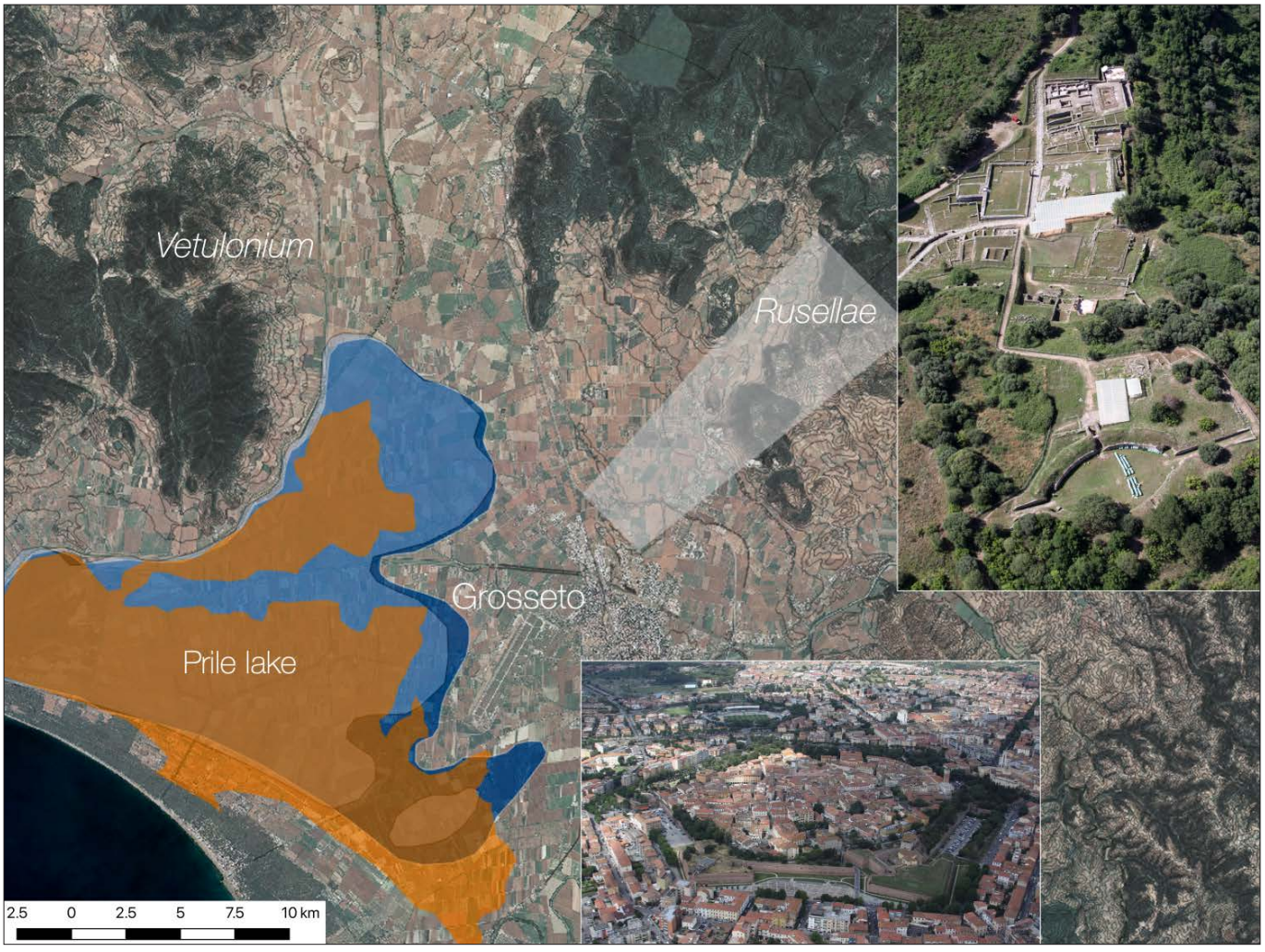


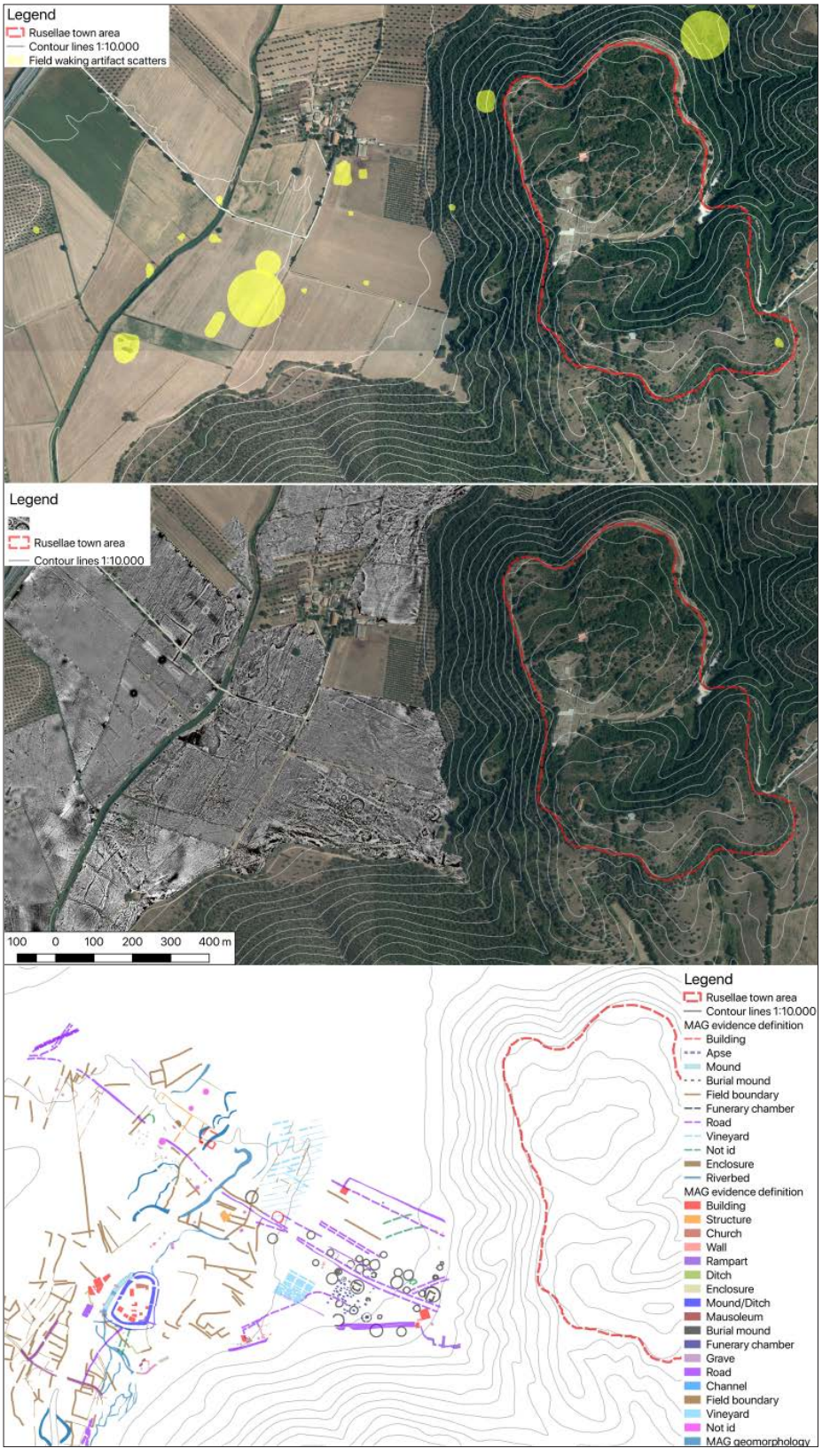
1. Distribution around the Mediterranean Sea of large-scale geophysical prospection projects in formerly urban contexts. The size of the circles is proportional to the size of the survey in hectares.
2. Layout of the whole surveyed area and close-up showing the detail and density of the archaeological features.



3. Veii: the Late Republican (red) and Imperial Age (green) distribution of artefact scatters is clearly less extensive compared with the Etruscan period (uncoloured part of the plateau) when artefacts covered the whole of the plateau, including parts of the magnetic map that have clear evidence of structures that can be interpreted as dwellings, roads, workshops, temples and so on.

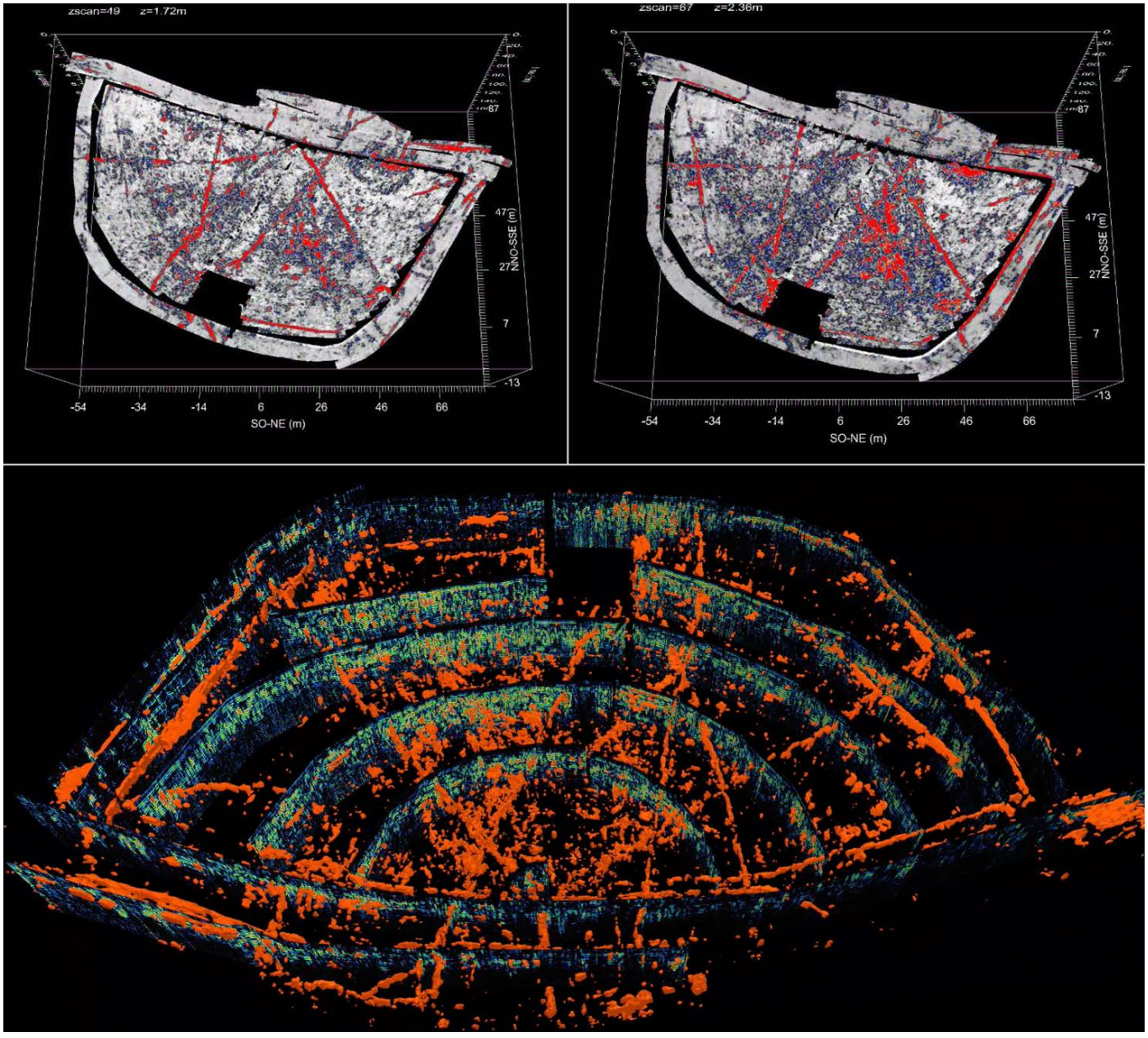


4. The Rusellae study area: the area within the trapezoid outline of the Emptyscapes sample transect has been systematically field-walked. The extent of Lake Prile, which gradually shrank from the first millennium BC until the end of the Middle Ages, is shown in solid colour along with the main urban areas, Rusellae, Vetulonium and Grosseto.



5. General overview of Rusellae and the suburban area to its W. From top to bottom in the figure: field-walking survey in progress; site distribution; magnetic map displaying the large number of features identified, including in particular several ring-ditches along with square anomalies interpreted as a major cemetery lining either side of a major road connecting the city of Rusellae to the surrounding countryside; and finally a map of all of the key features discovered so far.

6. The system created by IDS of Pisa in use for data acquisition in the Piazza del Campo in Siena. The instrument consists of radar system with multiple vertically-set antennae. This model, with a scanning width of 1.68m, is intended for large-scale data collection and includes a trolley that can be operated either by hand or by the use of a vehicle. The sensors consist of 16 diploles oriented parallel to the direction of travel, set at an interval of 12 cm and working at a frequency of 200 MHz. In an urban context georeferecing of the collected data is achieved through a fully automated total-station system.



7. From top left: visual interpretation of a GPR slice at a depth of 1.72m and on the right at 2.36m within which there can be seen in red the traces of the subterranean water supplies of Siena. In particular, at the centre of the slice on the right there are visible anomalies caused by ancient levelling work within the piazza. The lower part of the figure shows a 3D visualization of all of the detected anomalies.

8. Cartographic representation at a scale of 1:2000 of the city of Siena, showing in red the open spaces in which it may be possible to undertale GPR survey.