Archeologia e Calcolatori
22, 2011, 000-000

E. Giorgi (ed.), *Groma2. In profondità senza scavare. Metodologie di indagine non invasiva e diagnostica per l'archeologia*, Quaderni del Centro Studi per l'Archeologia dell'Adriatico, Bologna 2009, BraDypUS s.a.

D.C. Cowley (ed.), *Remote Sensing for Archaeological Heritage Management*, EAC Occasional Paper 5, Brussells 2011, Archaeolingua.

The increasingly regular application of geophysical survey methods in Italy, both as a research tool and as an investigative evaluation method applied prior to the development of land, has led to a much wider interest in the application and development of the techniques. Following the success of conferences such as that of Archaeological Prospection held in Rome in 2005, there have been a series of conferences devoted to general applications and potential of archaeological geophysics (in particular, *Geofisica per l'archeologia. Possibilità e limiti*, Rome 2008), as well as an increasing number of specifically themed conferences (such as the *XIII International Conference on Ground Penetrating Radar* held in Lecce in 2010) hosted in the country. However, against this background of conferences and the appearance of dedicated research groups within Universities, as well as a rising number of workshops and seminars, there had surprisingly yet to appear a general Italian-orientated text book explaining these techniques. The book *In profondità senza scavare. Metodologie di indagine non invasiva e diagnostica per l'archeologia* goes a long way to fulfilling this lacuna, providing both the student and specialist with an easily accessible reference manual for the most commonly applied archaeological survey techniques.

The structure of the book, providing first a general discussion of the different themes, ranging from topography through to remote sensing and geophysics, followed by in-depth articles and applied methodologies, complemented by detailed descriptions of the instruments themselves, allows its use both as a research reference and a teaching aid. The origins of the book, as described by the editor in the introduction, come from the conduction of a series of field schools run between 2007 and 2009 at five different sites, both in Italy and Croatia. The number and chronology of sites investigated provided the opportunity for a series of investigative methods to be applied, ranging from topographic techniques through to geophysics. In particular a suite of geophysical survey techniques were applied under similar conditions, therefore illustrating the strengths and weaknesses of each technique and how they can best be integrated together to provide the fullest understanding of the subsurface. Similar research has been conducted elsewhere in Italy, such as by the CNR at Colle del Forno (S. Piro, in S. Campana, M. Forte (eds.), *Remote Sensing in Archaeology*, Firenze 2000, 273-296) and by the British School at Rome as part of the Portus Project (S. Keay *et al.*, *The Role of Integrated Geophysical Survey Methods in the Assessment of Archaeological Landscapes: the Case of Portus*, «Archaeological Prospection», 16, 1-132). In the example of the latter, a full range of geophysical instruments and techniques have been applied (including caesium magnetometry, fluxgate gradiometer, Ground Penetrating Radar, resisitivity, electrical resistivity tomography) to a defined control area, allowing a better understanding of the response of these techniques under similar conditions.

The first section of the book (Ch. 3) covers the various applications of survey on archaeological sites, under the general heading of topography for archaeology. The chapter can be broadly separated into two parts, the first (Ch. 3.1-3.4) introducing

site based methodologies, ranging from traditional drawing and planning through to photography and standing building survey. A number of topics are covered, beginning with the theory and principles of how to undertake traditional planning, a knowledge of which is essential for a fuller understanding of more modern computerised techniques discussed in the chapter, such as recording using a Total Station, Global Positioning System or Laser Scanner. The section of the book also offers a detailed discussion of the theory, process and application of photogrammetry, an increasingly important recording technique as the benefits offered by digital photography continue to grow, particularly in terms of resolution and quality.

The second part of the chapter (Ch. 3.5-3.8) introduces techniques which can be grouped under the theme landscape archaeology, including an introduction to geophysics, satellite imagery and aerial photography. The rapid growth in the availability of satellite data over the past years means that this source of information will become ever more important, in particular due to the increased resolution of this imagery, permitting the extraction of additional data. The present contribution provides a useful introduction of the potentials of satellite remote sensing. Similarly, the basic principles and applications of aerial photography are also introduced, as well as the history of the technique. The detailed forms at the end of the chapter provide a more specific discussion of the use of balloons and kites for low level aerial photography, although since the publication of this volume there has been a growing interest in the deployment of quadricopter drones, which now have increased stability provided by the use of 2-axis gyrometers, and can be mounted with high definition video cameras. However, the volume offers a useful introduction to the technique, although those seeking further information and detailed case studies should refer to the recent publication of D.C. Cowley (*Landscapes through the Lens: Aerial Photographs and the Historic Environment*, Brussels 2010) and the excellent dedicated series *Archeologia Aerea*.

The strength of this volume lies in its excellent introduction of the techniques of geophysical survey (Ch. 5) and the support provided by the descriptive forms (Ch. 6), detailing the possible survey combination for each instrument and the advantages/disadvantages these may have when applied in the field. The introduction to the discipline (Ch. 5.1) gives a concise overview of the development of geophysics since the first applications were experimented with in the 1940s. Whilst the section neatly summarises the various developments and significant steps forward in the discipline (such as the introduction of ground penetrating radar in the mid 1970s), it perhaps would have been a timely opportunity to describe more fully the development of the technique in Italy, as most standard textbooks (A. Clark, *Seeing Beneath the Soil: Prospecting Methods in Archaeology*, London 1996 and more recently J. Gater, C. Gaffney, *Revealing the Buried Past: Geophysics for Archaeologists*, Gloucestershire 2003) focus particularly on northern Europe. However, the section provides a well-balanced introduction for students to the current techniques employed in archaeological geophysics.

The second section provides a basic overview of the principles of electrical methods applied in geophysics (Ch. 5.2), leading into a detailed discussion of the technique of ARP (Automatic Resistivity Profiling) (Ch. 5.3). A significant section is devoted to this automated application, which in essence allows the rapid collection of resistance data, previously limited to more time-consuming manual methods. Whilst the discussion of such a technique is welcome, as it clearly represents the future for large scale resistance data collection, it should perhaps be noted that currently there are limited opportunities to use and deploy this technique. Indeed it is surprising that significant space is devoted to this technique, as well as an introduction to the basics

of resistance and GPR, whilst there is no equivalent for the more frequently applied method of magnetometry. The growing importance of GPR as an investigative tool is illustrated by the inclusion of two sections devoted to the technique (Ch. 5.4-5.5) which provide an excellent introduction. Whilst there now exist a number of specialised books on this subject (in particular see L.B. Conyers, D. Goodman, *Ground-Penetrating Radar for Archaeology. An introduction for archaeologists*, Walnut Creek, CA 2004), the contribution is useful to both the novice and the expert.

The various techniques are drawn together in one of the final chapters (Ch. 7) relating to the non-invasive methods now applied in the investigation of an archaeological site. A useful summary is given of the fundamental role that GIS and databases now play in the processing, management, analysis and interpretation of data. Whilst there now exists a significant body of literature devoted to these areas, it is useful to acknowledge how the post-processing and analysis of the results is as significant as the collection of this data. Whilst some discussion is given to the increasingly central role of virtual reality in the concluding comments and discussion (Ch. 9), there is limited discussion of the importance of the collection and processing of 3D data. As the use of Total Stations and GPS becomes standard practice in archaeological fieldwork, these datasets allow the processing and visualisation of geophysical data in a 3D environment. The increasing application of GPR survey means that the creation of OpenGL volumes and the modelling of anomalies can now be considered an additional method with which to interpret geophysical data.

The importance of a dedicated Italian orientated text book, together with other collections of edited papers (such as S. Campana, S. Piro (eds.), *Seeing the Unseen. Geophysics and Landscape Archaeology*, London 2009), is that it should aid in bringing the practice of archaeological geophysical survey as a more standard investigative technique in Italian archaeology, and in particular as a site appraisal method in the commercial sector. Whilst the methodology has been fully embraced in the research sector, it has yet to be fully utilized for planning purposes and integrated as a methodology for cultural resource management as seen elsewhere throughout Europe. The centralization of these non-invasive techniques would bring a range of benefits, in turn allowing a fuller understanding of the buried archaeology. This important contribution should go some way to addressing this matter.

Continuing the theme of investigating the techniques applied in the context of landscape archaeology, the increasing number of remote sensing methods available to the archaeologist – ranging from airborne based systems such as aerial photography and more recently laser scanning, to terrestrial based ones such as geophysics – provides the underlying subject of the collection of papers edited by D.C. Cowley in 2011. The majority of these papers derive from the symposium (organized by the Europae Archaeologiae Consilium and the Aerial Archaeology Research Group) held in Reykjavik in March 2010, whose aim was to review remote sensing for archaeological heritage management at the start of the 21st century. As discussed in the introduction (D. Cowley and K. Huld Sigurdardóttir), the range of techniques now available provides the basics for discovering sites and monuments as well as allowing the registration and large scale mapping of landscapes. However, it should be the effective use of these systems for the sustainable management of the archaeological heritage which in turn should be the driver for developing and focusing these techniques. It was with these concepts in mind that the symposium aimed to review the current state of research and provide a series of broad based strategies in order to encourage best practice of these techniques.

The range of papers collected within this volume from across Europe, and the accounts of the differing experiences of the practitioners, perhaps best illustrate the problems in trying to establish broad strategies that can be applied on an international basis, as local differences and government policies effect their successful adoption (shown through the contributions of S. Campana and W. Rączkowski). However, this collection of 25 richly illustrated papers provides an invaluable resource and milestone in charting the progress of the adoption and integration of remote sensing techniques.

The volume is divided into three sections, firstly providing a series of general papers discussing the application of techniques, followed by a series of contributions exploring specific methods, data sources and contexts. A significant focus is placed upon the contribution that can now be made by techniques such as LiDAR and multi and hyper-spectral imaging, which have provided a new avenue of research and a wealth of new data. The volume concludes with a series of case studies from around Europe which clearly illustrate the significant contribution made by remote sensing technologies to the recording of the archaeological landscape.

As noted in the forward to the volume, the requirement to apply non-invasive techniques of archaeological investigation, such as those falling under the umbrella of remote sensing, is enshrined within the European Convention on the Protection of the Archaeological Heritage, established in Valetta in 1992 (Article 3). However, whilst significant progress has been made, it is clear from the contributions in the first part of this volume that the uptake and acceptance of these techniques have been more fully integrated in northern Europe than in some Mediterranean countries, despite the excellent research that is being done in these countries.

The three papers in this section show the importance of making remote sensing work for the profession, as they discuss the recording of a large tracts of landscape, both for archaeological research and as a tool with which to manage these often complex environments. The work of the Landscape Research Centre (D. Powlesland) in the Vale of Pickering (UK), a long term multiple method research project, provides an excellent case study in the effective management of a landscape. Through the multi-layered approach of integrating different types of data, ranging from aerial photography, to multi-spectral imagery and fluxgate gradiometry survey, the contribution illustrates at a micro-level how each of these techniques, sometimes complementary, can also record different archaeological traces in the landscape. The following paper, describing the large scale application of a range of remote sensing techniques ahead of a major infrastructure project in Italy (S. Campana – The BREBEMI Project) provides a valuable guide to good practice, as through the discussion of the work flow of the project it is made clear the need to integrate a range of methodologies in order to extract the fullest record of a landscape which perhaps will be lost. The last of the general papers draws upon research in Scotland (D. Cowley), where the author discusses the advantages of applying a broad-brush characterization in providing a framework for matching survey methodology to local contexts. The importance of understanding the impact of both the past and present land use on the archaeological record is also rightly emphasized by the author, therefore illustrating the import role which historical aerial photographs have in mapping the changing landscape.

The second part of the volume provides a series of papers which collectively discuss the potential of new technologies in remote sensing, though the presentation of a range of techniques and the processes that are being applied in order to extract further information. Significant discussion is devoted to airborne laser scanning (ALS) and in particular (M. Doneus and C. Briese) processes for extrapolating data from the

last pulse returns, which allows the modeling of surfaces hidden under tree canopies. In landscapes where significant parts are forested, limiting the success of other more traditional methods such as aerial photography, the potential that this technique offers is hugely significant. Together with this can be considered the advances that have been made in multi/hyper-spectral imagery (discussed by A. Beck), although following the overall theme of the volume in providing a guide to best practice (for a full discussion of the technique, and in particular its hugely successful recent application in Egypt, see S. Parcak, *Satellite Remote Sensing for Archaeology,* Routledge 2009) the author sounds a cautionary note in understanding the "appropriate conditions" in which this data can best be captured.

A final theme which is discussed within this section is the recent technological advances that have been made in terrestrial geophysical survey (C. Gaffney and V. Gaffney). At the turn of the century, geophysical surveys (in particular the most widely used techniques of magnetometry, resistance and ground penetrating radar) were either large scale or data dense, a limitation that has recently been overcome through the increased automation of these techniques and their integration into multiple arrays. The authors review these technological developments and consider how the increased speed of these surveys can impact upon the management of the archaeological record.

The third and final part of the volume, comprising of 14 papers, presents a series of case studies from around Europe, which have applied some of the techniques introduced in the first two parts of the volume. Together, the papers highlight the fundamental contribution that remote sensing makes to the creation of a detailed record of the archaeological landscape, and how the integration of these different technologies, and the exploration of the data, is leading to a richer understanding of the archaeological record. A dominant theme in these papers is the fundamental role of aerial photography, which provides an invaluable resource for the recording of the landscape. Several papers (B. Stichelbaut *et al*. and L. Helles Olesen) emphasize the importance of the historical aerial photographical record, and how the study of these resources provides irretrievable information about the landscapes which have since been lost.

The underlying theme that provides the framework for this volume is the importance of the integration: how the combination of different sources of remotely sensed data can conduct to a much better understanding and documentation, leading to an improved archaeological heritage management of the landscape. This volume, in line with the purpose of the Europae Archaeologia Consilium, aims to help develop broad based strategies and in turn, especially for the emerging remote sensing techniques, a guide to good practice. It provides an important resource in defining and discussing the current progress that has been made in remote sensing, and how these techniques can be used in the future to help preserve the archaeological heritage.

Stephen Kay

M. Serlorenzi (ed.), *SITAR. Sistema Informativo Territoriale Archeologico di Roma. Atti del I Convegno (Roma, Palazzo Massimo, 2010)*, Roma 2011, Iuno Edizioni.

Il 9 novembre 2011 si è tenuta a Palazzo Massimo alle Terme la seconda giornata di studi sul SITAR, il Sistema Informativo Territoriale Archeologico di Roma: è stata quella l'occasione per presentare gli atti della prima giornata, svoltasi

sempre a Palazzo Massimo nel 2010, raccolti in un volume curato da M. Serlorenzi. Gli atti, che qui vengono recensiti, costituiscono «un passaggio molto significativo nel percorso di sviluppo del Sistema Informativo della Soprintendenza Speciale per i Beni Archeologici di Roma, in particolar modo per la codifica dei nuovi standards procedurali dedicati alla redazione, al trattamento e alla digitalizzazione delle documentazioni archeologiche, sia d'archivio che di produzione corrente».

Il volume, piacevole nella grafica e arricchito da immagini a colori, raccoglie i diversi articoli divisi in una parte generale, una tavola rotonda e una sezione finale, più specifica, che illustra il SITAR nei suoi aspetti di dettaglio progettuali e procedurali. Innanzitutto, che cosa è il SITAR? Lo spiegano le parole del soprintendente archeologo di Roma, A.M. Moretti, nella prefazione: si tratta di un sistema informativo in grado di registrare «tutti i dati archeologici noti entro i confini del Comune di Roma, una soluzione flessibile» che riesce a «sistematizzare la complessità dei dati, accogliendo su una medesima piattaforma sia quelli dell'area centrale, relativi a monumenti conservati nella loro integrità e universalmente noti, sia le più labili e frammentarie testimonianze emerse grazie agli interventi di archeologia preventiva, tanto in ambito urbano quanto nelle periferie dove l'urbanizzazione procede rapidissima cancellando aree fino a ieri appartenenti alla campagna» (p. 5).

Un lavoro complesso avviato nel 2007 e portato avanti da una sinergia di forze e competenze diversificate e che si è avvalso in modo estremamente positivo di giovani collaborazioni: lo sottolinea M. Serlorenzi (*Il SITAR: Sistema Informativo Archeologico di Roma*) nel suo intervento, dove si raccontano anche la storia, le ragioni, l'architettura e gli sviluppi del sistema «inteso principalmente come un catasto archeologico in cui registrare innanzitutto le dimensioni fisiche attuali e, dove possibili, originarie del bene». Un sistema in cui si è scelto di privilegiare «il binomio fondante della cronologia e funzionalità» secondo «una logica…strettamente topografica che ha escluso in questa prima fase qualsiasi approfondimento sulle singole stratigrafie e sui materiali rinvenuti» (p. 15).

G. Azzena (*Una logica prospettiva*), lasciando da parte il suo pessimismo e la sua sfiducia verso la possibilità di costruire una base di conoscenza archeologica condivisa, più volte manifestati (ad es. in *Tancas serradas a muros. Tracce di incomunicabilità nel "linguaggio" dell'archeologia, tra tutela, archeologia del paesaggio e pianificazione territoriale*, «Archeologia e Calcolatori», 15, 2004), guarda con maggiore fiducia verso questo nuovo Sistema Informativo, il cui primo pilastro deve, secondo la sua opinione, essere quello della condivisione («condivisione in rete e rete di condivisioni, non solo di dati tra i tanti che li producono o li detengono… ma soprattutto condivisione dell'informazione tra tutti: amministratori, gestori, progettisti, urbanisti, utenti, cittadini…», p. 34). Azzena sottolinea anche l'importanza dell'approccio multi scalare del sistema e le numerose letture dell'informazione da esso offerte, in grado di venir incontro alle diverse esigenze dell'utenza.

Sul rapporto SITAR - archeologia preventiva si concentra S. Campana (*SITAR e archeologia preventiva*), mettendo in rilievo la scelta di agilità e sintesi che è stata fatta nell'implementazione del sistema: eliminazione di ogni forma di ridondanza dei dati, abolizione di ogni rappresentazione simbolica, mancanza di primitive quali il punto e la linea nella rappresentazione delle evidenze archeologiche. L'archeologia preventiva è nata in Italia in anni recenti grazie ad alcune importanti disposizioni normative (d.lgs. 42/2004, l. 109/2005), che sono ancora da perfezionare, ma che forniscono preziosi e nuovi strumenti di tutela. Lo ricorda S. De Caro (*L'Archeologia Preventiva e la standardizzazione dei dati*), mettendo in luce soluzioni adottate e problemi aperti.

Dei numerosi progetti informatici che caratterizzano la ricerca archeologica di oggi si dà conto negli interventi successivi incentrati su Roma e Lazio. Apre la serie il contributo di A. Carandini e P. Carafa (*Il Sistema Informativo Archeologico di Roma Antica*), che descrive il Sistema e il suo rapporto con il SITAR, di cui si sottolinea il ruolo di "grande cervello informatico", in grado di unire tutta l'evidenza e capace di superare le generazioni che lo hanno prodotto e di essere continuamente perfezionato, ampliato, arricchito. Il Sistema Informativo Archeologico presentato è un GIS progettato dai due autori che ha come oggetto la città antica dalla metà del IX secolo a.C. circa alla metà del VI secolo d.C. ed è stato pensato per finalità scientifiche piuttosto che di tutela o di gestione del territorio. Esso contiene dati e informazioni (strutture, reperti, fonti letterarie e iconografiche, cartografia storica) riferibili in modo univoco ad un luogo o ad un tempo ed esclude quegli oggetti che non siano riferibili né ad uno spazio, né ad un'epoca.

Dopo un articolo dedicato al Piano Paesisitico Regionale Lazio (D. Iacovone, G. De Vito, *L'importanza della cooperazione istituzionale per la realizzazione del Piano Paesisitico Regionale Lazio*), si torna su Roma con due progetti, il primo incentrato sull'iconografia urbana e la documentazione archeologica sulla città (P. Micalizzi, S. Maggaudda, P. Buonora, L. Sasso d'Elia, *L'informatizzazione della cartografia storica di Roma. Aspetti urbanistici, archeologici, archivistici e tecnici*), che ha prodotto un WebGIS di agile consultazione, gratuito e ampliabile nel tempo, e un secondo lavoro dedicato al patrimonio immobiliare comunale, realizzato dall'ufficio di Conservatoria (P. Mattera, *Il sistema informativo territoriale della Conservatoria immobiliare del Comune di Roma. Interscambio di dati ed interazione tra sistemi*): anche'esso un WebGIS, il Mpic, in grado di gestire i dati relativi a questo ingente e complesso patrimonio della nostra città.

La Tavola rotonda riunisce quattro brevi articoli, partendo da quello di L. Moro (*SITAR. Riflessioni sulle regole e i requisiti per i sistemi informativi del MiBac*): qui si sottolinea come, in un tempo in cui la rete costituisce sempre più un ambiente privilegiato per uno scambio di conoscenze in "tempo reale", sia oltremodo necessaria l'interoperabilità dei sistemi operativi. È questa l'unica strada che potrà garantire una vera rivoluzione per la condivisione della conoscenza, soprattutto per quella mirata alla tutela del patrimonio culturale. G. Sassatelli illustra il lavoro della Commissione paritetica Università/MiBAC sul sistema informativo archeologico delle città italiane e dei loro territori (*La Seconda Commissione ministeriale per la formazione di un Sistema Informativo Territoriale Archeologico Nazionale*). Si mettono in luce le linee operative seguite e orientate, anche in questo caso, verso l'uniformità dei dati per ottenere il necessario dialogo tra gli utenti coinvolti, nonché verso il recupero dei dati già raccolti al fine di mettere in rapporto sistemi del passato con quelli del presente. A. Gottarelli descrive quindi il *Progetto di Network della Ricerca Archeologica*, mentre il contributo conclusivo di M.P. Guermandi si sofferma sulla storia del sistema CART, la Carta Archeologica del Rischio Territoriale, nato nel 1995, di cui si parla come un'esperienza positiva, che «per la sua durata può costituire un riferimento ormai importante nei meriti e nelle criticità» (p. 109) (*I GIS per una archeologia del territorio. Un esempio "storico", alcune questioni aperte, un obiettivo*).

Si entra quindi nell'esame dettagliato del SITAR attraverso diversi interventi che ne mettono in luce i suoi vari aspetti: il rapporto tra dati archeologici e georcheologici (E. Farinetti); la sua architettura informativa e la logica del sistema (A. De Tommasi, A. Varavallo, M. Loche, M. Santamaria); l'interoperabilità con il MPic (R. Grassucci); il ruolo della documentazione d'archivio (I. Jovine); le procedure di acquisizione dei dati (F.C. Sabbatini); gli apparati schedografici (S. Ruggeri, A.

Cecchetti); la settorializzazione delle entità informative (P. Gringmuth, C. Parolini, A. Pintucci); gli standard di redazione della documentazione di scavo (V. Di Stefano, C. Cordone, S. Picciola); le politiche di sicurezza (G. Leoni); la formazione (C. Tempesta); il rapporto con la formazione universitaria (F. Lamonaca, V. Boi, M. Stacca); il ruolo come strumento di tutela (A. Colasanti, D. Ainis, D. Garritano, R. Pardi, S. Zacchia); la modellazione dei dati tridimensionali (V. Boi, C. Cordone, F. Lamonaca, S. Picciola, M. Stacca).

Il volume sancisce dunque, usando ancora le parole di Anna Maria Moretti, «la nascita ufficiale del Sistema e, soprattutto, ne favorisce la diffusione, rendendo disponibili al pubblico, ed in particolare a tutti i professionisti che dovranno utilizzarlo, un quadro di riferimento sui principi, il metodo ed i contenuti del progetto», con la consapevolezza che per parlare di Tutela e Pianificazione servono coscienza e sensibilità comuni e condivise.

Alessandra Caravale