



ArcheoSciences

Revue d'archéométrie

33 (suppl.) | 2009

Mémoire du sol, espace des hommes

Changing perspectives on the city of Cyrene, Libya: Remote sensing and the management of the buried archaeological resource

**Richard Cuttler, Chris Gaffney, Vince Gaffney, Helen Goodchild, Andy
Howard and Gareth Sears**



Electronic version

URL: <http://journals.openedition.org/archeosciences/1295>

DOI: 10.4000/archeosciences.1295

ISBN: 978-2-7535-1599-4

ISSN: 2104-3728

Publisher

Presses universitaires de Rennes

Printed version

Date of publication: 30 October 2009

Number of pages: 65-67

ISBN: 978-2-7535-0943-6

ISSN: 1960-1360

Electronic reference

Richard Cuttler, Chris Gaffney, Vince Gaffney, Helen Goodchild, Andy Howard and Gareth Sears,
« Changing perspectives on the city of Cyrene, Libya: Remote sensing and the management of the
buried archaeological resource », *ArcheoSciences* [Online], 33 (suppl.) | 2009, Online since 30 October
2011, connection on 21 April 2019. URL : <http://journals.openedition.org/archeosciences/1295> ; DOI :
10.4000/archeosciences.1295

Changing perspectives on the city of Cyrene, Libya: Remote sensing and the management of the buried archaeological resource

Richard CUTTLER*, Chris GAFFNEY**, Vince GAFFNEY*,
Helen GOODCHILD*, Andy HOWARD* and Gareth SEARS*

Key words: Cyrene, Cityscape, Remote sensing, Visualisation, Buried resource.

Cyrene, a designated UNESCO World Heritage Site (WHS) in eastern modern Libya, was the leading city of the Libyan Pentapolis. Settled by Greek colonists toward the end of the 7th century B.C., it remained an active Graeco-Roman city of distinctively Hellenic character until the time of the Islamic conquest (A.D. 643). Archaeological missions from America, Italy, and the United Kingdom have excavated in Cyrene for more than a century. As a result the city is well known from extensive excavations and the proliferation of significant upstanding remains. While it is true that intrusive excavations remain at the forefront of the investigation of this site, the role of non-destructive remote sensing is increasingly important due to management issues as well as general recognition that geophysical information may contain crucial interpretative information with respect to city planning and the use of social space (eg Benech 2007). The current program of remote sensing endeavours to redress the balance between the 'obvious' monumental archaeology and the hidden remains, of equal archaeological significance, that form the majority of the site. A dilemma at the start of the project was how do we map and monitor the monumental aspect of the site, how do we assess the unseen but potentially

important remains and, fundamentally' how do we link these two together?

During 2006 a preliminary field study (Cuttler et al, 2006) the authors noted the following:

- That the primary requirement of the world heritage site at Cyrene is an adequate base map of contemporary and ancient features to assist in the management and development of the site.
- That the value of data from current and future excavations at Cyrene would be significantly enhanced by provision of remote sensed data for the settlement as a whole and that this would support the provision of a management plan for the world heritage site.
- That historical and archaeological data from the town would be enhanced by a regional survey.

Experience gained while mapping other townscapes, such as Wroxeter (Gaffney et al 2000) and Forum Novum (Gaffney et al 2004) suggests that remote sensing will play an important part in the analysis of Cyrene. During the 2007 field season it was decided to trial the multi sensor Ferrex system for large scale coverage of the city. The logic behind the decision to use this system was based on field trials at Wroxeter using a non-magnetic cart, which was enabled

* *University of Birmingham.*

** *University of Bradford.*

with real time GPS for navigation and three dimensional data location. While the sensors are not as sensitive as many on the market, the magnetic anomalies within most ancient towns are normally well above the minimum detection level for this sensor. At Wroxeter the system easily matched the results from earlier surveys, partly due to the strength of response, the increased sampling density resulting from 0.5m traverse separation and a reduction in pre-processing due to exact positioning of data.

A preliminary technical report has been published on the magnetometry data from the 2007 season (Gaffney et al 2008). The Foerster system worked well under arduous conditions and significant magnetic results were obtained (see Fig. 1). In this paper the authors chart the progress in linking the digital data sets that are inherent within the heart of the investigation. In particular the project has at its core:

- A systematic, GIS-based mapping programme of the surface and sub-surface remains at Cyrene to support conservation and development planning.
- A comprehensive 3D scanning survey of the upstanding remains to provide highly accurate point and surface models of the upstanding structures for reconstruction and conservation.
- An extensive geophysical survey to provide accurate plans of sub-surface remains to improve knowledge of the nature and extent of the World Heritage Site.
- An extensive GIS-based regional database incorporating available environmental and archaeological data for the site and hinterland to support regional and site planning policy.
- An archaeological, geomorphological and palaeoenvironmental regional survey to support regional and site-based planning policy.



Figure : shows some geo-referenced magnetic results (-7nT white...+7nT black) on a Quickbird image that includes the monumental Temple of Zeus (at bottom of image) and other significant archaeological features.

Shortly after the first major fieldwork season, the Libyan government announced The Cyrene Declaration, which detailed the establishment of the Green Mountain Conservation and Development Authority. This is an ambitious plan to create the world's first large-scale conservation and sustainable development project. Naturally, this encompasses the WHS and the understanding of the whole of the city is crucial if the relationship between Cyrene and its hinterland is to be explored.

In this paper the authors illustrate the complex relationship between the digital data sets from both the magnificent upstanding Graeco-Roman remains and the unseen (and therefore undervalued) buried remains located using geophysical techniques. Crucial to the holistic understanding of the site is that, where appropriate, the buried remains are given the same value as the upstanding remains. By using digital recording of all data sets 'equivalence' can be made between the many forms of archaeological data – while the value of this concept is evident in the visualisation of the city, it is also of great importance in the delimitation and understanding of the complete cityscape.

References

- BENECH, C., 2007.** New approach to the study of city planning and domestic dwellings in the ancient Near East. *Archaeological Prospection*, 14: 87-103.
- CYRENE ARCHAEOLOGICAL PROJECT FIELD SURVEY, GIS AND ASSESSMENT, 2006.** unpublished report, [http://www.cyrenaica.org/CAP_report_2006_rev.pdf].
- GAFFNEY, C., GAFFNEY, V., CUTTLER, R. and YORSTON, R., 2008.** Initial results using GPS navigation with the Foerster magnetometer system at the World Heritage site of Cyrene, Libya. *Archaeological Prospection*, 15 (2): 151-156.
- GAFFNEY, C. F, GATER, J. A, LINFORD, P, GAFFNEY, V. L. and WHITE, R., 2000.** Large-scale systematic fluxgate gradiometry at the roman city of Wroxeter *Archaeological Prospection*, 7 (2): 81-99.
- GAFFNEY, V., GOODMAN, D., NISHIMURA, Y. and PIRO, S. 2004.** Discovery of a 1st century AD Roman amphitheatre and other structures at Forum Novum by GPR. *Journal of Environmental and Engineering Geophysics*, 9 (1): 35-41.