A report on Geophysical Survey work at Castelporziano

APRIL 2006

Timothy Evans
Birmingham Archaeology Unit

Introduction

The following report is a brief summary of the geophysical survey undertaken at the Castelporziano estate as part of the project *The evolution of Rome's maritime facade: archaeology and geomorphology at Castelporziano*. The work was carried out from Monday 10 to Friday 21 April 2006 by under the overall direction of Amanda Claridge.

Methodology

The geophysical work took the form of a resistivity survey using the Geoscan RM15 module with a 0.5m PA1 twin array. All results were processed using the associated Geoplot 300mx software. With all the data, the standard processing for resistivity data as recommended within the Geoplot manual took place:

- A clip to 3 standard deviations off the mean average.
- A high pass filter using a gaussian filter.
- A de-spike process at 3 points off the median average.
- For presentation purposes the data was subjected to the Interpolation procedure along the Sin/x and y-axes.

Copies of these data sets, along with the raw un-processed files have been left with the digital archive on the Castelporziano estate. Backup copies have been made and can be obtained from the author.

Area B2 (SS3) (Fig. 1)

This was surveyed during 10-15 April and covered an area approximately 180m x 20m over the location of a known portico structure. The survey was restricted in places by the dense undergrowth and woodland, though where possible this was worked around. Any pieces of ground deemed unworkable were recorded with the default 'dummy log' reading. The survey area was divided into 10m x 10m grids and traversed at a 0.5m sample interval on both the x and y axis, thus providing a maximum total of 400m per grid. This strategy was adopted in view of the suspected width of sub-surface features (less than 1m). The output current was constantly 1MA and the gain setting adjusted to x10 in order to compensate for a background resistance of less than 100 Ohms.

At a later date (20 April), a 10m x 20m corridor heading to the Northwest of the main survey area was cleared in order to facilitate further work. The survey followed an evening of heavy rain which severely affected the drainage pattern of the area, any discrepancies in the mean average reading of data collected on this day can be ascribed to this reason.

Initially results proved disappointing, with blanket areas of high resitivity masking any discernible architecture within the dataset. However, knowledge of the site formation processes derived from previous trial excavations proved invaluable. A large proportion of the survey was carried out on a raised area comprised of significant depths of wind blown sand. Analysis of the numerical data showed that this type of background drift geology was providing results +200% above a mean average (c. 70-74 Ohms) and thus introducing a massive bias into the visual data. Even high resistance features such as tufa and brick walls should only vary a maximum of 20-30% away from the mean average. Subsequent processing and re-evaluation of the data set showed areas of anomalies forming right angles of relatively lower resistance (80-100 Ohms) within these areas of massively high readings. One of the current theories in use is that both during the lifetime and after the abandonment of the site large deposits of windblown sand accumulated between the standing walls. The overall effect of this is to produce a 'negative' image of the relative resistance-the

opposite to what one would normally expect. Combined with the survey DEM and small scale excavations the geophysical data confirmed the existence of the portico structure, with an apparent 90 degree turn towards the area of the ancient coastline. Furthermore, possible architecture can be seen abutting the possible portico to the Northwest, perhaps linking to the villa site further along the coast.

All grids were given the prefix SSr001-034; a master plan of the layout has been saved as a Ssrmaster.mxd file and the composite visuals have been stored as Ssrmaster_unpro.cmp and Ssrmaster_pro.cmp.

Vicus Augustanus: Zone H (Fig. 2)

An area 20m x 20m was surveyed on 17th April using the same settings as on area SS, with the area again split into 10m grids. The results appeared to confirm the trend noted the previous week, with potential architecture only providing a relatively weak response above the background mean. Further explanations for the lack of a strong contrast could lie with the sandy and well drained nature of the subsoil layers. This area was also surveyed with a 1m-twin PA5 array to provide a deeper depth of reading (max 2m) to compare against the shallower PA1. Results showed the same trends but with slightly less clarity, perhaps suggesting a limited archaeological presence at this depth.

All files were saved with the prefix CPhres 001-004 with the PA5 array saved as Cphdeep 001-004. The respective prefixes were used for the mxd and cmp files.

Recommendations for future work

The 2006 survey season has demonstrated that a densely sampled resistivity survey can be effective on the subsoil conditions particular to the Castelporziano estate, especially when combined with the detailed DEM and small scale excavation. One of the best areas for future work would be on the unsampled sand dunes further towards the ancient coastline in order to establish the extent of the portico structure. Likewise, more work in area H to allow a broader picture of the surviving architecture in the Forum area. Another research question would be the influence of sub-surface water retention by the different subsoils; would this (and the data) be affected by seasonal change?
From a geophysical perspective, a multiplexed resistivity survey - allowing the collection of data at different levels - would be of interest. The effect of the well drained sand could then be examined at different depths, allowing some of the 'background noise' to be filtered out. There might be practical difficulties since the array was designed with a more barren and level ground surface in mind, but if a small flat area were available, it could provide a valuable study. Furthermore, a basic fluxgate gradiometer survey, if available, might still be of use. One of the advantages of the recent software upgrades is the facilitation of more sensitive filters and an increased visual appearance.
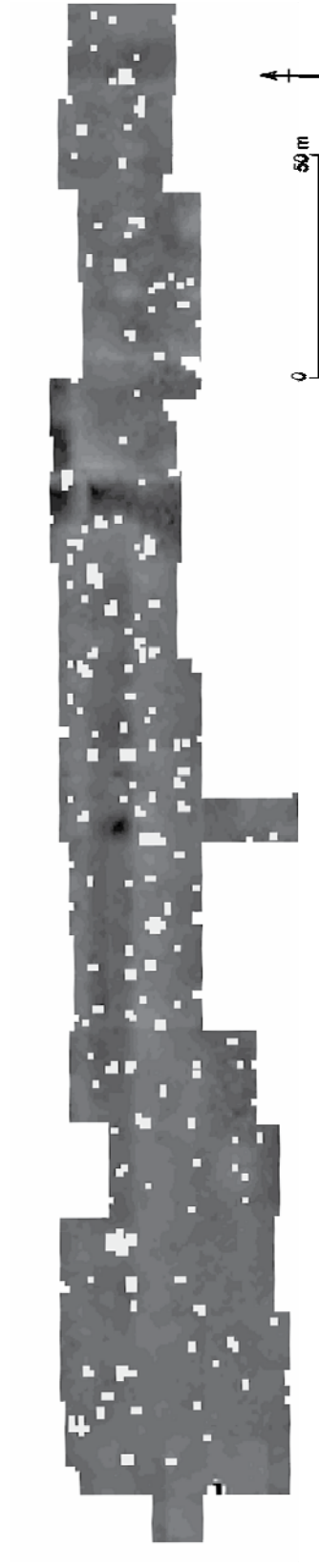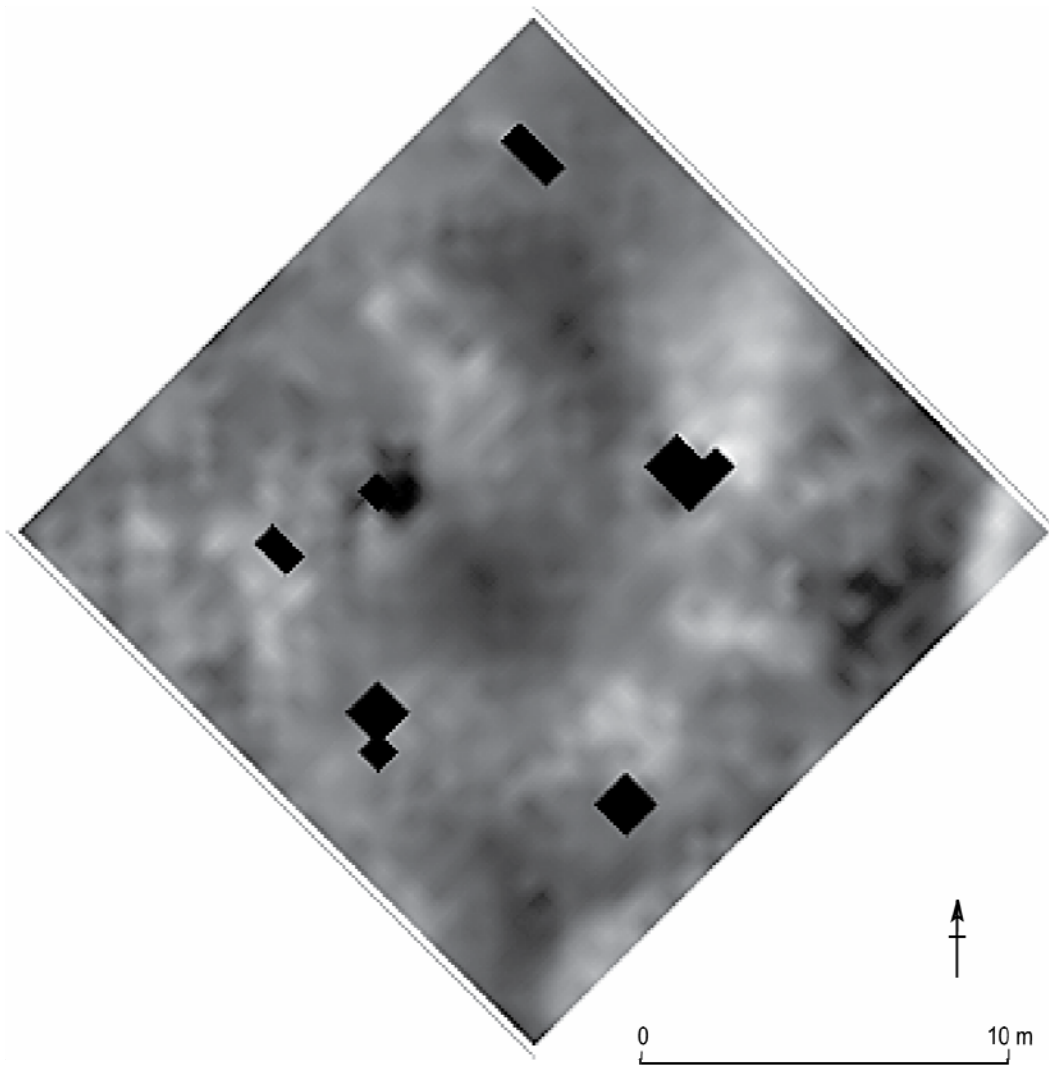
Fig. 1 SS2-3 resistivity April 2006

Fig. 2 Vicus zone H resistivity 2006