

Final dissertation: Master of Science in Geotechnologies for Archaeology

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Dr. Francesca Paola Di Casola

Via Latina project. New geophysical investigations at the first mile of the Via Latina

Internship at British School at Rome

Between 25 and 27 July 2022 geophysical prospections were carried out in via di Porta latina n.13, in the area of the residence of the Norwegian ambassador in Rome. The aim of the project of the British School at Rome and the Norwegian Institute, is the study of the area at the first mile on the ancient via Latina in order to find archaeological evidences and add new data that can give a more complete picture of the area.

The survey used a 200 and 400 MHz georadar in three different sectors (Areas A, B and C), and the columbarium at the entrance to the property has been investigated with Laser Scanner technology. Following the processing of the georadar and 3D data, the results have been visualized and interpreted in a Geographical Information System. The high-resolution recording of the columbarium has permitted an analysis and a comparison with other funerary monument of the same area.

Turning now to the geophysical surveys, the GPR data has provided a general understanding of the area and new data for the research. Areas A and C recorded the presence of linear anomalies of high amplitude, arranged in NE-SW direction. Considering the shape and the direction of these signals, whose geometry probably indicates an anthropogenic origin, it is not to be excluded that they can be of archaeological significance, but the absence of nearby archaeological structures makes complex the interpretation of the anomalies.

In Area B an interesting dataset was recorded that provides useful information regarding the use of the area in an earlier period. The GPR recorded a series of anomalies arranged in herringbone pattern that, given the comparison to other similar forms of land organization discovered in the city, could be referred to an agricultural practice of uncertain chronology.

Dr. Giorgia Frangioni

Potential and Archaeological Risk: The new GIS Template as a support for the drafting of Ministerial documentation
Internship at Geoexplorer I.S. s.r.l.

This Archaeological study, drawn up following a reconnaissance survey, is aimed at the preliminary verification of the archaeological interest related to the Project of geophysical prospecting activities. The preliminary archaeological risk assessment contained in this study will be aimed at analysing the critical issues potentially associated with subsurface prospecting activities.

In the paper, a derivation of the GIS software, developed from open-source sources, i.e. QGIS (Quantum GIS), will be examined. Within the latter, the functioning of the new Template that the Italian Central Institute for Archeology has developed will be shown, in order to replace the now former Archaeological Impact Assessments (VIARCH) and introduce the new Verification model Estimate of Archaeological Interest (VPIA).

Dr. Matteo Innocenti

Photogrammetry for archaeology. The photogrammetric investigations carried out on seventy-three finds from the Archaeological Area of Gonfienti (PO - Italy)
Internship at Eos Arc S.r.l.

This contribution presents the results of a photogrammetric survey carried out on various archaeological finds from the archaeological area of Gonfienti (PO - Italy), on behalf of the company Eos Arc of Rome. Photogrammetry is a surveying technique that allows to reconstruct the shape and position of objects to be determined metrically, starting from at least two distinct photogrammetry frames capturing the same object. After contextualizing the artefacts by briefly discussing the history of the Gonfienti area and its findings, this text describes the survey method carried out in the field and the procedures for data post-processing, from the alignment of photograms to the creation of orthophotos using the Agisoft Metashape and CloudCompare software, up to the processing of the final tables using Autocad software.

Dr. Eng. Antonio Merico

Multiparametric geophysical surveys: the case studies of the archaeological sites of Pompeii (Palestra dei Gladiatori - Gladiator Gym) and Ustica (Villaggio dei Faraglioni - Village of the Faraglioni)

Internship at INGV

Geophysical surveys hold a relevant role in subsoil exploration and are more and more frequently employed in the archaeological field as assisting tools to locate and characterise areas of interest, on which to later concentrate the efforts of excavation activities.

Multi-approach geophysical investigation techniques are of paramount importance in the context of the work presented: as proven in especially complex field scenarios, being able to observe the underground through complementary magnifying glasses (different physical responses), not only is key to deepen the knowledge of the spatial distribution of anomalies, but is also a valid tool to define – or at least restrict the list of – materials producing said anomalies, which yields a more complete knowledge of the investigated site.

Dr. Veronica Sanvito

Photomonitoring, an innovative approach to cultural heritage monitoring

Internship at NHAZCA S.r.l.

Since the mid-20th century there has been an increasing awareness of the importance of a preventive action for the protection of cultural heritage and it has been made clear the essential role of monitoring. Cultural heritage is constantly exposed to natural and anthropic risks and therefore it is required a periodic and systematic control of their conservation status. This procedure allows the causes and reasons for degradation to be known and prompt action to be taken. Monitoring can be considered the main phase of heritage preservation because it enables the determination of future phases of restoration or conservation projects.

In this perspective Photomonitoring can be considered an innovative method by which one can be able to monitor the heritage structural health using digital images analysis. Throughout the internship at Nhazca the process of applying this method to the cultural heritage was explored and the pros and cons were particularly pointed out. The focus of the internship was to define some best practices for the monitoring performance, starting with the best tool to use, according to the analysis, static or dynamic, up to some method tips to obtain images without errors that could make the images unusable.

A Nhazca-developed modular software to process digital images specifically, Iris, was used to analyse the data. Iris can work on images obtain from several sensors and platforms, such as optical, radar, thermal, satellite and terrestrial images but, throughout the internship, there was a focus on optical images. Features included Change detection analysis, displacement analysis based on correlation algorithms, and multiple image analysis to obtain displacement time-series, were used. Furthermore, pre-processing and post-processing phases were useful to improve input and output data.

The Aurelian Walls were selected as case study. Since any optical device can be used to perform Photomonitoring, in this occasion a tablet was used to obtain the images. The photos were taken once a week for six weeks, only in K sector. The aim was to get the images always from the same position and from the same angle and to do so it was used Care, a feature tracking app developed by Nhazca. The images were then co-registered and processed with Change detection analysis. The results demonstrated that it is possible to perform Photomonitoring using a tablet instead of a camera, but it must be considered that there may be more disruptions to address, such as different lighting conditions and poor focus.