

S26 The portable XRF revolution: Elemental analysis for all?

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The recent surge of popularity in the use of portable XRF in archaeology has been felt across all spheres of the discipline. Applications of the technique are now wide and varied, and the affordability, flexibility, and non-destructive nature of this type of elemental analysis, together with easy to use software and internal calibration parameters have created an instrument that many new users are keen to embrace. Although portable XRF is being applied in increasingly novel and inventive ways, a commonality is the production of large datasets that must be statically treated and analysed. It is often at this point where interpretation begins and the many potential problems of integrating elemental data with archaeological research questions occur. This session invites contributions from all portable XRF users to discuss the advantages and disadvantages of the technique, the methods they have used, and the practical and technical opportunities and restrictions. We are keen to examine the different stages of a project where portable XRF can be applied, whether as a prospection method, to screen through stratigraphical layers on a site, or within the lab on artefacts with extensive sample processing. A particular focus will be the challenges within the analysis, data processing and interpretation stages. The aim is to cover a broad range of material types, in-situ and ex-situ analysis, and the wide range of archaeological research questions the instrument can help address. We hope to create a productive, inclusive discussion between both new and experienced users from all backgrounds.

S26-01 Seeing things differently. The use of combined geochemical and geophysical prospection techniques to investigate early Islamic town planning

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This paper examines the combination of in-situ portable X-Ray Fluorescence (pXRF - Niton XL3TGOLDD+), and geophysical survey data obtained from the 10th century, early Islamic site of Madinat al-Zahra in Cordoba, Spain. The work presented here forms part of a larger research project that investigates the key role that glass, ceramic, and metal production had in the creation of urban centres, and the important question of technology transfer between Muslim, Christian and Jewish groups within Spain and in the wider Mediterranean at this time. Preliminary results are presented that demonstrate how this novel approach to site-wide prospection has identified a range of likely production areas within the medina (city) at Madinat al-Zahra. Elemental 'hotspots' obtained from a relatively coarse pXRF survey of the top-soil at the site are seen to be directly linked to substantive magnetic anomalies that have geophysical signatures suggestive of high-temperature activities. Iron working and probable ceramic production were located, and specifically areas of elevated lead, copper and manganese were found to be linked to the remains of furnaces that may have produced the famous glazed ceramics known to be manufactured on the site. The results move beyond enabling a more nuanced approach to the interpretation of geophysical datasets, and towards an integrated archaeological prospection tool on a site-wide level.

S26-02 Pipes, pedalis and portable X-ray fluorescence: New avenues for the study of Roman building materials

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This paper presents aspects of the 'Building Roman Britain' project which aims to use rapid, non-destructive chemical analysis to explore the procurement, production and use of building materials in early Roman Britain. Specifically, it focuses on the development of an analytical framework that employs portable X-ray fluorescence to target specific questions regarding the

production and use of ceramic building material (CBM) from Fishbourne Roman Palace and the Roman Bath Museum. In the context of Roman Britain, CBM production is a new technology practiced on an industrial scale. Its use could be considered a fundamental expression of Roman identity and the need for high volumes of material in a variety of forms presents interesting questions regarding how production was practiced and organised. CBM is one of the most abundant finds on many Roman sites and yet as an archaeological resource it is comparatively under researched. Its abundance coupled with its generally fragmented state can lead to inconsistent recovery and reporting practices, especially as single sites can produce literally tons of material. This can present significant problems for those tasked with interpreting and curating the material. On occasion, CBM may be preserved in-situ in the form of floors, hypocausts and foundations which represents a significant resource in the presentation of archaeology to the public. This leaves some of the most significant examples of CBM, from a public engagement perspective, inaccessible to lab-based study while there remains an abundance of accessible material that could serve to overwhelm traditional analytical methodologies. The work presented here explores these issues through the chemical analysis of samples of known date, form and fabric in order to explore the variation in production/raw material choices coupled with in-situ material in the two museums; giving a new avenue for the characterisation of archaeological material and the interpretation of museum exhibits.

S26-P1 A multidisciplinary project for the study of historical landscapes: New archaeological and physicochemical data from the “Colline Metallifere” district

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In the last years the Colline Metallifere district (southern Tuscany) has become a multidisciplinary study area. The territory is very well known for the presence of a large copper, silver, lead and iron sulfide deposit that was exploited over the centuries. A protocol for multiscale analysis of landscape and archaeological contexts has been developed and tested on different sites. The core of this protocol is a combination of archaeological, physicochemical and geological analysis, useful to describe and interpret the history of this peculiar region. The poster will illustrate the major results of pXRF analyses undertaken both on excavation sites and territorial samples; these data can be interpreted as possible traces of ancient human activities. In particular, it will be shown how this high throughput technique can be used in multi-scale investigations (intra-situ and medium-large territorial scale) with both predictive and descriptive goals, providing detailed chemical map helpful for excavation planning and historical evaluation of landscape changes. To validate pXRF data, a number of laboratory techniques (EDX, ICP-MS, GF-AA etc) have been applied on environmental matrices (soil, stream sediments), structures and findings. Moreover, preliminary results of pXRF analyses performed on new "key-sites" selected within a 5 years ERC project based in the University of Siena will be presented. The main object of this ERC project (NeuMed. Origins of a new economic union, 7th-12th centuries: resources, landscapes and political strategies in a Mediterranean region) is the study of the Colline Metallifere landscape features (coast, valley, hillsides and mountains), in order to reconstruct and understand the deep changes occurred in settlement patterns, trade routes and in the economical background of the area between Late Antiquity and the XIIth century.