Portable XRF for Anthropology Collections and Archaeologogy

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The Field Museum has gained a wide experience with portable XRF (pXRF) to analyze mostly anthropological and archaeological objects. In this presentation, we will reflect on the 12 years of use of pXRF at our institution, giving us an opportunity to discuss its advantage and limitation when use in a museum setting but also in the field.

PXRF assists conservators and collections managers with determining the presence of toxic elements in our collections. Arsenic based pesticides were applied for decades to preserve organic artifacts. Mercury or lead based pigments are often present on ethnographic objects. Identifying their presence is a priority in order to make sure that the safest handling procedures are followed and that the objects are stored properly to minimize cross-contamination. More generally, pXRF is a very efficient tool to determine the nature of the material, an object is made of.

A large portion of the research developed at the Field Museum deals with the provenance and the circulation of ancient goods. PXRF was found particularly helpful to track the source of the obsidian used to manufacture tools and elements of weaponry in ancient time. This instrument changed the approach adopted by archaeologists for provenance projects. Indeed, pXRF allows the rapid analysis of large groups of objects due to low analytical costs, short time of analysis and the possibility of conducting the analysis virtually anywhere, improving greatly interpretations and conclusions that were affected by sample size, sample bias…etc. Applications with pXRF in archaeology range from in-situ soil analysis to pigment analysis, opening new avenues of research in this field.

PXRF is a tool that motivates curiosity and exploration. In the field of archaeology, this technique has gone through a long period of testing and still needs improvements in some areas such as empirical calibrations. It is now part of the basic tool kit of archaeologists that have now a better knowledge of the capability and limitations of this technique.