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Analysis of Thousands of Prehistoric Mediterranean Obsidian Artifacts Using a Nondestructive Portable X-Ray Fluorescence Spectrometer
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A portable, hand-held X-ray fluorescence spectrometer has been used for a decade to elementally analyze prehistoric obsidian artifacts in the Mediterranean. Nearly 400 geological obsidian samples and 7500 obsidian artifacts have been analyzed. The pXRF can distinguish all individual sources, as well as assign artifacts specifically to most subsources. For the island sources of Lipari, Pantelleria, Sardinia, and Melos, it is important to address the usage of obsidian from specific subsources due to human selection based on physical properties of the raw material and their production practices, which may have changed over time from the Early Neolithic to the Bronze Age. The analysis of 50 or more artifacts from 60 different archaeological sites allows for statistical comparison between sites, and their contexts, geographic areas (e.g. coastal/inland, highland/lowland) and distance from geological sources. The frequency of transport between island sources and mainland sites is suggestive of maritime capabilities also for the transport of domesticated animals, ceramics, and other materials. This presentation will specifically address potential limitations of the portable XRF, including non-destructive surface analysis of potentially heterogeneous materials, and limited trace element detection compared to other analytical methods, versus its highly beneficial “package” of analyzing great numbers of artifacts non-destructively and rapidly without needing to export them from museums and facilities in many countries.