A SHORT HISTORY OF OBSIDIAN STUDIES AND X-RAY FLUORESCENCE SPECTROMETRY AT BERKELEY

In 1968 Robert Jack and Robert F. Heizer (Departments of Geology and Geophysics, and Anthropology, UC, Berkeley) published the first x-ray fluorescence spectrometric (XRF) analysis of archaeological obsidian in the New World. The next year (1969) Jack and Ian Carmichael (Department of Geology and Geophysics, UC, Berkeley, now the Department of Earth and Planetary Science - EPS) published "The Chemical 'Fingerprinting' of Acid Volcanic Rocks". And while Cann and Renfrew (1964) had four years earlier published their NAA characterization of Mediterranean obsidian, Berkeley's XRF analysis of obsidian artifacts for source provenance was the first in the New World, and the first of a multitude of XRF obsidian projects at Berkeley. For nearly 40 years now, Berkeley has remained a center for obsidian studies using x-ray fluorescence spectrometry (Jack 1971, 1976; Jack and Carmichael 1969; Jack and Heizer 1968). Robert Jack analyzed over 1500 obsidian artifacts worldwide during this period with Thomas Jackson (1974) who began to focus on California studies. Since that time a list of the ceramic, obsidian, and other rock provenance studies using Berkeley XRF facilities by faculty, graduate students, undergraduate students and scholars from other universities using Berkeley facilities would fill pages (see Hughes 1983, 1984; Jackson 1974, 1986; Shackley 2005a). And since 1990, the Geoarchaeological XRF Laboratory at UC, Berkeley has analyzed literally more than 10,000 artifacts, mostly obsidian and other volcanic rocks supporting faculty, student, government, and cultural resource management studies worldwide, and particularly from the North American Southwest (see Shackley 2005a). After the demise of the Spectrace 440 in EPS, Shackley purchased a Spectrace analog *QuanX* EDXRF instrument to continue the work in 2003. While the early studies were primarily focused on developing source standard data bases for various regions of the world, more recent graduate student and senior scholar research using these facilities are now integrating obsidian provenance studies into current archaeological theory and method in western North America, South America, East Africa, Oceania, and Mesoamerica (Craig 2005; Dillian 2002; Hull 2002; Joyce et al. 2004; Kahn 2005; Negash and Shackley 2006; Negash et al. 2006; Shackley 1991, 1992, 1995, 1998a, 1998b, 2005a; Silliman 2000; Weisler 1993, 1997). Indeed, while other techniques have been shown to exhibit more instrumental precision, XRF, particularly energy-dispersive XRF, has remained the leader in non-destructive studies of artifacts (see Davis et al. 1998; Hughes 1983; Shackley 1998a, 2005a; c.f. Speakman and Neff 2005).

Now, in part due to recognition as a leader in obsidian provenance studies and x-ray fluorescence spectrometry, in 2007 the National Science Foundation became a sponsor of the Geoarchaeological XRF Laboratory at Berkeley through the Archaeometry Competition in the Anthropology Program. Thermo Scientific the producer of the new digital *Quant'X* EDXRF and the industry leader in XRF spectrometry has graciously extended the maintenance warranty for the lab to four years insuring continual volcanic rock, ceramic, and historic artifact studies in archaeology well into the future.

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