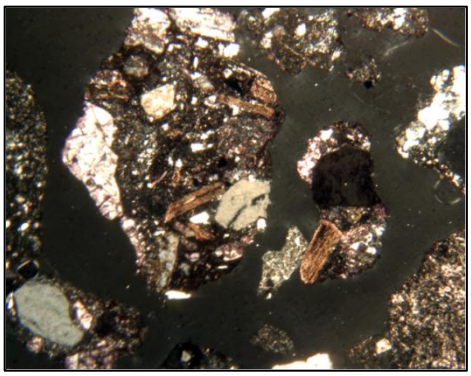
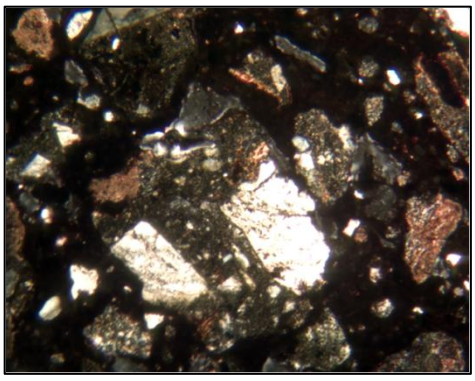
Desert Archaeology, Inc.
Ceramic Characterization Services

Since the 1980s, Desert Archaeology, Inc. (DAI) has conducted research on ceramic provenance and technology using a diversity of approaches. Our signature method has been comprehensive petrographic analysis of sands to provide accurate and specific source assignments. These quantitative petrofacies models cover significant areas of Arizona. Qualitative petrographic projects have been conducted in Arizona, New Mexico, Utah, Nevada, and California. DAI offers a range of instrumental analyses including chemistry, statistical analysis, and scanning electron microscopy. Training in temper identification for ceramicists is also available. Our research petrographer, Dr. Mary Ownby, has seven years of experience analyzing ceramics from a broad range of areas including Egypt, the Near East, and many parts of the Southwest.

All cost estimates are done on a per project basis, depending on the services required to address the research questions.


Sand in hand sample


Sand thin section


Thin section of sherd with sand temper

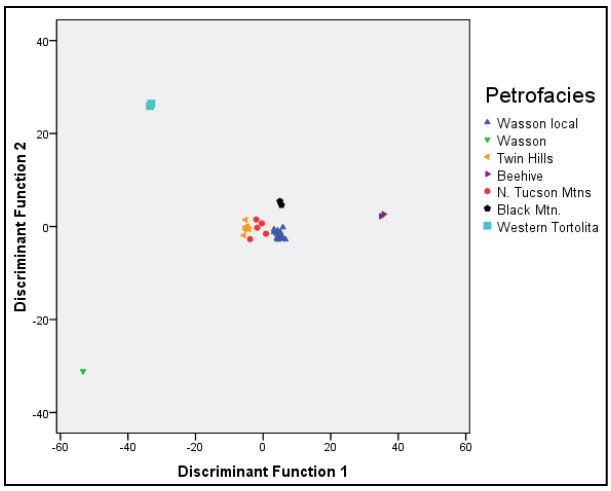
PETROGRAPHIC SERVICES

Binocular Microscopy: Characterization of temper under the binocular microscope and preparation of keys for the recognition of temper types and sources by non-geologists. Coupled with petrographic analysis, binocular microscopy can provide ceramicists with the information they need to accurately recognize and identify temper under low magnification.

Basic Petrography: Basic petrographic identification of rocks, minerals, or other materials used as temper, qualitative description and comparisons, information on paste preparation, and comparison to potential raw materials sent by the client.

Full-scale Provenance Characterization: For sand-tempered sherds from projects within our petrofacies models, we can provide full-scale provenance assessment. Options include binocular analysis by the client with follow-up petrography by DAI, or full characterization and petrography at DAI. Also includes point counting to establish proportions of temper material and to facilitate comparison to sand samples. Image analysis can be included to fully describe grain types and features in a statistical manner. Photographic sample documentation can be added to any level of analysis.

Temper Identification Workshops: For ceramicists working within modeled areas, we can provide two-day temper identification workshops. These workshops start with basic grain type identification and include discussions on statistical analysis, the level of identification accuracy that we can provide, and strategies for choosing research questions commensurate with available data for each region.



Discriminant analysis of chemical data


Scanning electron microscope image

INSTRUMENTAL SERVICES

Chemical Compositional Analyses: Compositional data can be acquired by instrumental Neutron Activation Analysis (through MURR) or other methods (XRF and ICP). DAI can perform statistical analyses, select samples for petrography based on chemical groups, and provide full interpretation.

Microprobe Analyses: Paste composition and analysis of individual inclusions can be performed with a microprobe that has an attached polarizing microscope (available through the University of Arizona) using polished thin sections This service is ideal for investigations of ceramic pastes and relating this information to pottery technology.

Scanning Electron Microscopy: This instrument (at the University of Arizona) is ideal for technology assessments, including: general firing temperatures, high magnification imaging, and compositional analyses of specific points in the paste and inclusions.

All of these techniques can be used in combination with petrography or alone, and can be applied to artifacts besides ceramics, such as beads, figurines, and stone objects.

RECENT PUBLICATIONS

Heidke, James M., and Elizabeth J. Miksa, 2000. Correspondence and Discriminant Analyses of Sand and Sand Temper Compositions, Tonto Basin, Arizona. *Archaeometry* 42:273-299.

Miksa, Elizabeth J., and James M. Heidke, 2001. It All Comes Out in the Wash: Actualistic Petrofacies Modeling of Temper Provenance, Tonto Basin, Arizona. *Geoarchaeology* 16:177-222.

Ownby, Mary F., 2013. *Chemical and Petrographic Analysis of Decorated Pottery from Four Sites in El Malpais National Monument, New Mexico*. Petrographic Report No. 2013-01. DAI, Tucson.

Ownby, Mary F., 2012. *Petrography of Prehistoric Moapa Valley Pottery, Clark County, Nevada*. Petrographic Report No. 2012-01. DAI, Tucson.

Ownby, Mary F., 2012. *Petrographic Analysis of Polychromes and Plain Wares from southern New Mexico and Arizona*. Petrographic Report No. 2012-04. DAI, Tucson. (includes chemistry)

Ownby, Mary F., and Janine Bourriau, 2010. The Movement of Middle Bronze Age Transport Jars: A Provenance Study Based on Petrographic and Chemical Analysis of Canaanite Jars from Memphis, Egypt. In *Interpreting Silent Artefacts: Petrographic Approaches to Archaeological Ceramics*, edited by P. Quinn, pp. 173-188. Archaeopress, Oxford.

Ownby, Mary F., and Carlos P. Lavayén, 2010. *Petrographic Analysis of Pottery from CA-RIV-6897, Coachella Valley, California*. Petrographic Report No. 2010-02. DAI, Tucson.

Ownby, Mary F., Charlotte L. Ownby, and Elizabeth J. Miksa, 2004. Use of scanning electron microscopy to characterize schist as a temper in Hohokam pottery. *Journal of Archaeological Science* 31: 31-38.

Petrofacies Map for Arizona

Petrofacies are areas of sand with similar mineral and rock composition. These areas are delineated through the systematic sampling of sand and its subsequent petrographic analysis. Point counting of the sand grains allows compositional models to be developed through statistical analysis of the data. These models are predictive when the point count data from sand temper is analyzed with the data from the sand samples. This allows for an accurate and specific provenance assessment for pottery samples from within the petrofacies areas. Ten such models have been developed covering Flagstaff, the Payson area, Tonto Basin, the lower Verde Valley, Sycamore Creek, the Phoenix Basin, the middle Gila River Valley, the Tucson Basin and Avra Valley, the entire San Pedro Valley (including Aravaipa Creek), and the Safford Valley.