

American Ceramic Petrography Meeting: Abstracts

Ceramic Petrography and Woodland Period Social Interactions in Florida and the Southeastern United States

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Swift Creek Complicated Stamped pottery from the lower Southeastern U.S. is a premier material for the systematic study of Woodland interactions. Petrographic analysis of Swift Creek pottery was undertaken as part of a research program that integrated materials analyses of pottery, including Neutron Activation Analysis, digital imaging of paddle stamp designs, technological analysis, and absolute dating, to identify patterns of social interaction. Over 200 samples have been thin sectioned from more than two dozen sites across Florida and Georgia, dating between AD 200 and 800. Integrative results indicate that interactions were geographically extensive, but clearly most intensive along particular corridors.

Ceramic production in ancient Peru, ceramic petrography for coastal and highlands sites

Isabelle C. Druc (University of Wisconsin-Madison)

Ceramic petrography in Peru has been conducted for 40 years by very few people, in several coastal and highland sites. However, this type of analysis is gaining interest and a few young archaeologists are getting trained in petrography. In my studies, I use comparative materials, clays and sands, as well as ancient ceramics to help in the determination of provenance and technology, and I conduct ethnoarchaeological studies if ceramics are still produced in the area. Highland productions in general tend to show less mineral diversity, even if different paste groups are recognized. This is illustrated by the study of the ceramics of the highland ceremonial site of Kuntur Wasi (900-200 BC) in northern Peru. It identified four production trends and two different traditions, one of which used pyroclastic material still mined today by potters from the production village of Mangallpa. Coastal productions, to the contrary, present mixed lithologies and mineralogy, by nature of the geology and mixed sediments found on the littoral and up into the lower valleys, mixed by flooding during Niño events, alluvial and aeolian deposits. The case of Castillo Huarmey production, a Wari political site and mausoleum in existence some time during the Middle Horizon (600-1000 AD), on the central coast, illustrates this point. With a team of Polish geologists, clays and sands were collected, made into tiles and fired. The analysis brought forth the existence of a variety of production areas and a panorama of multiple producers. Much of the ceramics appear to have been made with material available in the Huarmey lower valley, coastal area, and adjacent Culebras Valley. Communities of potters sharing the same technological tradition (and types of molds) must have been working close to the coast and in the lower to mid-valley. Upper valley producers probably contributed much less if at all to the distribution network feeding the Huarmey community. Very few non local wares were identified, two clearly from the highlands, eight from other coastal valleys.

This or That or Maybe Both? A synthesis of ceramic petrographic thin section preparation and analysis

Suzanne L. Eckert (Arizona State Museum)

Different traditions exist among ceramic petrographers in terms of how to prepare and analyze their thin sections. To understand the pros and cons of these different traditions, participants at the 2017 American Ceramic Petrography Workshop in Tucson, Arizona were asked to describe how they prepare and analyze their petrographic slides. This presentation summarizes the results of this survey combined with a literature review, discusses the reasoning behind different traditions, and discusses how we may want to move towards a more standardized approach.

Combining PIXE and Petrography to Assess Labor Relations and Interaction in Spanish Northwest Florida

Krista L. Eschbach (Arizona State University)

Between A.D. 1698 and 1763, three Spanish presidios were established in Pensacola to defend Northwest Florida from French and British encroachment. These presidios were to be supplied through the *situado* (royal subsidy) from New Spain and supplemented by native people at the presidios and nearby missions. Because the *situado* was unreliable and the indigenous population was never of sufficient size, Spanish officials bolstered their labor force with castas (people of mixed heritage) from Mexico and engaged in illicit exchange with their colonial rivals. I examine labor relations and interaction through an analysis of the production and exchange of locally manufactured pottery. I use proton-induced x-ray emission spectrometry (PIXE) to differentiate between imports and Florida manufactured wares. Petrographic analysis is used to assess representative samples from Florida chemical groups in order to refine provenance and to identify distinct technological styles of pottery production. This research begins to address social and economic relations that are rarely documented historically for the presidio and mission systems.

Early Pottery Provenance and the Origins of Place-Based Communities in the Late Archaic Southeast

Zachary Gilmore (Rollins College)

North America's oldest pottery-making societies belonged to the Late Archaic Stallings culture of Georgia and South Carolina. The basic culture history of Stallings archaeology is relatively well-known; however, the types and scales of communities constructed by Stallings people, along with the nature of the connections between them, remain poorly understood. This research uses compositional data from Stallings fiber-tempered pottery to investigate the transition from the loosely bounded "distributed communities" of Early Stallings (5150–4100 cal B.P.) times to the more fixed and formalized "place-based communities" characteristic of Classic Stallings (4100–3800 cal B.P.). To this end, more than 400 Stallings pottery samples and 24 clay reference samples were subjected to NAA, while half of these were also thin-sectioned and analyzed petrographically. The ultimate goal of these analyses is to evaluate the extent to which

Classic Stallings social formations were constrained and/or enabled by the Early Stallings arrangements that preceded them.

Combining Petrographic and NAA Data: An Example from Tijeras Pueblo

Judith A. Habicht-Mauche (University of California, Santa Cruz), Suzanne L. Eckert (Arizona State Museum)

The ceramic assemblage from the fourteenth century site of Tijeras Pueblo, located just east of Albuquerque, New Mexico, is characterized by an unusually large amount of Western-style glaze painted pottery, similar to types produced in the Acoma and Zuni areas. Determining whether these Western-style glaze wares were imported from the Western Pueblo region or are local copies made in the Rio Grande Valley has implications for understanding processes of inter-regional migration, settlement aggregation and identity formation among the Eastern Pueblos during the late precontact period. We discuss how our petrographic identifications of distinct paste groups, combined with refire color groupings, structured and refined our analysis of the NAA data, making those results more readily interpretable from both geological and cultural perspectives.

Petrographic Analysis of Rio Grande Glaze-F from LA 20,000

Danielle Huerta (University of California, Santa Cruz)

This poster presents preliminary petrographic data on Rio Grande Glaze Ware glaze F ceramic sherds from a seventeenth-century Spanish estancia (ranch) in Santa Fe, New Mexico, LA 20,000. These data are part of a larger study that will investigate the production and movement of pottery across the New Mexican landscape during the initial permanent colonization of New Mexico (A.D. 1598-1680) by relying on a variety of methods to chemically and mineralogically characterize pottery pastes and pigments to determine their source of procurement and techniques of manufacture. For instance, the Spanish may have obtained pottery from Pueblo people in a few ways: via a direct colonial relationship such as the encomienda system, by relying on traditional Puebloan exchange networks, or through the local production of pottery by Pueblo laborers at Spanish estancias. The early work presented here is a step in elucidating the potential sources of the Glaze Ware from the site using petrographic analysis of thin sections to determine paste and temper groups by comparing them to already well known petrographic data from the region.

Comparing Two Quantitative Techniques on Late Woodland Pots from Ontario, Canada

Daniel Ionico (McMaster University)

In this study, I analyzed pottery sherds from the early 17th Century Christianson (AiHa-2) village site in the Neutral Iroquoian Confederacy, a Late Woodland culture-group based in Southern Ontario, Canada and defined in ethno-historic texts. I seek to explore cultural changes and interactions between different communities of practice by investigating production micro-styles employed across the Christianson Site and to later compare these findings to an adjacent village.

To expand the petrographic dataset for my thesis project, I consider employing digital textural analysis. Braun (2015) found the method as useful for comparing ceramic pastes in other Ontario Late Woodland contexts. I began with Quinn's (2013) qualitative protocols to define unique paste groups. I initially examined 720 sherds macroscopically and then analysed 22 representative sherds petrographically. I found that during the Christianson village's occupation, potters had employed 11 different paste recipes. These potters predominately tempered their clay with felsic igneous rocks and low-grade metamorphic rocks, along with lesser amounts of intermediate-basic igneous rocks and crushed shell. To further define the paste groups quantitatively for comparative purposes, I consider Livingood and Cordell's (2017) comparison between digital analysis and point counting procedures. I used the free open access program *ImageJ* (v. 1.51k) and Adobe Photoshop CS6 to digitally analyse 5 slides and compare this textural data to their respective point counting analyses. Each method has advantages and disadvantages, with a range of data resolutions. This research highlights the contributions petrography can bring to investigating production practices and the different methodological possibilities in petrographic practice.

“Total petrography” – the many uses of polished thin sections

David Killick, School of Anthropology (University of Arizona)

The term “total petrography” was coined by the British geologist and archaeologist Rob Ixer for an approach that completely integrates optical, chemical and isotopic characterization of archaeological samples. Ixer and colleagues demonstrated this in their classic work on the provenance of pillars at Stonehenge, but the concept applies equally to ceramic and provenance studies. The key to “total petrography” is the use of uncovered and polished thin sections. These permit the identification of opaque phases in reflected light, chemical analysis of individual crystals by electron microprobe, scanning micro-XRF or LA-ICPMS, and mineralogical identification by micro-Raman and micro-infrared spectroscopy. My presentation will demonstrate some basic principles and reference resources for identification of opaque phases in reflected polarized light, and will also demonstrate the use of scanning micro-XRF on thin sections.

Adapting the Dickinson Method, Petrography and Craft Production

John Lawrence (CSUN Anthropology), K. Marsaglia (CSUN Geology), C. Costin (CSUN Anthropology), M. Love (CSUN Anthropology), H. Neff (CSULB Anthropology)

The Middle Pre-classic, (900-600 BCE) peoples of La Blanca, Guatemala used local raw materials such as clay and stream or beach sands to manufacture ceramics. To better understand the production dynamics and potential of urbanization at La Blanca, I am adapting Dickinson's methods of mapping interaction spheres and petrographic description of ceramics to a site level (Costin 1991, 2000; Dickinson 2006). This adaptation will provide insights into production dynamics surrounding ceramics. To do this I have sampled three common tableware's from four households. In an attempt to increase resolution in and among households, ware types, and vessel forms, only diagnostic, determinable-vessel-form samples were selected. Care was taken that no one vessel was sampled twice. Geochemically analyzed, regional sand and clay source samples

from the Missouri University Research Reactor (MURR) have been provided by Dr. Neff, California State University Long Beach (Neff et al., 1988; Neff 2003). Analysis of these source samples will create a corollary link between my study and the MURR's geochemical database and allow for more robust temper sourcing. Source and sherd samples will be thin sectioned and stain for feldspar identification using methods outlined in Marsaglia and Tazaki (1992). Sherd thin sections will be oriented perpendicular to vessel walls in order to better observe microstructures. Sherd and source sample temper sand and matrix characteristics will be petrographically described; with description focusing on major monomineralic and lithic grain types, and characteristic matrix microstructures. Sherds and source samples will then be grouped according to these descriptions and representative samples from each sherd and source group will be selected for point counting (300pts) using the Gazzi-Dickinson method to determine compositional trends (Ingersoll 1984). Compositional trends among vessel forms, wares, and households will be compared in order to better understand the use of raw materials in the production of ceramics at La Blanca and how ceramic production was potentially organized, within the polity.

Teaching Ceramic Petrography: A Tried and True Model Used at CMRAE

Jennifer Meanwell and William Gilstrap (Massachusetts Institute of Technology)

Since its foundation in the 1970s, the Center for Materials Research in Archaeology and Ethnology (CMRAE) has focused on training students to truly integrate materials analysis into archaeological and anthropological research. As part of its mission, CMRAE annually offers a year-long graduate class on a rotating group of archaeological materials, including metal, bone, and ceramics. These courses prepare students, many of whom have had little to no previous analytical experience, through a combination of theoretical discourse and practical exercises. The goal is to provide enough training and support that they can implement materials-based analysis directly into their own research.

In this presentation, we detail the way that graduate students are trained in petrography and ceramic analysis in the CMRAE classes. Our approach employs combined lecture, seminar and ample practical sessions in a laboratory setting. Students are taught the structure, properties, and performance characteristics of ceramic raw materials, as well as aspects of production technologies and applications of analytical techniques. This approach integrates practical skills and rigorous theory with realtime applications. We have found this to be a useful model for developing both qualified practitioners and informed consumers of ceramic analysis by thin section petrography.

Fun with Sand: Petrofacies Development and Approaches to Sourcing

Mary F. Ownby (Desert Archaeology, Inc./University of Arizona)

Desert Archaeology, Inc. is best known for the development of petrofacies models to characterize sand compositions within discrete basins in order to more accurately source sand temper in pottery. This approach was possible due to the geological variability in southern Arizona, restricted river basins that constrained sampling, and the use of sand temper for ceramic production. Over the last 30 years almost 1,500 sand samples have been collected to define

petrofacies in 11 areas. This has greatly facilitated the understanding of production and consumption of pottery in prehistoric Arizona. This presentation will outline the process of sand collection, analysis, and petrofacies development. Two case studies will highlight how these petrofacies models are utilized to predict the source of pottery and approaches to raw material collection in areas where petrofacies development is more challenging.

Interpreting Brownware Ceramic Exchange in the Moctezuma Valley of Sonora, Mexico

Matthew Pailes (University of Oklahoma)

Poster Abstract: This poster presents research on the exchange of plain and textured brownwares from the Moctezuma Valley, Sonora, Mexico. The goal of the project was to gauge the degree and directionality of mundane goods exchange. The project collected 34 samples of sand from 55 km of valley to determine aplastic source zones through the petrofacies approach (Miksa and Heidke 2001). The most manifest division was between a zone dominated by granite and the remainder of the project area characterized by extrusive volcanic rocks. Binocular inspection was then used to determine the petrofacies of origin for a sample of 5400 sherds. From this sample, 137 sherds also were prepared as thin sections and subjected to petrographic microscope inspection to verify binocular identifications. The results indicate a clear exportation of sherds with granitic aplastics to other portions of the river valley, including across otherwise distinct community boundaries. These data contribute significantly to current knowledge of exchange economies in eastern Sonora.

The Yale Khabur Basin Survey Ceramic Project

Yukiko Tonoike (Yale University)

The semi-arid steppe of the Lower Khabur Basin of northeastern Syria is a climatically marginal zone for agriculture, yet there have been episodes of settlement over the past 9000 years. Archaeological surveys have recorded more than 300 sites whose age, type, and distribution on the landscape are reflections of changing socio-natural systems. The region is particularly suitable for detecting changes in both environmental and socio-political spheres because of its environmental marginality, yet centrality to the political needs of states and empires. Due to the nature of the collection, stylistic and technical materials analyses (mainly petrography) of ceramics from the Yale University Khabur Basin Survey Project and related excavations will be critical in understanding the changes in the settlement landscape and interaction patterns, as well as the nature of the sites and their distribution on the landscape.

Petrographic analysis of ceramic fabrics from La Quemada, Zacatecas, Mexico

Andrea Torvinen (Arizona State University)

The hilltop center of La Quemada in the Malpaso Valley of Zacatecas, Mexico, was the focal point of one of several polities that developed along the northern frontier of Mesoamerica during the Epiclassic period (A.D. 500-900). Northern frontier polities are known to have interacted due to their shared material culture (i.e., patio-banquette complexes, colonnaded halls, and the

exchange of obsidian and shell products), but the mechanism(s) of this interaction are not fully understood. Ceramic wares, such as red-on-buff, incised-engraved, and resist, are widely distributed across the northern frontier and provide a means of analyzing past social networks. Were decorated ceramics recovered from La Quemada local variations of a shared regional ideology or were some produced in other polities and consumed by La Quemada residents? This poster begins to answer this question by reporting on a petrographic analysis of decorated ceramics recovered from La Quemada. The results of the analysis include the description of a series of paste groups of likely local or, in the case of the rare decorated types, possibly nonlocal origin. Ultimately, the ceramic characterization data will be used to reconstruct the networks of ceramic exchange at both the community and patio group scales within La Quemada.