What are the chemical characteristics of Early to Late Woodland Period Long Island Algonquin ceramics?

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Background

- Algonquins culture occupied parts of the Northeast for thousands of years. Coastal populations produced unique ceramics during the Woodland periods (1). (3)
- White Northeast ceramics have been well studied (2). Relatively little is known about the chemical composition of clays used for ceramics in different regions of Long Island. XRF analysis has become the technique of choice for ceramic comparisons (3-5).
- Ceramics from the Early to Late Woodland Period in Long Island Algonquins provided by the Southold Indian Museum were analyzed at the XRF and TES beamlines seeking to compare the ceramic samples’ mineralogical and elemental composition.
- Sherd samples were collected from sites across Long Island ranging from Brooklyn to Orient, including Shelter Island. Samples also range in time period from 2500 B.P. to 1000 B.P.

Research Aim: To compare the elemental profiles of ceramics from different regions and eras with a focus on the elements commonly found in clay such as K, Si, Al, Ti, Fe, Mg and Group 1 and 2 cations. Future work planned at the SRX and XFM beam lines analyzing transition and rare earth elements will also be beneficial for this comparison (6).

Hypothesis: Ceramics from different areas of Long Island can be differentiated by their mineral and elemental composition. This would imply using different clay sources and possibly yield

Methods

Sample Collection

Sample Preparation

Beamline Specifications

Data Processing

Data Analysis

- XPD wavelength was 0.1874 Angstroms
- TES: 6 micrometer beam at 4100 eV
- XPD: Diffract was used to create a graph of d-spacing vs. intensity.
- Excel, using Bragg’s Law, was used to calculate d-spacing for major peaks.
- TES maps of sherd were generated by the beam line scientists.

Discussion

- XPD analysis shows that the mineral and elemental profiles of the clay samples differ according to site region (Figures 4-13).
- TES mapping reveals a clear difference in the K distribution in the Brooklyn vs. Shelter Island ceramic sherd (Figure 14).
- Using existing resources detailing differences in clay composition across Long Island, the differences in these sample profiles could be used to determine the provenance of clay used in different regions to produce the ceramics (6-8).
- Many ceramic sherd samples share common d spacing values, which likely indicate minerals common in all clay sources. However, each sample does exhibit unique d spacing signatures, which we hope to use to differentiate the sources of clay used by Native Americans in different regions of Long Island.

Future work

- These samples will be further studied at SRX and XFM beam lines in order to expand the analysis of higher Z elements. This will be necessary because Fe and other transition elements and heavy metals such as Pb are often used to differentiate clays.

References


Acknowledgements

We would like to acknowledge the support of the NSF-IGERT program, specifically of beamlines TES 8-BM and XPD 28-ID-2, especially Dr. Paul Northrup for help with data collection and analysis. We would also like to acknowledge the NSF-IGERT User Office, L.Miller, G. Cisco, G. McKenzie and the Office of Educational Programs, K. White and S. Bronson for support of the SPARK program. This research utilized beam lines 28-ID-2, XPD and 8-BM, TES of the National Synchrotron Light Source II, a U.S. Department of Energy (DOE) Office of Science User Facility, operated by Brookhaven National Laboratory under Contract No. DE-SC0012704. Thanks go to Southold Indian Museum for providing ceramic samples. Finally, thank you to all members of the SPARK Spectroscopy Collaboration.