Establishing Early Chert Use with PXRF: A Case Study from the Cooper’s Ferry Site

Abstract

Chert artifacts are commonplace in Columbia River Plateau archaeological sites, and understanding prehistoric mobility and trade is crucial for understanding the formation of these archaeological sites. By analyzing chert artifacts texturally and chemically, we can test for optimal geochemical data, extraneous factors, and potential noise in the data. This research set out to answer four questions: 1) Can geochemical samples of cherts from different sources be differentiated in PXRF? 2) Do distinct chemical groups of cherts exist within the archaeological artifacts tested? 3) If distinct chemical groups exist, are there any relationships between these groups and either size or type of artifact, or host lithostratigraphy? 4) Can one of the artifacts tested be linked to known chert sources based on their geochemistry?

Questions

1. Can geochemical samples of cherts from different sources be differentiated in PXRF?

2. Do distinct chemical groups of cherts exist within the archaeological artifacts tested?

3. If distinct chemical groups exist, are there any relationships between these groups and either size or type of artifact, or host lithostratigraphy?

4. Can one of the artifacts tested be linked to known chert sources based on their geochemistry?

Data Acquisition and Statistical Treatment

Methods

To answer whether a short-term project could be feasible in the wild area, we tested the feasibility of the relative levels of elements in the Cooper’s Ferry chert artifacts. We understand this exercise, so geochemical values versus a chert type were used in a discriminant function analysis (DFA) to determine the geochemical composition of the sample. This process was repeated for each of the six geologic sources tested during this analysis. The cherts pictured above are examples from the six geologic sources tested during this analysis.

Results

The geochemical samples from different sources can be differentiated in PXRF. Results of geochemical samples testing showed that using the statistical methods outlined below, we determined that the geochemical data from the Cooper’s Ferry chert artifacts were able to be distinguished based on their chemical composition (see Figure 10). The 95% of data being currently assigned in DFA.

Conclusions

This research set out to answer four questions: 1) Can geochemical samples of cherts from different sources be differentiated in PXRF? 2) Do distinct chemical groups of cherts exist within the archaeological artifacts tested? 3) If distinct chemical groups exist, are there any relationships between these groups and either size or type of artifact, or host lithostratigraphy? 4) Can one of the artifacts tested be linked to known chert sources based on their geochemistry?

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References


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