

Abstract

We present the first results of an experiment which is aimed at ultimately producing recommendations for analysing archaeological ceramics specimens using hand held XRF analysis devices. In the experiment we study the effects of different measurement durations, different number of measured points, and three different types of surface treatments (breakage, polished, grounded) when analysing ceramics specimens, while controlling for nine different types of clay and three different types of temper (no temper, sand, rock), in total almost 1000 analysed points. For each measurement, the proportions of 36 different elements and all other elements are estimated. In those cases with multiple measurements of a specimen, the compositional centre of the measurements is calculated. A complicating issue in the analysis is the large number of parts found to be below detection limit; 13 elements have more than 50% of the measurements below detection limit and for more than half of those (almost) all measurements are below detection limit. We try nine different strategies for imputing the values. Each estimated elemental composition is compared to a reference estimate using the simplicial distance. The log distances are finally analysed using analysis of variance with main and interaction effects. We find that the different surface treatments have the greatest effect on the distances: grounded specimens yield the most accurate estimates and polished surfaces the least. We also find a significant effect of increasing the number of measured points, but less effect of increasing the duration of the measurements.