

A Geochemical and Petrographic Analysis of Ceramics from the Estero Site in SW Florida

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INTRODUCTION

- Estero Island site (also known as Mound House; 8LL4) is located on a shell ridge in what is now Fort Myers Beach in SW Florida (Figure 1). Conservation efforts to preserve exposed Calusa archaeological deposits at Mound House led to the excavation of five 1x1 units.
- The goal of this exploratory analysis of ceramics from one of five units at Mound House was to determine local and nonlocal production through characterization of geochemical (LA-ICP-MS) and petrographic composition. Few geochemical assays of Calusa ceramics exist from southwest Florida.
- We use a subset of ceramic geochemical data from Tampa Bay (Duke 2022; Duke et al. 2023) to help contextualize Mound House within the ceramic ecology of Florida.



Figure 2. Selected ceramic samples from 8LL4

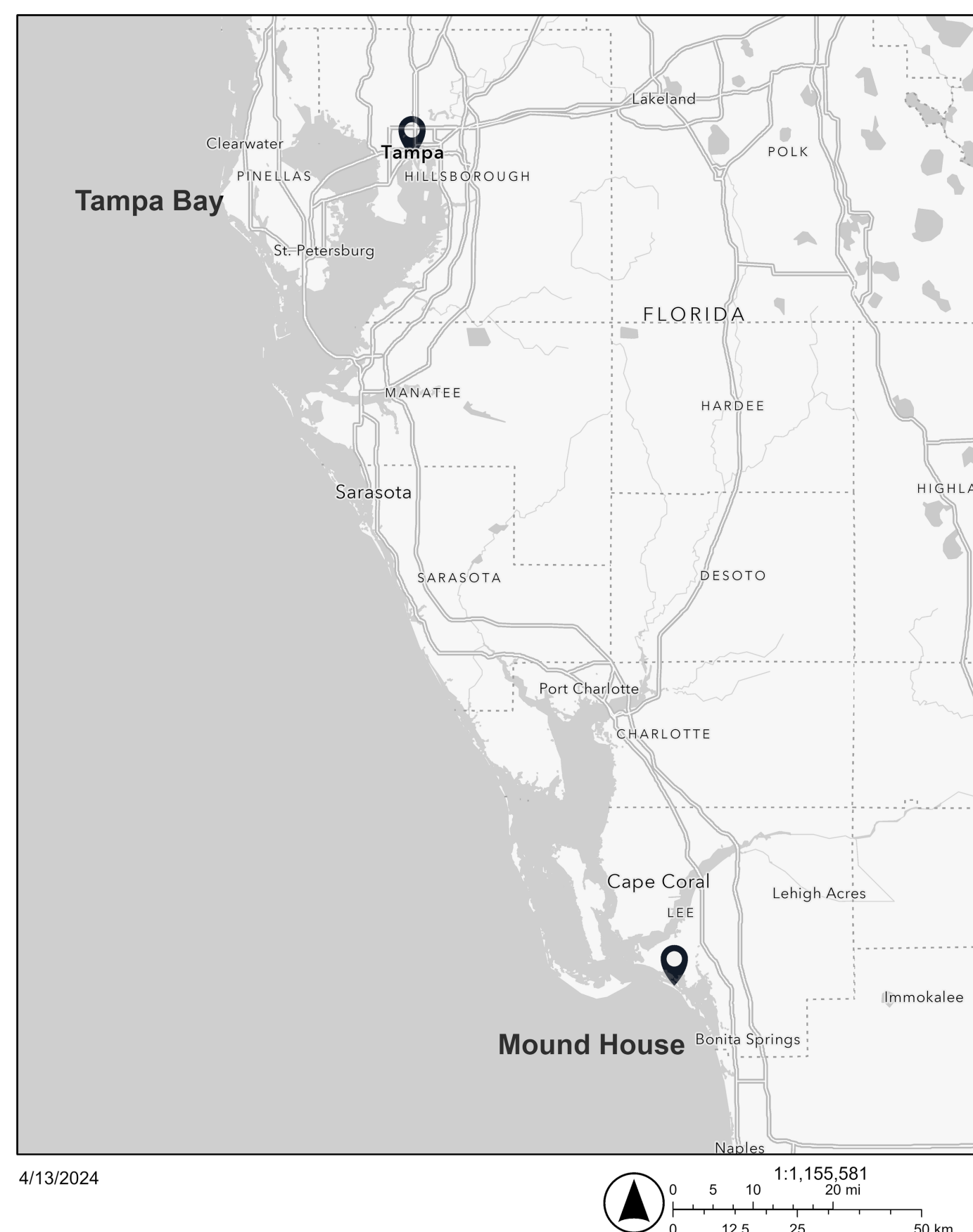


Figure 1. Location of Mound House (8LL4)

METHODOLOGY

1

LA-ICP-MS of Ceramic Paste

- Chemical characterization of 30 sherds were sampled using a New-Wave UP-213 nm Nd:YAG laser ablation system, attached to an Element 2 HR-ICP-MS.
- 20 elements with high accuracy in analysis of standards were used to characterize the sample.

2

Petrographic Analysis

- Cordell (2023) defined macroscopic paste categories for the population.
- Qualitative and quantitative (point-counting; Stoltman 1989) petrographic analysis of 12 thin sections were taken.
- Samples were split between Cordell's macroscopic paste categories and by level.

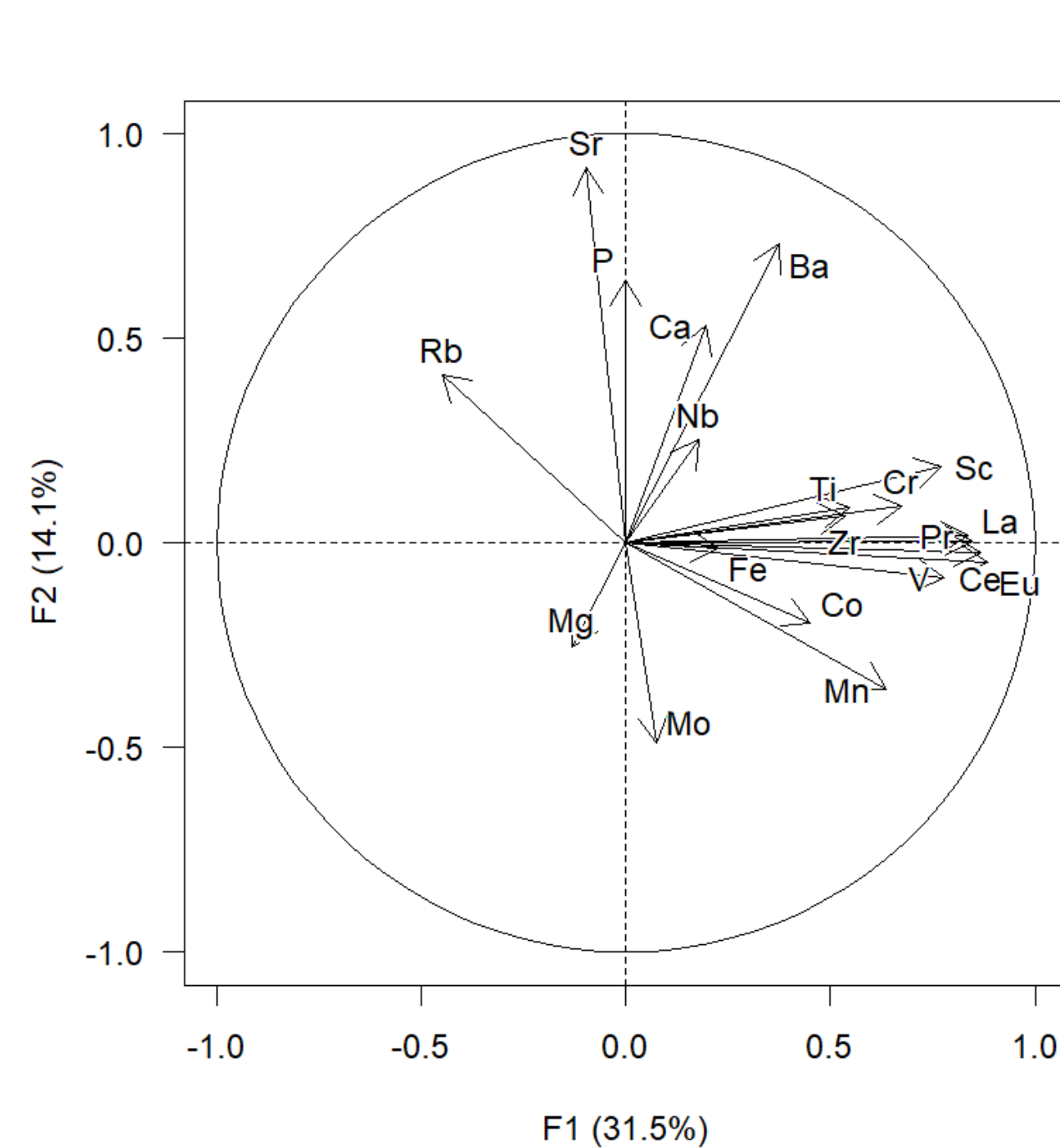
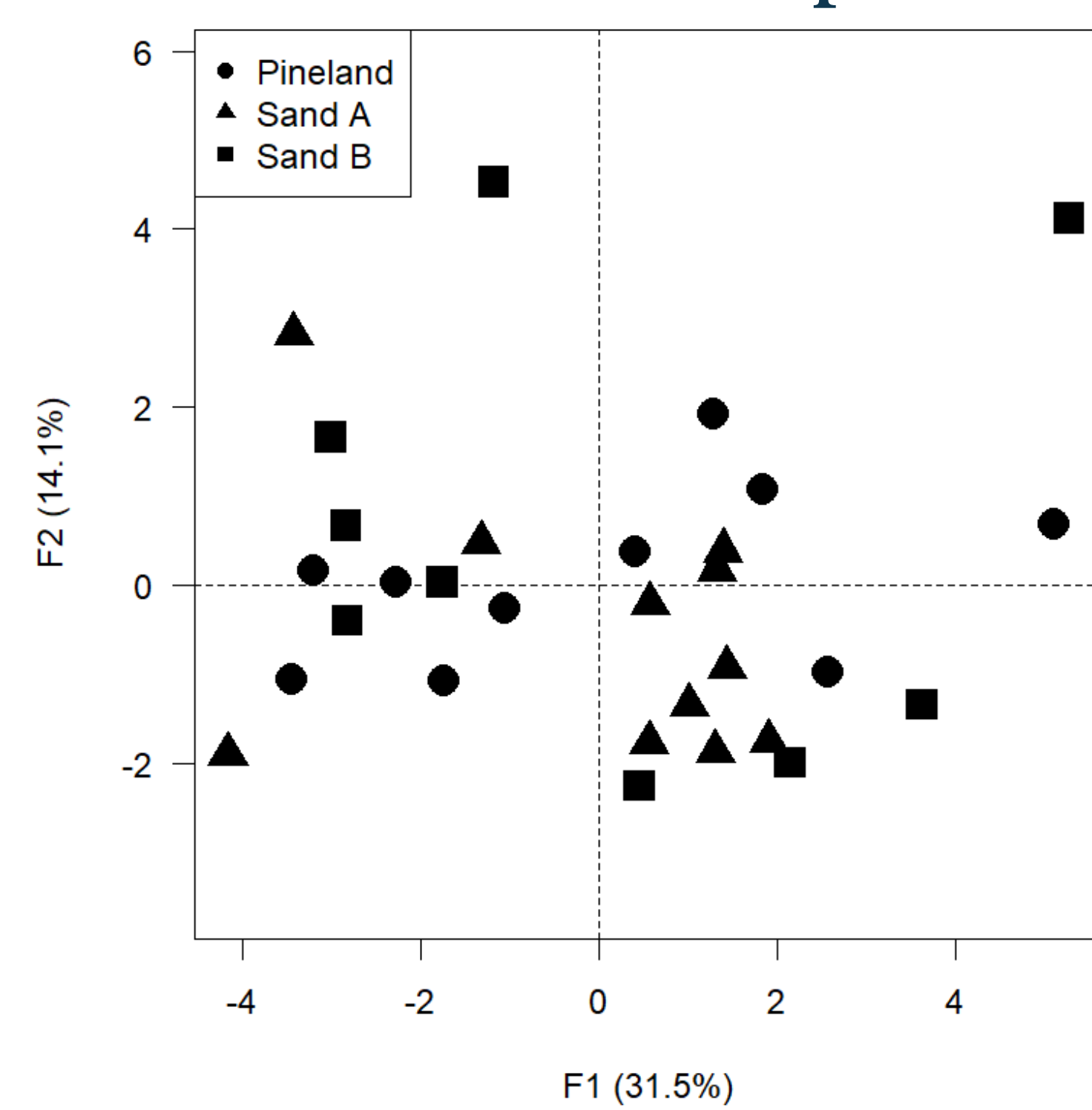
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Comparison to Central Florida

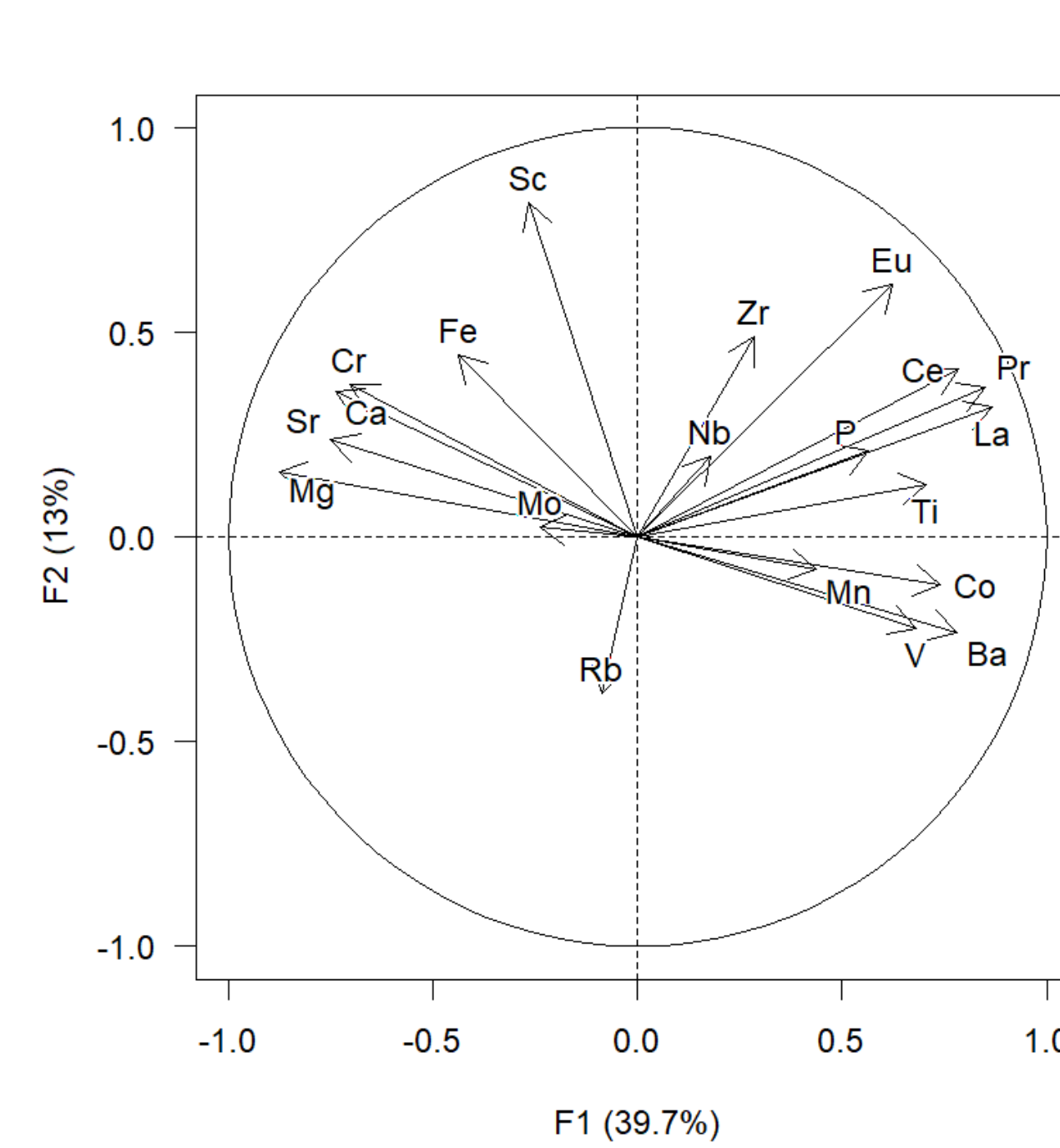
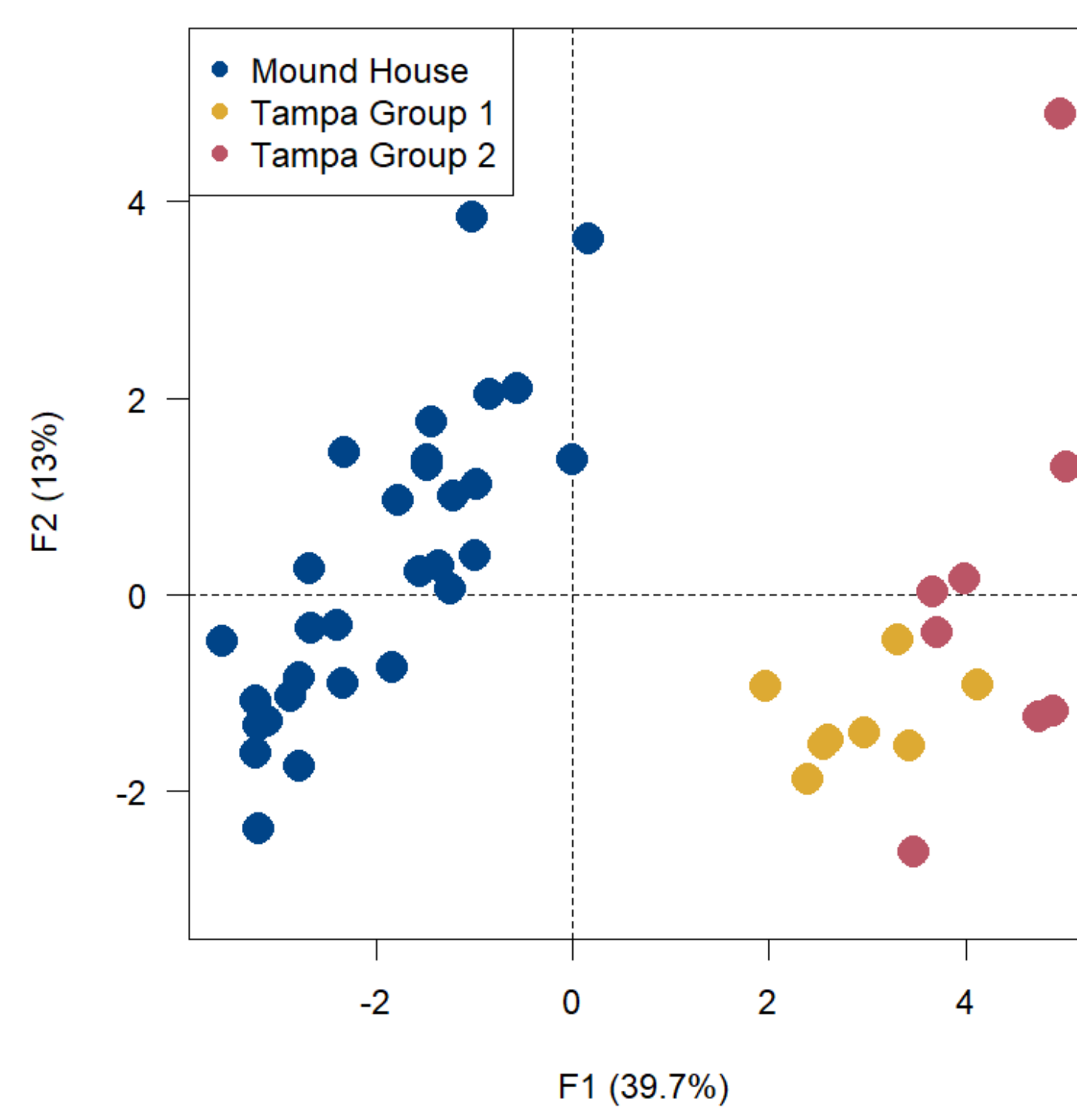
- Because few geochemical studies have been performed on ceramics from southwest Florida, we compare samples from Mound House to select ceramic matrix and grog sample data from Tampa Bay (Duke 2022; Duke et al. 2023).
- Principal Component Analysis was performed to compare the elemental compositions between groups.

RESULTS

LA-ICP-MS and Comparison



Figures 3 and 4. PCA (left) and loading plot of Mound House (8LL4) ceramics.



Figures 5 and 6. PCA (left) and loading plot comparing Mound House to Tampa Bay.

- Mound House macroscopic pastes have no clear grouping geochemically (Figures 3 & 4).
- When compared to Tampa Bay Groups 1 and 2 from Duke (2022), the Mound House sample has enrichments in Cr, Sr, and Mg and depletions in Ba, V, and Ce (Figures 5 & 6).

Ceramic Petrography

- Petrographic analysis improved the detail of the macroscopic analysis by quantifying constituents, uncommon mineral inclusions, and providing a sand size index (Stoltman 1989)
- Expanded paste categories are seen to the right.
- Paste groups are best distinguished by comparing sponge spicule % to matrix and sand % (Figure 7)

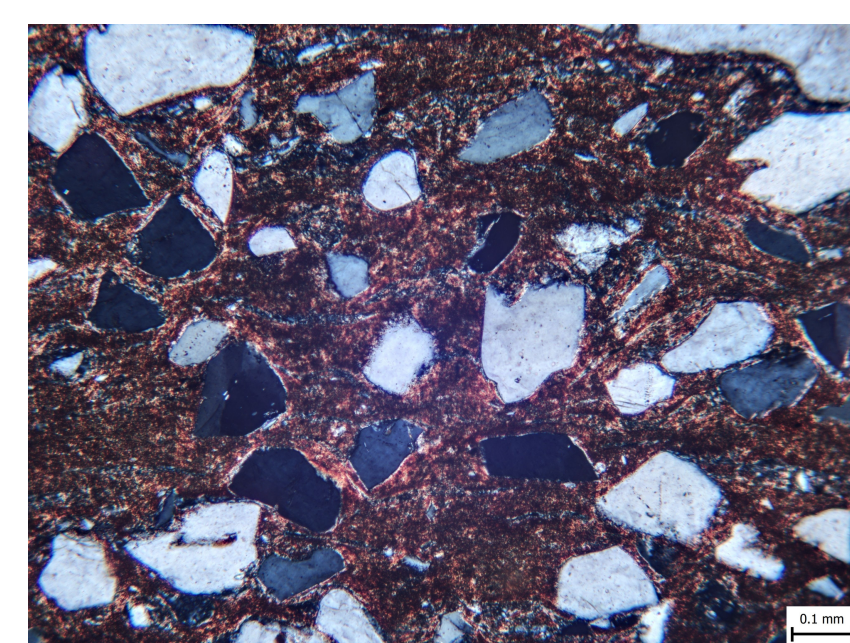
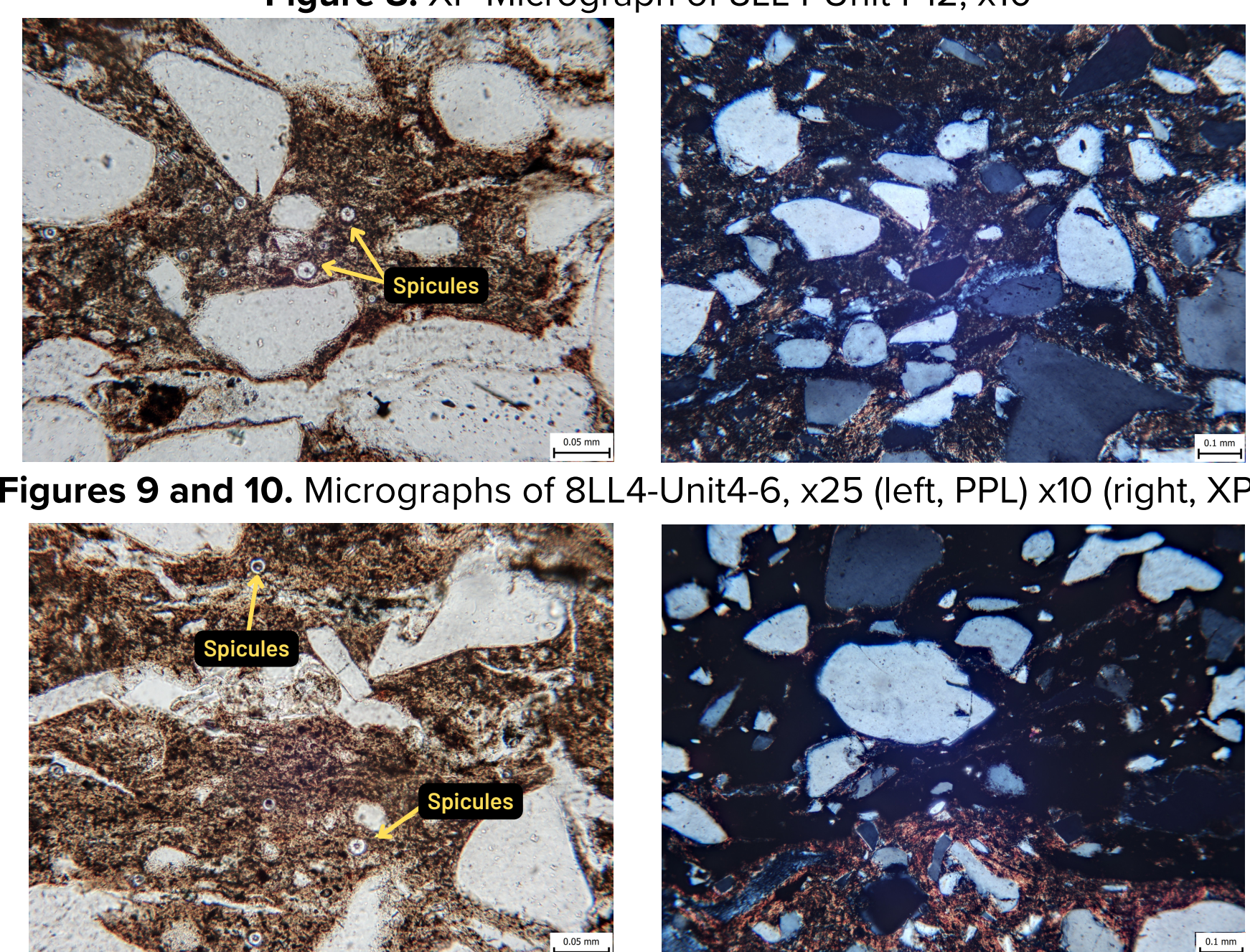


Figure 8. XP Micrograph of 8LL4-Unit4-12, x10



Figures 9 and 10. Micrographs of 8LL4-Unit4-6, x25 (left, PPL) x10 (right, XP)

Figures 11 and 12. Micrographs of 8LL4-Unit4-25, x25 (left, PPL) x10 (right, XP)

Paste Categories

SAND A

- Figure 8
- Common quartz inclusions
- Sand size index: 2.16 (fine)
- Rare sponge spicules, and feldspar (plag and UID feldspars)

SAND B

- Figures 9 and 10
- Abundant quartz inclusions
- Occasional sponge spicules
- Sand size index: 1.97 (fine)
- Rare feldspar and heavy minerals.

PINELAND

- Figures 11 and 12
- Common quartz inclusions
- Frequent sponge spicules
- Sand size index: 2.10 (fine)
- Rare epidote

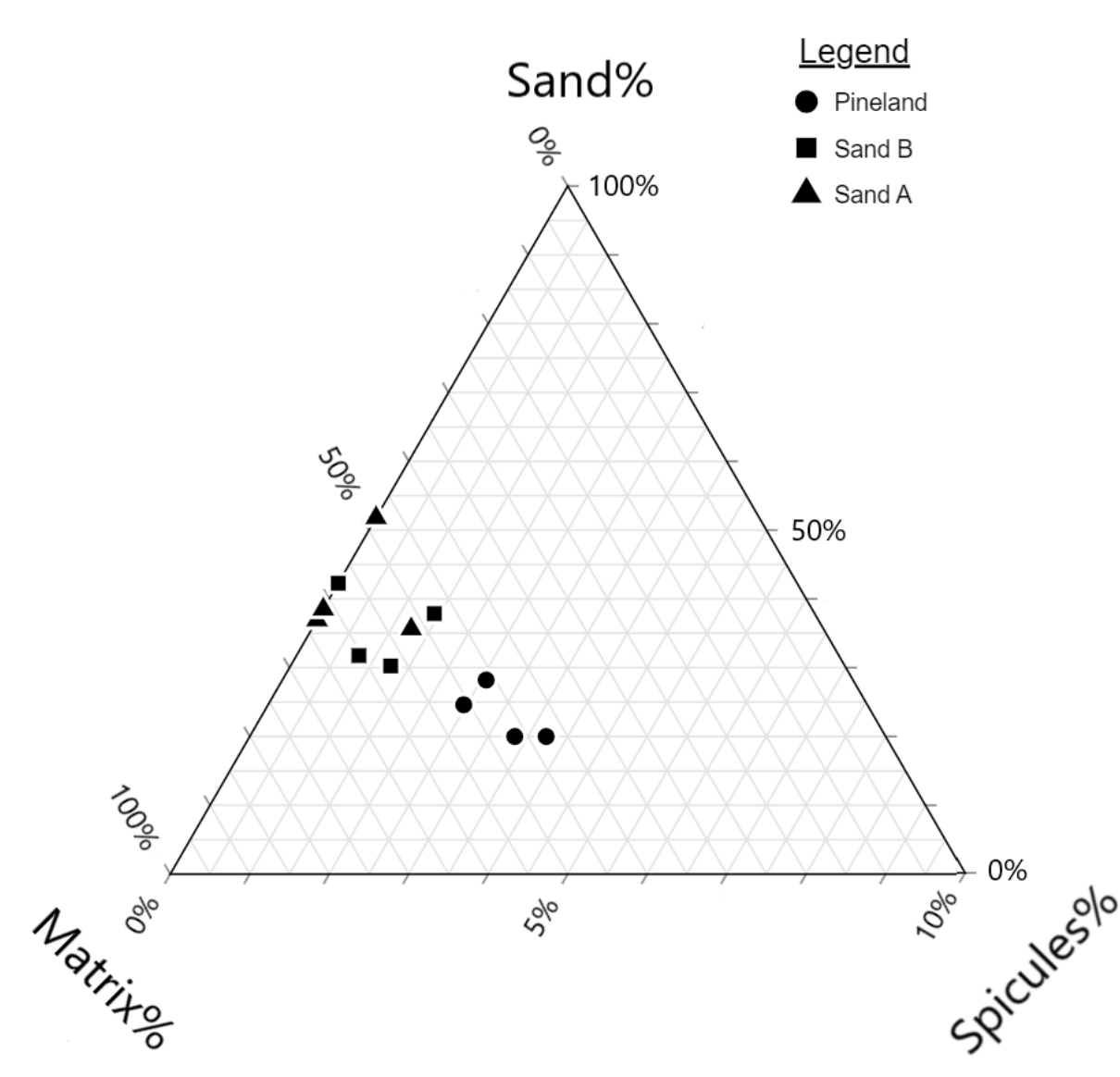


Figure 7. Ternary plot comparing matrix, sponge spicules, and sand %.

CONCLUSION

Our analysis presents chemical characterization (through LA-ICP-MS) and ceramic petrography of Mound House ceramics that provides a baseline for southwest Florida and Calusa ceramic signatures.

Our analysis demonstrates that:

- Clays from Mound House are compositionally distinguishable from those in Tampa Bay.
- Petrographically, the sherds show that three differing pastes exist at Mound House. This may reflect differences in clay sources, clay mixing, or the addition of temper.

Further analyses are needed to establish wider trends in ceramic composition variability in southwest Florida.

Options to continue this study include:

- Determining the source clays in the study area. Source clays can be collected and processed using methods by Cordell et al. (2017).
- Characterizing and comparing samples from other southern Florida archaeological sites.

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