The World of Iron at 10, 6th – 11th November 2023
BIEA, Nairobi, Kenya. ABSTRACT SUBMISSION FORM

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5. Title of paper:

Preliminary Analysis of Iron Remnants from Three Archaeological Sites in Central and Eastern Taiwan

6. Abstract (maximum 500 words):

During the past few decades, it has been widely believed that bloomery artifacts found in Taiwan archaeology were locally produced, while cast iron might have been exchanged from mainland China. However, the argument needs refinement as cast iron has long been the dominant ironworking technology in China. Nevertheless, bloomery smelting technology has also been adopted in peripheral regions of China, leading to the establishment of several local workshops.

Regarding Taiwan, the provenance of Taiwanese iron objects has not yet been thoroughly investigated through robust statistical methods. In this paper, the author aims to explore the correlation among iron artifacts unearthed at the two Iron Age sites in Central Taiwan (Luliao and Nanshikeng), as well as discussing several iron slags

collected from the Chongde site in Eastern Taiwan.

Based on metallography and cluster analysis of the slag inclusion chemistry, the Principal Component Analysis (PCA) results indicate that the iron artifacts from the two sites can be classified into two distinct groups. The author also attempted to use Kernel Density Estimation (KDE) to explain the impact of corroded samples on the overall chemical analysis. Preliminary results suggest that the iron artifacts from the two sites in central Taiwan have multiple sources, especially for cast iron and decarburized steel products, which may have originated from China. However, the source of manganese (1-4wt%) within the slag inclusions of bloomery artifacts remains unexplained. The reasons behind the division among iron artifacts in central Taiwan are still unclear.

It is uncertain whether manganese was intentionally added as a flux during the smelting process to replace iron, or if there are other inherent variations. Overall, significant difference in the composition of iron artifacts does exist between the two sites in central Taiwan and the Shihsanhang site in northern Taiwan. Furthermore, optical microscope analysis is being conducted to confirm that the majority of slags from the Chongde site in eastern Taiwan are primary smithing slags. However, there are a few pieces that exhibit markers of secondary smithing or partially reacted ore.

In summary, the study provides primary insights into the discussion of iron objects in central Taiwan. However, the sample size of the work is small, and a larger-scale analysis is necessary to clarify the provenance of iron artifacts, especially concerning the working residues and iron objects found in other regions of the island. Further work is ongoing as part of the lead author's PhD project.

For further perspectives, by establishing connections between the ratios of the Non-Reduced Compounds (NRCs) and potential source materials such as ores, fuel ash, and technical ceramics. It will be possible to explore trends or changes and gain insights into the causes of variations observed among different iron clusters, such as shifts in fuel or ore composition during smelting. (455 words)

7. Preferred session (papers will be divided across session):
Session 2, Scales of Production and Exchange

8. Preferred format (oral / poster presentation):
Oral Presentation



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