

## DATA PAPER

# Contemporary Gold Mining in Eastern Zimbabwe: Archaeological, Ethnographic and Historical Characteristics

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This paper is based on the dataset that I collected during my doctoral research in Eastern Zimbabwe between 2015 and 2018. The dataset represents an investigation of pre-colonial and contemporary gold mining practices in this area and covers the period from AD 1300–2018 from an anthropological and archaeological perspective. The fieldwork conducted consists of archaeological excavations and surface collections that I carried out at three selected sites. Recovered material culture was then analysed using ethnographic analogies based on interviewing contemporary gold miners who were working near these sites. The dataset will be potentially useful to southern African archaeologists by offering them new direction on pre-colonial gold mining practices in a region where these have only been partially studied as appendages of iron production processes. The use of archaeological ethnography in this research also adds a multi-dimensional perspective in the interpretation of archaeological objects associated with pre-colonial gold mining practices in Eastern Zimbabwe.

**Keywords:** Archaeological Ethnography; Contemporary miners; Eastern Zimbabwe; Mutanda; Nyahokwe; Saungweme

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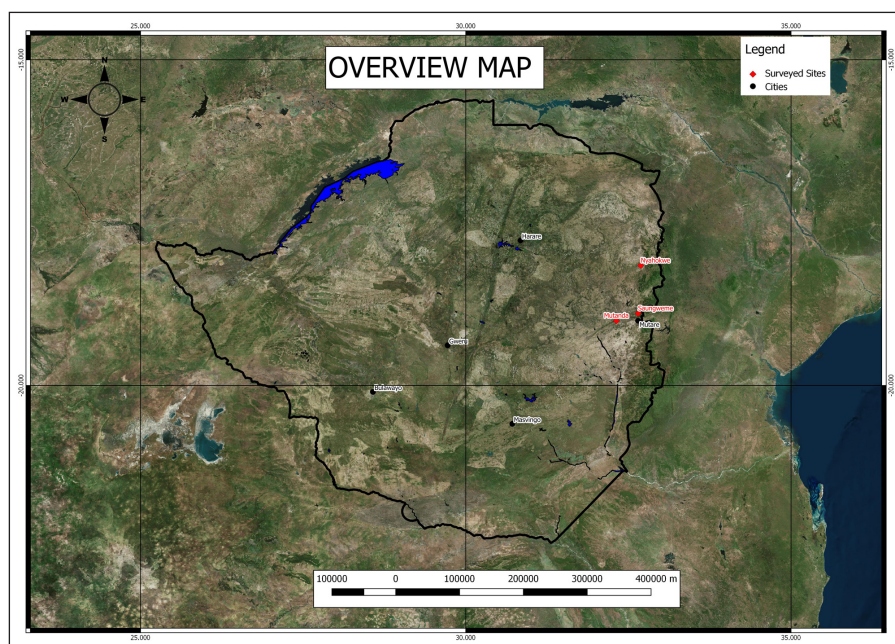
## (1) Overview

### Context

The research presented in this dataset is based on an ethnographic and archaeological investigation of Mutanda, Nyahokwe and Saungweme archaeological sites in Eastern Zimbabwe (see map on **Figure 1**). Emphasis on this research was on mining archaeology in both pre-colonial and contemporary settings with an ultimate aim of contributing to the documentation of African indigenous gold mining technologies. The dataset also revealed that digging up artefacts, cataloguing and describing them is only a small segment of the archaeological practice [1]. What is more important is digging into the past and present of living people, collaborating with them in hope that their knowledge and ways of knowing the past will help us to better construct a history that in cooperates African voices [2]. Such a holistic anthropological archaeology approach will produce decolonised archaeological knowledge. Thus, this dataset also feeds into growing debates on decolonising archaeological knowledge in southern Africa. It builds up on the previous research on post-colonial archaeologies being conducted in the region by other archaeologists [3, 4, 5, 6]. The research itself present empirical descriptions of indigenous African mining technologies where there has been a problem in the past of describing these in

terms of European and or Asian models. As such, this holistic anthropological archaeology approach embraced local communities in capturing different voices of the past by identifying contemporary gold mining methods that were used to explain the archaeology of the three sites. The current rise of artisanal gold mining, processing and refining also provided a rich ethnographic model for understanding earlier indigenous gold mining technologies. The fact that mining is practiced today in close connection with indigenous African ritual and religious activities provided valuable evidence for this study [7].

In the research project, archaeological ethnography was used as a transdisciplinary, transcultural space for critical engagement and dialogue [8] which enabled an understanding of contemporary mining practices around these three archaeological sites. Material culture generated by contemporary miners was used in building up ethnographic analogies for the interpretation of archaeological remains of recovered at the three sites. Thus, the growth of contemporary gold mining in Eastern Zimbabwe was addressed as a social practice underwritten by several rituals and beliefs. The results of this research also revealed that the knowledge and skills employed during gold mining practices from the past and up to the present was not just mere labour but rather an art, craft and



**Figure 1:** Map showing the location of the three archaeological sites that were surveyed and excavated.

a trade. Multiple methodologies were used in the research because of its multitemporal and multi-sited nature. In the end, a holistic integration of these approaches showed the different connections in gold mining and processing practices in Eastern Zimbabwe moving between the past and the present.

#### Spatial Coverage

Mutanda Site: S 18° 58' 40.1" E 032° 18' 21.0", Elev. 1089 m.

Nyahokwe Site: S 18° 08' 31.3" E 032° 41' 18.4", Elev. 1555 m.

Saungweme Site: S 18° 51' 18.9" E 032° 38' 32.5" Elev. 1259 m.

#### Temporal Coverage

AD 1300–2018

This temporal coverage was obtained from excavated archaeological data at Nyahokwe, Mutanda and Saungweme pre-colonial sites and ethnographic data derived from interviewing contemporary gold miners.

## (2) Methods

The research used multiple methodologies within multi-sited and multitemporal locales by bringing together archaeological, historical, and ethnographic datasets to understand the knowledge and practices associated with contemporary artisanal mining and metallurgy. Therefore, standard archaeological and ethnographic methods used include: surface surveys, sample collections, excavations, and interviews and participant observation. In addition, mapping using aerial photographs from drone, XRF analysis, optical microscopy and radio carbon dating were used. In their multiple usage, it is important to stress that archaeological methods used were not only concerned about the past but were applied to a kind of contemporary archaeology of material culture in the present through the application of a hybrid methodology called archaeological ethnography [9–12].

## Steps

### Surface surveys

Surface surveys are part of ground reconnaissance methods used in archaeology. A scatter of artefacts on the surface can provide the possible extent of the site. This method was used at Saungweme, Mutanda and Nyahokwe sites before any decision to excavate was made. Surface surveys at these sites revealed the distribution of objects and the multi-sited nature of the practices under investigation. However, the surveys were not entirely formulated to pave way for excavations for all the three sites. At Saungweme, for example, the surveys led to a selected collection of surface objects without having to carry out any excavations. Cluster sampling, which involved the collection of all portable archaeological artefacts represented, was used here as a strategy to yield data on the temporal and spatial patterning of the objects. The collection of objects at Saungweme without excavating was largely necessitated by time restrictions. Surface surveys and cluster sampling are now beginning to be recognized as having advantages over large scale excavations because they are non-destructive. Hence, surface surveys are no longer preliminary stages for preparing for excavations but rather have become independent inquiries capable of producing information differently as compared to digging [13].

At Nyahokwe site, foot surveys were carried out around the three exposed granite surfaces and subsequently yielded cultural materials such as beads, hammerstones, portable lower grinding surfaces and pottery. These materials were collected for further analysis. However, at Nyahokwe excavations were later carried out on the other side of the mountain with standing furnaces to get a total picture of the metallurgical and industrial use of the site (see pictures in the dataset). At Nyahokwe and Saungweme the surveys employed the transect method which involved walking across the landscape in groups. The surface surveys covered an area of 1 km<sup>2</sup>, (1 × 1 km). Both sites were

situated at the top part of the mountain. Granite rocks and sandy soils covered much of the area on these sites. The survey consisted of 12 people divided into four groups of three. Each group had 2 surveyors and 1 objects recorder. The 1 km<sup>2</sup> study area was then divided into 10, 80 × 100 m (8000 m<sup>2</sup>) quadrates. In each of the 8000 m<sup>2</sup>, 4, 20 × 100 m line transect were constructed and each group of 3 worked on that transect. The transects were 2 m apart meaning the total area covered including the distance apart was 86 × 100 m for each quadrate. Therefore, each 80 × 100 m quadrate was separated from another similar quadrate by 14 m width wise. In each of the 20 × 100 m line transect surveyors walked at the central point of their 10 m line transect ensuring that each 5 m was adequately surveyed. The recorders helped in the proper identification and grouping of the objects and they also recorded the location of the objects in the transects using a GPS. This was done for each of the 10, 8000 m<sup>2</sup> line transects.

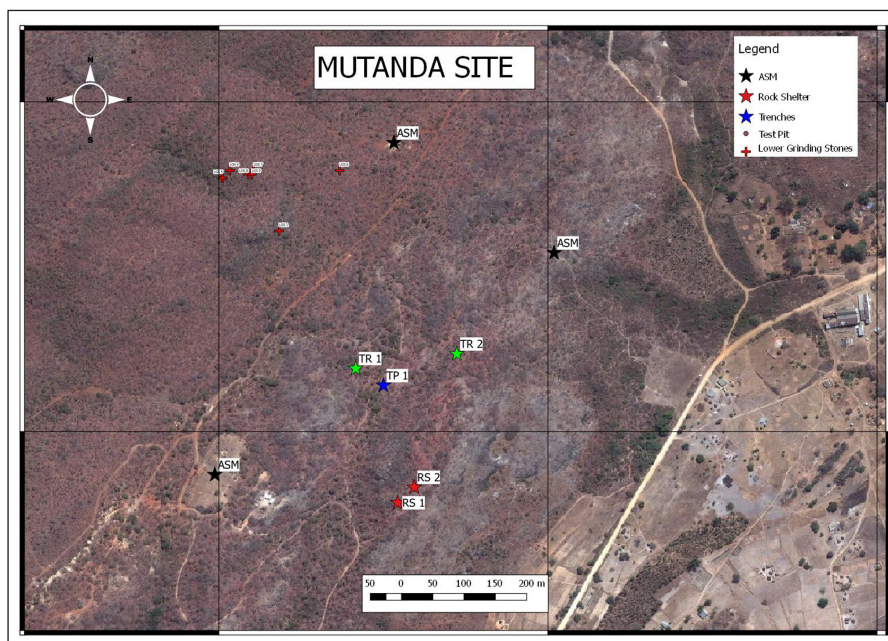
At Mutanda site, a random foot survey was undertaken in and around the perimeter stone walled enclosure before the excavations commenced. This was done as a way of trying to establish the extent of the site and to check for additional evidence associated with mining and metallurgy. Such type of a survey was also formulated with the view that apart from the position of features or artefacts there may also be a series of relationships between their locations which can be revealed by significant patterns and arrangements relative to other features and things. This survey covered an area of 1 km<sup>2</sup>, (1 × 1 km) and consisted of 12 people divided into four groups of three.

### Excavations

Reconstructing the organizational patterns of metal production activities at Mutanda and Nyahokwe Sites together with their social contexts was achieved through carrying out excavations which were largely informed by the surface density of archaeological material. Permission to excavate these sites was granted in accordance with the

provisions of sections 25 and 26 of the National Museums and Monuments of Zimbabwe Act, 1972 (CAP 25/11), permit no 006/2016. At Mutanda Site, the precursor to the excavations was the recording of thick pieces of furnace and crucible fragments which were distributed all over the surface. The variation in the density scatter indicated the rate at which the cultural material accumulated within each context. Excavations at Mutanda and Nyahokwe sites were undertaken using the vertical dimension of cutting into deep deposits to reveal stratification and the horizontal dimension of opening areas in a layer to reveal the spatial relationships between artefacts [14]. This was done using the square grid unit-level method. The digging was done in a succession of levels within each unit starting from the surface divided by 10cm vertical arbitrary spits also known as metrical stratigraphy. However, there is a growing opposition to the use of metrical stratigraphy when undertaking archaeological excavations. The argument is that it is better to follow the natural stratigraphic layers because arbitrary spits imposes a false regularity where it does not exist [15–17]. However, the natural stratigraphy method of following layers works well for sites with clearly defined and undisturbed strata. In this case, Mutanda and Nyahokwe did not have clear cut stratigraphy because of heavy leaching caused by precipitation over years. Thus, because of leaching, the soil deposits were identical throughout the profile. Furthermore, excavation by metric stratigraphy was chosen because it provided an accurate in depth recordings of findings each separated by successive levels of occupation.

At Mutanda site two trenches and a test pit were excavated to investigate the site. Trench 1 (T1) measured 1 × 3 m with a 1 m extension. Trench 2 (T2) also measured 1 × 3 m and Test Pit Trench 1 (TPT1) was a 1 × 1 m. The trenches and test pit were selected on surfaces that had a visible concentration of crucible fragments (see **Figure 2**) Crucible fragments, ceramics, beads, glass chips, dimpled



**Figure 2:** Showing the location of excavated units at Mutanda Site.

hammer stones, charcoal and hearth floors were amongst the cultural material recovered during this excavation.

The other full excavation was carried out at Nyahokwe site to establish the metallurgical use of the site for both gold processing and iron smelting (See **Figure 3**). The excavation at Nyahokwe metal working site was also carried out after a careful sampling of the visible surface remains. Initial knowledge of metal working processes was provided by the dense occurrence of iron slags, charcoal and standing furnaces on the surface. The dimensions and layout plans of these furnaces were recorded before the excavations commenced. Trench 1 measuring 3 × 2 m was set up around a standing smelting furnace. In addition, test pit 1 measuring 1 × 1 m was set up around a collapsed smithing furnace and test pit 2 with the same size was set up on the floor of a nearby rock shelter. The excavations yielded slags, pottery, charcoal, hammerstones, glass beads and quartz fragments.

**Archaeological Ethnography**

Archaeological ethnography is not only a practice but is also a method and transdisciplinary and transcultural space allows for multiple meanings, conversations and interventions to take place around archaeological sites [18]. Therefore, the archaeological ethnography of contemporary working around Mutanda, Nyahokwe and Saungweme sites involved the recording of material culture excavated complimented by entering a dialogue with them to understand their own material and temporal sensitivities, perceptions and practices on time and matter and their own archaeologies. It was thus a collective practice between me as the researcher and contemporary miners as the interlocutors. Accordingly, data sharing is a fundamental principle of archaeological ethnography [19].

It is clear the indigenous artisans in Eastern Zimbabwe were making metals (gold in particular) and mining ore but the knowledge of how this was done, and even the stories might not have survived into the present. However,

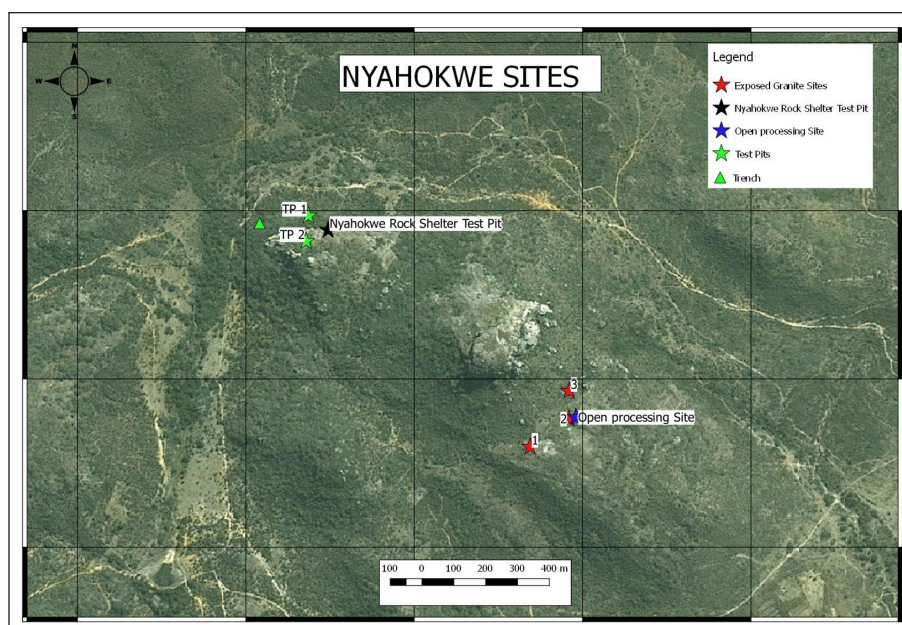
knowledge of past gold mining techniques and processes was attained during this research by observing what contemporary miners were doing. Similarity of function was thus inferred based on similarity in form between ethnographically known and archaeologically recovered materials. The story was not only about indigenous gold mining pasts but rather more of an understanding of how the value of that past is calibrated across a wide social spectrum of contemporary gold mining [20].

**Participant observation and interviews**

Interlocutor's derived data was obtained from interviewing contemporary gold miners working close to Nyahokwe Mutanda and Saungweme sites. This was complemented by participant observational data. These interviews were not structured but were premised on the life history or biographical approach. The interviews were carried out using audio voice recorders. Interlocutors amongst miners were selected based on their mining knowledge and their willingness to share their individual experiences. Throughout the interviews, the goal was to allow miners to share as much information as possible, unguided and in their own language. Using such an approach, social information concerning their beliefs, totems, religion, places of origin, and cultures was gathered. In one case at Saungweme Site, I went down a 20-metre shaft and spent some time underground to observe the mining and operational sequences. Participant observation offers several advantages in its use as an ethnographic method. Rapport also develops between the researcher and interlocutors through periods of active participant observations. Once such kind of rapport is established apprehension is removed amongst the interlocutors as they begin to freely cooperate.

**Photography**

Photography was used as form of documentation to produce a comprehensive and precise pictorial record of the archaeological and ethnographic phenomenon under



**Figure 3:** Showing the location of excavated unit at Nyahokwe Site.

investigation. The photographic record started with taking general photographs of the sites together with visible surface archaeological features before the start of the excavations. Subsequently, each stage of the excavation was photographed together with each context and objects that were coming out of the trenches and test pits. Understanding context during photography was very important because it gave detailed information about past human activities at the sites. Still photographs were taken using the Nikon D3200 single lens reflex digital camera (18–55 mm 1:3.5-5G11). Aerial photography of the archaeological sites and the test excavation process were taken using the DJI Phantom 4 Quadcopter low altitude drone imaging. The drone revealed the spatial patterns of the material remains on the surface before the start of the excavations. Aerial photography was also used in defining the overall distribution patterns of the mining areas and correlating this distribution with geology, topography and drainage. Furthermore, mining activities undertaken by contemporary were mapped using the drone to establish the spatial relationship between the mining holes, the dumps and waste materials that was generated.

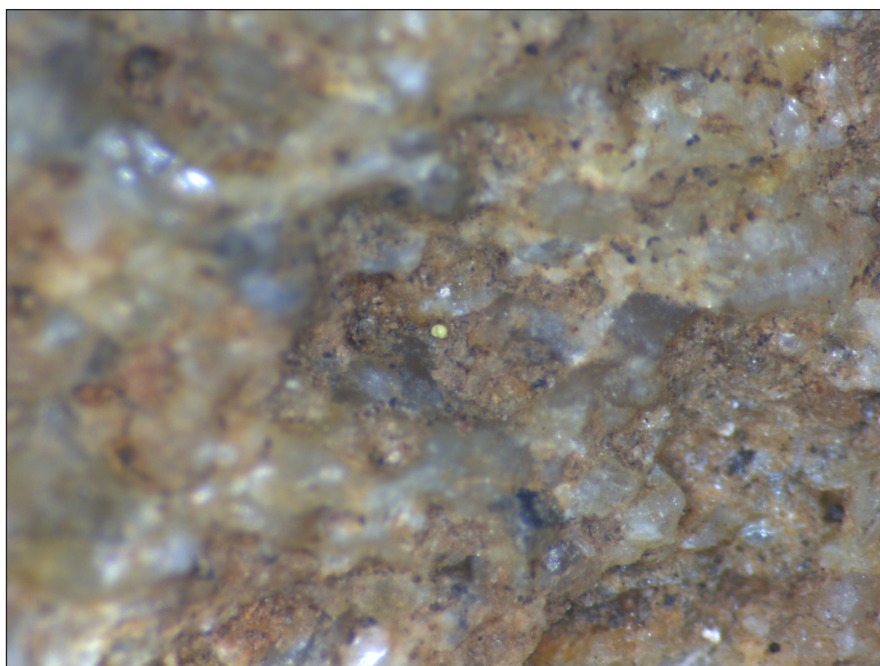
#### **XRF Analysis**

X-ray fluorescence (XRF) is a widely used method of chemical analysis in archaeological researches. The objects that were recovered during excavations at Mutanda and Nyahokwe together with the surface finds from Saungweme were prepared for the handheld Thermo Fisher Niton XL3 portable XRF analysis at the Earth Lab at the University of the Witwatersrand, Johannesburg. The collected objects comprised of crucible fragments and grinding stones. XRF is basically a qualitative analysis of surfaces of the samples by direct scanning. Through direct scanning, traces of metals can be identified in a fast and relatively inexpensive way. The

pXRF can detect the amounts of major, minor and trace elements. Analyses using pXRF were carried out in metal mode with an average of 8 readings per object sample. The materials were detected at parts-per-million (ppm) level. Using the pXRF a beam is directed onto the sample which emits an X-ray spectrum. The beam dimensions were 3 × 4 mm [20]. Measurement times on each section of the sample or object was set at 180 seconds. Incoming primary X-ray interacts with atoms that make up the sample and cause them to emit secondary X-rays and by knowing the energy levels of the secondary X-rays – atoms can be identified and the number elements present in each sample [21].

#### **Optical Light Microscopy (OLM)**

An optical microscope, which utilized plane polarized light (PPL) and cross polarized light (CPL), was employed to examine the ceramics, beads, glass fragments and hammerstones recovered from the three field sites. The optical microscope allowed for a field view of the samples at magnification points that ranged between 2.0× and 5.5×. This microscope was equipped with a digital camera to capture important attributes of the samples in the form of photomicrographs. The microscopic analysis was carried out in the Evolutionary Studies Institute and the Geology Lab at the University of the Witwatersrand, Johannesburg using the Leica DMS 300 microscope. Fragmentary crucible remains recovered from excavations at Mutanda site were put under the optical microscope to check for any gold inclusion in its fabric. A careful visual inspection of the fragments using the optical microscope confirmed that the crucibles were heavily tempered with sand whose grains could be seen protruding on the surfaces. Optical light microscopy (OLM) of grinding stones, for instance also showed what appeared to be gold particles embedded on the surface (See **Figure 4** below).



**Figure 4:** Showing a gold prill in the middle of Saungweme Grinding Stone 1.

### Radiocarbon Dating

Uncontaminated charcoal samples were collected at Mutanda and Nyahokwe Sites in their original contexts during the excavations for radiocarbon dating. Due to financial constraints, only one sample from Mutanda Trench 2 Level 2 was dated. However, this sample gave inconclusive results due to the Suess effect. The Suess effect is the depletion in the ratios of carbon isotopes caused by release of carbon from fossil fuels. The carbon date obtained for this site span between AD1695-1725.

### (3) Data description

#### Object name

Study: Data from Contemporary gold mining in Eastern Zimbabwe: Archaeological, Ethnographic and Historical Characteristics.

#### Files:

Mutanda Summarised Table of Objects recovered from the archaeological excavations.docx

Table of Summarised surface collections from Saungweme site.docx

Calibrated radio carbon dates for Mutanda Site.pdf

XRF results for Mutanda and Saungweme Hammerstones and Crucibles.docx

OSL Results for Mutanda and Nyahokwe.docx

Transcript of interviews carried out with contemporary miners.docx

Aerial and still photographs of excavations units and surface finds.jpeg

Maps showing study areas and excavated sites.jpeg

Photomicrograph showing grinding stone and crucible fragment

#### Data type

Primary and secondary data, and processed data from published materials.

#### Format names and versions

Word Text Documents, JPEG and Adobe PDF reader.

#### Creation dates

11/01/2016–30/07/2016

#### Dataset Creators

Njabulo Chipangura

#### Language

Interview were transcribed into English from Shona language.

#### License

Creative Commons (CC-BY 4.0)

#### Repository location

This dataset can be accessed at: <https://figshare.com/s/4e4fd537732574a50f49>.

#### Publication Date

19 August 2019

### (4) Reuse potential

This datasets generated by this research can be used by all archaeologist, anthropologist or heritage scholars in sub Saharan Africa and beyond who are interested in understanding how ethnographic analogies drawn from contemporary mining practices can help in interpreting the archaeological mining past. Furthermore, although there has been a lot of discussion on archaeometallurgy and metallurgical analysis in sub Saharan Africa, much of it has been devoted to iron production, smelting, rituals and as a result we know very little about gold production and other non-ferrous metals in general. Thus, this research project generated new knowledge on metallurgical practices of non-ferrous metals in Eastern Zimbabwe particularly gold using a holistic anthropological approach.

#### Acknowledgements

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#### Competing Interests

The author has no competing interests to declare.

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