

Archaeometallurgy in Tigrai: a pilot investigation of ancient iron production in Ethiopia

Report for the Society for the Promotion of Museums in Ethiopia

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Background

Iron objects are often found during archaeological excavations in Ethiopia, yet nothing is currently known of the ancient technologies or craftspeople responsible for their production. In 2015 the archaeological sites of Mariam Takot and Mariam Kadih in north-eastern Tigrai (figure 1), were confirmed as significant ancient iron production locations, thus providing opportunity for a pilot investigation of the metallurgical history of the region. With the generous support of the Society for the Promotion of Museums in Ethiopia (SPME), the Institute for Archaeometallurgical Studies (IAMS) and UCL Qatar, and following the award of a research license by the Authority for Research and Conservation of Cultural Heritage in Ethiopia (ARCCH), a short season took place with research conducted at both sites in June 2017. The aim of this fieldwork was to document the sites in terms of their scale and nature, and systematically collect samples of iron slag, possible iron ore, technical ceramics and associated archaeological material for radiocarbon dating and laboratory analysis. A combination of the chronological and archaeometric results is intended to provide the first information about the ancient iron production technologies of Ethiopia, and data from which a major funding application can be made for a large-scale investigation of ancient Ethiopian iron technologies.



Figure 1. The location of the sites of Mariam Takot and Mariam Kadih in relation to Aksum and Yeha.

Fieldwork: Mariam Kadih

At the site of Mariam Kadih (figure 2 and 3), the church complex and the surrounding landscape were documented and an area within the church complex was selected for archaeometallurgical sampling. Ten slag samples (MKD s1-10) were collected from the surface, mainly to provide comparative data to that generated from the more systematic investigation at Mariam Takot (see below). No excavations took place at Mariam Kadih because no location provided an obvious opportunity to obtain in situ metallurgical remains. This site will require large-scale excavations in the future to produce a comprehensive understanding of its metallurgical history and of the history of the site in general.

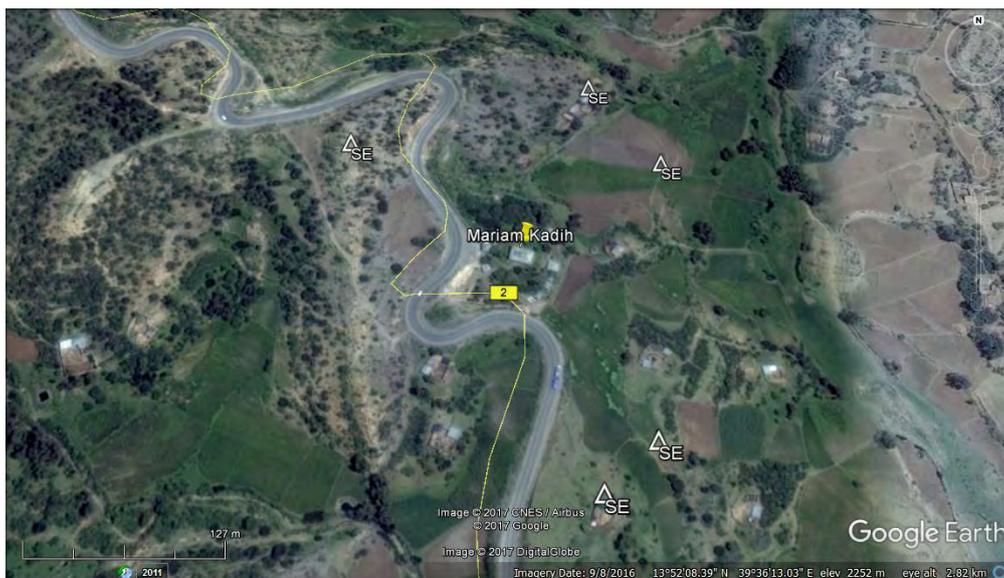


Figure 2. The site of Mariam Kadih with the Survey Extent points also shown.



Figure 3. The church of Mariam Kadih.

General Observations

The pragmatic walking surveys conducted around the church of Mariam Kadih revealed Aksumite and possibly pre-Aksumite pottery and a variety of architectural features such as extensive terracing on the hill slope to the west of the church (figure 4). The terracing did not display architectural features characteristic of any particular time period. The slag scatter extends for at least 0.3-4 km in a north-south direction and quite possibly further, although the topography of the site and recent farming has more than likely influenced the appearance of the extent of the site. For example, the area to the east of the church was noted as the area of densest slag occurrence, yet this lies at the bottom of the hill. As was the case at Mariam Takot, most of the slag observed around the site is present as small (c. 1-5cm³) fragments, although occasional larger slag fragments are evident, weighing at times over c. 3kg. Also similar to the case of Mariam Takot, most slag appears to have formed within a furnace rather than to have been tapped outside a furnace, and no tuyère fragments were observed (although 1 tuyère fragment was collected at Mariam Takot).



Figure 4. Terracing at the summit of the hill ridge to the west of the church of Mariam Kadih

Fieldwork: Mariam Takot

The majority of the fieldwork time in Tigray was dedicated to investigating the site of Mariam Takot c. 35 km north of Mariam Kadih (figure 5), as the area with the greatest archaeometallurgical potential for a small-scale pilot investigation. In 2009-2010 a Chinese road-construction company extracted material from a large area of the site of Mariam Takot, leaving a long section which in places reaches almost 2.5 m deep. Architecture and metallurgical remains dominate this section (figure 6). During the recent fieldwork, archaeological remains visible within the section were documented to provide an understanding of the features of the metal producing site. A pragmatic landscape survey took place, revealing the slag scatter to be greater in extent than that of Mariam Kadih, reaching at least 0.6 km in extent. Additionally, a number of important landscape features were recorded, such as a rock-cut church (figure 7) and rock-cut graves (figure 8), as well as possible iron ore locations.

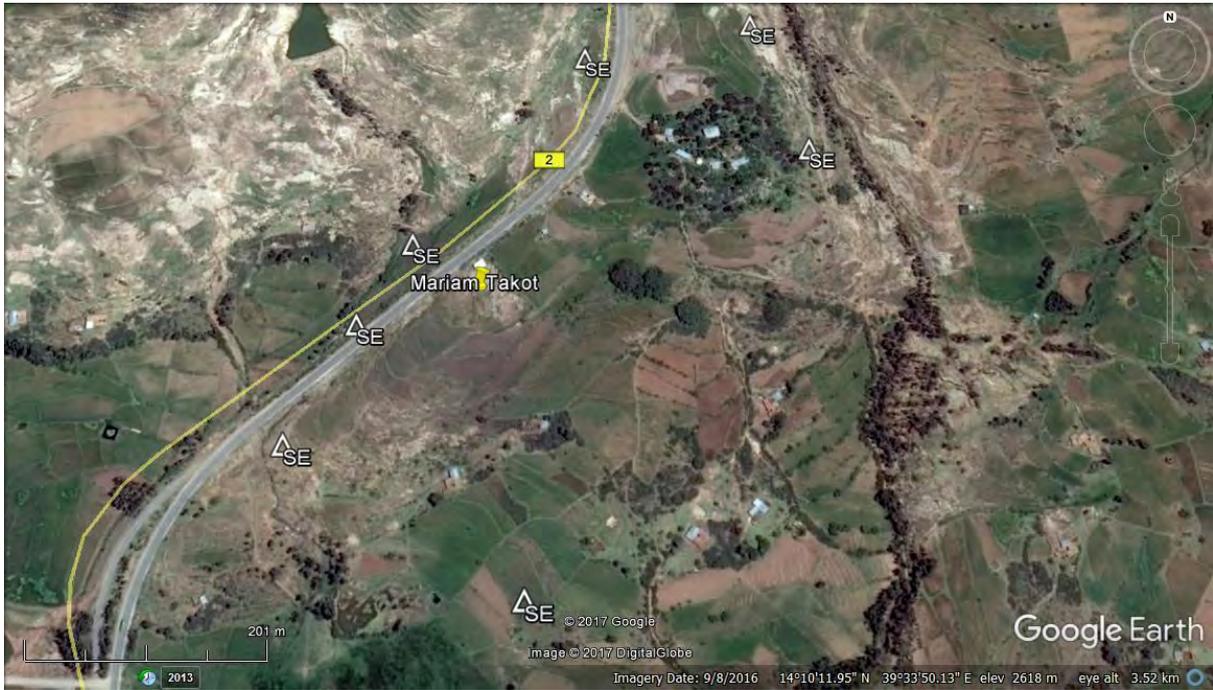


Figure 5. The site of Mariam Takot with the Survey Extent points also shown.



Figure 6. Architectural features visible in the section at Mariam Takot



Figure 7. The nearby rock-cut



Figure 8. Local rock-cut graves

The deepest area of the modern section was selected for detailed analysis. This section area, which was c. 1 m wide and dominated by metallurgical deposits, was cleaned to ground level and then excavated to natural, documented and sampled (figure 9 and 10). 38 slag samples (MTK s1-38), 16 possible ore samples (MTK o1-16), 9 samples of furnace material (MTK f1-9), 1 tuyère sample (MTK t1) and 33 charcoal samples were collected from 31 systematically recorded contexts. Additionally, 31 diagnostic pottery vessel units (figure 11) were described in line with the documentation format used by the DAI Wuqro excavations to ensure comparability of samples, and photographed. These were deposited alongside 41 non-diagnostic, photographed pottery sherds, in the Wuqro museum with permission from the TCTB, where they await further investigation by the UCL Qatar team in the future.



Figure 9 (left). The final section at Mariam Takot.

Figure 10 (upper right). Documenting sample locations.

Figure 11 (lower right). Examples of pottery found during section excavation.

Next steps

Permission was granted by the ARCCH for the exportation of all metallurgical samples for destructive analysis and these samples are now in Qatar. Charcoal samples for dating will be sent to the NSF University of Arizona Dating Laboratory, while other charcoal samples will be sent to Frankfurt for wood species analysis. At UCL Qatar, the samples of slag, possible ore and technical ceramics will be documented and prepared into polished resin blocks. These will be analysed microscopically to understand formation processes and phases present, and where appropriate by SEM-EDS. The work will be published as soon as possible, on completion of the laboratory analysis.

Once sample preparation and analysis is complete a full accounting breakdown will be provided to the SPME and any remaining funds transferred back to the organisation.

Please do not hesitate to contact me should you have any further questions.

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