Field Report from August 2009 Feasibility Study on the Middle Stone Age of Northern Malawi

Jessica C. Thompsona, b*, Menno Wellingc, and Justin Pargeterd

aSchool of Social Science, Archaeology Program, Michie Building (9), University of Queensland, Brisbane, QLD 4072, Australia; jessica.thompson@uq.edu.au; Tel. +61 7 3365 2765, Fax +61 7 3365 1544

bInstitute of Human Origins, Arizona State University, PO Box 874101, Tempe, AZ 85287-4101, USA

cCatholic University of Malawi, PO Box 5452, Limbe, Malawi; WellingM@cunima.net; Tel. +265 (0)1 916540 (office); Cel. +265 (0)9 99235823

dInstitute for Human Evolution, University of the Witwatersrand, Private bag 3, PO WITS, 2050, South Africa; justin.pargeter@gmail.com; Tel. +27 (0)82 873 6123

*Corresponding author
Field Report to the Malawi Ministry of Tourism, Wildlife and Culture

Contents

I. Introduction .................................................................................................................. 3
II. Personnel ................................................................................................................... 4
III. The Modern Human Origins Debate ..................................................................... 5
IV. Importance of the Middle Pleistocene ................................................................. 7
V. Significance of the Malawi Rift ............................................................................. 9
VI. Conventions for Reporting, Mapping, and Sampling ........................................ 12
VII. Sites Investigated .................................................................................................. 15
  1. Mwanganda’s Village ......................................................................................... 15
  2. Airport Site ........................................................................................................ 28
  3. Chaminade ........................................................................................................ 35
  4. Misuku Hills ...................................................................................................... 41
  5. I’Bungu Cave .................................................................................................... 43
VIII. Sites Visited .......................................................................................................... 46
  1. Rumphi Rockshelter ......................................................................................... 46
  2. Chombwa Gravel Pits ..................................................................................... 47
  3. Malowa Rockshelter ......................................................................................... 48
  4. Thyolo Escarpment Road .................................................................................. 50
IX. Work at the National Repository ......................................................................... 51
X. Summary of Future Goals .................................................................................... 53
XI. Acknowledgements ............................................................................................... 54
XII. References Cited ................................................................................................ 55
I. Introduction

The Malawi Earlier-Middle Stone Age Project (MEMSAP) is conceptualized as a large-scale research agenda aimed at understanding changes in human technology, subsistence, and demography from the late Middle Pleistocene to the early Upper Pleistocene (ca. 310 – 128 thousand years ago [ka]). These investigations require well-documented and well-dated Earlier to Middle Stone Age archaeological and palaeoenvironmental records. The development of these two practical outcomes is therefore one of the long-term objectives of MEMSAP.

Several smaller sub-projects have been identified that will be informative on their own as well as designed to contribute seamlessly to the larger research agenda. In this stepwise manner, we intend to begin with what is known and work towards the unknown. This ensures a useful result at the end of each field season regardless of the scale of the investigations. With this strategy in mind we undertook pilot survey and sampling in August 2009 in the Karonga District, which at present contains the best-studied Middle Stone Age deposits in Malawi. This report outlines the results of the pilot study and embeds them within a description of the ongoing goals of MEMSAP.
II. Personnel

CV’s for all personnel were provided to Antiquities in August 2009.

Personnel involved in the August 2009 fieldwork were:

- PI-Dr. Jessica Thompson, Postdoctoral Research Fellow at the University of Queensland (UQ).
- PI-Menno Welling, Senior Lecturer in Anthropology at the Catholic University of Malawi (CUNIMA).
- Justin Pargeter, Assistant Lecturer in Archaeology at CUNIMA at the time of the fieldwork, now a postgraduate student at the University of the Witwatersrand
- Harrison Simfukwe, Senior Antiquities Officer based at the Karonga Museum.
- Alfred Topeka, Antiquities Officer based in Lilongwe.
- Davie Simengwa, a third-year student in Archaeology at CUNIMA.

Personnel who will analyse the samples taken during the 2009 field season are:

- Dr. Andy Herries, a paleomagnetics specialist at the University of New South Wales (samples received).
- Dr. Ann-Maria Hart, a sediment micromorphologist at UQ (samples in transit).
- Dr. Jian-xin Zhao, a U-series dating specialist at UQ (permission pending).
- Dr. Zenobia Jacobs, an OSL dating specialist at the University of Woollongong (samples in transit).
- Dr. Gail Robertson, a lithics residue and use-wear specialist at UQ (sample in transit).
III. The Modern Human Origins Debate

Research into the origins of modern humans addresses the fundamental question of when and how we became human. This work has demonstrated that the vast diversity of modern populations and cultures can all be traced to a single origin in Africa as recently as 200 ka (ka = thousand years ago) (Relethford 2008). Archaeologists have accepted that behavioural modernity was well-established by ca. 40 thousand years ago (ka), but there has been much debate regarding the specifics of when, where, and how the transition occurred (Chase and Dibble 1990, Foley and Lahr 1997, Henshilwood and Marean 2003, Klein 2008, McBrearty and Brooks 2000). Our project aims to resolve crucial issues surrounding these debates by:

- Understanding significant technological changes in stone tool manufacture;
- Determining when modern human hunting ability arose;
- Identifying key changes in landscape and resource use; and
- Linking human demographics to climate change.

The recent discovery of incised pigments, shell beads, and elaborate stone tools from Blombos Cave in South Africa clearly demonstrate that modern cultural complexity and symbolic behaviour was well-established by 75 ka (Henshilwood et al. 2001, Henshilwood et al. 2004, Vanhaeren et al. 2006, Yellen et al. 1995). Modern hunting ability was also in place at Blombos and the nearby site of Pinnacle Point, which dates to ca 180 ka (Thompson 2008, Thompson in press). This has challenged the longest-standing model for the origins of behavioural modernity (Klein 2000, Klein 2008), which posits a very rapid change in behaviour quite recently in human prehistory, close to the end of the cultural designation known in Africa as the Middle Stone Age (from ca. 280 – 30 ka).

Shell beads dating to at least 100 ka have also been recovered at the opposite end of Africa, conclusively showing that the unique ability of modern humans to express themselves in a complex symbolic manner was rooted much more deeply than the terminal Middle Stone Age (Vanhaeren et al. 2006). Central Africa was the crossroads for demographic movement of these earlier human populations, who have left behind the oldest evidence of modern
behaviour in the form of worked pigments and complex stone tools (Barham 2000, Barham 2002a, Barham and Robson-Brown 2001).

Unfortunately, recent research has shown that the most important behavioural shifts likely occurred during the most poorly-documented part of the archaeological record. The majority of work on the problem of the origins of modern humans (OMH) has focussed on the latter portion of the Middle Stone Age, from ca. 128 – 30 ka (Table 1). This is attributable to problems of site preservation, dating, and a lack of focussed research on the earlier Middle Stone Age (Henshilwood and Marean 2003).
IV. Importance of the Middle Pleistocene

The entire history of stone tool technology in Africa is divided into three major portions, characterized by important transitions. One of these occurred at the Earlier Stone Age (ESA) – Middle Stone Age (MSA) boundary, around 280 ka (Table 1). Major changes in human biology also occurred during this time, resulting in a fully modern anatomy and genotype by the end of the Middle Pleistocene at 128 ka (Miller et al. 1999, Pearson 2000, Rightmire 1989). The ESA-MSA transition occurred during a very harsh (cooler and likely drier) climatic episode, lasting from 310 – 240 ka (Table 1), and the human genome records a clear history of important demographic shifts in concert with these climatic extremes (Fagundes et al. 2007, Relethford 2008). These factors together identify the late Middle Pleistocene as a period that witnessed fundamental changes in human biology, behaviour, and technology - accompanied and perhaps fuelled by extreme climatic shifts.

Unfortunately, the Middle Pleistocene is the most poorly-documented part of the archaeological record. In a recent letter to *Nature* (Marean et al. 2007), GIS technologies were used to link archaeological, bathymetric and local palaeoenvironmental data. The resultant model demonstrated that during periods of extreme cold and aridity such as the late Middle Pleistocene, sea levels lowered and the African coast was up to 100 km from its present position. Human settlement moved onto the coastal plain as populations were driven from elsewhere by a rapidly deteriorating climate. Many late Middle Pleistocene sites are therefore inaccessible because they are now submerged.
The central African archaeological record preserves rare and significant evidence of the ESA-MSA transition. OMH research has been most heavily focused on the subregions of southern and eastern Africa, with the vast linking region of central Africa seeing little systematic research. Well-dated sites from the early MSA are restricted to a handful sporadically distributed from eastern to southern Africa (Barham, Pinto Llona, and Stringer 2002, Barham and Robson-Brown 2001, Clark 2001, Kingston and McBrearty 1993, Kuman et al. 2007, Kuman, Le Baron, and Gibbon 2005, McBrearty 1988, McBrearty and Clark 1991).

V. Significance of the Malawi Rift

Malawi is an ideal place to track human demographic responses to climate change in the Middle Pleistocene. The Malawian landscape imposes important constraints on human population movement. Lake Malawi provides a physical barrier along the eastern margin of the study area (Cohen et al. 2007). Less than 100 km to the west the Nyika Plateau rises to nearly 2500 m, leaving a narrow north-south strip of land between the two major features. Today northern Malawi falls within the Zambezi ecozone vegetational community (White 1983), and is a large mammal barrier between endemic faunas of eastern and southern Africa (Klein 1984). The strip of land between lake and plateau was a natural funnel for animal and human populations, guiding major population dispersals ultimately leading out of Africa (Bromage, Schrenk, and Juwayeyi 1995).

Recent work has suggested that ecological refugia during periods of harsh climatic conditions may have driven human biological and behavioural evolution through increased competition (Basell 2008, Scholz et al. 2007). Potential refugia can be identified by a high degree of endemic species diversity, as is found in Malawi (Danley et al. 2000, Dudley 2005). A report in PNAS has recently shown that the water volume in Lake Malawi was reduced by up to 95% during periods of extreme drought in central Africa (Cohen et al. 2007). Vegetation and biotic communities responded by contracting toward the lake, and much of Malawi was a tropical grassland – one of the most productive ecosystems in the world for hunter-gatherers (Marean 2005). Many sites are now submerged, but bathymetric data indicate that ancient lakeshore sites will still be preserved in areas such as Nkhata Bay (Scholz et al. 2007), where MSA artefacts have been found (Cole-King 1973) (central asterisk in Figure 1).
Analogous sedimentary deposits to the north in the Karonga District (the Chitimwe beds) contain an enormous wealth of MSA sites, many of which are likely Middle Pleistocene in age (Betzler and Ring 1995, Clark 1972, Clark, Stephens, and Coryndon 1966, Cole-King 1973, Ring and Betzler 1995). The Mwanganda’s Village site in Karonga is the best-reported open-air MSA site in Malawi (Clark and Haynes 1970, Kaufulu 1990). It has been described as a rare example of an early MSA Sangoan site. Other MSA lithic assemblages are abundant in the Chitimwe beds, particularly at Chaminade southwest of the Karonga airstrip (northeast asterisk in Figure 1, also indicating Mwanganda’s Village) and the Kayelekera region (northwest asterisk in Figure 1) about 21 km west of the Chaminade (Clark 1966, Clark 1968, Clark and Haynes 1970, Cole-King 1973, Juwayeyi and Betzler 1995, Kafulu and Stern 1987). The feasibility study reported here therefore focuses on Karonga.

The best-described rock shelter site in Malawi with a probable MSA component is Malowa, in Chiradzulu District (southernmost asterisk in Figure 1). However, at this stage the dating of the oldest deposits remains uncertain (Denbow 1973, Denbow and Ainsworth 1969, Juwayeyi 1981, Juwayeyi 2008). The total number of MSA sites in Malawi recorded in the Malawi Department of Antiquities (MAD) master register and located during this survey is 111, but it is clear that more formal survey would exponentially increase this number. This is because large parts of Karonga represent a “Middle Stone Age landscape” rather than a series of discrete sites. Furthermore, excavations
in rock shelter settings have rarely penetrated into MSA layers most probably because of a lack of research focus on this time period rather than a lack of suitable materials for study. Malawi holds a stunning and possibly unique record of early human behaviour that is highly relevant to important questions regarding the origins of modern behavioural complexity. It is imperative that this priceless record be studied, shared with the people of Malawi, and preserved for the future.
VI. Conventions for Reporting, Mapping, and Sampling

The August 2009 fieldwork focused on mapping, photographing, surveying, and sampling localities within 2 km of the Karonga airstrip (Figure 2), in order to obtain pilot data that could be used as a launching point for a larger project in the future. A brief (3 day) survey was also undertaken in Chitipa District, with particular emphasis on the Mughesse Forest Reserve in the Misuku Hills. Finally, sites were visited in the Districts of Rumphi, Chiradzulu, Chikwawa, and Nsanje to take notes and photographs. A summary of the work done or observations taken at these sites is provided in this report.

Figure 2. Georectified satellite photographs of the Karonga airstrip with mapping points indicated (yellow dots). Top box is Mwanganda’s Village and bottom box is the Airport Site (magnified at right). The Chaminade deposits are situated under the scale bar in the photograph on the left, with Chaminade Secondary School visible as the large cluster of buildings southwest of the airstrip.

Map coordinates are given for each site. These coordinates refer to the UTM grid number, longitude, and latitude respectively (Datum is Clarke 1984). The MEMSAP shorthand is the 2-3 letter designation for each site that is written on specimens, samples, and photographs.
taken in 2009. For the sake of consistency it is hoped that in the future this shorthand will be converted to either the numbering system used by Cole-King (1973) or the Malawi Antiquities Department (MAD) accession numbering system. Unfortunately, at the time of this study the next number for new sites in the various districts was unconfirmed, as was the next consecutive MAD number. The two-letter designation is also inconsistent for some districts (for example, “Karonga” is written as “KR” in Cole-King [1973] but “KA” in the master Antiquities Site Register).

All mapping and survey was done with two Garmin GPS units and a total station. Photographs were taken with a Nikon D80 digital camera. Detailed mapping was done only at Mwanganda’s Village and the Airport Site, and only after total station accuracy was checked to be within 4 cm deviation from the established value of a known control point in all three axes (N, E, and Z). Survey points were used to generate raster digital elevation maps, from which contour maps were generated. The precise locations of all samples are integrated into these maps. All elevations were adjusted to metres above sea level (MSL) using a GPS reading, but because of the imprecision of such readings the closest elevation survey beacon (to the Karonga Airstrip) was also located. Future plans include survey using a total station to the beacon so that absolute elevations for all sites in the region can be established more precisely in terms of MSL.

Sediment micromorphology samples were taken as ca. 0.1 x 0.2 x 0.1 m intact blocks of sediment from exposed sections. The directionality of the sample was indicated and the sample was taped securely for transport. Paleomagnetometry samples were taken by inscribing and/or writing in permanent ink the current position of magnetic north relative to the sample. Optically-stimulated luminescence samples were taken by driving a 0.2 m conduit pipe into a section and securely taping the ends of the sample so that light could not penetrate into the interior of the pipe. The tanged artefact that will be subjected to residue analysis was handled when it was initially discovered but was afterwards examined only using tweezers and wrapped in toilet paper and clean plastic packaging.

Artefacts were collected (with one exception) only from the surface, and only when they provided illustration of the potential of the site; e.g. examples of raw material types, diagnostic technological types, or weathering stages. Surface collections of artefacts were
only made for 15 lot numbers (e.g. 15 different proveniences). The only exception to the surface collection protocol was at the Airport Site, where five buried artefacts had to be removed during extraction of a micromorphology sample. These were piece-plotted using the total station and assigned specimen numbers. All collected artefacts are currently housed at the Catholic University of Malawi in Limbe, from whence they will ultimately be curated at the National Respository in Nguludi after study.
VII. Sites Investigated

Three previously-known sites were investigated from 19 – 24 August in the Karonga District. New survey was also conducted from 25 – 26 August in the Chitipa District. The locations of all reported sites with an MSA component are shown in Figure 3, with sites reported here labeled according to the MEMSAP shorthand.

Figure 3. Map of northern Malawi showing all recorded MSA sites and highlighting sites investigated here.

1. Mwanganda’s Village (Figure 4)

UTM Coordinates: 36L 0597465 8900852
MEMSAP Shorthand: MGD
MAD Number: 162
District: Karonga
District/Site Number (MAD Register): KR2b
The Mwanganda’s Village site (Clark and Haynes 1970, Kaufulu 1990) is heavily referenced as an early MSA occurrence with Sangoan stone tool technology and as a proboscidean butchery locality (McBrearty 1988, Mussi and Villa 2008, Surovell, Waguespack, and Brantingham 2005). It is also the only internationally-published MSA site from Malawi with both geological and archaeological data - and one of a handful from central Africa. These factors make Mwanganda’s Village a critical reference point for workers seeking to understand larger patterns of behavioural change during the MSA and an excellent initial research area.

We returned to Mwanganda’s Village between 19 – 24 August 2009 and began by making a basic site map. Five control points were set into cement, numbered, and photographed. Three depth data points were established using nails in trees around the site. We also took samples that will lay the groundwork for a study aimed at addressing five major questions
about the site that remain unknown or open to question. These questions seriously undermine the site’s current research value, but are relatively straightforward to resolve using current analytical and interpretive techniques. On site, it was apparent that the original excavation trenches from 1970 were not backfilled, with the backdirt piles having been left as slumped inverted remnants of excavated material. This is unfortunate, as it made the precise edges of the previous excavations impossible to locate, but it did remove any ambiguity in the location of the original trenches. Each outstanding problem with the site, our proposed resolution, and the action we took during the August 2009 study is outlined below:

Research Questions and Proposed Resolutions

Question 1: What was the functional relationship of the stone tools to the fossils that were recovered from the site?

Discussion: Several purported Paleolithic proboscidean hunting and/or butchery sites have been systematically re-evaluated on the basis of taphonomic research (Villa et al. 2005), but the fossil assemblage from Mwanganda’s Village has never been examined for hominin modification or other indications of a behavioural association with the MSA artefacts. This leaves unconfirmed the entire site interpretation as a “Sangoan elephant butchery site” (Clark and Haynes 1970), or as evidence of early hunting of megafauna (Surovell and Waguespack 2008, Surovell, Waguespack, and Brantingham 2005).

Proposed Resolution: A systematic taphonomic analysis is necessary before any behavioural association between the artefacts and fossils at the site can be inferred and further perpetuated in the literature. This study will be carried out by PI-Thompson on the entire fossil faunal assemblage, following the methods detailed in another study of MSA faunal assemblages (Thompson in press). The original collection is housed at the Stone Age Institute near Bloomington, Indiana, U.S.A. Each fragment will be examined using low-power light microscopy, a method that confidently diagnoses bone surface alterations caused by humans, carnivores, and natural processes (Blumenschine, Marean, and Capaldo 1996, Dominguez-
Rodrigo and Barba 2006, Dominguez-Rodrigo and Yravedra 2009). Subsequent analyses of hunting proficiency, butchery strategies, and carcass transport will therefore only include fossils that are relevant to ancient hominin behaviour.

**Question 2: What are the technological attributes of the stone tool assemblage?**

**Discussion:** In some cases early MSA lithic assemblages include a large core tool component similar to the preceding Acheulean technological designation. This early MSA technology has been termed ‘Sangoan’, and the Mwanganda’s Village lithic assemblage was assigned to this industry based on the relatively large size of cores, the absence of large cutting tools (handaxes and cleavers), and the presence of “crude core-axes and high frequency of concave, notched, and denticulate pieces” (Clark & Haynes 1970:402). However, the function and technological underpinnings of the Sangoan are poorly understood and the industry has not been dated adequately outside of East Africa (Clark 1964a, Clark 1964b, Clark 2001, Clark and Haynes 1970, Kingston and McBrearty 1993, Kuman et al. 2007, Kuman, Le Baron, and Gibbon 2005, McBrearty 1988, McBrearty 1990, McBrearty 1992, Tryon and McBrearty 2002, Tryon and McBrearty 2006).

**Proposed Resolution:** A full technological (rather than typological) analysis is needed to address how the tools were made, their probable function, and how they relate to other reported Sangoan assemblages. PI-Braun will conduct a technological analysis of the original Mwanganda’s Village assemblage, and produce a comprehensive assessment of Sangoan tool functionality at the site. In the forty years of research since the site was reported more Sangoan sites have been described, offering many opportunities for comparison to other well-dated Sangoan occurrences (Kuman et al. 2007, Kuman, Le Baron, and Gibbon 2005, McBrearty and Tryon 2005, Tryon, McBrearty, and Texier 2005, Tryon and McBrearty 2006, Van Peer et al. 2003). Artefact reduction intensity with will be measured so that the effects of raw material availability on assemblage characteristics and variation in artefact size and shape can be quantitatively assessed (Clarkson 2007). Non-metric analyses of assemblage diversity and richness relative to sample size will be used to determine whether there are
discernable and quantifiable differences in industrial variability or technological characteristics between Mwanganda’s Village, other published Sangoan occurrences, and later MSA assemblages. Geochemical sourcing will inform about mobility and lithic resource transport, particularly of the quartzite raw materials that are so abundant in northern Malawi (Braun, Harris, and Maina 2009, Braun et al. 2008).

**Question 3: What are the chronometric ages of the artefactual and ecofactual assemblages?**

**Discussion:** Good chronological control has rarely been obtained for early MSA sites, which makes it difficult to discern the timing and nature of the important behavioural and technological changes that took place at this time (Clark 2001, Morgan and Renne 2008, Tryon, McBrearty, and Texier 2005, Tryon and McBrearty 2006). A single date of ca. 300 ka has been reported from Mwanganda’s Village. This was a rubidium-strontium date on soil carbonates, which is not generally considered to be a reliable technique and if furthermore only cited as personal communication from the original excavator (Kaufulu 1990). This imprecision makes it impossible to insert the Mwanganda’s Village site into either a local or regional chronology of technological change in Malawi. Furthermore, the MSA tools from the assemblage are crafted using the same technology that is represented by abundant MSA tools derived from the Chitimwe beds at other sites in the area (and which should therefore all post-date ca. 280 ka, based on what is known from other Sangoan sites in Africa). Both the lithic artefacts and the fossils recovered from Mwanganda’s Village are reportedly from the iron-rich basal Chitimwe (Clark and Haynes 1970). However, every other fossil-bearing locality in Karonga has been reported from the carbonate-rich Chiwondo beds, which unconformably underlie the Chitimwe beds and have been dated to ca. 2.4 – 2.0 million years ago (Bromage, Schrenk, and Juwayeyi 1995, Kaufulu, Vrba, and White 1981). Conversely, lithic artefacts of any type have only controversially been reported from the underlying Chiwondo beds at the site of Mwimbi (Juwayeyi and Betzler 1995, Kaufulu and Stern 1987). This raises three possibilities:
1) The fossils and lithics were deposited together during basal Chitimwe times because the hominins were using the stone tools to butcher the animals represented by the fossils, which were then preserved because of their proximity to the underlying Chiwondo beds.

2) The fossils and lithics were deposited asynchronously during basal Chitimwe times, making the association of the two coincidental, and the fossils were then preserved because of their proximity to the underlying Chiwondo beds.

3) The fossils were deposited and preserved during Chiwondo times and the lithics were deposited during Chitimwe times and the association of the two is coincidental.

4) The fossils were deposited during Chiwondo times and the lithics were deposited during Chitimwe times and the association of the two is attributable to some other resource extraction strategy – such as the modification of pre-fossilized elephant ivory.

Proposed Resolution: The procurement of multiple reliable dates from Mwanganda’s Village is essential for understanding how its lithic assemblage fits into the larger picture of MSA behaviour. In 2009 we took two OSL samples from a section of the original excavations at the Mwanganda’s Village elephant butchery site – one from near the base of the Chitimwe beds from which the elephant fossils allegedly derived and one from the Chiwondo beds just below the carbonate horizon described by Clark and Haynes (1970). These samples are in transit to the University of Wollongong, where Dr. Zenobia Jacobs will examine them for their potential in applying luminescence dating to the site (Figure 5). Both may be too old for application of the most commonly-used light emission spectra, but new techniques are under continual development that have pushed the potential age range of luminescence techniques back to ca. 780 ka (Jacobs and Roberts 2007, Lian and Roberts 2006, Rhodes et al. 2006).

A sample of elephant ivory from the original excavations will be submitted for U-Th dating at the Radioisotope Facility at UQ. Depending on background uranium levels a date should come out sometime during the Middle or Late Pleistocene or it will be saturated, indicating that it is beyond the boundaries of U-series dating. If this is the case, the tooth would predate all other known early MSA assemblges in Africa, and the substantial
unconformity at the Chiwondo-Chitimwe boundary would suggest that a saturated date can most likely be assigned to Chiwondo times. Problems with variable U uptake have also recently been addressed through mapping of elemental concentrations through the sample (Grün et al. 2008).

![Figure 5. DEM of the central portion of the Mwanganda’s Village site with the original trenches shown as a block-and-cross shape in the middle. Lighter areas are higher elevation. Contour intervals are 0.1 metres. The location of the sampled section is indicated with an asterisk.](image)

**Question 4: What fine-scale site formation processes were in operation?**

**Discussion:** Mwanganda’s Village has been interpreted as a braided stream edge with minimal disturbance (Kaufulu 1990), but this work is based on sedimentary attributes that can be resolved with the naked eye. Detailed plans of the original excavations show the
horizontal arrangement of fossils and stone tools that were found within the same sedimentary horizon (Clark and Haynes 1970). However, it has been shown that piece-plotted and taking orientations for materials by hand to draw such plans can result in the misleading interpretation of materials being contemporaneous, when in fact they have been deposited within potentially time-averaged fine sedimentary sequences (McPherron 2005, McPherron, Dibble, and Goldberg 2005).

Proposed Resolution: A refitting study would partially address the issue of post-depositional movement (Clark and Haynes 1970, Kaufulu 1990), but although such a study was initiated it was never completed or published (N. Stern pers. comm. 2009). A micro-scale investigation of sediment thin sections and corresponding geochemical analyses of the sediments directly at the Chitimwe-Chiwondo boundary is needed in order to quantify how much exchange in macro-particles (such as clays) and micro-particles (such as ions) has taken place between the sediments. This will clarify the potential in each layer for fossil preservation and determine if bioturbation or other disturbances may have played a role in bringing the artefacts and fossils into association with one another (positions of micromorphology samples indicated in Figure 5).

Question: What was the larger behavioural, depositional, and paleoenvironmental context of Mwanganda’s Village?

Discussion: In order to understand larger processes that drove the important changes across the ESA-MSA boundary, the archaeological data must be situated within their regional and paleoenvironmental contexts. Detailed survey, excavation, and analysis of multiple archaeological and paleoenvironmental sites in the Northern Province is a long-term goal of our project. This can begin with a small survey and limited test-pitting of the deposits within which Mwanganda’s Village is located. We clearly observed that a variety of depositional facies are present at Mwanganda’s Village, and that the main excavation site only samples one of these. Within the mapped area artefacts are superabundant but appear to have distinct areas where they are concentrated and/or present different weathering stages that suggest a
complex taphonomic and depositional history. We attempted to quantify some of these factors through the systematic surface collection of artefacts at two other areas (Surface Sweepings 1 and 2) within the mapped region (Figure 6). The details of these collections are provided in the next section.

Figure 6. DEM (lighter is higher elevation) and contour map (1 m interval) of the Mwanganda’s Village site showing the original excavation area (T), and the two surface sweepings with illustrative artefacts shown from each. T) Core-axe tip of the type described by Clark and Haynes (1970); 1) Cobble with sparse flake removals showing a moderate degree of weathering; 2) Flake produced from elephant ivory.

Proposed Resolution: Understanding the site’s greater depositional relationship to its surroundings will require a small (ca. 5 m$^2$) re-excavation of the original trenches so that the locations of fossils, artefacts, samples, and stratigraphic units can be piece-plotted and mapped with < 1 cm accuracy. It will also require a visit to the original excavator’s notes that are now housed at the Stone Age Institute in Bloomington, Indiana. An additional four small (ca. 3 m$^2$) excavations should be placed within the mapped area in ways designed to sample
variability in artefact characteristics (including weathering), fossil abundances, and geological facies. Finally, a systematic survey with strategic test-pitting should be initiated in the surrounding region, at least 2 km² around the site. This survey should include the Chaminade area directly to the south, where artefacts are abundant, natural sections are readily available, and current human settlement densities are low. The main objective of this component of the study would not be to recover large quantities of artefacts, but rather to map and document variability in both the palaeolandscape and MSA habitation on that landscape. Artefact collection would be targeted and as low-impact as possible so that these sites can be preserved for the future. Detailed mapping, photography, and backfilling will be standard.

As a final note, two other localities dug by Clark and his team were also shown to us by Chimwemwe Mwanganda, brother of the present Chief Mwanganda and part of Clark’s original excavation team at the site. Nsokolowe and Changalamo River were excavated in 1970, after three trenches were dug at the main Mwanganda site in 1964. Nsokolowe was comprised of three trenches within ca. 100 metres of one another. Nsokolowe 1 was ca. 1 x 3 m and dug into heavily-rolled basal Chitimwe gravels with highly polished and water-worn MSA artefacts and occasional sharp-edged artefacts that may have deflated onto this surface. Nsokolowe 2 was a 1 x 1 m test now overgrown with grass such that the underlying deposits cannot be ascertained. Nsokolowe 3 was a ca. 1 x 3 m trench at the Chiwondo-Chitimwe contact. The Changalamo River excavation was ca. 1 x 4 m, sunk into modern alluvial deposits overlying the Chiwondo beds.

Preliminary Lithic Data

Illustrative lithic artefacts were collected from the surface of the original 1970 trenches and in the northwest field near Surface Sweeping (SS) 2 (Figure 6). Diagnostic artefacts from these collections include a core-axe tip (a Sangoan fossil directeur) of the type described by Clark and Haynes (1970), a partial biface on quartz, Levallois flakes, and a sample of raw material types. Of particular note is a single clear flake on fossil elephant ivory found within 20 cm of SS2 (illustrated in Figure 6). Flaked proboscidean ivory has been reported from the
Pleistocene of Asia, Europe and the Americas (Chlachula, Drozdov, and Ovodov 2003, Haynes 2006, Mussi 2002), but never from the MSA of Africa. The faceted platform of the flake suggests that MSA technological reduction sequences were employed even on non-lithic raw materials. This raises the possibility that fossil occurrences in the Chiwondo beds had importance to the MSA people occupying the same region in Chitimwe bed times. Alternatively, if the lithics and fossils at the Chiwondo-Chitimwe contact are contemporaneous as suggested by Clark and Haynes (1970), the elephant may have been exploited for its ivory in addition to or rather than its meat. A direct U-series age on a small portion of the flake will demonstrate if the specimen dates to the Pleistocene or the Pliocene, while a small excavation in the region where the flake was recovered may yield a sample of artefacts and bones that could be used to address in detail the technological significance of ivory flaking.

The lithic analysis presented here is designed to provide an overview of basic characteristics and variability of the technological characteristics of artefacts found on the surface around the Mwanganda’s Village main excavation. SS1 yielded an average abundance of 50 lithic artefacts/m² (N = 150), along with a high proportion of unmodified (likely naturally-occurring) pebbles between 0.2 – 5 cm. A grab sample of these pebbles was retained. Abundances are basically the same at SS2, with 46 artefacts/m² (N = 92). However, far fewer unmodified pebbles accompanied this collection, which took place in a tilled field.

At both of the surface sweeping localities, milky quartz dominates the lithic inventory (SS1=48.7%; SS2=62%). Quartzite is the next most common raw material present (SS1=38%; SS2=20.7%) followed by crystal quartz (SS1=10.7%; SS2=13%) and other unidentifiable raw materials in minor quantities. A possible reason for this is that milky quartz tends to shatter when flaked, thereby producing larger amounts of debris than quartzite. A future goal of the project would be to identify, characterize, and possibly source the unidentified raw material types. In contrast to the raw material abundances from the two surface sweepings, the materials excavated by Clark and Vance Haynes (1970) are predominantly made from quartzite. However, the difference between the quartzite (53%) and quartz (46%) frequencies in their assemblage is marginal, but they do not differentiate between crystal quartz and milky quartz in their analysis.
Of both of the surface sweepings, 4 pieces have cobble cortex indicating that they were flaked from river cobbles (see example from SS2 in Figure 6). Clark and Haynes (1970) mention that the flaking of cobbles was a characteristic of the Mwanganda’s Village ‘Sangoan’ assemblages from the trench area. This makes sense in terms of the abundance of this raw material type in the surrounding region, particularly from river terraces. For most of the surface sweeping pieces it was not possible to determine whether flaking had taken place on cobbles or slabs.

Flakes constitute 36.7% of the lithics in the assemblages. Of these, 34.5% are proximal ends, while complete, broken, and distal ends each comprise 13.8%. 4.6% are convergent, only 2 pieces were from the mid section of a flake, and the remainder were unidentifiable. Therefore, the minimum number of flakes (based on the number of proximal ends present) is 30.

About half (46.3%) of the flakes display surfaces with cortex while the other half (45%) do not and the remainder could not be determined. This indicates that the initial stages of flaking, represented by cortical flakes, are represented at the site, as well as subsequent reduction stages. It makes sense to find high numbers of cortical flakes at the site as milky quartz and quartzite raw materials would have been readily available in the area.

A majority of the flakes in the assemblage had platform attributes that were indeterminate. However, 22.9% of the flakes had plain platforms; 20% had no platforms; 21.4% had cortical platforms and 5.7% had faceted platforms. The high frequency of cortical platforms is expected in light of the high frequencies of cortical flakes at the site. The 4 flakes with faceted platforms are interesting. Platform faceting is an attribute often associated with flake preparation and the mode 3 technologies of the MSA of Africa. A common reduction technology often associated with platform preparation is the Levallois or prepared core technique. When

---

**Figure 7. Example of a broken Levallois flake from SS2.**
Clark and Haynes (1970) excavated the site they characterised their assemblage as non-MSA by the distinct lack of prepared cores (however, the Sangoan has since come to be recognised elsewhere in Africa as an early MSA technology). It is clear from this analysis and from a number of prepared cores and a single Levallois flake fragment that there are more ‘typical’ MSA artefacts at Mwanganda’s Village (Figure 7). This is not surprising in the context of Karonga and its numerous MSA occurrences. However, it does indicate that the site may have a sequence of human activity younger than just the Sangoan.

Because many of the MSA pieces are found on the surface, some degree of mixing in the assemblage is likely. The single bladelet recovered could be further evidence of this, as this piece resembles a Later Stone Age technology, but it is difficult to say for certain based on a single surface find. Mixing at the surface is also supported by high variability in the types and stages of weathering on artefacts. Some flakes have been so heavily-rolled and polished (likely in water) that they resemble river pebbles themselves, while others retain sharp edges with no patination. In total six flakes shown signs of weathering and four do not. Targeting sampling of Mwanganda’s Village around the trenched area will quantify this variability and assist geological interpretations of the palaeofacies of the Chitimwe beds represented at the site.

Morphometric measurements were taken for the complete, broken and convergent flakes in these assemblages. There do not appear to be any observable trends in terms of morphometric variation across the categories. Moreover, the sample size of measureable flakes within each raw material category is, for many of the categories, too small for meaningful comparisons. A single bladelet, three blades, two possible formal tools (a trapezoid and naturally backed segment) were also recorded. Very few cores were recovered from the surface sweepings. The cores recovered included one single platform core, a prepared core, one bi-directional core, an irregular core, a casual core and a core rejuvenation flake. The core rejuvenation flake and prepared core restate the presence of more MSA-like (mode 3) technology at Mwanganda’s Village.

Chips, chunks and cores/core fragments were recovered in the surface sweepings. These categories are indicative that knapping activities took place at Mwanganda’s Village. However, as these pieces were collected from disturbed contexts we cannot be sure as to their
association with each other or with the flakes already described from these two surface sweepings. Chips constitute 15.2% of the stone assemblage from the surface sweepings, although within SS1 the proportion is only 8.3% versus 17.4% at SS2. These are small (<1cm) flakes of stone that often shoot off during the knapping process, and their presence is a good indicator of an assemblage that has not been too badly affected by winnowing or sorting. It is suggestive that the higher proportion of chips occurs in SS2, where fewer unmodified water-worn pebbles were recovered, but Fisher’s Exact Test does not find a significant difference in this proportion (p = 0.1703). A larger excavated sample recovered in conjunction with a detailed geological study is required to unravel the how both human behaviour and post-depositional artefact movement through natural processes have shaped the spatial distributions of artefacts today.

2. Airport Site (Figure 8)

UTM Coordinates: 36L 0598463 8899288
MEMSAP Shorthand: APS
MAD Number: Unknown
District: Karonga
District/Site Number (MAD Register): Unknown

Figure 8. 360-degree view of the Airport Site as taken from the P1 datum point on the mound in the centre of the eroded basin.
The Airport Site has been known at least since 1995, when Juwayeyi and Betzler (1995:115) refer to a “joint HCRP [Hominid Research Corridor Project]-Antiquities Department project” that resulted in the surface collection of at least one weathered cortical flake from the site that is currently housed in the National Repository. However, to our knowledge it has never been excavated or otherwise investigated in detail. The site is located directly at the southeast end of the modern Karonga Airstrip, and it is possible that the deposits continue below the airstrip (if they were not removed during its construction). Because the Chitimwe beds contain so many clasts ranging between ca. 1 – 30 cm, they form a hard ‘pavement’ on top of the Chiwondo beds that resists erosion (Figure 9). Wherever the water has penetrated the Chitimwe, therefore, it has quickly and deeply incised into the softer underlying Chiwondo beds. Extensive water erosion has formed several deep gullies and a ‘basin’ with a ca. 50 x 40 m diameter where Chitimwe and Chiwondo beds are exposed in clear superposition (section on left in Figure 10).

At the Airport Site four conduit pipes ca. 20 cm in length were set into the ground as control points. An additional pipe was used as the elevation datum. Coordinate points were taken across the site, with more attention given to the eastern aspect, where a tall natural section of Chitimwe material is exposed (section on right in Figure 10). The top of this section is comprised of approximately 0.75 m of red sand from which at least one sharp-edged lithic artefact protrudes. A clear contact is made between this horizon and a line of pebbles ranging from 0.5 – 6 cm in size. Artefacts with moderately worn edges are present in this horizon. Below this lies a series of banded sub-horizons comprised of well-sorted, water-rounded pebbles and sands of varying sizes that continue to an indeterminate depth.
Figure 10. DEM of the Airport Site (lighter areas are higher elevation, contour interval is 1 m) showing positions of Chiwondo-Chitimwe section and the tall intact Chitimwe section. The erosion is currently proceeding into the beds to the northwest and cutting deeply into the Chiwondo beds to the southeast.
This section was examined in the field by Prof. Heinrich Thiemeyer, a fluvial geomorphologist at the Goethe University of Frankfurt, who spent a morning at the site while he was in the area working with Prof. Freidemann Schrenk of the same university. Dr. Thiemeyer (pers. comm.) stated that this section appears to be an in situ remnant of original fluvial deposition during Chitimwe bed times, rather than having suffered reworking or deflation as he has observed elsewhere in the region. Less than 100 metres to the northwest he examined a second section, where in contrast such reworking appears to have taken place (Figure 11). Our general interpretation of the large Airport Site section is that it represents several consecutive phases of fluvial deposition of different scales and velocities, interspersed with some in situ and some secondary evidence of hominin behaviour.

The pebble horizons have rolled MSA artefacts in them because these have been brought from elsewhere and incorporated as clasts into the depositional environment. Periodically, on top of exposed river terraces comprised of these pebbles, MSA hominins reduced large cobbles transported from nearby higher-energy stream environments. This behaviour is inferred from the sporadic presence of very large cobbles (> 15 cm), some with flake removals, which are out of proportion with the size grade of other well-sorted pebbles in the section. These behaviours left sharp-edged artefacts mixed amongst the rounded artefacts, with the sharp-edged artefacts a more accurate reflection of human activities that actually took place at the Airport Site.

Further evidence of in situ hominin behaviour at the site is located to the northwest of the section, where MSA artefacts lie in abundance on top of a resistant iron pan feature (asterisks
in Figure 12 indicate where it is exposed). The artefacts on top of the feature are sharp-edged and unpolished, which denies extensive water transport or exposure to abrasive wind-blown sediments. However, they may have been deflated upon the iron pan surface and thus represent a time-averaged sequence of MSA behaviour of indeterminate chronology. This question could be resolved by following the pan into the section where ca. 25 cm of sediment is still available on top of them. Careful piece-plotting in three dimensions, refitting, and concurrent micromorphological analysis would reconstruct the micro-sedimentary history of the materials on top of the pan and determine the nature of vertical movement that may have taken place.

No diagnostic Sangoan artefacts are present on the pan, and Levallois and other mode 3 technology is in abundant evidence (top left in Figure 12). This supports the inference that the artefacts on top are deflated from a more recent part of the MSA, unlike artefacts within and below the iron pan itself, which is within 20 cm of the contact between the Chiwondo and Chitimwe beds and should therefore be of approximately the same age as the deposits at Mwanganda’s Village. However, it should be emphasized that these are preliminary field observations only. The most concrete fact currently available is that the sediments of the Chitimwe beds have had an extremely complex depositional history of cutting, filling, and transport along the dimensions of both space and time. Chiwondo deposits would have been incised to varying degrees, and the Chitimwe deposits themselves have likely experienced episodes of erosion and deposition in ways that may not be correlated even over short distances. It is highly possible that deposition and subsequent modification of the Chitimwe beds took place asynchronously in the region, such that the Chiwondo-Chitimwe contact may be of very different ages. Untangling these histories through careful mapping, dating, and geoarchaeological work will be a priority for future work.
Figure 12. DEM of main Airport Site basin (lighter areas are higher elevation, contour interval is 0.1 m) showing locations of iron pans to the northwest (asterisks).
Although the artefacts lying on top of the iron pan may be deflated, this would not be the case for the MSA artefacts which are found stuck within the iron pan and below it near the base of the Chitimwe beds (two bottom photographs in Figure 12). The positions of these artefacts would not have changed since the pan was formed, and the sharp-edged nature of the artefacts within it suggests that they were in primary or near-primary context when this occurred. The pan itself also potentially holds much palaeoenvironmental significance because it may represent the position of an ancient water table (Heinrich Thiemeyes, pers. comm.). Such features, which link human behaviour to attributes of its contemporaneous environment, are key discoveries for the long-term goals of MEMSAP.

The iron pan at the Airport Site is about 40 metres higher than the present surface of nearby Lake Malawi, suggesting that it represents a time when the water table was much higher than the lake. This may have been true in ancient time or relatively recently, but the pan could also represent a time when the land surface itself was much lower than today. The possibility of a higher land surface is best understood within the framework of the geological history of the region. Tectonic activity in northern Malawi initiated ca. 8 million years ago (ma), eventually resulting in palaeo-lake Malawi ca. 4 ma (Ring, Betzler, and Delvaux 1992). Between 1.5 ma and 0.2 ma the tectonic regime changed from predominately normal to predominately strike-slip in directionality (Ring and Betzler 1995). This resulted in both regional uplift and increased erosion, particularly through fluvial incision. Upon this constantly-changing landscape Acheulean and MSA hominins left behavioural traces in the form of stone artefacts.

The pan outcrops in two places within 10 metres of one another and it is unclear if these represent two separate pans or one continuous feature. Mapping of the iron pan surface revealed that the southern outcrop was up to 50 cm lower than the northern outcrop, suggesting that they represent two different features. However, this may also be attributable to uplift. This is another question that would be best resolved by carefully mapping the pan and artefacts within it into the section through targeted excavations.

Two ca. 15 x 15 x 5 cm sediment micromorphology samples were taken across the iron pan. One was taken at the edge of the southern pan where it was prominently eroding and where the nodules appeared generally large (ca. 2 cm). Iron nodules and underlying artefact-
bearing sediments were included in the block. The other was taken from the northern pan where it continues into the section and included the sediments immediately above and below the pan. Eleven nodules were oriented and removed for paleomagnetic analysis.

Paleomagnetics can be used for many purposes, one of which is dating. However, such dating is not as useful without an independent date from a different technique to anchor it. An OSL sample was attempted elsewhere at the Airport Site but the pipe could not be driven into the section effectively because of the consolidated nature of the sediment and the presence of numerous clasts. Such samples should be taken in the future by an OSL specialist.

Paleomagnetic dating based on magnetic pole reversals is not likely to be as informative because the last known paleomagnetic reversal was ca. 780 ka at the Brunhes-Matuyama boundary. The MSA has not been dated beyond 285 ka elsewhere in Africa, and the artefacts in the iron pans are MSA in type. However, there currently are no absolute dates on the MSA of Malawi, nor has a regional chronology been constructed. Nearby survey (described below) suggests that an Acheulean component is also present in the region, so it cannot be immediately discounted that a reversal may be found in the iron pan sediments. Instead, the paleomagnetic samples will be informative in other more subtle ways, such as understanding the formation processes of the iron pan.

3. Chaminade

UTM Coordinates: 36L 0598333 8899340
MEMSAP Shorthand: CH AAA – CH AAQ
MAD Number: 163
District: Karonga
District/Site Number (MAD Register): KR2c

The Chaminade Secondary School resides on a hill overlooking to the southeast several km² of stream-dissected territory with thin miombo cover and little human settlement (Figure 13). The region’s primary drainage is the Thuruwe River. Although the river was dry at the time of survey, it contains a sandy bottom lined with large (> 10 cm) cobbles indicative of
occasional high velocity streamflow. Where it has incised into the relatively soft Chiwondo beds it has cut a steep bank (ca. 2-3 m), which displays secondary soil development in profile.

The landscape is comprised of dozens of tall hills separated by drainages, with the slopes of the hills covered in Chitimwe gravels (Clark 1972). The gravels contain large quantities of MSA artefacts, the abundance of which clearly impressed Clark during his work in the area in the 1960’s and early 1970’s. During this time Clark and his crew conducted several excavations in the Chaminade area, opening up over 150 m² of deposit and recovering thousands of artefacts (Clark 1972, Cole-King, 1973). The present whereabouts of these collections are not known, and could not be located at the National Repository in Nguludi at the time of our visit in August. One hundred and twenty-four surface-collected artefacts are curated at the Phoebe A. Hearst Museum of Anthropology in Berkeley, California - along with six lithics from the Mwenerondo area and two from south of Uraha. It is likely that the remainder of the Chaminade collections and the field notes from the Clark excavations are

![Figure 13. Georectified satellite image of Chaminade area south of the Karonga airstrip. Chaminade Secondary School is the cluster of buildings in the northwest. Sites surveyed in 2009 are indicated by yellow dots (Airport Site is the dot immediately to the southeast at the end of the airstrip).](image-url)
curated at the Stone Age Institute in Bloomington, Indiana. This will be investigated when a visit to the Institute can be arranged.

Much of the MSA material at Chaminade is in secondary or even tertiary context. The eroded material covering the hill surfaces likely derived from higher up in the sequence, while rolled artefacts indicate that at some point in the past a substantial amount of transport occurred. Some artefacts may have been first transported fluvially, only to be subsequently re-transported through further fluvial or colluvial processes. Furthermore, in some cases near the bases of the hills the stratigraphy may even be inverted, with the older material on top where it has eroded last from deposits further upslope. However, sharp-edged artefacts are also in abundance, suggesting that some localities at Chaminade have undergone minimal disturbance since their deposition. This is supported by the presence of artefact-bearing stratified lenses of Chitimwe pebbles and sands that preserve at the tops of many of the hills and which likely represent the sources of the artefacts that are now scattered on their slopes. This situation was described by Clark (1966:21) who later (1968:43) reported that “On the western scarp [of Chaminade School] sealed “Middle Stone Age” workshop and living floors have been excavated”. Several decades of archaeological work on understanding fine-scale site formation processes have now shown that the concept of a ‘workshop’ or ‘living floor’ is an antiquated ideal – particularly for open-air sites. However, Chaminade remains a rare and impressive MSA landscape that warrants further investigation to achieve three major goals: 1) linkage of hominin behaviour to landscape attributes; 2) construction of a regional chronology; and 3) understanding of technological change within the MSA.

MSA behaviour would have been intimately tied to resource availability on the landscape such as water and lithic raw materials. The Chitimwe beds represent a variety of micro-depositional environments that were constantly in flux, and MSA hominins likely exploited these environments in different ways. For example, large cobbles may have been transported from active streambeds to sandy facies or river terraces, where they were reduced. In a landscape that was constantly being rearranged, this variability in behaviour should be apparent both over time and space. The integration of archaeological and landscape data into a GIS will provide the data and analytical tools necessary for understanding these complex interactions. It is likely that many in situ ‘islands’ of stratified lithic material are preserved on
the hilltops at Chaminade, and that careful mapping will facilitate correlations between these occurrences (Figure 14). This work should be done concurrently by an archaeologist and a geomorphologist, which will enable the MSA behaviour shown by the lithics to be reconstructed at the same time as is the landscape upon which this behaviour occurred.

Figure 14. View from Chaminade locality AAQ showing hilltops where in situ MSA material may be recovered and correlations may be made to create a composite sequence of lateral and chronological variability in MSA behaviour. Both cores were found within a metre of one another.

Correlation between separate localities at the desired scale of resolution will require small, targeted (ca. 1-2 m²) excavations of the hilltops. These will provide piece-plotted samples for lithic and sediment micromorphology analysis which can be used to reconstruct the micro-depositional processes at a given locality in tandem with lithic technological analyses, artefact taphonomy, and refitting. In contrast to the methods used in the 1960’s and 1970’s the main purpose of these excavations would not be to recover large samples of artefacts. Rather it would be to understand the spatial distributions of these materials relative to other attributes such as sedimentological facies, artefact size, raw material type, or technological characteristics.

One locality that is of particular interest for this strategy is Chaminade AAQ. Here, exposures of artefacts line a ridge with sections from which multiple radial cores and sharp-edged lithics protrude. The sections appear to be intact, but this can only be verified through
excavation and sampling. However, the surface of the ridge near the sections may be deflated. This is evidenced by a large, barely-reduced cobble found within a metre of a small, heavily-reduced core of the same raw material (Figure 14). An alternate explanation would be very interesting in terms of MSA raw material selection, transport, and curation, but first the depositional context requires detailed investigation. This locality also yielded a tanged point with two notches at the base and a stepped macrofracture at the tip, which may be indicative of hafting and impact, respectively. Although a surface find, it may be significant as an indication that the northern Malawian MSA contains a typologically distinctive point form, which is rare in the MSA. Permission was received to export the artefact and it will be studied for residues and evidence of use wear at UQ before it is returned to Malawi. Residues can be unreliable in surface find contexts, but some that are used in hafting can be extremely durable (Robertson, pers. comm.). Excavations at AAQ would hopefully result in the recovery of analogous in situ artefacts for use wear and microresidue analysis.

Figure 15. Weathered cores from the gully between Chaminade AAH and AAI.
A second locality of interest is Chaminade AAH/AAI. These two hilltops emerge from gullies where water has deeply eroded the Chitimwe and underlying Chiwondo beds. Within these wide gullies are large partially-reduced quartzite cobbles with modern weathering and no water rolling (Figure 15). Although these may have been transported for a small distance and/or deflated by natural processes, their presence indicates that at some point a source of quartzite raw materials was present nearby. At AAH a large biface, interpreted to be an Acheulean handaxe, was recovered near the base of the hill. As a surface find it may be derived from farther up in the sequence, but its presence is critical in that it would suggest an unambiguous Earlier Stone Age component in the study area. At the nearby hill designated AAI a large (ca. 10 cm) Levallois point was recovered (Figure 16). With the correlation, mapping, and targeted excavation of these localities, Chaminade AAH/AAI could potentially provide one of the few sequences of technological change across the Earlier to Middle Stone Age boundary in Africa. OSL and/or cosmogenic nuclide dating can be used to confirm correlations and assign an absolute chronology to analyses of these technological changes.

Chaminade may also hold a wealth of palaeoenvironmental data that were not observed in a single day of survey. Palaeosols or iron feature indicating remnants of stable land surfaces may be present, just as the iron pan is present at the Airport Site. These can be mapped across the landscape to reconstruct the ever-changing morphology of the landscape. The AAH/AAI locality is fossiliferous but is not clear if the fossils are associated with the Chiwondo beds only, or also with the...

Figure 16. Levallois point recovered from the surface of Chaminade AAI.
Chitimwe beds. Future work would included a systematic effort to recover and map palaeoenvironmental data concurrently with geomorphological and archaeological occurrences.

4. Misuku Hills

UTM Coordinates: 36L 0567511 8923727
MEMSAP Shorthand: MIS 1/2
MAD Number: Required
District: Chitipa
District/Site Number (MAD Register): Required

One of the major goals of MEMSAP is to understand changes in MSA land use over both time and space, and at several different scales. Another is to recover long sequences from different modern environmental contexts that can be used to anchor data from the surrounding landscape more securely. With this goal in mind, Thompson and Welling travelled with Simfukwe to the Chitipa District for preliminary survey of the higher-elevation area of Misuku Hills. Ethnographic reports suggested that caves or rockshelters might be present in the area, and it was hoped that these might hold stratified records that would include the MSA (Hargreaves 1978, Hargreaves 1980, Malanga not dated).

The elevation change from the modern alluvial plain by Lake Malawi to the Misuku Hills area is rapid, but the topography does not take the form of steep cliffs into which rockshelters might be set. Instead, the hills rise steadily as rocky, thinly-forested humps. A change in lithic raw material availability is immediately apparent, as vein quartz now dominates the landscape. No streams with the quartzite cobbles that dominate the raw materials by the lakeshore were observed. Once upon the hills rounded granite boulders could be seen outcropping at various points. Many appeared to be large enough to provide a rockshelter situation, and indeed when several were examined they often did contain small crevices with Iron Age or modern pottery apparent on the surface. Similarly, tilled fields often contained isolated Iron Age or Later Stone Age (LSA) artefacts. However, no sites were discovered that
had the potential to provide a long sequence. Systematic survey will likely to be useful in this little-explored region of Malawi, but its productivity for MSA research would be limited relative to what could be accomplished with the same amount of effort in Karonga.

The site designated here as Misuku Hills 1 is a deflation surface upon which the only clear MSA artefacts in the Chitipa survey were recovered (Figure 17). These consist of 7 weathered/patinated quartzite flakes from a widely scattered area, some showing cortex from river cobbles. LSA flakes on quartz and crystal quartz were also recovered from this area along with nondiagnostic pottery and chunks of haematite. The LSA lithics display sharp edges, which suggest that the patinated MSA flakes have been exposed to the elements for a long time, likely through deflation processes, and LSA flakes were deposited upon this surface relatively recently. Although the site itself is not one that required further investigation, it does demonstrate the existence of MSA sites in the higher-elevation areas of northern Malawi. The use of cortical quartzite cobbles that were likely transported from lower-elevation streams and rivers is also of interest. Given that the entire landscape began to experience uplift relatively recently (ca. 1.5 – 0.2 ma), it is possible that quartzite cobbles were not readily available at the initiation of this process. Thus, there may have been important changes in lithic technology that took place from the ESA and through the MSA that can be directly related to the availability of lithic raw material resources and its transport around the greater landscape.
Figure 17. Deflation site surface designated MIS 1/2. Arrow in the distance indicates a granite slab that was investigated but which was archaeologically sterile.

5. I’Bungu Cave

UTM Coordinates: 36L 0545444 8933795
MEMSAP Shorthand: IBU
MAD Number: Required
District: Chitipa
District/Site Number (MAD Register): Required

Oral histories suggested that a feature on the outskirts of the Mughesse Forest Reserve in the Misuku Hills was locally called I’Bungu Rock, and that this feature had a cave situated above it (Hargreaves 1980). I’Bungu Rock is a large, flat-faced granite slab that outcrops for ca. 30 m midway up a steep, windy hill. The hillsides in this area are covered in such slabs, tilted nearly vertically and providing dozens of opportunities for rockshelter situations (Figure 18). Probable quartz lithics were discovered sporadically under some shelters and
upon the surface, but the nature of the raw material made it difficult to select these items from other angular, broken fragments of quartz on the landscape. One chunk of quartz on the bare top of the hill above I’Bungu Cave has all the characteristics of a Levallois flake, but the rough vein quartz material makes this singular discovery uncertain.

I’Bungu Cave itself is long and low (ca. 20 x 15 x 1.5 m) and is basically comprised of a jumble of fallen slabs that have created several dry cavities. The western aspect is moist and mossy and acts to catch water. The site is used on occasion by herders, and the cavities contain modern campfires, bones, and other evidence of recent human occupation. The wide north-facing cavity at the top of the jumble does not have space to stand, but an adjacent cavity can be reached by crawling through a hole or walking around the jumble. This area presents room to stand, and a large (ca. 8 x 3 cm) chunk of possibly-worked quartz was found on the surface.

Many of the cavities around I’Bungu Cave contain potsherds, and quartz lithics were recovered from below I’Bungu Rock. It would make an interesting research area for investigations of high-elevation LSA and Iron Age adaptations and land use. However, this cool and windy place does not present a promising locality for MSA studies.
The rockshelters and ‘caves’ we visited appeared shallow and unlikely to yield long sequences beyond the LSA. The ‘MSA-like’ artefacts we recovered were nondiagnostic, in part because of the poor quality of the lithic raw material. Future workers might find it useful to return to this area for systematic survey in order to compare the sedimentary processes and site density data to that obtained for the lower-elevation sites, but at present this is not a priority for MEMSAP.
VIII. Sites Visited

We visited and observed several other sites at which we did not undertake any investigations. However, several key aspects of these sites should be noted, along with recommendations for future investigation and/or mitigation efforts.

1. Rumphi Rockshelter

UTM Coordinates: 36L 0597479 0597479
MEMSAP Shorthand: RRS
MAD Number: N/A
District: Rumphi
District/Site Number (MAD Register): N/A

Rumphi Rockshelter is not an archaeological site to our present knowledge. However, it has the potential to present a good palaeoenvironmental locality. The site is located at the very top of a steep hill just prior to the river crossing into Rumphi Town. It is visible only as a large boulder from the road, and requires an ascent of about 300 m up a slippery slope of pulverized granite grus talus. Once inside, it opens into a deposit of flat, dry, fine sediment (Figure 19). This surface is covered with microfaunal remains, and the deposits appear quite substantial, with no modern trash in evidence. Although it presents a difficult approach, a small team could feasibly sample the site to determine the extent of its deposits and...
establish if the microfaunal record extends into the Pleistocene. There are several similar boulder outcrops in this part of Rumphi, and a systematic survey might prove very productive.

2. Chombwa Gravel Pits

UTM Coordinates: 36L 0688153 8211382
MEMSAP Shorthand: CHG
MAD Number: Assigned but requires confirmation
District: Chikwawa
District/Site Number (MAD Register): CK6

This open-air site was reported in Cole-King (1973) but never studied. Pargeter and Welling visited the site in 2007 when they became aware that many of the ‘gravels’ that were being used by the Illovo Sugar Company to pave their cane roads were in fact MSA artefacts from these pits. They photographed sections of deposit on the southern side of the gravel digging that included MSA artefacts and fossil bone (Figure 20). We returned in on 15 August 2009 and discovered that although Ilovo is no longer mining there the Mota-Engil company has moved the operation south and is extracting gravels to redo the Chikwawa-Nchalo road. Our purpose was to relocate the site and determine if it would be worthwhile for future investigation. However, after several hours we were unable to locate any in situ artefacts or bone. Several pieces of Mawudzu pottery and some LSA lithics were found scattered on the surface, but these were clearly part of the dumping associated with gravel extraction. At the time, the MSA site appeared to be completely destroyed. Later examination of photographs suggests one very small part of the section may be preserved because it happens to lie under a large tree (Figure 20). It is also possible that others might be located in the area in deposits of similar age. Open-air MSA sites with preserved bone are extremely rare and offer valuable counterparts to stratified rockshelters. If both could be found in this region, Chikwawa could become an important area of study.
However, this would require systematic survey and at present this region is not a priority for MEMSAP.

![Figure 20. Section at the Chombwa gravel pits (top left) with MSA artefacts and fossil bone (top right) in 2007, and the same section (arrow below) in August 2009.](image)

3. Malowa Rockshelter

UTM Coordinates: 36L 0737436 8250246
MEMSAP Shorthand: MAL
MAD Number: Assigned but requires confirmation
Malowa Rockshelter is an important stratified site with excellent faunal preservation throughout. Sites such as these are essential for developing a regional chronology, but Malowa is currently the only potential MSA site reported in Malawi that has all these attributes. Its importance is highlighted further by the fact that open-air MSA sites have also been reported from nearby (Juwayeyi 1981:54). It has been excavated several times: by Denbow and Ainsworth (1969), Denbow (1973) in 1971-1972, and by Juwayeyi (1981) in 1978-1979. Denbow (1973) was the first to suggest that the site had an MSA component. However, the maximum chronometric age at the site currently stands at 8560 +/- 240 based on a single 14C date from the upper part of the bottom layer (Juwayeyi 1981). This presents a mystery, because radial cores and other lithic types considered to be diagnostic of the MSA are found even in the upper layers of the site. Denbow (1973) attributed this to a propensity for later people at the site to re-use MSA artifacts, while Juwayeyi (1981) simply reports the 14C chronology and does not address the issue of ‘Levallois-like’ components in the assemblage.

The fauna at the site is extremely well-preserved, with excellent surfaces that are ideal for microscopic taphonomic analyses. However, to date only the species abundances have been reported. Some large bags of faunal remains from the Denbow (1973) excavations were present at the National Repository but they are poorly-provenienced. The fauna from Juwayeyi’s (1981, 2008) study was not found at the National Repository. These remains may be at the National Museum of Kenya, where they were originally studied, they may be with Dr. Juwayeyi on Long Island in New York, or they may yet be discovered at the National Repository. A complete microscopic taphonomic analysis such as reported by Thompson (2008) is highly recommended for this collection, because current analyses are restricted to species abundances (Juwayeyi 2008). A similar study for the microfaunal component would also be useful for testing Juwayeyi’s (1981) hypothesis that the rodents and hyraxes were human food items. A concurrent palaeoecological study of the microfauna using more recent analytical methods would yield important updated palaeoenvironmental data.
A visit to Malowa Rockshelter on the afternoon of 30 August revealed that it is in serious need of mitigation efforts. The excavation walls are badly slumped and thousands of previously \textit{in situ} artefacts and fossils have been displaced out of context since it was excavated. The main witness section in the middle of the site is eroding towards the wall, and will likely not still be present if 30 more years pass without documenting the sections, sandbagging, and backfilling as soon as possible (Figure 21). It is also recommended that OSL samples be taken from the basal sediments described by Juwayeyi (1981) as ‘reddish brown earth with grit’, and that excavation to bedrock take place in order to definitively answer the question of an MSA component at the site.

![Figure 21. Interior of Malowa Rockshelter showing slumped witness section and need for mitigation efforts.](image)

4. Thyolo Escarpment Road

UTM Coordinates: 36K 0734750 8186250
MEMSAP Shorthand: N/A
Three dolerite MSA artefacts are described by Cole-King (1973) from this site, and one of them is illustrated. However, the photograph is poor and ambiguous and the dolerite in this region naturally breaks into angular pieces that can closely resemble artefacts. The isolated finding combined with the nature of the raw material suggested that the status of this ‘site’ as an MSA locality should be reconsidered. However, the illustrated artefact could not be re-located at the National Repository for inspection. We drove along the Thyolo Escarpment Road on 16 August and stopped at various points as indicated by Cole-King (1973). However, we were unable to locate a single unambiguous lithic artefact. All current evidence indicates that this is not a confirmed MSA locality, and the site is therefore not listed in Appendix A.

IX. **Work at the National Repository**

Welling and Thompson spent 31 August and 01 September at the National Repository in Nguludi. With the assistance of Alfred Topeka they examined several of the collections from Karonga and began to develop a summary database of what materials are present. Time restrictions dictated that several sites could not be examined, and no materials from any site could be examined in detail. Despite the fact that many of the collections were from surface deposits, some interesting differences in technological types, raw material representation, and weathering began to emerge. One region for which this was particularly the case was Kayelekera in Karonga, where a survey was conducted in 1990 by the Department of Antiquities prior to the land being secured for the purposes of uranium mining. Photographs were taken of collections from several of these sites to provide a virtual archive of the materials at the National Repository. A future goal would be to complete this archive for all MSA sites in Malawi and integrate both the data and the photographs into a GIS database. Figure 22 illustrates how such a database might combine spatial and photographic data.
Figure 22. Georectified satellite image of the Kayelekera region in Karonga with illustrations of the artifacts housed at the National Repository that were collected from each locality. Top: flake-based collection from IcIe18; Middle: core-based collection from IcIe25; Bottom: bifaces from IcIe32 indicating possible ESA.
X. **Summary of Future Goals**

Based on this feasibility study of the Earlier-Middle Stone Age deposits in Malawi, MEMSAP has outlined eight major logistical goals for the next phase of field research:

1) Targeted sampling and re-excavation of the Mwanganda’s Village site.
2) Targeted sampling and excavation of the Airport Site.
3) Detailed mapping, sediment correlation, and sampling of the Chaminade deposits.
4) Systematic survey of the 5 km$^2$ surrounding the Mwanganda site.
5) New survey in analogous deposits in the Nkhata Bay area.
6) Mitigation of damage to Malowa Rockshelter and sampling for chronology and micromorphology.
7) Development of an interactive photographic GIS database of MSA sites in Malawi.
8) Incorporation and training of Malawian students and Antiquities personnel such that the work can continue on recovered materials beyond the formal time constraints of annual field seasons.
XI. **Acknowledgements**

We thank Dr. Elizabeth Gomani, Director of the Malawi Ministry of Tourism, Wildlife, and Culture, for granting permission to undertake this study. Chrissie Chiumia, Harrison Simfukwe, and Alfred Topeka at the Malawi Department of Antiquities provided invaluable assistance and advice. Prof. Friedemann Schrenk and Prof. Henrich Thiemeyer offered extraordinary insight and camaraderie in the field. Dr. Arun Banerjee kindly identified the flaked ivory as deriving from a fossil elephant. Rachel Warren and Davie Simengwa accompanied us on our visit to the Chombwa gravel pits, and Davie was of great assistance in Karonga. We thank Chief Mwanganda and the people of his village for kindly allowing us to examine the elephant butchery site – and for their interest in our work. Chimwemwe Mwanganda assisted us for three days there. The Catholic University of Malawi generously provided a part-time base for the research. This work was funded from a postdoctoral fellowship grant to Thompson from the University of Queensland, Australia.
XII. References Cited


Clark, J. D. 1942. Further excavations at the Mumbwa Cave, Northern Rhodesia. *Transactions of the Royal Society of South Africa* 29:133-201.


Field Report to the Malawi Ministry of Tourism, Wildlife and Culture


Juwayeyi, Y. 1981. The later prehistory of southern Malawi: a contribution to the study of technology and economy during the Later Stone Age and Iron Age periods, University of California, Berkeley.


Kaufulu, Z., and N. Stern. 1987. The first stone artifacts to be found in situ within the Plio-Pleistocene Chiwondo Beds in northern Malawi. *Journal of Human Evolution* 16:729-740.


Kaufulu, Z. M. 1983. The geological context of some early archaeological sites in Kenya, Malawi and Tanzania: microstratigraphy, site formation and interpretation, University of California, Berkeley.


—. 1990. "The Sangoan record at Simbi, Kenya."


—. in press. Taphonomic analysis of the faunal assemblage from Pinnacle Point Cave 13B, Western Cape, South Africa. *Journal of Human Evolution*.


—. 2006. Taphrostratigraphy of the Bedded Tuff Member (Kapthurin Formation, Kenya) and the nature of archaeological change in the later middle Pleistocene. *Quaternary Research* 65:492-507.


