RAW MATERIAL VARIABILITY IN MSA (& LSA) LITHIC ASSEMBLAGES FROM IRINGA REGION, TANZANIA

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Katie Biittner, PhD Candidate
Department of Anthropology, University of Alberta

Overview

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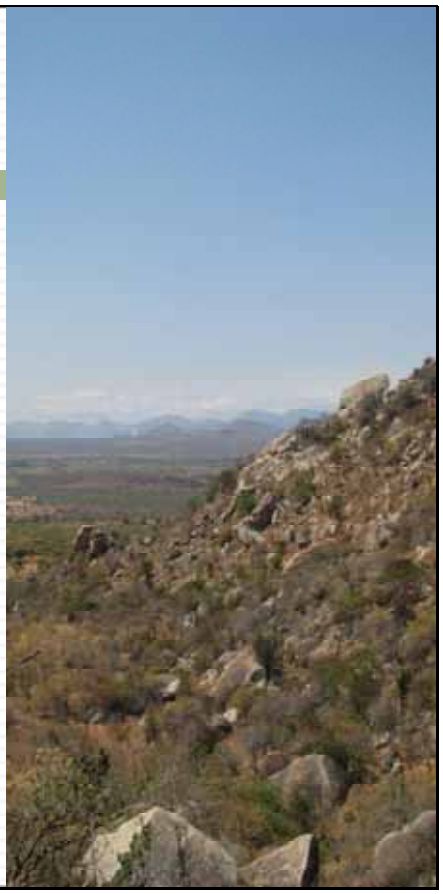


For my doctoral research I am conducting sourcing analysis on the Stone Age assemblages from two rockshelters, Magubike and Mlambalasi, in Iringa region, southern Tanzania.

RESEARCH DESIGN

Research Design: Theory

- Raw material utilization & mobility in context of origins of modern human behaviour
  - Technological strategy as means of adaptation
  - Development of long distance trade & exchange networks
    - Group mobility across a landscape
  - Exotics vs. local resources
    - Resource availability and abundance

Lithic resource procurement is an important topic in African archaeology as long distance exchange and the development of trade networks are considered as "key ingredients" in modern human behavior (McBrearty and Brooks 2000:513). Its application is generally based on understanding the differential use of raw material types present in lithic assemblages, and the proximity of sources of these raw materials in the surrounding landscape. Group mobility and procurement strategies are determined by the abundance, availability, quality, and distribution of resources (Andrefsky 1994, 2005; Beck and Jones 1990; Morrow and Jefferies 1989; Newman 1994). The differential use of local versus non-local ("exotic") materials has been used to demonstrate selectivity and decision making processes, as well as knowledge of resource availability and landscape (Gould et al. 1971). Thus understanding the landscape whch the humans were living from is crucial; it is not just raw material abundance and quality but all of the social dimensions that influence the selection of a particular technological strategy as a means of adaptation.

The study of raw material utilization and mobility for African assemblages has been limited. The majority of studies of this kind focus on obsidian. The movement of "well-sourced obsidians" over distances greater than 300 km in eastern Africa is well documented (Barut 1996; Muir and Hivernel 1976; Negash and Shackley 2006). Merrick et al. (1994) suggest that increased interaction and exchange among human groups can explain the transport of obsidian for distances > 300km which is well outside of the range of

deliberate collecting forays for mobile foraging groups. Furthermore, there are stylistic provinces within the African MSA which supports trade rather than transport as the obsidian distribution mechanism (McBrearty and Brooks 2000:515). Raw material variability in Early Stone Age (ESA) assemblages at Olduvai Gorge and Laetoli, Tanzania (Kyara 1996), East Turkana, Kenya (Rogers 1996), Gona, Ethiopia (Stout et al. 2005), and Sterkfontein, South Africa (Kuman 1996) have been examined. Although the raw material type exploitation by the earliest stone tool makers have been studied, such comprehensive analyses have not been conducted on MSA and LSA assemblages in southern Tanzania. This is partially the result of the nature of the lithic assemblages themselves; most LSA assemblages are composed primarily of quartz and/or quartzite. Research has been carried out in order to develop techniques for studying South African LSA quartz assemblages as the natural fracture patterns of quartz can be hard to distinguish from human induced ones.

Elsewhere patterns of change in lithic raw material use have been used to suggest changes in resource exploitation in response to environmental change. Ambrose and Lorenz (1990) concluded that changes in the frequency of fine-grained "exotic" lithics during the Howiesons Poort (HP) substage of the southern African MSA at Klasies River, South Africa reflect fundamental changes in behavior in response to similar environmental changes during the glacial-interglacial cycles of the last million years. They use these conclusions to support the idea that MSA people prior to HP were not behaving in a fully modern fashion, following the Klein (1995, 1999) model proposed for the timing and nature of modern human origins. On the contrary, Minchillo (2006:363), in examining the same materials but applying a time-dependant foraging model, argues that there is a general pattern of long distance travel and exchange, of local intensification, and of mosaic of approaches during the MSA that as a whole is fully modern. Throughout my investigations, I hope to examine the validity of these proposed models for understanding and interpreting East African assemblages from the same time period.

Research Questions

I. How many types of raw material were utilized at each site, and how were the various types used?
II. Which sources (local, non-local or exotic) were utilized?
III. How were raw materials acquired? (Who were the agents of raw material acquisition, transportation, and utilization?)
IV. What technological (lithic tool production) strategies were utilized at each site as represented in the lithic artifacts recovered? (How was technology organized?)
V. Can technological change be used to explain raw material variability?
    I. MSA vs. LSA

Specifically, my research will address these research questions.

Sourcing, in conjunction with technological analysis, provides the means to answer these questions within the larger theoretical framework presented.

Research Design: Methodology

- Technological analysis
  - Maximal artifact categorie
  - Reduction strategy

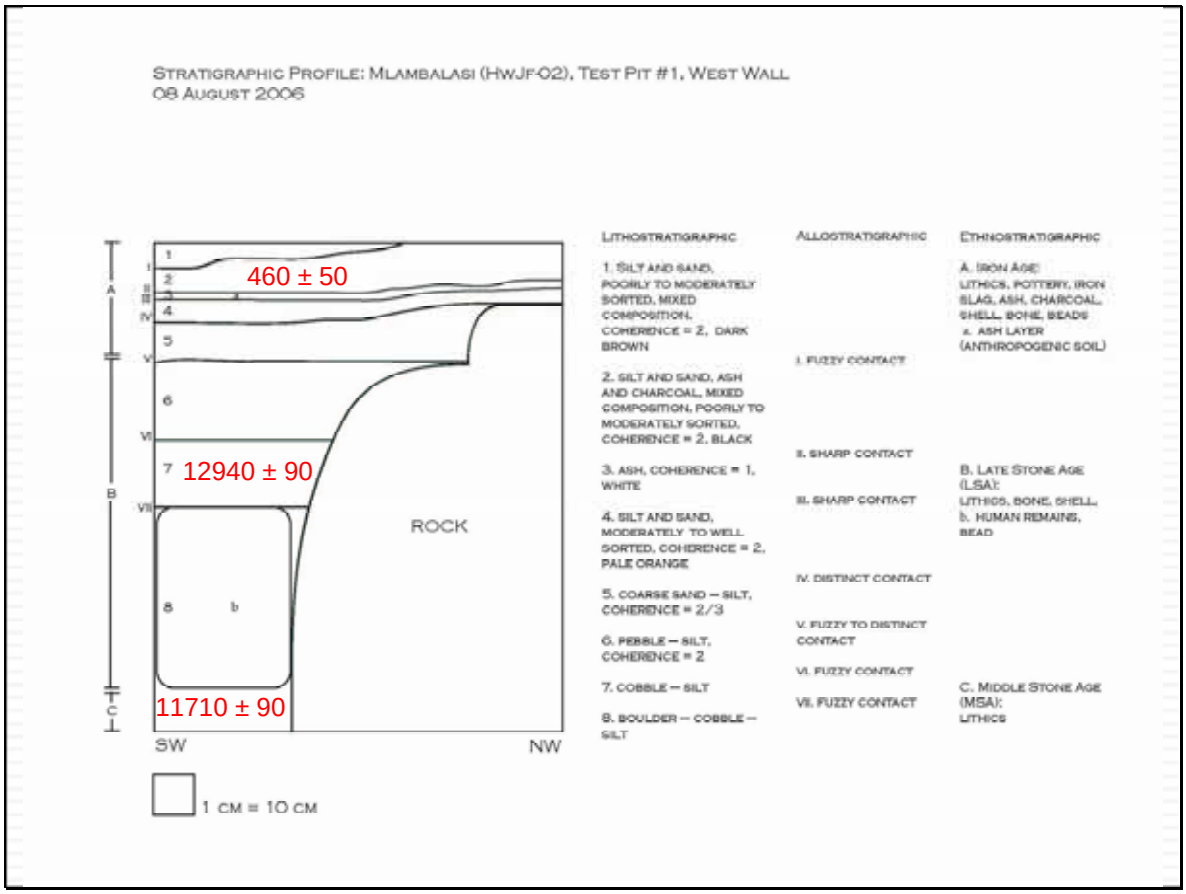
- Macroscopic analysis
  - Lustre, texture, colour, translucency, mottling, speckling, banding, patination, grain sphericity and angularity, mineral composition
- Microscopic analysis
  - Mineral composition, carbonate fabrics, grain sphericity and angularity, inclusions, etc.

Raw material and technological analyses are in progress. As quartz and quartzite are ubiquitous across the landscape, artifacts made from these materials are not included in this study. Lithic sourcing analysis must necessarily begin with macroscopic analysis (Luedtke 1979, 1992). In fact, all archaeological research should begin with description - something we often forget in this age dominated by technology. Each artifact is individually analyzed and scored for macroscopic properties including luster, texture, grain sphericity and angularity, colour, translucency, mottling, speckling, banding, and patination. The presence of inclusions, including fossils, was noted when present. For non-chert lithic types, mineral composition is described in terms of major, minor, and trace minerals and their relative percents. Grain size of clastic, sedimentary rocks is measured following the Wentworth Scale.

However, Calogero (1992), among others, found that relying upon macroscopic inspection alone for material identification is a significant problem for archaeologists, and more often than not leads to misidentification of the raw materials used to produce stone tools; therefore, microscopic (petrographic) analysis will also be conducted as it has proven to be effective in both archaeology and geology.

2006 FIELDWORK

Mlambalasi (HwJf-02)



Test pit #1: 25 cm 14C= 460±50 (charcoal assoc. with ash layer)

Test pit #1: 65-70 cm 14C=12940±90 (achatina shell fragment)

Test pit #1: 110-120 cm 14C=11710±90 (achatina shell fragment)

Test pit #2: 20-30 cm 14C= 1860±60

Test pit #2: 110-120 cm 14C= 3050±60

Test pit #2: 150-160 cm 14C= 6090±70

Sample for sourcing analyses:

Surface = Iron Age, LSA, MSA 158/1767 (9%)

Test Pit #1:

0-45 cm = Iron Age 42/651 (6%)

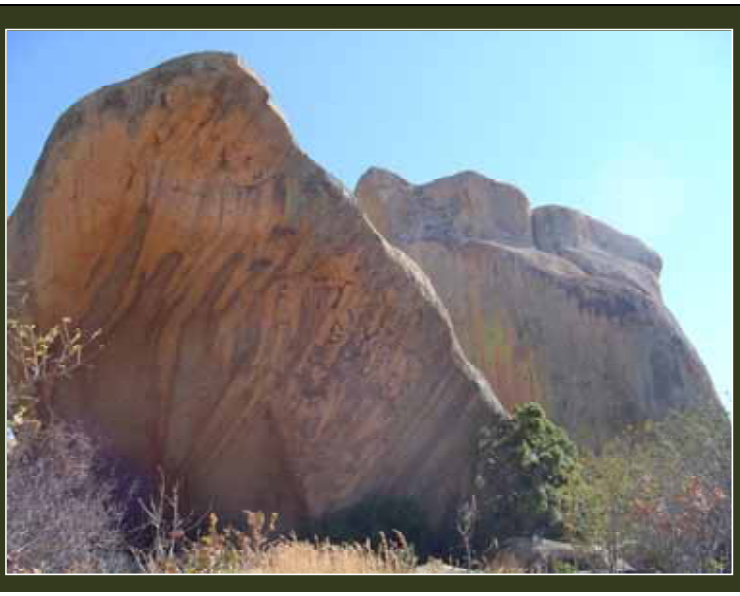
45-120 cm= LSA 118/2015 (6%)

Test Pit #2:

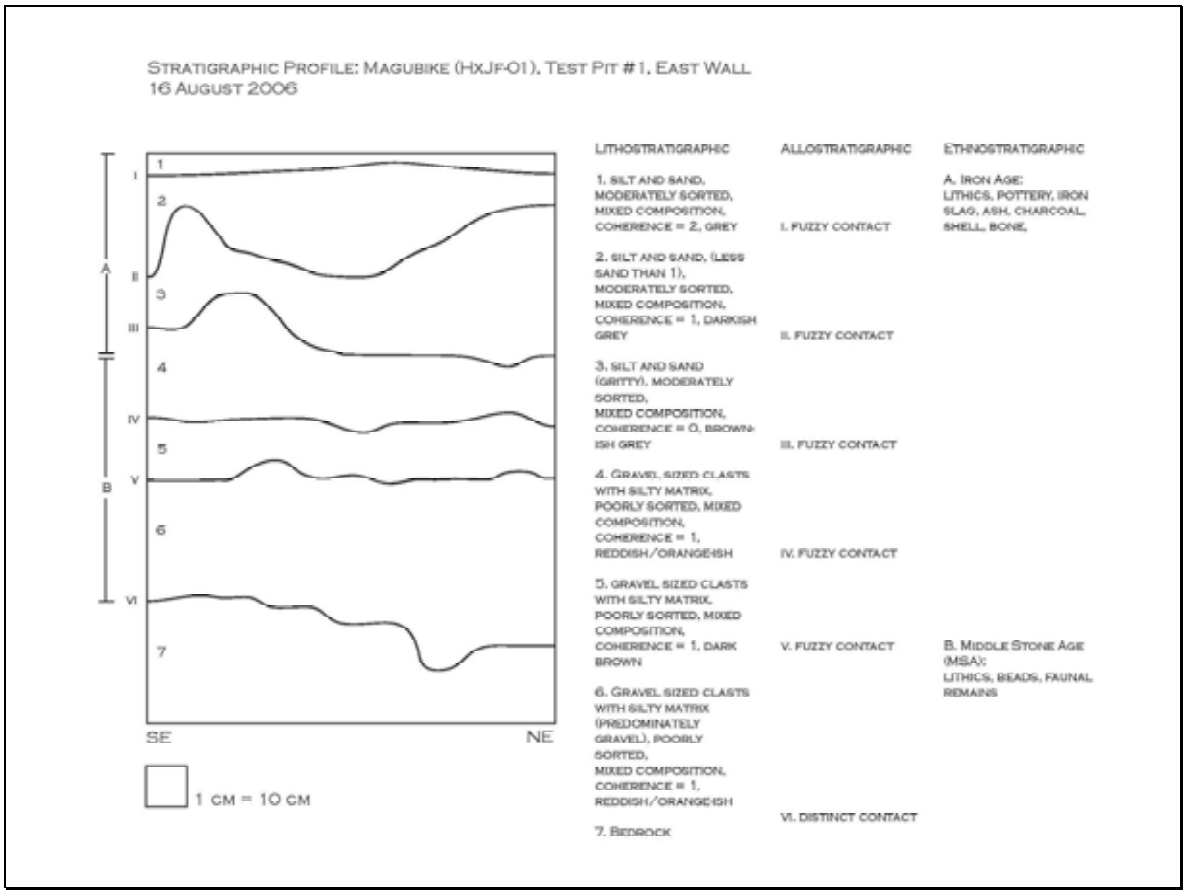
0-70 cm = Iron Age 546/2995 (18%)

70-110 cm = LSA & Iron Age 149/1365 (11%)

110-160 cm = MSA & LSA 446/2735



Magubike Rockshelter (HxJf-01)



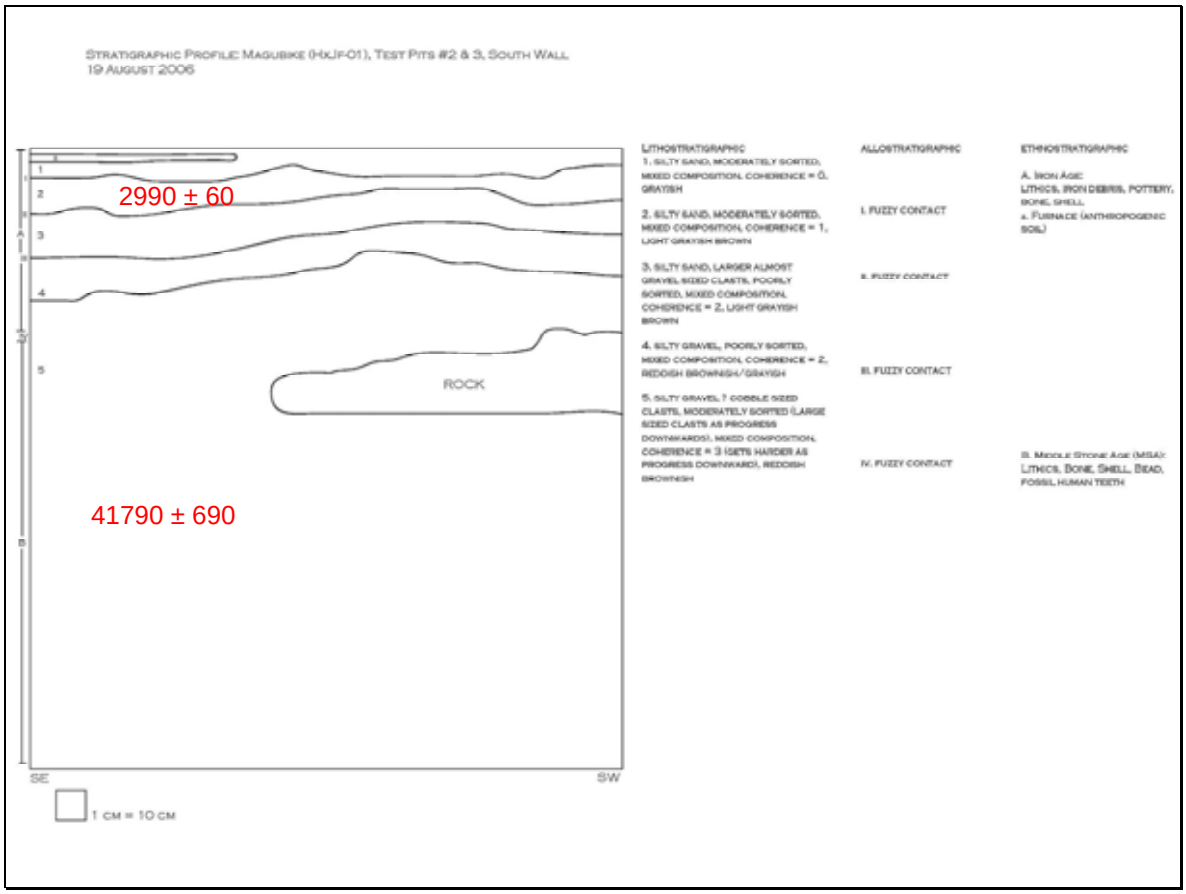
Surface = 254/790 (32%)

0-50 cm = Iron Age 60/941 (6%)

50-70 cm = LSA 43/877 (5%)

70-100 cm = LSA & MSA 17/138 (12%)

100-180 cm = MSA 1137/4618 (25%)



Test Pit #2:

0-50 cm = Iron Age 98/752 (13%)

50-60 cm = MSA 66/186

Test Pit #3 20-30 cm 14C = 2990 ± 60

Test Pit #3 130-140 cm 14C = 41790 ± 690

Test Pit #3:

0-60 cm = Iron Age 89/969 (9%)

60-120 cm = MSA? (in progress)

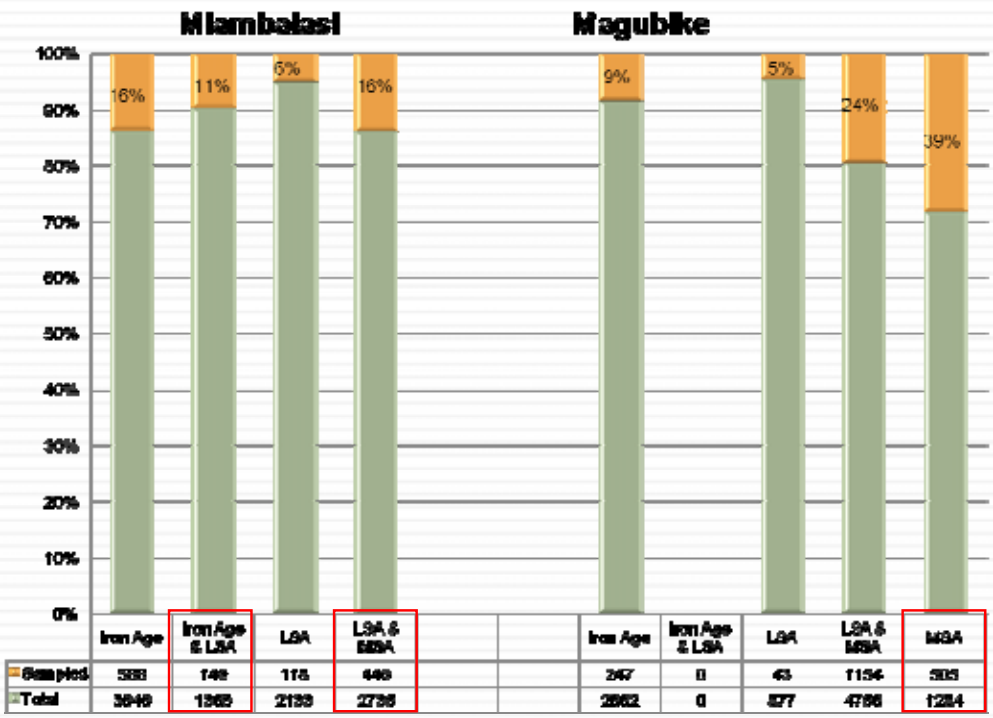
Preliminary Results

- Macroscopic only
- Quartz is most abundant
- Increase in variability in MSA assemblages vs LSA assemblages
- Relatively low volume of each raw material type suggests acquisition from secondary sources (i.e., river cobbles, nodular cherts)
- Cherts in particular display considerable variation in colour, inclusions, mottling, speckling, and banding

Preliminary analysis indicates that the MSA artifacts demonstrate a considerable range of variability in raw material types including quartz, quartzite, basalt, and numerous chert or flint varieties, while the LSA artifacts are primarily produced from quartz and quartzite. This is significant as quartz and quartzite are poor quality materials but ubiquitous, whereas the volcanic and chert varieties are of higher quality but less abundant and not found in close proximity to the rockshelters. This suggests that the inhabitants of the site would have knowledge of where to acquire these materials, and the foresight to plan to obtain them either via exchange networks or by incorporating the sources into their seasonal movements. However, the relatively low total volume of each raw material type suggests that the inhabitants were using secondary sources (i.e. river cobbles) to acquire lithic materials for tool production. The cherts display considerable variation in color, visible inclusions, mottling, speckling and banding. Whether or not these differences are owing to inter-source or intra-source variability will require the petrographic analysis of both the chert assemblages and sources themselves.

Cherts from Mlambalasi (only a small representation of the huge amount of variability found)

“Volcanics” - a category I dislike. These will be separated into separate rock types including basalt, phonolite etc. Note that our Iringa assemblages do not contain obsidian.



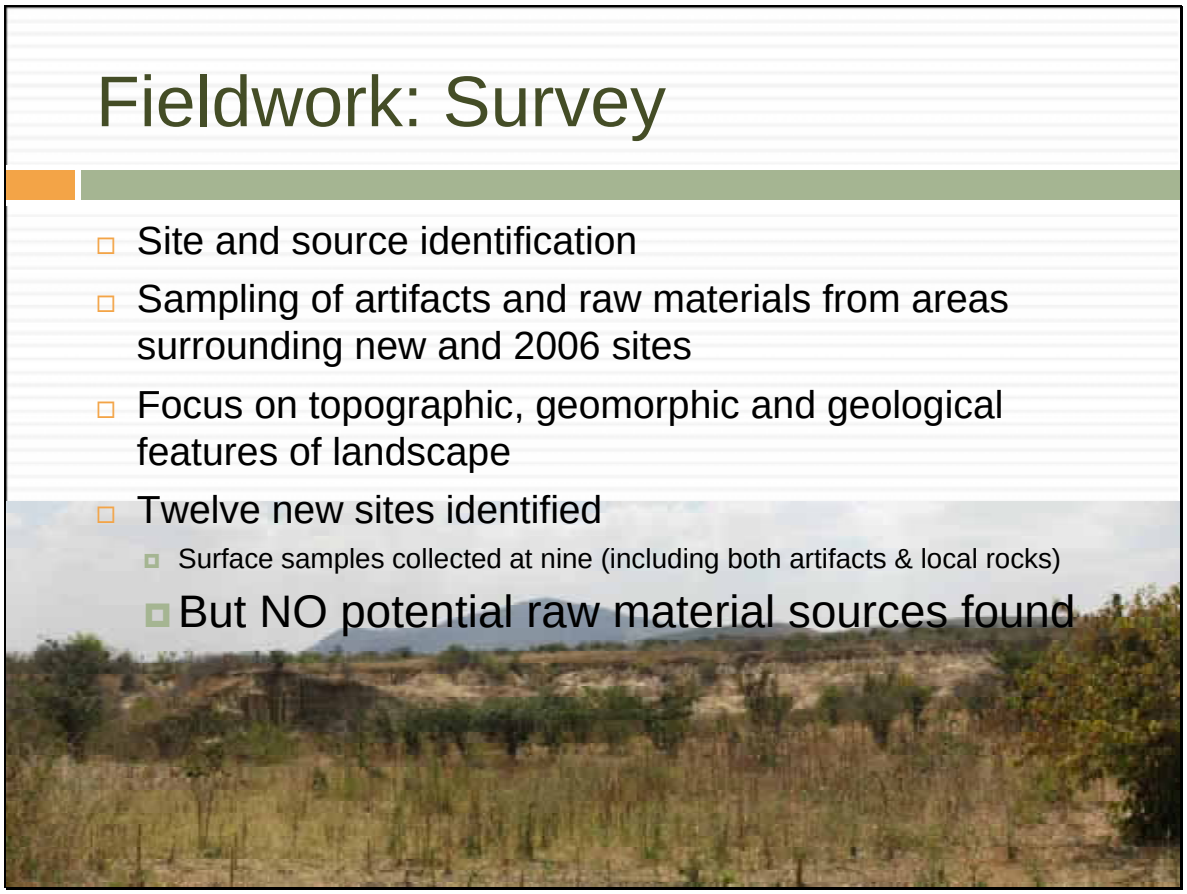
Proportion of sampled artifacts (i.e., non quartz/quartzite) to total population.

Does not include surface finds.

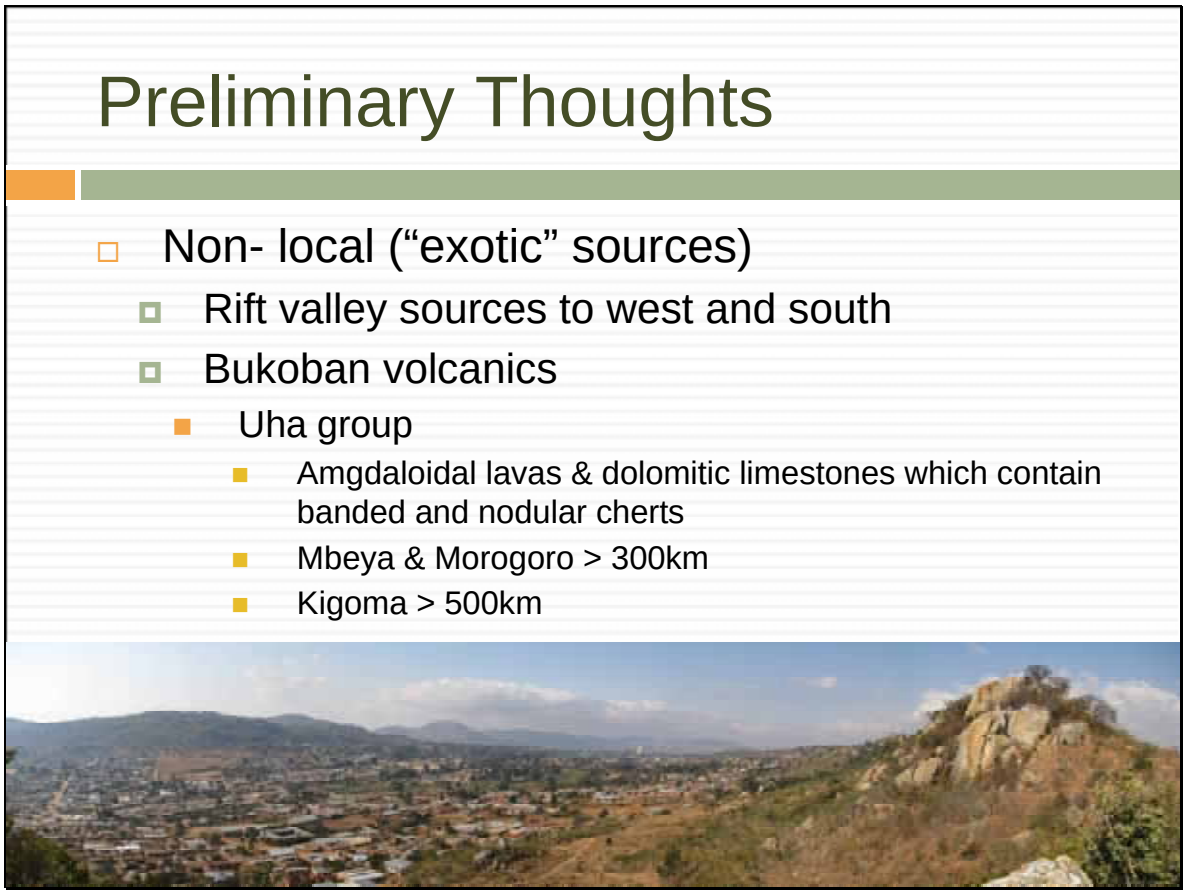
At Mlambalasi only see mixed (Iron Age & LSA, and LSA & MSA) components with Test Pit #2 which is located on the slope i.e., is subject to erosional processes such as gravity (slumping) and water (washout) and as no clear stratigraphy could be defined one can argue that the artifacts are in an disturbed context (note: also was a large termite mount at 60-70 cm dbs).

For Magubike, Test Pits # 1 & 2 have been completely sampled thus MSA is only from TP#2 and two levels of TP#3 (60-70 cm & 70-80cm)- these numbers will change once sampling of TP#3 is completed.

2008 SEASON



Stratified sampling is used: study area has been divided up into geomorphic units (highlands, foothills, valleys, river courses) and a few of each are sampled using foot survey (linear transects).



Some of these Bukoban Uha group volcanics have been found in the Mbeya region (at Chimolo and Chimala Hills) southwest of Iringa region, near Morogoro to the northeast of Iringa, and to the northwest of Iringa near Kigoma. All of these potential sources (for chert in particular), are 300+km (Kigoma is over 500km) away from the sites in our study region.

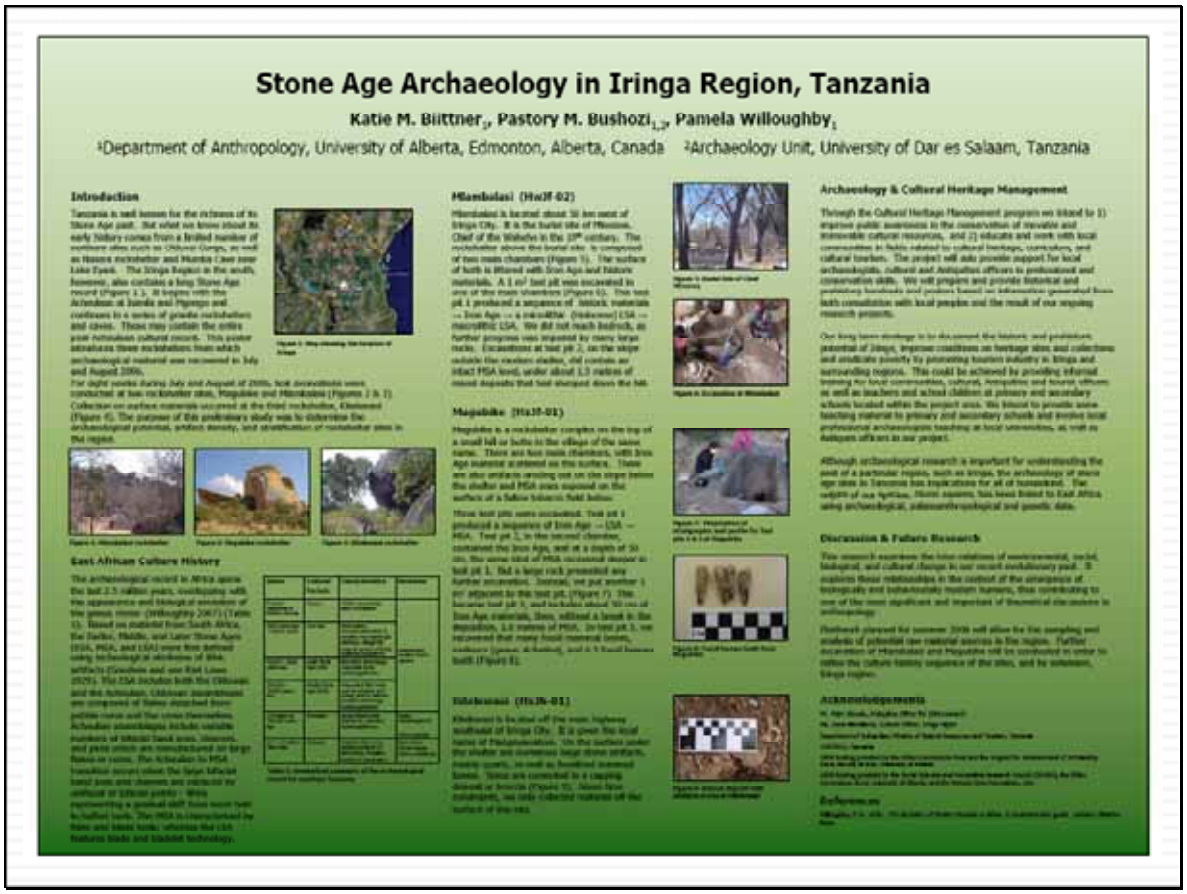
Preliminary Thoughts

- Other possibilities
  - Sources were exhausted in prehistory (no traces remain)
  - geological processes in region (tectonic/volcanic) have affected the visibility of these features on the modern landscape

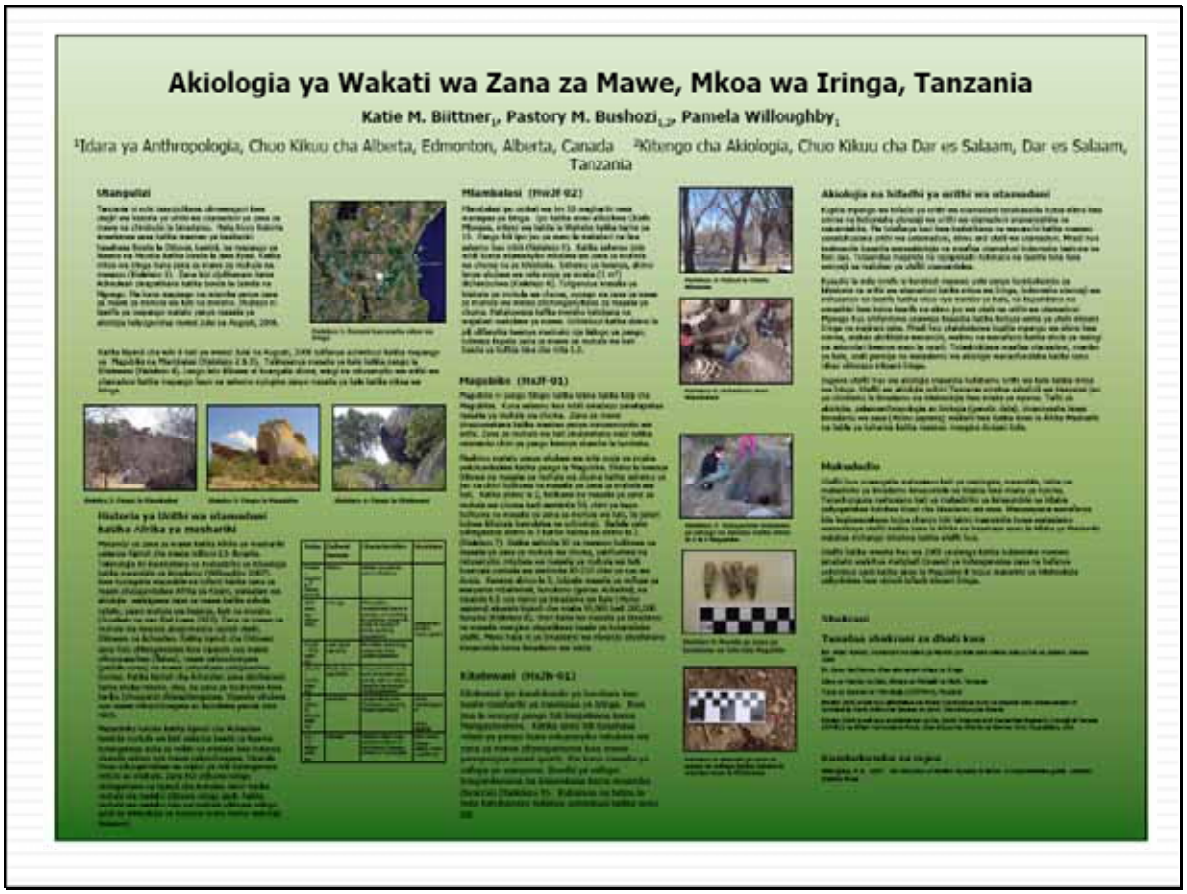
Goals & Dissemination of Results

- Goals:
  - Creation of baseline data for raw materials in region
  - Development of classification scheme whereby the macroscopic characters used are supported by microscopic analyses
  - Standardized system of raw material type characterization/identification for Stone Age assemblages in East Africa
- Dissemination:
  - Pamphlet
  - Posters at village schools
  - Display at Isimila & Mkwawa Museums

Standardized method for describing lithic materials is key - literature review conducted in May 2007 of Journal of African Archaeology, African Archaeological Review, and Nyame Akuma found that in 253 articles (out of a total of 678) where stone tools are mentioned, only 170 provided what raw materials were present, and less than a handful provided a description for the materials listed. Although these descriptions will be grounded in geology, one will not need to be a geologist to apply them; nor am I expecting others to fit their materials into my 'types', rather I would have them describe their lithics using the same terminology so that we can begin to look at inter-regional variability.



Poster prepared from 2006 fieldwork. Distributed this season to local villages, the Department of Antiquities, and the museums at Kalenga and Isimila.



Two versions provided: one in English and one in kiswahili.

Future research

- Return to survey (September)
  - Mbeya region volcanics
- Macroscopic analysis of source materials
- Microscopic analysis:
  - 10% of sample (300 sections) = 1% of population
  - 100 % of source samples (??? sections)

As well as comparison of data with that from other sites - Mbeya region, Mumba, Nasera

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Questions?

Comments?

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- Villages (and villagers) of Iringa, Kalenga, Magubike, Wenda, Lupalama, and Kibebe
- COSTECH, Tanzania
- Department of Antiquities, Ministry of Natural Resources & Tourism, Tanzania
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