

# Glass Beads of Southern Africa and Indian Ocean Trading Networks

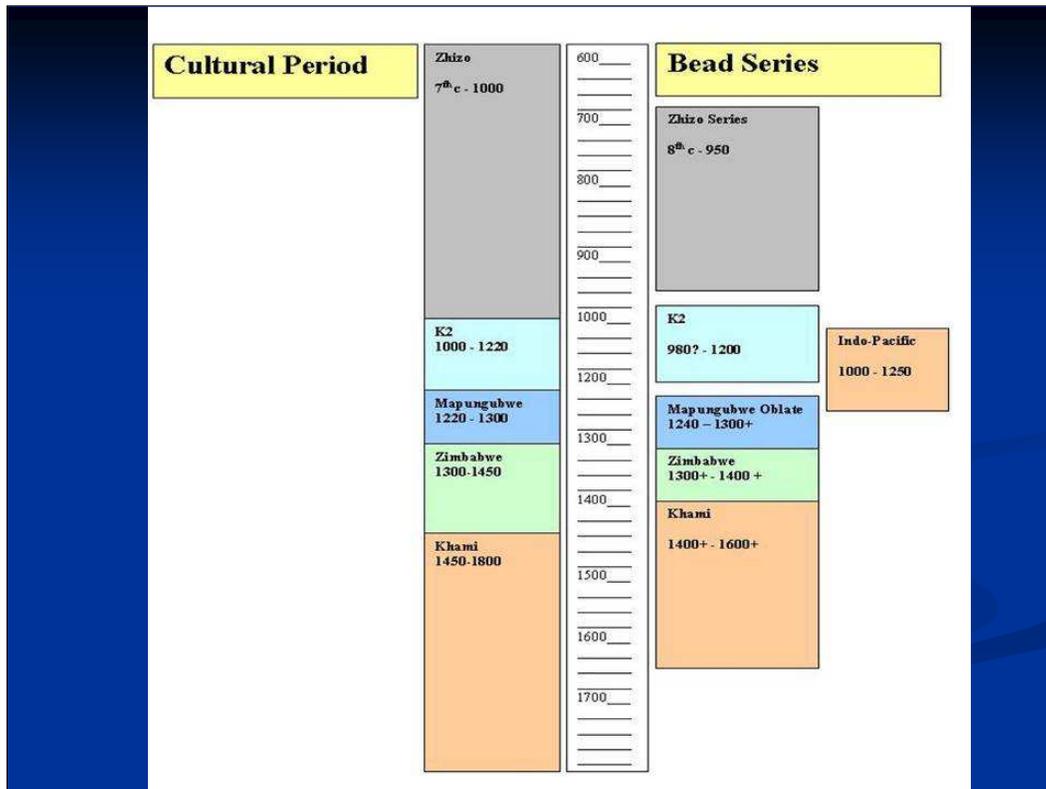
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Slide prepared by Marilee Wood.

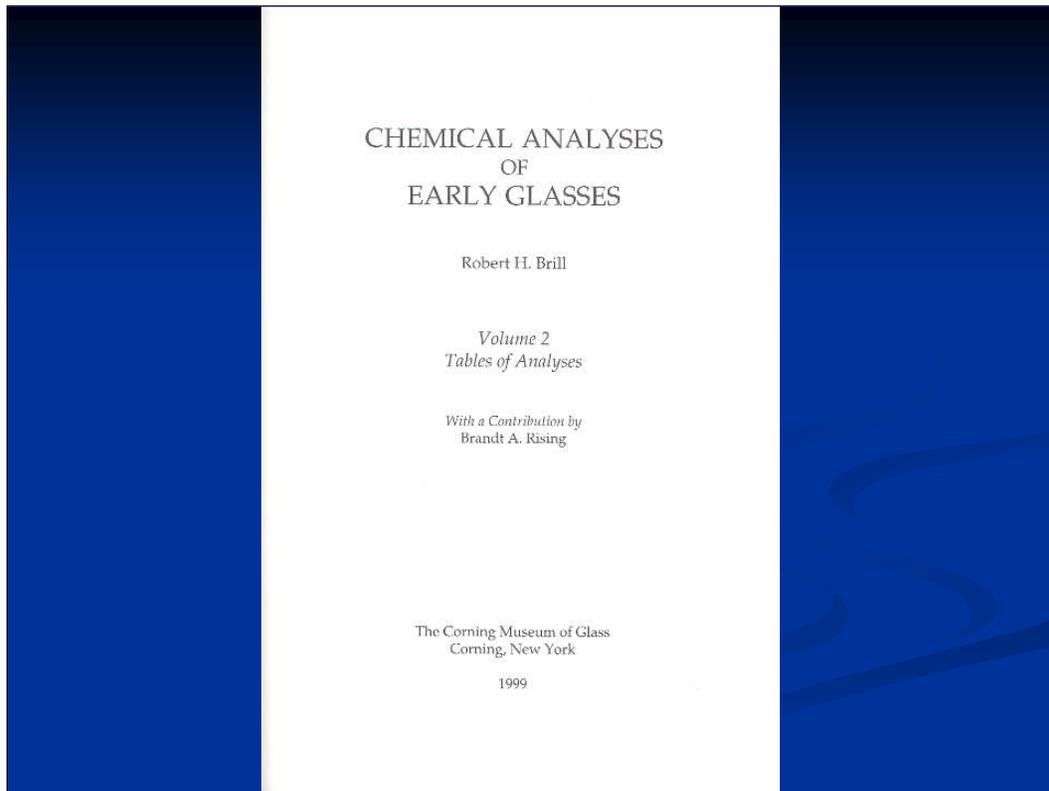
## Earlier Work in Africa

“Glass Beads in African Archaeology: Results of Neutron Activation Analysis, Supplemented by Results of X-Ray Fluorescence Analysis”

Claire C. Davison

PhD thesis, UC Berkeley 1972

Analyzed almost 400 beads. Recognized TWBCG (relatively high Uranium). Worked with relatively few elements. Lack of comparative data from outside Africa, but in Azania 1974 noted some matches for TWBCG (mineral soda glass) with India.



Other than Jenne-jeno, most of the relatively few African samples were unprovenienced, e.g. collected from beach in Zanzibar.



THESE  
PRESENTEE  
A L'UNIVERSITE D'ORLEANS  
POUR OBTENIR LE GRADE DE  
DOCTEUR DE L'UNIVERSITE D'ORLEANS  
CHIMIE  
par  
Laure Dussubieux

L'apport de l'ablation laser couplée à l'ICP-MS à la caractérisation des verres :  
application à l'étude du verre archéologique de l'Océan Indien

Soutenue le 20 décembre 2001 devant le jury :

550 samples from S and SE Asia, spanning 4<sup>th</sup> century BC to 10<sup>th</sup> century AD. Inspired us to do the same in Africa using LA-ICP-MS and selecting beads from good archaeological contexts. Pilot study with Mike Glascock of MURR. Then NSF grant for analysis of 1000 glass beads.

### Glass bead trade from Islamic Egypt to South Africa c. AD 900–1250

*Glass beads are found at most Iron Age sites in southern Africa from AD 800–900 onwards. Except for one type made locally from re-worked glass, all the beads were imported from glass-producing centres elsewhere, widely believed to have been India and the Indian Ocean rim, with distribution through Arab traders in the Indian Ocean. We have used plasma mass spectrometry to determine the rare earth element contents of some beads excavated in the former northern and eastern Transvaal and found that they are identical to beads produced in al-Fustat (now Old Cairo). The alkali agent used to make the glass is specific to seawater and its derivatives, as found on the desert coasts of Egypt. Specimens from two Indian manufacturing sites do not show the same seawater pattern. This casts a new light on maritime trade along the east coast of Africa a millennium ago, and external influences which helped to launch significant political developments in southern Africa.*

Thousands of glass beads have been excavated at Late Iron Age sites in the Limpopo basin of southern Africa, including the sites which have provided the beads for this study. For comparison we have used beads from the coeval site of al-Fustat (AD 640–1168) in Egypt, and glass waste from Arikamedu and Purdalpur in India. The presence of beads in southern African sites indicates substantial external trade. Exports included gold, ivory and other raw materials. The identity and location of their sources is important to an understanding of early economic and political developments in southern Africa.

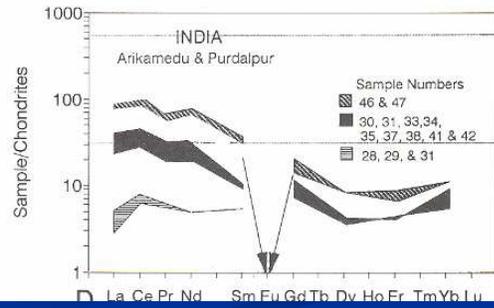
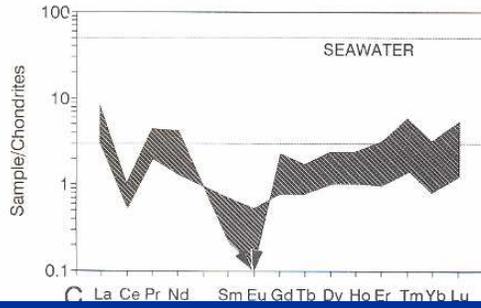
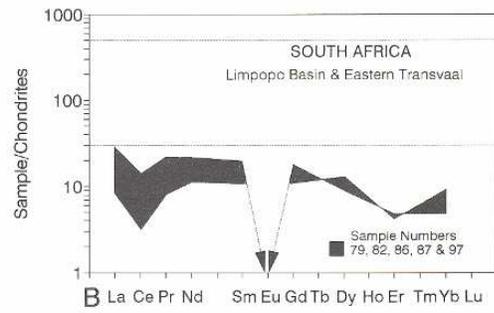
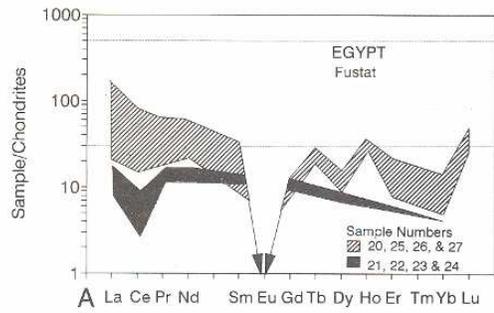
The majority of the beads are small (2–4 mm), monochrome,

oblate, 'seed'<sup>1</sup> beads of various colours, made by the drawn technique — a method usually associated with mass production rather than individual working. The colours and method of manufacture of many of the beads are so similar that they are virtually indistinguishable from one another. This invalidates many early attempts at source identification based on visual inspection.<sup>2–7</sup> Studies based on chemical composition<sup>8–10</sup> likewise failed, because the major constituents of glass do not show patterns of variation that are very diagnostic. Despite this lack of evidence, the notion persists that the beads were made in India or at other production centres around the Indian Ocean rim<sup>11–13</sup> and distributed through Arab traders in the Indian Ocean.

Some of the most likely primary glassmaking sites during the period AD 950–1250 were in Egypt, North Africa,<sup>14</sup> Syria, Persia, and Mesopotamia<sup>15–17</sup> (Fig. 1), not India. However, this does not necessarily mean that glass bead-making was restricted only to primary glass-producing centres, as they could have been made from glass ingots or cullet, traded from different geographical locations.

Al-Fustat was already a successful and reliably documented cosmopolitan entrepôt,<sup>15,18</sup> with a long history of glass-making,<sup>19–21</sup> by the time the Fatimid dynasty gained control of Egypt in AD 969.<sup>21</sup> The infrastructure of manufacture and trade would have been allied to Islamic enterprises. Al-Fustat was also a clearing and forwarding centre for glassware from other glasshouses within the Islamic world including Syria, Mesopotamia and Persia.<sup>19</sup> High-quality glassware has been excavated from within the city, including distinctive bead types termed Fustat Fused Rod Beads dated AD 800–900.<sup>19–22</sup> Fatimid economic policy focused on banking and trade.<sup>18</sup> During this period maritime trade entered a period of rapid expansion in the Mediterranean

Saitowitz, S.J., Reid, D.L. & van der Merwe, N.J. 1996. Glass bead trade from Islamic Egypt to South Africa, c. AD 900 – 1250. South African Journal of Science 92:101-104.



## Problems with the Cape Town study

- 1) Considerable variation in the major and minor element chemistry of the beads they examined.
- 2) All but one of the Indian comparative data were taken from Arikamedu, where most beads are of Roman date and have very different major and minor chemistry.
- 3) Analyzed Fustat beads purchased by Van Riet Lowe in a Cairo bazaar in 1937.

1) Makes it very unlikely that all the glass comes from a single source, since this variation indicates the use of different major raw materials and different recipes. Saitowitz et al claim that “major constituents of glass do not show patterns of variation that are very diagnostic”; false claim that ignores all the work of Brill et al. Also ignores the links to India noted by Davison and Clark in 1974.

Possible that glass beads were made in Fustat (Cairo) after 1168 but we don't know.

They ignore the morphological and technological similarities between African and Indian beads that were identified by Pete Francis and other bead experts.

A couple of the VRL Cairo beads are of types considered to have been made at Fustat

Very selective reporting of results!

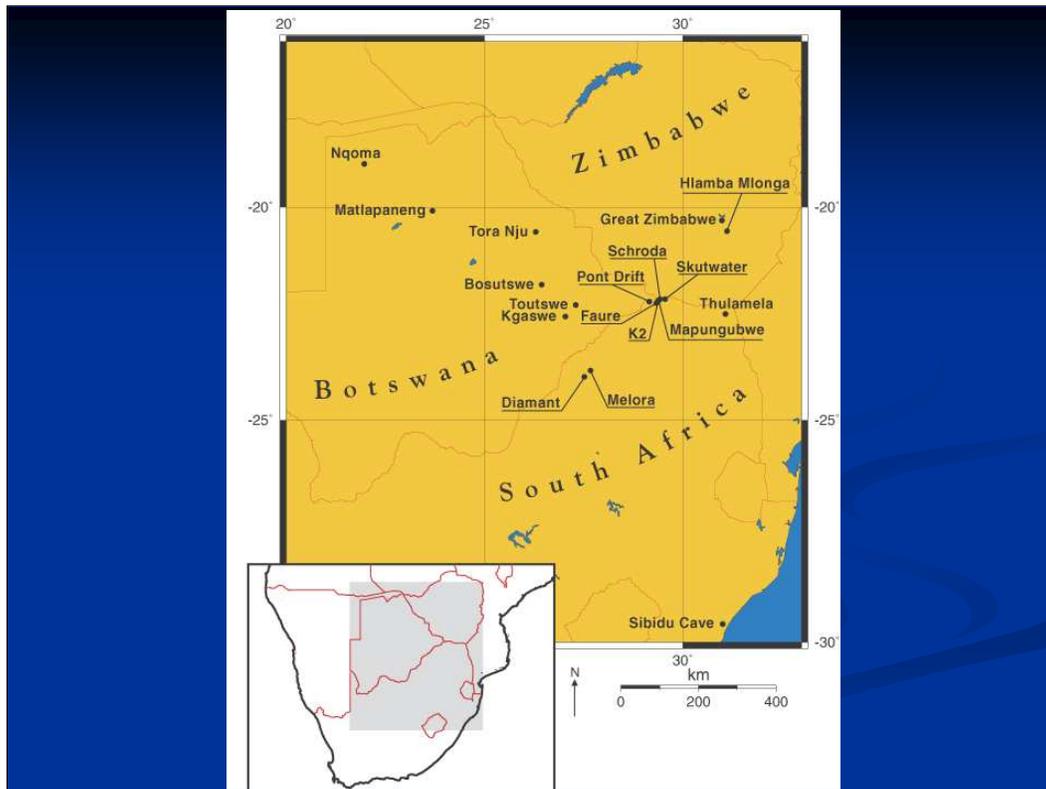
## Samples

- Zhizo series - 24 beads
- K2 series - 25 beads
- K2 garden rollers - 14 beads
- Indo-Pacific series - 43 beads
- Mabungubwe oblates - 64 beads
- Zimbabwe series - 86 beads
- (IP) Khami series - 81 beads
- Undefined - 37 beads

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Total = 374 beads

Beads we analyzed.



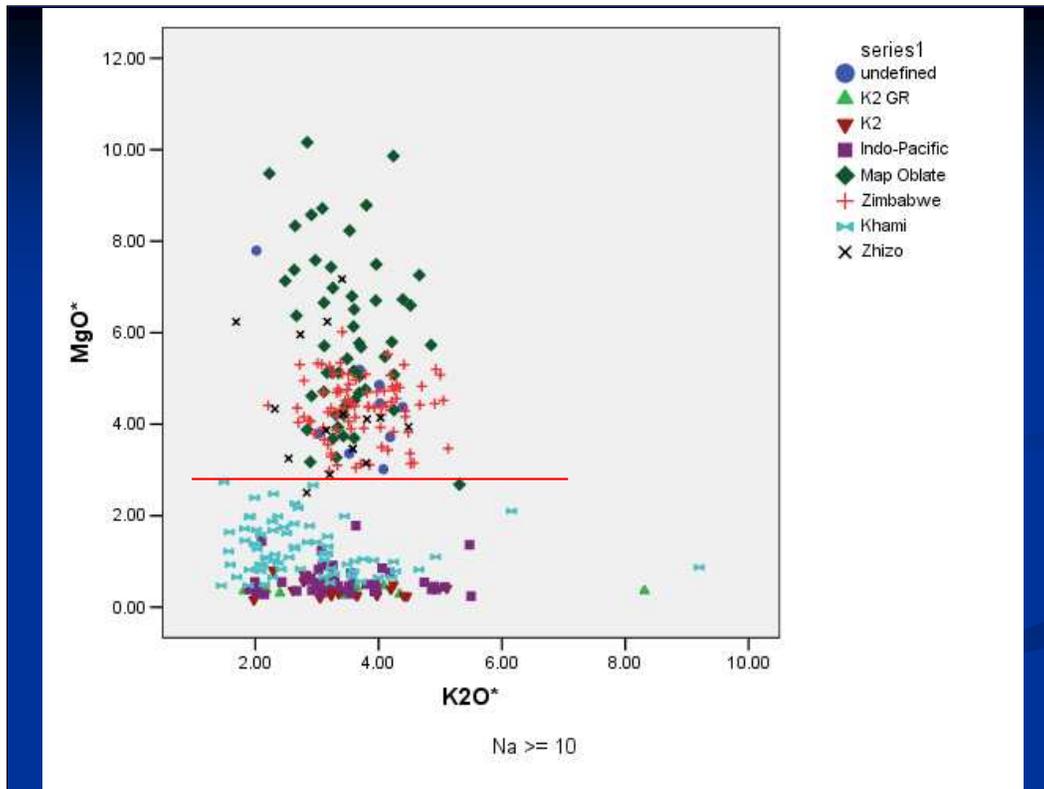
Thanks to bead providers – Jim Denbow for Botswana, Carolyn Thorp, Lyn Wadley and others at Wits. Map prepared by Jess Drake, graphics design student at CSU San Bernardino.

## Common Glass Types

### Soda(alkali)/lime/silica glasses

1. Mineral-soda glasses (LMG):
  - a) low MgO and  $K_2O$  (<1%) - Hellenistic & Roman – natron glass; natron from Wadi el-Natrun (near Cairo)
  - b) low MgO (<2%) and high  $K_2O$  (>2.5%) – common glass in South and SE Asia
2. Plant-ash glasses (HMG): high  $K_2O$  (c.2-3.5%) and MgO (c.2.5-6%)
  - a) With high CaO (>4.5%) and low  $Al_2O_3$  (<4%) – Middle Eastern (Brill)
  - b) Plant-ash glasses with low CaO (<4.5%) and high  $Al_2O_3$  (>4%). Indian (Brill).

With the emphasis on glass from periods associated with the present project. Shift from 1 to 2 when Abbasid caliphate collapses. Dated about 9<sup>th</sup> century AD. Henderson (Raqqa) – 2 subtypes of plant-ash glass based perhaps on sand vs quartz as silica source.



This and other plots, where oxides are starred(\*), are based on reduced compositions, i.e. amounts of Na<sub>2</sub>O, K<sub>2</sub>O, MgO, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, CaO, and Fe<sub>2</sub>O<sub>3</sub> summed to 100% (see Brill 1999, volume 2, for details). Scale is in percentage. We ignore here several beads with less than 10% Na<sub>2</sub>O. Some of these are decayed. Some are really different and one or two may not even be glass.

## Southern Africa

### Bead series and glass types

AD 750 – 950: Zhizo – plant-ash (often decayed)

AD 1000 – 1200 (1250): K2 & I-P – mineral-soda

AD 1240 – 1300+: Mapungubwe – plant-ash

AD 1300 – 1400+: Zimbabwe – plant-ash

AD 1400 – 1600+: Khami – mineral-soda

Note that mineral soda glasses differ between K2 and Khami. Ditto for plant-ash between Zhizo and Mapungubwe.

## Source of the mineral-soda glasses?

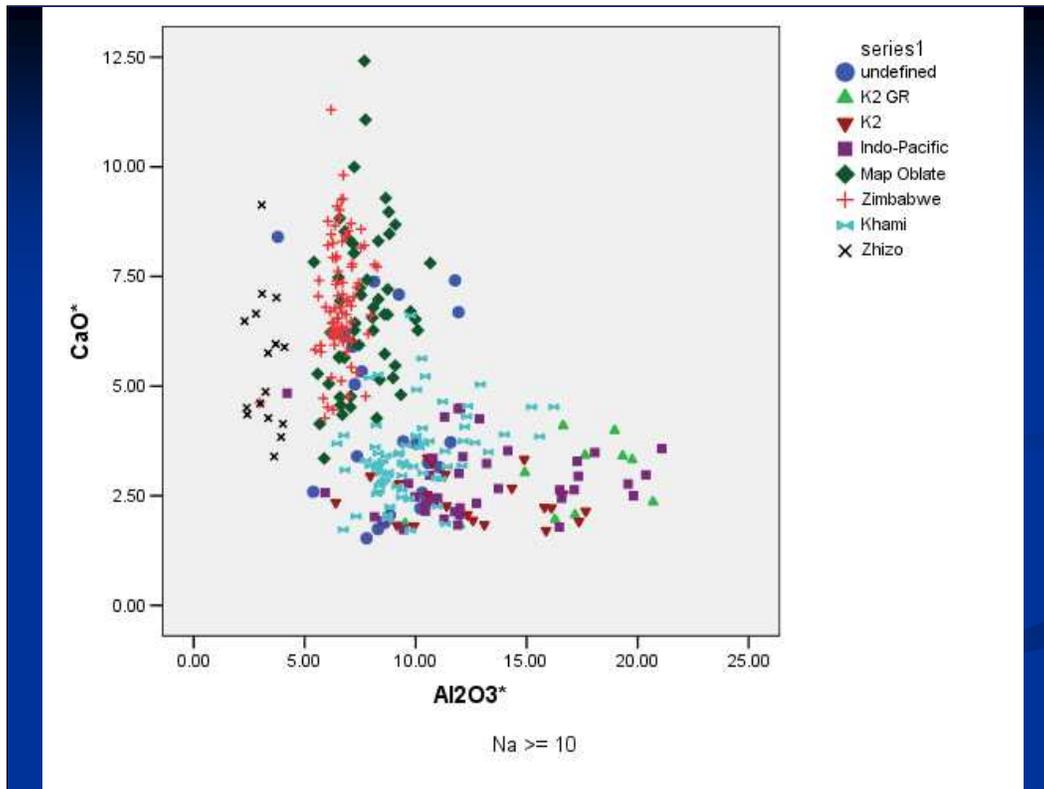
All the Southern African mineral-soda glasses have high  $K_2O$  and low  $MgO$  distinctive of South Asia, not Egyptian glass

Known ethnographically from Firozabad region of S. Ganges plain (Kock and Sode). Glass from evaporite (*reh*)

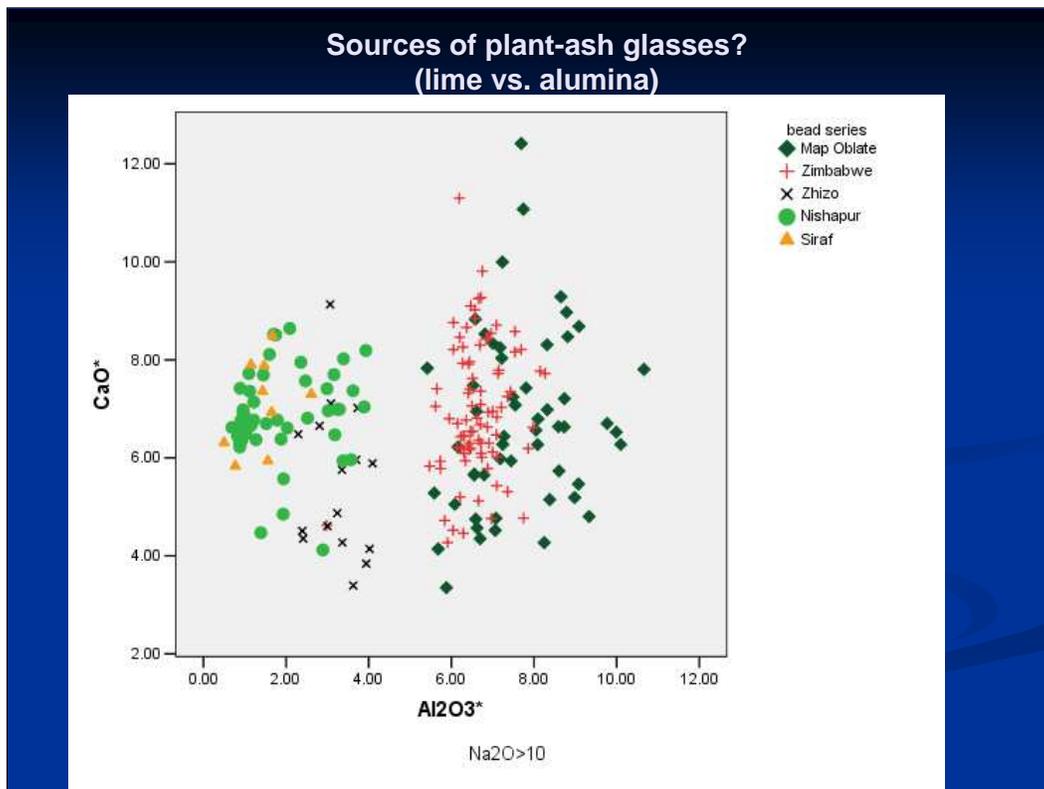
Known archaeologically as “m-Na-Al” glass. Most common glass by far in beads from S. & SE Asia between 4<sup>th</sup> century BC and 10<sup>th</sup> century AD.

Portuguese documents explicitly mention export of glass beads from India to Africa in the Khami period.

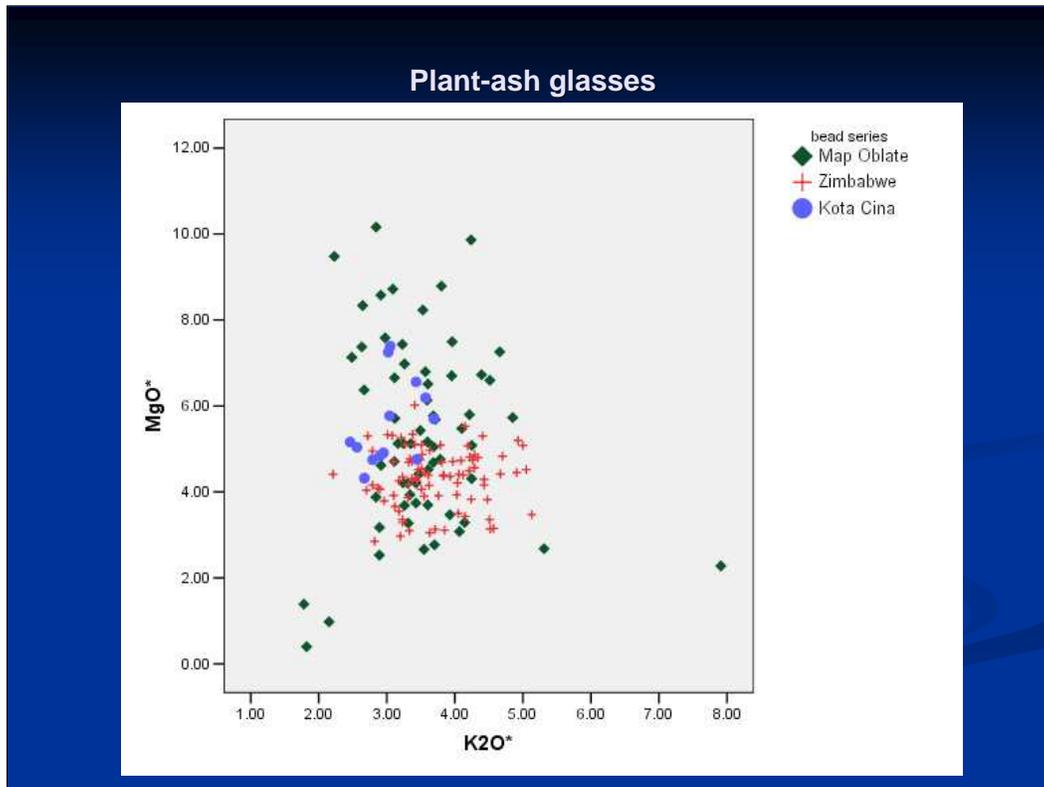
Natron glass was not made in the Middle East (or Europe), including Egypt after the 9<sup>th</sup> century. Also, no Middle Eastern, European or Chinese glass has alumina levels even approaching those found in our beads and in Indian and SE Asian beads and glasses analyzed by Brill and Dussubieux. 2. This glass includes what Pete Francis referred to as Indo-Pacific beads. Any mineral-soda glass found in Africa after about the 9<sup>th</sup> century must have come from India or perhaps SE Asia. Also, not from China; Chinese beads are distinctive morphologically and often chemically. m-Na-Al glass probably made in numerous places, not just S. Ganges Plain. Dussubieux demonstrated that it could well have been made in Sri Lanka in first millennium AD.



Three groups: 1) high lime, low Al (Zhizo); high lime and high Al (Zim & Map Ob); low lime and high Al (K2, IP, Khami)



The comparison glasses are vessels. Nishapur and Siraf are the right age for Zhizo. Kota Cina is not. Also important to note that there are no high Al glasses from the Middle East or Europe throughout the Islamic period. Nishapur is known as a major glass-manufacturing center contemporary with the Zhizo period. Pb isotope data for Zhizo glass from Igbo-Ukwu (Tom Fenn, University of Arizona) also indicates an Iranian source. The Pb isotope data also show that the lead in the I-U glass did not come from Egypt.



Very few plant-ash glass analyses from Indian sites. Beads from Bara in Pakistan have very similar chemical composition to the Mapungubwe and Zimbabwe series beads but they date to 1<sup>st</sup> centuries BCE and CE. No analyses of post-10<sup>th</sup> century glass from sites in India. KC is a 12<sup>th</sup>-14<sup>th</sup> century harbor site in northern Sumatra with evidence of strong S. Indian and Chinese connections. Brill argues that the KC glass vessels were made in India.

## Southern Africa

### Archaeological Periods and glasses

AD 750 – 950: Zhizo – Middle East – Iran

AD 1000 – 1200/1250: K2 & I-P – South Asia (SE Asia)

AD 1240 – 1300+: Mapungubwe – South Asia (SE Asia)

AD 1300 – 1400+: Zimbabwe – South Asia (SE Asia)

AD 1400 – 1600+: Khami – South Asia (SE Asia)

## Cobalt sources

- Zhizo (10 beads) – cobalt, zinc, nickel **Iran**
- K2 and I-P – no use of cobalt
- Mapungubwe Oblates (4 beads) – cobalt:arsenic (1:1) – cobaltite **Rajasthan, India**
- Zimbabwe (10 beads) – 9 cobaltite; 1 cobalt:arsenic (3:2) – erythrite **9 Rajasthan, India; 1 Qamsar, Iran**
- Khami (7 beads) – 2 cobaltite; 5 cobalt:arsenic (~4:1)  
**2 Rajasthan, India; 5 unknown**

Additive levels of cobalt found in some beads. Analysis of the oxides associated with cobalt sometimes enables identification of the cobalt-bearing ore. Cobaltite = Khetri (Rajasthan); erythrite – Qamsar (Iran); cobalt-zinc ore found at Anarak near Kashan in Iran.

## Origins of Southern Africa Glass

AD 750 – 950: Zhizo – Middle East – Iran (Nishapur?)

AD 1000 – 1200/1250: K2 & Indo-Pacific – South Asia

AD 1240 – 1300+: Mapungubwe Oblates – S Asia

AD 1300 – 1400+: Zimbabwe – S Asia

AD 1400 – 1600+: Khami – S Asia

K2 – Sri Lanka? Doubtful since Mantai destroyed in Indian invasion in 957.

## Transitions and their Causes

AD 950-1000: Zhizo/K2 – decline of Abbasid empire.

AD 1200-1240: K2/Mapungubwe – Decline of the Chola empire.  
Arrival of Muslims in NW India.

AD 1300: Mapungubwe/Zimbabwe – Delhi Sultanate's  
conquest of Gujerat.

AD 1400: Zimbabwe/Khami – Sacking of Delhi by  
Tamerlane in 1398. Vijayanagara Empire in S. India.

The above are obviously speculations! AD 1400: Zimbabwe/Khami – local shift in glass making in India with development of mineral-soda glassworks in Firozabad region? Glass still exported via Cambay (Gujerat), but now also from Coromandel coast.

Of course, political changes within Southern Africa also relevant.