Using a multi-proxy approach to refining paleoenvironmental and paleoclimatic reconstructions of the Holocene at Lake Turkana, Kenya









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Significance

Conclusions

Geologic Setting





Turkana Basin

g. 1. (A) Map of the Turkana Basin and adjacent basins (SRTM topography). Also shown are rivers (thin blue lines), catchment boundaries (thick and thin black lines), the maximum tent of Lake Turkana during the Holocene (MHS. thick blue line) approximated using a present-day surface elevation of 460 m. and the various overflow sills in the area (arrows linked



Kabua Gorge



Outcrops created as Kalokol Laga and its tributaries incise through older strata - Holocene clays, silts, and sands onlapping Miocene basalts and Pliocene Lonyumun Frm

- Galana Boi formation which was described at Koobi Fora (Owen and Renaut, 1986)





Significance

Potential to correlate outcrops to cores

Advantages of outcrops:

- 1) Ease of access
- 2) Opportunity to trace lateral facies changes
- 3) Larger sample sizes

Challenges of working with outcrops:

- 1) Exposed to surface weathering
- 2) Working on margins of Holocene lake

1984 project cored multiple sites in North, Central, and South basins of Lake Turkana Late Holocene in age based on AMS dates

Is my section correlatable???

36° OO'E Halfman et al., 1994

Methods- Field Work

- Measured sections
- Made lithologic descriptions
- Took bulk samples with particular focus on lacustrine phases
- Collected material (ostracods, charcoal) for AMS dating



Methods- Lab Work

- Wet sieved and picked ostracods
- Imaged cods on the SEM
- Will conduct stable isotope (δ¹³C, δ¹⁸O) analysis on cods
- Will collect material (ostracods, charcoal) for AMS dating





Stratigraphy

Lateral facies changes over scale of 100's of meters to km's



Stratigraphy

<u>Facies</u> (from bottom to top)- recrystallized *Cleopatra* coquina (irregular, erosional contact), pedogenic calcic soil, bedded gravel, molluscan coquina, massive to weakly planar bedded sand

Environmental Interpretationflood plain -> beach









Significance

Methods

Potential to tie relative

lamination thicknesses

from outcrops to cores

Laminations



- Present on multiple scales (cm to mm)

- Sedimentological changes
 - grain size variation
 - diatomaceous

- What is controlling deposition?



	Significanc	e	Methods	Results	
Save Image			Ost	racods	
P			Main spe	ecies	
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131×	28.0 kV 100µm AMRAY	#8888*	Darwir	nula 🔪	
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			Cyprid	eis? 🔨	
129×	20.0 kV 100µm AMRAY	#8888*			
(Fresh water a Preliminary re 	assemblage esults show incre	easing
			Darwinula thro	ugh lacustrine p	hase 1
			Darwinula selHypothesize	\uparrow Dar = \checkmark fluvi	al input
36Ø×	20.0 KV ^{100µm} AMRAY	#0000	Indication	of regression?	





#0000

Regional Picture



• Observe 3 distinct lacustrine phases at Kabua even though curve only predicts 2

Elevation of base of Kabua Gorge outcrops

- If ↑ Dar = ↓ fluvial input,
 then regressive sequences
 should have increase in % Dar
- Could detect regressions even when sedimentologically there is no record of them!

Novel approaches

1. Comparison with type section from east side of Turkana (Koobi Fora)

2. Potential for core to outcrop correlation

Systematic sampling of Galana
 Boi never done before on outcrops



4. Need stratigraphic/sedimentological framework to build upon for other novel research such as high-resolution paleomagnetic studies and Sr isotopes

