Record of a fluctuating lacustrine margin: Updates from the HSPDP West Turkana Kaitio drill leg

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Acknowledgements

• Entire HSPDP-WTK field and sampling party teams
• LacCore, DOSECC, Chris Vidito
• Field support crew
Outline

• WTK Objectives

• Preliminary Results
  – What was recovered
  – Age Model (Tephra and Paleomag)
  – Stratigraphy and Cycles
  – Ostracods and Preservation

• What’s next for WTK
WTK Objectives
Opportunity for comparison between outcrop and core

Drilling target = Kaitio Mb
Lacustrine sequence ~2 Ma
Record Recovered

Drilling Logistics
10° drilling angle + 5° natural dip to the W
HQ pipe

Outcomes
Cored 215 m with 95% recovery
Hydrothermal Evidence

Hydrothermal fracture composed of series of small faults with cm-scale offset

No stratigraphically significant offset

~20 m hydrothermally influenced sediment

with input from Dennis Nielson
Tephra

- Drawing on extensive data (Brown, Feibel, others) from outcrop
- Fingerprinting tephra with single glass shard analysis using Electron Microprobe

Oxide Percents

<table>
<thead>
<tr>
<th></th>
<th>SiO₂</th>
<th>Al₂O₃</th>
<th>Fe₂O₃</th>
<th>CaO</th>
<th>K₂O</th>
<th>Na₂O</th>
<th>TiO₂</th>
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</thead>
<tbody>
<tr>
<td>4Q-2: 14-16</td>
<td>73.83</td>
<td>10.77</td>
<td>2.73</td>
<td>0.17</td>
<td>3.93</td>
<td>4.72</td>
<td>0.18</td>
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<tr>
<td>Chari avg</td>
<td>74.36</td>
<td>10.69</td>
<td>2.80</td>
<td>0.17</td>
<td>4.08</td>
<td>3.86</td>
<td>0.17</td>
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<tr>
<td>20Q-3: 52-54</td>
<td>71.87</td>
<td>9.13</td>
<td>5.57</td>
<td>0.18</td>
<td>3.03</td>
<td>3.99</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Unnamed but with shards of the Ebei and Etirr
Contains pumice so opportunity to date directly!
Additional age control
  – Some challenges as segments of the core rotated within the tool
High sed rate and relatively continuous deposition
  – Top of Olduvai potential Vrica Event?
  – Comparison with outcrop study
**Stratigraphy**

> 96% of the core is clay/silt
  
  - low energy environment
  
  - good preservation for proxies

**Deltaically influenced**

Littoral lacustrine deposition with flooding cycles as evidenced by weak soil overprint

**Evidence of hydrothermal overprinting**

lithologic log by Robyn Henderek
Stratigraphy

Example of a flooding cycle

- Laminated lacustrine clay
- Fine to medium grained sand, often ostracod-rich
- Weakly pedogenically modified lacustrine clay

See this cycle repeat ~32 times in parallel outcrop section
Ostracods

> 75% of 10 m initial scan with ostracods

15Q-3: 32-34 cm
n = 2933

30Q-1: 45-47 cm
n = 32

74Q-1: 55.5-57.5 cm
n = 429

Un-ID Fragments

Un-ID Juveniles

Cyprideis

Hemicypris

Ilyocypris

Potamocypris

Sclerocypris

Un-ID Fragments

Un-ID Fragments

Un-ID Fragments

Un-ID Fragments
Ostracods and Pyrite

• First time pyrite has been observed in these sediments
  – Hypothesized to be source for diagenetic gypsum

• Are the pyrite vs. non-pyrite cod assemblages different?
Conclusions

• Unique record
  – Sensitive littoral margin
  – First observed pyrite
  – Parallel outcrop study

• Stay tuned for more results!
Thank You