National Lacustrine Core Repository
Limnological Research Center

University of Minnesota, Minneapolis

www.laccore.org

Anders Noren
LacCore Background

Services to Paleolimnological Community

• Planning
• Field
• Core processing / ICD
• Sample prep / Analysis
• Archiving
LacCore Background

Services to Paleolimnological Community

- Planning
- Field
- Core processing / ICD
- Sample prep / Analysis
- Archiving

** All projects, large and small m to km of core
Work Flow

- Planning
- Field
- Core processing / ICD
- Sample prep / Analysis
- Archiving
1. Multisensor logging
   - gamma density
   - acoustic velocity
   - electrical resistivity
   - magnetic susceptibility (loop and high-resolution point sensors)
   - color spectrophotometry
   - natural gamma radiation
Core Processing / ICD

1. Multisensor logging
   - gamma density
   - acoustic velocity
   - electrical resistivity
   - magnetic susceptibility (loop and high-resolution point sensors)
   - color spectrophotometry
   - natural gamma radiation

Parse logger files, plot / email
Core Processing / ICD

1. Multisensor logging
   < split the cores >
2. High-res linescan digital imaging
DMT CoreScan
Geotek GeoScan III
• 10-40 pixels/mm
• whole-core
• uniform lighting
• glare-free: polarizing filters on light and lens
Initial Core Description
Core Processing / ICD

Core layout
Smear slides
Core Processing / ICD

1. Multisensor logging
2. High-res linescan digital imaging
3. Description
   a. macro-scale
      • color
      • texture
      • structure
Core Processing / ICD

1. Multisensor logging
2. High-res linescan digital imaging

3. Description
   a. macro-scale
      • color
      • texture
      • structure
   b. micro-scale
      • mineral & biological components
      • detrital vs authigenic vs diagenetic
5Y 2.5/1
0-100 cm continuation of lithostratigraphic unit 7 from section above.
Finely laminated dark gray and olive gray diatomaceous clay(?) or clayey ooze (?). Downward in this section, fine to very fine lamellae increasing broken by 1-3 cm massive bands, beginning below 58 cm.

Contacts between laminated and massive intervals typically sharp but irregular.

Diatomaceous silty clay. Trace carbonates, charcoal. Diatoms busted up.

5Y 4/1

3 cm wood fragment at 75-76 cm has unoxidized core.

5Y 4/2
ICD Sheets

Permanent descriptive record
Easily shared
Used for sample requests
Expedition report
ICD Sheets

Complicated procedure
4 programs!
  Excel, SigmaPlot, PhotoShop, Illustrator
Creation: 2-3 minutes/sheet
Digitizing: longer/later
### LacCore - National Lacustrine Core Repository - Section Database

**Main Menu**

#### Identification
- **Expedition/Project:** GLAC7
  - **Lake:** Lake Malawi
- **Year:** 2006
- **Site/Hole:** 1B
- **Core:** C4
- **Date:** 3/12/2006
- **Coring Device:** E
- **Core Diameter (cm):** 6.62
- **Accession Number:** 4274

#### Section Comments

<table>
<thead>
<tr>
<th>ICD MBLF</th>
<th>Corrected MBLF</th>
<th>Hole Depth Shift</th>
<th>MCD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sec Length (m):</strong></td>
<td>1.038</td>
<td></td>
<td></td>
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<td><strong>Sed Length (m):</strong></td>
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<td><strong>mblf bot (m):</strong></td>
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<td></td>
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<tr>
<td><strong>Gaps:</strong></td>
<td>9.800</td>
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<td>88.030</td>
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<td></td>
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<td><strong>Corrected mblf bot:</strong></td>
<td>50.565</td>
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<td></td>
</tr>
<tr>
<td><strong>Hole Offset:</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>DMblf Top:</strong></td>
<td>88.88</td>
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<tr>
<td><strong>DMblf Base:</strong></td>
<td>90.88</td>
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<tr>
<td><strong>MCD Offset:</strong></td>
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<tr>
<td><strong>MCD Top:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MCD Base:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Shipboard MBLF Calculation
- **Section L:** 1.01
- **Sec mblf T:** 90.44
- **Sec mblf B:** 51.45
- **Sec mblf Total:** 124.00

#### Shipboard Core
- **Core mblf top:** 88.11
- **Core mblf base:** 91.49
- **Core recovery:** 3.30

#### ICD Core
- **Core mblf top:** 88.11
- **Core mblf base:** 91.42
- **Core recovery:** 3.31

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**Archival**

- **Measured Location:** COMO2C28
- **Original Location:** COMO2C28

**Work Half**

**Permanent Location:**

**Temporary Location:**

<table>
<thead>
<tr>
<th>Gap</th>
<th>Top</th>
<th>Bottom</th>
<th>Span (cm)</th>
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<tr>
<td>1</td>
<td>0</td>
<td>.3</td>
<td>.3</td>
</tr>
<tr>
<td>2</td>
<td>7.5</td>
<td>7.7</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>80.5</td>
<td>5</td>
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<tr>
<td>4</td>
<td>86.5</td>
<td>86.9</td>
<td>4</td>
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<tr>
<td>5</td>
<td>95.4</td>
<td>103.8</td>
<td>8.4</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
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</tbody>
</table>
• de-gapping
LacCore Database

gas expansion
LacCore Database

gap boundaries

<table>
<thead>
<tr>
<th>Gap</th>
<th>Top</th>
<th>Bottom</th>
<th>Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap 1</td>
<td>0</td>
<td>3</td>
<td>.3</td>
</tr>
<tr>
<td>Gap 2</td>
<td>7.5</td>
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<td>2</td>
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<td>Gap 3</td>
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<td>80.5</td>
<td>.5</td>
</tr>
<tr>
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<td>.4</td>
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<tr>
<td>Gap 5</td>
<td>95.4</td>
<td>103.8</td>
<td>8.4</td>
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</table>

Start of next drive

- 80cm
- 89cm
- 32cm
- 40cm
LacCore Database

compress / remove gaps
LacCore Database

still too long!
shrinkage factor
(3.32/3.00)

Corrected MBLF

<table>
<thead>
<tr>
<th></th>
<th>Shrinkage Factor</th>
<th>Corr. Sed Length (m)</th>
<th>Corrected mblf top</th>
<th>Corrected mblf bot</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1.325</td>
<td>0.71</td>
<td>89.657</td>
<td>90.565</td>
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</tbody>
</table>

start of next drive
LacCore Database

offset if needed
Stratigraphic Correlation

- Visual
- Image-based
- Data-based
- Refine sampling strategy
Subsample Analyses

- Smear slides
- LOI
- TC/TIC coulometry
- Sulfur coulometry
- Biogenic silica
- Pollen
- XRD
- Thin sections
- Isotopes

- Grain size
- Diatoms
- Charcoal
- AMS carbon-14
- Lead-210
- Cesium-137
CoreWall

- Digital ICD
  - Eliminate handwriting step
  - Post/share data, images immediately
CoreWall

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- Subsample analyses’ results juxtaposed with other datasets
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- Remote PIs/students can participate in ICD
CoreWall

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Particularly beneficial to paleolimnologists:
- Tradition of independence
- Funding structure
CoreWall

Generate printable ICD sheets/section summaries from data & annotations

- Choose data to juxtapose
- Trim bad data points
CoreWall

De-gapping: Compress regions of core and associated images and data to eliminate sediment gaps (squeezing/expanding within a section)
CoreWall

Perform stratigraphic correlation based on logger data or images
Generate composite depth scales following de-gapping and correlating
CoreWall

Show the locations of previously-taken samples

Generate sample lists/requests from user interactions with core images

• Consistent depth measurements
CoreWall

Generate stratigraphic figures and numeric exports for external plotting from description keywords
CoreWall

Perform depth scale adjustments and exports (and other numeric functionality) without loading core images
CoreWall

SUPPORT!
CoreWall

SUPPORT!

- Documentation
- User group
- A person, people, etc.