LONGTERM NEARSHORE SEDIMENTATION
ON A RENOURISHED BEACH: HANCOCK
COUNTY, MISSISSIPPI

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Introduction

• Goals
  – Help Quantify coastal budget
  – Document potential sediment sources
  – Assess borrow pit effects
  – Map sediment transport/deposition
  – Interactions of Holocene and Pleistocene

• Lessons learned
  – Coring techniques
  – Combining data sources using “If Then” logic
Background

- Several Renourishments
  - Most important 1967 and 1994
  - Both created ≈ 200 ft wide beach
  - 600,000 cyds for Waveland section of 1994 project
  - Potential for roughly 1.6 million cyds of fill for combined 1967 and 1994 projects

- Two Pleistocene units
  - Biloxi
  - Gulfport

<table>
<thead>
<tr>
<th></th>
<th>Waveland</th>
<th>Bay St. Louis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994 Renourishment</td>
<td>560,000</td>
<td>250,000</td>
<td>810,000</td>
</tr>
</tbody>
</table>

![1992 Image](image1992.png)

![1998 Image](image1998.png)
Methods

• Data
  – Profiles
    • total station
  – GPS
  – Augers
    • no sedimentary structures
  – Vibracores

• Analysis
  – Sediments
    • Texture, composition, structures, trace fossils
      • “If then”
  – GIS
    • Interpolation
    • Trends
Data

- Profile Comparison
  - Total Station
    - 1993
    - 1994
    - 1999
- Onshore Stratigraphy
  - Facies Change
- Nearshore Stratigraphy
  - Trace Fossils
  - Sedimentation Rates
• Erosion
  – Onshore
  – East and west ends
  – Adjacent to borrow pit

• Deposition
  – Dominant over nearshore area
Hancock- Pleistocene Surface and Lithology

- Difference in shoreline configuration associated with change in Pleistocene lithology
- Borrow pit in area with Gulfport sands
Onshore Units

- Unit 1 = Fill
- Unit 2 = Holo/Fill
- Unit 3 = Holo

<table>
<thead>
<tr>
<th>Unit</th>
<th>n</th>
<th>Mean</th>
<th>Sorting (std dev)</th>
<th>Mud%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>3</td>
<td>2.01</td>
<td>0.58</td>
<td>0.08</td>
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<tr>
<td>1B</td>
<td>3</td>
<td>2.11</td>
<td>0.60</td>
<td>0.30</td>
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<tr>
<td>2</td>
<td>4</td>
<td>2.48</td>
<td>1.05</td>
<td>5.76</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>3.20</td>
<td>1.79</td>
<td>21.36</td>
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</tbody>
</table>
Nearshore

- A1 = Probably Fill
- A2 = Big Question??
  - Characteristics of Holocene and Fill
- A3 = Holocene

<table>
<thead>
<tr>
<th>Type</th>
<th>n</th>
<th>Mean</th>
<th>Sorting</th>
<th>Mud%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>4</td>
<td>2.88</td>
<td>0.90</td>
<td>10.79</td>
</tr>
<tr>
<td>A1(TYP)*</td>
<td>3</td>
<td>2.60</td>
<td>0.65</td>
<td>1.66</td>
</tr>
<tr>
<td>A2</td>
<td>3</td>
<td>2.72</td>
<td>0.96</td>
<td>5.76</td>
</tr>
<tr>
<td>A3</td>
<td>3</td>
<td>3.11</td>
<td>1.25</td>
<td>14.37</td>
</tr>
</tbody>
</table>

Pleistocene
Nearshore-Recent Example
Nearshore Contacts

Pleistocene  Holo (A-3)
Combined Data

- **Onshore** – Facies change
- **Nearshore** – “If Then” condition
  - Variable 1 = core data
  - Variable 2 = profile change
Combined Data (cont)

• “If Then” logic
  – Depositional areas have more accommodation space (deep Holocene)
  – Transport areas have higher energy and less accommodation space (if you can’t tell the difference it must all be part of the fill unit)
  – Erosional areas have low accommodation space or higher energy

• Some Assumptions must be made
  – Sedimentation patterns during past 5 years are consistent with long-term patterns
  – No large-scale resuspension (major scouring events) of sediment occurred
  – Bedforms are relatively stable
Case 1 A1 and A2 **can** be differentiated

Case 2 A1 and A2 **can not** be differentiated
Results

<table>
<thead>
<tr>
<th></th>
<th>Onshore</th>
<th>Nearshore</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994 to 1999 change</td>
<td>-76,000</td>
<td>156,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Total Fill (1945-1999)</td>
<td>700,000</td>
<td>980,000</td>
<td>1,680,000</td>
</tr>
<tr>
<td>Total Holocene*</td>
<td>640,000</td>
<td>3,250,000</td>
<td>3,890,000</td>
</tr>
</tbody>
</table>

*total actual volume higher on the nearshore due to smaller calculation area

1.7 million cyds

4.2 million cyds
- Thick area near borrow pit
- Headlands generally have thicker Holocene
Mississippi Office of Geology - MDEQ

Hancock - Fill Thickness

- High thickness adjacent to borrow pit, at headlands, and near Ladner pier
- Low thickness in the embayment
- Thickest along the subaerial beach
Conclusions

• Volume of calculated fill thickness is in general agreement with theoretical fill volumes
• Thick Holocene sequences are associated with thick fill
• Gulfport units are typically overlain by thicker Holocene sequences than Biloxi units
• Erosion is higher on ends of beach and also near borrow pit
• Borrow pit may have increased erosion on the adjacent nearshore