Center for Coastal and Ocean Mapping
NOAA/UNH Joint Hydrographic Center
Center Goals

• To be a world leader in the development of hydrographic & ocean mapping technologies and approaches

• To expand the scope of ocean mapping clients and constituencies through the development of innovative applications and collaborative work with both the private sector and government labs
Center Goals

• To educate a new generation of hydrographers and ocean mappers that can meet the growing needs of both government agencies and the private sector.
Complementary Centers

• NOAA/UNH Joint Hydrographic Center (JHC)
  - A Government and University Organization

• UNH Center for Coastal and Ocean Mapping (C-COM)
  - Provides for participation of private sector and other government agencies
    NSF, ONR, NRL, DARPA, CICEET, USGS, ACoE, Coast Guard, Nippon Foundation, BBN, IOOS, JPL, EPSCOR, NHIRC, IHO,NE Consortium, NP Research Bd, NOAA Fisheries
Industry Partners

Sonar and LIDAR manufacturers:

Survey Companies:

Mapping and processing software:
Educational Programs

- **M.Sc. and Ph.D.**
  - Two tracks:
    - Ocean, Electrical, Mechanical Engineering
    - Earth Sciences/Computer Science/Oceanography/Natural Resources

- **Graduate Certificate Program**

- **Nippon Foundation/GEBCO Training Program**

- **Non-Degree Programs**
  - Short Courses and Seminars

- **IHO CAT A Certification** - May 2001

- **New math course specifically for JHC students**
NEW WING --- IOCM
13 m R/V Coastal Surveyor

- Odom Echo-Track profiler, sidescan and Digibar
- Knudsen 50 - 200 kHz chirp profiler
- Trimble RTK GPS
- C-NAV
- POS-MV 320
- TSS-335B
- Seabird CTD
- Dell server with new radar and GPS displays
And our new --

11 m R/V Cocheco

Hydraulic A-Frame for towing (1000 lbs tow load)

1000 ft of 12 conductor coax

6 conductor slip-ring

Hydraulic instrument-cable winch with open drum for rope
Research Themes

- Sonar System Capabilities and Limitations
- New approaches to multibeam sonar data processing
- New Applications of Seafloor Mapping Data
  Remote Seafloor Characterization and Fisheries Habitat
- Data Visualization and Management
Research Themes

- Sonar System Capabilities and Limitations
- New approaches to multibeam sonar data processing
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- New Applications of Seafloor Mapping Data
- Remote Seafloor Characterization and Fisheries Habitat
- Portsmouth Harbor Common Data Set
- Law of the Sea
- Chart of the Future
Flow Visualization Package for Operational Forecast Models

Katrina

Galveston

Smithsonian Science on a Sphere
nowCOAST: Incorporation of Flow Visualization Technique From CCOM/JHC Visualization Lab
Whale Tagging and Tracking
Current Project: GeoCoastPilot

- GeoCoastPilot w/ Kurt
Current Project: GeoCoastPilot

Boston Next
LIDAR STUDIES
Shachak and Yuri

Substrate vs bottom detection

Artificial Targets

Lidar simulator
## LIDAR STUDIES

Shachak and Lynn M
Shoreline Studies

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### Shoreline Measurements

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Man-made, Rocky</th>
<th>Length (m)</th>
<th>IR-R constrained</th>
<th>IR-R maximum</th>
<th>IR-saturated</th>
<th>R std deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># of Areas</strong></td>
<td>40</td>
<td>35</td>
<td>52</td>
<td>31</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td><strong>Total Area (m²)</strong></td>
<td>1544.0</td>
<td>1679.4</td>
<td>1596.1</td>
<td>1496.7</td>
<td>2226.3</td>
<td></td>
</tr>
<tr>
<td><strong>Landward Area - Negative (m²)</strong></td>
<td>-563.6</td>
<td>-1224.8</td>
<td>-961.2</td>
<td>-1106.9</td>
<td>-1942.0</td>
<td></td>
</tr>
<tr>
<td><strong>Seaward Area - Positive (m²)</strong></td>
<td>980.4</td>
<td>454.7</td>
<td>634.9</td>
<td>389.9</td>
<td>284.3</td>
<td></td>
</tr>
<tr>
<td><strong>Offshore Area Difference (m²)</strong></td>
<td>39.5</td>
<td>0.0</td>
<td>29.4</td>
<td>0.0</td>
<td>277.6</td>
<td></td>
</tr>
<tr>
<td><strong>Algorithm Vector Vertices (#)</strong></td>
<td>284</td>
<td>264</td>
<td>324</td>
<td>246</td>
<td>342</td>
<td></td>
</tr>
<tr>
<td><strong>95% Conf Level of Offset Distances (m)</strong></td>
<td>8.5</td>
<td>6.3</td>
<td>8.3</td>
<td>5.9</td>
<td>15.4</td>
<td></td>
</tr>
</tbody>
</table>
DuncanTech
DT-4000 RGB camera mosaic

Optech SHOALS-3000

CASI-1500
NOT FOR NAVIGATION
Valid through 12/2006

Shallow Survey 2008
GEOCODER - ARA Theme Mode

Fonseca and Rzhanov

Backscatter Strength (dB)

Mz=4.3 Ch=3.0cm
IOI=1.23 Clayey Sand

30 40 50 60 70 80

Mz=3.2 Ch=2.1cm
IOI=1.40 Muddy Sand

30 40 50 60 70 80
Bedform migration from repeat surveys

(Felzenberg, Ward, Rzhanov)

5 surveys over 7 days
Harbor Tracking Project
Tom Weber, Val Schmidt, Jim Irish
(Michelle Weirathmueller)

Acoustics

Instrumentation
Midwater Multibeam Mapping
Tom Weber, Tyler Clark, Colin Ware, Roland Arsenault, Larry Mayer
High-Resolution Bathymetric, Sediment, and Epifauna Mapping
Seafloor Stability and Coastal Change Analyses

- Impacts of Increase in Sea Level Rise on Coastal Systems
  - Quaternary Sea Level Changes and Shoreline Migrations
  - Future Sea Level Projections

- Seafloor Stability
  - Sediment Transport (Shoals and Bedforms)
  - Seismic Stratigraphy
  - Application to Navigation and Charts
  - Presently Being Developed
Law of the Sea Surveys

*Gulf of Alaska*: 2005
*Gulf of Mexico*: 2007
*Bering Sea*: 2003
*Kingman Reef Palmyra Atoll*