Waves and Water Level
Integrated System, Data, and Products Architecture

Systems
- Tide Gauges
- Wave Buoys
- Satellites
- Radar, Video, etc.

Data
- Real Time
- Near Real Time
- Delayed Mode
- Archived Historic

Products
- Ocean Flooding
- Coastal Erosion
- Tsunami
- Sea Level Change

process
time frame
use sector

NOWCAST
warnings and bulletins
FORECAST
weekly, monthly, seasonal outlook
FUTURECAST
scenarios and projections

Mitigation Planners and Managers
Emergency Managers and Responders
Ship Masters and Port Managers
Recreation and Tourism
Mitigation Planners and Managers
Waves and Water Level Data/Product Typology

**Systems**

**Tier 0 – station/platform information**
(e.g., station location description, instrument specifications)

**Data**
by system

**Tier 1 – “raw” data**
(e.g., real time or near real time elevation time series)

**Tier 2 – “archived” data**
(e.g., QA/QC’d historical elevation time series)

**Products**
by process and time frame

**Tier 3 – “derived” products**
(e.g., plot of observed versus predicted tides with residuals)

**Tier 4 – “applied” products**
(e.g., plot of total water level return intervals based on GEV analysis)

by use sector

**Tier 5 – “customized” products**
(e.g., flood insurance rate map)

**Tier 6 – “culturally-sensitive” products**
# Marine Data Model

## Common Marine Data Types

<table>
<thead>
<tr>
<th>Feature Points</th>
<th>Measurement Points</th>
<th>Feature Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
<td><strong>Instantaneous Points</strong></td>
<td><strong>Data Line</strong></td>
</tr>
<tr>
<td>X, Y, Z</td>
<td>X, Y, Z or ΔZ</td>
<td>X, Y, M₁, M₂, Z₁, Z₂, ...</td>
</tr>
<tr>
<td><strong>Examples:</strong></td>
<td></td>
<td><strong>Examples:</strong></td>
</tr>
<tr>
<td>marker buoy, transponder, other fixed geography</td>
<td>CTD, XBT, SVP casts at ΔZ, fish density, tide gauge, etc. at surface or a single Z</td>
<td>cable, pipeline, seawall, ocean front, EEZ or legal boundaries NOT enclosing an area</td>
</tr>
<tr>
<td><strong>Sounding Subtype</strong></td>
<td><strong>Survey Point Subtype</strong></td>
<td><strong>Feature Line</strong></td>
</tr>
<tr>
<td>E.g., single beam bathy</td>
<td>E.g., aerial coastal survey, LIDAR</td>
<td>Shoreline</td>
</tr>
</tbody>
</table>

## Marine Areas

<table>
<thead>
<tr>
<th>Feature Line</th>
<th>Time Duration Area</th>
<th>Regularly Interpolated Surfaces</th>
<th>Irregularly Interpolated Surfaces</th>
<th>Derived or Placeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
<td><strong>Time Duration Area</strong></td>
<td><strong>Regularly Interpolated Surfaces</strong></td>
<td><strong>Irregularly Interpolated Surfaces</strong></td>
<td><strong>Derived or Placeholder</strong></td>
</tr>
<tr>
<td>X₁, Y₁, X₂, Y₂, ...</td>
<td>X, Y, Z, m</td>
<td>row₁, col₁, ..., rowᵢ, colᵢ</td>
<td>rowᵢ, colᵢ, ..., rowᵢ, colᵢ</td>
<td><strong>Animations,</strong></td>
</tr>
<tr>
<td><strong>Examples:</strong></td>
<td>Zᵢ, Zᵢ</td>
<td>Zᵢ</td>
<td>Zᵢ</td>
<td><strong>Movies,</strong></td>
</tr>
<tr>
<td>Marine boundaries (e.g., sanctuary, MPA), habitats, patches, lava flows, clipping, masking</td>
<td>No-take zones, oil spills, harmful algal bloom</td>
<td>multibeam bathy, sidescan, LIDAR, SST, climatology, scientific mesh, “re-analyzed” products (images such as GeoTIFF, BIL, etc.)</td>
<td>TINs, bathymetry, sidescan, LIDAR, scientific mesh for finite element model, etc.</td>
<td><strong>Video</strong></td>
</tr>
</tbody>
</table>

## Marine Rasters/Grids/Meshes

<table>
<thead>
<tr>
<th>Object Class</th>
<th>MeshVolume</th>
<th><strong>Animations,</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ID</strong></td>
<td><strong>MeshVolume</strong></td>
<td><strong>Movies,</strong></td>
</tr>
<tr>
<td>X₁, Y₁, Z₁, X₂, Y₂, Z₂, ...</td>
<td>X₁, Y₁, Z₁, Z₁, Z₂</td>
<td><strong>U/W video footage,</strong></td>
</tr>
<tr>
<td><strong>Examples:</strong></td>
<td></td>
<td>outputs from atm. or circulation models that are animated &amp; georegistered so other data may be overlain</td>
</tr>
</tbody>
</table>

*from D. Wright and OSU Webworks http://dusk.geo.orst.edu/djl/arcgis/about.html*