The Role of NOAA's National Geodetic Survey in Ensuring Safe Navigation

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Presented to:

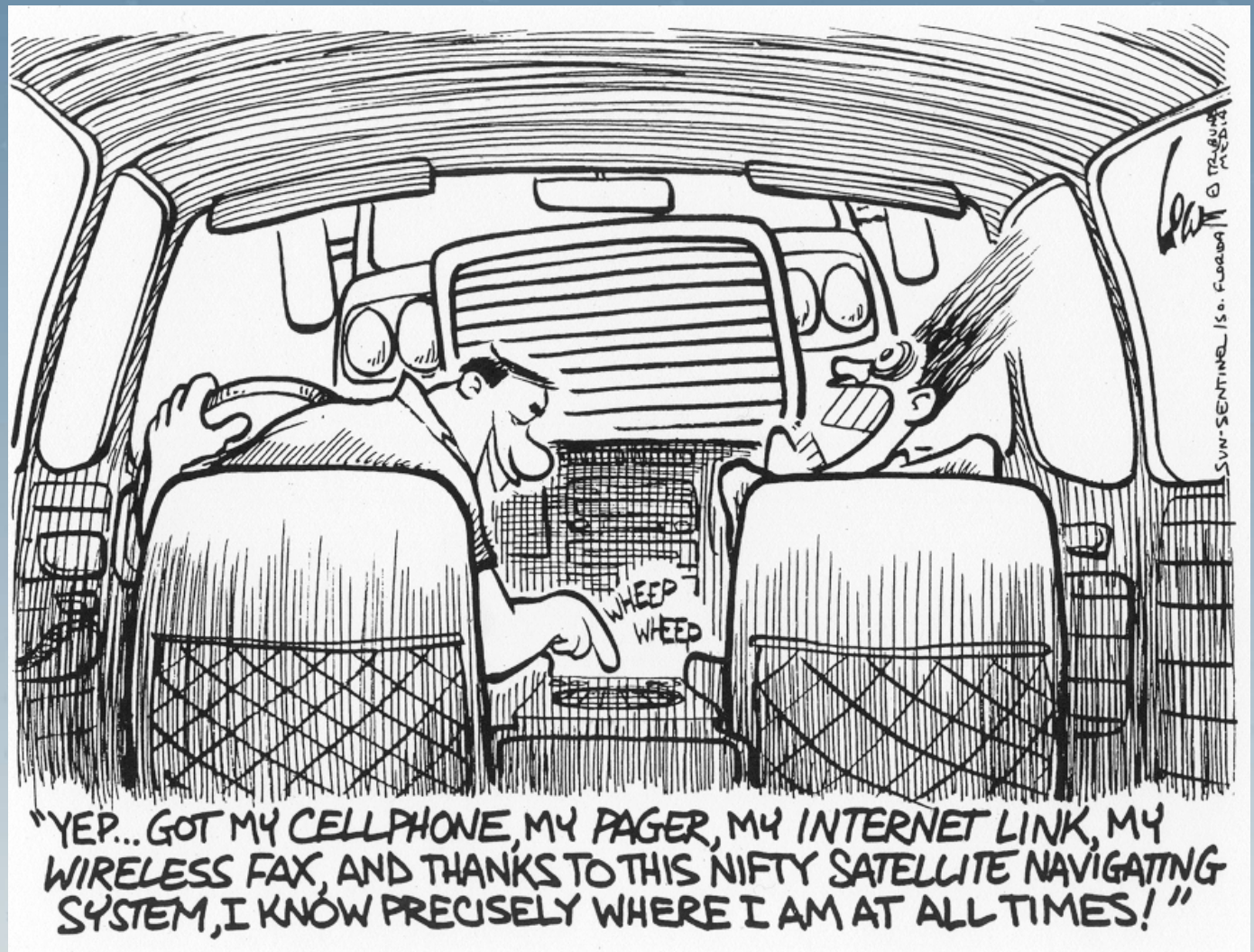
The Hydrographic Services Review Panel

The National Geodetic Survey's Role Includes:

1) Providing Precise Positions
2) Providing Accurate Timely Height Information
3) Defining Our Changing Shoreline
4) Developing Emerging Technologies
5) Meeting Future Challenges

Providing Precise Positions:

It's the other things that complicate safe navigation.



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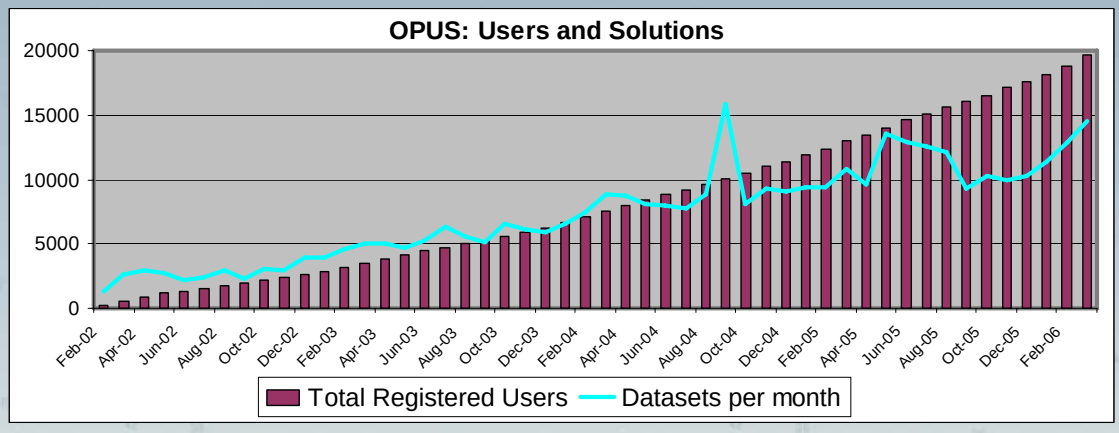
Providing Precise Positions: CORS

- Critical component of land and ocean observing systems
- Accurate interface between land and ocean observing systems
- Also used to monitor atmospheric water vapor, improving weather prediction.

Providing Precise Positions: Online Positioning User Service (OPUS)

- Users' GPS data processed relative to three CORS sites
- Uses NGS computers and software
- Precise positions e-mailed in minutes
- Use continues to grow.



Providing Accurate Timely Height Information

Accurate heights are crucial for:

- safe clearance under bridges
- avoiding damage to ships and the environment.

Providing Accurate Timely Height Information

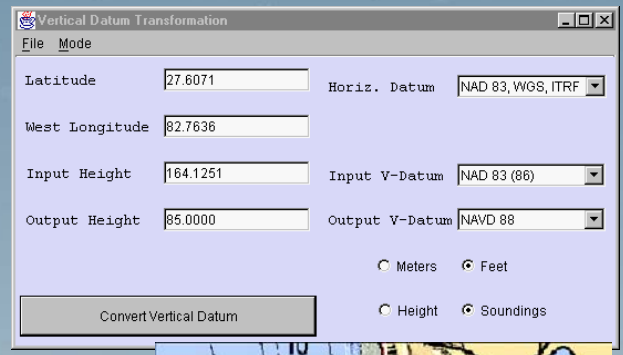
Accurate Heights Are Crucial For Coastal Areas

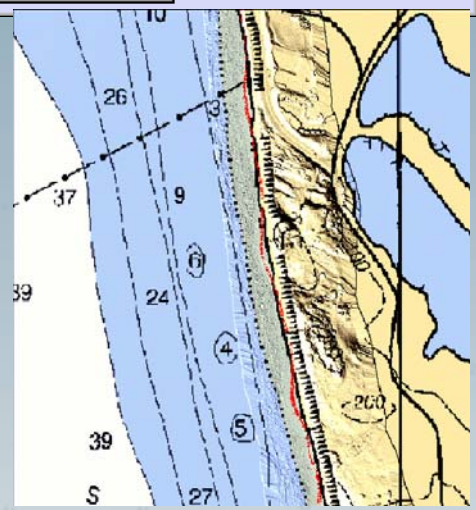
- Dam, levee safety
- Evacuation planning, prioritizing
- Hazard mitigation
- Flood-plain mapping
- Subsidence monitoring
- Determining high-water marks

Providing Accurate Timely Height Information

VDatum Provides a Common Base of Reference

- Allows using disparate data in GIS, other applications
- Critical to evaluating levee design and performance
- Supports efficient hydrographic data collection
- GPS data can be converted to local tidal references
- Aids many coastal rebuilding efforts





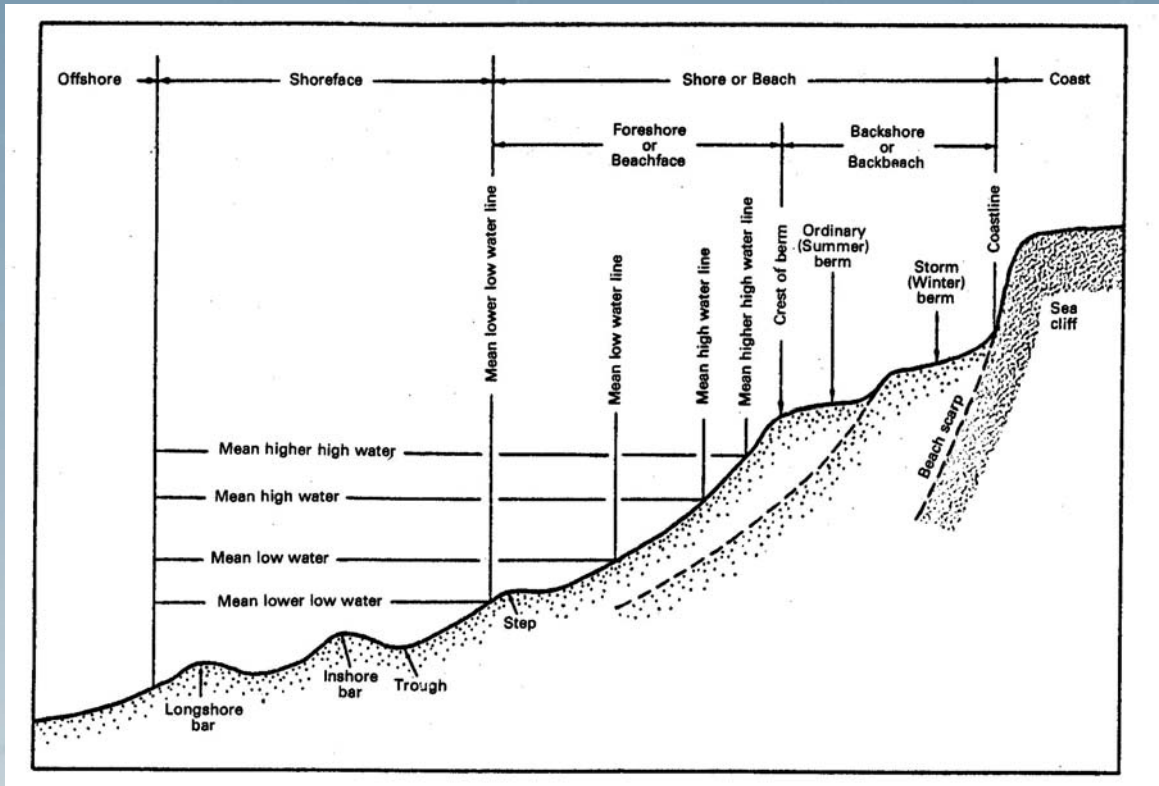
Defining Our Changing Shoreline

- Accurate, consistent, up-to-date shoreline is essential for charting, coastal management, and GIS uses
- Critical to accurately portraying the marine navigation environment
- Minor portion of NOAA hydrographic survey observations

Defining Our Changing Shoreline

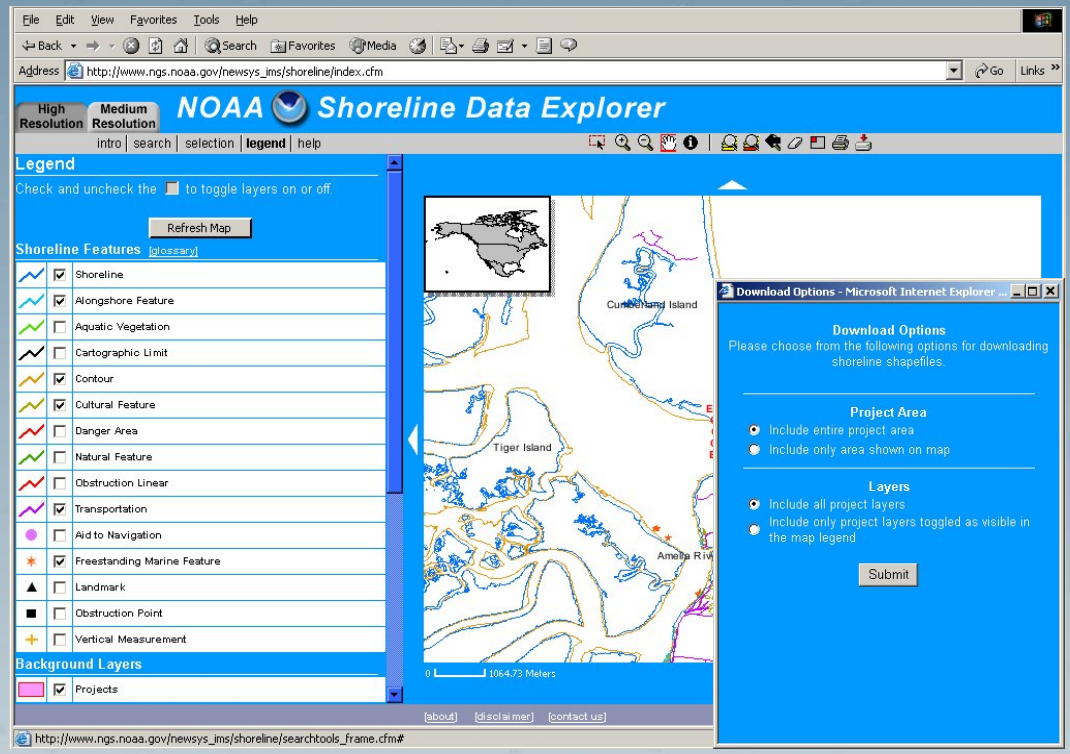
Which Shoreline Do We Map?

- Shoreline based on position of the land/water interface at various tide levels
- For nautical charting, shoreline in tidal areas represented by the Mean High Water Line



Defining Our Changing Shoreline
Shoreline Data Explorer

- Web-based access to vector shoreline
- Browse by area; project name, location, other attributes

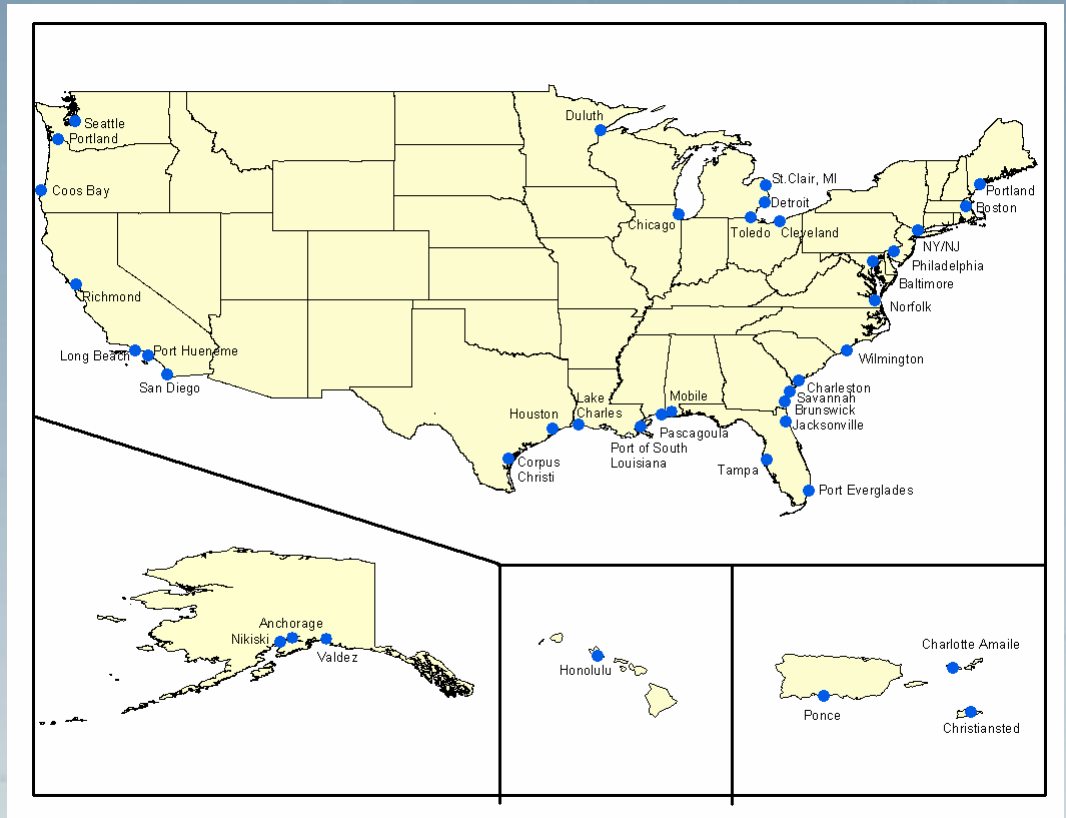


Defining Our Changing Shoreline

Top Priority Port Areas, Defined in Conjunction With Office of Coast Survey

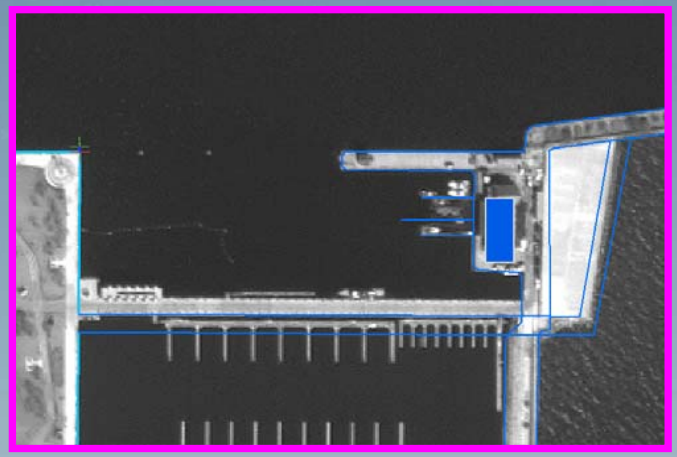
Ranking Factors:

- Cargo tonnage
- Commercial fishing
- Military ports



Defining Our Changing Shoreline

Coast and Shoreline Change Analysis Program (CSCAP)



Selected Attributes of IL0301_CEF

ATTRIBUTE	S57_CODE	CHG_NOTE	EN
ALONGSHORE FEATURE Pier.Fixed	SLCONS catslc 4	marina piers are not shown in this area (they are shown elsewhere)	

- Coastlines Change Continually
- Improves ability to update nautical charts
- Interim shoreline in areas of significant change

Defining Our Changing Shoreline

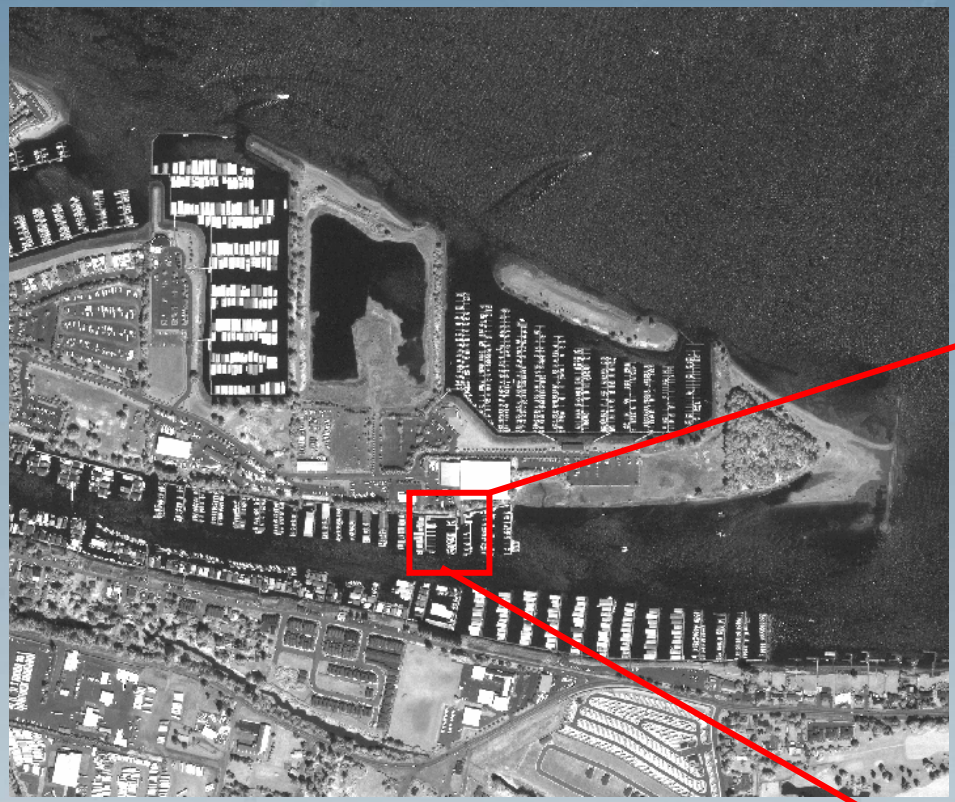
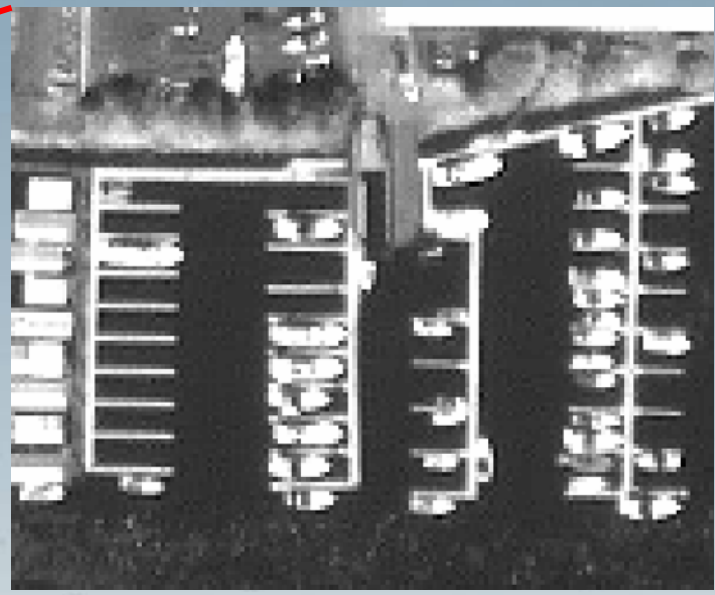


Image Source: Space Imaging

Portland, OR,
IKONOS Image

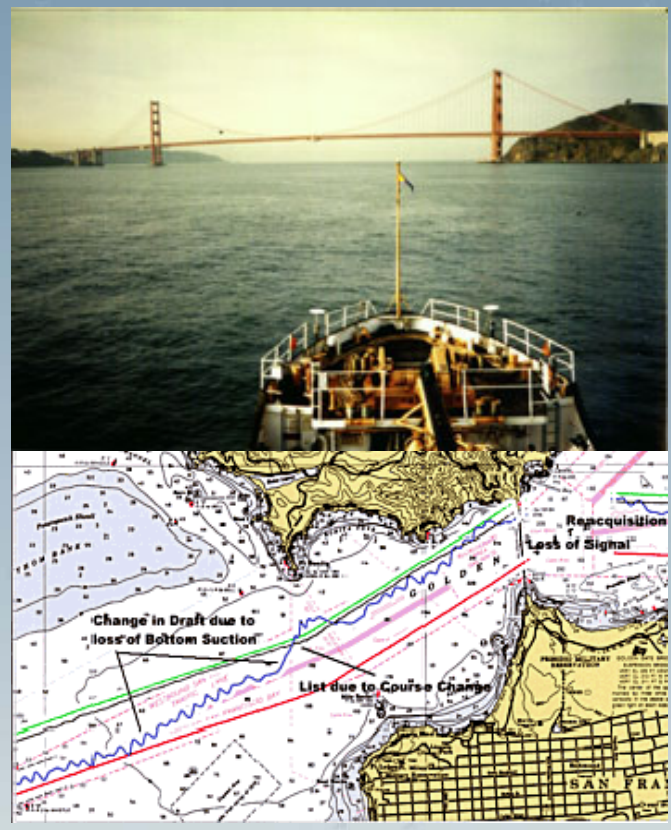


1 meter spatial resolution

Developing Emerging Technologies

Precise Heights On Vessels Transiting San Francisco Bay

GPS used to position a vessel's keel in real time to within 10 cm relative to the bottom of a channel, and measure the vessel's pitch, roll, settlement, and heading.



Developing Emerging Technologies

Precise Docking In All Weather Conditions

- High-accuracy docking charts will enable all-weather navigation, similar to aircraft Instrument Landing Systems
- Valuable where fog prohibits safe navigation and docking
- Real-time navigation to 10cm available in near future

Developing Emerging Technologies

Safe Clearance Underneath Bridges

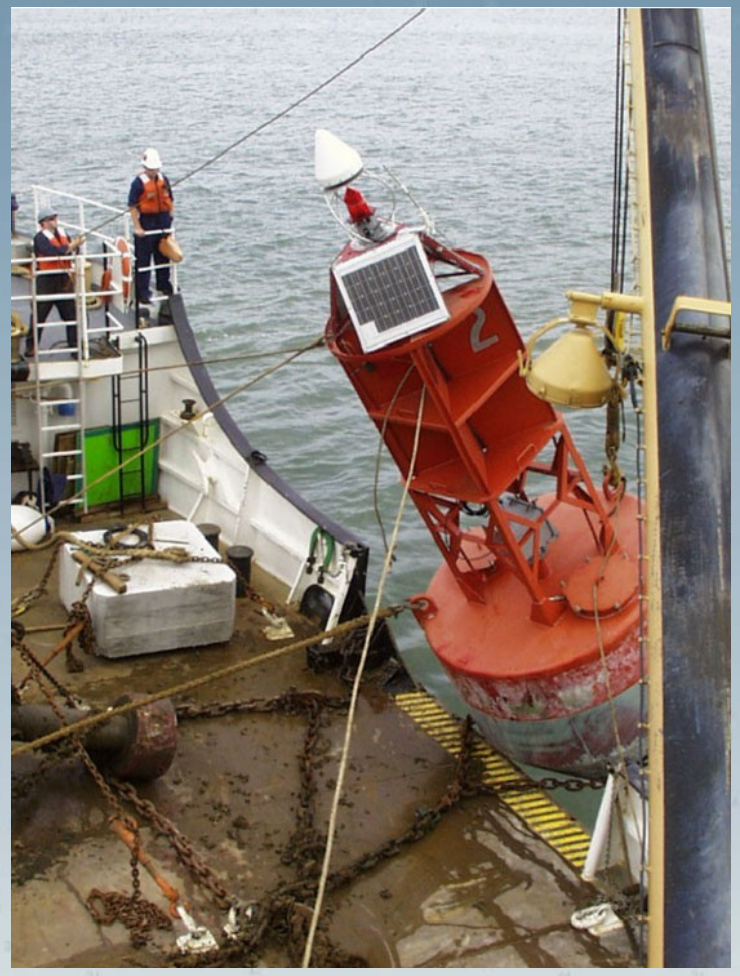
- Vertical clearance determined using GPS
- Cooperation among Coast Guard, Port of Charleston, and South Carolina Dept. of Transportation

www.cooperriverbridge.org

Developing Emerging Technologies

Real-time Water-level Data

- GPS receivers on buoys
- Real-time sea-state data at strategic locations in a harbor
- Includes wind-induced water-level changes



Developing Emerging Technologies

Shallow-Water Positioning System

- Precise positioning (~10 cm) of marine features, digitally recorded
- Accurate, reliable damage assessments from ship groundings, storms, significant events
- Results readily incorporated into GIS.
- Currently an optical system

Developing Emerging Technologies

Rapid Profiling Of Local Shoreline

Dune buggy equipped with GPS

Developing Emerging Technologies

Linking Technologies and Leveraging Resources

- CORS located with water-level station
- Supports subsidence measurements, sea-level trends, storm-surge monitoring, shoreline change, habitat monitoring
- CORS stations proximate to tide gages will increase
- Improved understanding of subsidence, sea-level changes

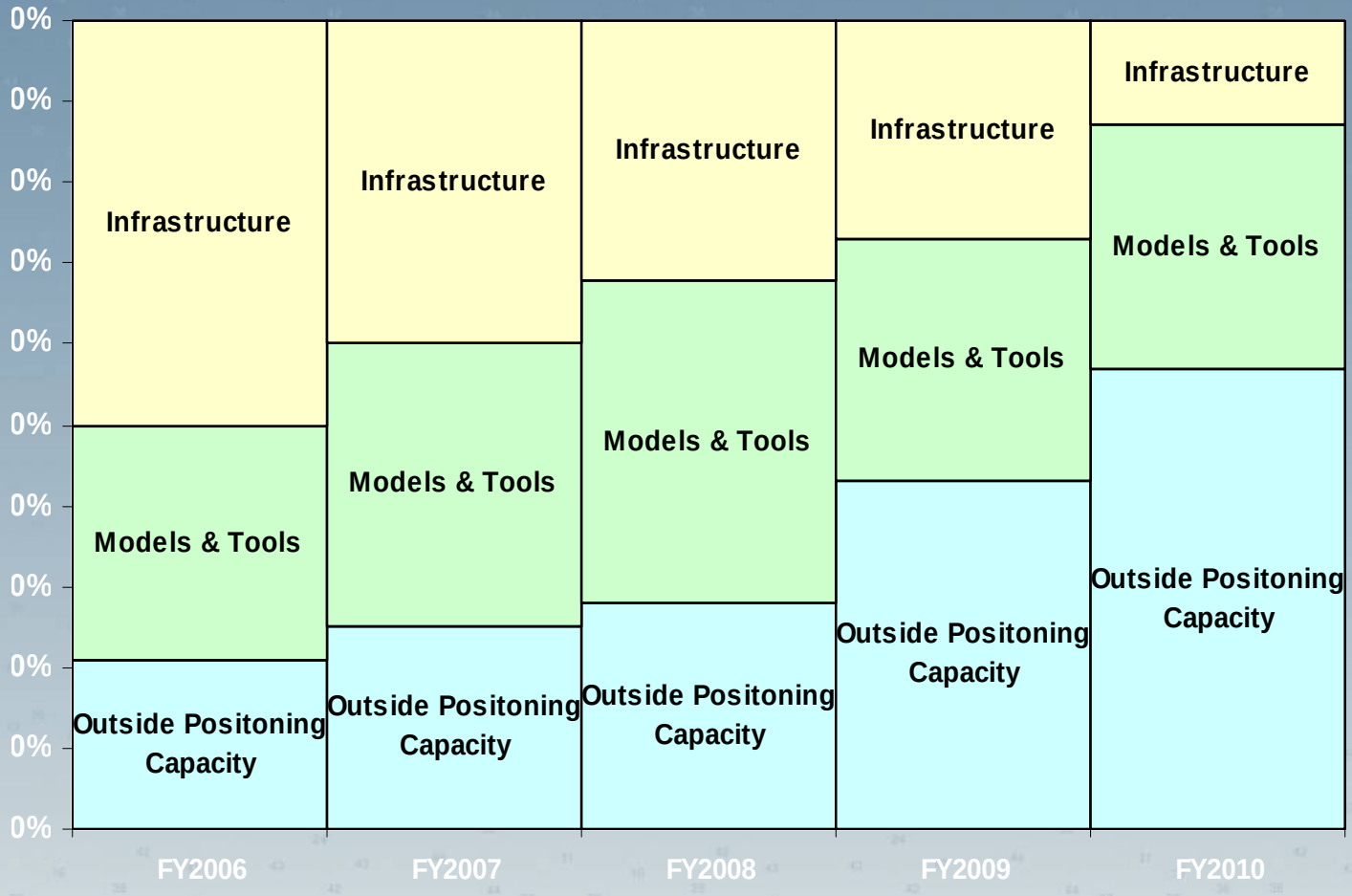
Monitoring station: Ocean Springs, MS

Developing Emerging Technologies
Monitoring Subsidence Along Chesapeake Bay

- Determine whether local sea-level increases are due to rising sea level or land subsidence
- Critical to success of wetland restoration, along with tidal information
- Interagency Cooperation

Meeting Future Challenges

Transitioning From "Doing" To "Training"



Percentage of Funds by Capability

Meeting Future Challenges

Partnership Opportunities

- Supporting the GIS community
- Coordinate information available in ShapeFile format - used in GIS, automated mapping systems
- How can coastal managers best utilize NGS products and services?

Meeting Future Challenges

What *Should* Be National Geodetic Survey's Role in Ensuring Safe Navigation?

- Real-time positioning
- All-weather navigation/docking
- Limited funding for new technologies

End of Presentation.

Questions?

(Slides following this one are for backup)