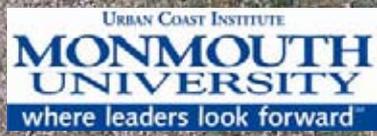


# National Center for Secure and Resilient Maritime Commerce and Coastal Environments (CSR)



**Michael S. Bruno**  
**Stevens Institute of Technology**  
**March 20, 2008**



# National Center for Secure and Resilient Maritime Commerce and Coastal Environments (CSR)



## Mission

To secure the nation's maritime borders, promote navigation and commerce, protect ocean resources and maritime infrastructure, and provide for the safe and secure use of our coastal and off-shore areas, through advancement of the relevant sciences and development of the new workforce

## Impact and Relevance

- improve the security of maritime transportation and coastal and offshore (EEZ) operations;
- improve emergency response to events in the maritime domain; and
- improve the resiliency of the MTS, offshore operations, and our nation's coastal environments.

## Partners

Rutgers University, *University of Miami*, MIT, *University of Puerto Rico*, Monmouth University

*\* Minority Serving Institutions*

Non-university partners: Port Authority of NY & NJ, Lockheed Martin, JBC International, Pacific Basin Development Council, Nansen Environmental Remote Sensing Center, and US Merchant Marine Academy

## Customers

DHS Science and Technology  
DHS Borders/Maritime Security Division  
DHS Preparedness Directorate  
US Coast Guard  
FEMA  
DHS Office of Infrastructure Protection (OIP)  
State Homeland Security Agencies  
State and Local Emergency Response Agencies  
CBP, TSA  
Port Authorities



**STEVENS**  
Institute of Technology

<b>DHS Strategic Goals</b>	<b>Corresponding CSR Goals</b>	<b>Present Capabilities and Research Areas of CSR Partners</b>
<b>Awareness</b>	<b>Maritime Domain Awareness</b>	<b>Space-Based to Fine-Scale Maritime Sensing Systems</b>
<b>Prevention</b>	<b>Risk and Vulnerability Assessment, Modeling and Simulation, <i>Education</i></b>	<b>Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training</b>
<b>Protection</b>	<b>Integrated Sensors and Decision Aids</b>	<b>Information Fusion, Hostile Intent Assessment, Optimization</b>
<b>Response</b>	<b>Emergency Management, <i>Education</i></b>	<b>Reduced Latency in Response, Wireless Communications, Training</b>
<b>Recovery</b>	<b>Design for Resilience</b>	<b>Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises</b>
<b>Service</b>	<b>Impacts (including economic) of Security Measures, <i>Education</i></b>	<b>Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures</b>
<b>Organizational Excellence</b>	<b>Policies and Regulations, Human Capital Development, <i>Education</i></b>	<b>Assessment of Policy and Regulatory Impacts from Local to Global Scale</b>



- **CSTARS/U of Miami:** Satellite Based Maritime Monitoring of High Seas and Sea Lanes; Detection, Classification and Tracking of Vessels in Near-Real Time
- **Rutgers University:** HF RADAR and Gliders
- **University of Puerto Rico, Mayaguez:** HF RADAR
- **Stevens Institute of Technology:** High-Resolution Multi-Sensor Surveillance of Estuaries and Harbors



<b>Present Capabilities and Research Areas of CSR Partners</b>
<b>Space-Based to Fine-Scale Maritime Sensing Systems</b>
Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training
Information Fusion, Hostile Intent Assessment, Optimization
Reduced Latency in Response, Wireless Communications, Training
Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises
Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures
Assessment of Policy and Regulatory Impacts from Local to Global Scale



- **MIT:** Supply Chain Security
- **Stevens Institute of Technology:** Systems-Level Examination of Inter-Modal MTS
- **Stevens Institute of Technology:** Coastal Hazards Management, Coastal Wave and Inundation Modeling and Risk Assessment
- **Rutgers University:** Coastal Weather Modeling
- **USMMA:** Supply Chain Security, Training

## Present Capabilities and Research Areas of CSR Partners

Space-Based to Fine-Scale Maritime Sensing Systems

**Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training**

Information Fusion, Hostile Intent Assessment, Optimization

Reduced Latency in Response, Wireless Communications, Training

Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises

Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures

Assessment of Policy and Regulatory Impacts from Local to Global Scale



- **Stevens Institute of Technology:** Behavior Analysis and Hostile Intent Assessment, Decision-Making
- **Lockheed-Martin:** Information Fusion via MIDAS
- **Rutgers University:** Pattern Recognition
- **Stevens Institute of Technology:** Sensor Placement Optimization
- **University of Miami:** Information Fusion

## Present Capabilities and Research Areas of CSR Partners

Space-Based to Fine-Scale Maritime Sensing Systems

Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training

**Information Fusion, Hostile Intent Assessment, Optimization**

Reduced Latency in Response, Wireless Communication, Training

Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises

Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures

Assessment of Policy and Regulatory Impacts from Local to Global Scale



➤ **Stevens Institute of Technology:**

Wireless Communications in the Maritime Environment

➤ **Monmouth University:** Emergency Response Systems and Training

**Present Capabilities and Research Areas of CSR Partners**

Space-Based to Fine-Scale Maritime Sensing Systems

Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training

Information Fusion, Hostile Intent Assessment, Optimization

**Reduced Latency in Response, Wireless Communications, Training**

Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises

Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures

Assessment of Policy and Regulatory Impacts from Local to Global Scale



- **Stevens Institute of Technology:** Systems Engineering and Enterprise Architecture
- **USMMA:** Scenario Development, Continuity of Operations
- **PANYNJ:** Scenario Development, Continuity of Operations
- **JBC International:** Scenario Development, Continuity of Operations

## Present Capabilities and Research Areas of CSR Partners

Space-Based to Fine-Scale Maritime Sensing Systems

Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training

Information Fusion, Hostile Intent Assessment, Optimization

Reduced Latency in Response, Wireless Communications, Training

**Resiliency Analysis, Strategic Planning, Design of Resilient Extended Enterprises**

Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures

Assessment of Policy and Regulatory Impacts from Local to Global Scale



- **Stevens Institute of Technology:** Assessment of MTS Impacts, including Economic Impacts
- **JBC International:** Assessment Tools for Security Measures
- **MIT:** Logistics
- **USMMA:** Organization and Policy Impacts of Security Measures
- **PANYNJ:** Organization and Policy Impacts of Security Measures

<b>Present Capabilities and Research Areas of CSR Partners</b>
Space-Based to Fine-Scale Maritime Sensing Systems
Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training
Information Fusion, Hostile Intent Assessment, Optimization
Reduced Latency in Response, Wireless Communications, Training
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<b>Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures</b>
Assessment of Policy and Regulatory Impacts from Local to Global Scale



- **MIT:** Logistics
- **USMMA:** Security Policy and Regulations
- **PANYNJ:** Security Policy and Regulations

## **Present Capabilities and Research Areas of CSR Partners**

**Space-Based to Fine-Scale Maritime Sensing Systems**

**Integrated Supply Chain Management, Coastal Hazards Management, Systems Engineering, Training**

**Information Fusion, Hostile Intent Assessment, Optimization**

**Reduced Latency in Response, Wireless Communications, Training**

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**Analysis of Security Measures, including Technical, Legal, Organizational, Political, and Policy Issues, Economic Benefits of Security Measures**

**Assessment of Policy and Regulatory Impacts from Local to Global Scale**



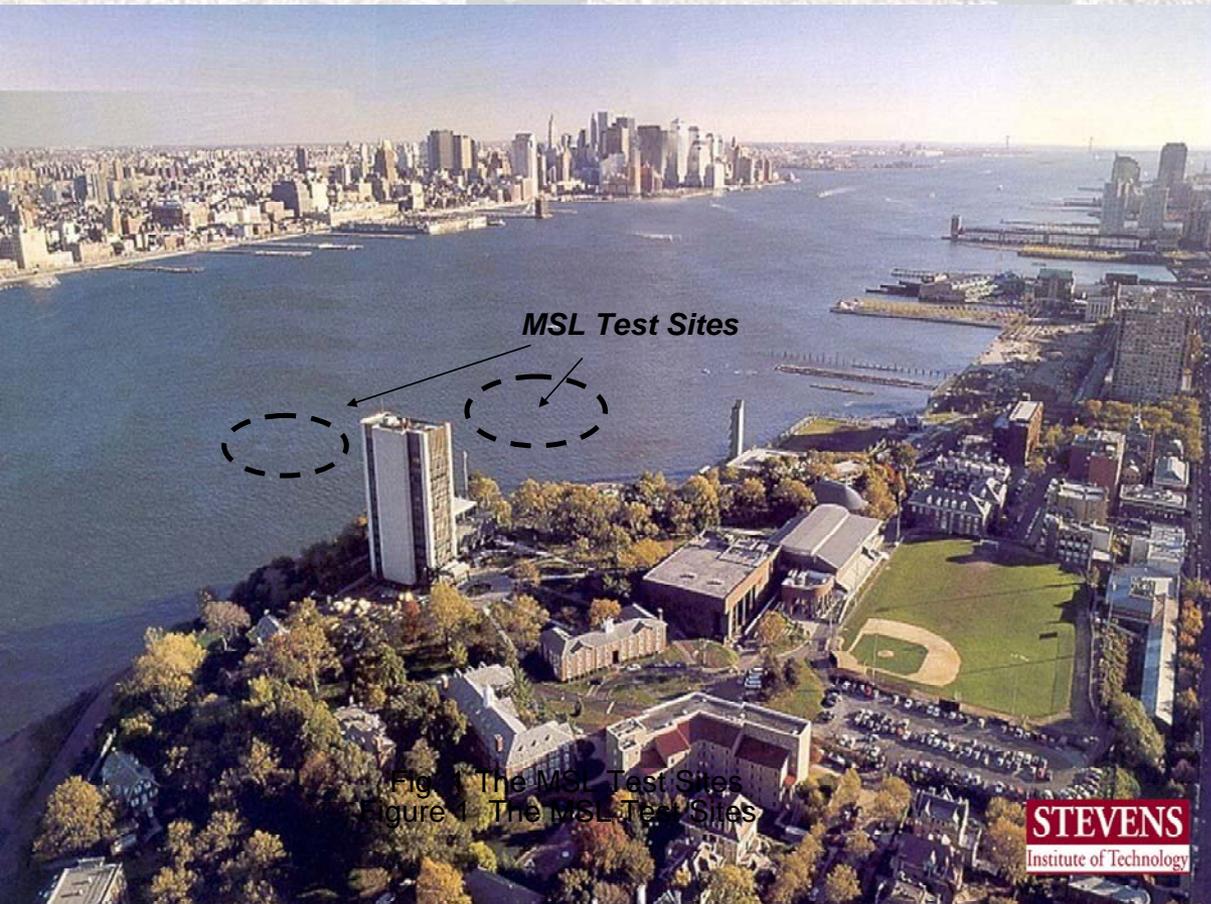
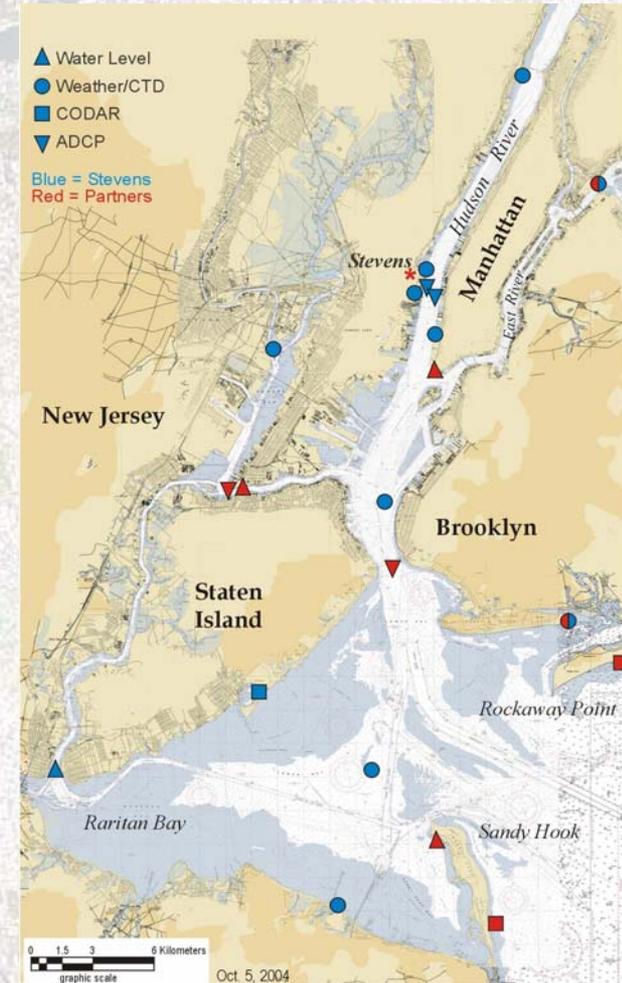


Figure 1: The MSL Test Sites

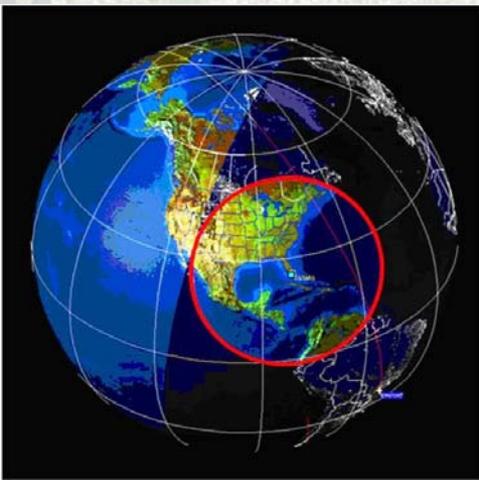


## Laboratory features:

- Real-time command & control
- Systems-level experiments & integration
- Relevant environments and scenarios



# A Satellite Data Reception and Analysis Facility for Environmental Monitoring and Time Sensitive Tactical Applications in the Southeastern US, Gulf of Mexico, Caribbean Basin and Equatorial Atlantic



**24 x 7 Operation**  
Utilization of **Unclassified** Commercial  
Satellite Data



# OceanView™ Detections with AIS data at the Port of Miami

Image: **ENVISAT IS5**  
Date: **20070412031650**  
Vectors: **AIS data**

North



Intuition II

F. G. Walton Smith  
@ RSMAS

Fowey Rock  
Station

Island Adventure

Rio Miami

Tobias Maersk

Koos Karrier

Seaboard Intrepid

Clipper Trader

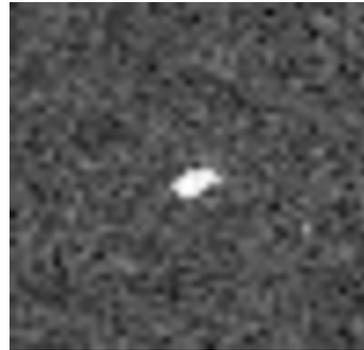
  
**CSTAR**

# Intuition II

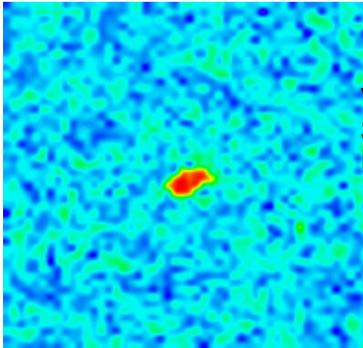
Full  
Resolution  
Chip



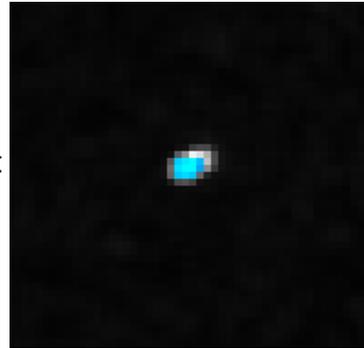
4x Zoom  
Chip



ENVI  
Rainbow  
Color Mapping



Vexcel  
Ship  
Enhancement



# Rutgers University - Coastal Ocean Observation Lab Operations Center



## Communications



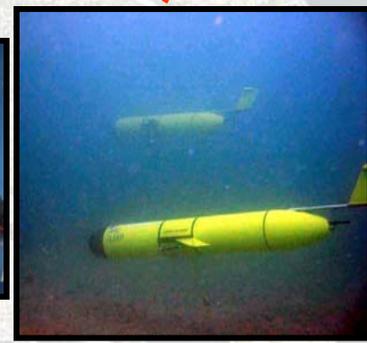
**CODAR Network**



**L-Band & X-Band  
 Satellite Systems**



**3-D Nowcasts  
 & Forecasts**



**Glider Fleet**

## Coastal Observation and Prediction Sponsors:



# Mid-Atlantic Raw Velocities (1 Day Avg) 2007/05/26 0500 GMT

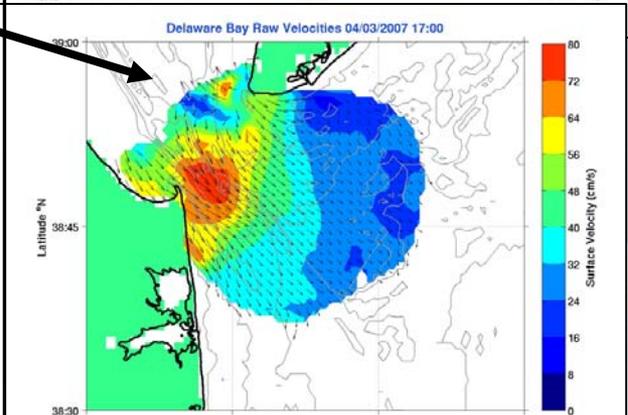
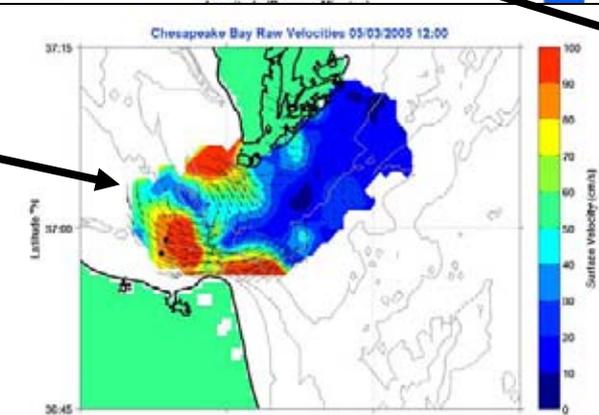
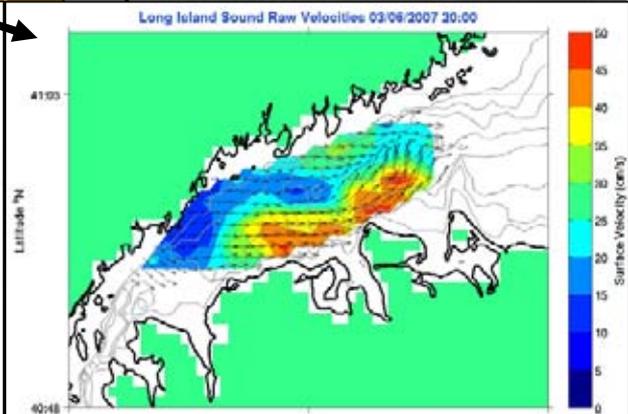
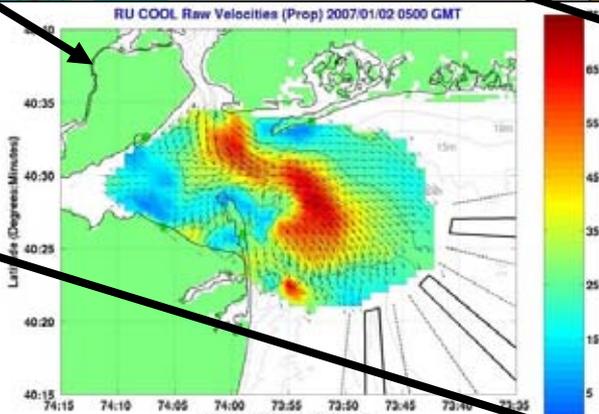
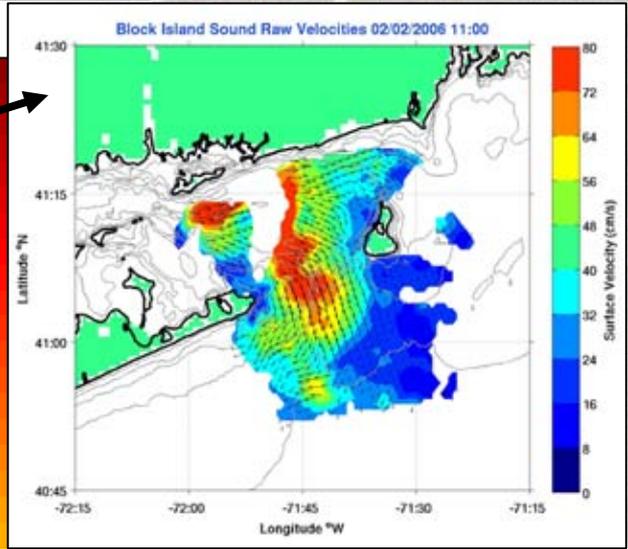
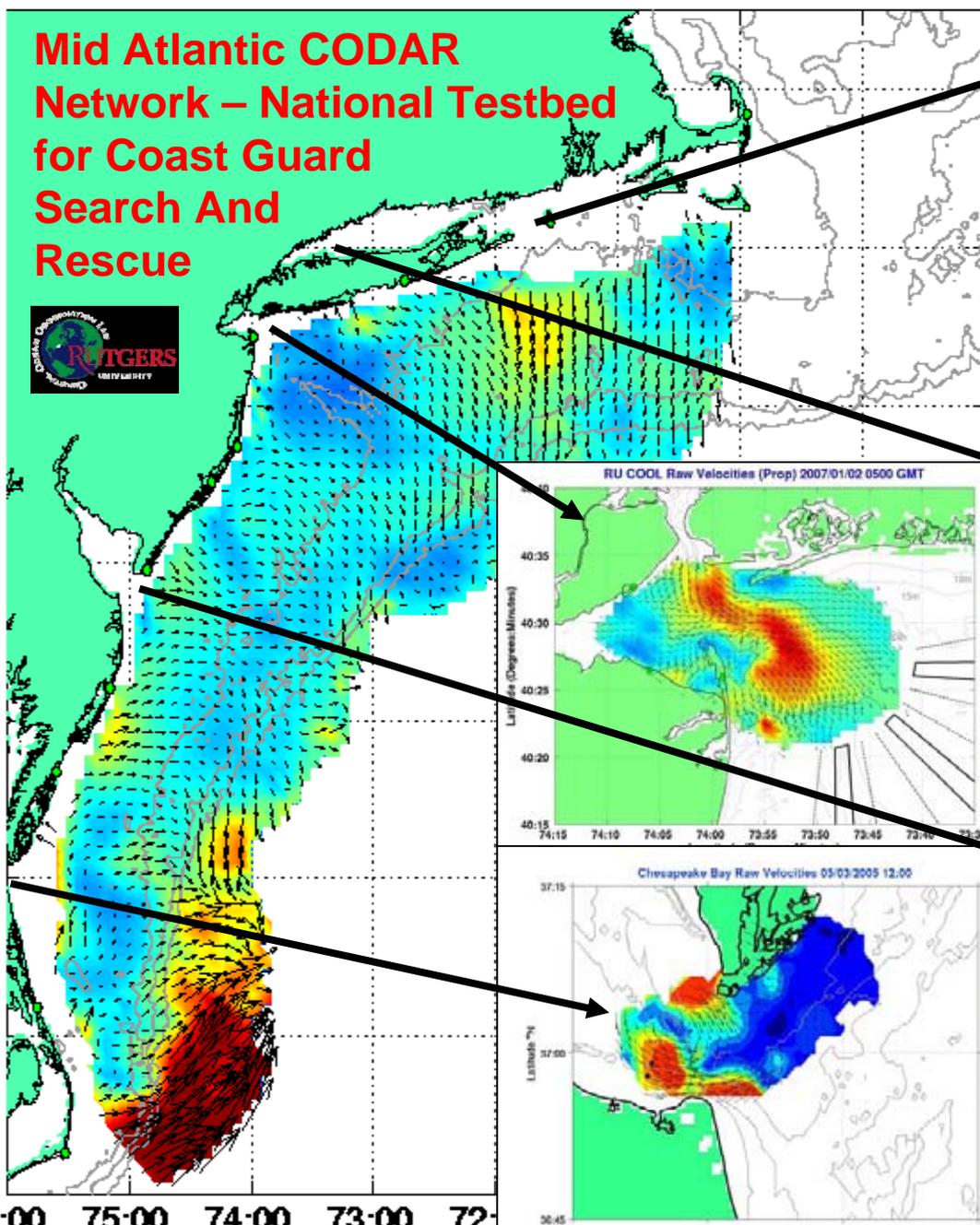
**Mid Atlantic CODAR  
Network – National Testbed  
for Coast Guard  
Search And  
Rescue**



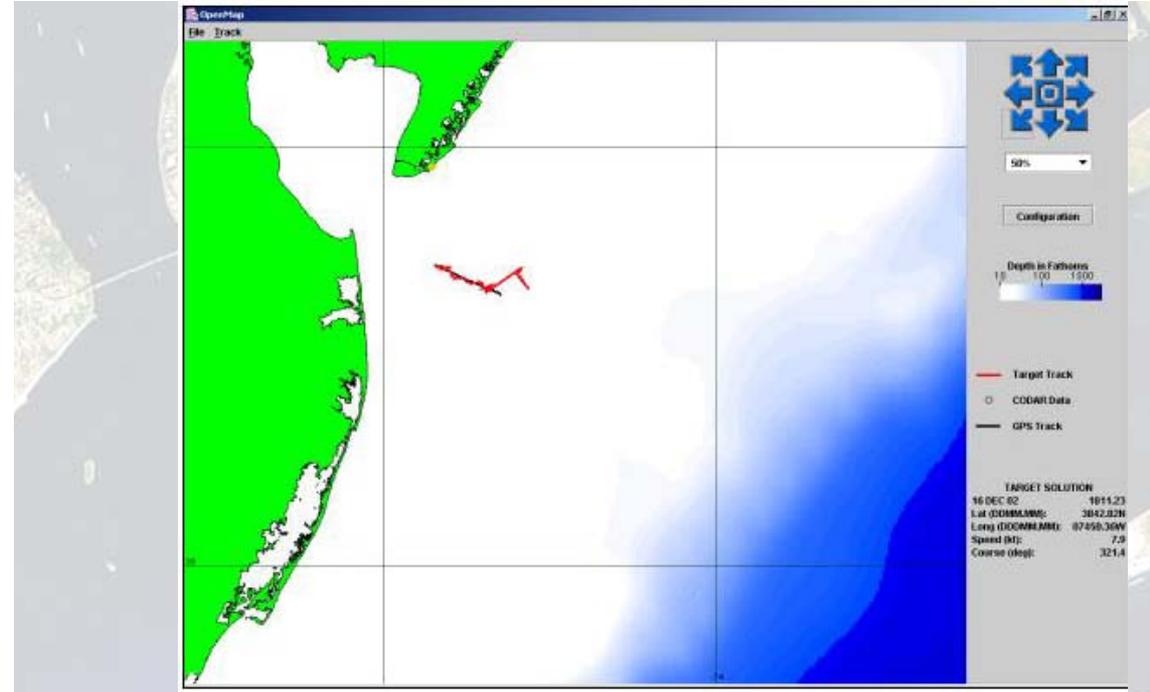
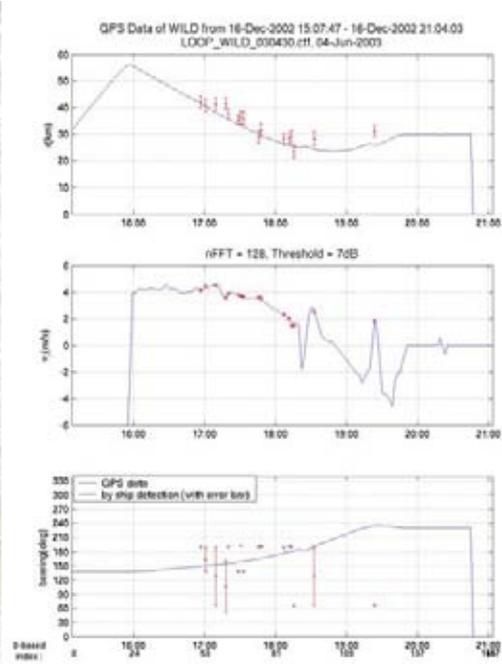
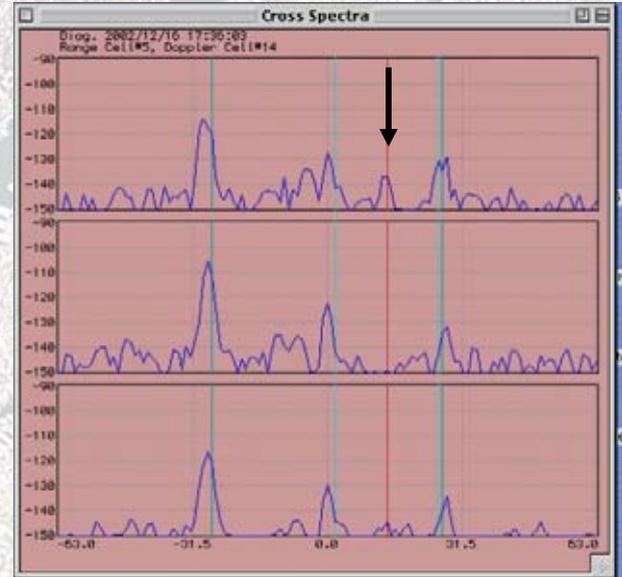
Latitude (Degrees:Minutes)

42:00  
41:00  
40:00  
39:00  
38:00  
37:00  
36:00  
35:00

76:00 75:00 74:00 73:00 72:00  
Longitude (De



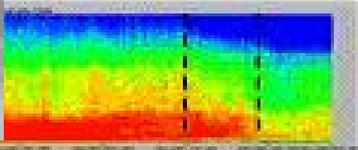
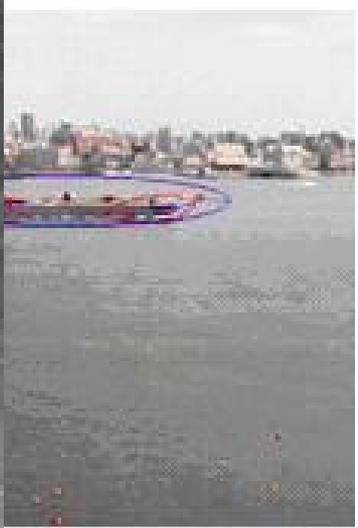
# USCGC Finback





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# END to END EDUCATION, TRAINING AND OUTREACH at CSR

## CORE PRINCIPLES OF EtE - ETO at CSR

- **Principle 1:** All consortium partners will contribute significantly to one or more of the EtE components of the ETO
- **Principle 2:** All partners will use their existing ETO platforms to achieve the CSR ETO objectives and maximize impact
- **Principle 3:** All components of of the EtE - ETO will design and execute their initiatives such that maximum impact to underrepresented and minority populations is ensured.
- **Principle 4:** The CSR leadership in each partner organization will do their best to eliminate institutional barriers such that the ETO effort becomes seamless and integrated



# **EtE COMPONENTS AND OBJECTIVES**

***The Pipeline  
K - 12***

***The Future  
Work Force  
College (BS – PhD)***

***The Current  
Work Force  
Professional Training***

**SCIENCE- ENGINEERING-TECHNOLOGY-POLICY**

***Stakeholders***

***The Public***



Questions?

