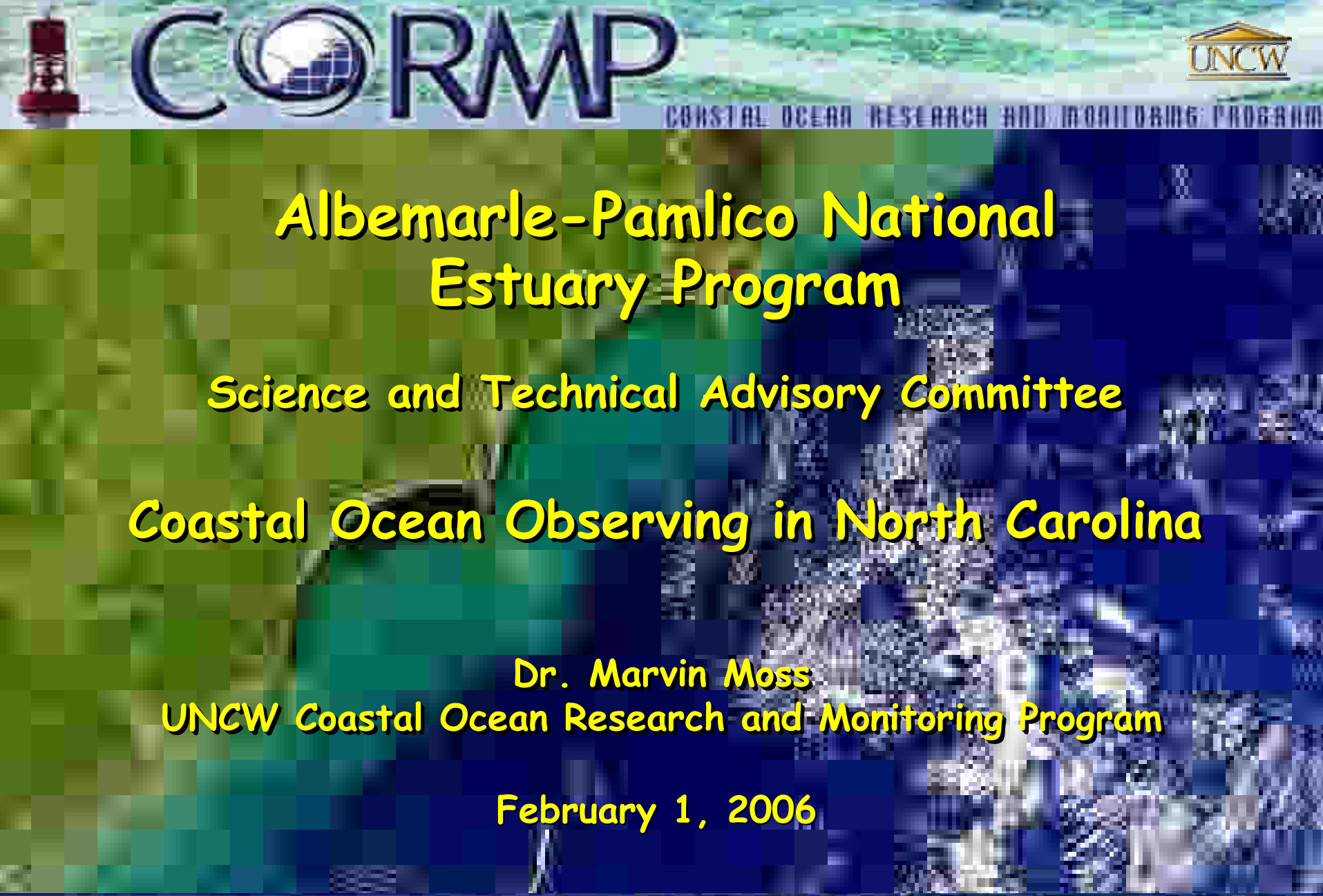


Albemarle-Pamlico National Estuary Program

Science and Technical Advisory Committee

Coastal Ocean Observing in North Carolina

Dr. Marvin Moss
UNCW Coastal Ocean Research and Monitoring Program

February 1, 2006

Funded by the National Oceanic and Atmospheric Administration


The Coastal Carolinas

- One of the most ecologically diverse and economically important systems in the nation
- Dynamic and complex region
- Resources – finfish, shellfish, ports, beaches – under serious risks
- Need for observation, understanding, prediction

- Since 2000, UNCW has conducted a sustained, long-term program of coastal ocean observations and research off North Carolina.

- This program, along with Caro-COOPS and NCCOOS (through SEACOOS), has collectively evolved into comprehensive coastal ocean observing systems.

- Individually and collectively, they support our NC coastal region and, particularly, the national IOOS initiative.

What is IOOS?

1998 National Ocean Research Leadership Council charged by Congress to establish an Integrated Ocean Observing System

System of:

- sustained coastal ocean observations & data products
- driven by societal-goals
- provides open & timely access to data
- based on sound scientific research

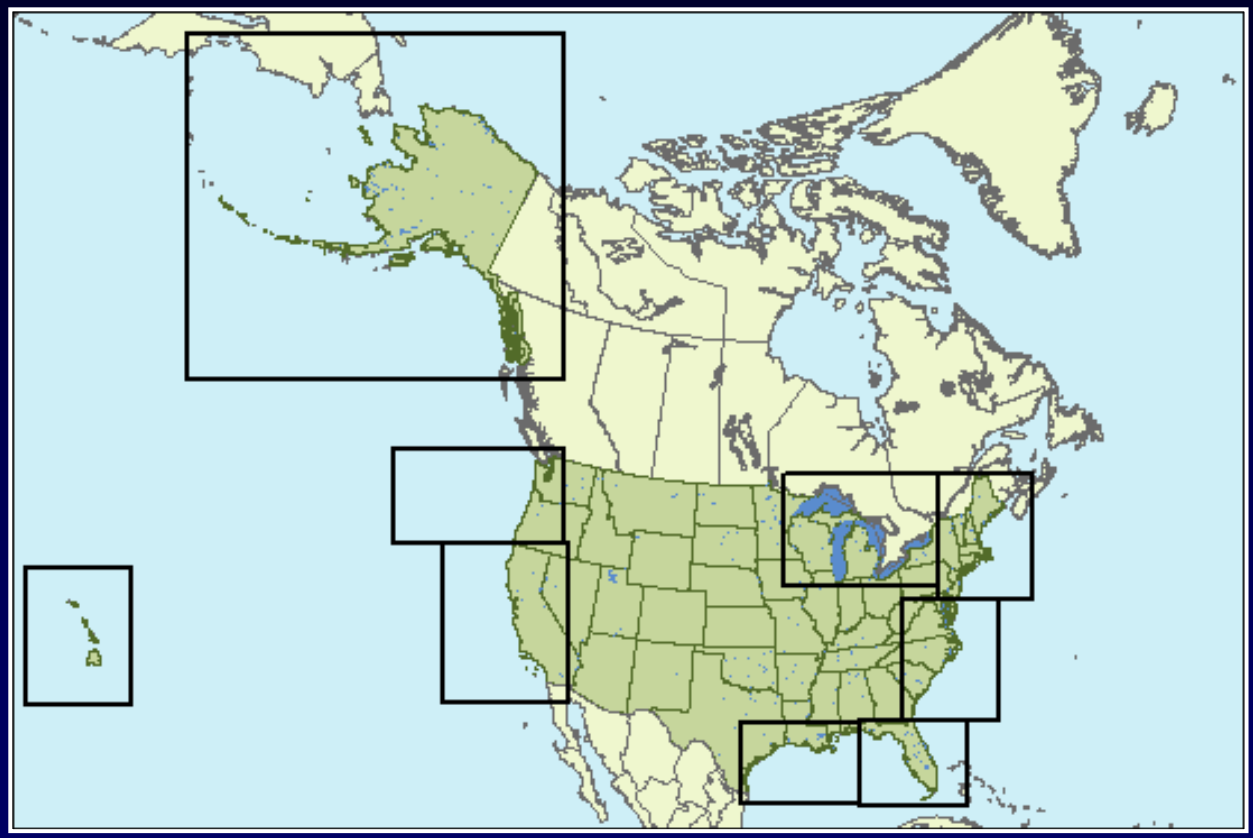
- Eleven regional components
- CORMP, CaroCOOPS and NC-COOS fill essential functional and geographic niches in the national IOOS grid

Congress (in 1998) defined the need and goals for an Integrated Ocean Observing System (IOOS)

- Improve the safety & efficiency of marine operations
- Improve homeland security
- Mitigate effects of natural hazards
- Improve predictions of climate change
- Minimize public health risks
- Protect & restore coastal marine ecosystems
- Sustain living marine resources"

"Provide Data and Information Required for
More Rapid Detection & Timely Prediction of State Changes"

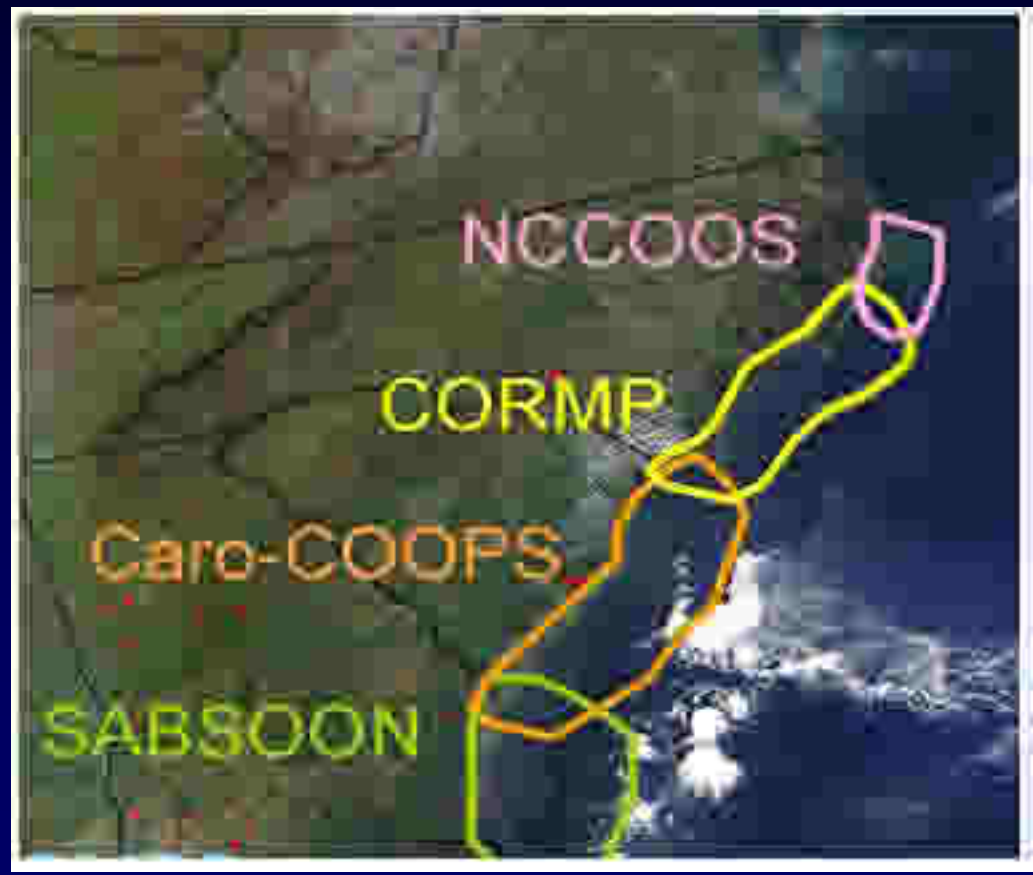
U.S. Coastal Observing System Regions



http://www.csc.noaa.gov/coos/

Southeast Observing Systems

- Each observing program is affiliated with a research institution.
- In the Southeast, the South East Coastal Ocean Regional Association (SECOORA) will oversee the ocean observing programs.



Offshore Physical Observing Network

- Collection of real-time, web available, and archived marine meteorology and physical ocean conditions data
- Data used to describe ocean conditions associated with storms & fair weather, examine cross & along shelf material fluxes, and to validate numeric circulation models & predictive storm surge models in the Cape Fear Region.

Offshore Observing Network

2 - NDBC Design

- Weather Observations
- Surface & bottom currents
- Turbidity
- Surface and bottom temp
- Salinity
- NDBC buoys will also transmit standard wave data
- All buoys will transmit data via Iridium & GOES satellites

2 - NC State Design

Potential Benefits

- Increased amount of real time marine observations in southeastern NC
- More observations = more informed and safer marine community
- Improved inshore and offshore marine forecasting ability by the NWS
- Pier based observations will allow for improved rip current forecasting


Federally Deployed
Institutionally Deployed
Future Deployment
AUV, Research Cruises, FerryMon
North Carolina
South Carolina
Jacksonville
Wilmington
Myrtle Beach
Georgetown
Charleston
Hatteras
Atlantic Ocean
30
60
120
180
Miles

http://www.cormp.org/

CORMP

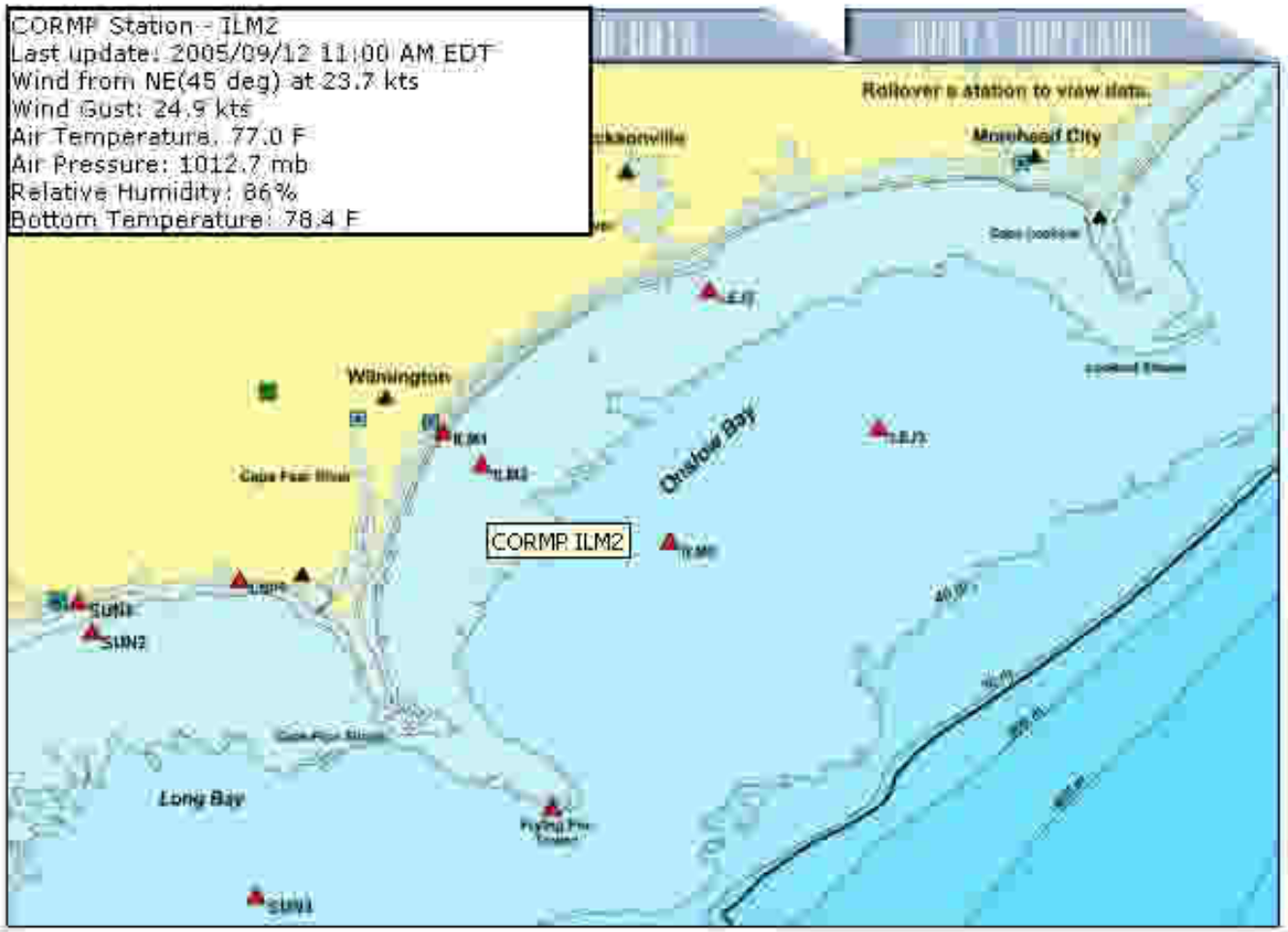
COASTAL OCEAN RESEARCH AND MONITORING PROGRAM

- HOME
- ABOUT US
- CORMP DATA
- MARINE FORECAST
- RESEARCH THEMES
- REPORTS & PUBLICATIONS
- TEACHER & STUDENT RESOURCES
- LINKS OF INTEREST
- DISCLAIMER
- CORMP CONTACTS

NEW! Hurricane Ophelia Storm Surge Forecast

NEW! Notice to Mariners

CORMP Station - ILM2
Last update: 2005/09/12 11:00 AM EDT
Wind from NE(45 deg) at 23.7 kts
Wind Gust: 24.9 kts
Air Temperature: 77.0 F
Air Pressure: 1012.7 mb
Relative Humidity: 86%
Bottom Temperature: 78.4 F



HOME
ABOUT US
CORMP DATA
MARINE FORECAST
RESEARCH THEMES
REPORTS & PUBLICATIONS
TEACHER & STUDENT RESOURCES
LINKS OF INTEREST
DISCLAIMER
CORMP CONTACTS

Site: ILM2

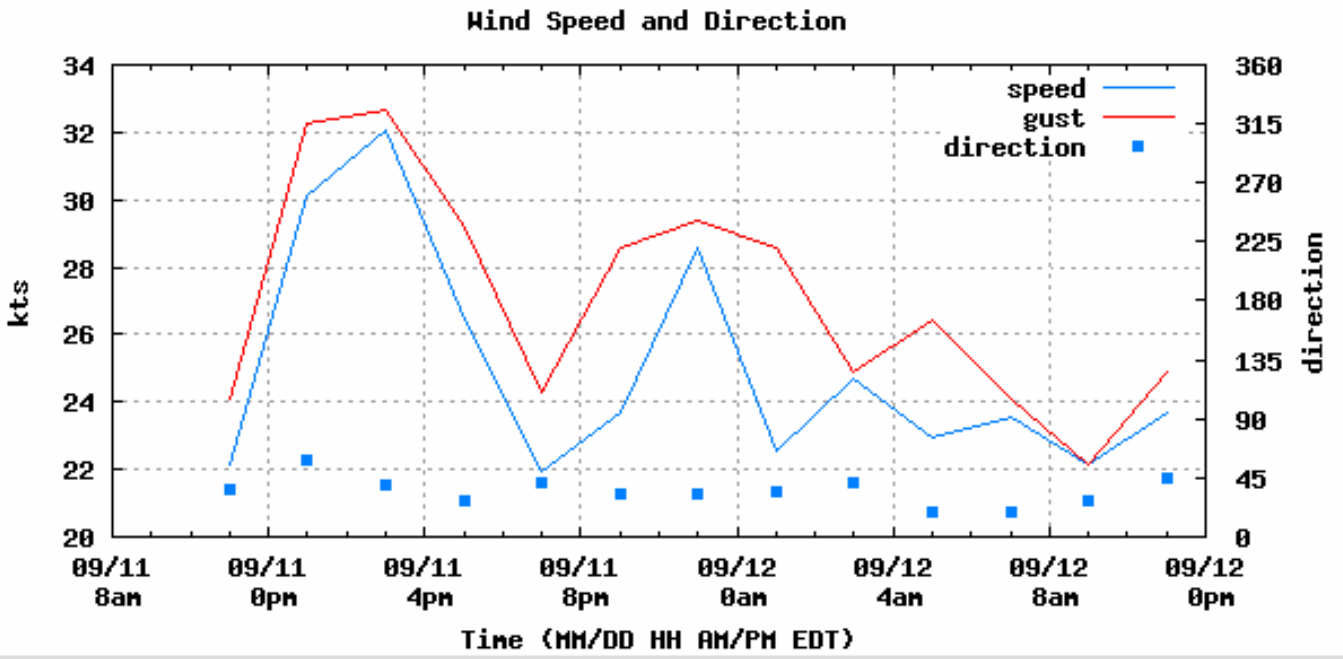
CHANGE SITES: ILM2 GO

Latitude: 34 08.4502
Longitude: -77 42.8901
Depth(approx): 17 M

Buoy Configuration

Graph Last Day
Graph Past 3 Days
Graph Past Week
Graph Past Month
Graph Past 3 Months
Graph Past Year

Replot in m/s



HOME
ABOUT US
CORMP DATA
MARINE FORECAST
RESEARCH THEMES
REPORTS & PUBLICATIONS
TEACHER & STUDENT RESOURCES
LINKS OF INTEREST
DISCLAIMER
CORMP CONTACTS

Site: ILM2

CHANGE SITES: ILM2 GO

Latitude: 34 08.4502
Longitude: -77 42.8901
Depth(approx): 17 M

Buoy Configuration

Data Type: Air Temp
Start Date: 2005-06-07
End Date: 2005-09-12
Output: Graph
Submit

Last update: 2005/09/12 11:00 AM EDT

Wind Speed	23.7 kts
Wind Direction - From	NE(45 deg)
Wind Gust	24.9 kts
Air Temperature	77.0 F
Air Pressure	1012.7 mb
Relative Humidity	86%
Bottom Temperature	78.4 F
Bottom Chlorophyll	52.92 (ug/L)
Bottom Salinity	35.17 ppt
Surface Current Speed	1.07 kts
Surface Current Direction - To	216.7 deg
Solar Radiation	549(W/m^2)

Graph Last Day
Graph Past3 Days
Graph Past Week
Graph Past Month
Graph Past 3 Months
Graph Past Year

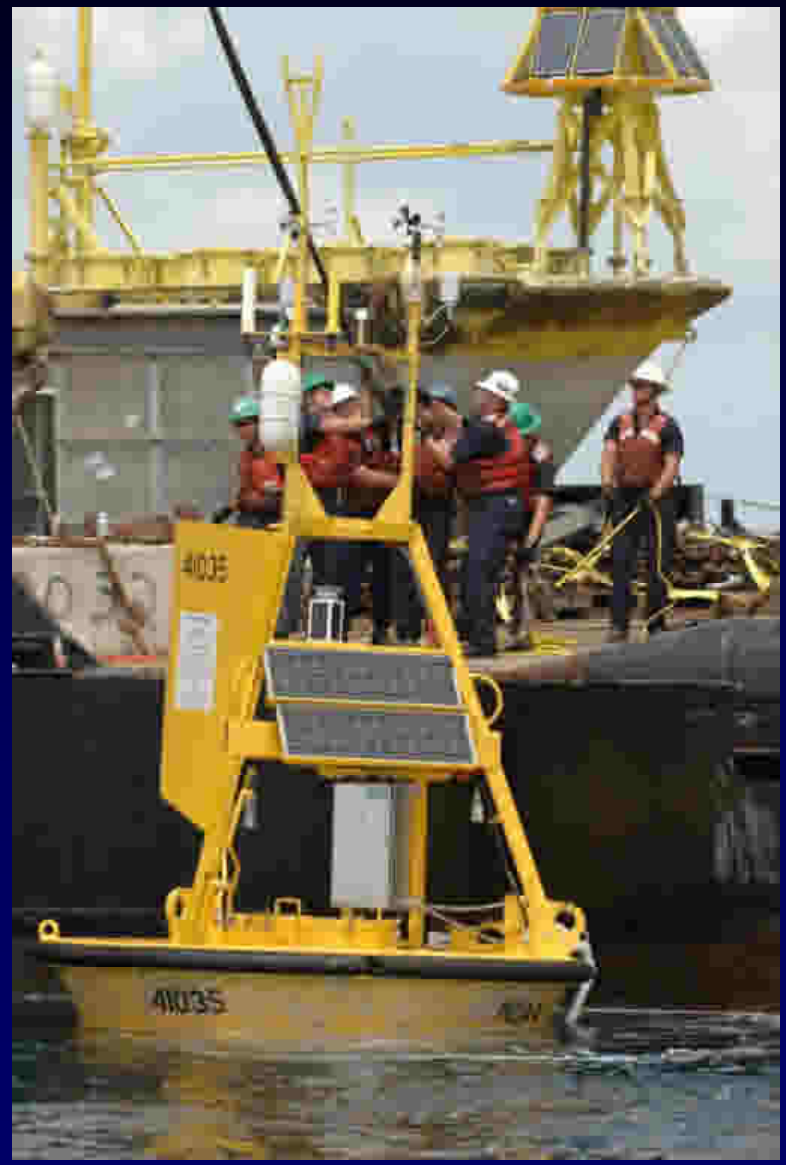
Query Mooring Data
Direct File Access
Quality Control Criteria
Metadata
<-- Archived Data Map
<-- Real-time Data Map

Buoy Deployments

ILM2 & ILM3 deployed June 6, 2005

Buoy Deployments

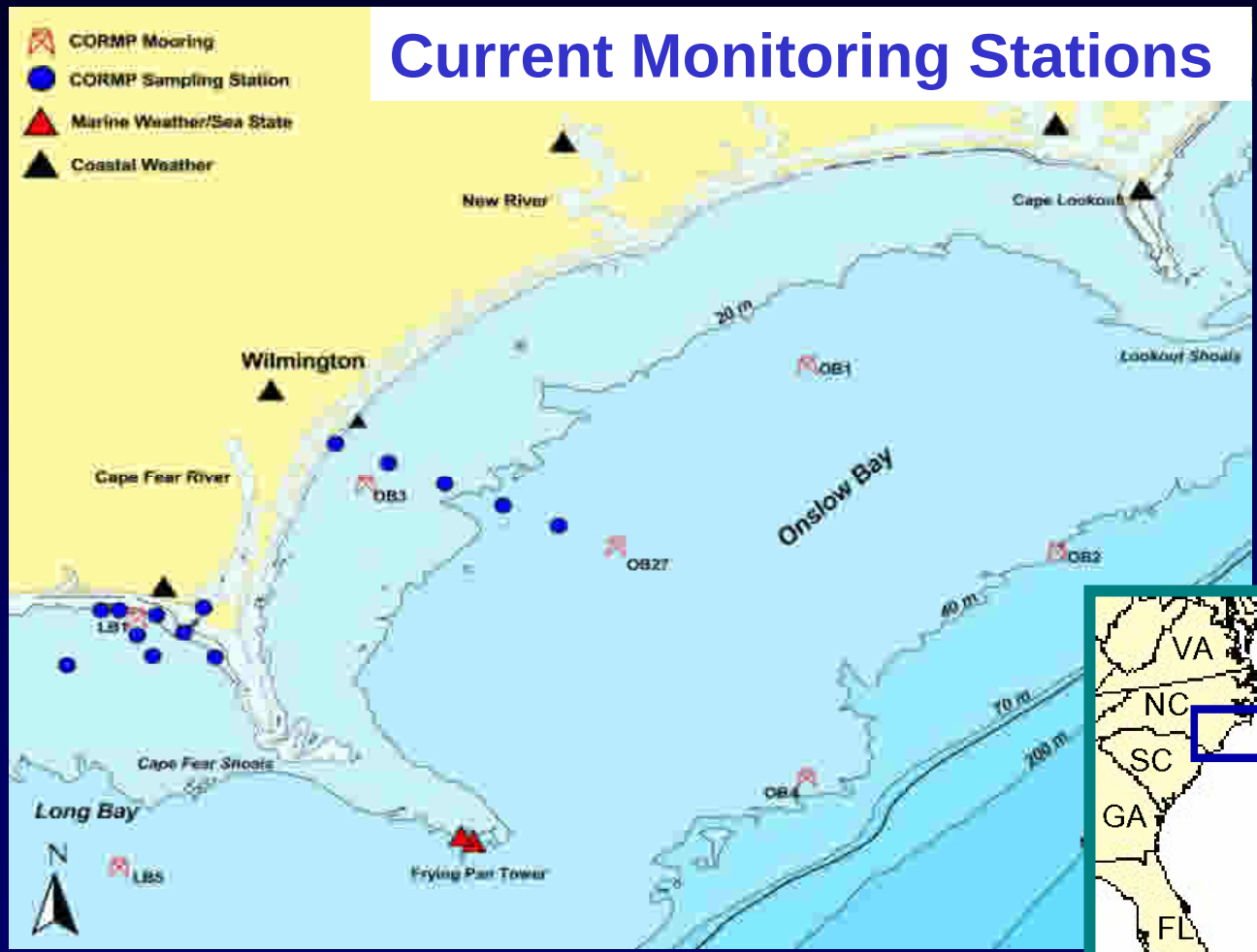
LEJ2 deployed
Aug 1, 2005



Bi-monthly, Monthly, and other Sampling Cruises

Water Quality
(Turbidity, Nutrients, etc.)
Physical parameters
(Temp, Salinity & Currents)
Sea floor characteristics
Bioptical measurements
Primary productivity
Fisheries

Observing Network



Components

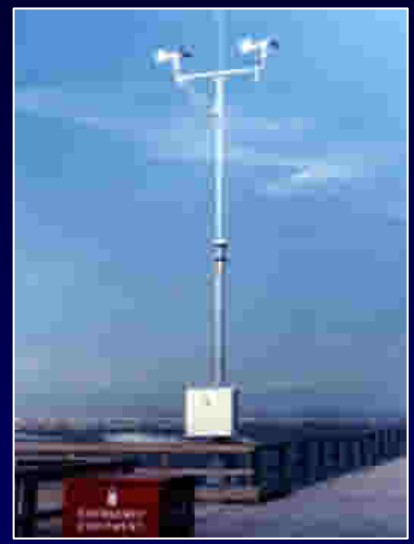
- Fixed moorings

  - Real time
  - Non-real time

- Offshore stations sampled bi-monthly

Pier-Based Observing Network

- Instruments are deployed and hard-wired to local fishing piers.
- Transmit real-time marine weather and oceanographic data.
  - waves (height, direction, frequency)
  - currents
  - bottom temperature
  - salinity
  - water level (tide)



Pier-Based Physical Observing Network

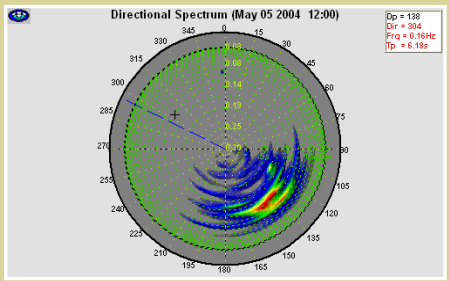
Instruments deployed & hard-wired to local fishing piers to measure & report meteorologic & oceanographic data in near real-time

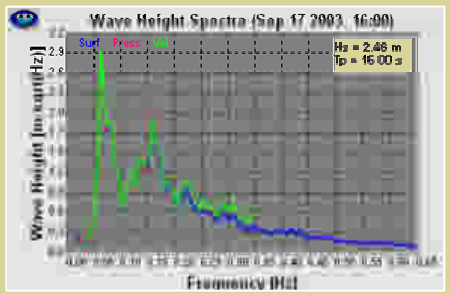
RF Antenna

LCD Pierhouse Display

Computer
FTP to University

RF Antenna





Sample Hourly Wave Data

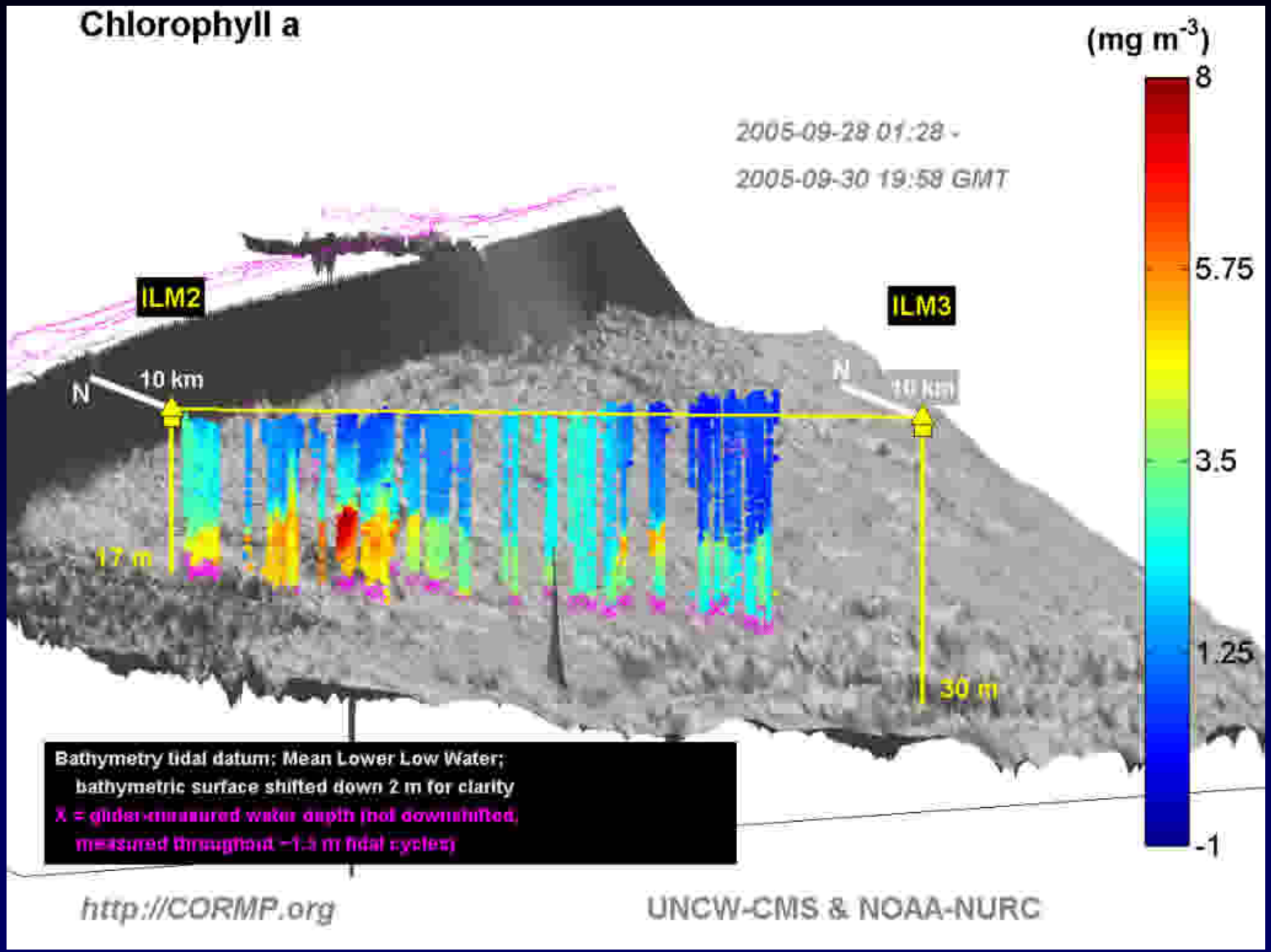
ADCP to measure waves, currents, salinity and bottom temperature

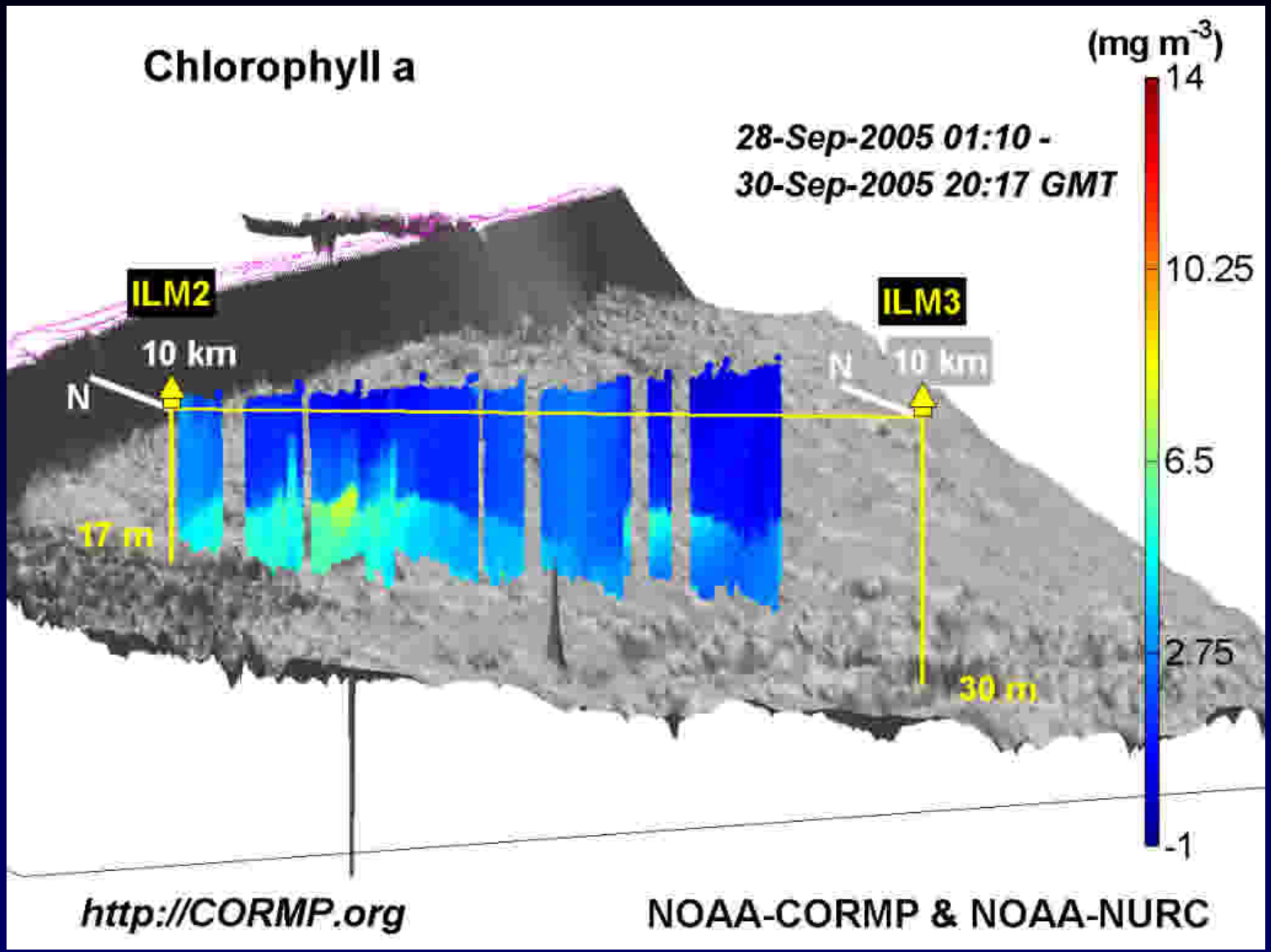
Other Ongoing Measures of the Coastal Ocean…….

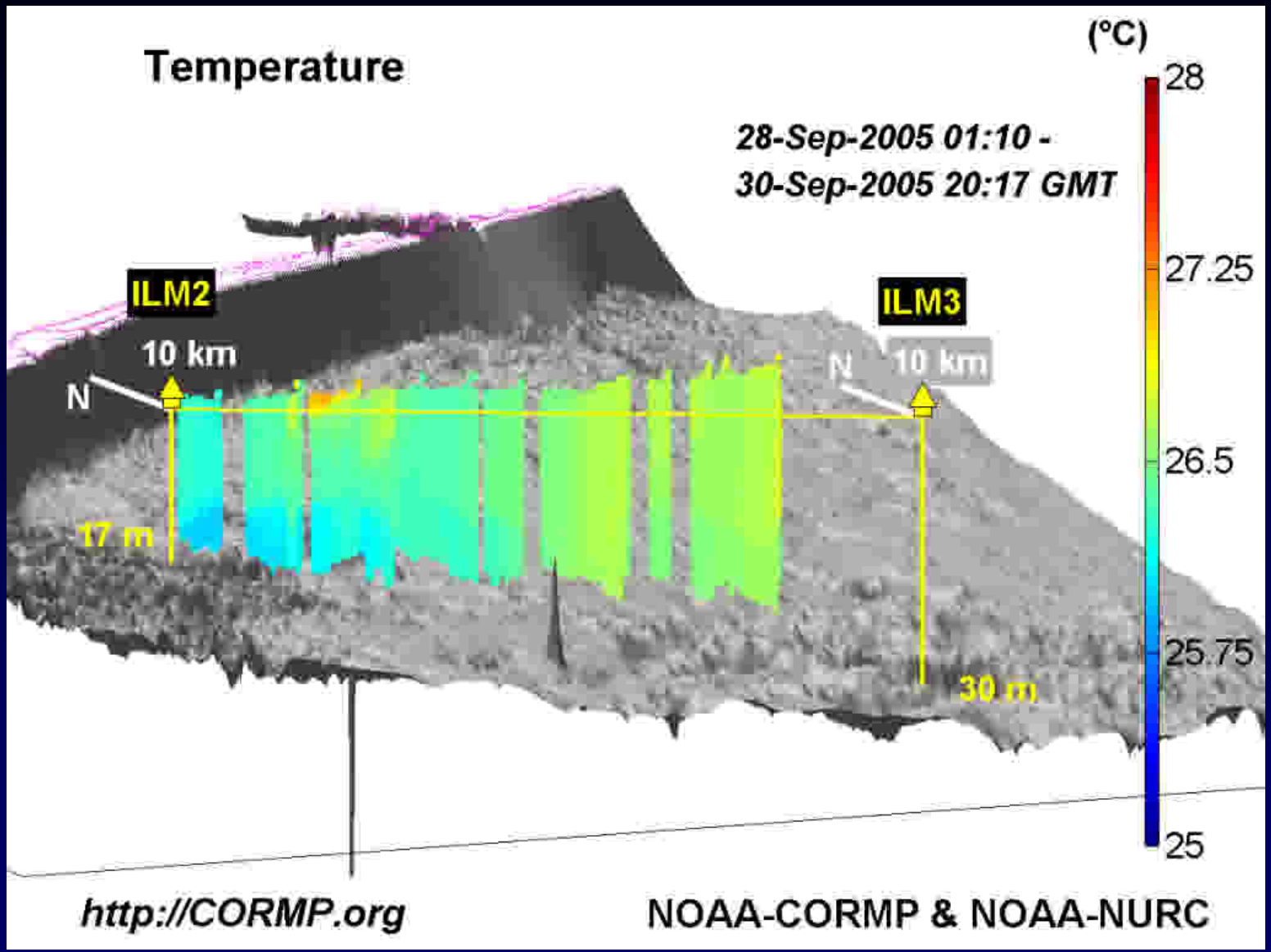
Autonomous Underwater Glider Vehicle

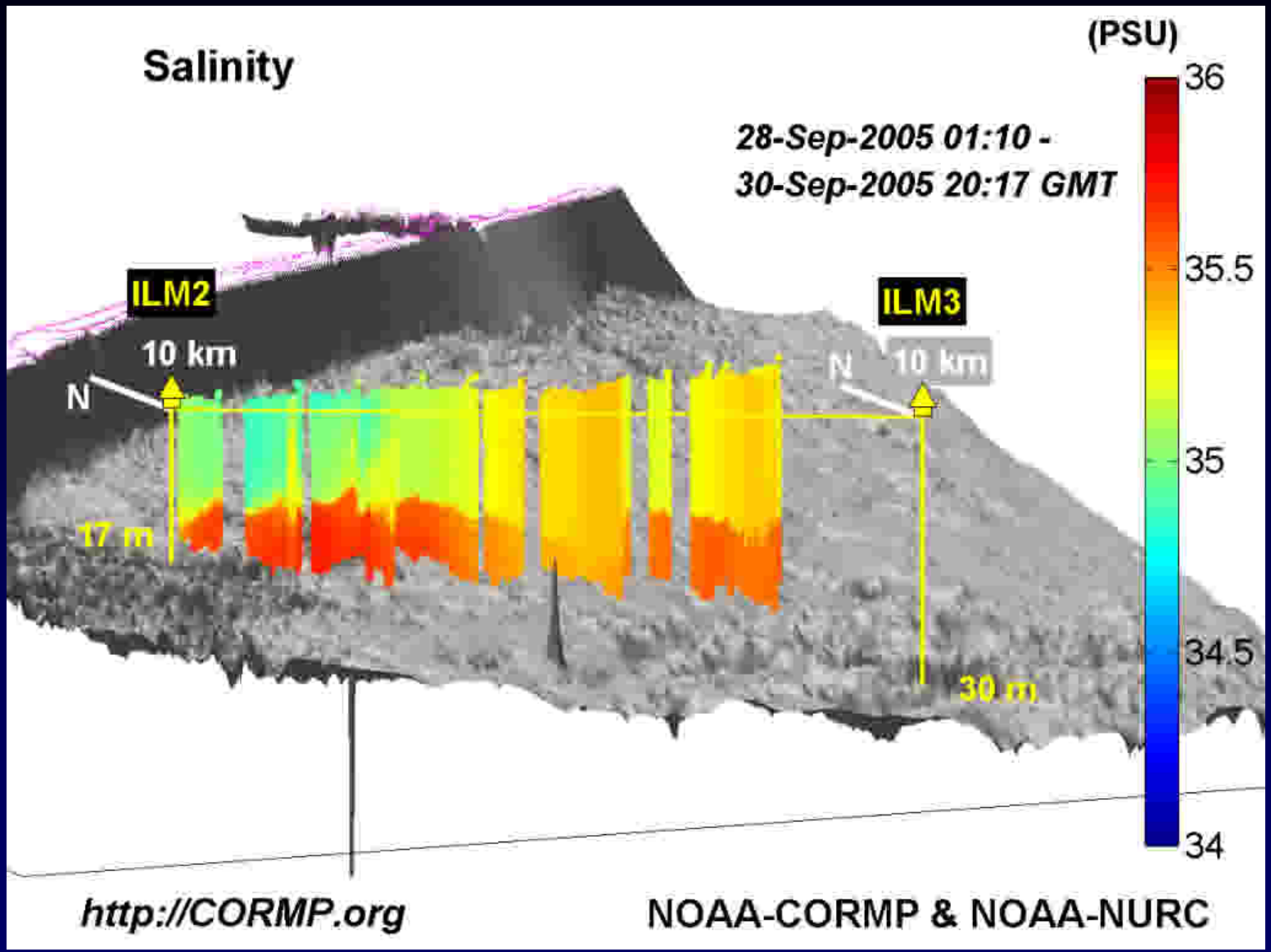
Made possible thru cost-sharing partnership with NURC

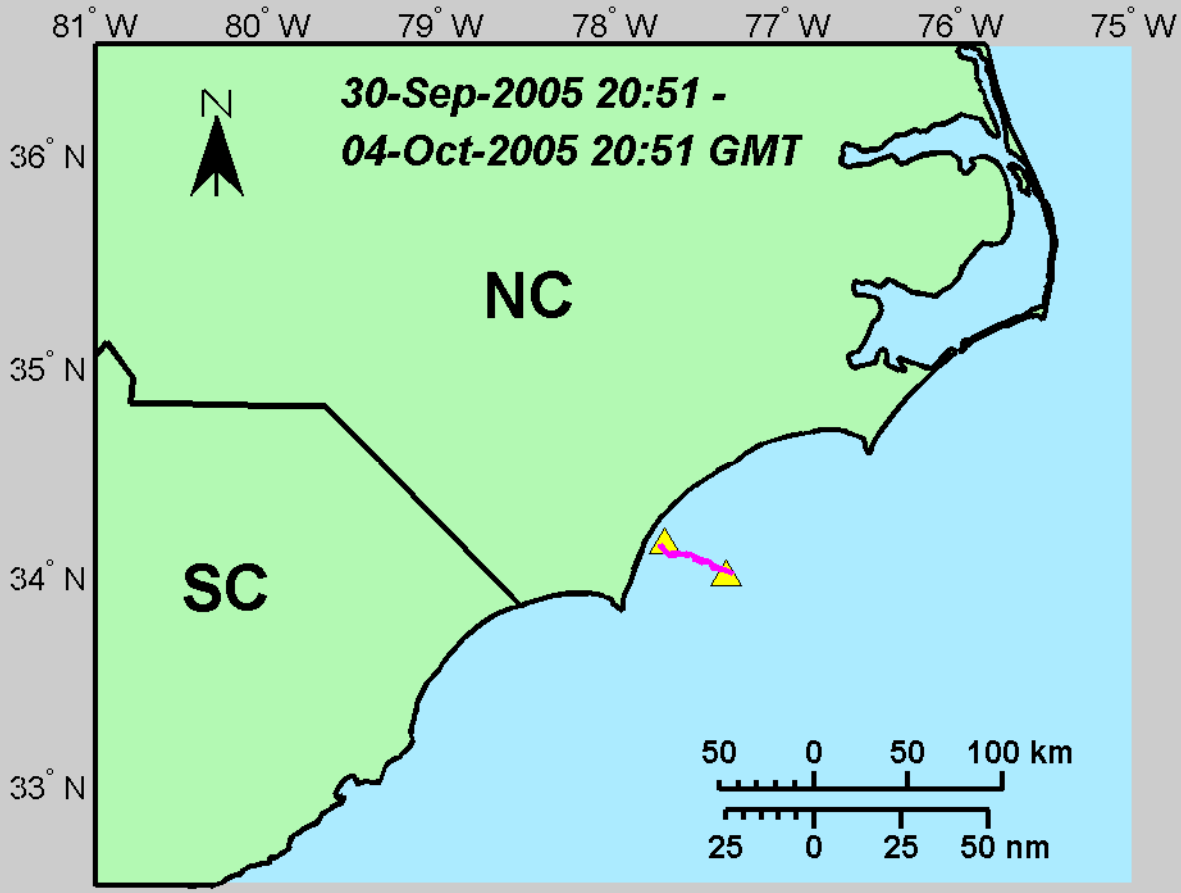
Combination of moorings, cruises, remotely sensed and direct observations provides unique data to set to accurately interpret phenomena in coastal ocean that might otherwise be misinterpreted!


Chlorophyll a
(mg m-3)
8
5.75
3.5
1.25
-1
2005-09-28 01:28 -
2005-09-30 19:58 GMT
ILM2
ILM3
N
10 km
N
10 km
17 m
30 m
Bathymetry tidal datum: Mean Lower Low Water;
bathymetric surface shifted down 2 m for clarity
X = glider-measured water depth (not downshifted;
measured throughout ~1.5 m tidal cycles)
http://CORMP.org
UNCW-CMS & NOAA-NURC


Chlorophyll a
(mg m-3)
14
10.25
6.5
2.75
-1
28-Sep-2005 01:10 -
30-Sep-2005 20:17 GMT
ILM2
10 km
N
17 m
ILM3
10 km
N
30 m
http://CORMP.org
NOAA-CORMP & NOAA-NURC


Temperature
(°C)
28
27.25
26.5
25.75
25
28-Sep-2005 01:10 -
30-Sep-2005 20:17 GMT
ILM2
10 km
N
17 m
ILM3
10 km
N
30 m
http://CORMP.org
NOAA-CORMP & NOAA-NURC


Salinity
(PSU)
36
35.5
35
34.5
34
28-Sep-2005 01:10 -
30-Sep-2005 20:17 GMT
ILM2
10 km
N
17 m
ILM3
10 km
N
30 m
http://CORMP.org
NOAA-CORMP & NOAA-NURC



http://CORMP.org

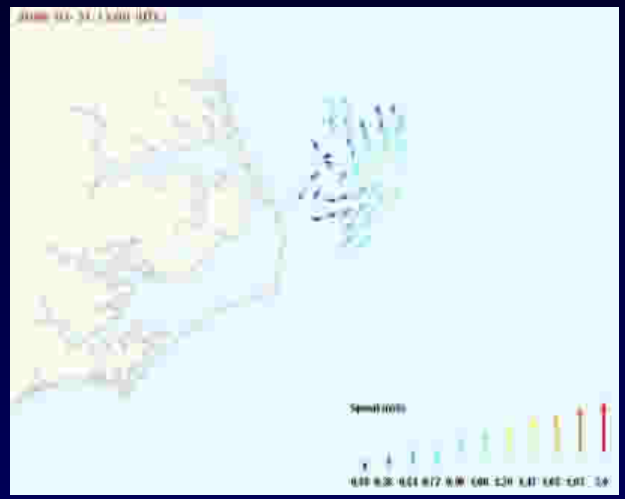
NOAA-CORMP & NOAA-NURC

NURC/CORMP Glider Deployment

Other Observing Efforts

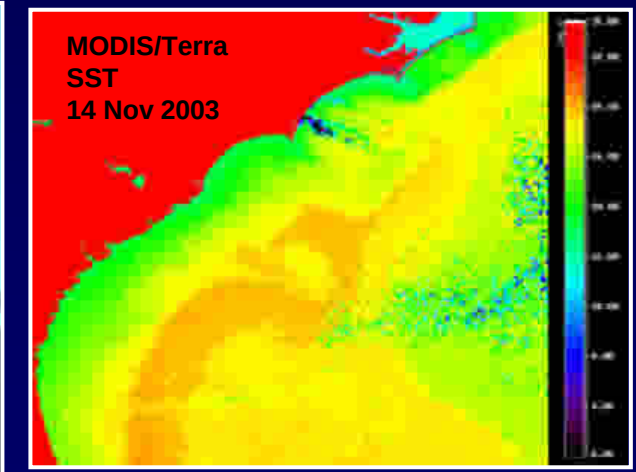
Ferry-Mon

NCCOOS CODAR



Diver Ops

Sea Surface Temp



Access buoy data

- www.cormp.org
- www.seacoos.org
- www.carocoops.org
- National Data Buoy Center www.ndbc.noaa.gov
- NOAA weather radio
- Dial-a-buoy

Partnerships, Stakeholders, and Users

- UNC-System Partners
  - UNC-CH, NCSU, UNCW
- Other Educational
  - CFCC, NC middle and high schools, USC, USF, SCRIPPS
- Commercial Interests:
  - NC Ports, Cape Fear River Pilots Association, Sunny Point DoD Terminal, fishermen
- Emergency Management/Search and Rescue:
  - US Coast Guard and USCG Auxiliary, SC/NC Emergency Management, Power Squadron
- IOOS Partners
  - SEACOOS; SECOORA, Caro-COOPs, NCCOOS, SABSOON, COMPS, SURA, CDIP
- Private Sector Interests
  - Johnny Mercers Pier, Weatherflow, Frying Pan Tower Associates, HurricaneTrack
- Recreational Users
  - Pier & surf fishermen, coastal & offshore anglers, SCUBA diving shops, charter vessels, and clubs

US Marine Corps Base - Camp Lejeune
Amphibious Training

National Data Buoy Center

CORMP

CONSTAL OCEAN RESEARCH AND MONITORING PROGRAM

UNCW

NOAA National Weather Service
U.S. Army Corps of Engineers

Improved marine forecasts & Rip current prediction

Wave climatology & Regional beach erosion management plans

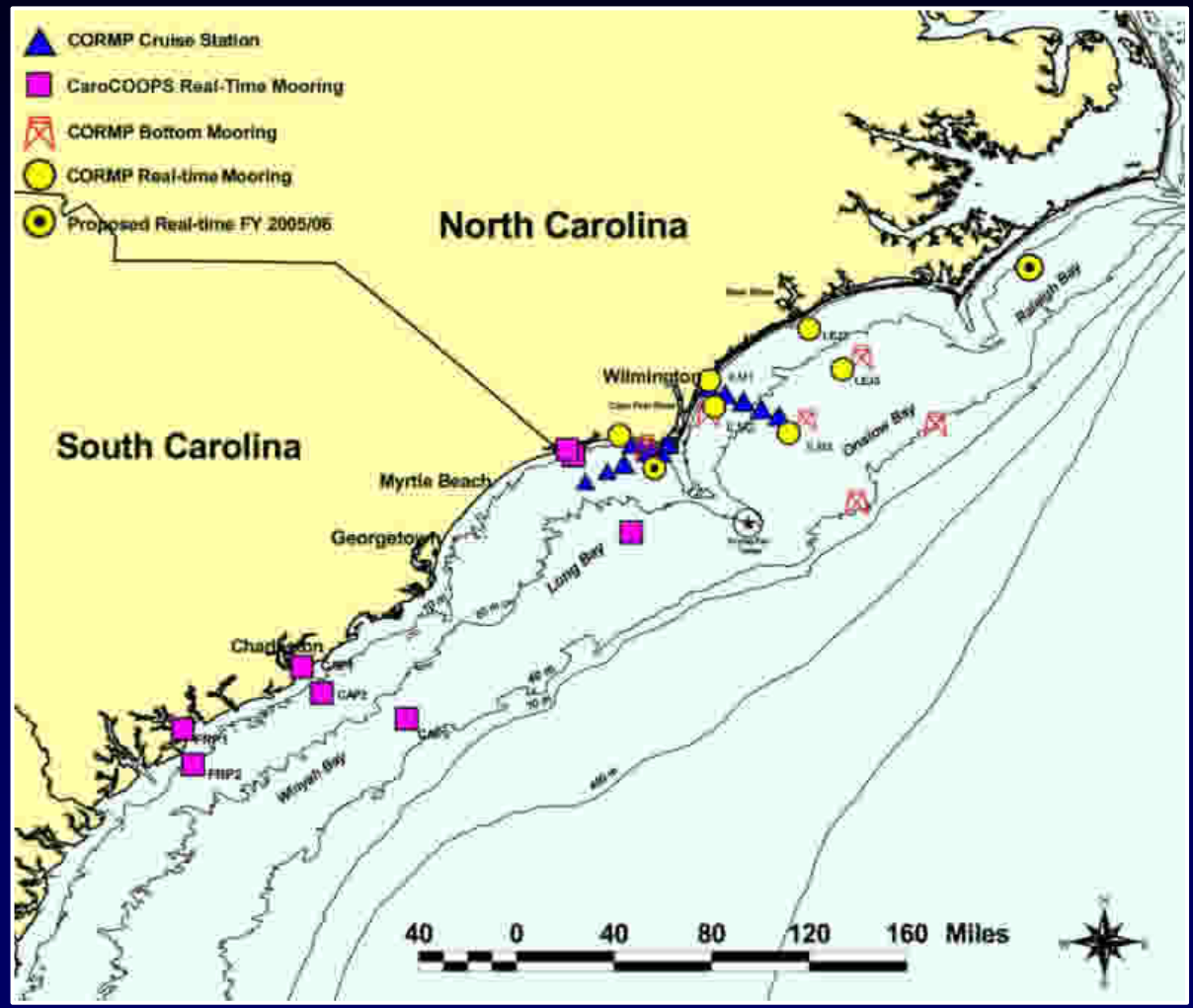
Questions…


Federally Deployed
Institutionally Deployed
Future Deployment
AUV, Research Cruises, FerryMon
North Carolina
South Carolina
Jacksonville
Wilmington
Myrtle Beach
Georgetown
Charleston
Hatteras
Atlantic Ocean
30
60
120
180
Miles


Federally Deployed
Institutionally Deployed
Future Deployment
AUV, Research Cruises, FerryMon
North Carolina
South Carolina
Jacksonville
Wilmington
Myrtle Beach
Georgetown
Charleston
Hatteras
Atlantic Ocean
30
60
120
180
Miles

CORMP

Caro-COOPS



CORMP-CaroCOOPS Ocean Observing Network