SURA Coastal Ocean Observing and Prediction (SCOOP) Program

20 Sep 2005

Philip Bogden & Many Others

Advancing the science of environmental prediction and hazard planning for our nation's coasts.

Integrating diverse efforts and empowering a virtual community of scientists with the tools, resources, and ideas that lead to discovery.

The SCOOP Team

University of Alabama at Huntsville, University of Florida, GoMOOS, Louisiana State University, University of Miami, University of Maryland, University of North Carolina, Texas A&M, Virginia Inst of Marine Sciences

The SCOOP Team

- **Alabama at Huntsville:** Sara Graves, Ken Keiser, Matt Smith, Helen Conover, Marilyn Drewry, Sandi Redman
- **GoMOOS:** Will Perrie (Bedford Inst. of Oceanography), Tom Shyka
- **Louisiana State:** Gabrielle Allen, Ed Seidel, Greg Stone, Xiongping Zhang, Ian Kelley, Jon MacLaren, Chirag Dekate, Chongjie Zhang, Andrei Hutanu
- **Florida:** Peter Sheng, Justin Davis, Renato Figueredo, Vladimir Paramygin
- **Maryland:** Don Riley
- **Miami:** Hans Graber, Ed Kearns, Neil Williams, Florence Coquet
- **North Carolina:** Rick Luettich, Brian Blanton, Lavanya Ramakrishnan, Howard Lander, Dan Reed
- **SURA:** Joanne Bintz, Gary Crane, Mary Fran Yafchak
- **Texas A&M:** Wei Zhao, Gerry Creager, Larry Flournoy, Donna Cote, Matt Howard
- **VIMS:** Don Wright, Harry Wang, David Forrest, Courtney Harris

President's Information Technology Advisory Committee (PITAC) – Principal Findings

- Computational science is indispensable for solving complex problems in every sector, from traditional science and engineering domains to such key areas as national security, public health, and economic innovation

- Advances in computing and connectivity and ability to capture and analyze huge amounts of data make it increasingly possible and practical to address these complex problems

- *Universities and Federal government have not effectively recognized the strategic significance of computational science*

- *These inadequacies compromise U.S. scientific leadership, economic competitiveness, and national security*

Goal

3-Legged Stool:

     1. Federal & State Government

     2. Private Sector

     3. Research Community – SURA's role

SCOOP is…

A **community initiative** creating a new kind of integrated, yet geographically distributed, national laboratory for coastal research and applications.

A **broadly accessible, open-access, distributed facility**, supported by university researchers in partnership with government agencies and the private sector.

A **virtual laboratory** revolutionizing the science of coastal environmental & hazard prediction with the right blend of information technology & computer science.

SCOOP will…

Enable coordinated observation and prediction of a wide range of phenomena including coastal inundation, hurricane impacts, pathogen dispersal, climate change, and more.

Create a network of shared resources that will broaden access to the requisite measurements, models, computational resources and other key components of a real-time prediction system.

Employ a community approach to facilitate the transition of new technology and new knowledge from the realm of research to the operational world of practical applications.

SCOOP Objectives

1. **Build Community Support**
   - OOS Tech Workshops (Next: 24-26 Oct 2005)
   - OpenIOOS.org (NOAA Coastal Services Center)

2. **Work the Data Standards Problem(s)**
   - Help create the language of interoperability
   - Marine Metadata Interoperability (MMI) project

3. **Demonstrate Data Interoperability**
   - Distributed data sharing, integration & visualization
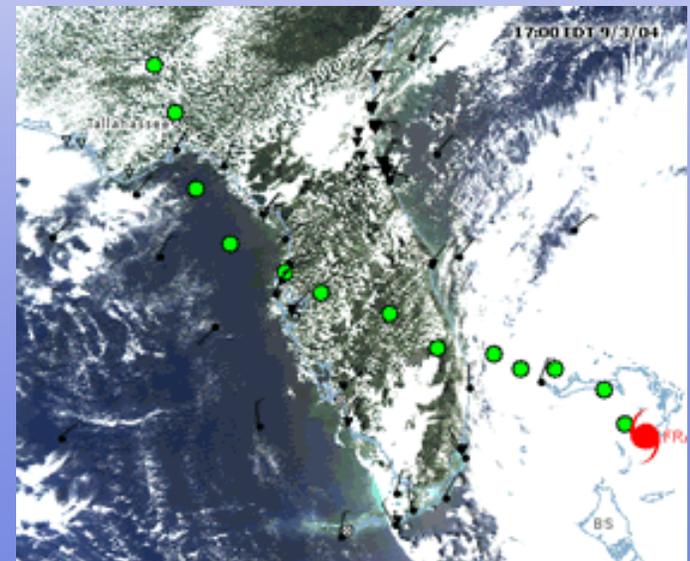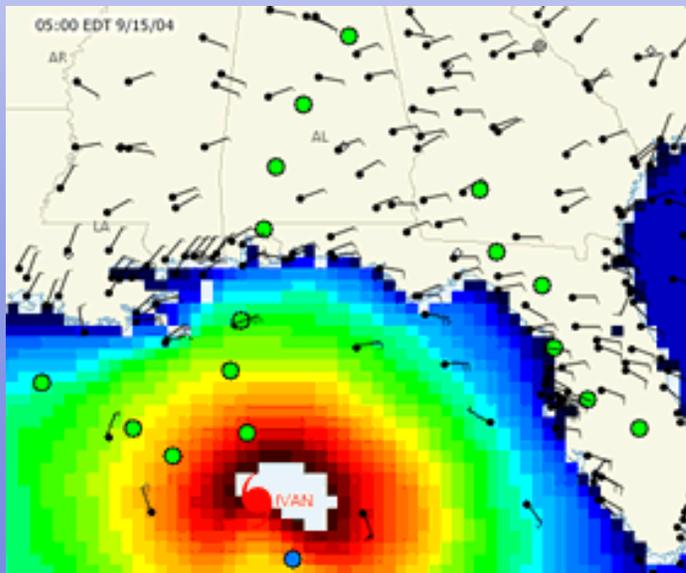   - Interoperability a la Open Geospatial Consortium

4. **Develop an Ensemble Prediction System**
   - Data management & Grid middleware for real-time prediction,
   - Modular and standardized to enable broad access

www.OpenIOOS.org

Contributors: NASA, NOAA, Navy, USGS, Various regional programs and their many research university partners

# OpenIOOS Interoperability Test Bed

What's remarkable about it?

- Fully distributed

- Standards enabling innovation (interfaces & modularity)

- Interoperability independent of technology (encourages private-sector)

- Open Geospatial Consortium (GIS-access nurtures practical use)

- Modern & forward thinking: WWW = HTTP + HTML → Web Services

- Feds and Researchers interoperating with IT

- A virtual community sharing data with Open Standards

- Advancing the science of environmental prediction & hazard planning

- Enabling transition from research to operations

Welcome to www.OpenIOOS.org   ...where standards enable innovation

This interoperability demonstration represents a coastal sciences community effort. Our partners include several federal agencies and dozens of the top research universities in the country. We rely heavily on Open Geospatial Consortium (OGC) standards. To learn about the project, click here for answers to some frequently asked questions. For detailed project information visit the project wiki.
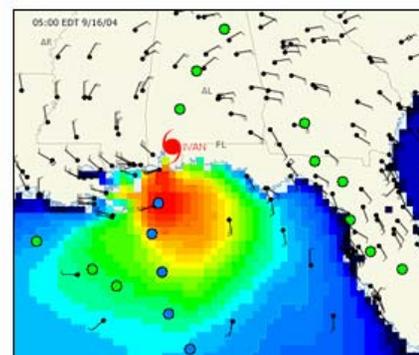
Latest Real-time Observations

Sea Surface Temperatures from Buoys and Satellites
12:00 PM May 02, 2005 EDT

Deg C
33
30
26
22
19
15
12
8
5
1
-2

CANADA

UNITED STATES

MEXICO
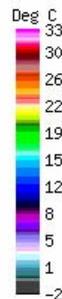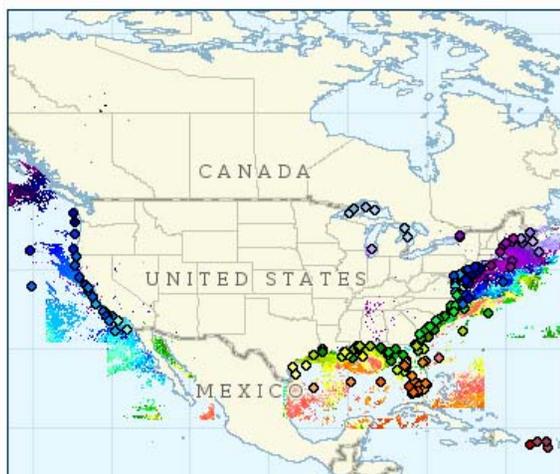
Click map for interactive version

2004 Hurricane Retrospective

Showing Storm Tracks, In-Situ Observations, Satellite Imagery and Model Predictions

05:00 EDT 9/16/04

Samples from the 2004 hurricane season

Frances (8/24 - 09/6)
Show animation
Go to map

Ivan (9/2 - 9/24)
Show animation
Go to map

Jeanne (9/13 - 9/27)
Show animation
Go to map

Hurricane Ivan's approach to the Gulf coast showing predicted wave heights and observed winds.

Contributors

- NOAA (National Hurricane Center)
- NOAA (National Ocean Service)
- NOAA (National Data Buoy Center)
- USGS (Winds)
- USGS (Waterwatch)

- NASA (Satellites)
- NASA (Jet Propulsion Laboratory)
- GoMOOS
- SEACOOS

- NYHOS
- Texas A & M Mesonet Weather Radar
- Navy (ONR/CBLAST)
- NOAA (Hurricane Research)

Detailed information about sea surface temperature demo can be found here on the project wiki.

File   Edit   View   Go   Bookmarks   Tools   Window   Help

Back   Forward   Reload   Stop   http://dev.openioos.org/chameleon/hurricane/index.phtml   Search   Print

I O O S   O G C   C o m p l i a n t
2 0 0 4   H u r r i c a n e   S e a s o n   R e t r o s p e c t i v e
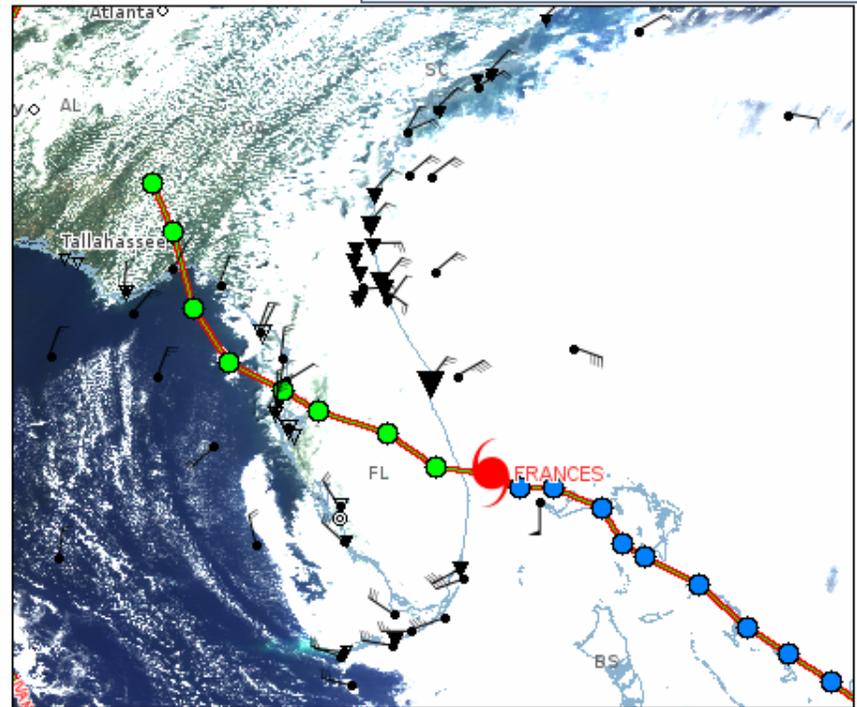
Zoom to: North America

Select date/time: Sep   4   11 PM   EDT
Select storm by date: Set end date by storm

Redraw Map   Key to Reading Map Symbols   Map Credits   Help

☐ **Hurricane Tracks**
  ☐ 🌀 NOAA (Hurricane Center)

☐ **Water Level**
  ☑ ▼ NOAA (Ocean Service): Coastal water level
  ☐ △ USGS: River stage

☐ **Wave Predictions Sept 15-16**
  ☐ GoMOOS: Wave Height
  ☐ GoMOOS: Wave Period & Direction

☐ **Satellite Imagery**
  ☐ NOAA (Satellite Service): Sea Surface Temperature
  ☐ NASA (JPL): Winds
  ☐ NASA (JPL): Sea Surface Height
  ☐ NASA (via SEACOOS): Sea Surface Temperature
  ☐ NASA (via SEACOOS): Merged SeaSurface Temperature
  ☑ NASA (via SEACOOS): True Color
  ☐ NASA (via SEACOOS): Chlorophyll

☐ **Wind Observation Stations**
  ☑ GoMOOS: Ocean Winds

2004-9-4 23:00 -4

0   96   192   288   384   480 mi

This is an experimental product and should not be relied on for official hurricane information.
For official National Weather Service products go to The National Hurricane Center website.
In particular the 2004 Tropical Cyclone Archive.

Return to OpenIOOS.org

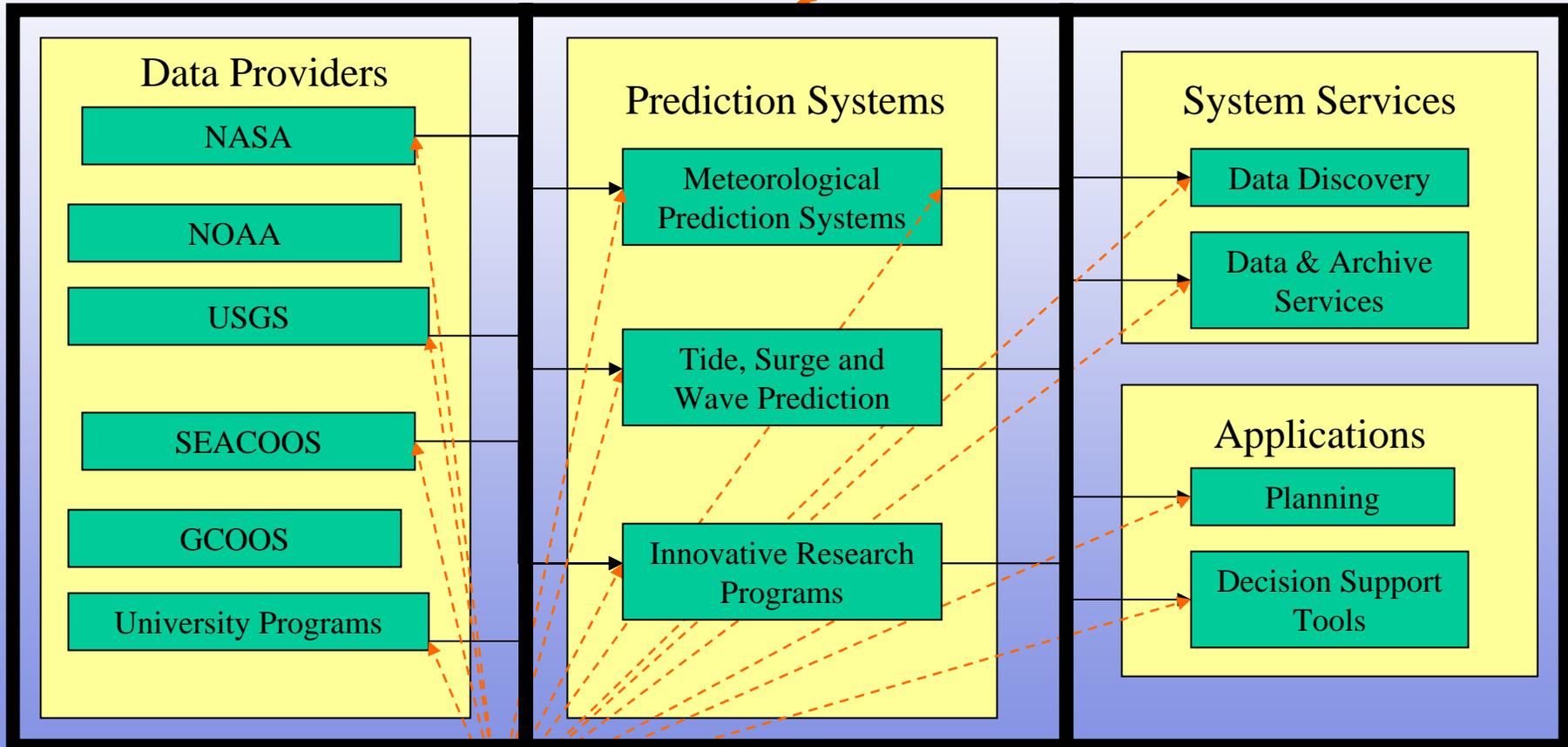Transferring data from dev.openioos.org...

Distributed "System of Systems"

SCOOP Architecture

Cross-cutting Services

Directory Services	
Security (GSI, etc)	
...	
Monitoring	

User Interface Layer

SCOOP portal (resource access, workflow orchestration, interactive search services, etc.) visualization tools, software libraries

Management Layer

Resource Management	Application Management	Data Management	Data Translation
Data Visualization	Archive Management	Workflow Management	(Meta) Data Models & Standards

Resource Access Layer

Data transport		Grid and Web services	
LDM	GridFTP, scp	Globus middleware catalog access, data services, etc.	...

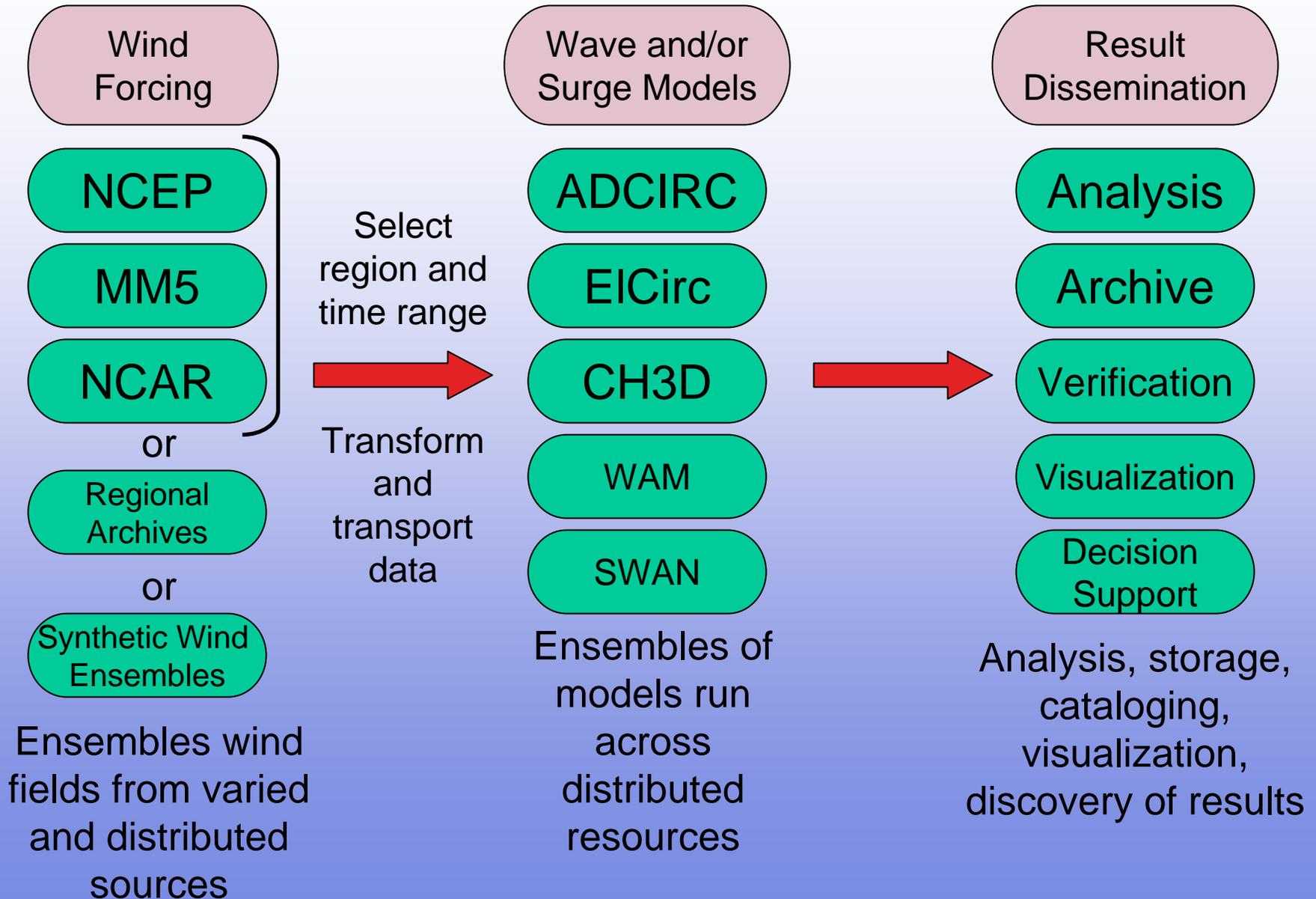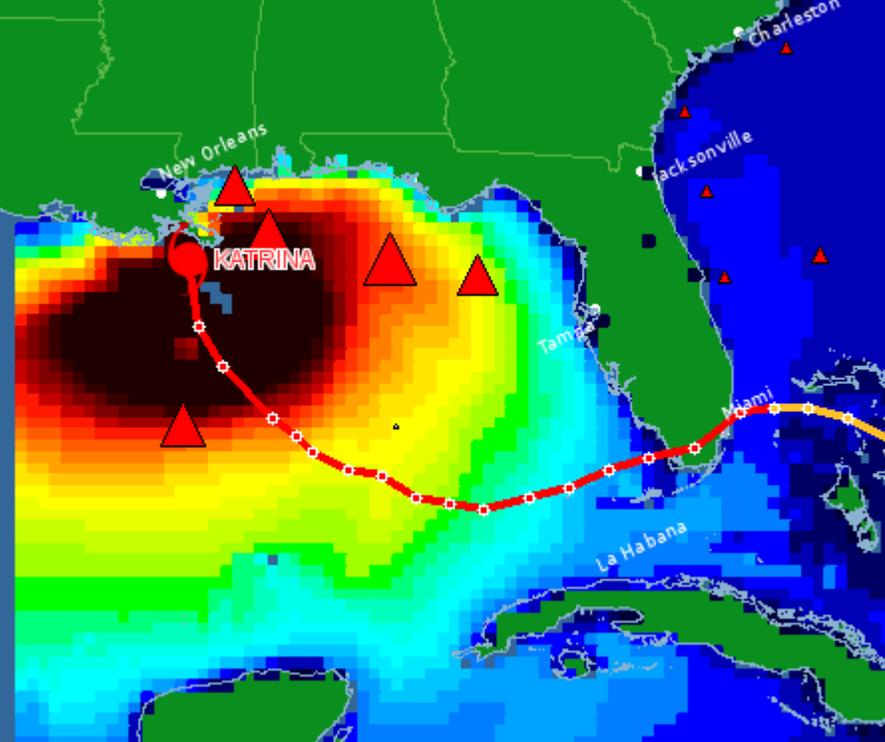## Virtualization services

Archives (LSU, TAMU, etc)

Resources (compute, storage, network)

Ensemble Prediction Scenarios

SURA

Wind Forcing		Wave and/or Surge Models		Result Dissemination
NCEP		ADCIRC		Analysis
MM5	Select region and time range	ElCirc		Archive
NCAR		CH3D		Verification
or	Transform and transport data	WAM		Visualization
Regional Archives		SWAN		Decision Support
or				
Synthetic Wind Ensembles				

Ensembles wind fields from varied and distributed sources

Ensembles of models run across distributed resources

Analysis, storage, cataloging, visualization, discovery of results

OpenIOOS.org
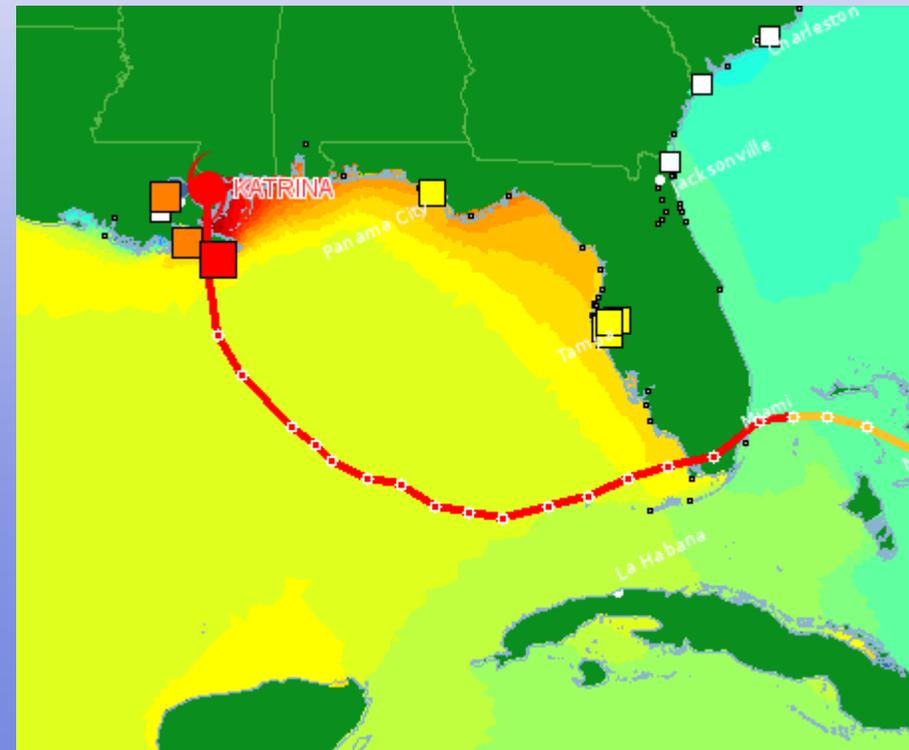## The Southeast Region

This site showed real-time storm surge and waves predictions before Katrina made landfall.

OOS Tech 2005

24-26 October

Baltimore Inner Harbor

Web Services for Interoperable Ocean Science

For more info: http://twiki.sura.org