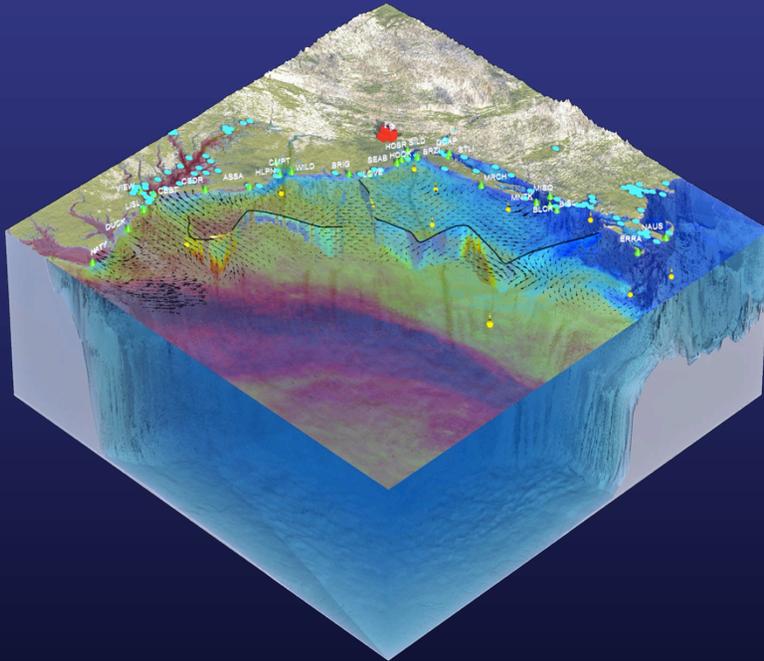


# Ocean Connections:

*Mapping potential pathways between the spill in the Gulf of Mexico and the Jersey Shore*



**Dr. Josh Kohut**

Rutgers University

School of Environmental and Biological Sciences

New Jersey Agriculture Experiment Station

**Dr. Alan Blumberg**

Stevens Institute of Technology

Center for Marine Systems

**RUTGERS**

**STEVENS**  
Institute of Technology

# Oil Spill Status : NOAA Guidance

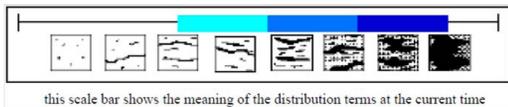
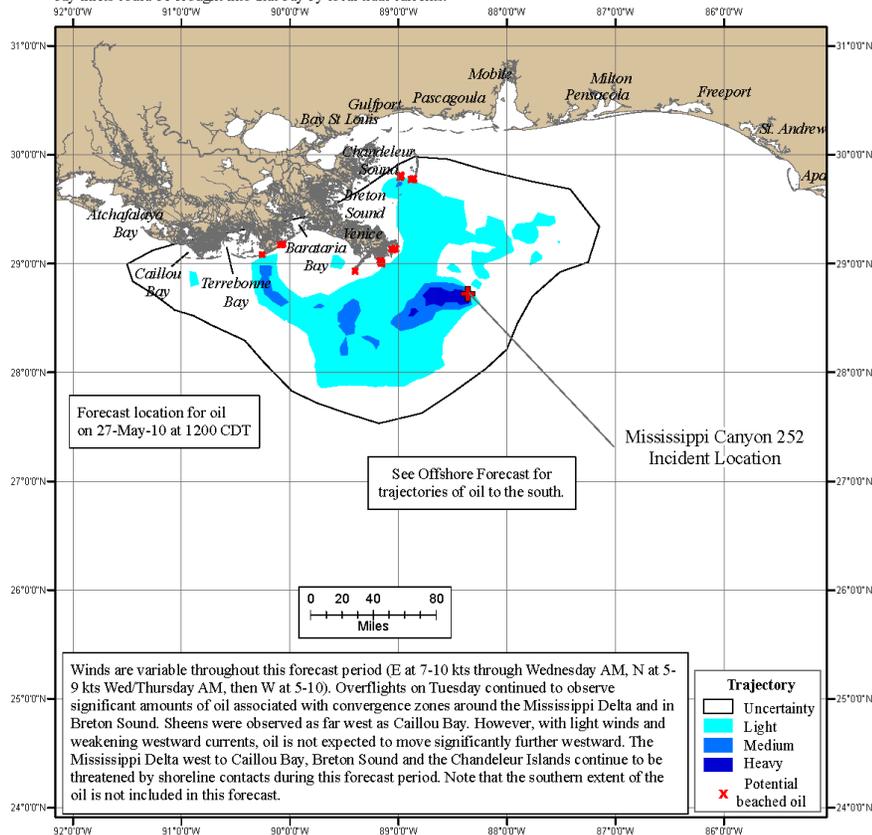
## Nearshore Surface Oil Forecast Deepwater Horizon MC252

NOAA/NOS/OR&R

Nearshore

Estimate for: 1200 CDT, Thursday 5/27/10  
Date Prepared: 2100 CDT, Tuesday, 5/25/10

This forecast is based on the NWS spot forecast from Tuesday, May 25 PM. Currents were obtained from several models (NOAA Gulf of Mexico, West Florida Shelf/USE, TAMU/TGLO, NAVO/NRL) and HFR measurements. The model was initialized from Tuesday satellite imagery analysis (NOAA/NESDIS) and overflight observations. The leading edge may contain tarballs that are not readily observable from the imagery (hence not included in the model initialization). Oil near bay inlets could be brought into that bay by local tidal currents.



Next Forecast:  
May 26th PM

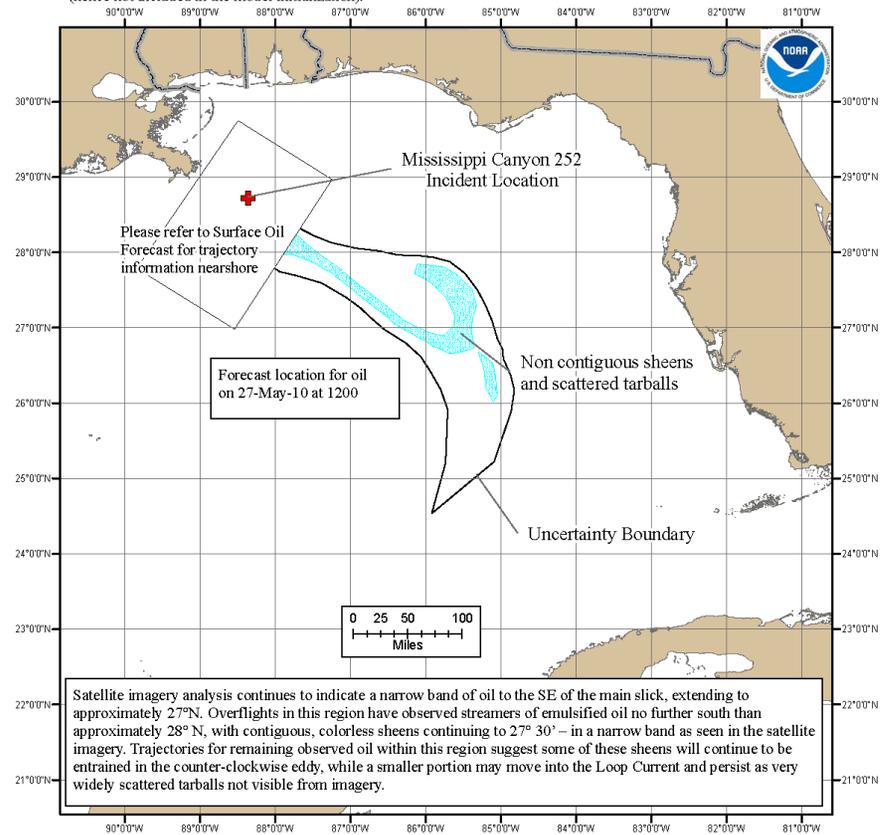
## Offshore Surface Oil Forecast Deepwater Horizon MC252

NOAA/NOS/OR&R

Offshore

Estimate for: 1200 CDT, Thursday 5/27/10  
Date Prepared: 1600 CDT, Tuesday, 5/25/10

Currents were obtained from four models: NOAA Gulf of Mexico, West Florida Shelf/USE, NRL IASNFS and NC State SABGOM. Each includes Loop Current dynamics. Gulf wide winds were obtained from the gridded NCEP product. The model was initialized from Tuesday morning satellite imagery analysis (NOAA/NESDIS) and observations from a Tuesday morning overflight. The leading edge may contain tarballs that are not readily observable from the imagery (hence not included in the model initialization).



Next Forecast:  
May 26th PM

## Accounting for uncertainty

### *Deep ocean leak*

- *Extreme pressure (2,170 psi)*
- *Difficult access (5,000 ft deep)*
- *Unknown distribution of oil*
- *Continuous oil supply*



### **On the Impact**

*"We've never dealt with this kind of deep water, we've never dealt with this amount of dispersants, we've never dealt with the Gulf," Helm said. "We're in a very early phase of the science here; there is not a lot of experimental work or practical work upon which to base the work we're doing."*

Roger Helm, chief of the contaminants division of the Fish and Wildlife Service

# Accounting for uncertainty

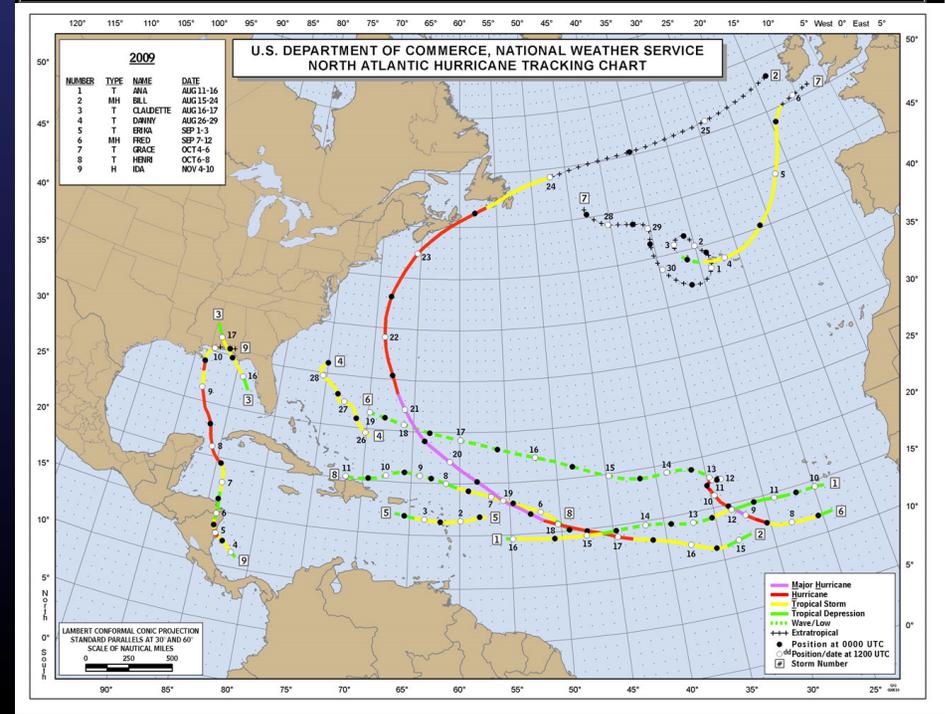
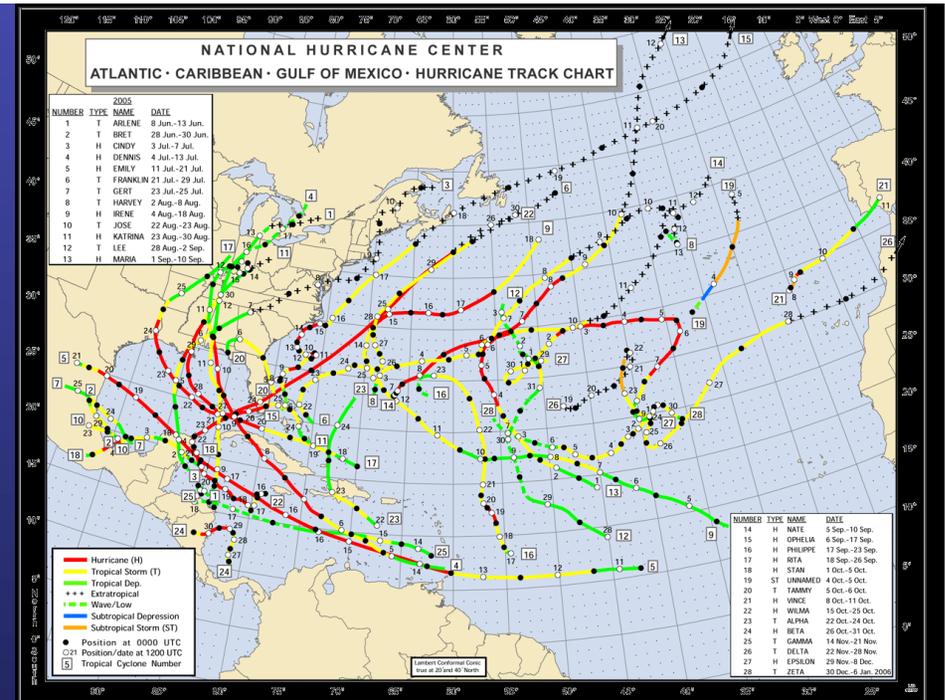
## Weather

### Named Storms:

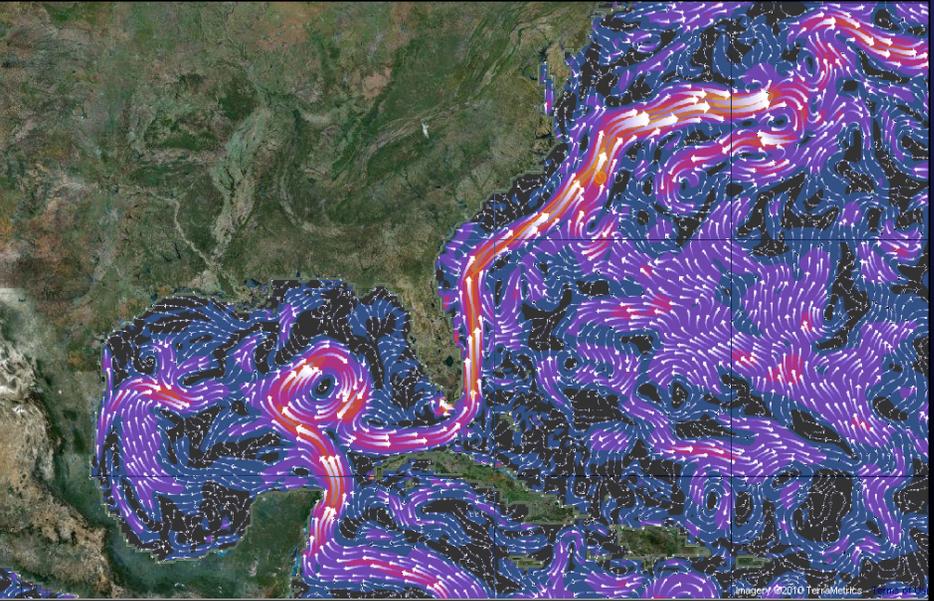
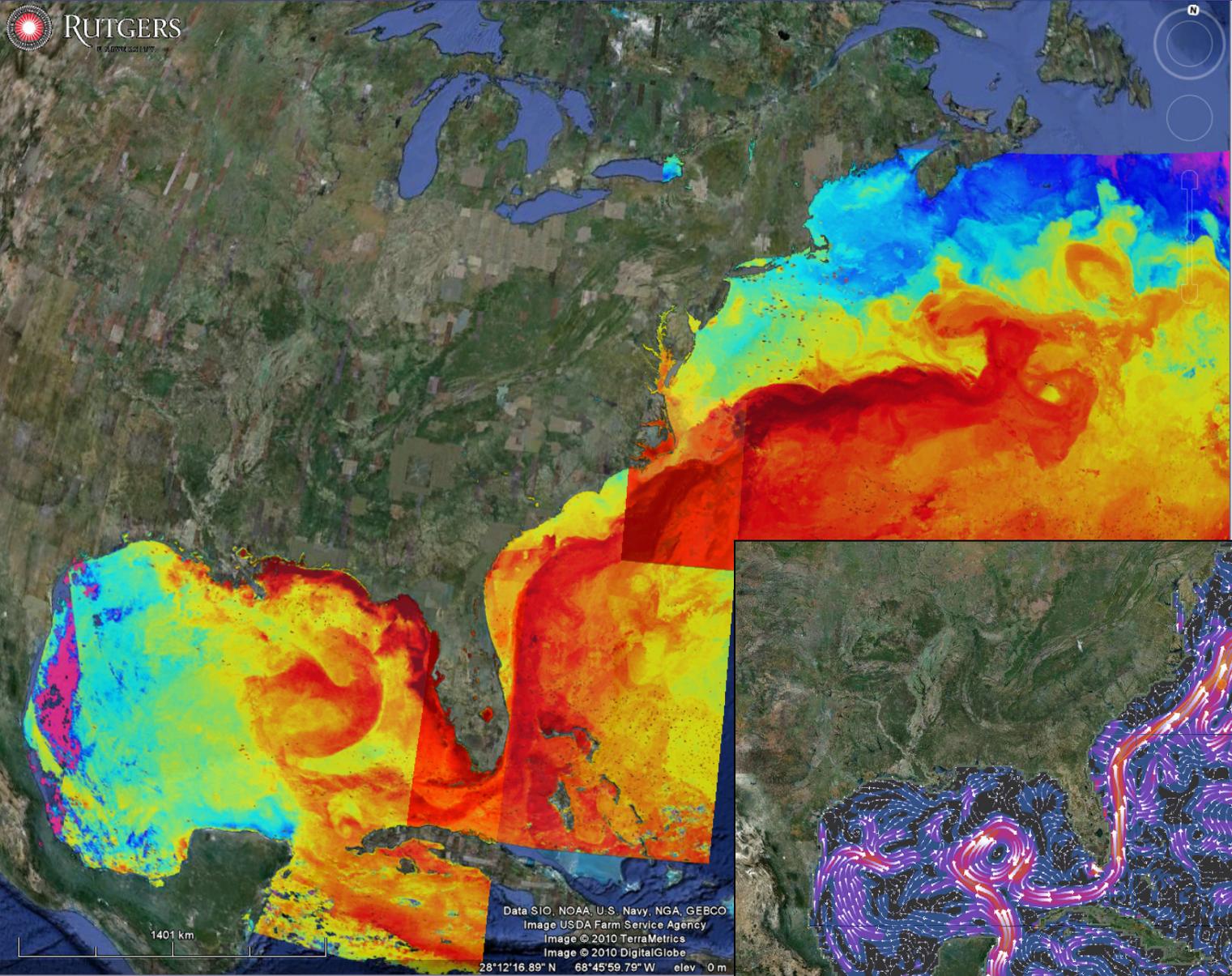
2005: 28

2009: 9

2010: Outlook to be released today at 10:00 am by NOAA

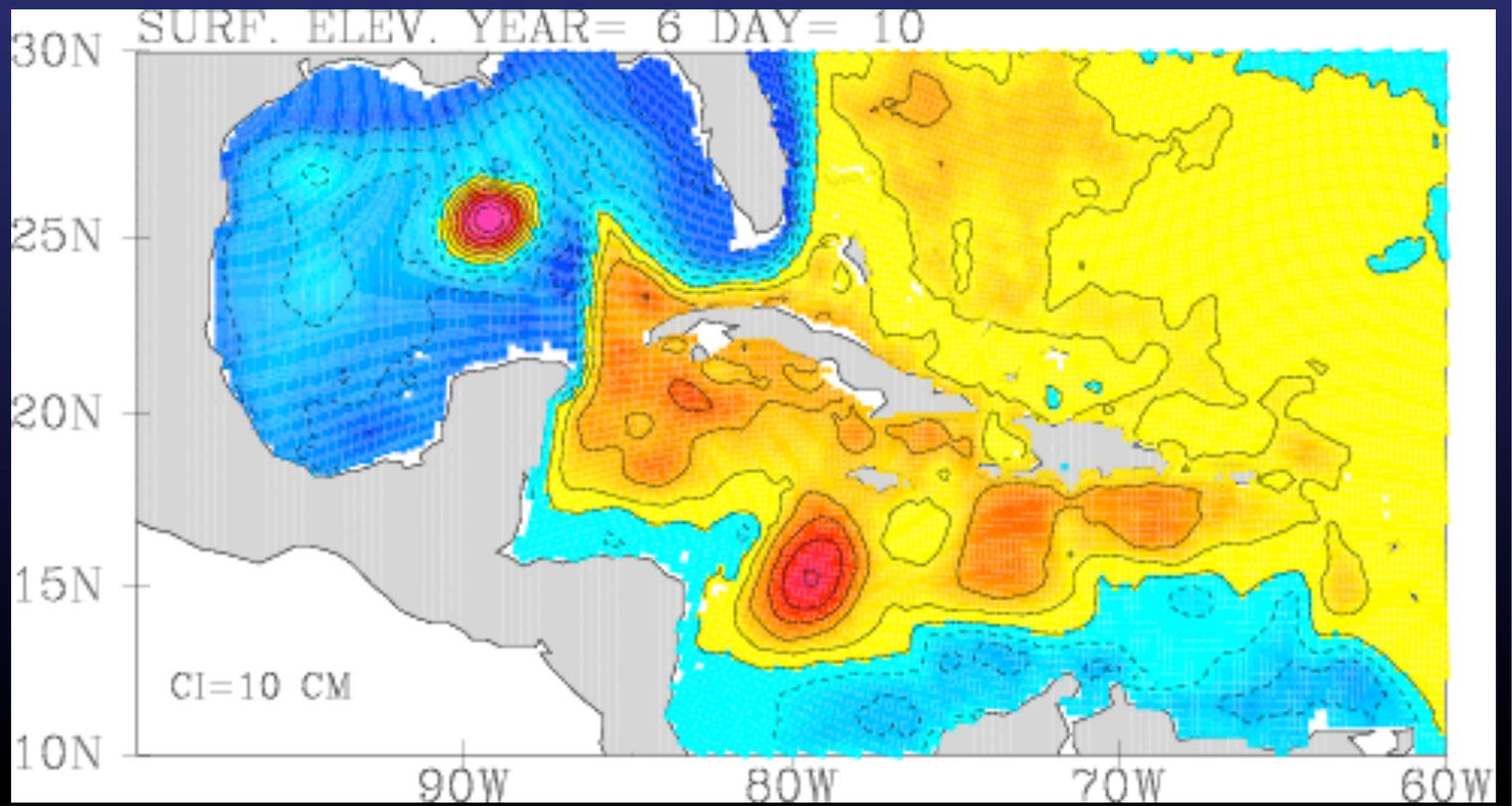


# Ocean Connections: Gulf of Mexico to New Jersey



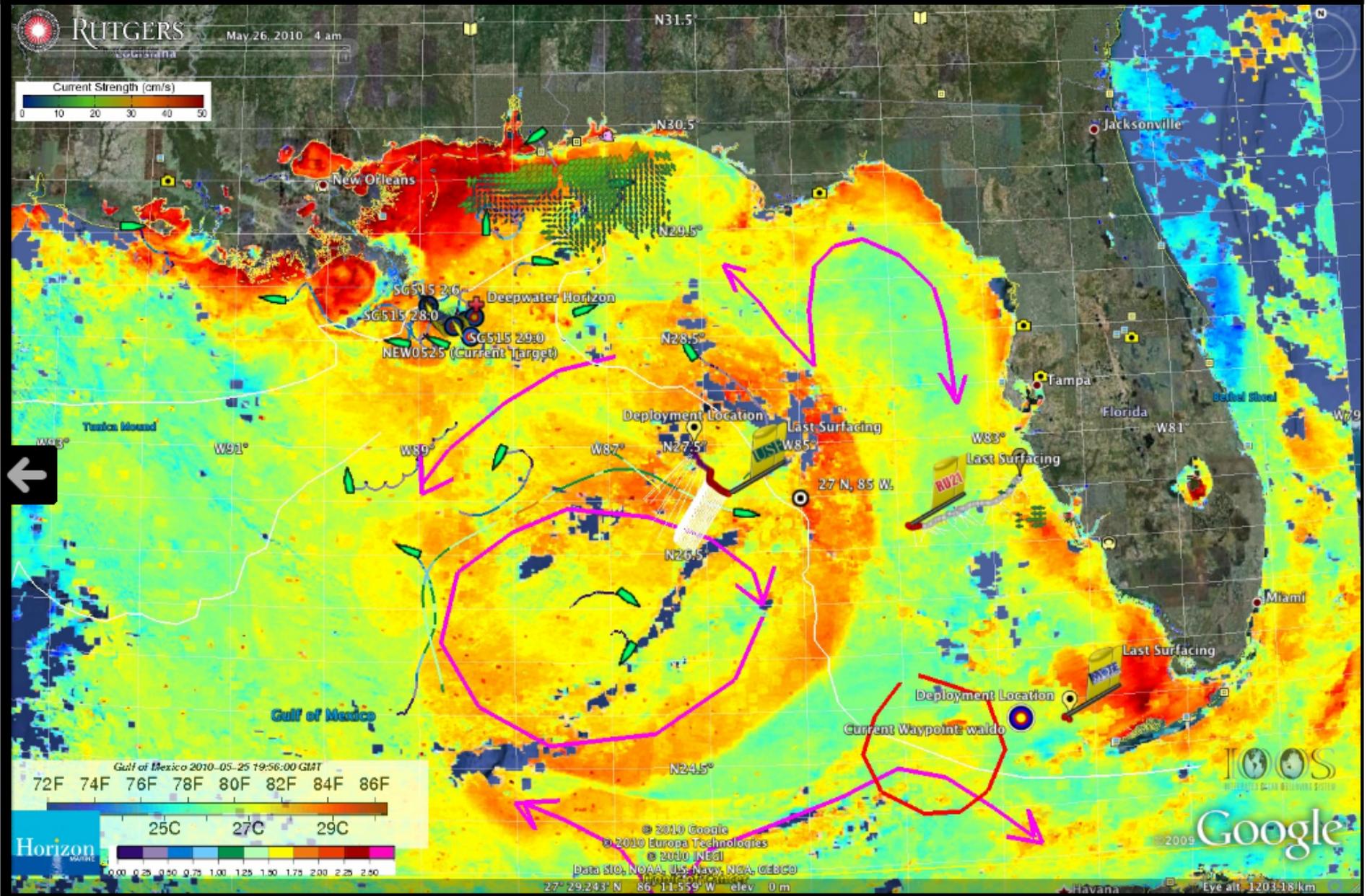
# Gulf of Mexico Oceanography

## *The Loop Current*

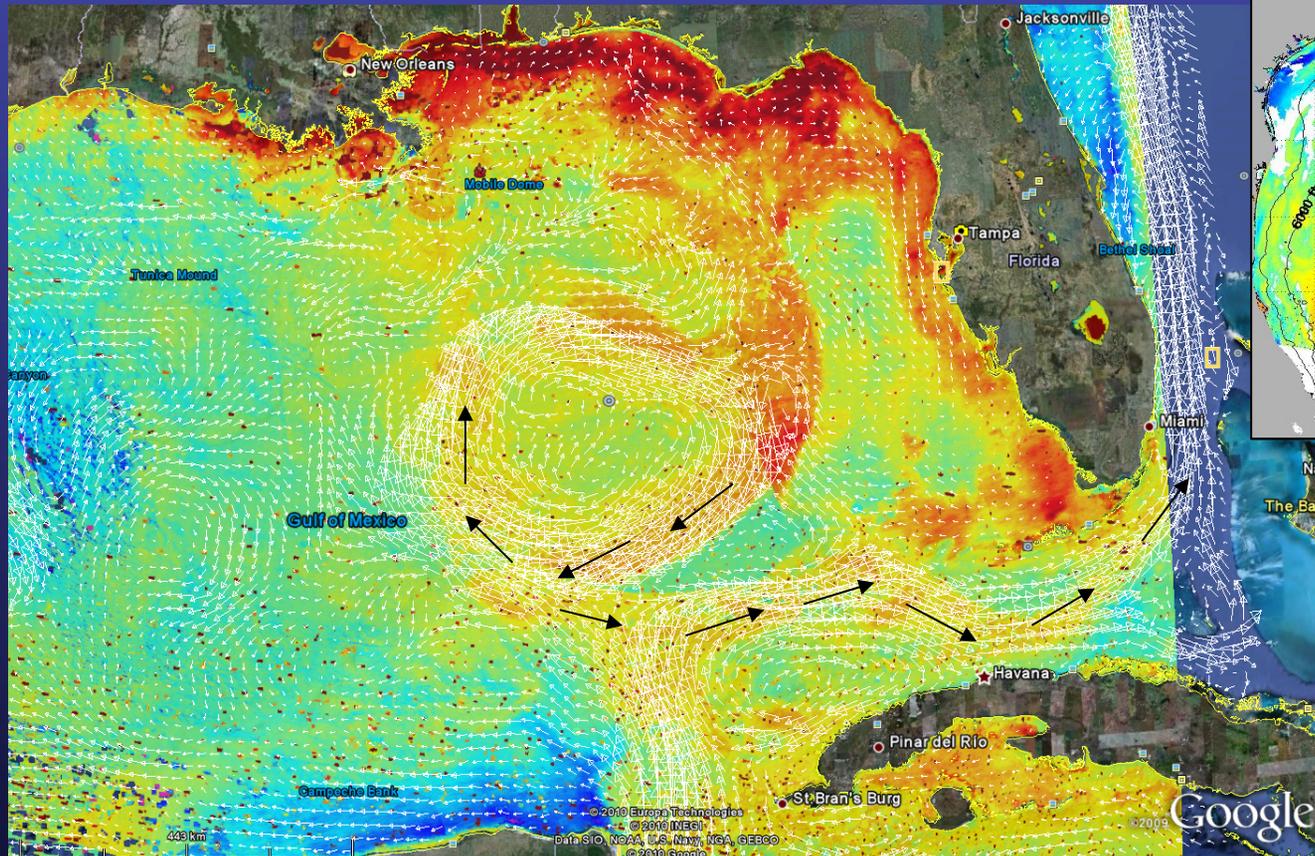


# Gulf being sampled with ships, drifters, and gliders

## Spatial information provided by satellites.



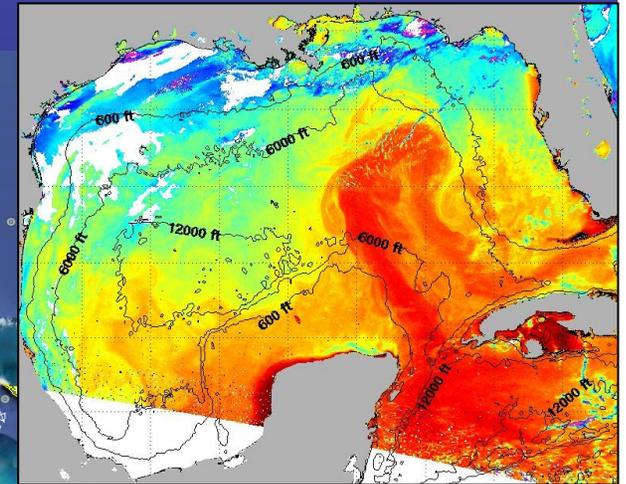
# Ocean Connections: Gulf of Mexico to Florida Straits



May 26, 2010

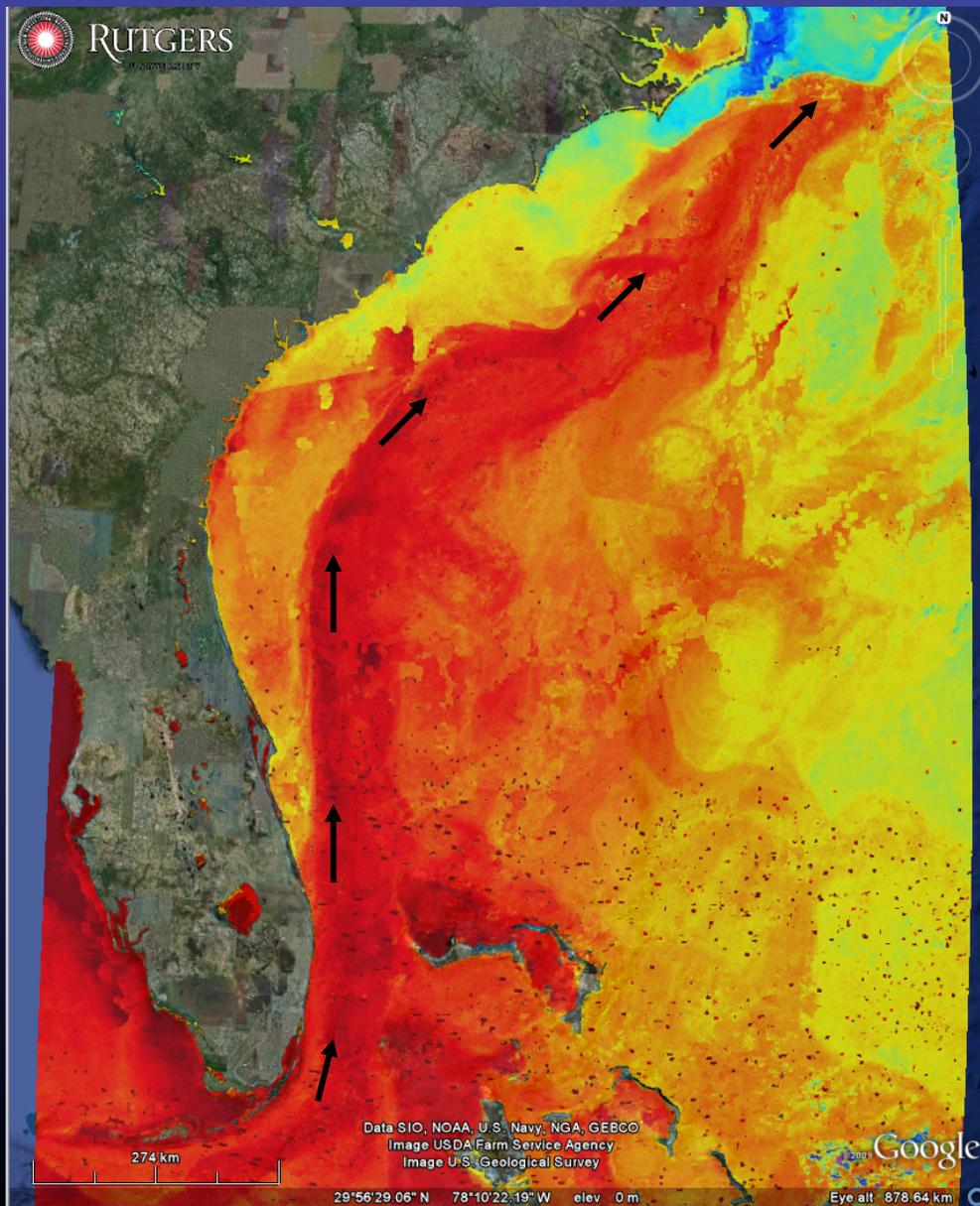
Typical ocean velocities: 2-3 mph

Estimated Arrival at the Florida Straits: ~ Mid June



May 8, 2010

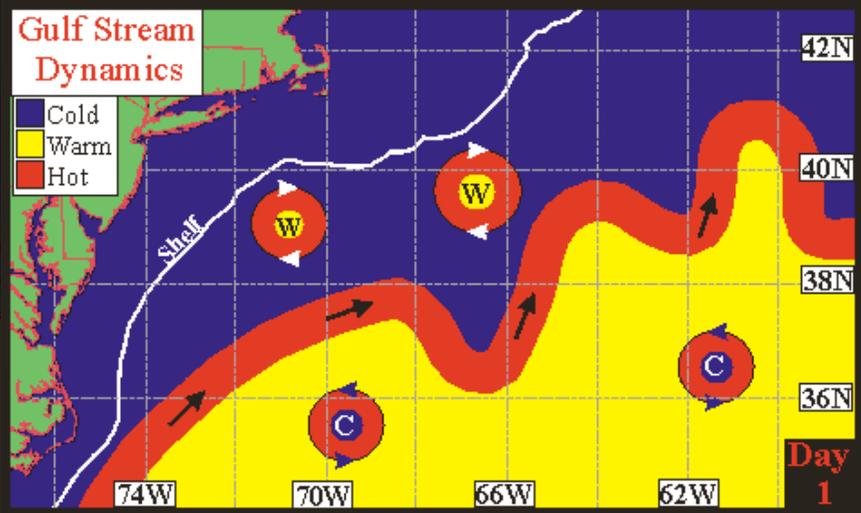
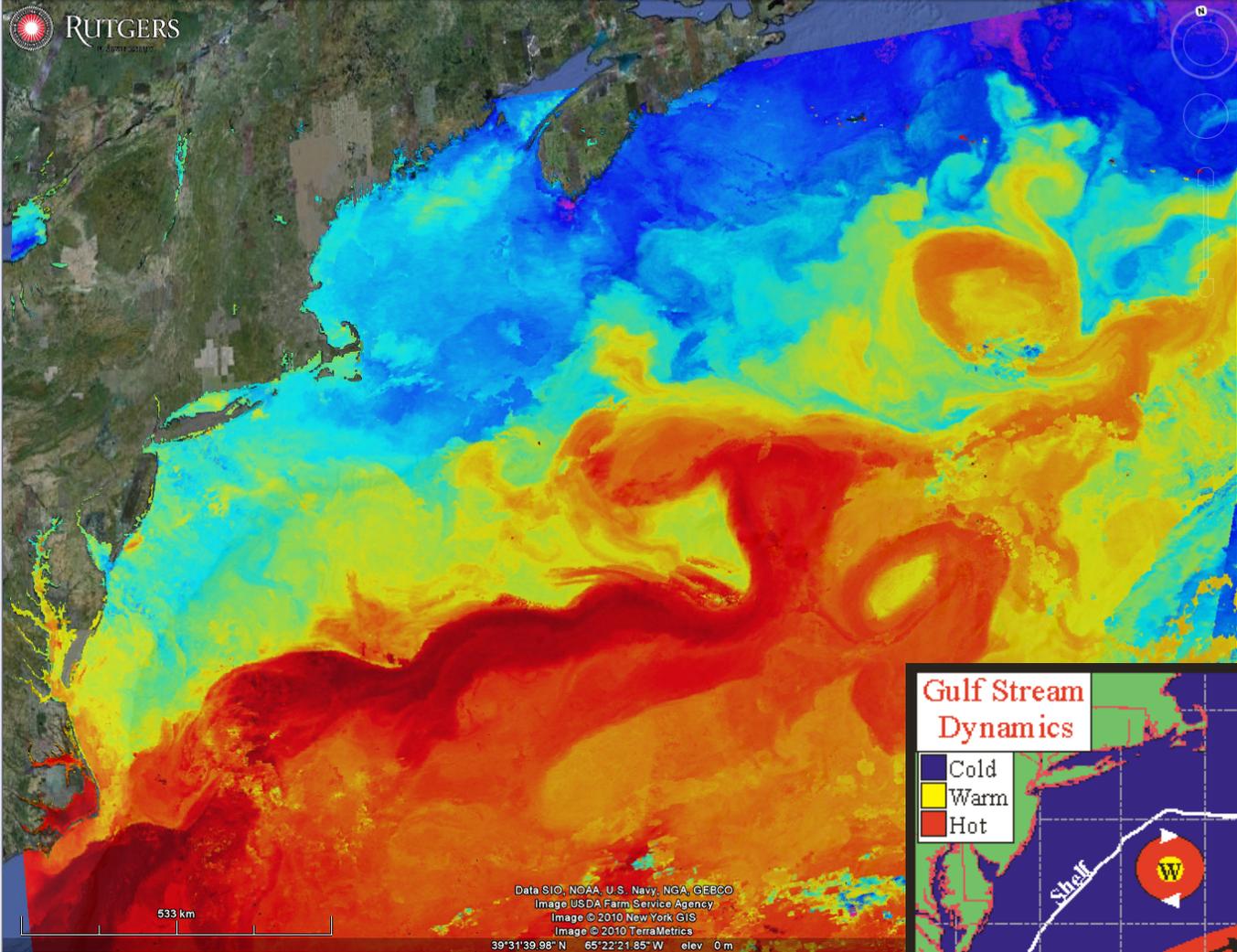
# Ocean Connections: Florida Straits to Cape Hatteras



Typical ocean velocities: 2-4 mph

Estimated arrival at the Cape Hatteras: ~ End of June

# Ocean Connections: Cape Hatteras to New Jersey

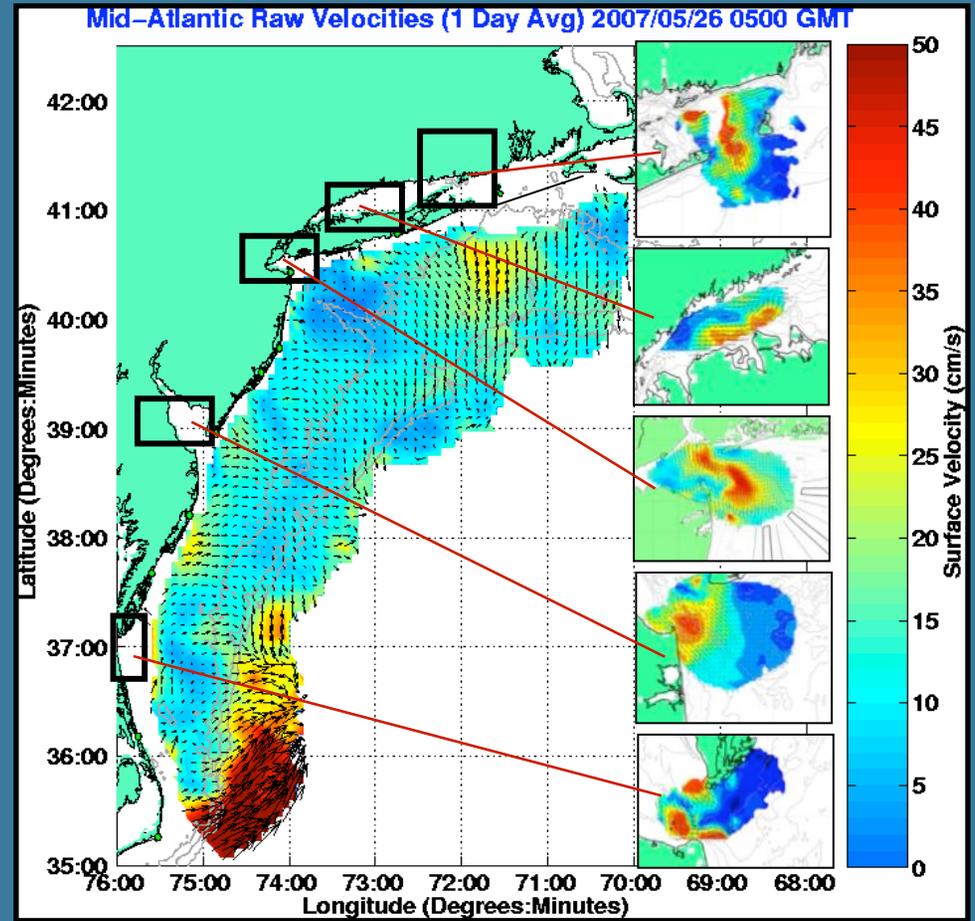
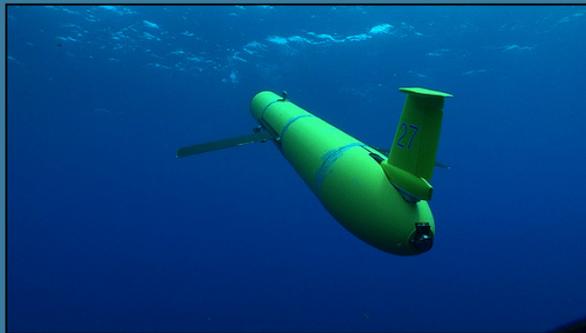
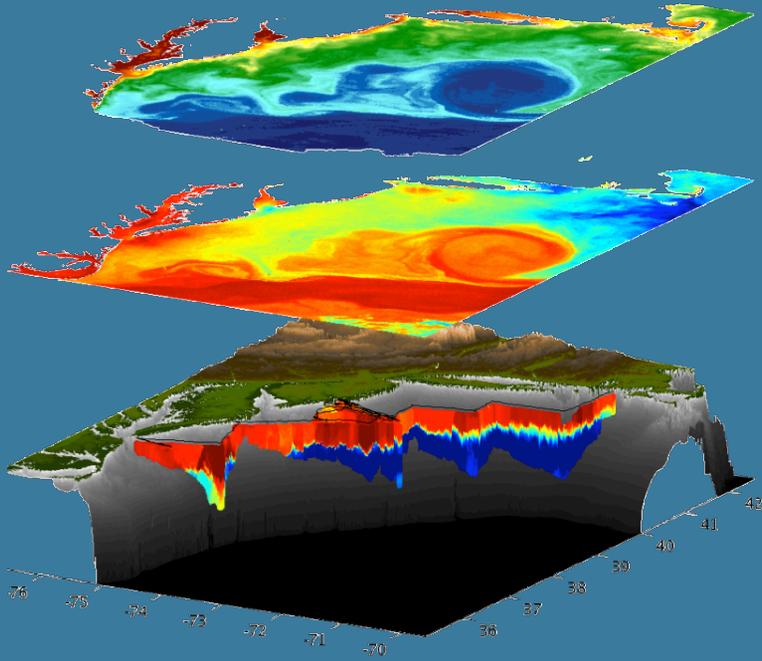


# Oil Spill Weathering: Slicks to Tarballs

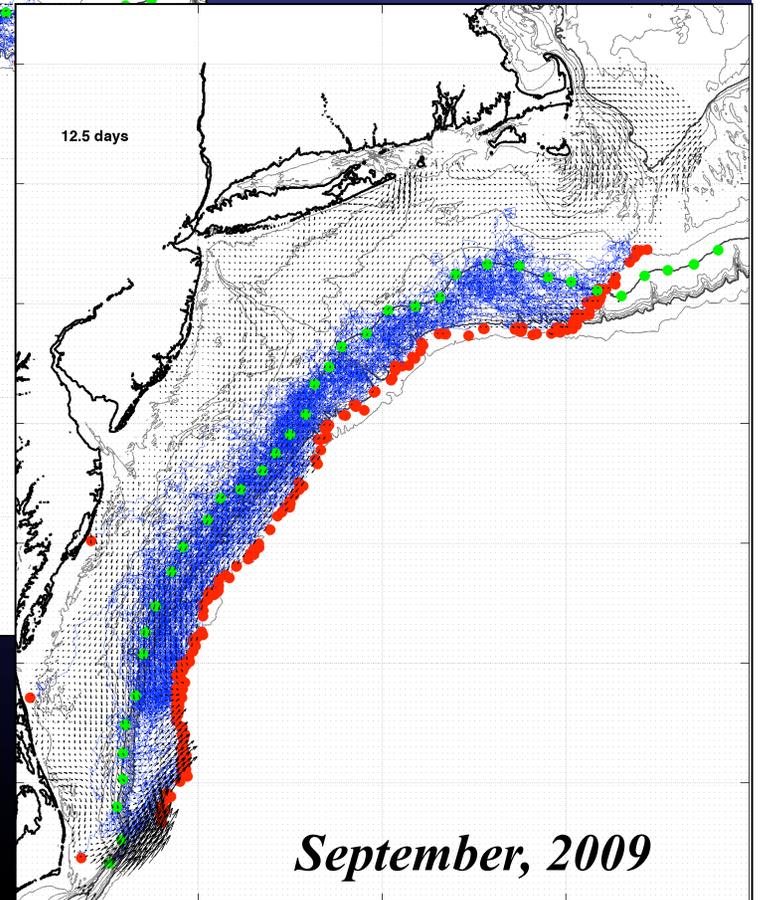
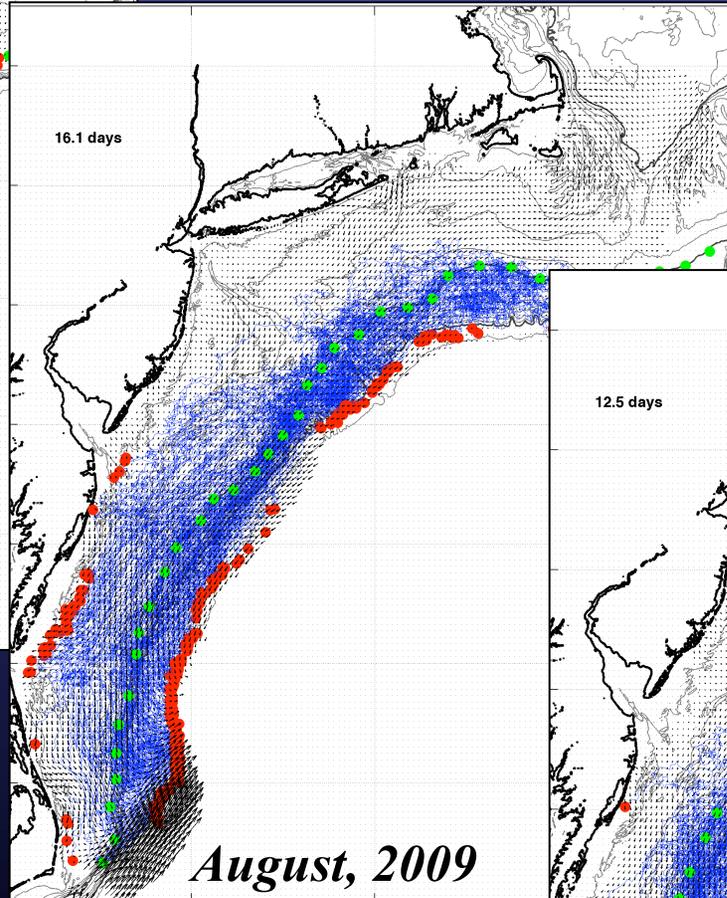
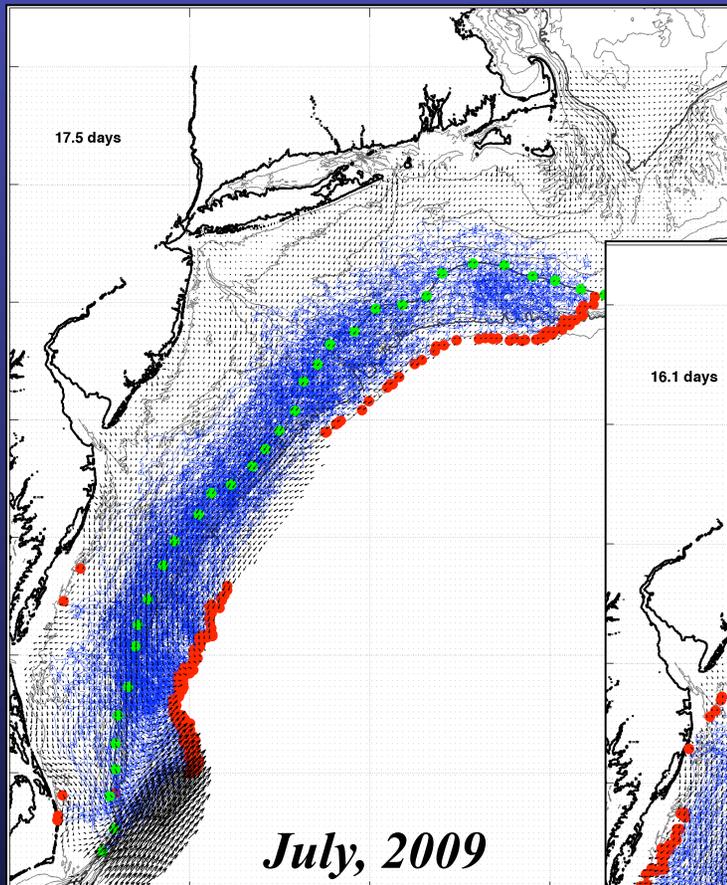


- During the first few hours of a spill, the oil spreads into a thin slick.
- Winds and waves stretch and tear the oil patches into smaller pieces, or tarballs.
- Weathering processes eventually create a tarball that is hard and crusty on the outside and soft and goeey on the inside.
- As air and water temperatures increase, tarballs become more fluid and, therefore, sticky--similar to an asphalt road warmed by the summer sun.
- The more sand and debris attached to a tarball, the more difficult it is to break the tarball open.

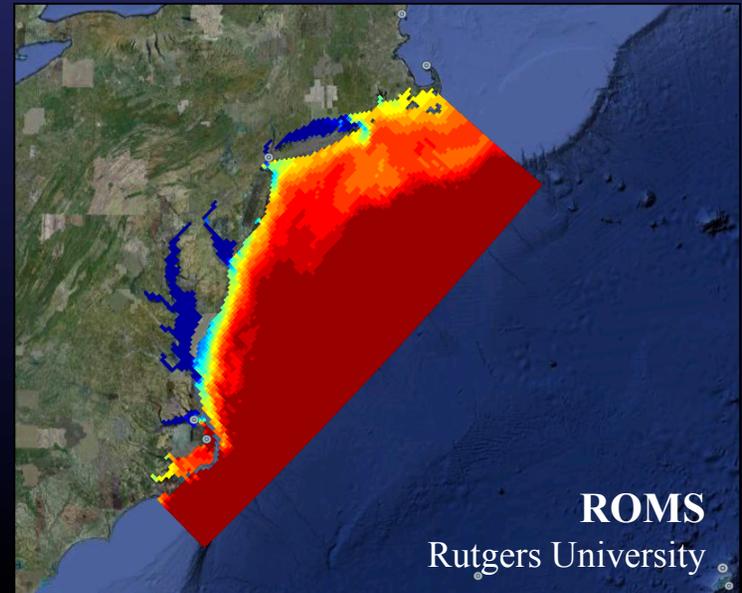
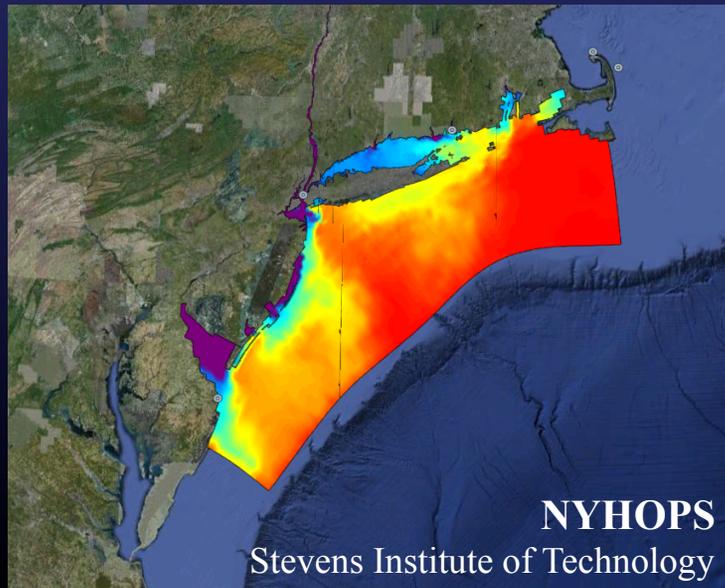
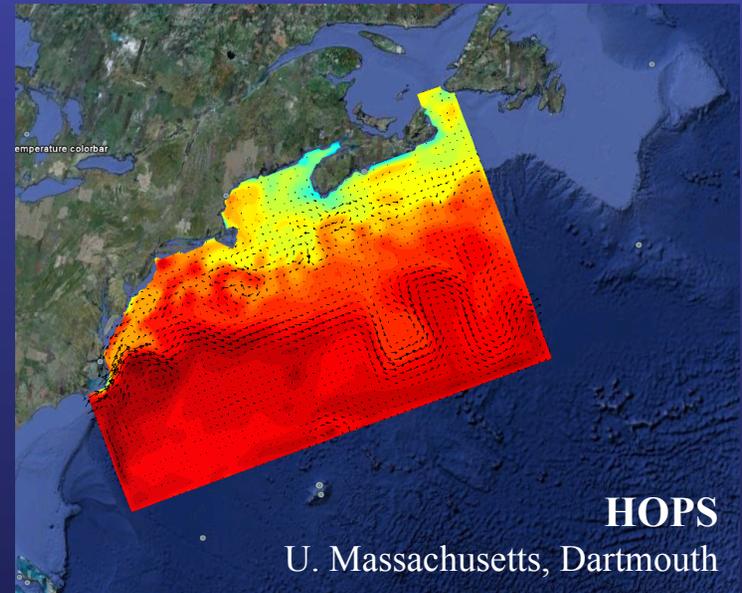
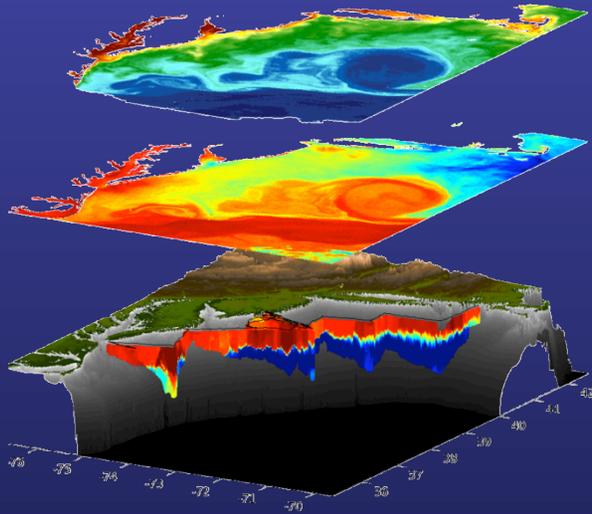




# Surface Trajectories

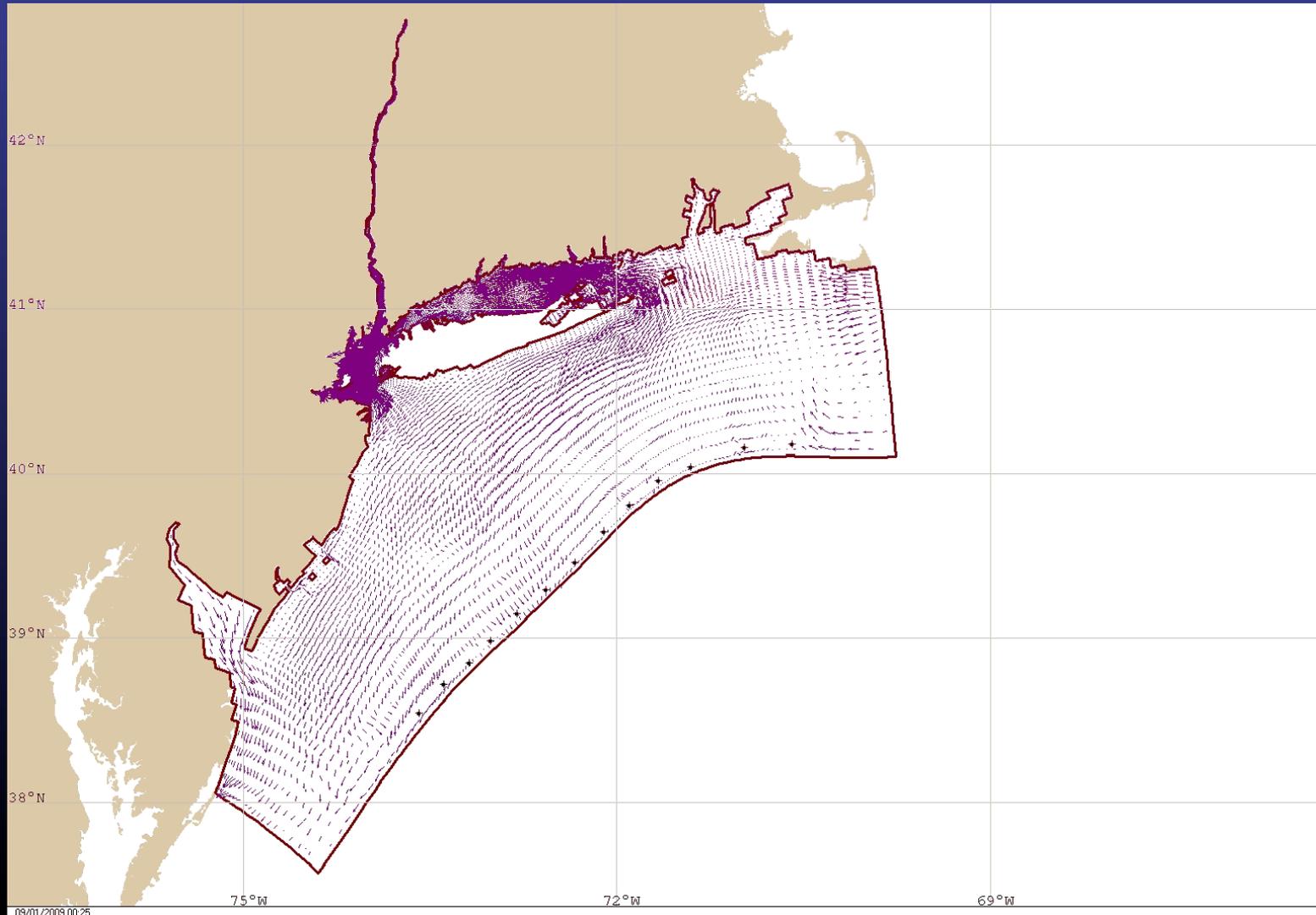


# Ocean Models

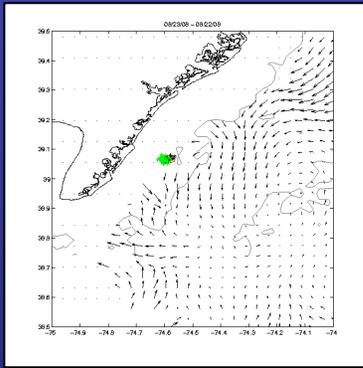


# Modeled Particle Trajectories

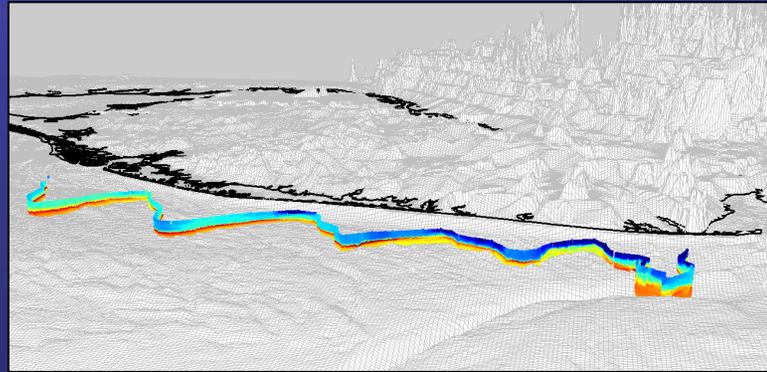
*Particles released September 1, 2009 to September 15, 2009*



# Local Predications: New Jersey Observations and Models



HF Radar



Gliders

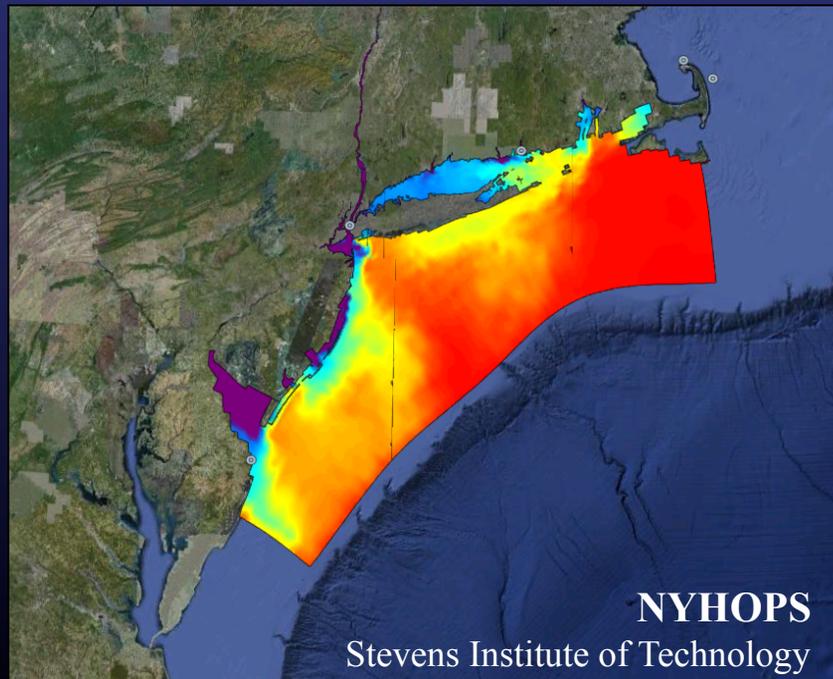
Observations focused on optimizing forecasts off the NJ Coast

RUTGERS

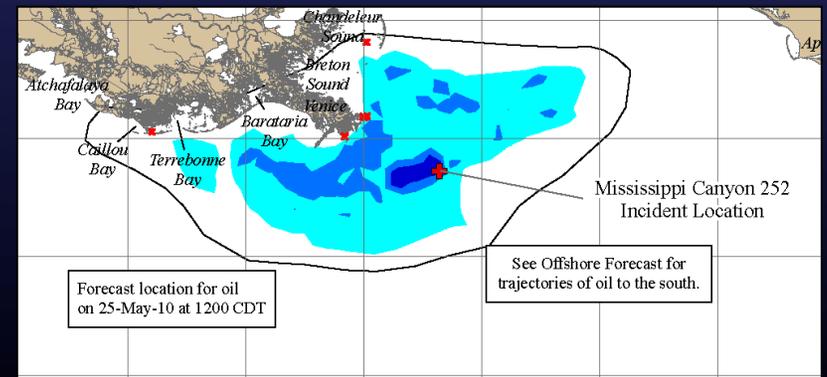
STEVENS  
Institute of Technology



Water Monitoring and Standards



Circulation Model



GNOME Oil Trajectories