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Ocean Weather Laboratory

Continuous Monitoring of the Gulf of Mexico
Ocean Weather Laboratory

**Mission:** to assemble and couple satellite remote sensing data with ocean models, *in situ* observations, and other remotely sensed products to fully characterize a 4-dimensional ocean.
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What is ocean weather?

How do we measure ocean weather?

What can we do with that information?

How does this apply to oil spills?
What is ocean weather?

Ocean Conditions at any given time

Ocean Weather Lab monitors Gulf of Mexico “weather” daily

Monitor: water movement
heat and energy
marine organisms
How do we measure ocean weather?

**SATELLITES**

Multiple ocean satellites in orbit since 1978

Measure surface properties (Temperature, Surface Height, Ocean Color)

Ocean color tells us what is in the water
  - Water quality
  - River plume boundaries
  - Algal blooms
  - Impacts from events (like oil spills)

Continuous ocean color data since 1998

VIIRS sensor is most advanced with 750 m resolution

Gulf of Mexico = 6,185,120 measurements each day
How do we measure ocean weather?

Chlorophyll = Phytoplankton distribution

Daily maps let us see how they grow and move due to water conditions

Very important for the marine ecosystem

Closely monitor to determine ecosystem health
How do we measure ocean weather?

**MODELS**

HYCOM and AMSEAS Navy models

Use input data to calculate unknowns

Currents, temperature, salinity and other physical fields

Provide depth estimates of conditions

3km Resolution – can be varied

Forecast of conditions out to several days
How do we measure ocean weather?

- Current strength
- Track major water movements
- Able to measure the depth of currents
- Loop Current in the Gulf of Mexico drives much of the water movement for the entire Gulf
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What can we do with that information?

Use Google Earth to ‘see’ complex data

Observe large processes across different time scales

Merge environmental and biological information
What can we do with that information?

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- Observe large processes across different time scales
- Merge environmental and biological information
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**What can we do with that information?**

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- Observe large processes across different time scales
- Merge environmental and biological information
How does this apply to oil spills?
Fortunately there have been no oil spills recently. Ocean color can detect the impact of other events – we can be prepared.

Here flood waters move into an offshore area and cause phytoplankton growth.

This growth has detrimental effects on local coral.

How does this apply to oil spills?
The significance of the abnormality can be seen in a plot over time. Peak values show that this incident was high, but not isolated. It was, however, longer lasting than usual events. This may have caused more disruption to the coral ecosystem.

*How does this apply to oil spills?*
QUESTIONS?