# Upper Ocean Response to 2002 Hurricanes Isidore and Lili in Tandem

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## Coupled Atmosphere-Wave-Ocean Modeling System for Hurricane Predictions



# Coupled Modeling System

### •MM5 (PSU/NCAR)

(vortex-following nests with 45, 15, 5, and 1.67 km grid spacing, NCEP analysis and AVHRR or TMI/AMSR-E SST) •WAVEWATCH III (NOAA/EMC)

(1/6°, 25 frequency bands, 48 directional bands) •HYCOM (UMiami/NRL)

 (1/12°, 22 vertical levels with 4-6 in the ocean mixed layer)
•3DUOM (WHOI's 3-D Upper Ocean Circulation Models) (15 km, 30 vertical levels with 4-6 in the ocean mixed layer)





#### PWP Model Surface Current and SST (°C) for 0000 UTC 22 Aug 1998

Minimum SLP for Bonnie (1998)



## Hurricanes Isidore and Lili (2002) in tandem

#### Hurricane Isidore

#### Hurricane Lili

21:00 Sat September 14, 2002 to 21:00 Thu September 26, 2002 U 21:00 Sat September 21, 2002 to 09:00 Fri October 4, 2002 UTC



# Objectives

► To examine the upper ocean circulation in response to a dual hurricane passage in the Gulf of Mexico.

> To test HYCOM performance under high-resolution, complex atmospheric forcing.

# **HYCOM Configuration**

- one-way nested Western Atlantic-Gulf of Mexico-Caribbean Sea regional domain with data assimilation of SSH and SST prior to hurricane simulations
- 0.08 degree grid spacing
- 22 Vertical layer, 4-6 layers in mixed layer with the 1<sup>st</sup> layer at 3 meter
- MM5 atmospheric forcing, 17 August 17 October 2002 (1.67-km grid resolution during Hurricanes Isidore and Lili, 45-km in pre- and post-hurricane periods)



## Hurricane Isidore

## Hurricane Lili







# **Pre-Isidore**

# SSHA (satellite)



SST / SSC Sep.18,2002 00:00:00





SST / SSC Sep.18,2002 00:00:00



# SST pre- and post-Isidore





# SST Cooling post-Isidore



Satellite

### HYCOM

# SST pre- and post-Lili



## SST Cooling post-Lili



Satellite

HYCOM

SST / SSC Sep.18,2002 00:00:00



#### A: Gulf Common Water

### B: Loop Current



# satellite

### SSH & SST data assimilation O.M. Smedstad

SST / SSC Sep.18,2002 00:00:00





## 21 days SST data assimilation

## SSH data assimilation only



SST / SSC Sep.18,2002 00:00:00

