

Towards models for barotropic and baroclinic circulation in the Choctawhatchee Bay and River System

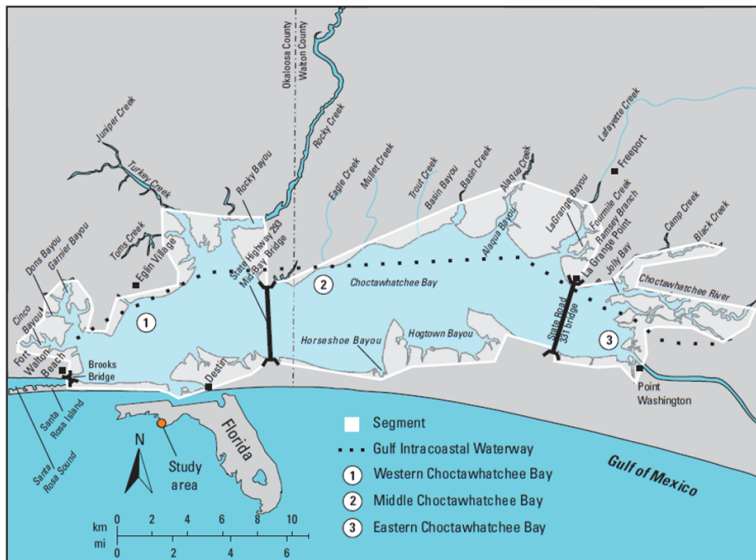
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*2016 Fall CARTHE II Fall All Hands Meeting
November 15-16, University of Miami*



Study Area: Choctawhatchee Bay and River System



Surfzone Coastal Oil Pathways Experiment (SCOPE)

Satellite Imagery

12/05/2013 11:34:19

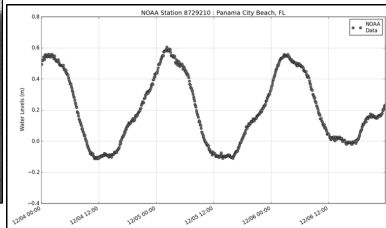
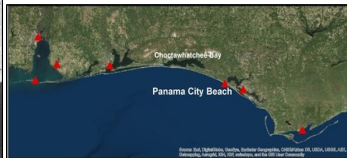
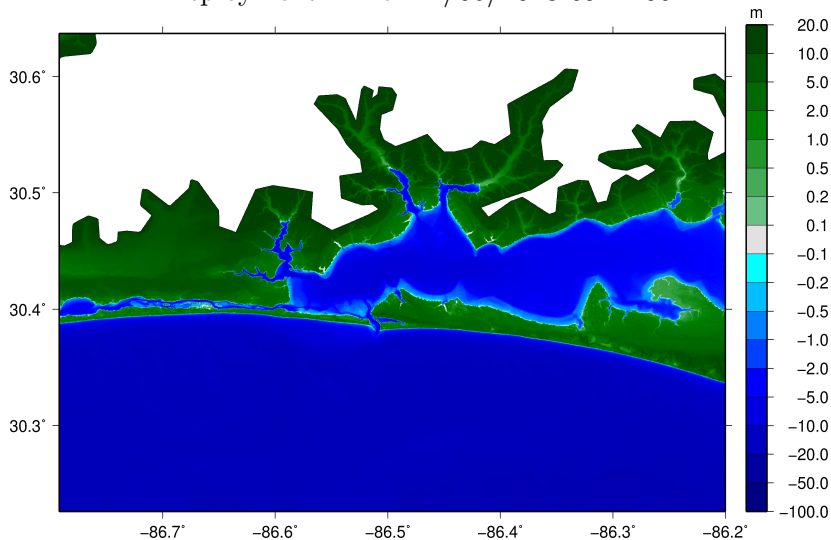


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Surfzone Coastal Oil Pathways Experiment (SCOPE)

Drifter Deployment

Deployment Time: 12/06/2013 09:11:00



Research Objectives

Explore available experimental data

Develop barotropic and baroclinic models for Choctawhatchee River and Bay System

- ▶ **Leverage and improve existing ADCIRC meshes**
- ▶ **Depth-averaged currents using barotropic ADCIRC 2D**
- ▶ Implement ADCIRC 3D barotropic and baroclinic

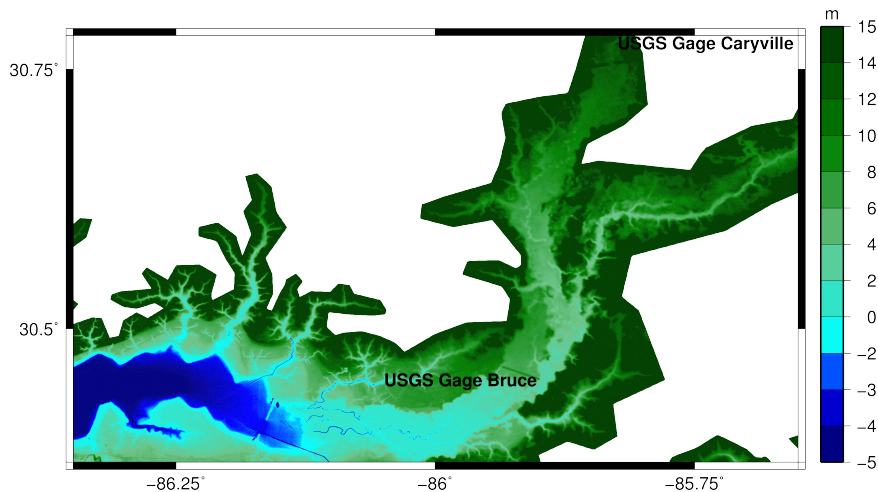
Model the influence of the incoming freshwater discharge

- ▶ **Increase resolution along the Choctawhatchee River**
- ▶ **Implement river boundary condition using synthetic channels**
- ▶ Implement incoming discharge via realistic channel profile

Study the spatial extent and behavior of the freshwater plume coming out through the inlet

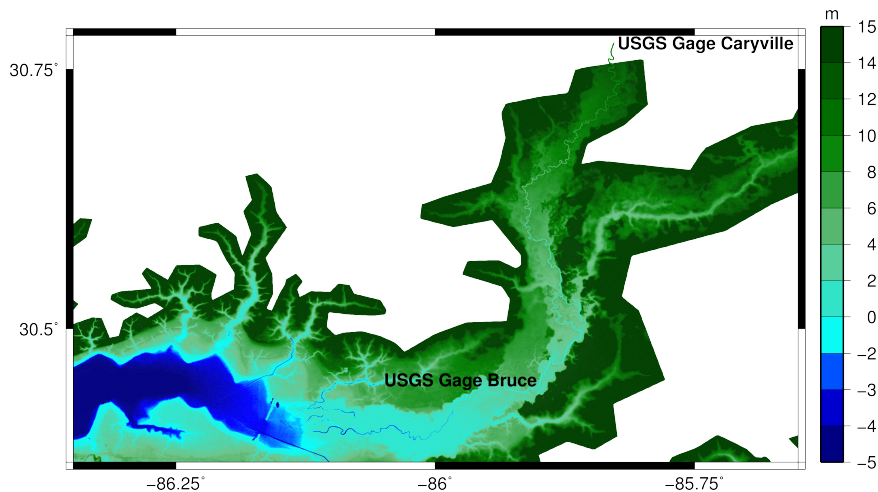
Mesh Development

Adding resolution along Choctawhatchee River



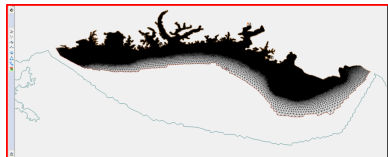
Mesh Development

Adding resolution along Choctawhatchee River

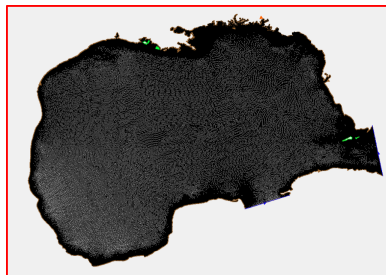


Mesh Development

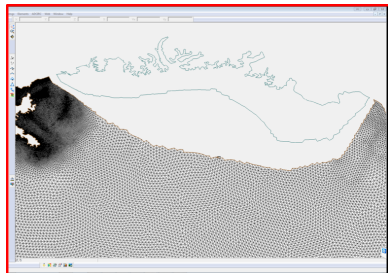
Adding resolution in the open ocean



Original mesh with highly resolved flood plains



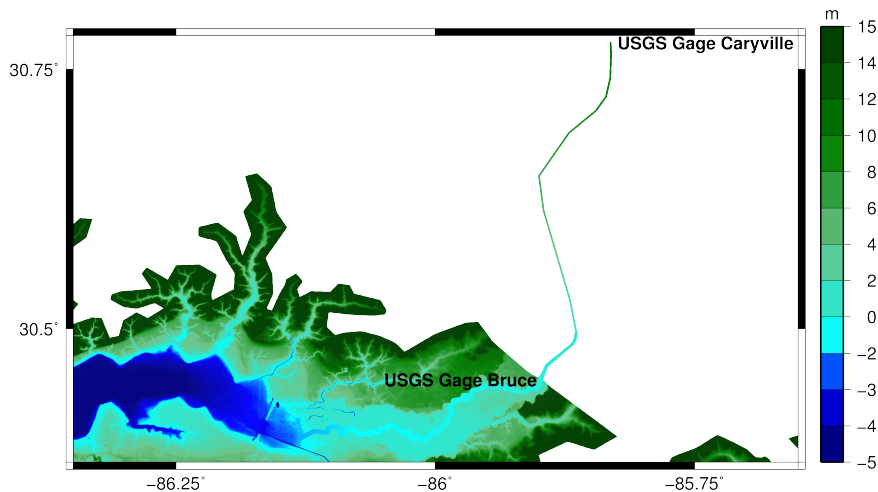
Combined mesh maintaining resolution in the flood plains with enhanced resolution in the open ocean



SURA mesh with open ocean resolution = 6km

Mesh Development

Developing synthetic channel



Model Validation: Water levels

Stage-discharge comparisons

Discharge (cms)	Observed Stage (m)	ADCIRC water levels (m)
100	2.16	0.63
200	2.19	1.1
300	3.45	1.42
1000	5.0	3.1

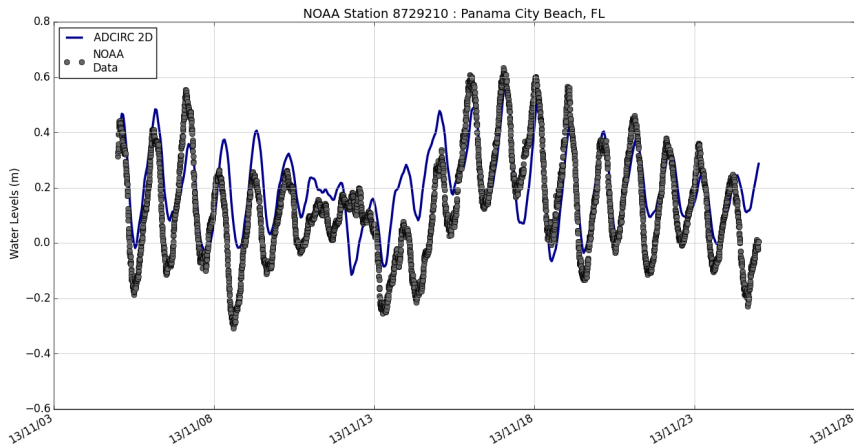
Table: USGS gage at Bruce, FL

Discharge (cms)	Observed Stage (m)	ADCIRC water levels (m)
100	13.6	13.33
200	14.67	13.85
300	15.08	14.28
1000	16.37	16.35

Table: USGS gage at Caryville, FL

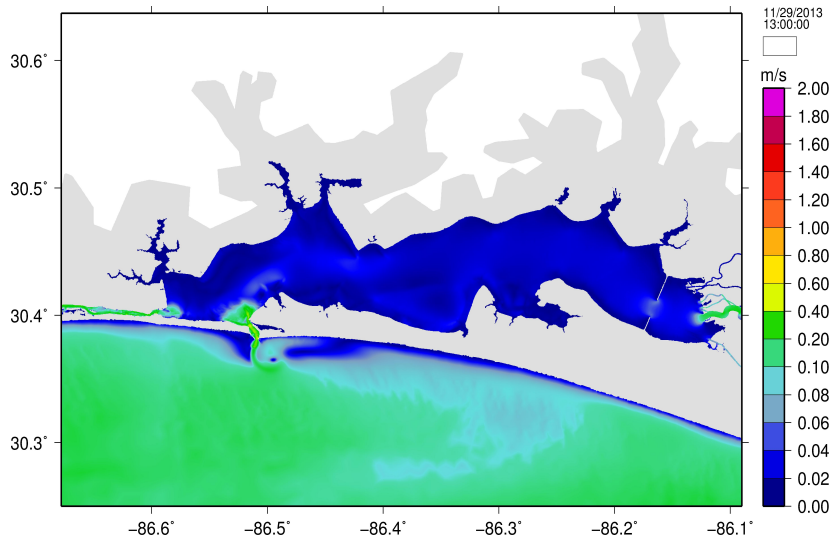
Model Validation: Water Levels

Time series at NOAA gauges



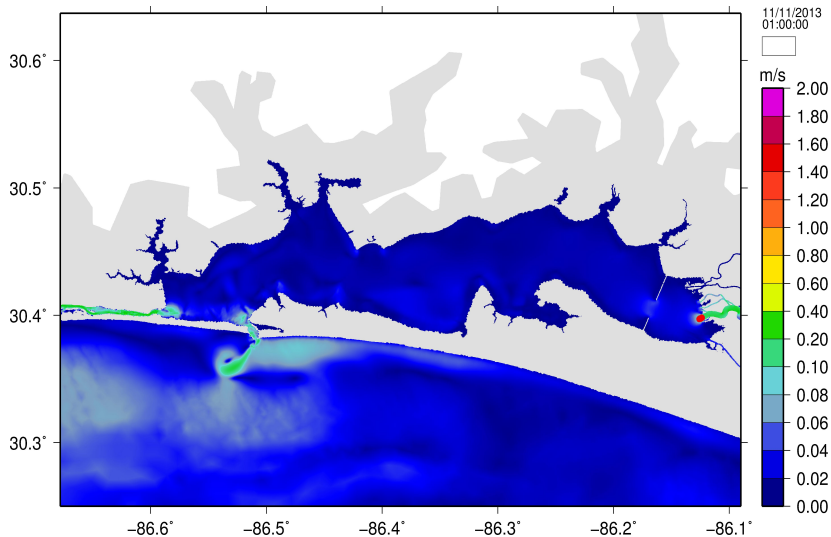
Model Results: Currents

Depth Averaged Currents in the Choctawhatchee Bay



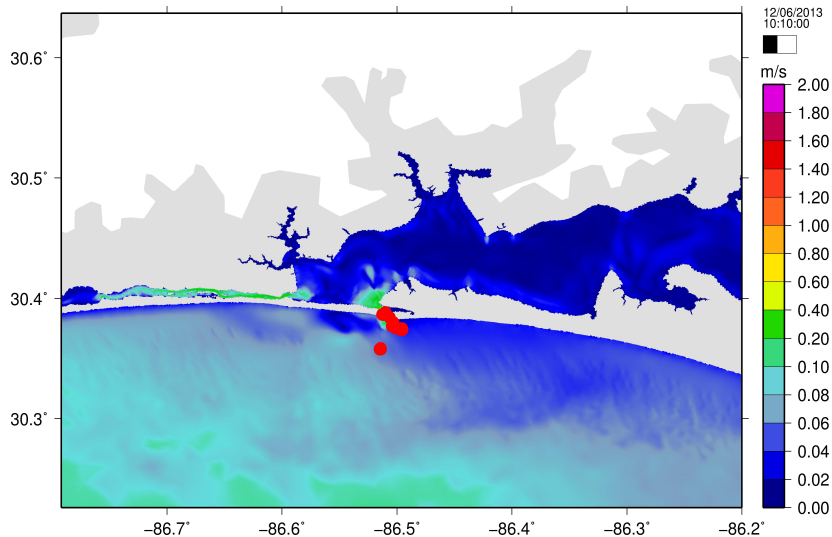
Model Results: Currents

Hypothetical Drifters



Model Validation: Currents

Comparison to real drifters



Ongoing Work

Complete model validation for synthetic and realistic channel

- ▶ Stage/discharge curves at USGS gages
- ▶ SCOPE drifter trajectories
- ▶ Satellite Imagery
- ▶ NOAA gauges

Implement incoming discharge through realistic channel profile

Acquire initial/boundary conditions for salinity and temperature profiles

Application of ADCIRC 3D in baroclinic mode