BOEM
Bureau of Ocean Energy Management

OSC Scientific Committee Meeting
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Gulf of Mexico Region
Physical Science Studies

Page #	Break-out	Title	Rank
23	PO	Cumulative Impacts Modeling in the Gulf of Mexico Region (Ensz)	FY2014 #1
25	PO	Trends Analysis of OCS Emissions in the Gulf of Mexico (Ensz)	FY2014 #2
47	PO	Synthesizing and Quantifying Environmental Effects on the Gulf of Mexico (O'Reilly)	FY2014 #11
85	PO	Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico (Green)	FY2015 N/A
93	PO	Workshop on Developing a New, Leveraged Approach to Long-Term Monitoring in the Gulf of Mexico Using Stations (O'Reilly)	FY2015 N/A

PO = Physical Oceanography
PS = Protected Species
FE = Fate & Effect
SE = Social & Economic
BIO = Biology
OT = Other

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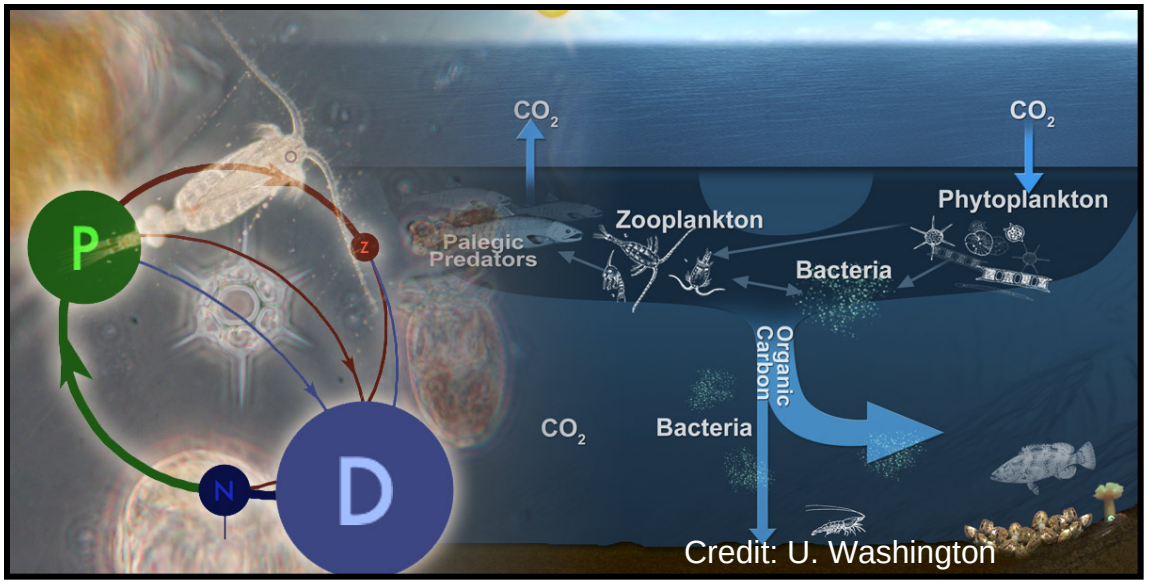
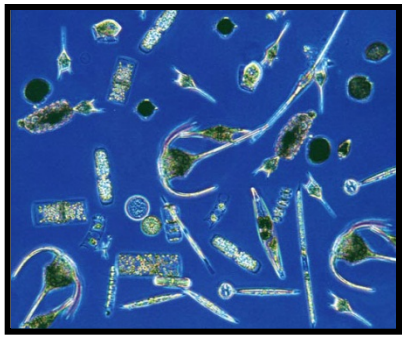
Physical Science Studies

Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico





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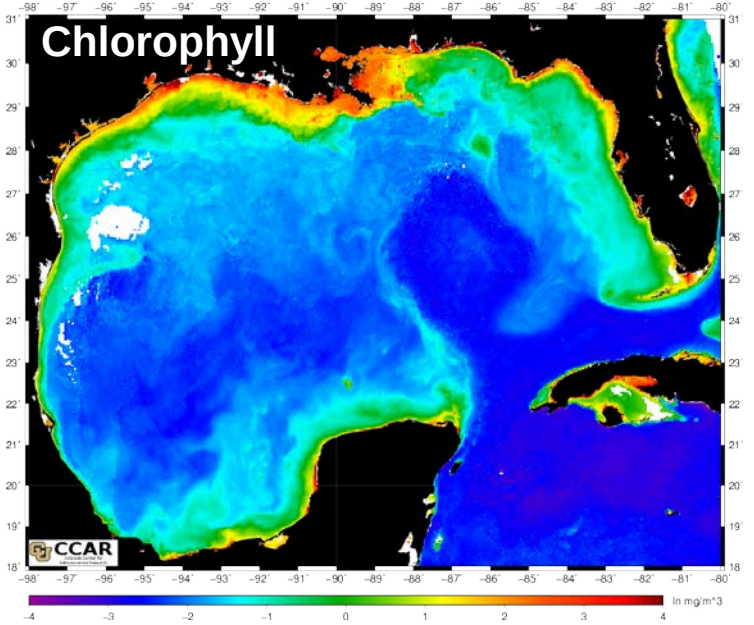
Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico

BOEM Information Needs:

- NEPA – Inform current state of productivity & impact of perturbations.
- Statistical summaries for Relative Environmental Sensitivity Analyses.
- OCSLA - Predictive capability to assess future cumulative impacts of oil and gas industry on marine biota, including climate-related impacts.

Date Information is Required:

- As soon as possible …
- Further model applications:
  (1) Higher-trophic habitat
  (2) Air-quality



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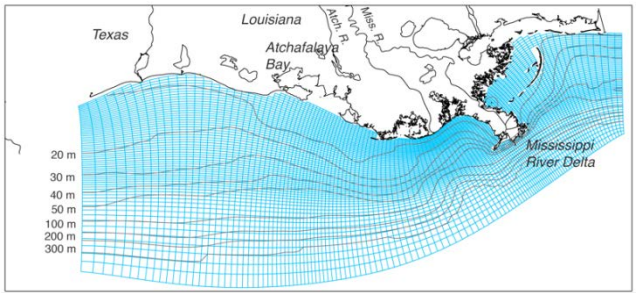
Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico

Background:

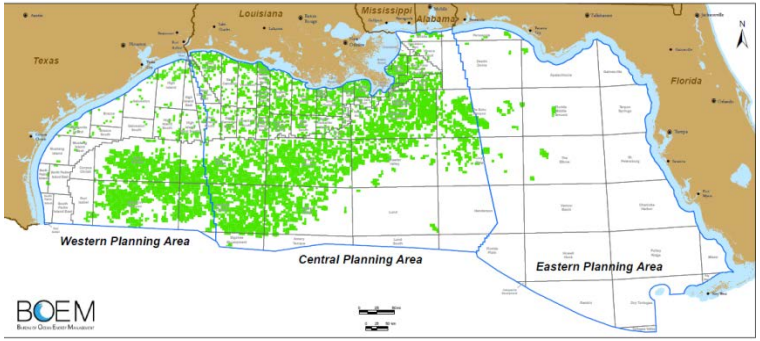
A) Relationship with Previous Work/Efforts

- Fifty-year evolution of circulation and ecosystem concepts, including Walsh's (1989) nitrogen modeling.
- Previous BOEM study expanded LATEX bio-physical modeling.
- Regional vs. basin-wide models with relevance to large O & G footprint.
- Historical data: Phys-O, SE Area Monitoring & Assessment Program (SEAMAP), Sperm Whale Acoustic Prey Study (SWAPS), etc.

Regional Models



vs. Gulf-wide Model Needs



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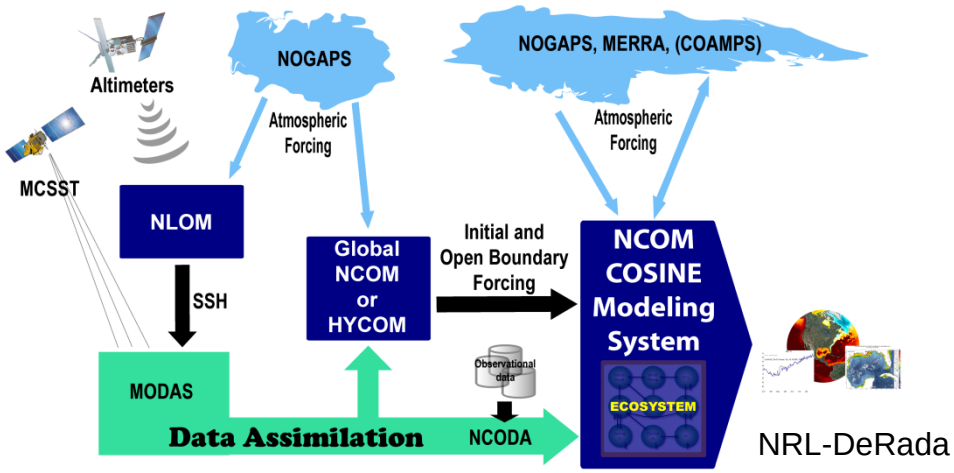
Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico

Background:

B) Relationship with Concurrent/Future Efforts

- Two Gulf-wide models in development (NRL, NCSU).
- Long time periods examined (1979-2050) using IPCC projections.
- Partnerships developing for decision-making applications.
- Studies on relationships between higher-trophic levels, habitat, and prey.



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Simulating Planktonic Prey and Higher-Trophic Habitat Variability in the Gulf of Mexico

Study's Objectives:

#1 -- Simulate planktonic distributions and higher-trophic habitat at higher spatio-temporal scales Gulf-wide.

#2 -- Provide model validation and statistical summaries of model output.

#3 – Develop a predictive ecosystem capability for estimating potential cumulative impacts of O & G industry in comparison to other stressors.

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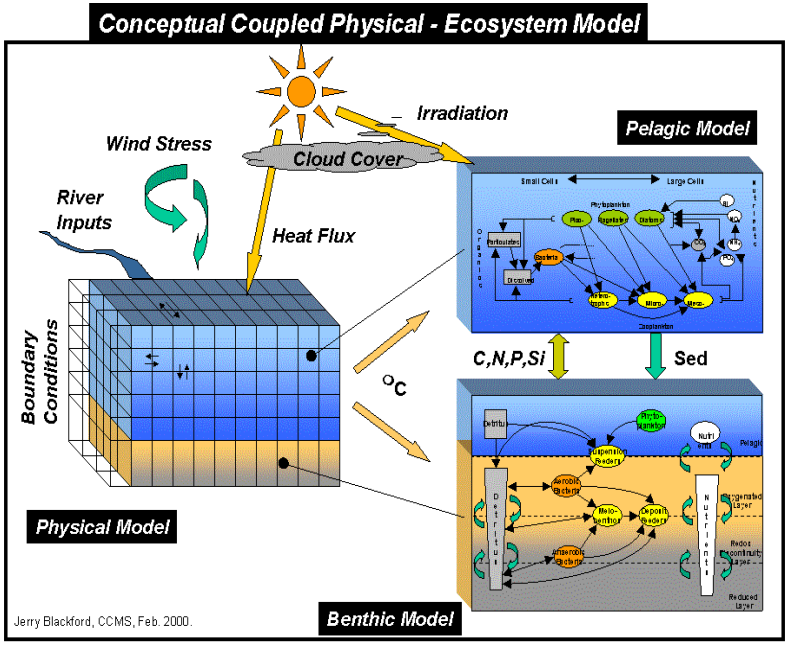
Study's Methods:

- Develop, validate, and implement coupled bio-physical model.
- Input climatology to determine long-term variability in ecosystem processes.
- Model variability in potential higher-trophic habitat using observed relationships.
- Apply nested, higher-resolution model in areas of especial interest (e.g., DeSoto & Miss. Canyons).



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Additional *Pertinent* Information

- Provide recommendations for future observational work and numerical modeling.
- Potential to leverage NASA funding.
- Most of $1M cost estimate to labor for developing, validating, and applying the model.
- Decision-support tool to inform management on potential impacts of leasing activities.