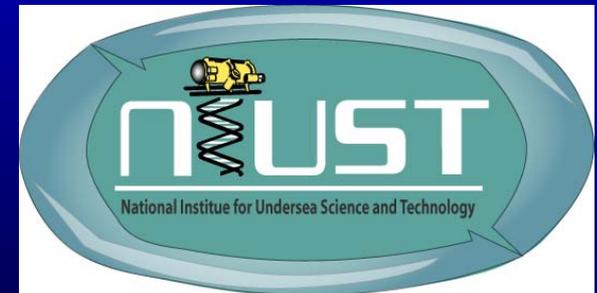


# SEAGRASS HEALTH MODELING AND PREDICTION WITH NASA SCIENCE DATA



**Greg Easson**  
**University of Mississippi**



**Grand Bay**  
**National Estuarine Research Reserve**

# Seagrass Communities

**Worldwide- one of the most important marine ecosystems:**

- critical nursery habitat for many coastal & pelagic species
- economic resource- fisheries, tourism & biodiversity
- feeding grounds for ecologically-important species
- baffles for wave energy and coastal erosion
- vital refuge for threatened species



# Modeling Seagrass Communities

*Problem: management of seagrass communities requires management of seagrass populations [=productivity]...*

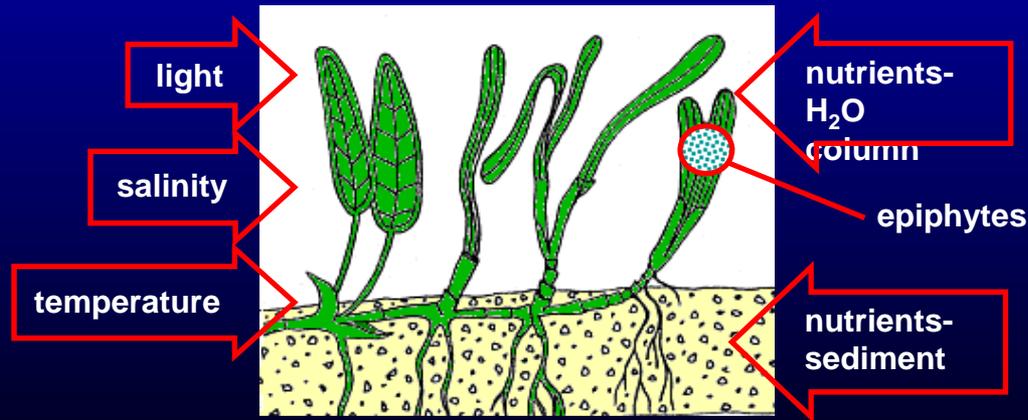
P. Fong & M. Harwell, 1994. Modeling seagrass communities in tropical and subtropical bays and estuaries: a mathematical synthesis of current hypotheses. *Bulletin of Marine Science* 54:757-781.

- $\text{Biomass}_{\text{seagrass}[t+1]} = \text{Biomass}_{\text{seagrass}[t]} + \text{Productivity}_{\text{seagrass}} - \text{Loss}_{\text{seagrass}} \quad \Leftrightarrow [\text{Loss } f(\text{senescence})]$

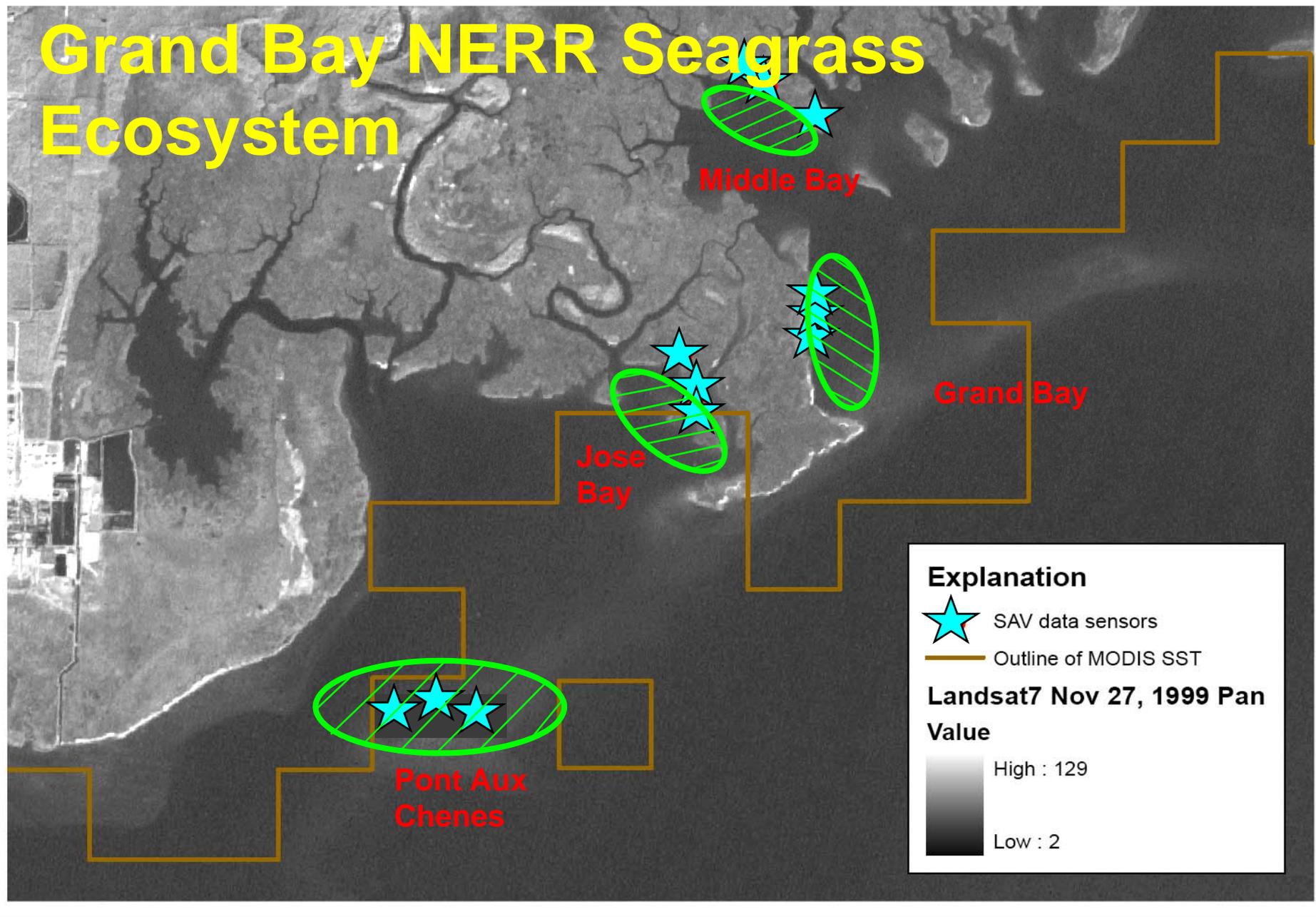
$$\text{Productivity}_{\text{seagrass}} = \text{Pmax}_{\text{seagrass}} (\text{Salinity}_{\text{seagrass}} \times \text{Temperature}_{\text{seagrass}} \times \text{Light}_{\text{seagrass}} \times \text{nutrients}_{\text{seagrass}})$$

[productivity ↓ assc w/ ↑ salinity]
[productivity ↓ assc w/ ↓ temperature]
[productivity ↓ assc w/ ↓ light]
[productivity ↓ assc w/ ↓ nutrients]

Environmental Factors Controlling Seagrass Biomass/Abundance



# Grand Bay NERR Seagrass Ecosystem



Middle Bay

Grand Bay

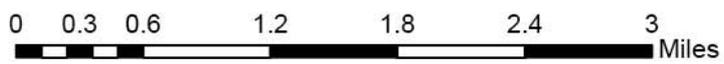
Jose Bay

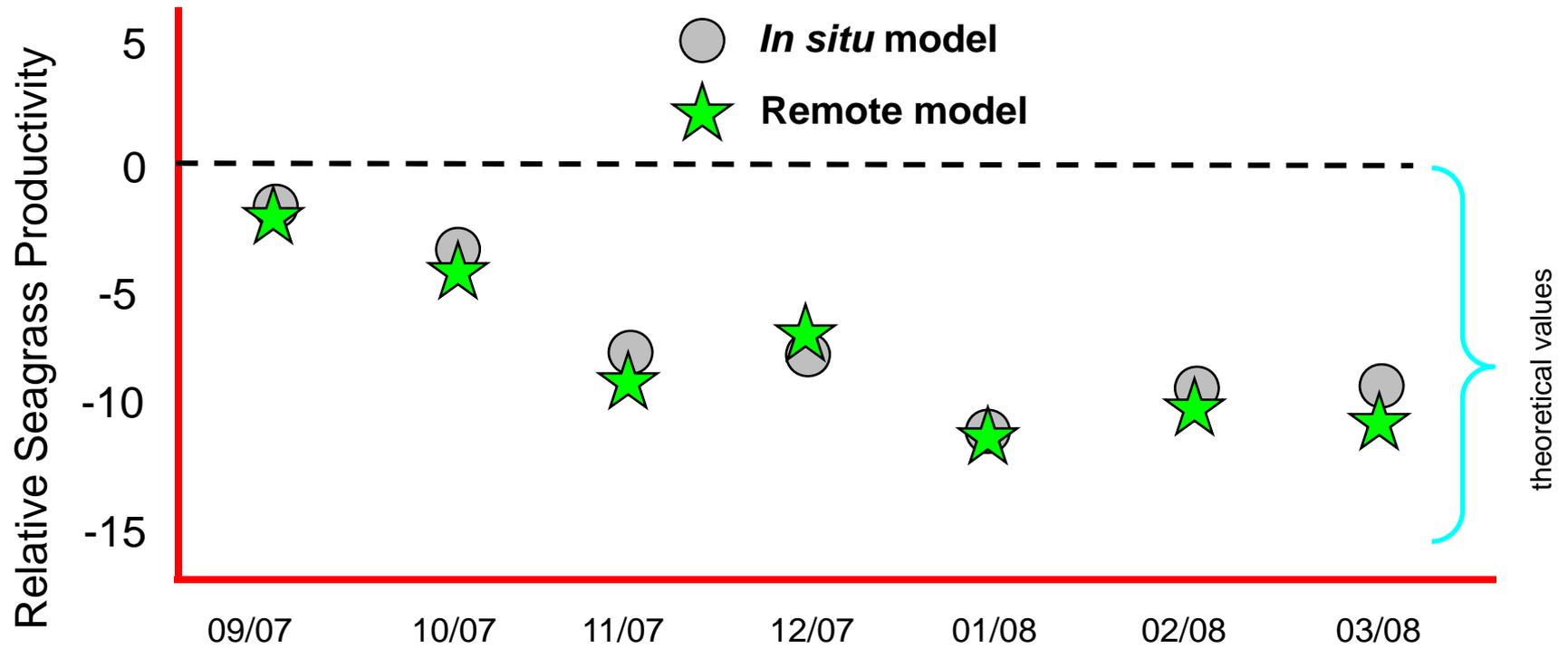
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## Explanation

-  SAV data sensors
-  Outline of MODIS SST

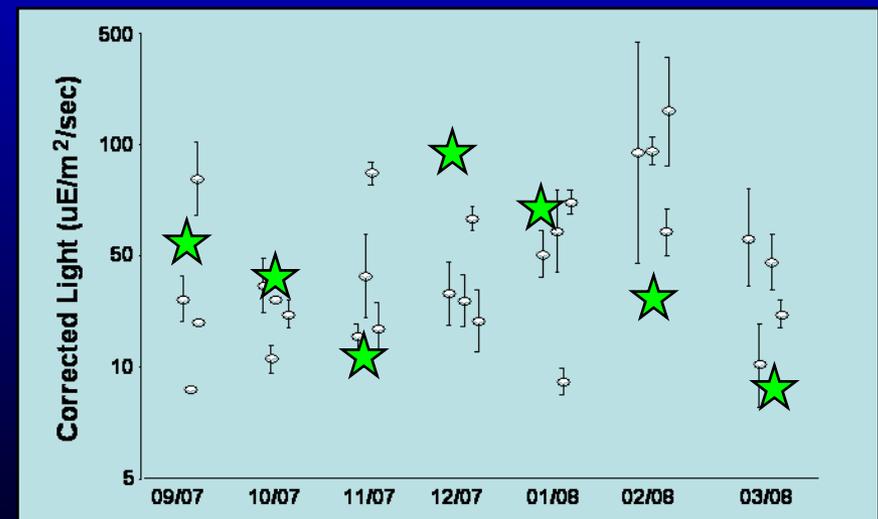
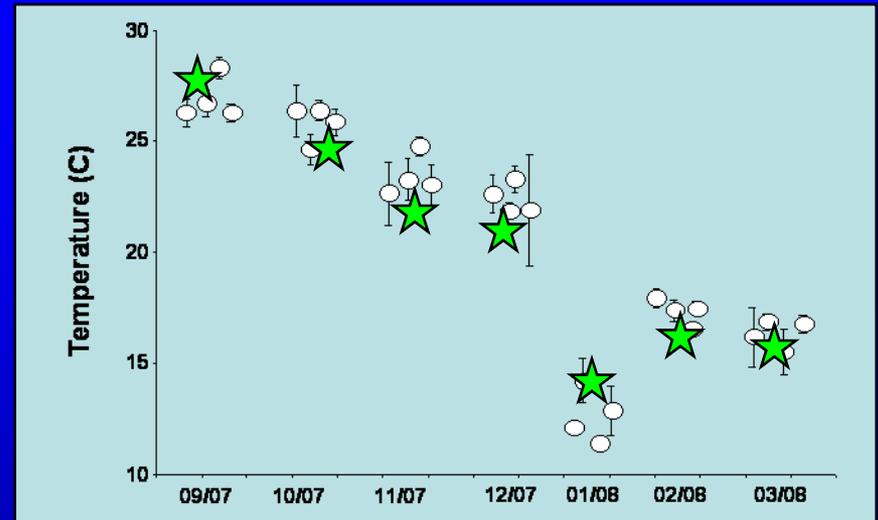
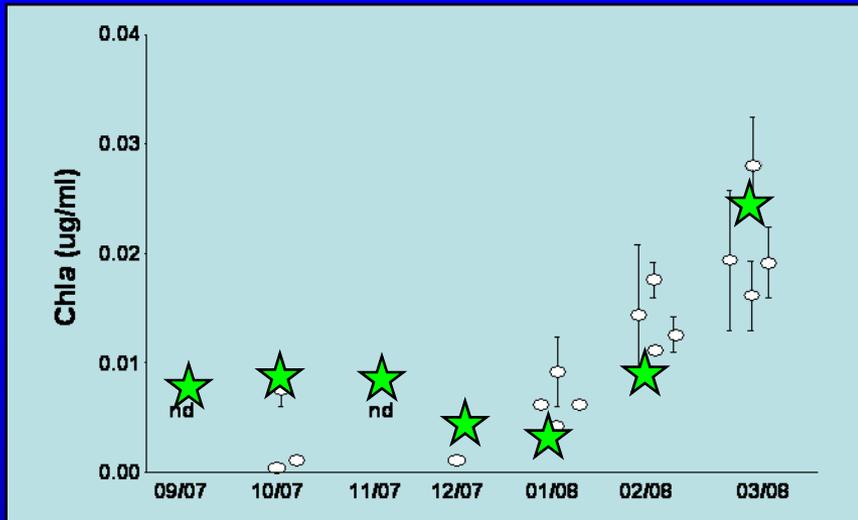
Landsat7 Nov 27, 1999 Pan Value





$$\text{Productivity}_{\text{seagrass}} = \text{Pmax}_{\text{seagrass}} (\text{Temperature}_{\text{seagrass}} \times \text{Light}_{\text{seagrass}} \times \text{nutrients}_{\text{seagrass}}) + \text{species 2...}$$

# Remote Sensing Data



# Goals of this Project

- Develop tools and methods to use daily and 8-day composite MODIS data to provide inputs for the Fong and Harwell seagrass productivity model and distribute the results to estuarine reserve scientists and managers through a web portal,

# Tasks

- 1. Workshop to determine system needs and design – scheduled for February, 2010**
- 2. Develop a system to download and process MODIS data to produce needed products.**
- 3. Develop an Internet-based tool to incorporate NASA science data into the Fong and Harwell model and create output that is distributed to Gulf of Mexico marine resource managers**

# Project Status

1. **Contract for funding received Dec 7, 2009**
2. **Met with scientists at GBNERR**
3. **Workshop to determine system needs and design – scheduled for February, 2010**
4. **Graduate student accepted and schedule to start in January 2010**

# Project Participants

**Greg Easson, UM Geoinformatics Center**

**Marc Slattery, UM Department of Pharmacognosy**

**Hal Robinson, UM Geoinformatics Center**

**Bruce Spiering, NASA Stennis Space Center**

**Craig Peterson, NASA Stennis Space Center**

**Kenton Ross, SSAI**

**David Lewis, Radiance Technologies**

**David Ruple, Grand Bay NERR**

# Questions

