Mobile Bay National Estuary Program

Biological Condition Gradient

Remotely Sensed Data Potential

Issues with Remote Sensing Data for BCG

- Land – sea interface is a difficult region to study
- Clouds and mixed pixels degrade quality and amount of data
- Data coverage and scale!
- Cost is largely in data processing
  - How much data do you need?
  - How often do you need data?

Advantages of Remote Sensing Data

- Spatial coverage globally
- High temporal updates and historical archives
- Data is generally in public domain (except very high resolution commercial data)
- Data is digital and can be manipulated with mathematical operations (spatial statistics)

Potential Satellite Remote Sensing Data

<u>Ocean Color Products:</u> (Daily, 3-8 day composites, monthly composites, 1-4km)

- Sea Surface Temperature
- Water clarity
- Chlorophyll-a

<u>Reflectance algorithm</u>

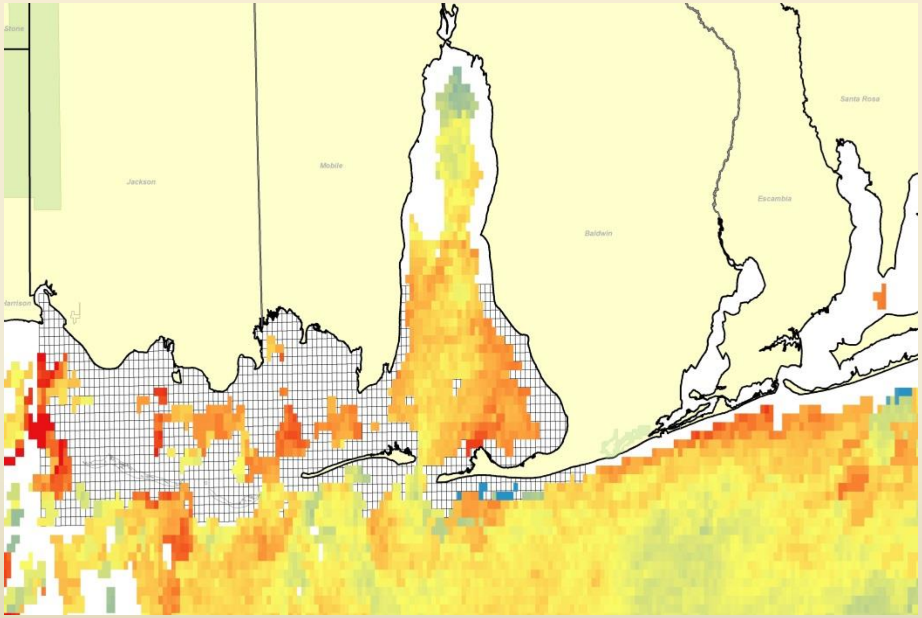
- Salinity (Daily to composites at 1-4km)

<u>Land Products</u>

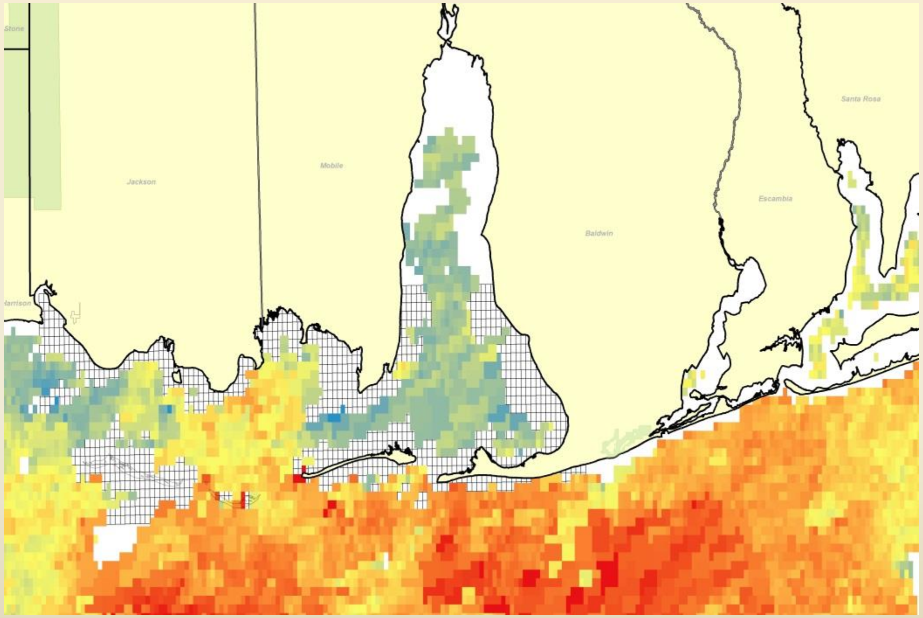
- Normalized Difference Vegetation Index: (1km daily or 30 m 16-day)
- Coastal Change Analysis Program: Land Cover Land Use (annual or multi-year updates, 30 m)
- North American Land Data Assimilation System (12 km)

Weekly 1km SST

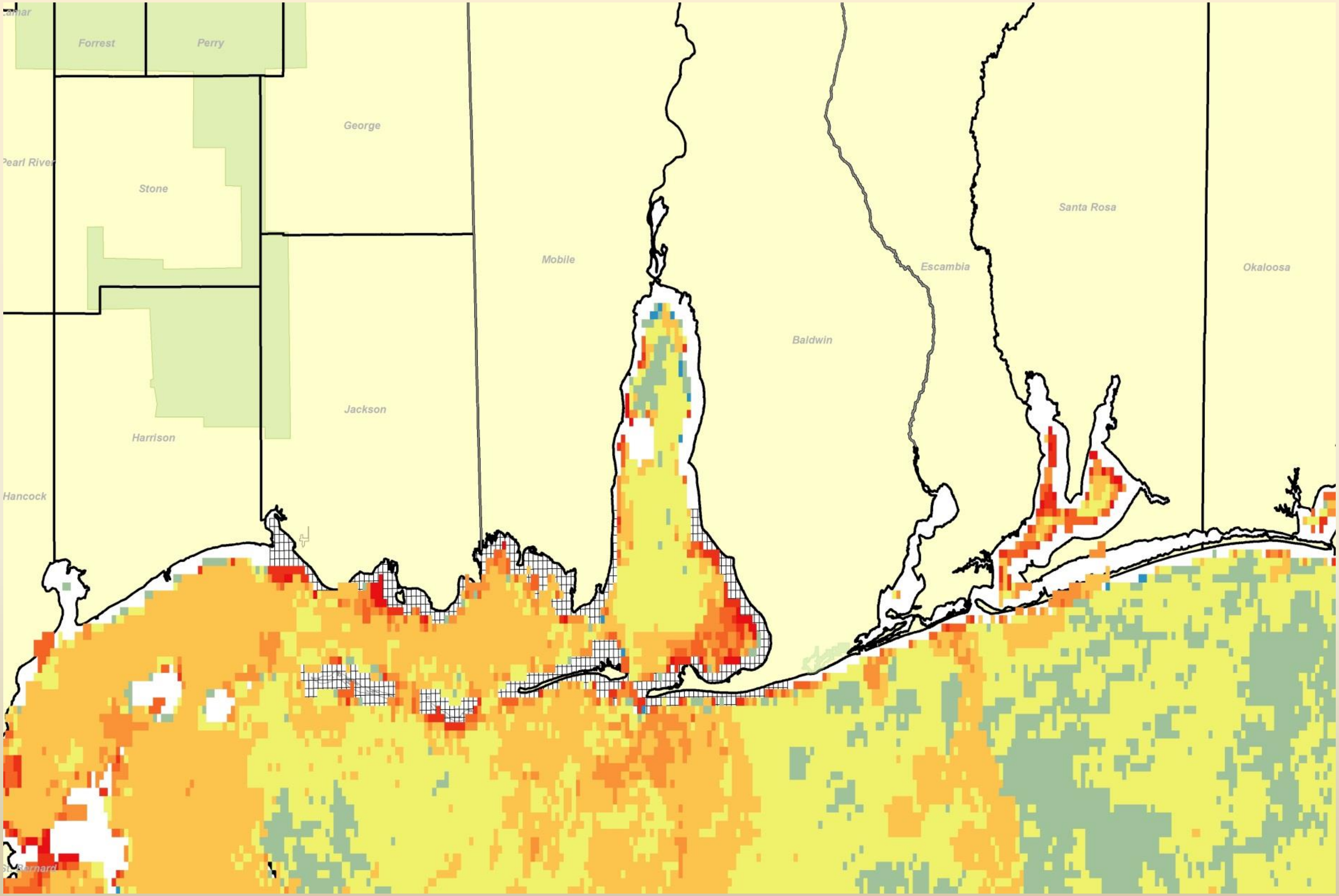
May 21, 2013



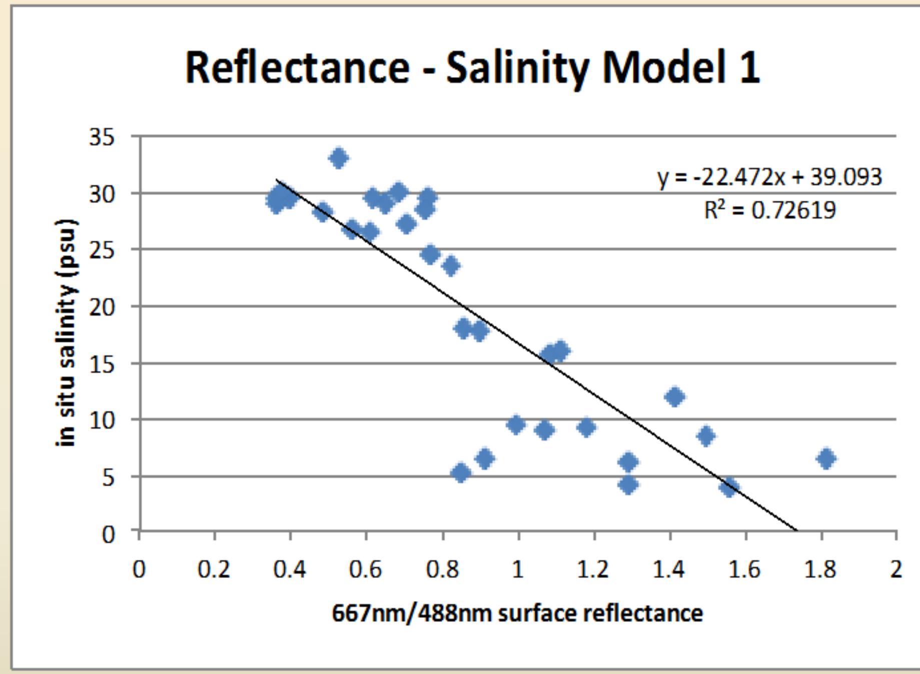
October 1, 2013



May 2013 SST Mean Mosaic



Development of an Algorithm for Salinity Estimates in Mobile Bay Alabama and the Mississippi Sound

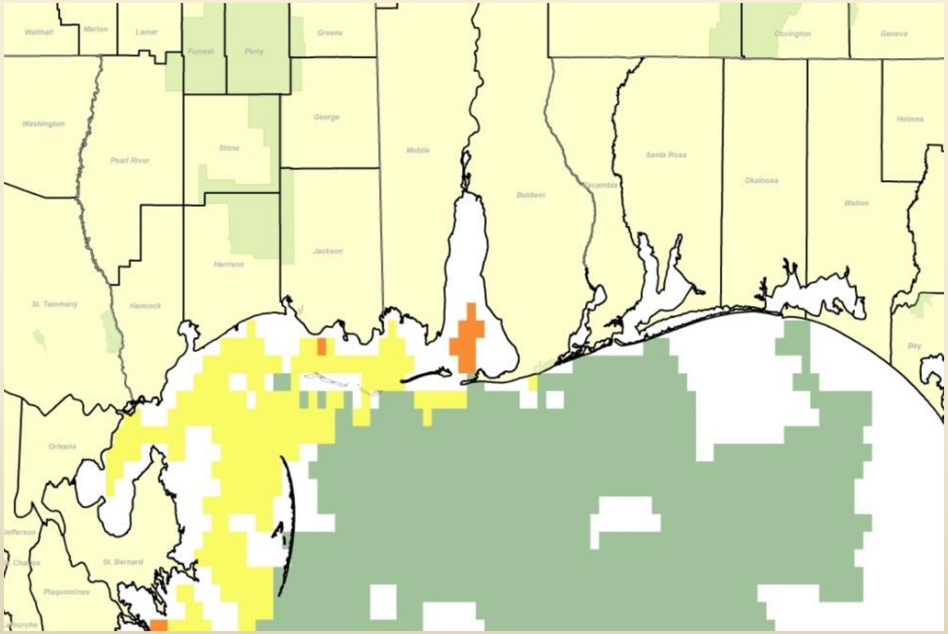


Water Clarity K_d490

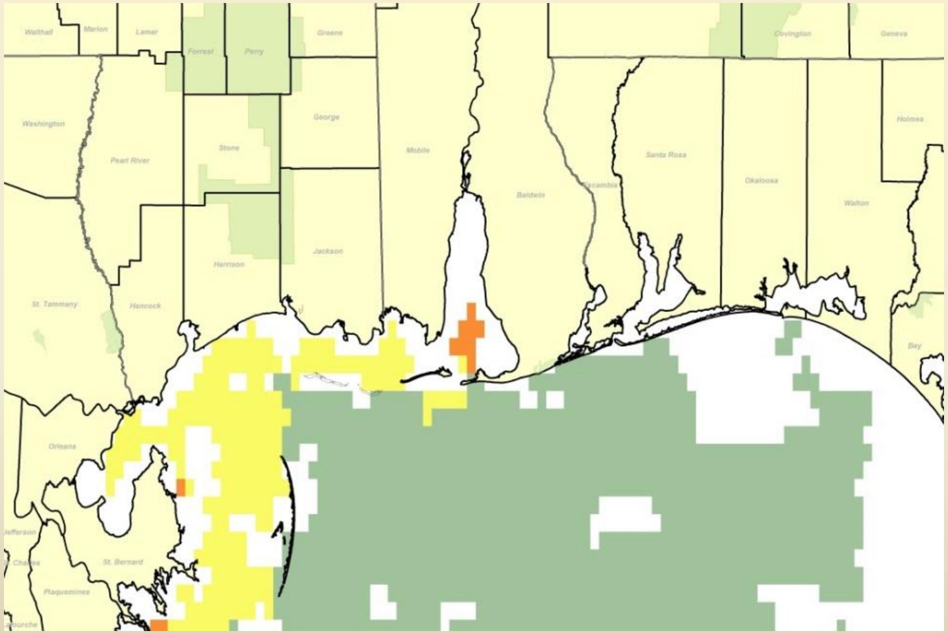
- The attenuation coefficient is a quantity that characterizes how easily a material or medium can be penetrated by a beam of light, sound, particles, or other energy or matter.
- A large attenuation coefficient means that the beam is quickly "attenuated" (weakened) as it passes through the medium, and a small attenuation coefficient means that the medium is relatively transparent to the beam.

K_d490 3-day and 8-day composite products

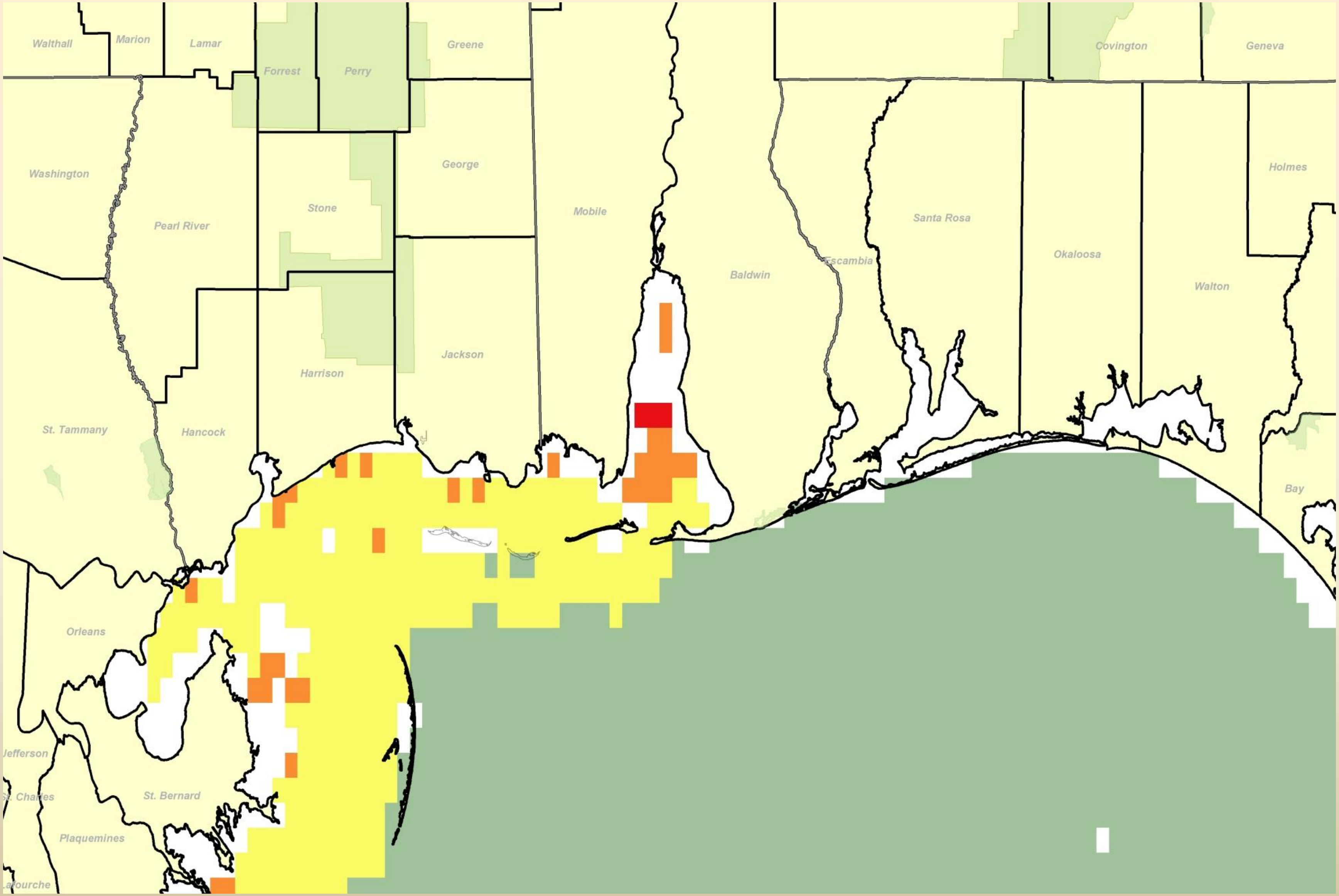
July 2012 (3-day)



July 2012 (8-day)

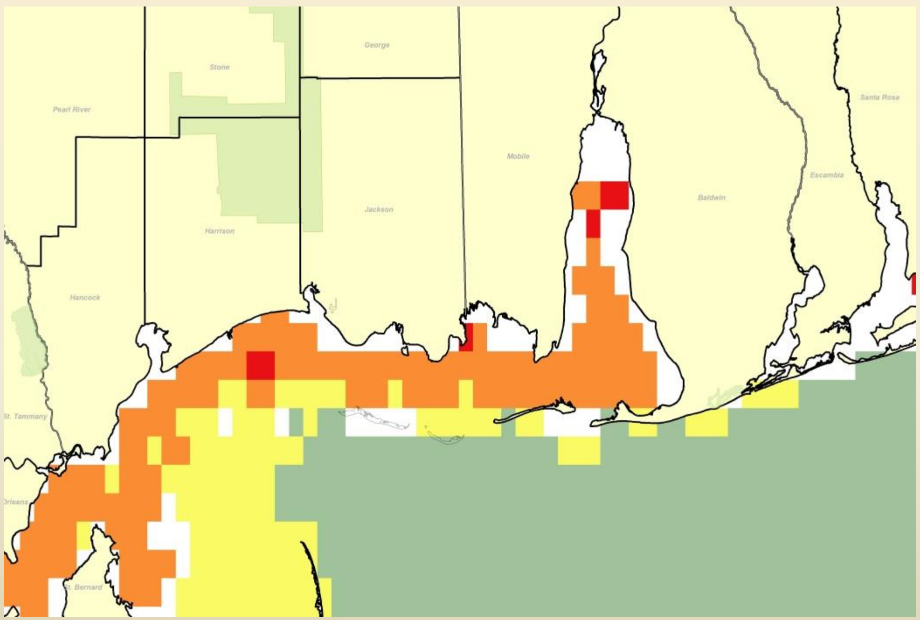


K_d490 Monthly Product, July 2012

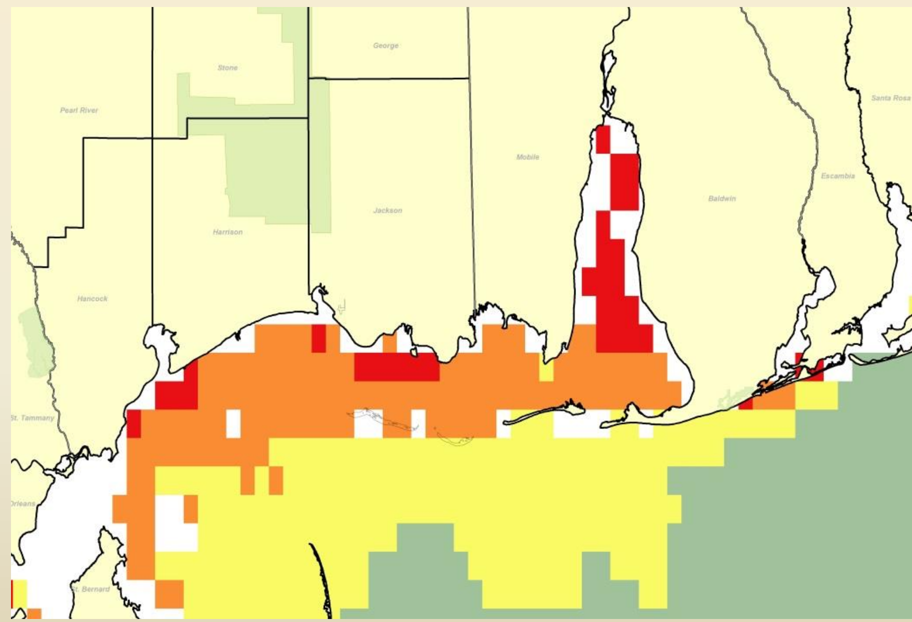


May 2012 compared to 2013 Mobile Estuary Chlorophyll-a

May 2012



May 2013



Note: Common scale used with color tables.

Adaptive Ecosystem Climatology

Dr. Bradley Penta, NRL

Highlight: EO Climatology

- Chlorophyll-a 1997-2013 (1km)
- Mean value for each day of year
- Average of day plus two days on either side to minimize number of pixels missing data due to clouds or processing flags

Relevance:

- By itself, provides decision-makers with mean surface conditions for every day of the year
- Used for spatial-temporal covariances
- Can be used if operational (real-time) satellite data is not available

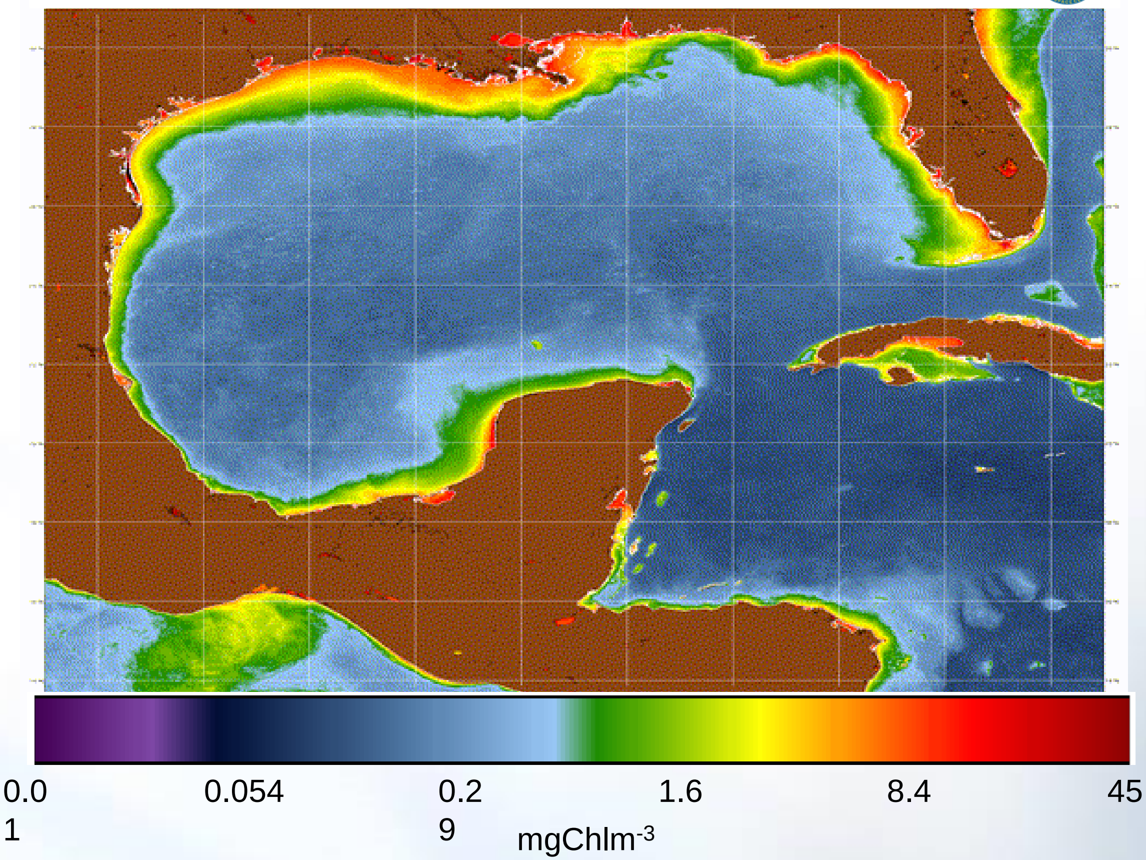
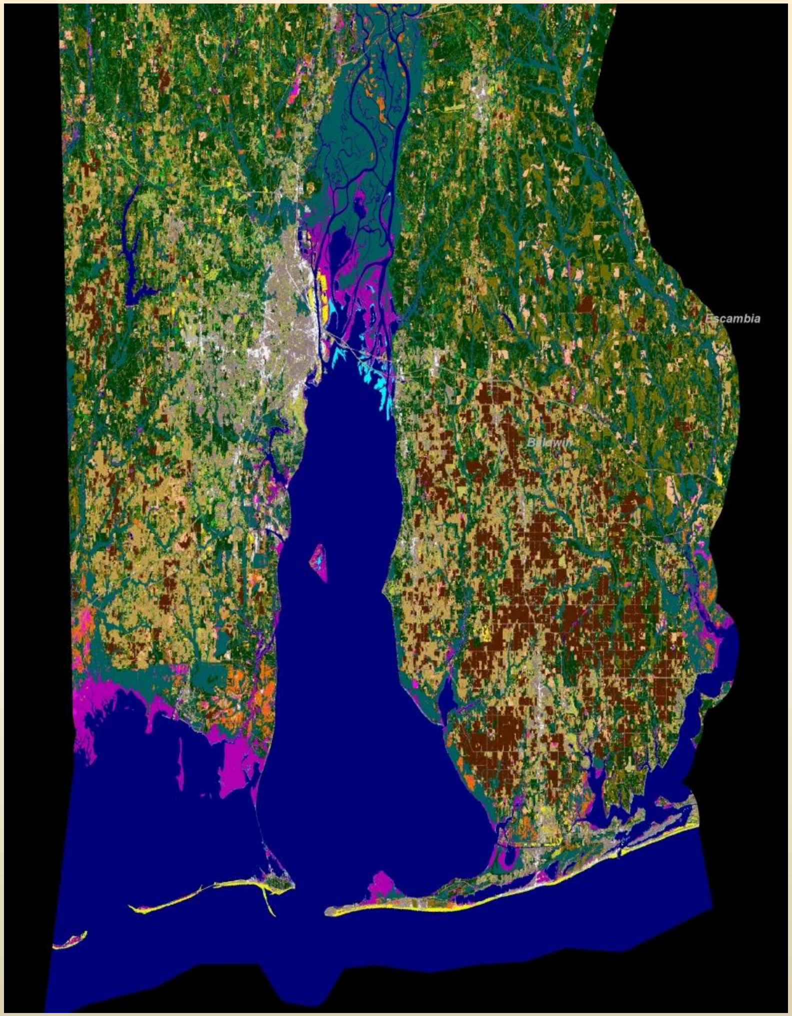
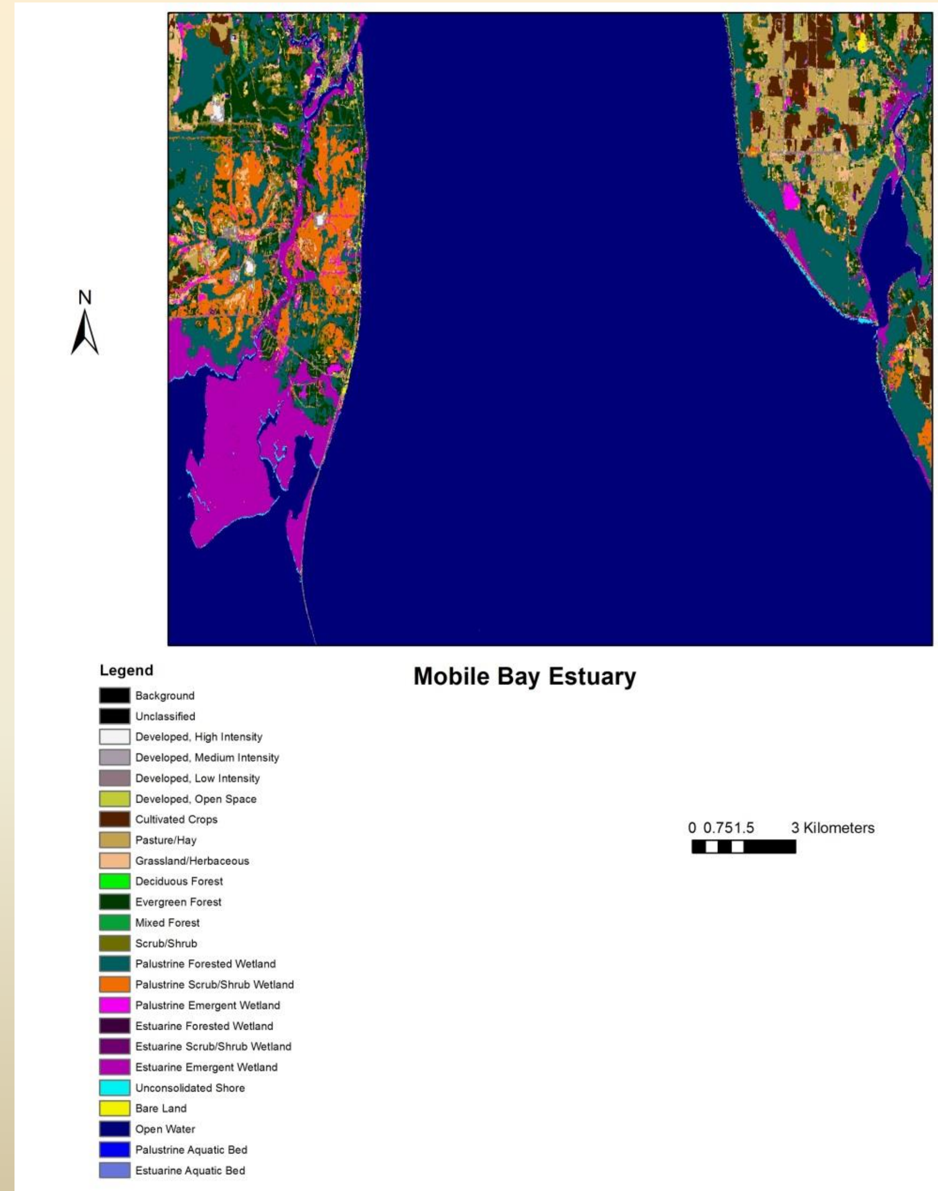


Figure 1: Gulf of Mexico mean sea-surface chlorophyll-a for each year-day.

Coastal Change Analysis Program (C-CAP)

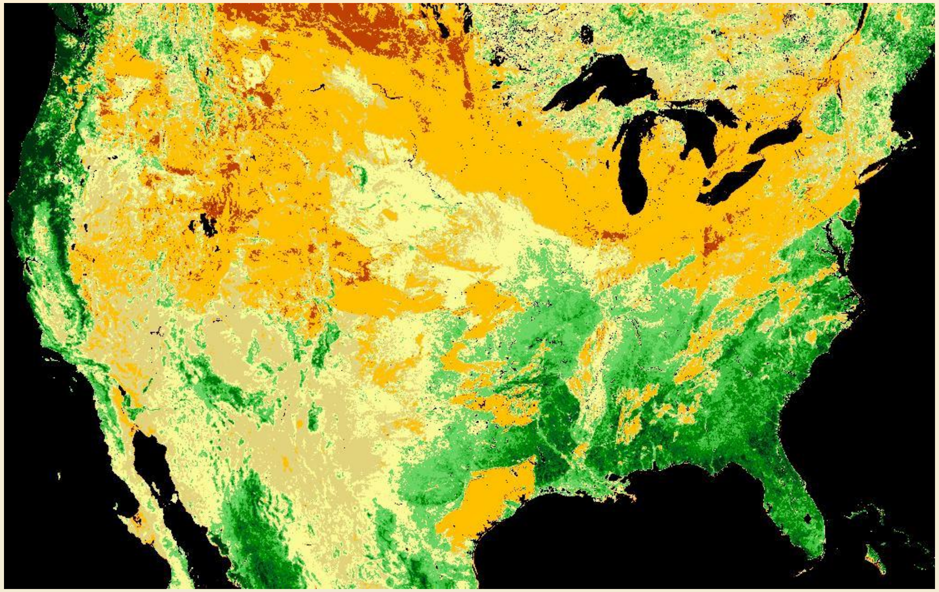


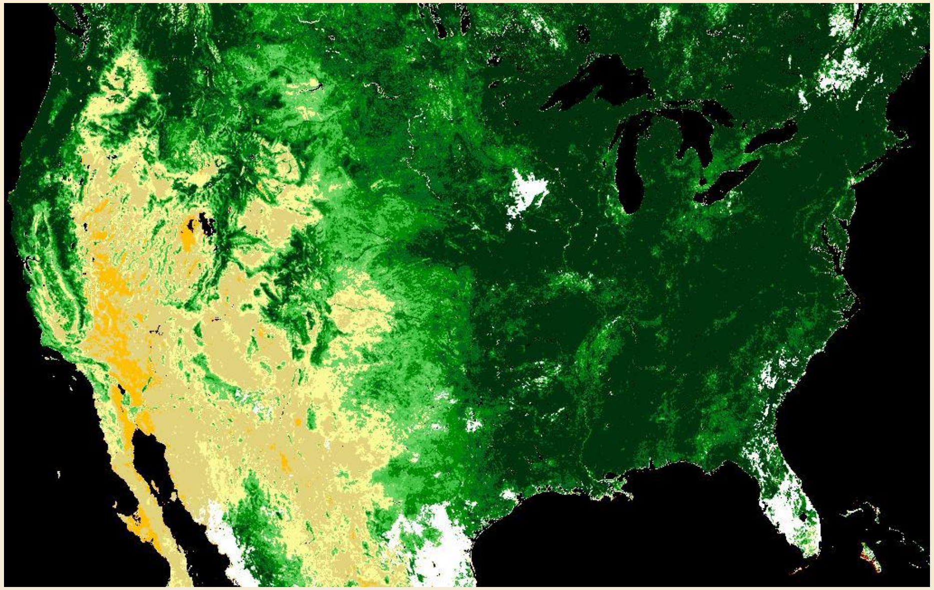


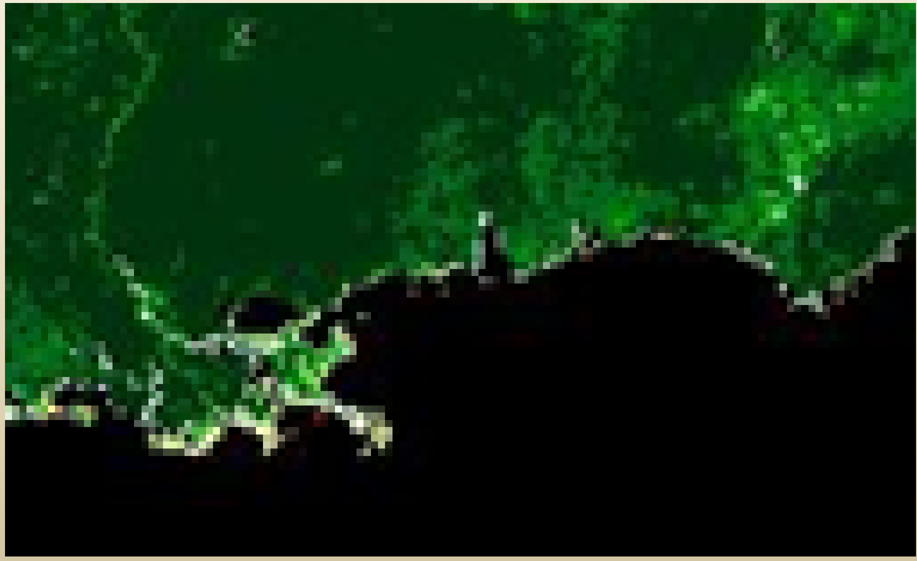
NDVI

- The **Normalized Difference Vegetation Index** (**NDVI**) is a simple graphical indicator that can be used to analyze remote sensing measurements, typically but not necessarily from a space platform, and assess whether the target being observed contains live green vegetation or not (Wikipedia).

NDVI January (left) vs July 2014 (right) 250 m spatial resolution







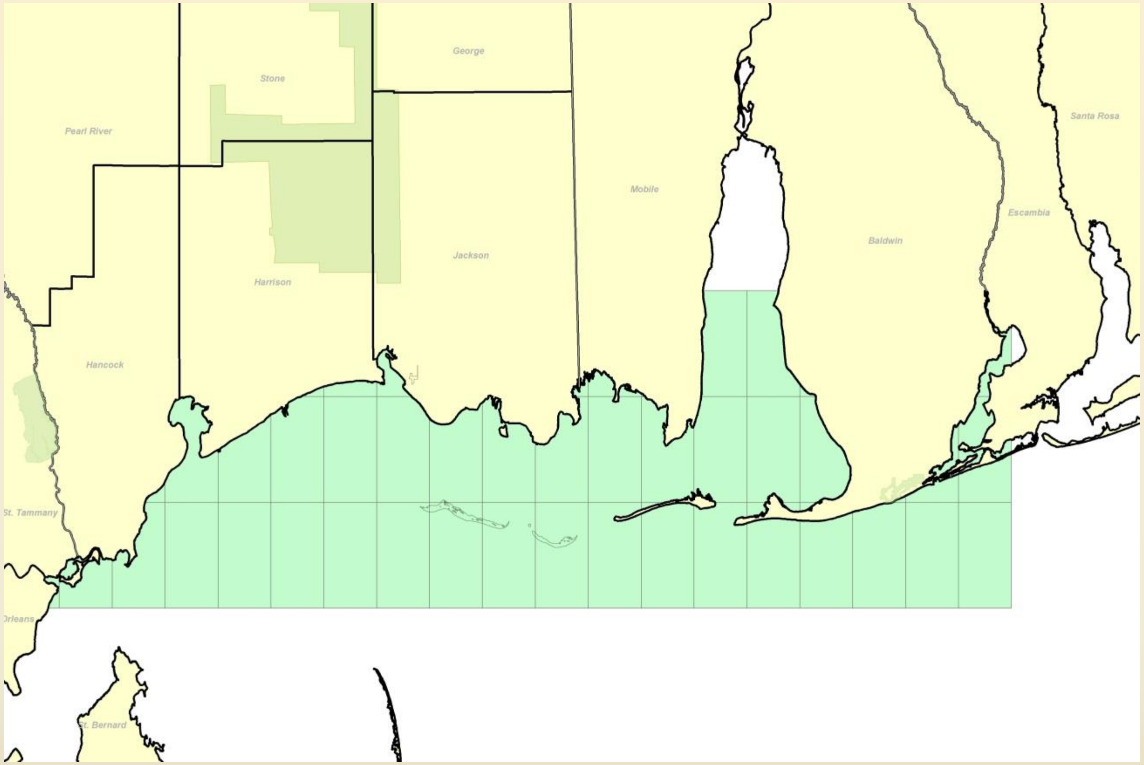
North American Land Data Assimilation System (NLDAS)

Years of Record

1980/01 to present

Main variables Atmosphere * Air Temperature * CAPE * Evaporation * Precipitation * Radiation * Specific Humidity * Surface Pressure * Wind

(https://climatedataguide.ucar.edu/climate-data/nldas-north-american-land-data-assimilation-system-monthly-climatologies)



Other Possibilities

Land Surface Temperature

Leaf Area Index & FPAR (fraction of absorbed photosynthetically active radiation)

Net Photosynthesis and Primary Productivity

Going Forward with Remote Sensing Data for the BCG?

- Data coverage gaps can be filled with algorithms such as nearest neighbor.
- Composites mitigate much of the problems from clouds that affect data coverage for a single day.
- What remote sensing products are of interest?
- What spatial resolution is needed – possibly more than one would be useful?
- What temporal resolution is needed – possibly different for different products?

Thanks!

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