Sargassum Watch from Space

Chuanmin Hu
University of South Florida
huc@usf.edu

and

many collaborators and partners

Thanks to NASA, NOAA, and GoMRI for financial and data support

Sargassum bloom and aggregation

Sargassum beaching in the Caribbean
(photo courtesy of Jean-Philippe Maréchal)

- On one hand, *Sargassum* is good – it provides food and shade to many animals (fish, young turtles, shrimp, crab, etc.) and serves as an important habitat, and it also supports sand dunes and shoreline stabilization
- On the other hand, excessive *Sargassum* beaching is bad – requires physical removal

Questions on *Sargassum*

Where? How much? How often? Why? So what?

……..

Answers: nearly none

Reasons: lack of enough observations

Objectives

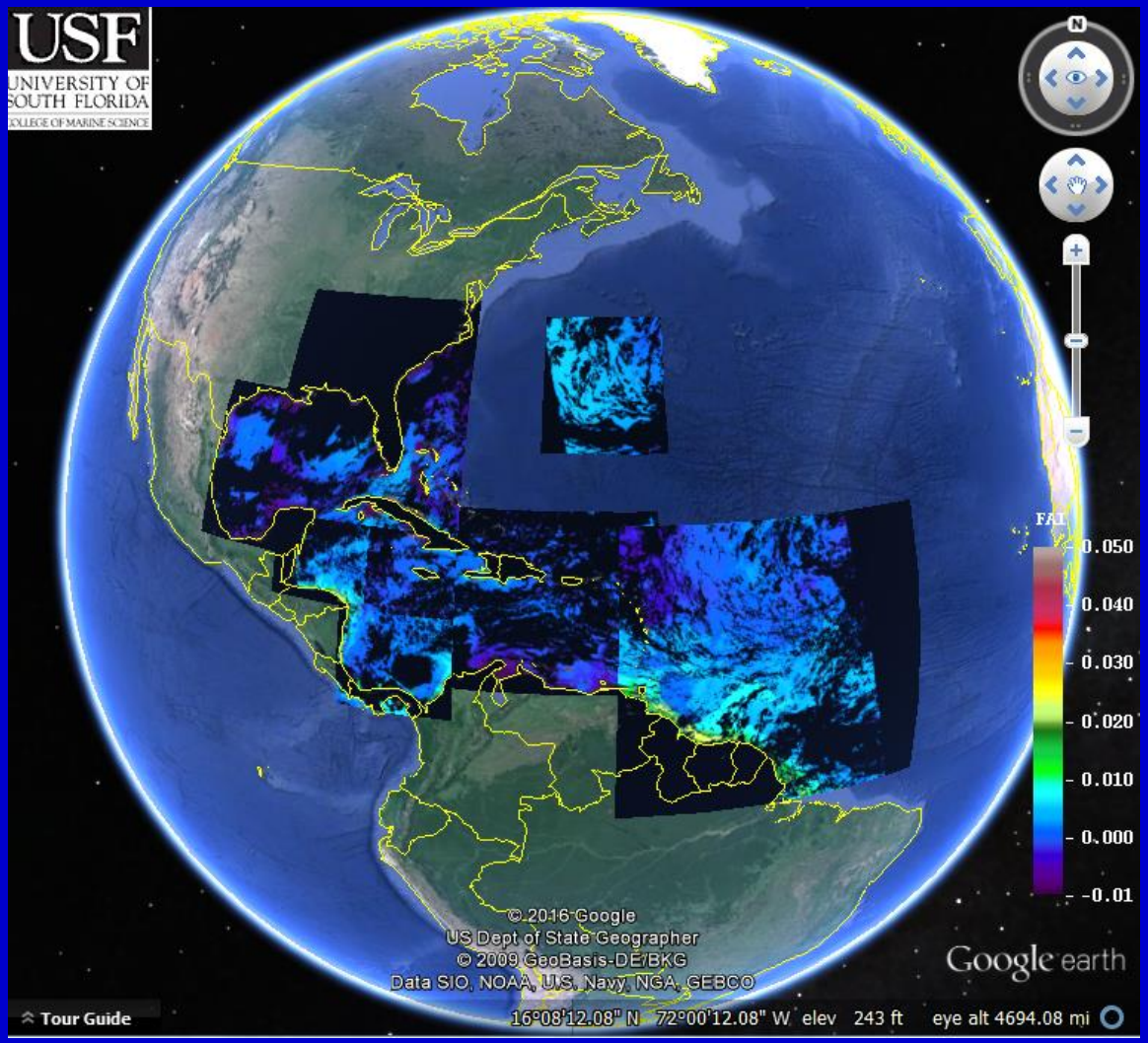
Address some (!) of these questions through

1. A near real-time satellite-based SaWS
2. Retrospective analysis of satellite data

Near real-time products for the Intra-Americas Sea

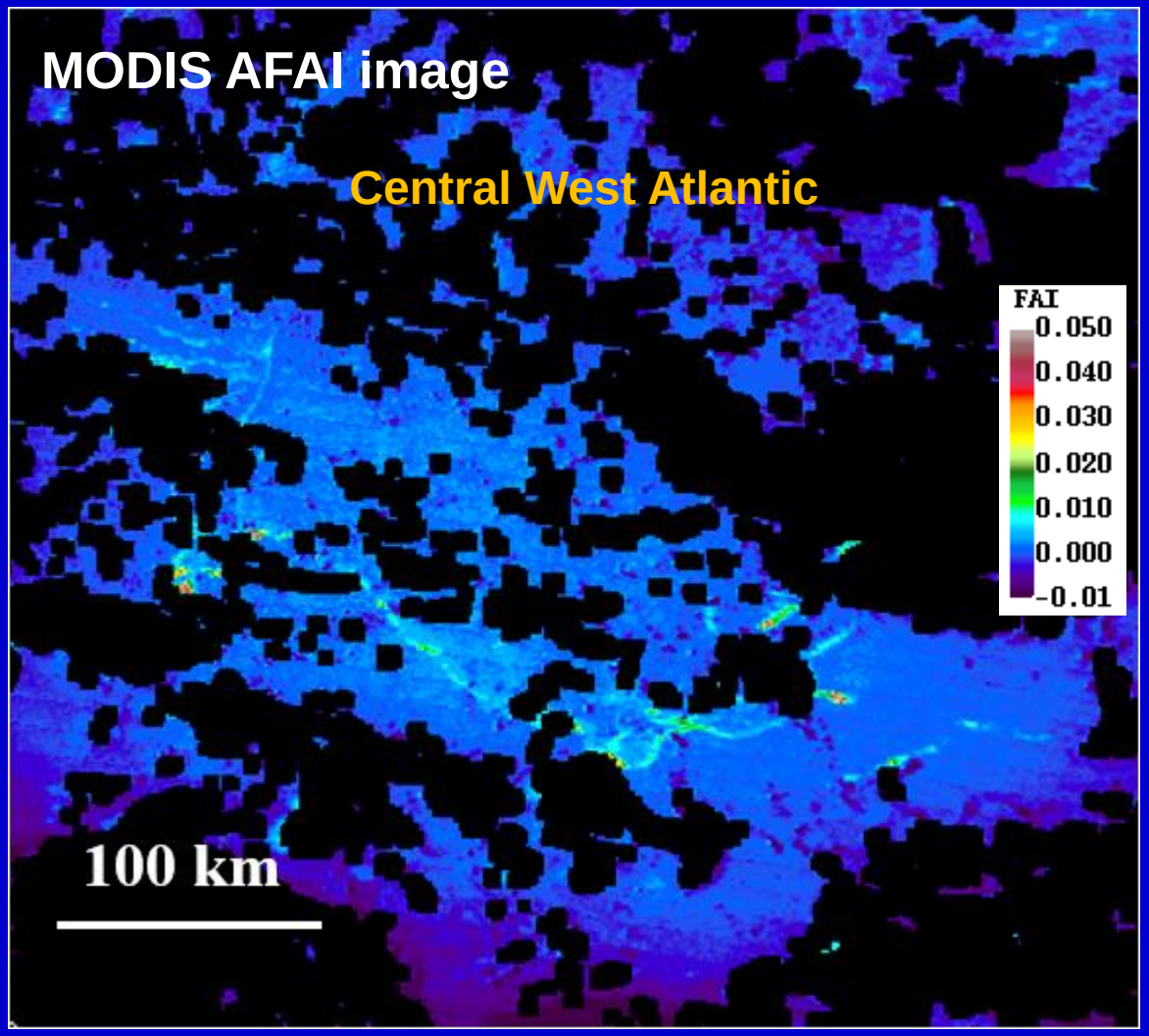
Gulf of Mexico, Caribbean, C West Atlantic

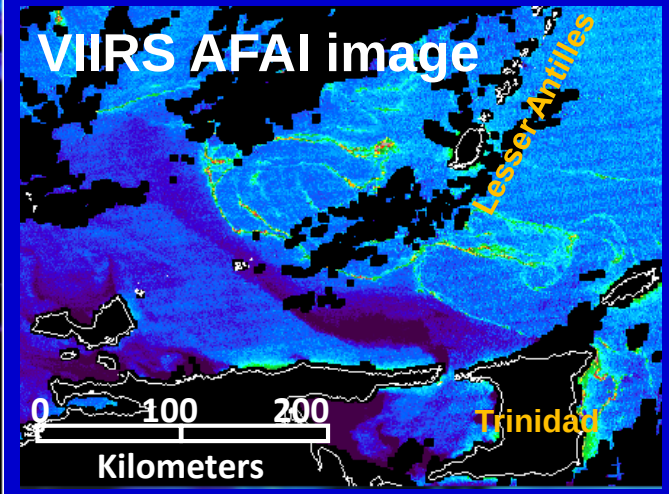
http://optics.marine.usf.edu, under “Satellite Data Products”

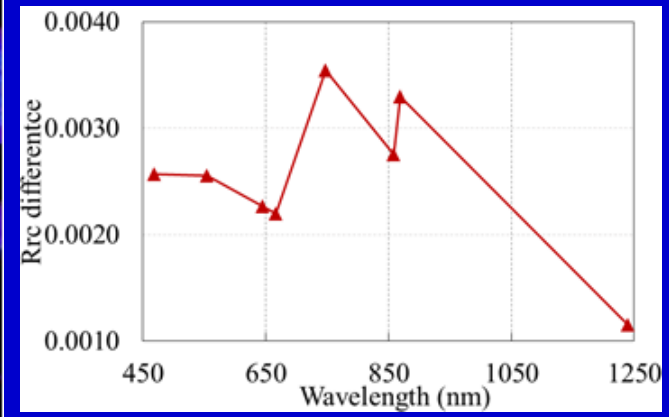


Near real-time products for the Intra-Americas Sea

Customized imagery to detect and track floating algae rafts







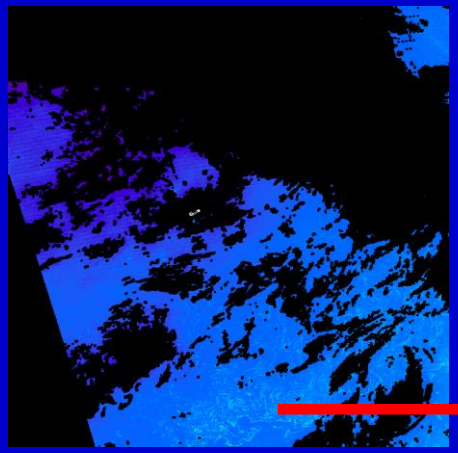
Red-edge reflectance

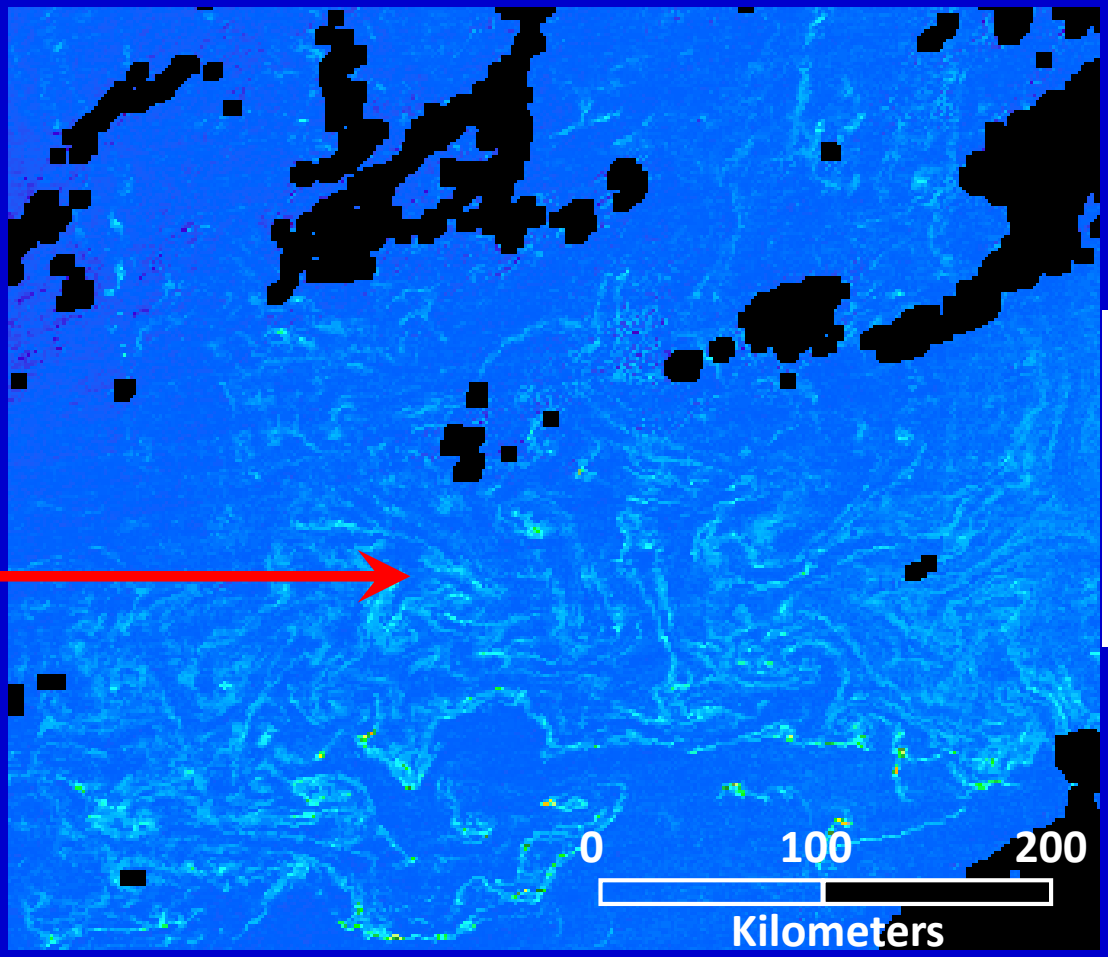
Near real-time products for the Intra-Americas Sea

Customized imagery to detect and track floating algae rafts

MODIS AFAI image, 2/24/2012

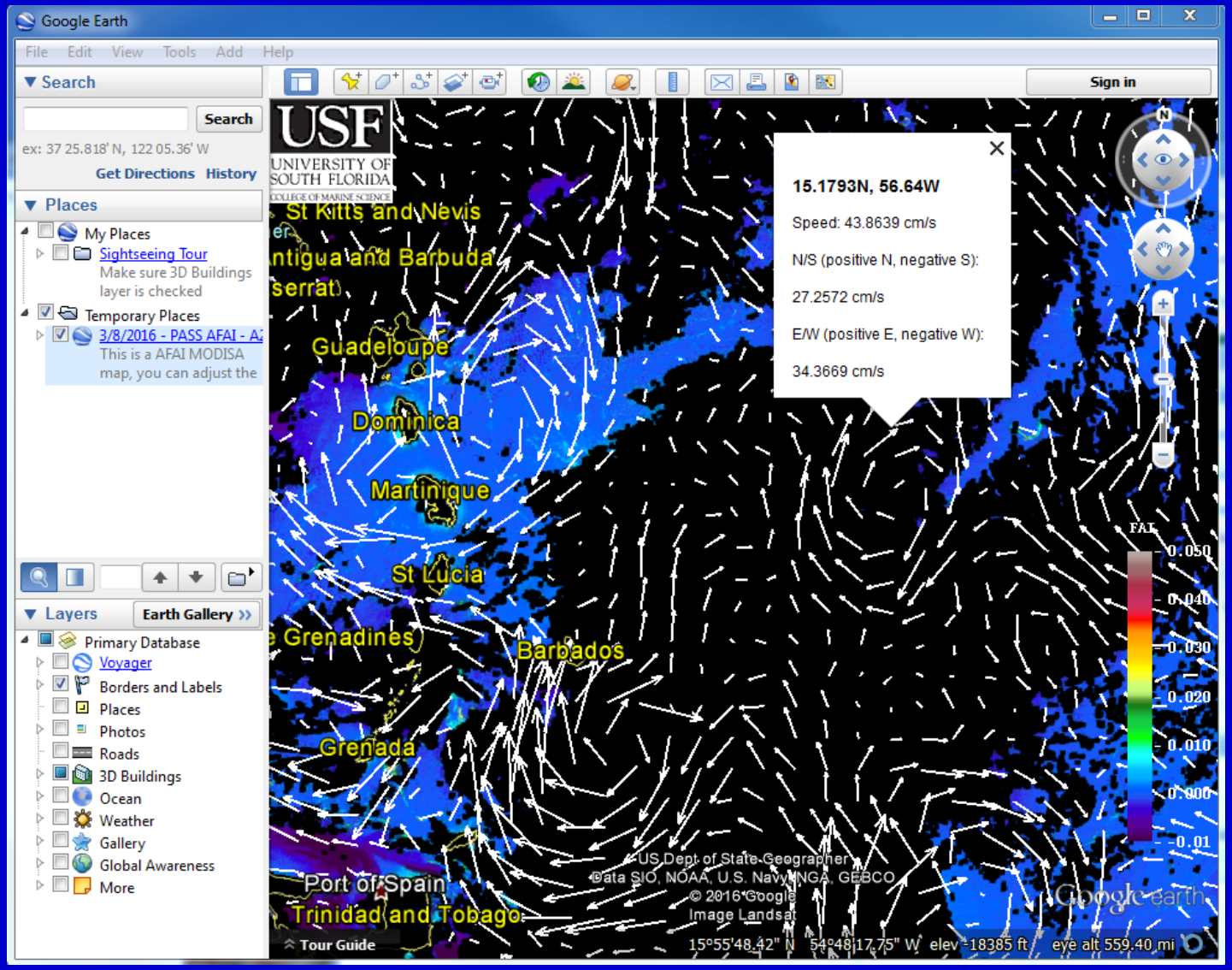
Bermuda
(27 – 37N, 69 – 59W)





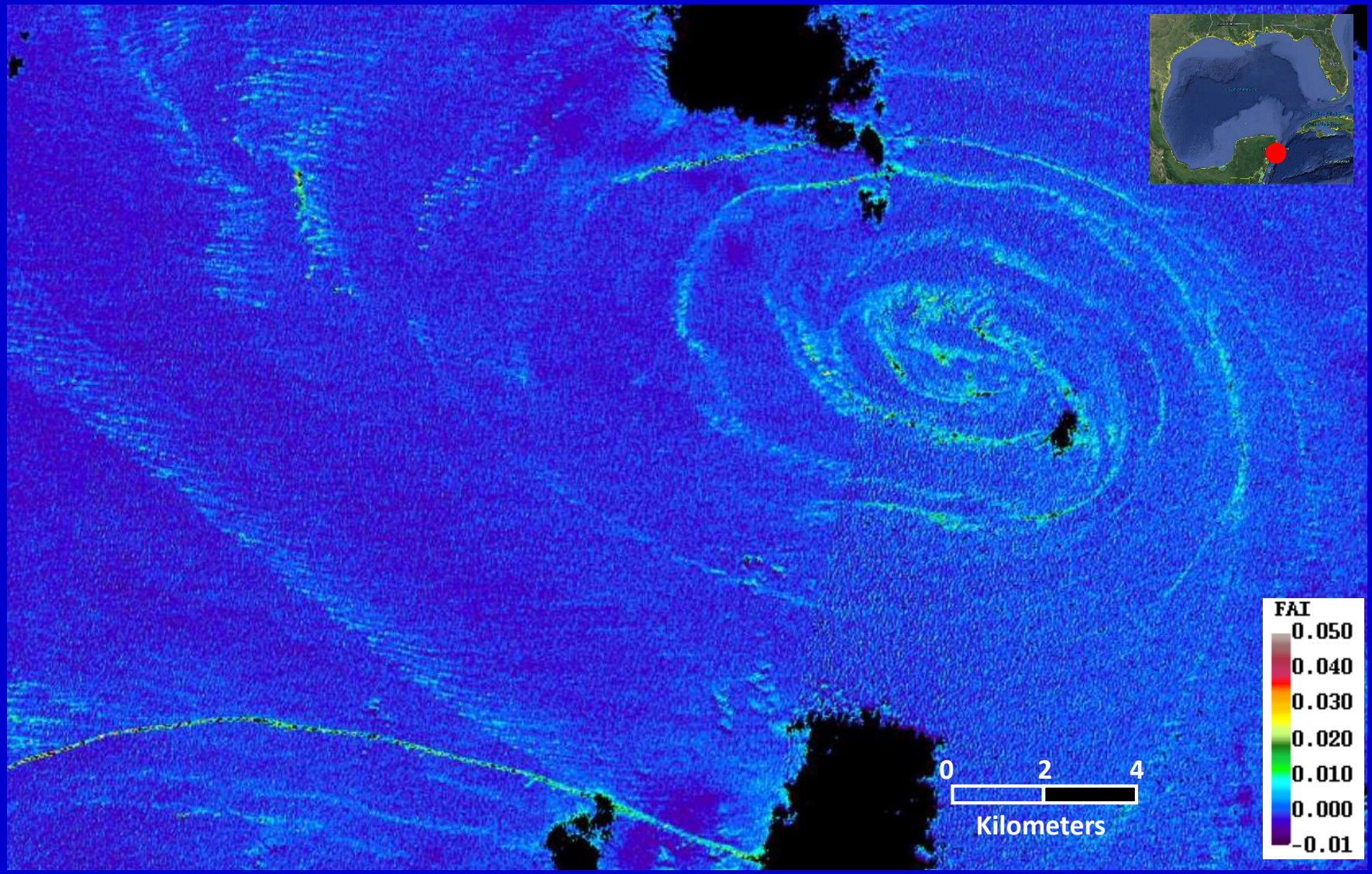
Near real-time products for the Intra-Americas Sea

Integration with HYCOM currents in Google Earth



Near real-time products for the Intra-Americas Sea

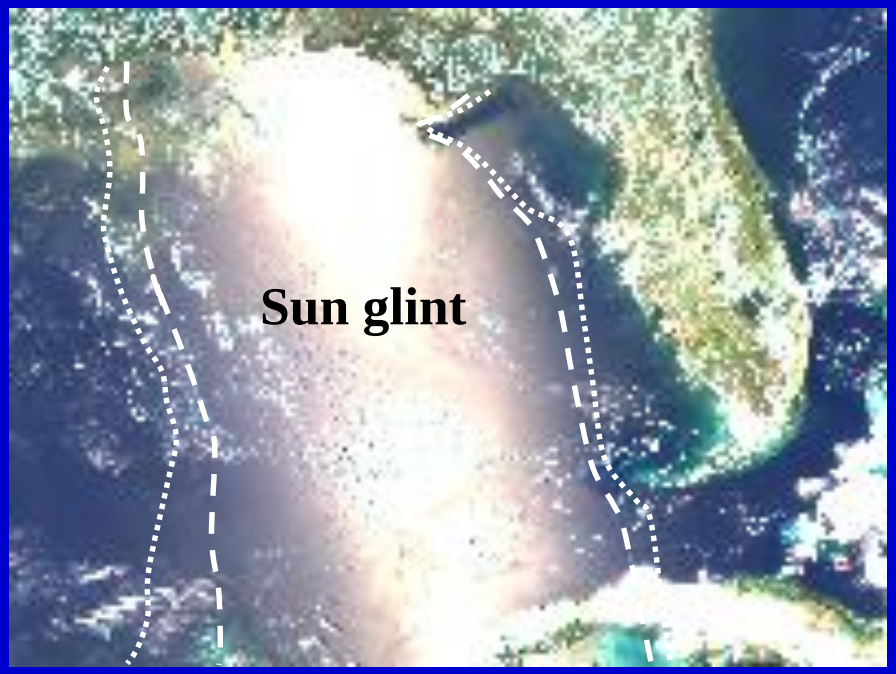
Landsat-8 OLI FAI product



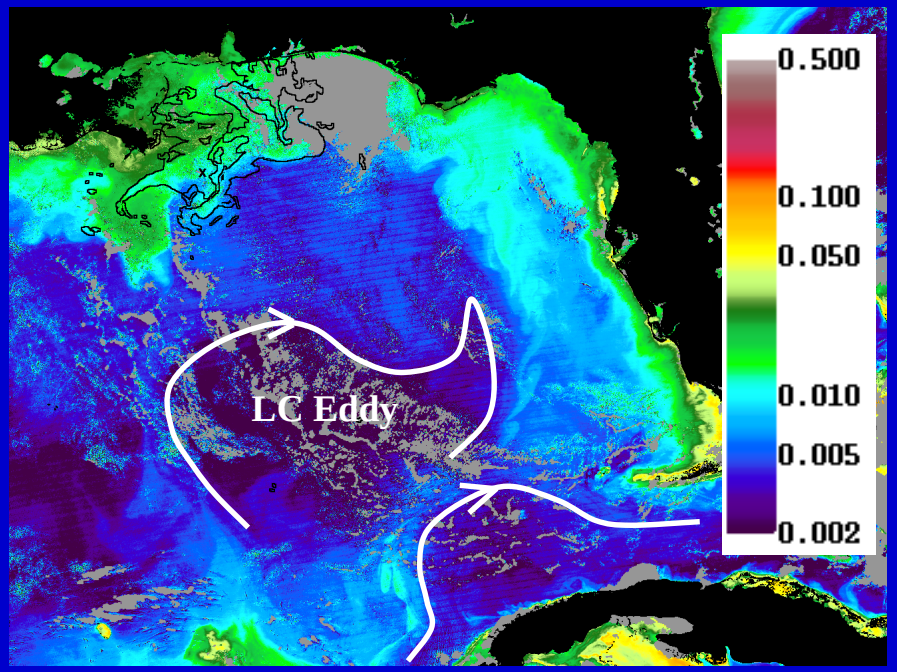
Near real-time products for the Intra-Americas Sea

Customized imagery to detect and track color features

MODIS RGB, 12 June 2010



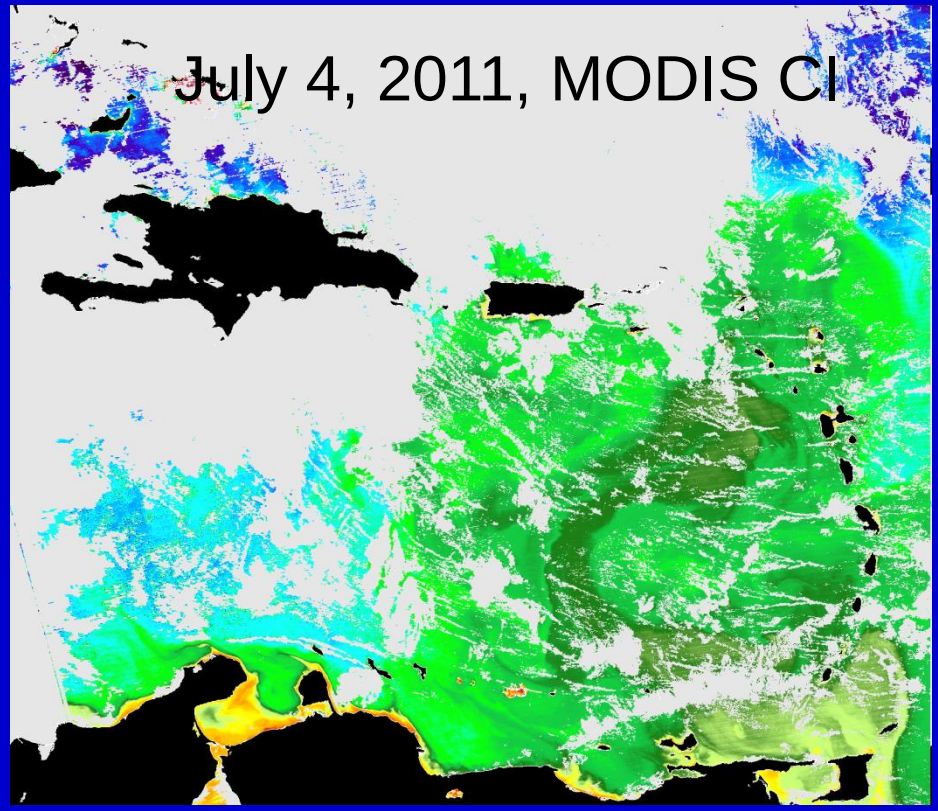
MODIS CI, after glint correction

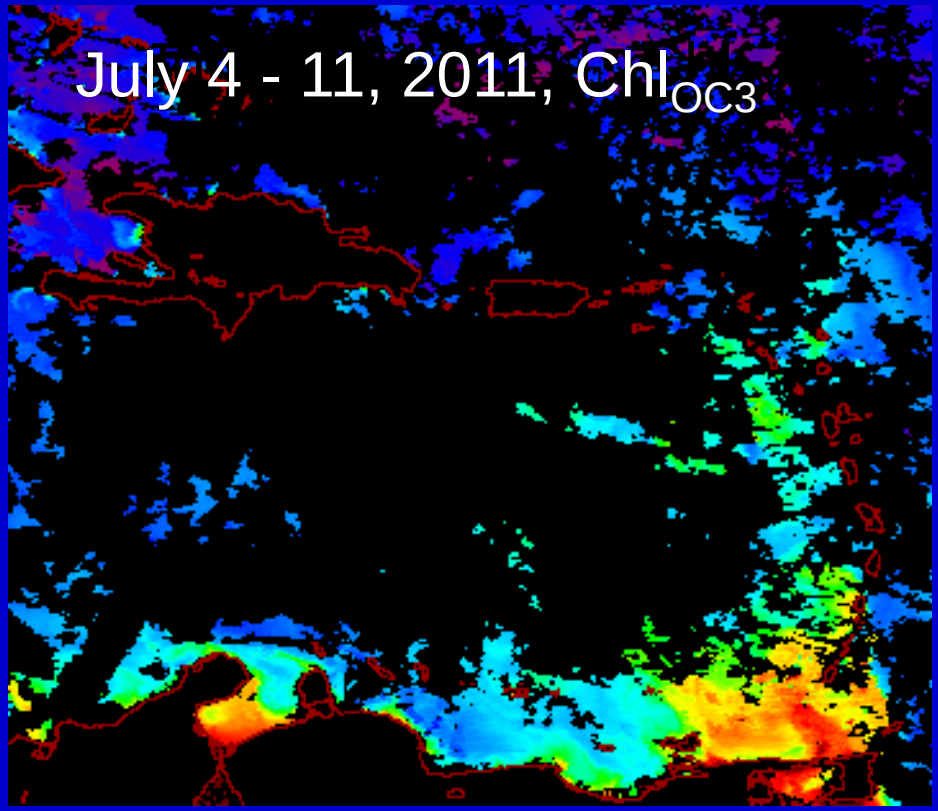


From Hu (2011, GRL)

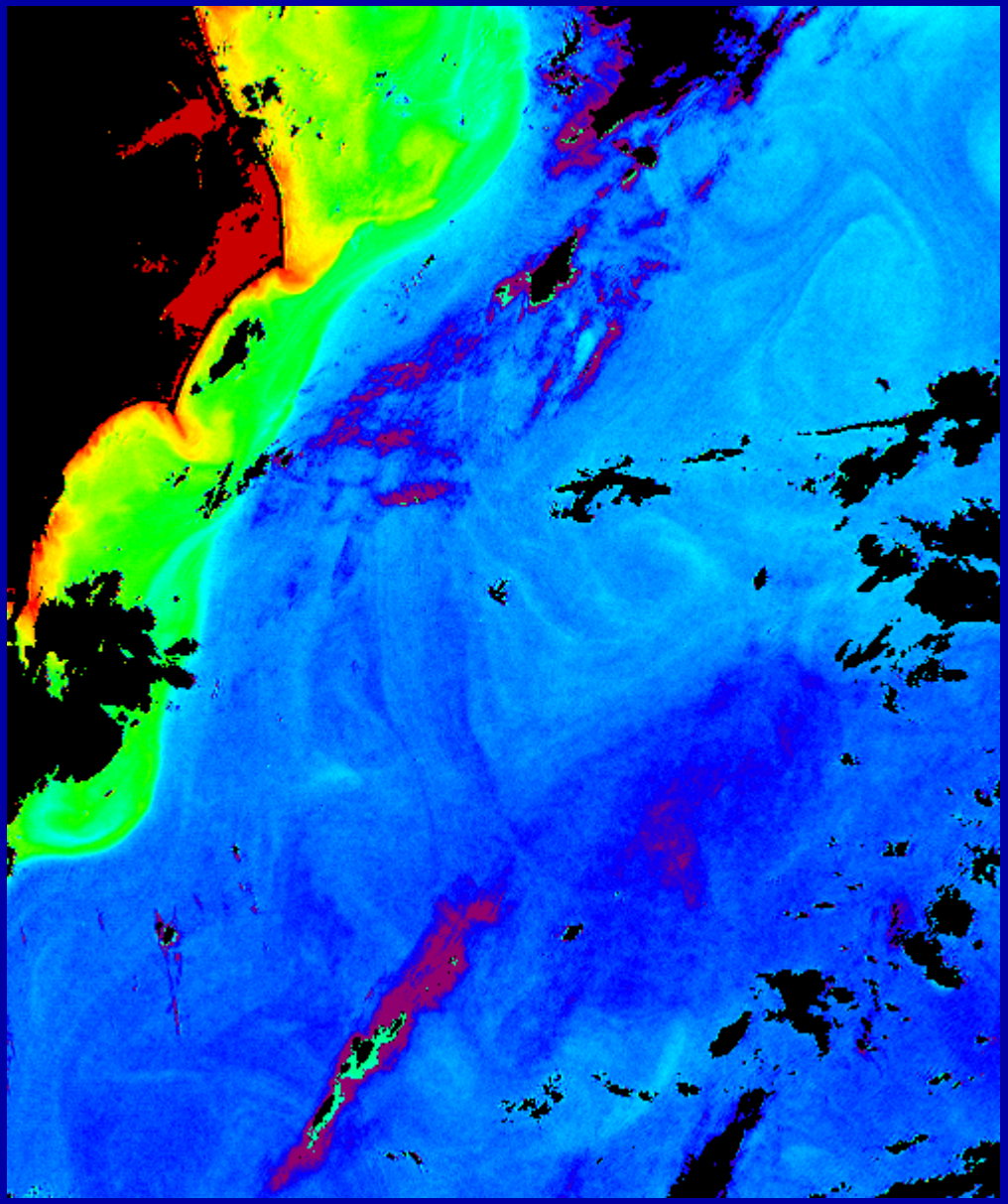
Near real-time products for the Intra-Americas Sea

Customized imagery to detect and track color features

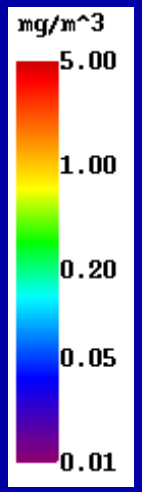




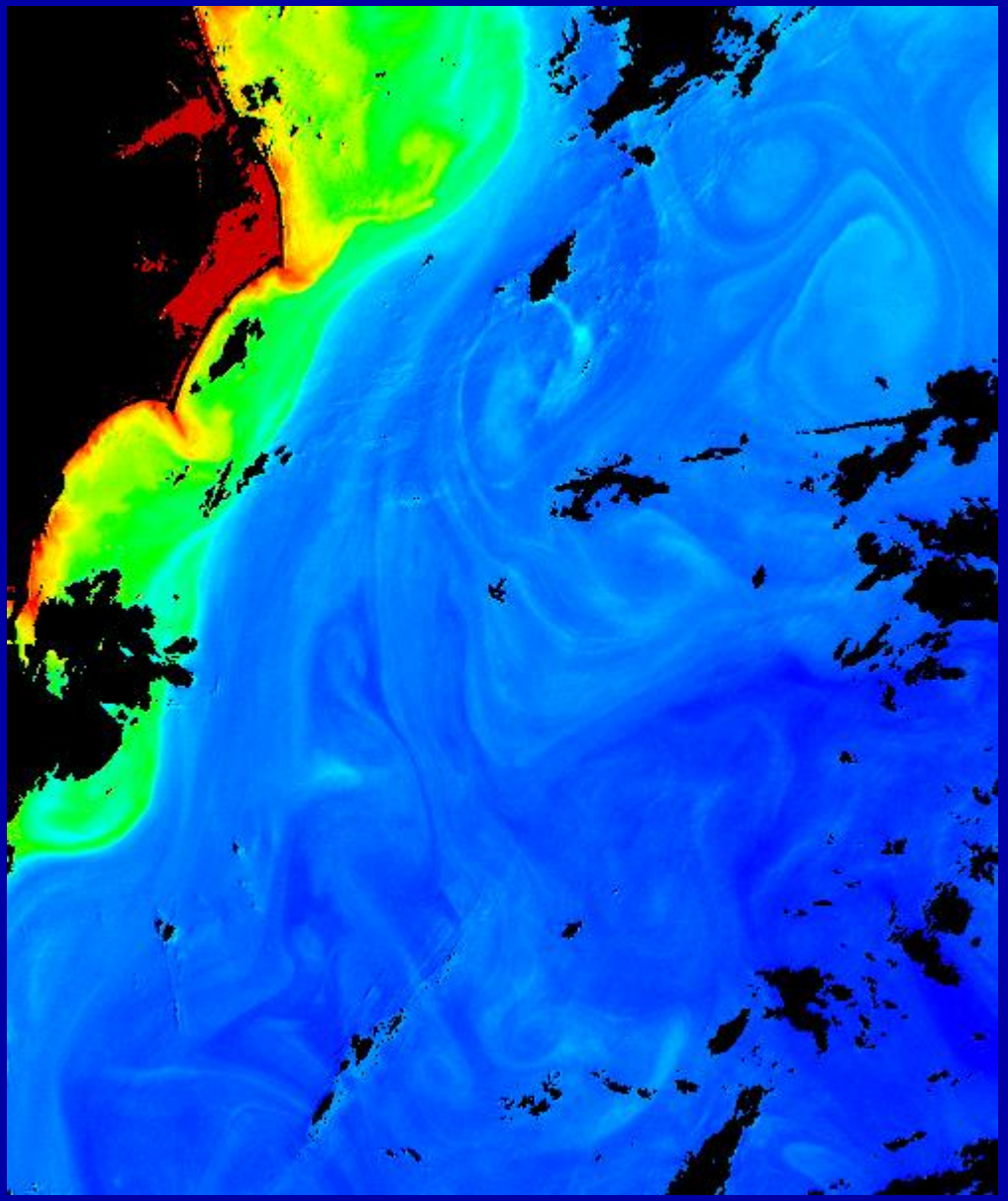
SeaWiFS, June 1, 2004, 17:15 GMT



Chl_{OC4}

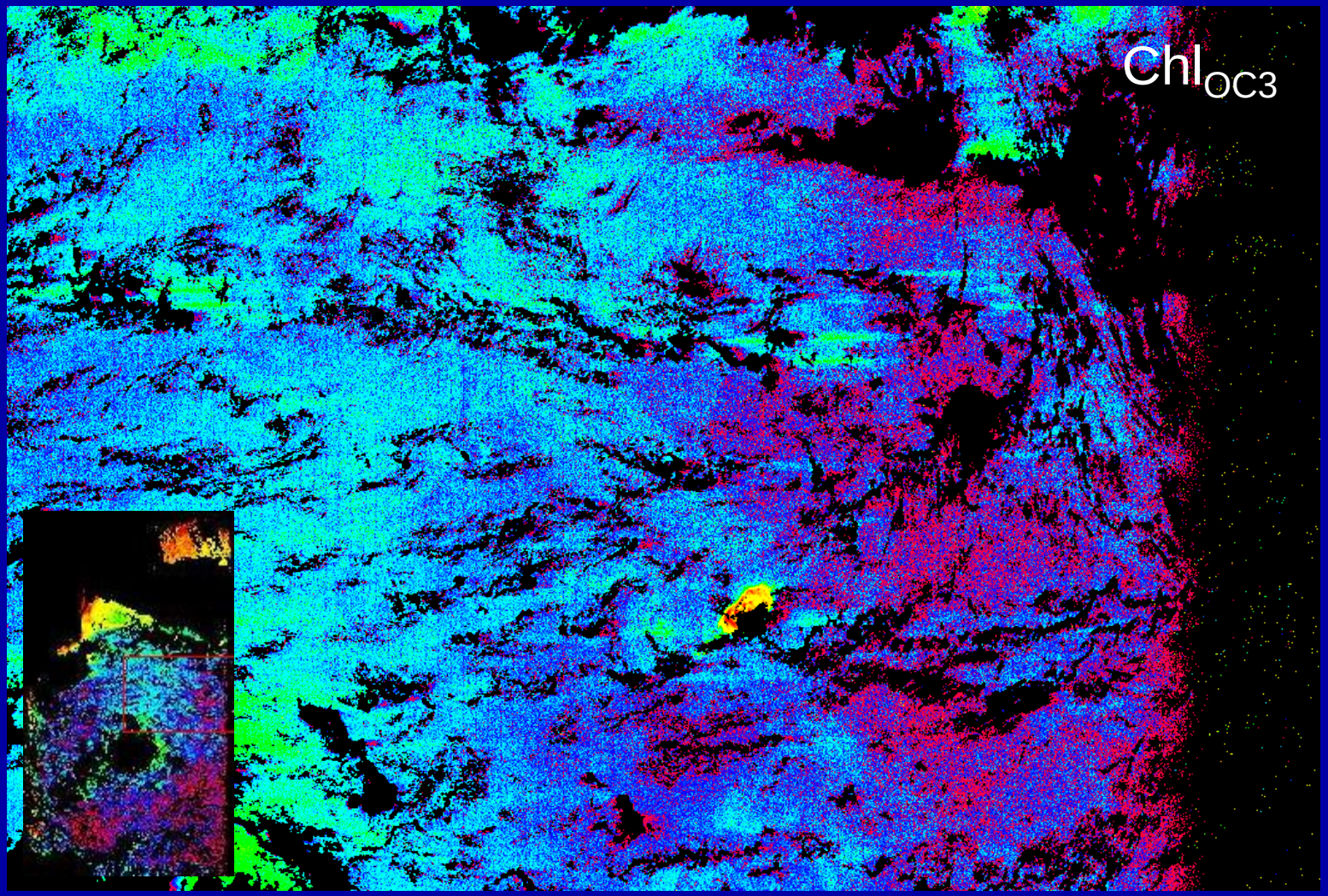


SeaWiFS, June 1, 2004, 17:15 GMT

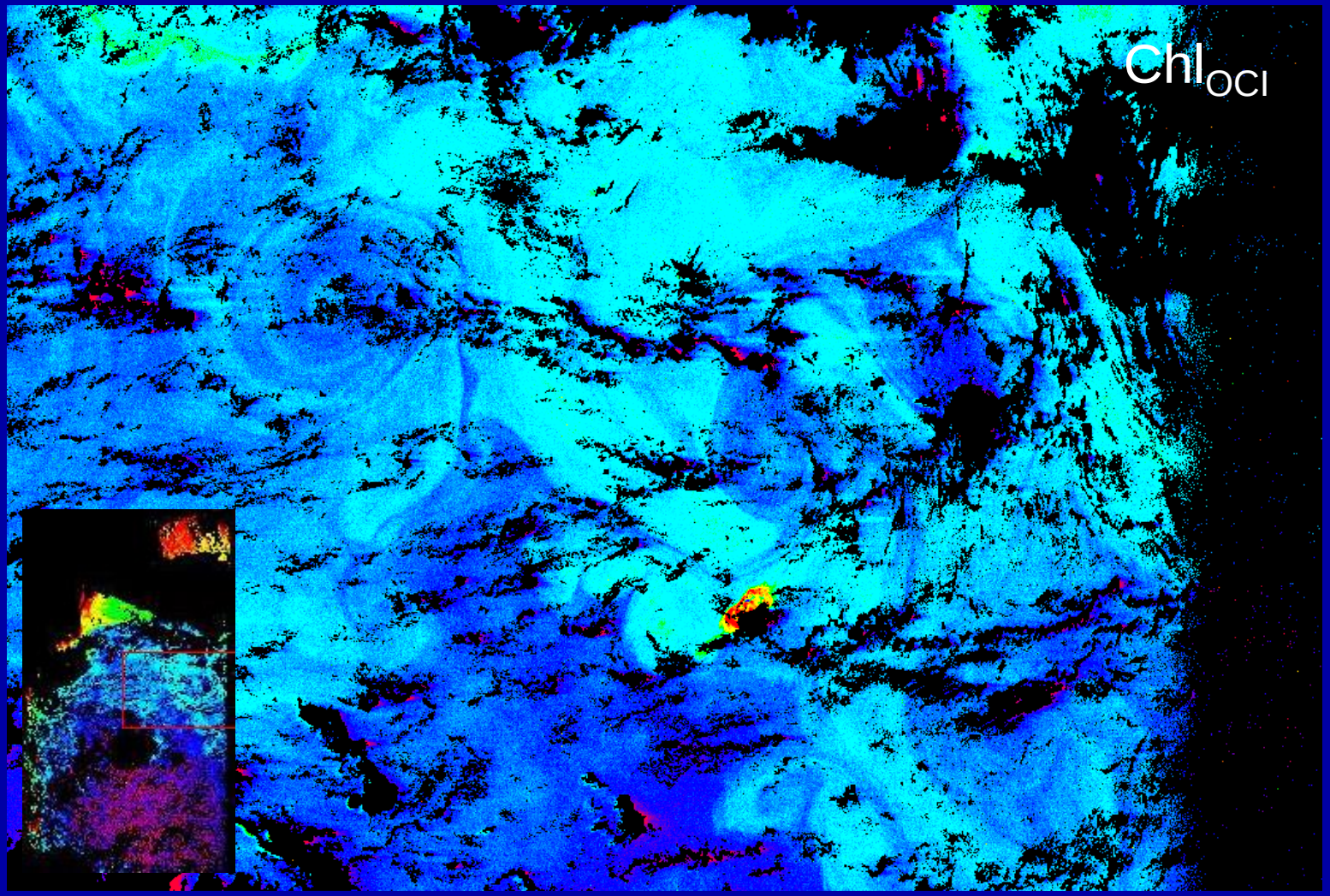


Chl_{OCI}

CZCS, July 31, 1983, 16:02 GMT



CZCS, July 31, 1983, 16:02 GMT



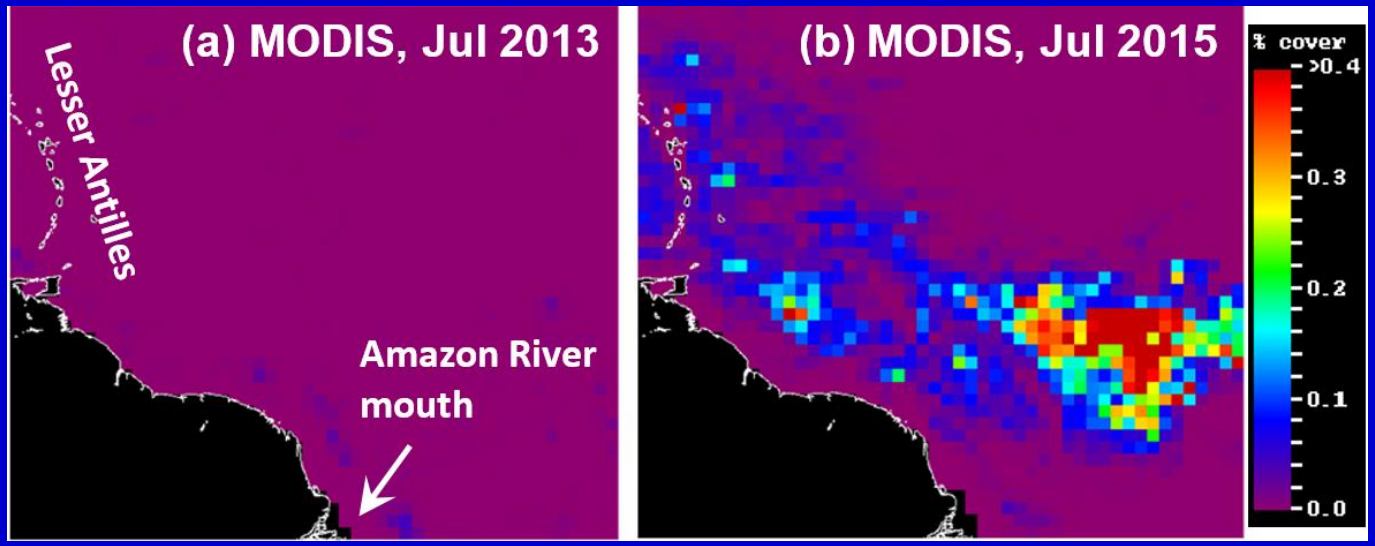
Summary on Objective #1

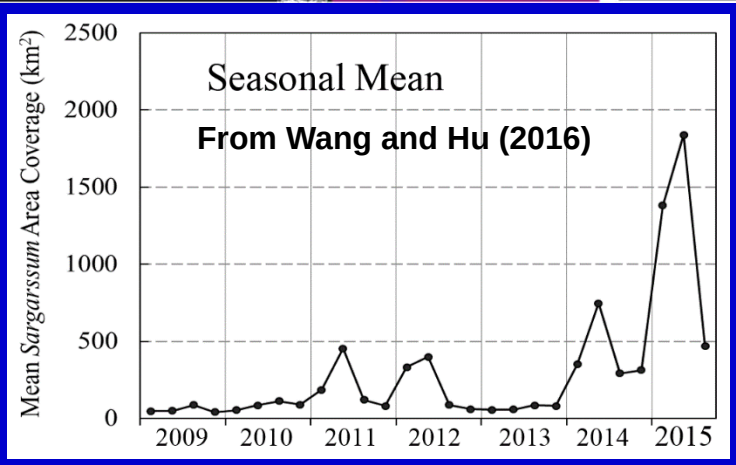
A near real-time satellite-based SaWS

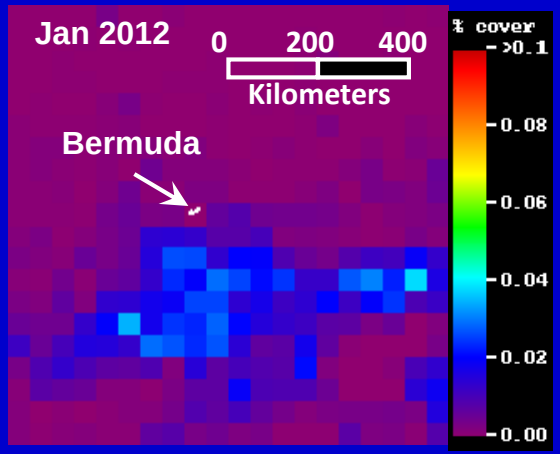
- Sensors: MODIST (daily), MODISA (daily), VIIRS (daily), L8 (16-day)
- Products: AFAI (1-km), CI (1-km), HyCOM; L8 FAI and CI (30-m)
- Where: http://optics.marine.usf.edu, under “Satellite Data Products”
- Full Google-Earth compatibility

Summary on Objective #2

Mapping and quantifying *Sargassum* coverage using MODIS AFAI data

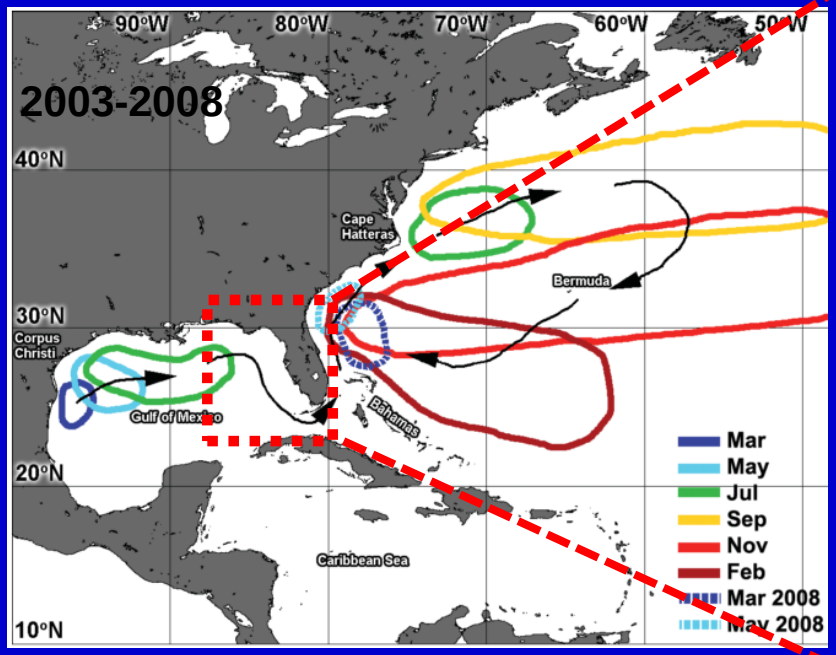




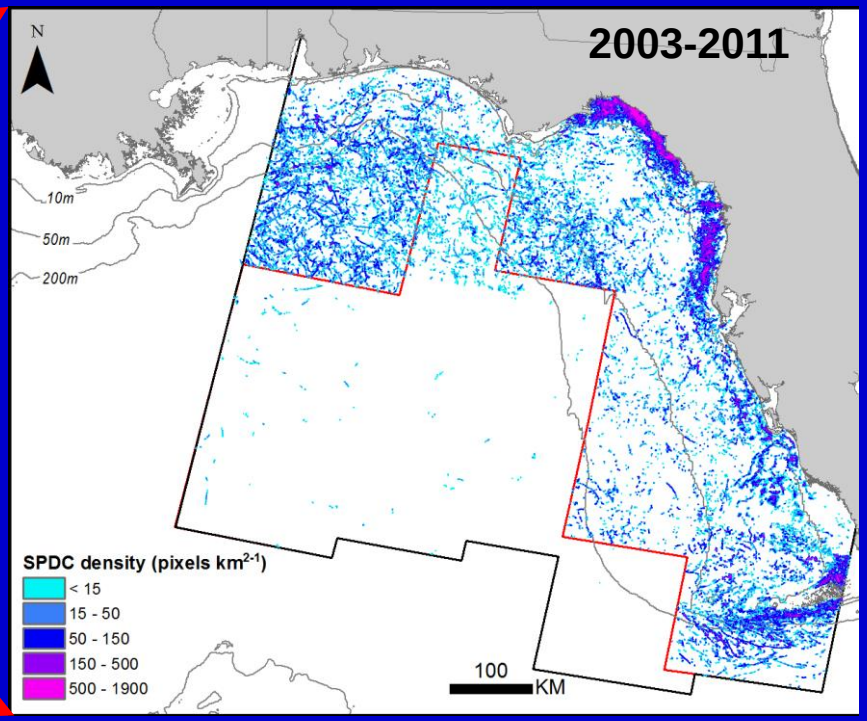


Summary on Objective #2

Mapping and quantifying *Sargassum* coverage using Landsat FAI data



MERIS (1 km), Gower et al. (2011, IJRS)



Landsat (30 m), Hardy (2014, MS thesis)