Sargassum in the ocean

Where, when, why - observations from satellites

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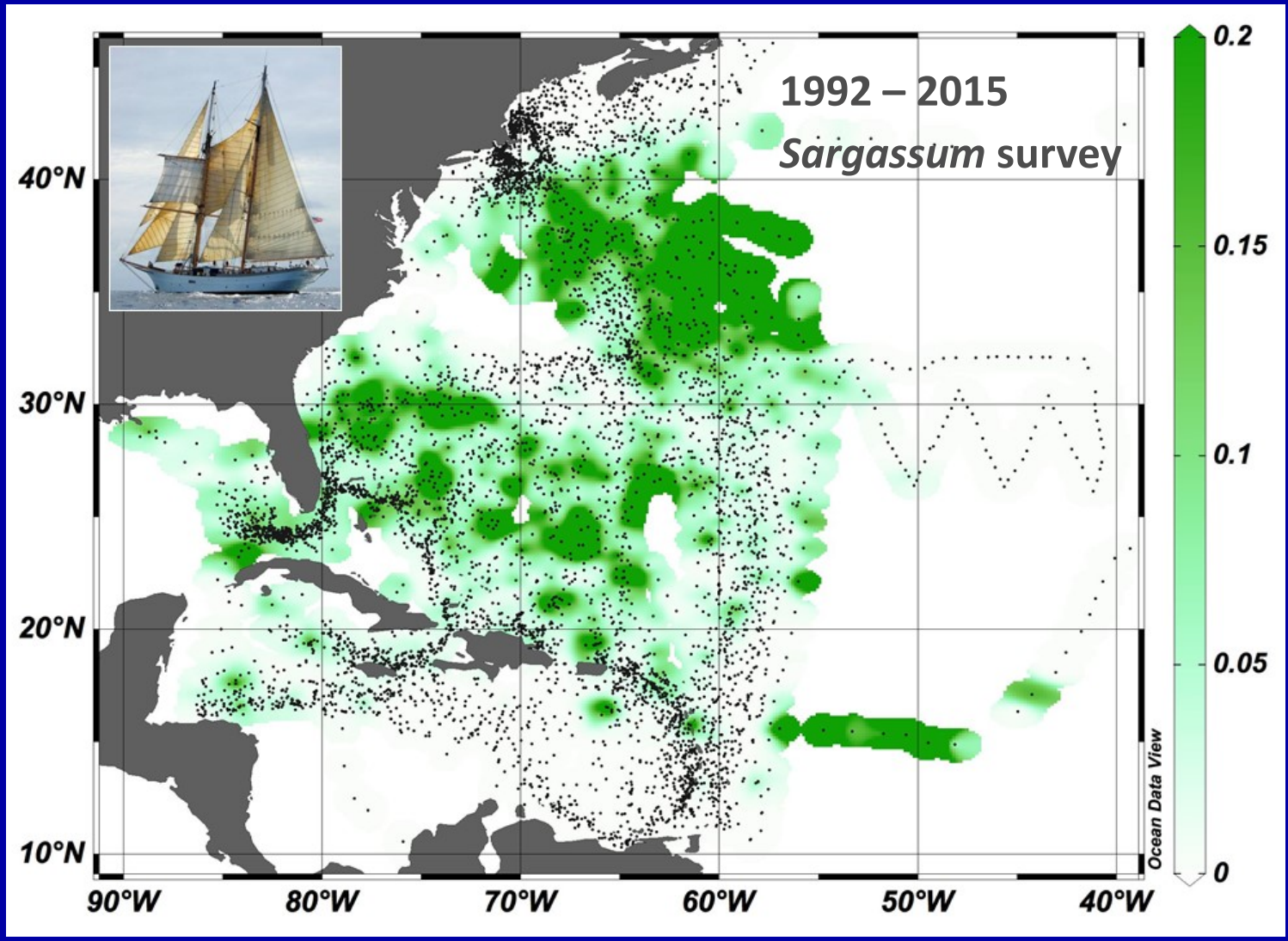
Mengqiu Wang, Brian Barnes, Brock Murch, Brian Lapointe, Frank Hernandez, James Frank, Donald Johnson, Sargasso Sea Commission…

Photo credit: Franck Mazéas

The most comprehensive survey is still not enough

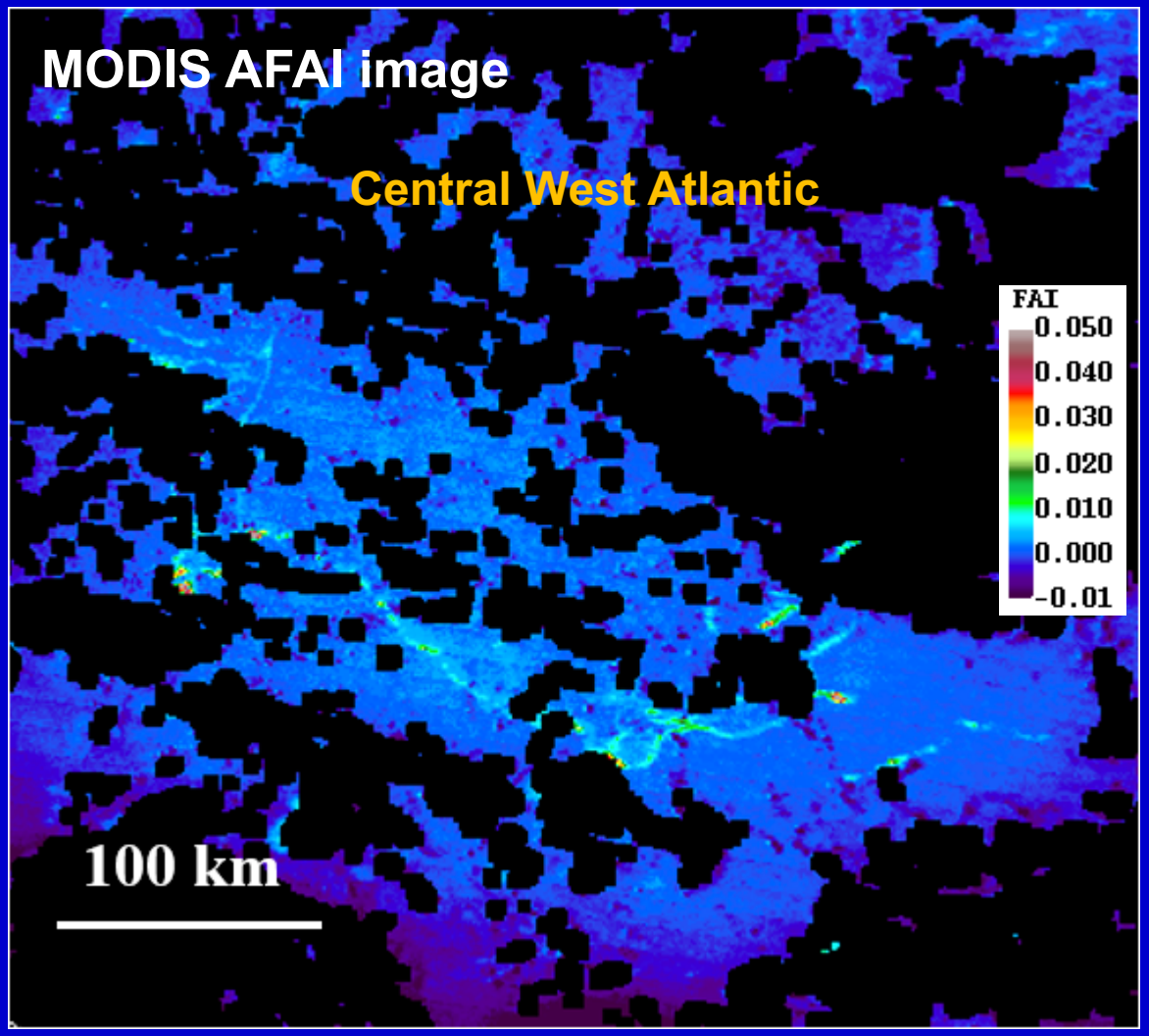
Annual surveys using neuston tows (1992 – 2015). Color represent density in g/m2

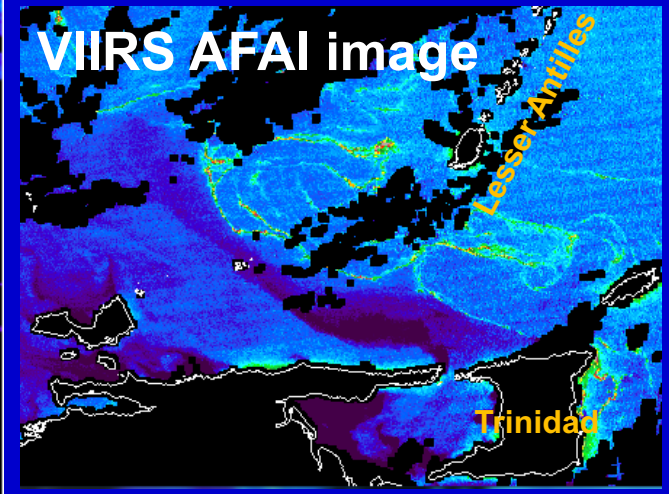


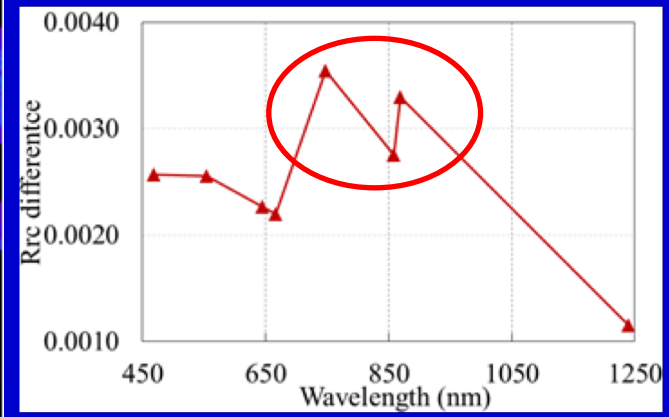
Slide from Amy Sinuda of Sea Education Association

From space: How?

Sargassum shows "red-edge" reflectance





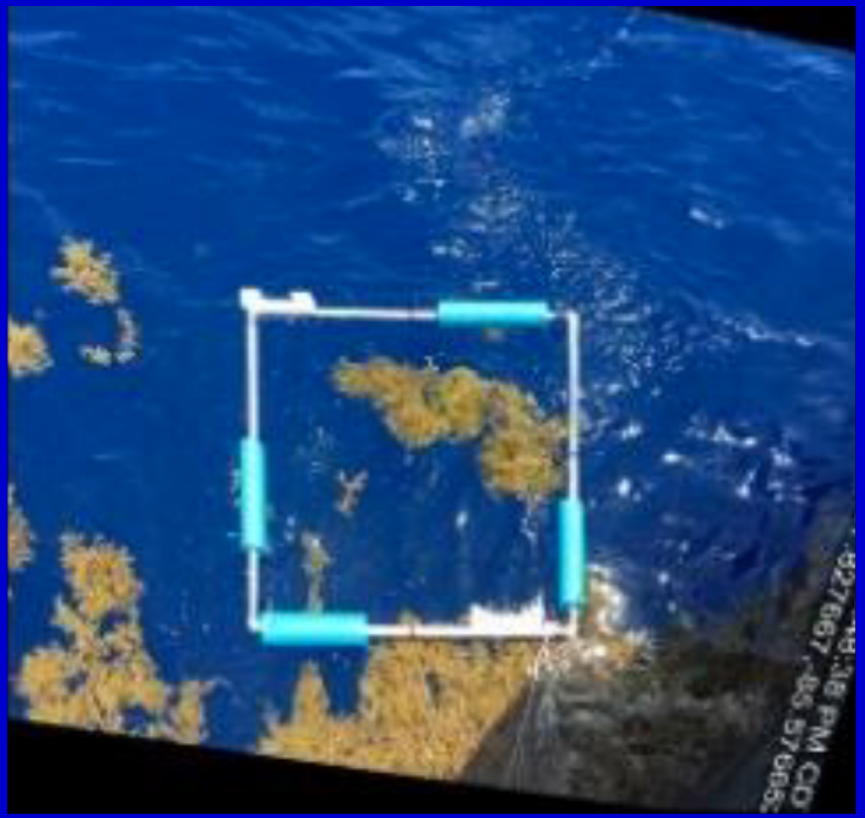


Red-edge reflectance

Hu (2009, RSE); Wang and Hu (2016, RSE)

How?

Experiment to determine biomass density versus reflectance

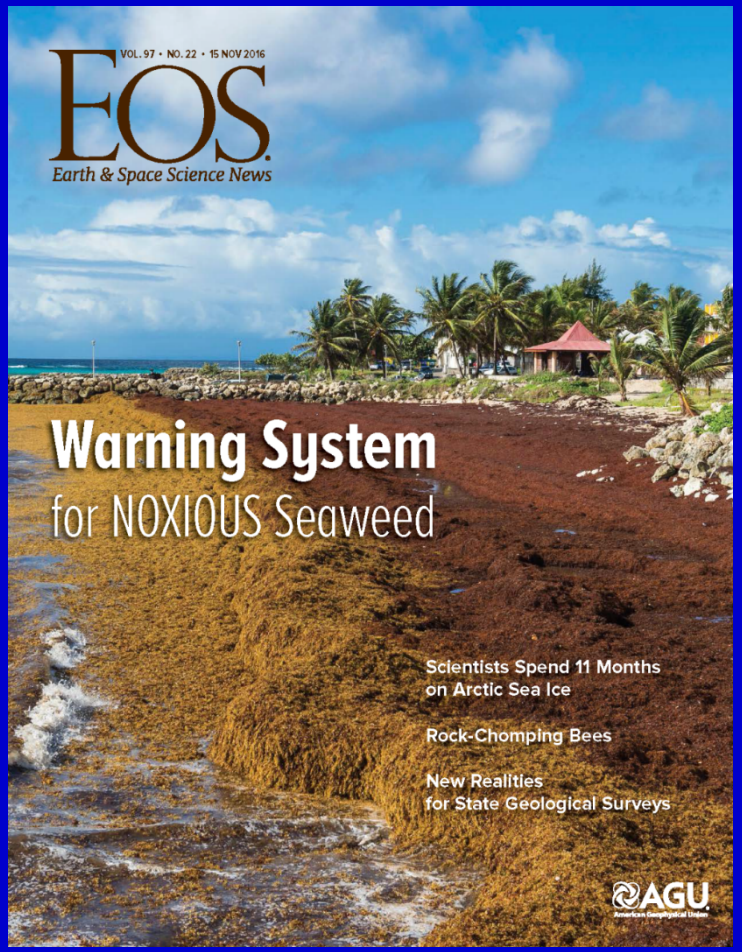


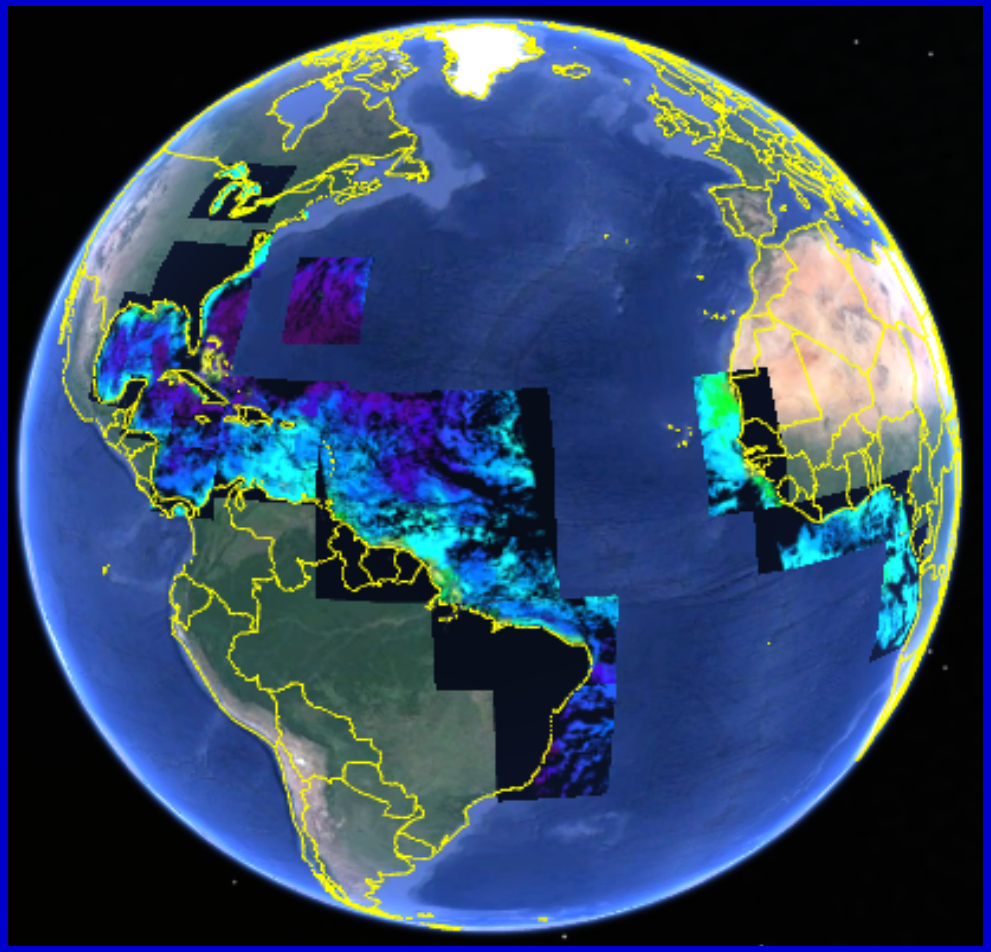
Wang, Hu, et al. (2018, GRL)

Where: near real-time products for the Intra-Americas Sea

Gulf of Mexico, Caribbean, C West Atlantic, W Africa….

https://optics.marine.usf.edu/projects/saws.html

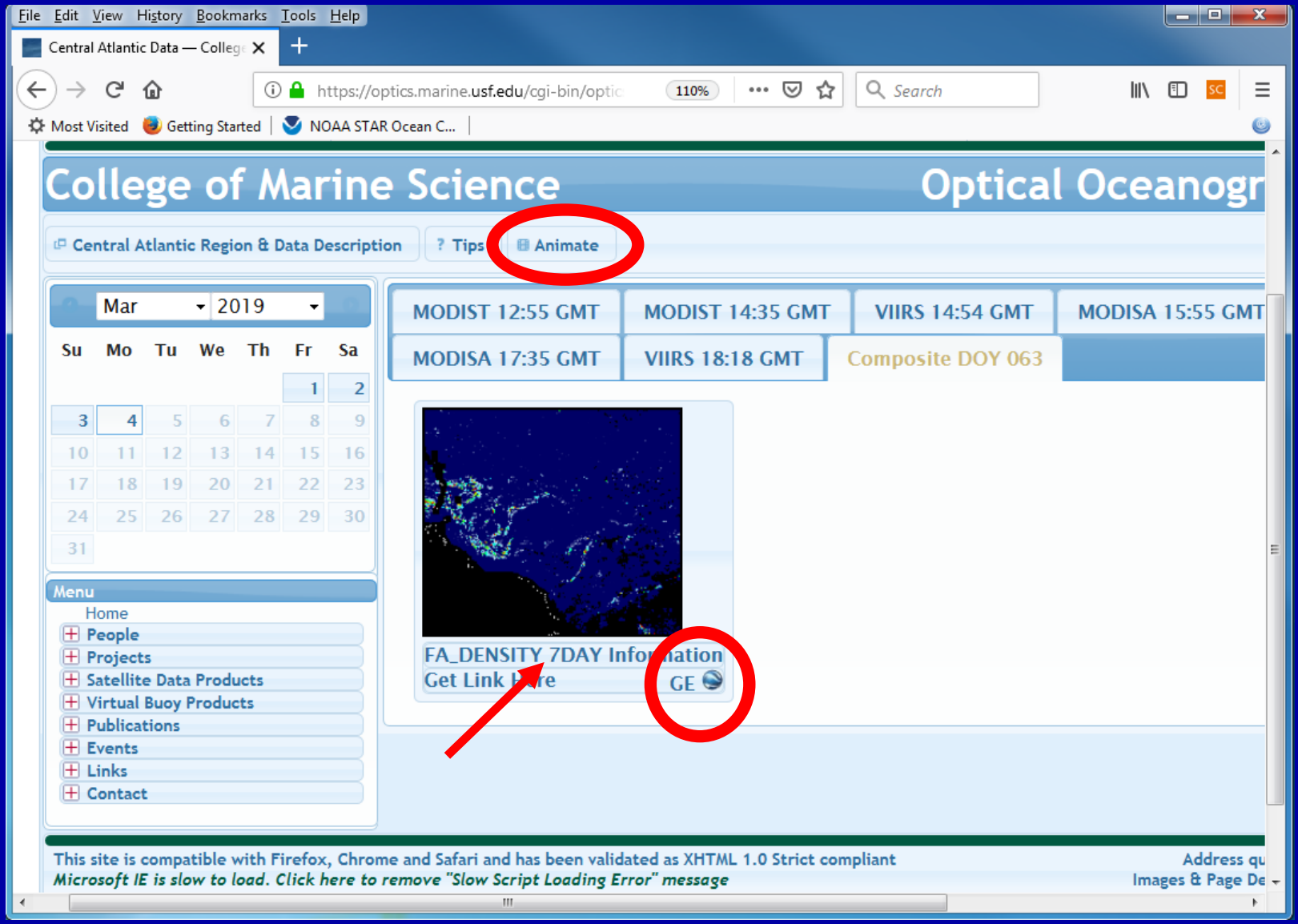




Hu et al. (2016, EOS)

Near real-time products for the Intra-Americas Sea

Google Earth compatible, functions to animate image sequence



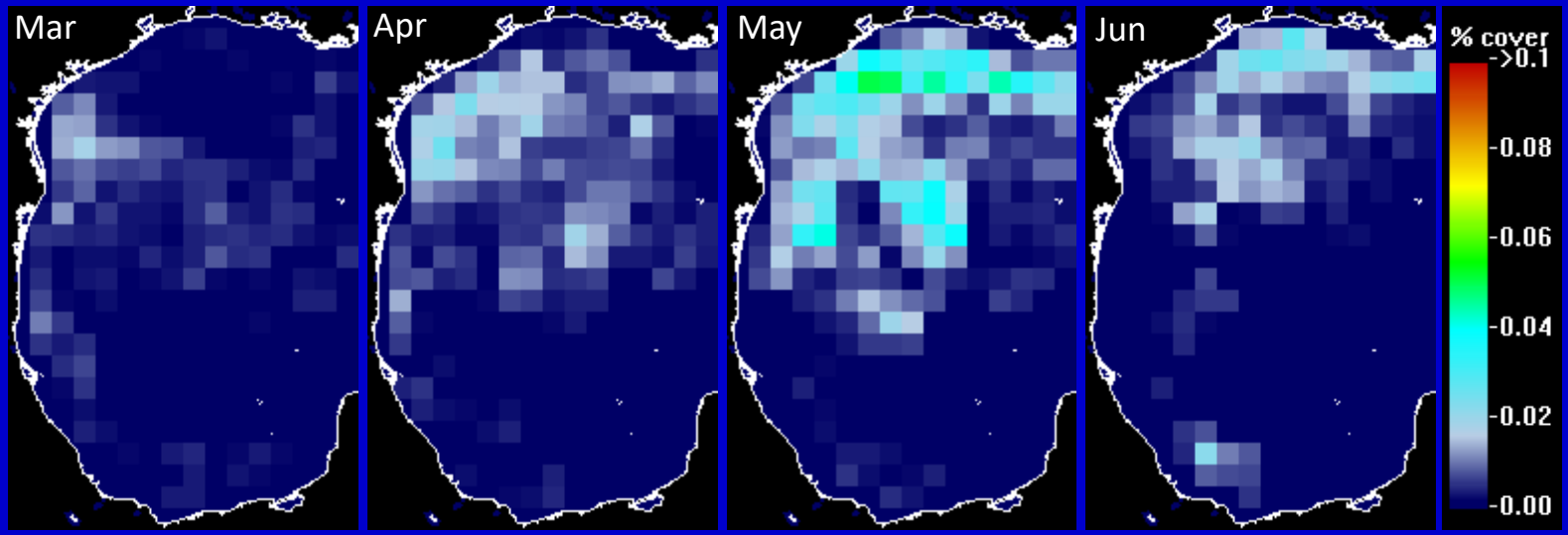
Some applications

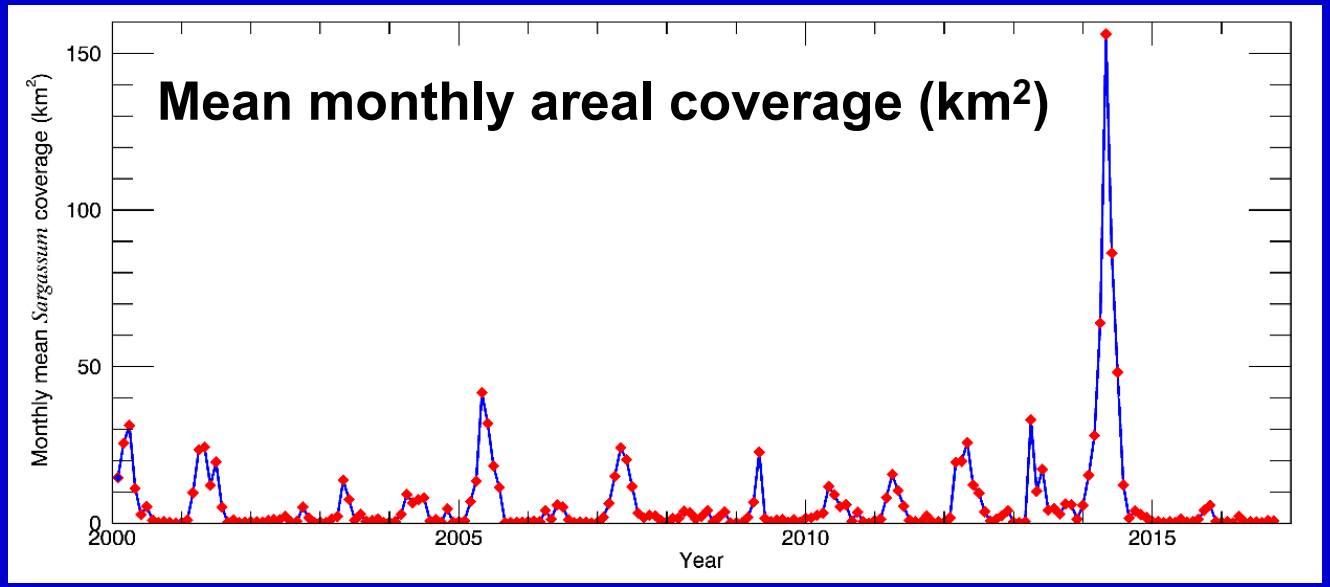
Turtle rehabilitation program

NOAA Fisheries and partners have been using SaWS to identify *Sargassum* habitat in near real-time, which is critical to sea turtle conservation and research. During storm events when juvenile turtles are washed ashore, responders need to collect and hold them in a central facility until they are released in Sargassum habitat (otherwise they would have little chance of survival). During Hurricane Irma, over 2,500 hatchlings were washed ashore and later placed on Sargassum mats.

Time series: western Gulf of Mexico

Climatology between April 2000 – March 2017





Prediction for the Caribbean Sea

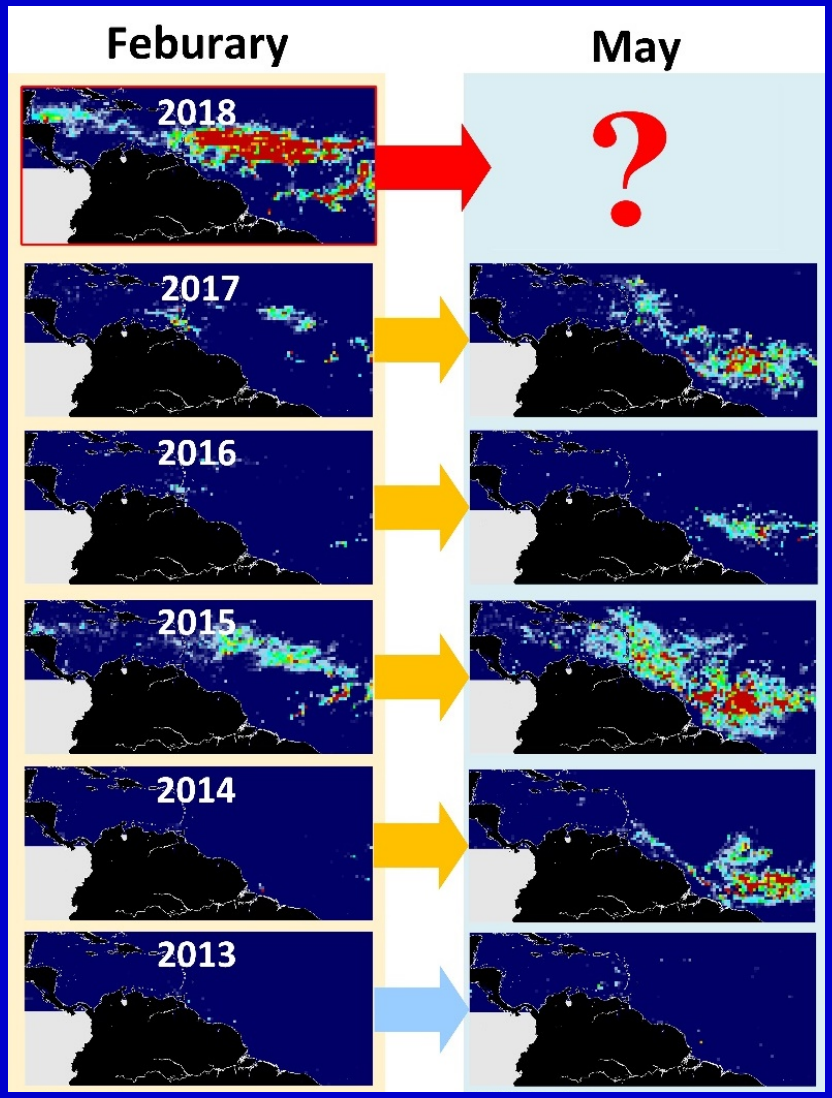
Prediction: if a bloom occurs in the central West Atlantic in February, there will be major blooms in the Caribbean in May - August

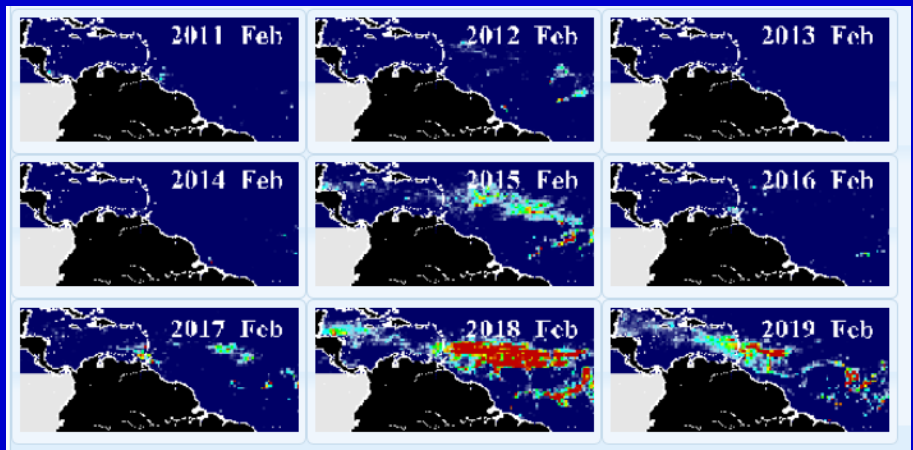
Wang and Hu (2017, GRL)

Prediction for the Caribbean Sea

Monthly bulletins

optics.marine.usf.edu/projects/saws.html





Sargassum Outlook Bulletin, February 2019

Sargassum Outlook Bulletin, January 2019

Sargassum Outlook Bulletin, December 2018

Sargassum Outlook Bulletin, November 2018

Sargassum Outlook Bulletin, October 2018

Sargassum Outlook Bulletin, September 2018

Sargassum Outlook Bulletin, August 2018

Sargassum Outlook Bulletin, July 2018

Sargassum Outlook Bulletin, June 2018

Sargassum Outlook Bulletin, May 2018

Sargassum Outlook Bulletin, April 2018

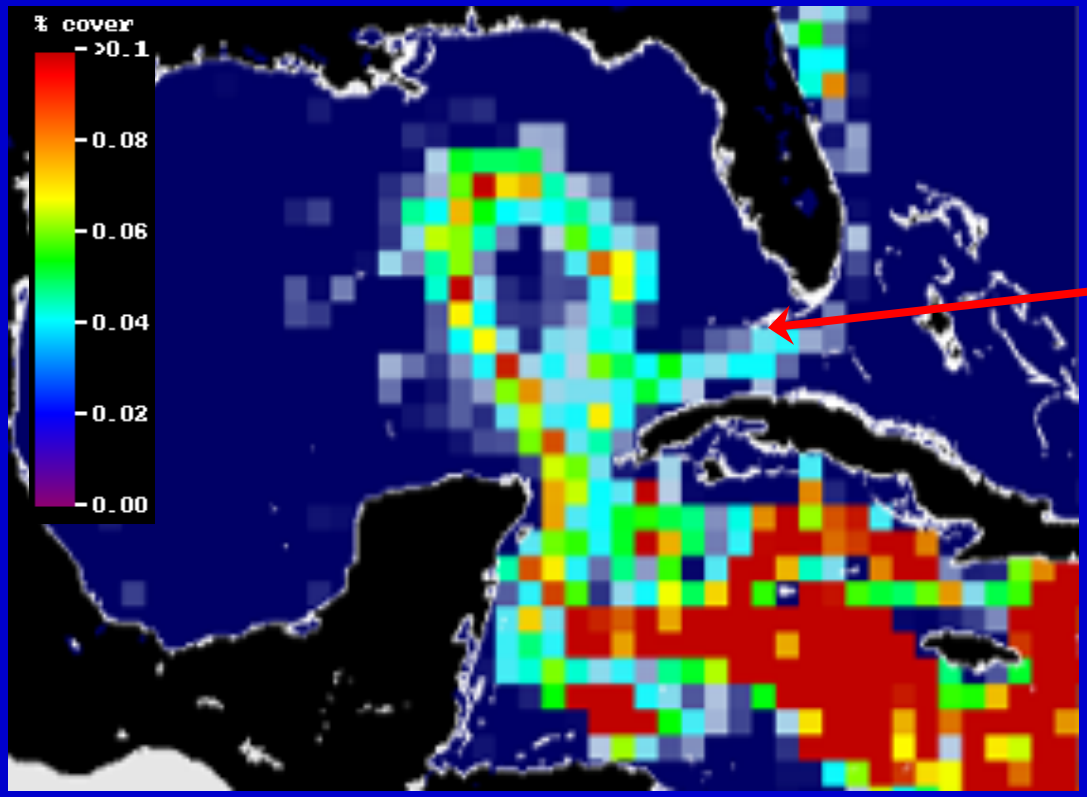
Sargassum Outlook Bulletin, March 2018

Sargassum Outlook Bulletin, February 2018

Sargassum Outlook Bulletin, January 2018

Prediction in other places?

Sargassum transport through Gulf of Mexico



General conclusions

- Satellite remote sensing is the only way to provide frequent and synoptic observations of pelagic Sargassum in the vast ocean
- The general large picture (seasonality, distribution, amount, etc) has been established for several regions, and can be established for other regions

  - when, where, how much, some prediction

- Infrastructure for near real-time monitoring and tracking has been established through SaWS
- Further research is required to 1) understand what caused the inter-annual changes and 2) predict the future

So what?

How to take the increased blooms as an opportunity?

- Fertilizers, biofuel, other use?
- Improve fisheries?
- Improve tourism guide?