



Sargassum in the ocean

Where, when, why - observations from satellites

Chuanmin Hu, University of South Florida

huc@usf.edu; <https://optics.marine.usf.edu/projects/saws.html>

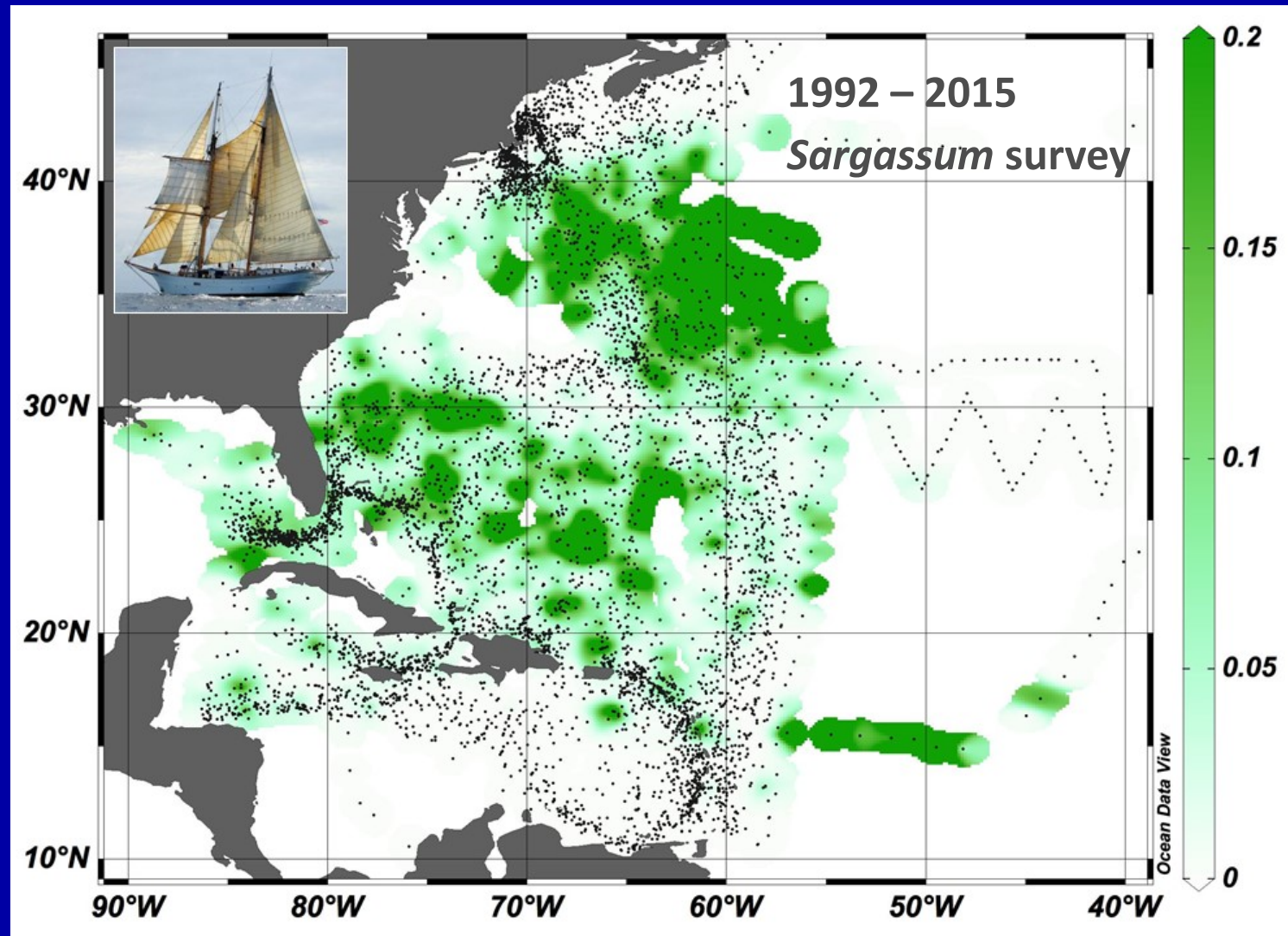
Co-authors and collaborators:

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

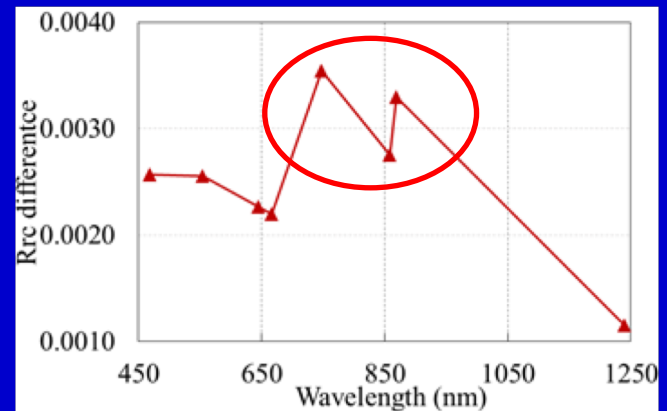
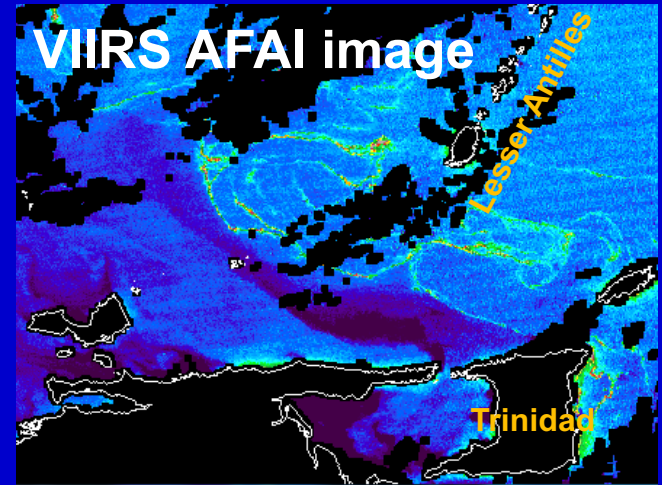
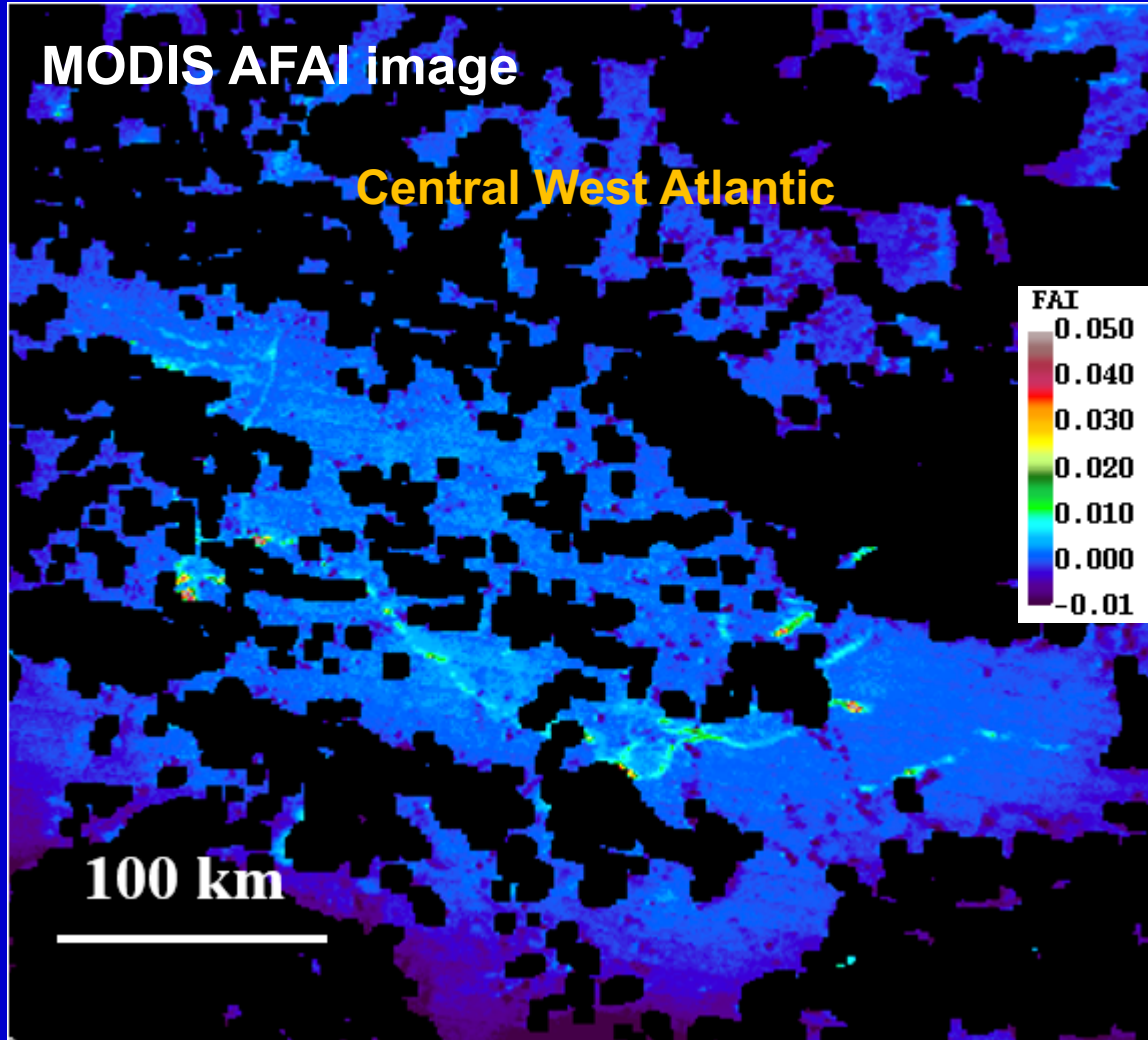
Annual surveys using neuston tows (1992 – 2015). Color represent density in g/m²



Slide from Amy Sinuda of Sea Education Association

From space: How?

Sargassum shows “red-edge” reflectance

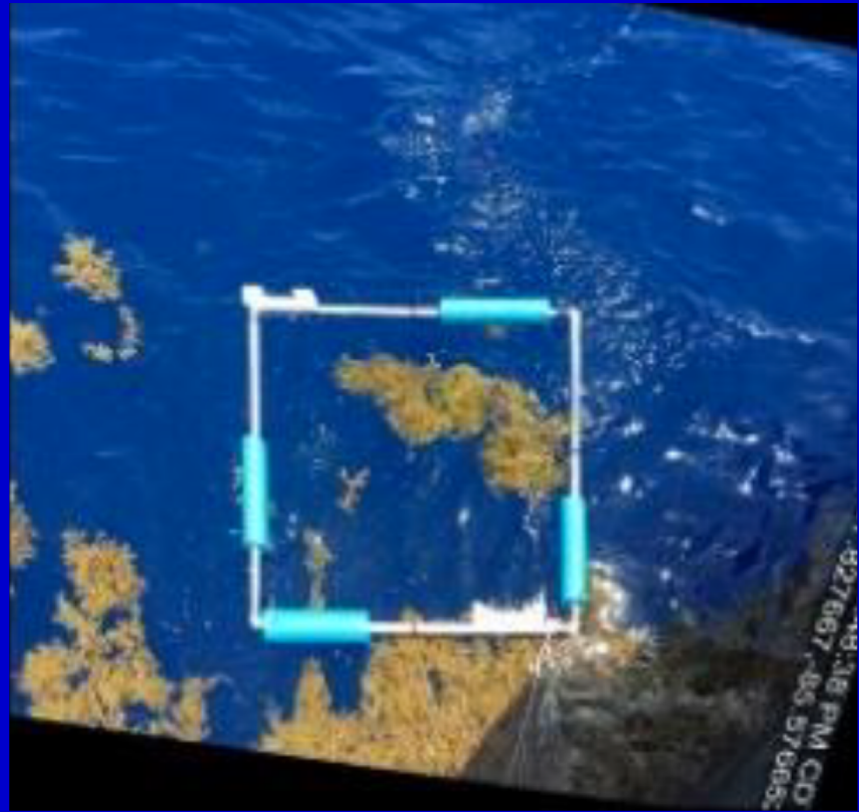


Red-edge reflectance

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

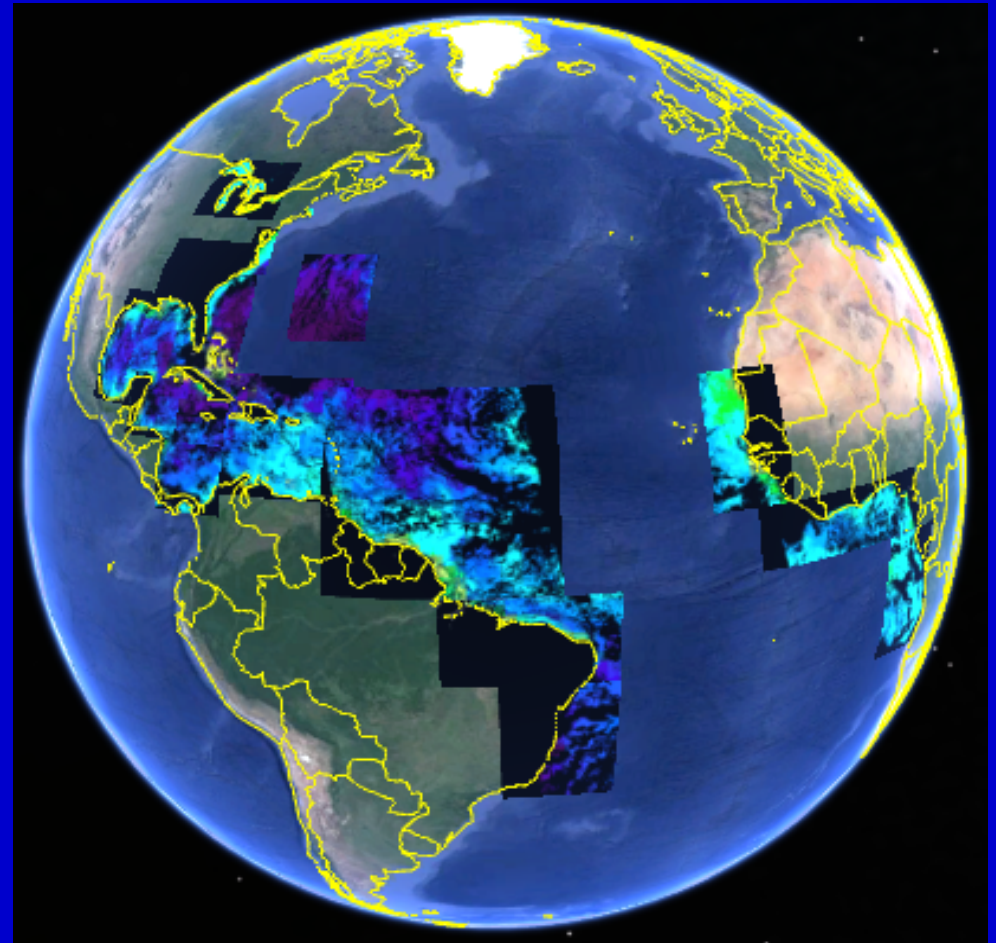
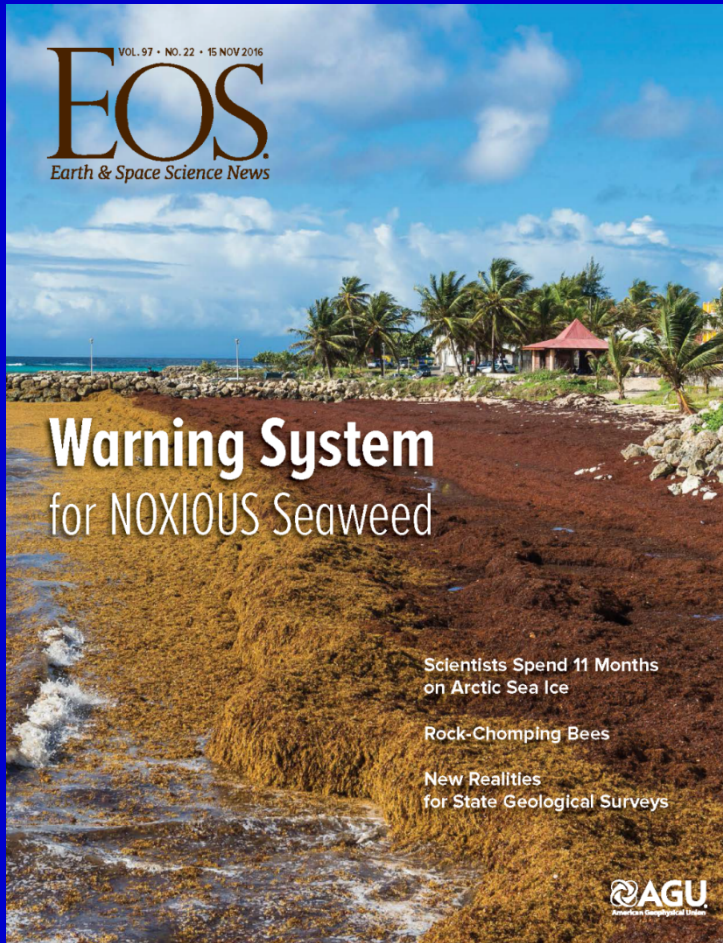
How?

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

The screenshot shows a web browser window displaying the 'College of Marine Science Optical Oceanography' website. The browser's address bar shows the URL <https://optics.marine.usf.edu/cgi-bin/optic>. The website header includes the text 'College of Marine Science' and 'Optical Oceanogr'. Below the header, there are navigation tabs: 'Central Atlantic Region & Data Description', '? Tips', and 'Animate', with the 'Animate' tab circled in red. A calendar for March 2019 is visible on the left side. The main content area features a grid of satellite data product thumbnails: 'MODIST 12:55 GMT', 'MODIST 14:35 GMT', 'VIIRS 14:54 GMT', 'MODISA 15:55 GMT', 'MODISA 17:35 GMT', 'VIIRS 18:18 GMT', and 'Composite DOY 063'. A large satellite image of the Intra-Americas Sea is displayed, with a red arrow pointing to a button labeled 'FA_DENSITY 7DAY Information Get Link Here' and a red circle around a 'GE' icon. The footer contains a compatibility notice: 'This site is compatible with Firefox, Chrome and Safari and has been validated as XHTML 1.0 Strict compliant. Microsoft IE is slow to load. Click here to remove "Slow Script Loading Error" message'.

Some applications

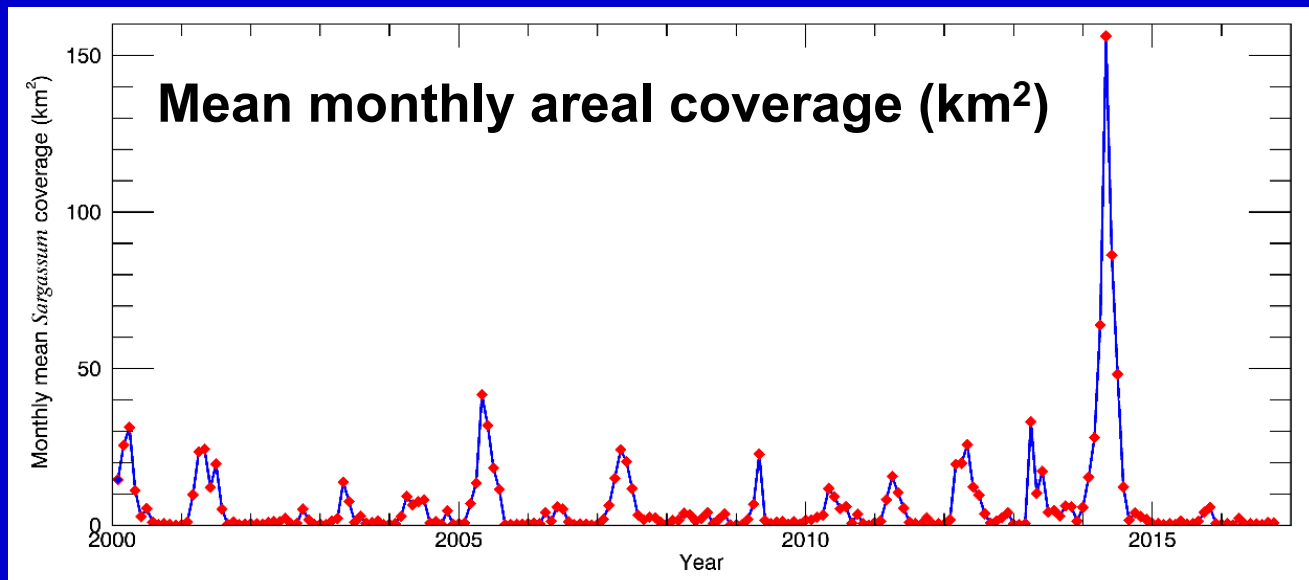
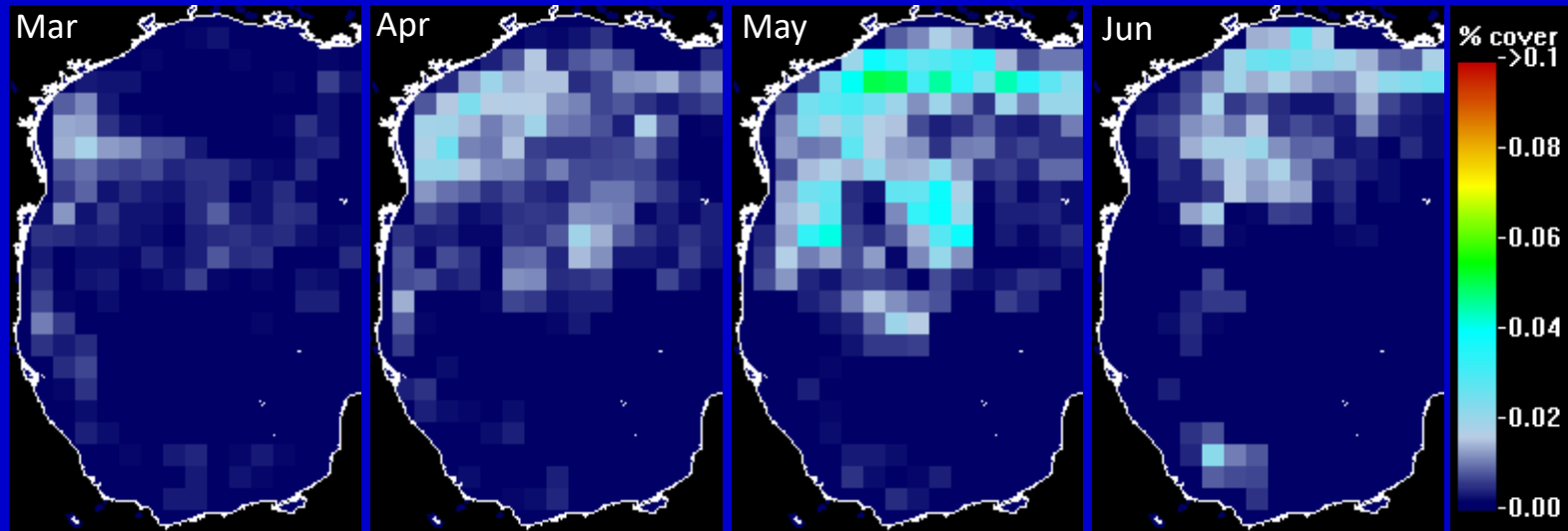
Turtle rehabilitation program

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

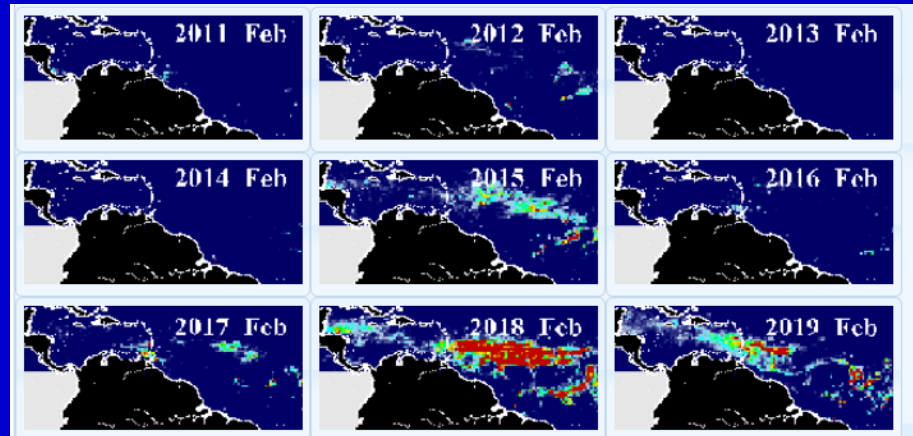
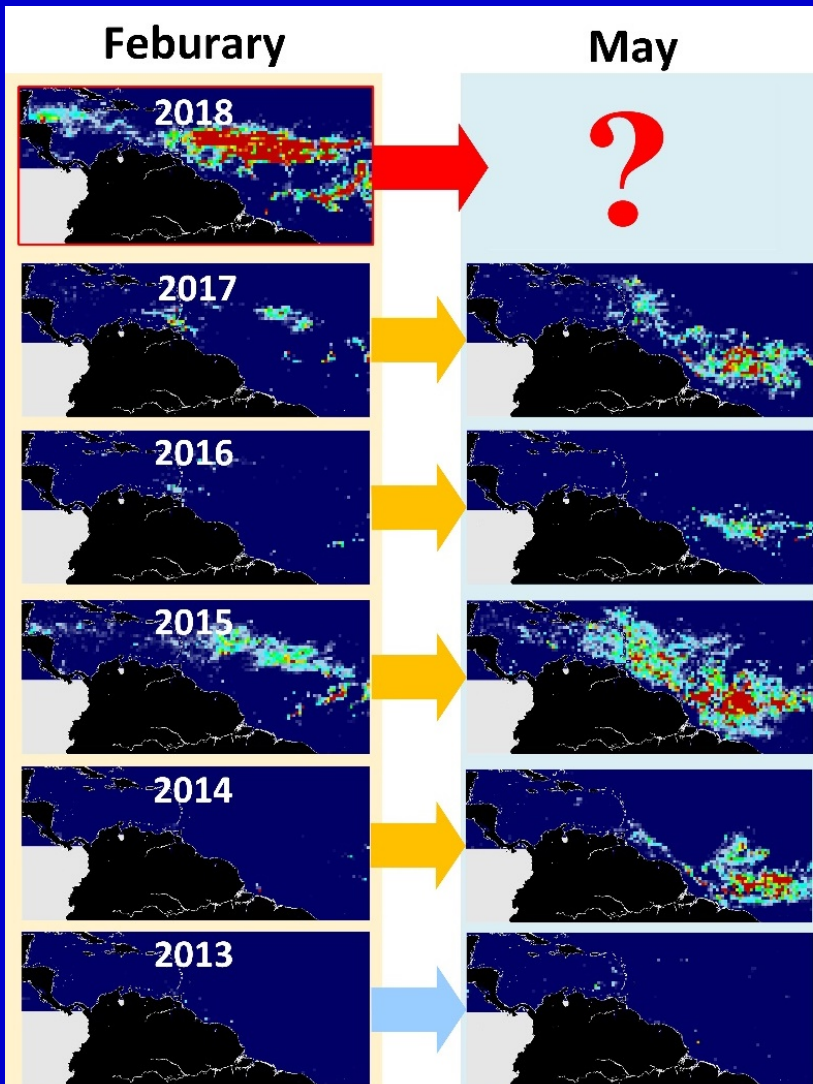


Wang and Hu (2017, GRL)

Prediction for the Caribbean Sea

Monthly bulletins

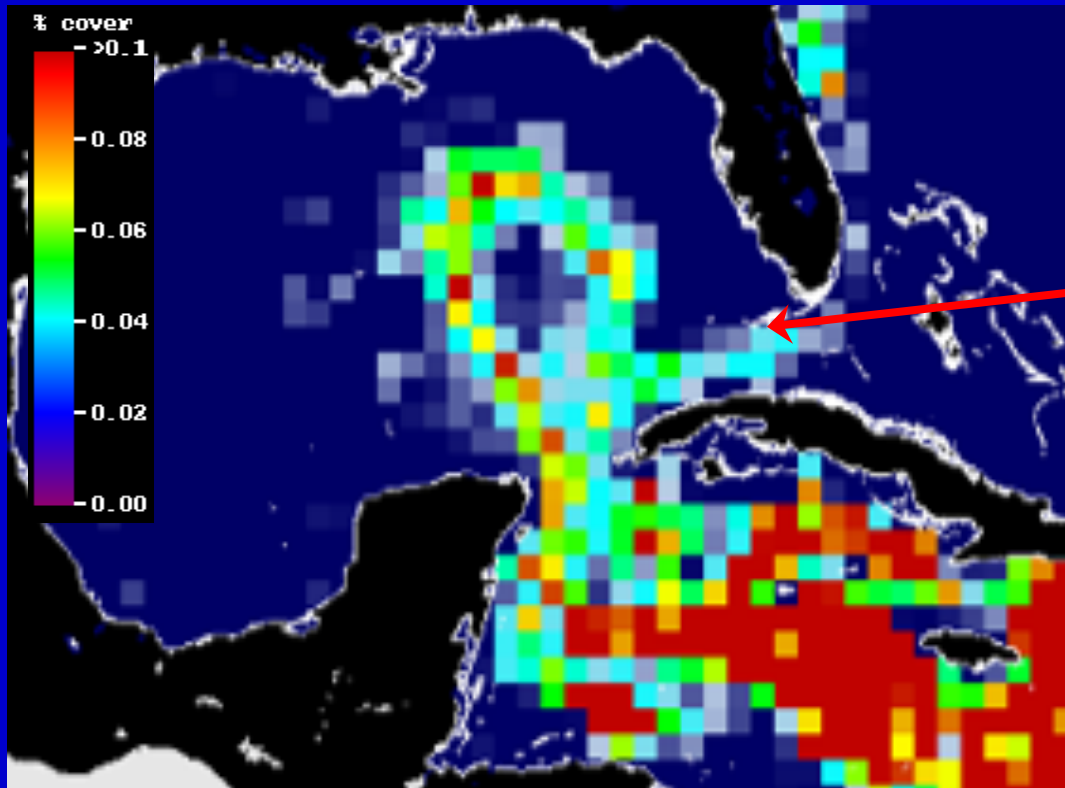
optics.marine.usf.edu/projects/saws.html



- 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?