

What to do about all that Sargassum?!

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Rutland Bay, Mustique, SVG, 2014 (D. Wilson)

Warm-up questions

1. Have you noticed an occurrence of greater than normal amounts of sargassum on your beaches in recent years?
2. Has it caused any problems for your turtles or their habitats?
3. Are other people in your country/territory talking about sargassum?

Would you like to know more?



An emerging topic....

“Retention and growth of pelagic sargassum in the North Equatorial Recirculation Region of the Atlantic Ocean: Hypothesis for examining recent mass strandings of sargassum along Caribbean and West Africa coastlines”

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What is sargassum?



- Pelagic brown alga
- Class Phaeophyceae
- Family Sargassaceae
- Occurs only in Atlantic
- Buoyancy from gas-filled pods
- Reproduces by fragmentation
- Two species



Sargassum natans
Common Gulfweed
photo by Phillippe Rouja



Sargassum fluitans
Broad-toothed Gulfweed
photo by GCRL

The characteristics described below are useful in differentiating between the two species. However, characteristics vary and identification of a particular sample may not be straightforward.

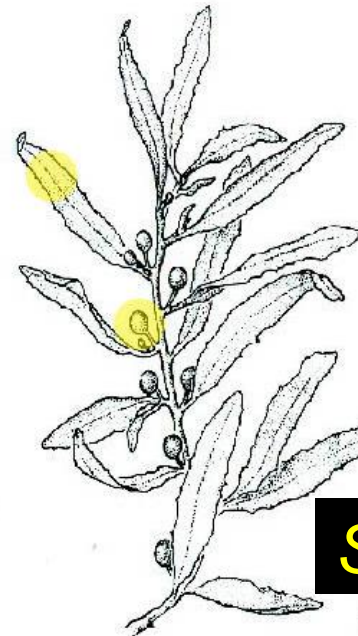
<http://www.usm.edu/gcrl/sargassum>

Sargassum natans



Sargassum natans

- Pods - usually tipped with spikes or small leaves
- Leaves - long-stalked, narrow



Sargassum fluitans

Sargassum fluitans

- Pods - usually *not* tipped with spikes or small leaves
- Leaves - short-stalked, broad

Sargassum natans

Sargassum fluitans



Importance of sargassum

- Entirely natural in our region
- Pelagic ecosystem harbors diverse fauna eg. small fish, crustaceans, worms, mollusks, tunicates, and coelenterates
- Refuge for migratory species
- Important nursery habitat for sea turtles - shelter and food for young turtles
- Nursery and cover habitat for fish of commercial and recreational value eg. marlin
- Role in beach nourishment
- Important element in shoreline stability

‘Behaving like an invasive’

Not a regular event, not local event, not one-off event

Unprecedented quantities of pelagic sargassum occurred throughout the Caribbean in 2011, 2014 = influx



Barbados
2011



Puerto Rico
2014

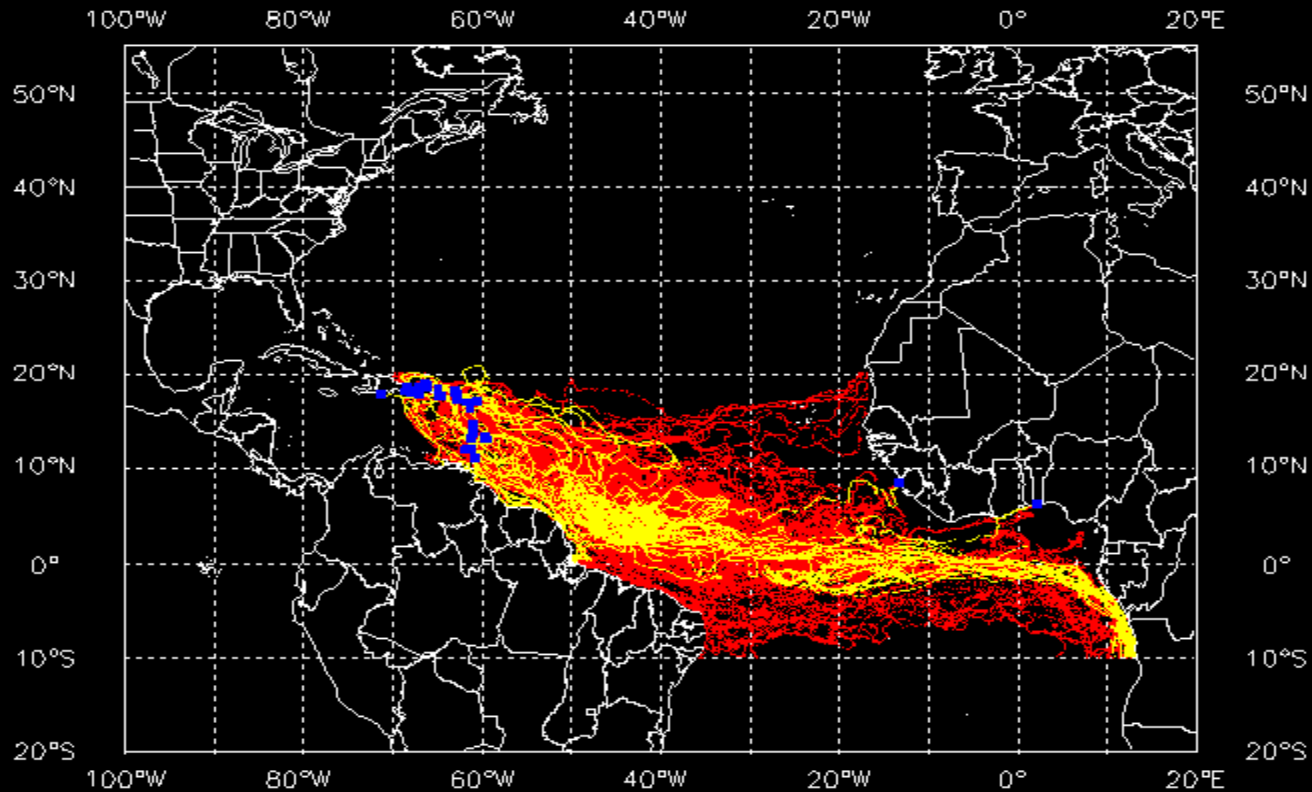


Antigua
2011



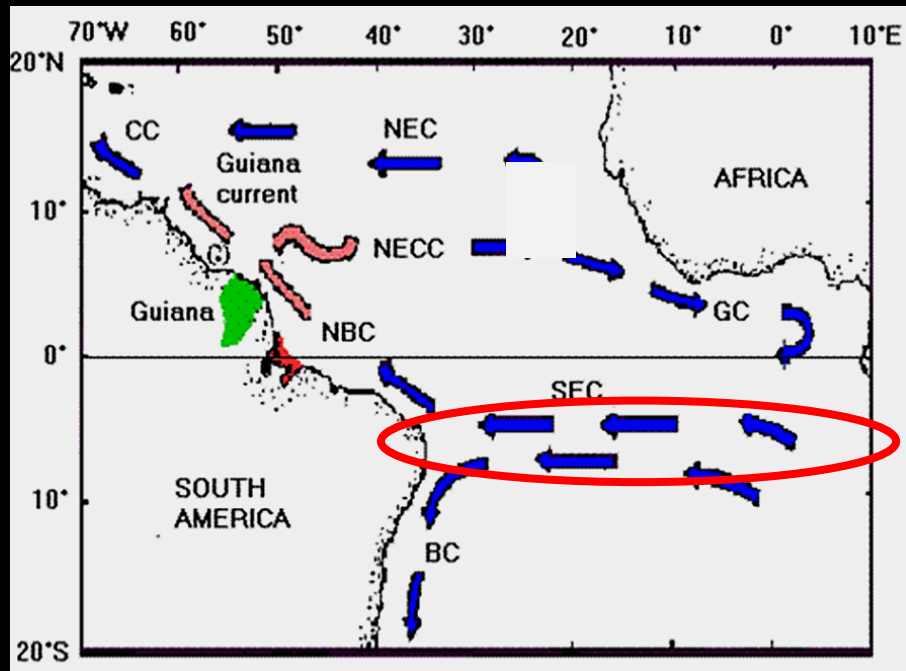
San Andrés, Colombia
2014

Where is the sargassum coming from?



Hypothesis:
an equatorial event

Hypothesis about influx



NERR - North Equatorial Recirculation Region

NEC - North Equatorial Current

NECC - North Equatorial Counter Current

GC - Guinea Current

SEC - South Equatorial Current

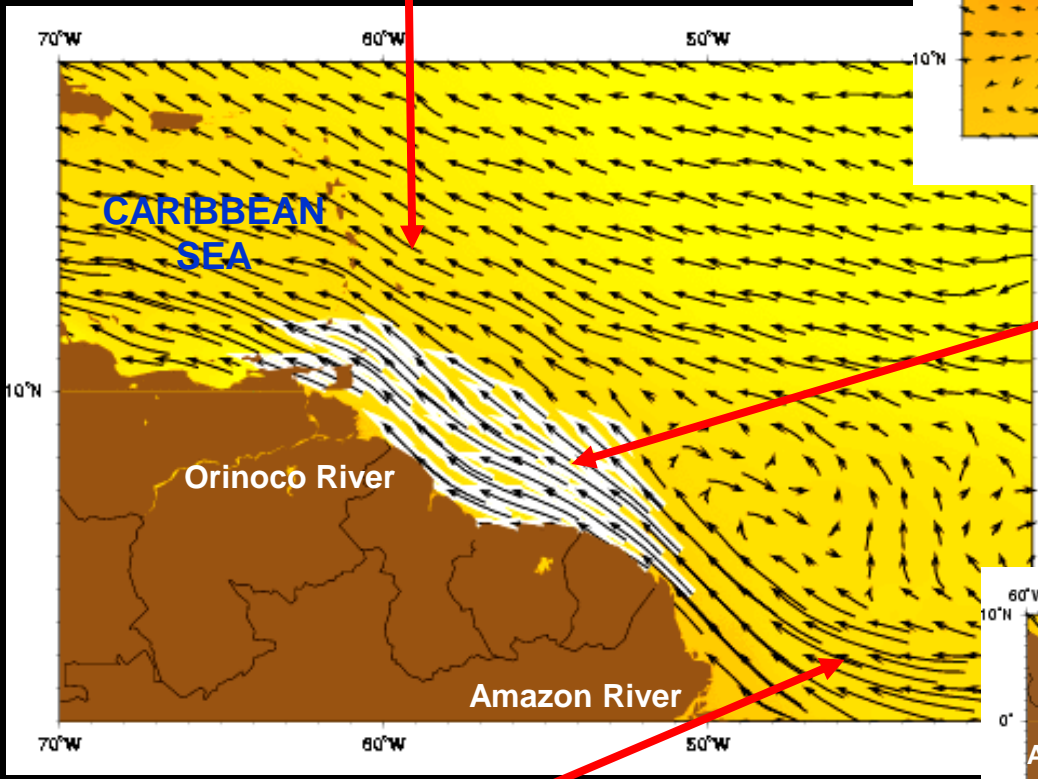
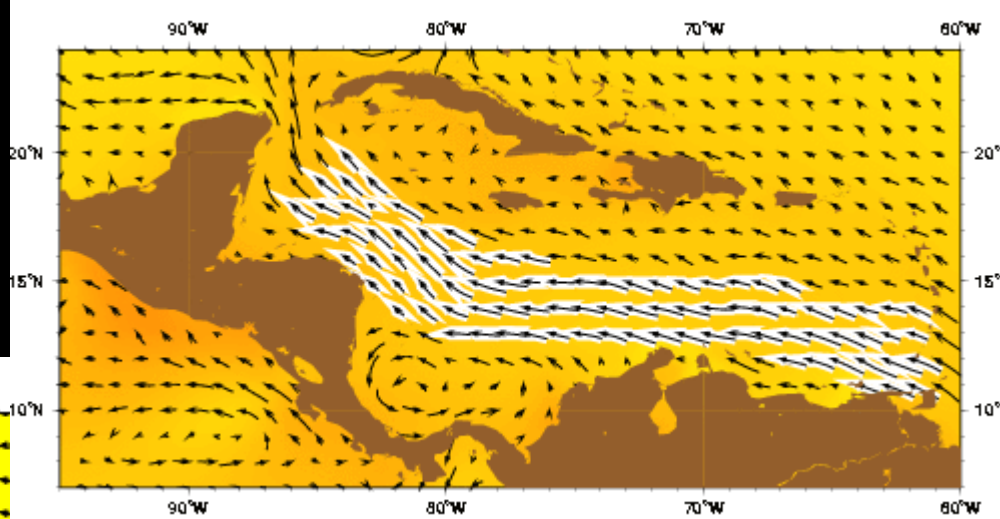
NBC - North Brazil Current

CC - Caribbean Current

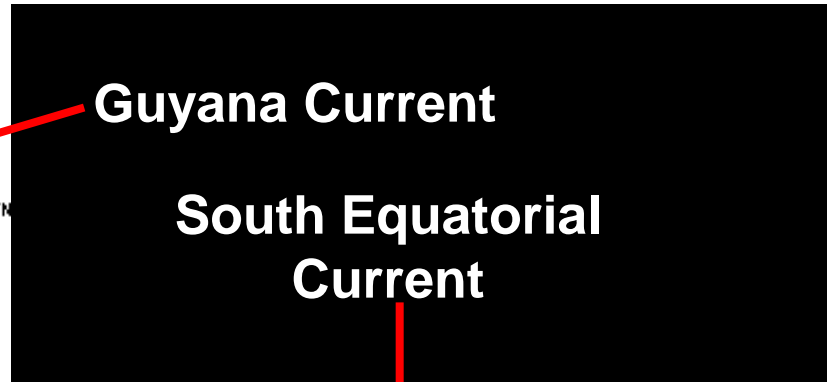
nb. takes one year to go from one end of NERR to other

Sargassum proliferation (bloom) occurred in the North Equatorial Recirculation Region (NERR) of the North Atlantic between the North Equatorial Counter Current and the equator

Antilles Current

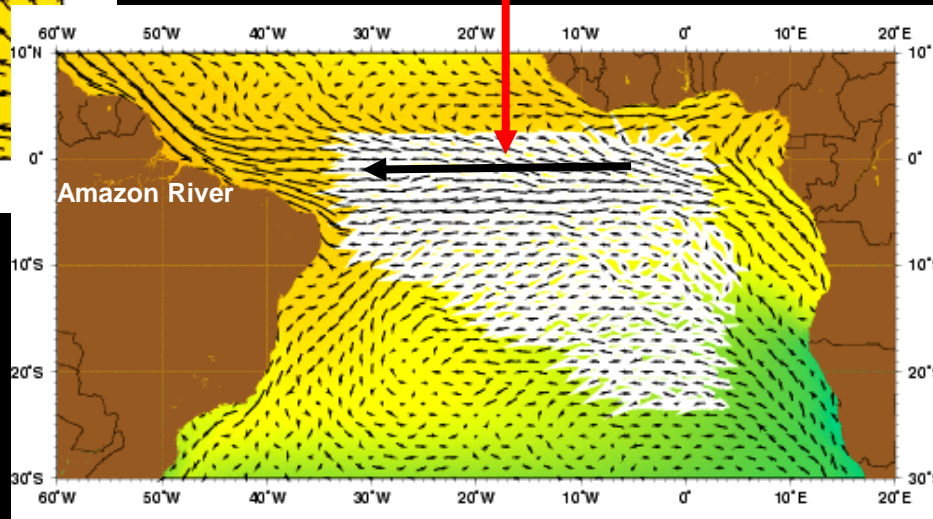


North Brazil Current



Guyana Current

South Equatorial Current



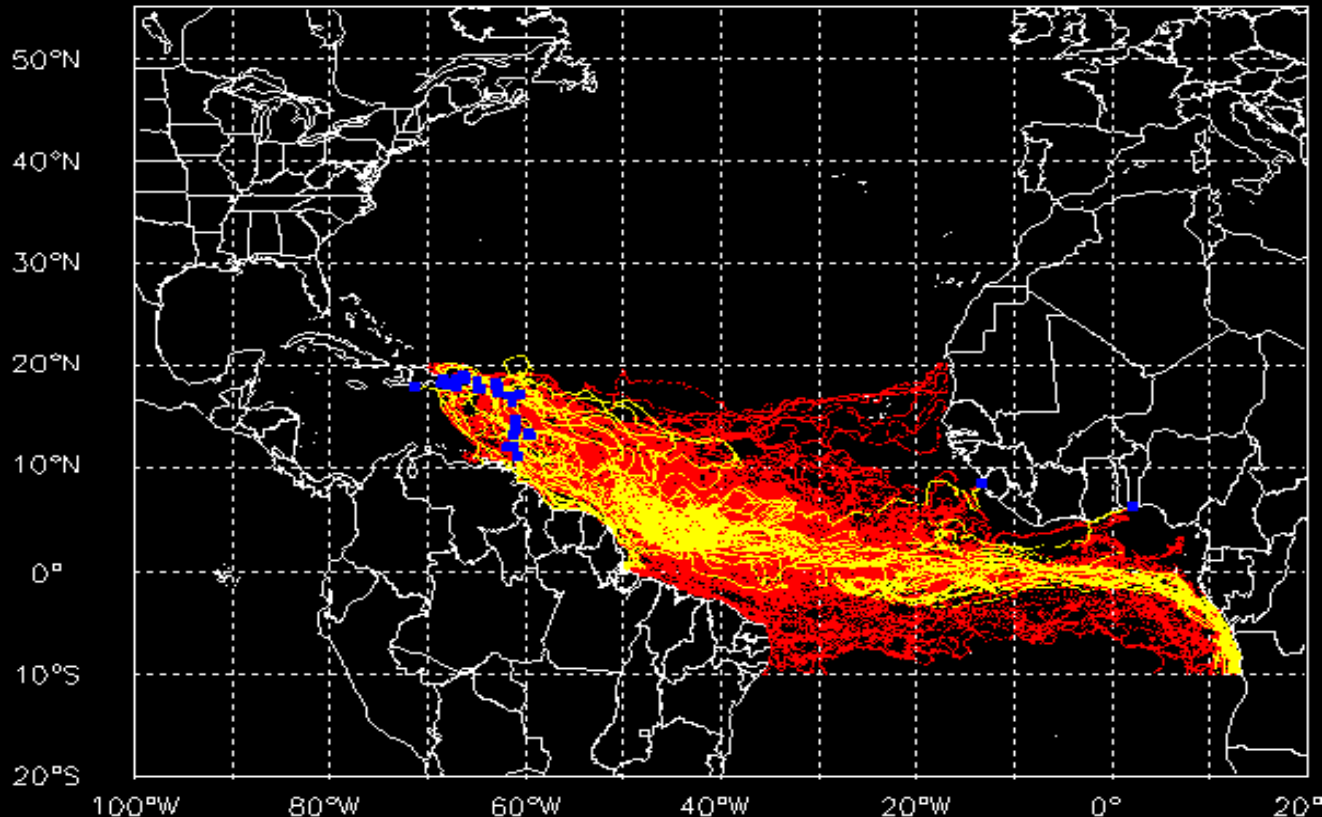
Amazon River

Method for research into source and pathways

- Use oceanographic modelling and satellite-tracked drifters:
 1. **Back-tracking** of sargassum transport patterns from sargassum landing sites using modelled currents
 2. **Forward-tracking** of sargassum transport patterns from possible source regions using the same modelled currents
 3. Validation of sargassum transport patterns using data from satellite-tracked **ocean surface drifters** previously deployed in the Atlantic
 4. Examination of interannual changes in NERR **ocean dynamics** between 2009-2013
- > Confirmed by observations of fishers at sea, fisheries officers etc
- Remote sensing incomplete and difficult - confused with oil, phytoplankton

2011 Influx

- Back-tracked sargassum movements from landing sites across the Atlantic equatorial region to W. Africa
- The equatorial region recirculated and consolidated sargassum prior to the 2011 release into the Caribbean



Blue squares: 2011 sargassum stranding locations (note west Africa)

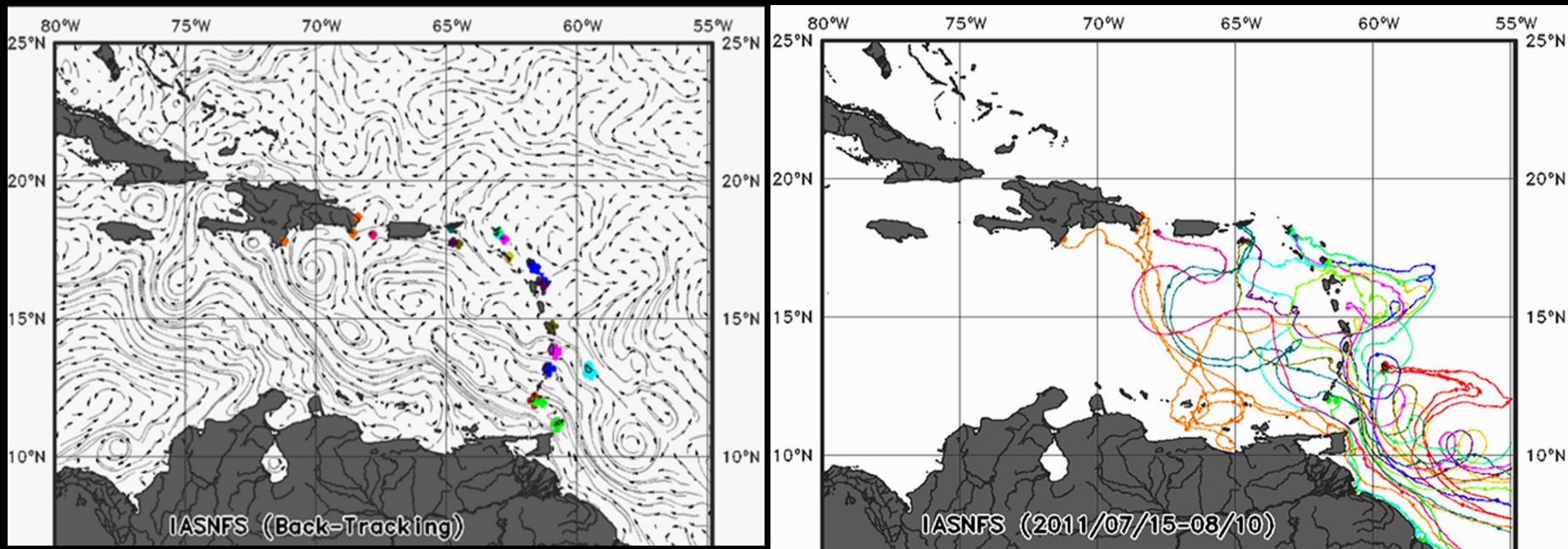
Yellow lines: back-tracked sargassum movements to January 2010

Red lines: model uncertainties (Lagrangian stochastic model, LSM)

2011 Influx

- Back-tracked sargassum from reported sighting locations & dates to determine transport pathways (Franks et al. 2011)
- Examination of connectivity across the tropical Atlantic, particularly the NERR (Johnson et al. 2012)

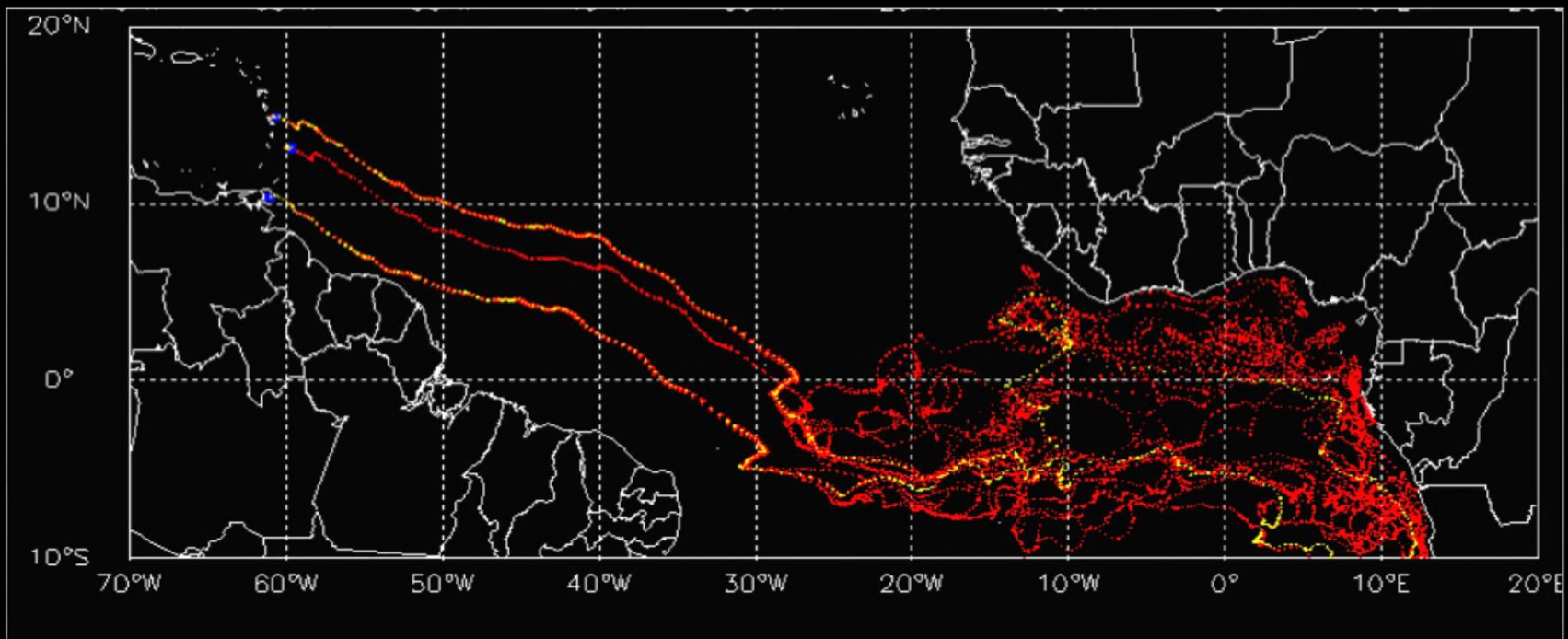
Intra-Americas Sea Nowcast-Forecast System (IASNFS) model



May – September 2011

2014 Influx

- Back-tracked sargassum movements from landing sites across the Atlantic equatorial region to W. Africa
- No western recirculation zone off Brazil, but a direct pathway to the equatorial consolidation region and Gulf of Guinea



Blue squares: 2014 sargassum stranding locations (examples)

Yellow lines: back-tracked sargassum movements to January 2013

Red lines: back-tracked sargassum movements with LSM

What is causing the sargassum influx?

Source  Growth  Consolidation  Transport

- Smaller quantities of sargassum found in the NERR recirculation region bloomed through high nutrient input (eg. equatorial upwelling, river inflow, African dust)
- Exceptional alignment of peaks (+ and -) in climate indices during 2009-10 in the North Atlantic (high temps, low wind, reduced currents) created conditions in the NERR that allowed sargassum accumulation and consolidation pre-Caribbean influx in 2011
- Transport pathways via currents

Meanwhile in West Africa....



Google Earth



Sierra Leone

Per: Andrew Huckbody
Huckbody Environmental Ltd.

West African coastlines also impacted by sargassum

In Summary...

- **The sargassum 'bloom' that impacted the tropical Atlantic in 2011 – 2014 (& ongoing) did not originate in the Sargasso Sea or the Gulf of Mexico**
- **The North Equatorial Recirculation Region (NERR) between Brazil & Africa was favorable for accumulation & consolidation of pelagic sargassum... growth from nutrient input**
- **Atlantic climate indices reached historical maxima/minima in the period 2009-2011. It is suggested that conditions during this period favored recirculation, consolidation & massive growth of sargassum in the equatorial Atlantic**

What's the message for coastal managers?

- Sargassum influx could be an indicator of climate change
- Sargassum might have become 'established' in the NERR
- Future influxes of sargassum might periodically occur – eg. in next 2-3 months?
- Adaptation strategies are needed

What's the impact on sea turtles?

- Direct impacts:
 - Stranding of sea turtles (eg. SVG, Martinique)
 - Entanglement of hatchlings (eg. Saint Lucia)
 - Obstruction of hatching?
 - Marine debris and invasive species
 - Reduced light levels on reefs, benthic communities and submerged sea grass
 - Decomposition of sargassum with water quality impacts



What's the impact on sea turtles?

- Indirect impacts:
 - Trampling of stranded turtles in beach cleaning
 - Compaction of nests by heavy beach cleaning machinery
 - Destruction of nesting habitat
 - Erosion due to removal of sand and loss of nourishment
 - Local conflict



Antigua



Martinique, E. Dumont-Dayot

Other impacts and concerns

- **Fishing:** entangled lines and nets, difficulties accessing resource, loss of locally important species
- **Vessels:** motor intakes (over-heating), launching issues
- **Tourism:** incessant incursion onto shorelines and into bays, decomposition and smell

“I have lived in the Bay Islands of Honduras for 10 years. I have never seen anything like this. It is a disaster.”

Antigua Eli Fuller – Adventure Antigua
Photo credit: Max Freeling; Bugpilot



What can we do?

- Report influxes:
 - Confirm species of sargassum you see

<http://www.usm.edu/gcrl/sargassum/sargassum.observation.form.php>

Reporting Site: Pelagic Sargassum in the Caribbean

During 2011, massive quantities of pelagic sargassum occurred throughout the Caribbean, impacting aquatic resources, fisheries, shorelines, waterways, and tourism. There are indications that such an event may occur this year, 2014.

In the effort to better understand critical aspects of this phenomenon, this website serves as a data collection center to accommodate reports of large quantities of pelagic sargassum observed within the region during 2014. The website provides easy access for data entry and represents a service to those interested in contributing to the information database. Data provided to this site will be used by Gulf Coast Research Laboratory (GCRL) scientists and colleagues throughout the region to identify the source and examine the movements and causes of this extraordinary event.

Your participation is essential to this work. Please use [this form](#) to report your observations. Thank you.

Area of Interest

Click [here](#) to view the study area in a larger map.



Examples of Sargassum Observations

Click any image to see a larger version.



Sargassum line offshore
photo by GCRL



Sargassum washed up on shore
photo by Hazel Oxenford

[Sargassum Reports Home](#)
[Report an Observation](#)
[Identification Guide](#)
[Resources](#)



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Fall 2014 Coastal Sciences Seminar Series

The [schedule for the Fall 2014 Coastal Sciences Seminar Series](#) is now available. The series features 12 speakers on a variety of marine and natural sciences topics. Typically on Thursdays at 10:00 in Caylor Auditorium.

[Read all news items](#)

Reporting Site: Pelagic Sargassum in the Caribbean - 2014

[Sargassum Reports Home](#)
[Report an Observation](#)
[Identification Guide](#)
[Resources](#)

Please use this form to report details of your observations of sargassum during 2014. All inputs are not required.

Please report each observation separately. You may use this form to make multiple reports, both for multiple observations of the same sargassum mass and for observations of new sargassum masses.

We will not share your email address and contact information without your permission.

(Spam Check - This helps prevent robot software from using this form to submit spam.)

Please enter the number 7.

Date of observation (mm/dd/yyyy)

Country

Latitude (if available)

Longitude (if available)



Photo by GCRL

Description of location (Be as specific as possible. A distance and bearing to a well-known location are helpful.)

What can we do?

- **Stay informed:**
 - Watch developing alert systems eg. Texas A&M
- **Communicate with stakeholders:**
 - It's natural and important - leave it on the beach!
...Marc?
 - eg. tourism industry (Martinique)
- **Educate about turtle friendly practices:**
 - Avoid heavy machinery, only essential cleaning, not on dunes
- **Enforce existing CZM regulations:**
 - Work with agencies and law enforcement partners



What can we do?

- **Monitor impacts on sea turtles:**
 - Nesting and hatching success on index beaches
 - Beach profile monitoring (WWF protocol)
 - Record and share about strandings (eg. SVG)
- **Monitor effectiveness of adaptation strategies:**
 - eg. value of clearing path for hatchlings?
- **Assist with data gathering:**
 - Random surveys by dip net, sort free organisms, photograph and freeze sample (with attached organisms), note water quality indicators



SVG, R. Hoflund

Possible opportunities?

- Encourage local livelihoods:
 - Beach raking for supplemental income?
 - Use as fertilizer
 - Novel approaches eg. via small grants (Martinique)

The screenshot shows a web browser window displaying the 'Eat The Weeds' website. The page title is 'Sargassum Sea Vegetable' by Green Deane. The article is categorized under 'ANTIOXIDANTS, EDIBLE RAW, PLANTS, SEAWEED, VEGETABLE'. A photograph of Sargassum mutans seaweed is shown with the caption 'Sargassum mutans'. The article text begins with 'Sargassum — Gulf weed — comprises a huge number of seaweeds in all oceans, both bottom dwelling and free floating. In fact, two common species found in Florida waters, *S. natans* and *S. fluitans*, are free floating all their lives.' The website also features a search bar, a 'LATEST ARCHIVED ARTICLES' section, and social media icons for Facebook, RSS, Twitter, and YouTube. A green badge indicates '289 readers BY FEEDBURNER'. A search bar with the text 'SEARCH 1,000+ WILD EDIBLES' is visible. The website's navigation menu includes HOME, ABOUT, ARCHIVE, CLASSES, FORAGING, MEDIA, NOT EDIBLE, and FORUM. The header banner reads 'Eat The Weeds and other things, too'.

Possible opportunities?

- Leverage opportunity for support:
 - Build on general interest to communicate about marine biodiversity and CZM
 - Resource managers and tourism industries may need to develop action plans for risk management
 - Assist SPAW with response plan
 - Seek climate change adaptation funding?

Please join the working group at 4pm



ACKNOWLEDGMENTS

James Franks, Donald Johnson, Dong-Shan Ko

- gcfinet@listserv.gcfi.org
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