



**GALVESTON  
SARGASSUM EARLY  
ADVISORY SYSTEM**



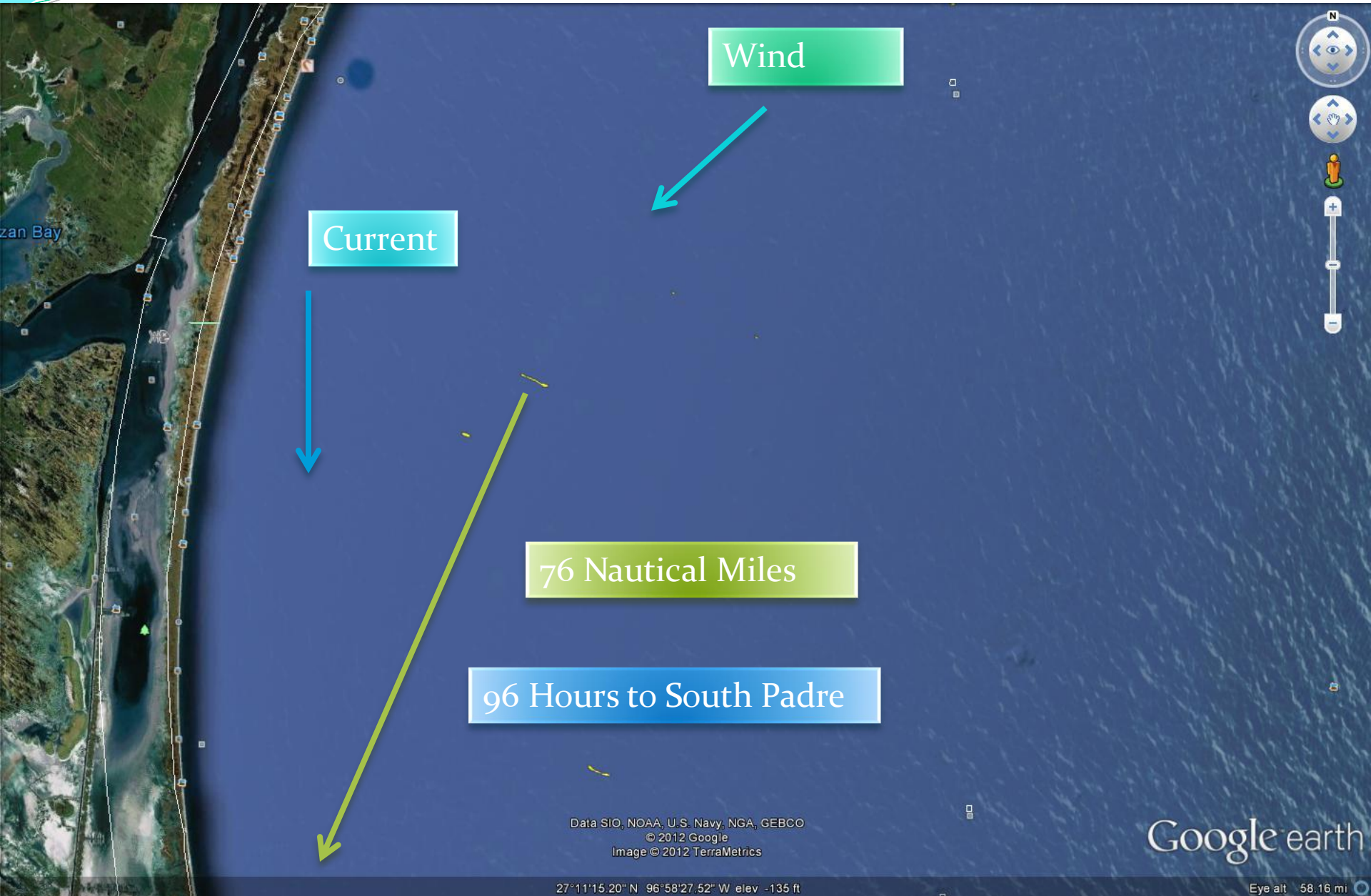
# 2015 Sargassum Symposium







# Sargassum Weed Lines 02/04/2012





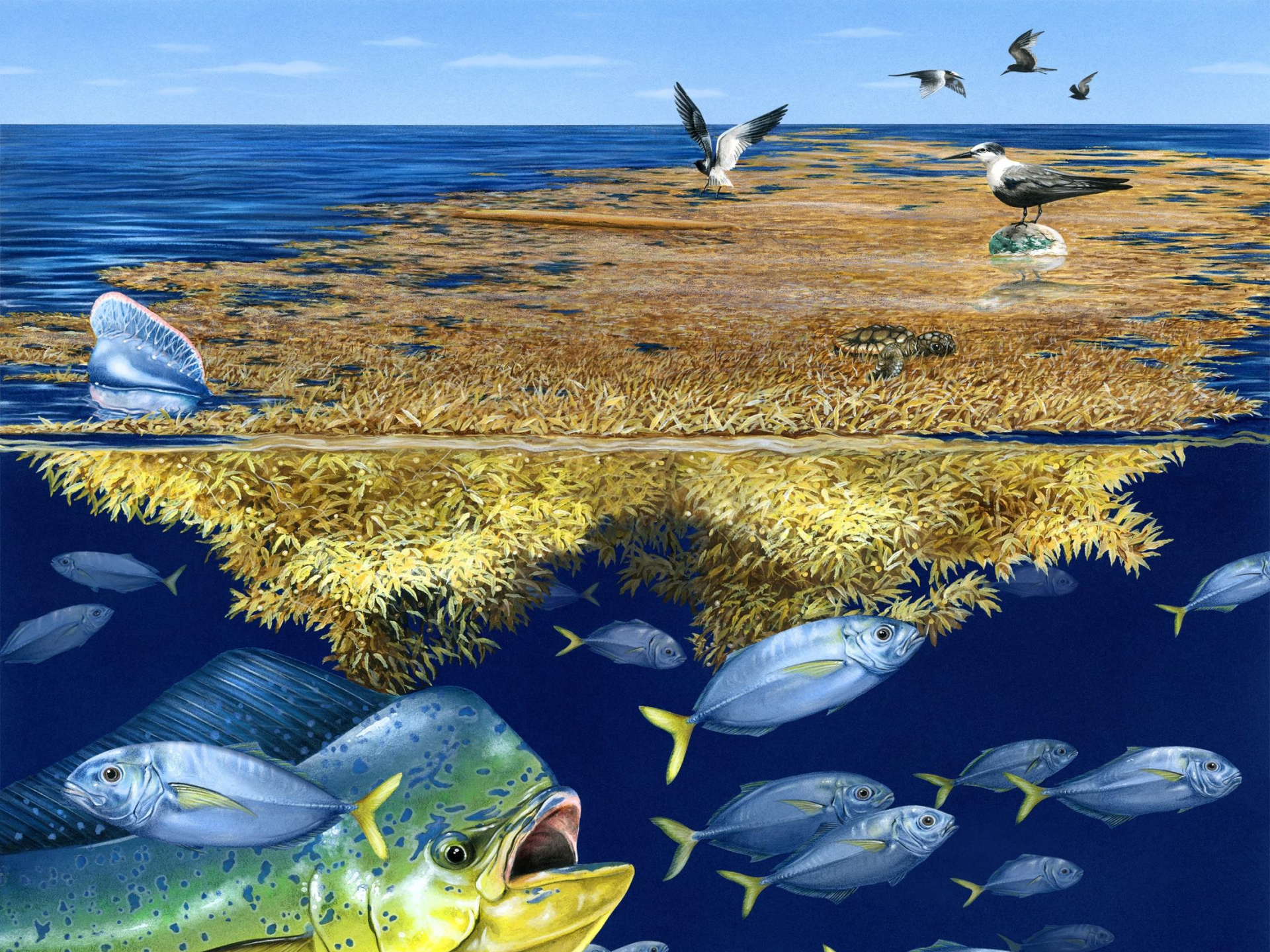




# Higher Resolution Landsat 8 Images









# Ideal Beach

**Natural  
Ariel Beach**

**Robust sandbars**

**Growing Vegetated  
Dunes**

*Karissa Miller*



# The Life and Times of Seaweed (Sargassum)

BROUGHT TO YOU BY TEXAS A&M UNIVERSITY AT GALVESTON  
SARGASSUM EARLY ADVISORY SYSTEM (SEAS) TEAM



# In the Beginning



*Sargassum ilicifolium*









# June 7, 2004

## Clash over what to do with seaweed

**By Carter Thompson**

The Daily News

GALVESTON — A line of seaweed has become the dividing line between those who say it stinks and others who contend it is what the park board does with it that smells foul.

The park board before Memorial Day began scraping seaweed off the beaches in front of three of Galveston's 28 beachfront subdivisions. Property owners near San Luis Pass, Indian Beach and Bermuda Beach requested the board send out its front-end loaders to scrape the blanket of Sargasso seaweed from the waterline and pile it near the dunes. The seaweed also was cleared in front of land being purchased by Centex Destination Properties, which plans a \$500-million development near San Luis Pass.

July 17, 1966

# Seaweed A 'Current' Problem

BY JOHN DAVIS  
STAFF WRITER

Columbus cried about it when the only tourists on Hispaniola were Kanakawa Indians. And "the weed" as it has come to be known along the beachfront, has angered and frightened people since.

On his first voyage to the West Indies, Columbus and his three ships passed through the Sargasso Sea.

This tract of the North Atlantic Ocean is covered with Sargassum, the same seaweed that piles up along the Gulf beaches.

**THE BELIEF** that ships passing through the area could become hopelessly entangled in the floating weed was widely adhered to until the early part of this century. Shippers avoided the Sargasso Sea like the plague.

And Galvestonians view the weed as an economic plague that keeps the tourists away in droves.

No one, according to Dr. Robert Stevenson of the U. S. Bureau of Commercial Fisheries, knows why the weed

decides to pile up on Gulf beaches in any particular year. As a matter of fact, he said, no one can say when it will come in or when it will stop.

**ABOUT TWO** weeks ago, a spokesman for the bureau predicted that the island had seen the last of the weed for the year 1966. County Commissioner Jimmie Vacek hopefully concurred.

And then, last week, masses of brown were spotted out in the Gulf. Today, the brown mass piles up along the beach as quickly as the county can tow it off.

"It is a floating algae," "and goes where the currents carry it."

**HE BELIEVES** the weed that reaches Galveston is carried up from the Yucatan Straits near the southern tip of Mexico. It is almost as plentiful there, he said, as in the Sargasso Sea.

"It's a problem that varies from year to year. Some people have theorized that nutrients brought to the surface by Hurricane Carla caused the seaweed to grow rapidly and cause the influx in 1962. I think that's reaching pretty far," he said.

He pointed out that Hurricanes Betsy and Hilda followed basically the same path as Carla, but produced no seaweed invasion. "No one really knows what facts

influence this. As a guess, the primary thing causing the buildup is the ocean current — waters from the Yucatan Straits."

Not everyone shares the aversion to Sargassum. Amateur marine biologists find it a constant source of fascination, since it supports innumerable small plant and

See SEAWEED, Page 3A

W. L. MOODY & CO.  
(UNINCORPORATED)  
BANKERS

ESTABLISHED 1866  
First in Service  
First in Convenience  
First in Facilities

Time to remodel - Get a  
Clean up - Paint up - Fix up  
Home Improvement Loan of

**ST HUTCHINGS-SEALY**  
NATIONAL BANK  
of Galveston

INSURED  
MEMBER F.D.I.C.  
OLDEST BANK IN TEXAS



# BROWNSVILLE, TEXAS, THURSDAY, MAY 16, 1935



By RALPH L. BUELL  
REPRESENTATIVE AUGUSTINE Celaya vouches for the truth of this one.

Among the relief projects over Texas was one in Galveston county—

Cleaning the beach of the island from seaweed.

Very carefully would the laborers garner all the seaweed in sight.

And very carefully would it be loaded on barges—

Taken out into the bay and dumped.

And as nature took its course, and the seaweed again drifted to the beach—

Very carefully would the seaweed be gathered, loaded on barges, and taken out into the bay and dumped.

Finally somebody with a sense of humor took a moving picture of the procedure and sent it to Washington.

The project was stopped.

## Victor MINISTER OF INTERIOR IS CITY VISITOR

### Long-Sought Shorter Route to Capital of Mexico Promise Is Made Here

Construction work on the Matamoros-Victoria highway will be started next year, Jaun de Dios Bojorquez, Mexican secretary of interior, said upon his arrival here at noon Thursday by Pan American plane.

Secretary Bojorquez was accompanied by his two young sons and left shortly after noon on the Bowen Airlines plane for New York where he will undergo medical treatment, and will spend a month resting from his official duties in Mexico.

#### Important Official

Secretary Bojorquez holds one of the most important positions in Mexico as Secretario de Gobernacion, passing on most federal projects, including roads.

He said the Matamoros to Victoria highway would be started next year with the state and fed

# Galveston Island Circa 1894





# Historical Records

The scouts seeing no chance of escape with their horses, abandoned them and secreted themselves in the sand hills by covering themselves up with sand and seaweed, and there remained until the enemy passed, when they crawled out of their holes and made for camp.

Date: Wednesday, January 27, 1864

City: Galveston

State: Texas

# LONDON, SATURDAY, AUGUST 14, 1883.

Last week, a fisherman picked up a bottle about three miles off Innishowen-head, Ireland, near to Urris, in which was found a paper containing the following words, written in English, French, Italian, and Danish. The bottle was floating on the surface of the water, and was covered with sea-weed:—

H. M. Ship *Alexander*, this 29th day of May, 1883.

At 1. 20. a. m.

Latitude 62. 05. N. Longitude 54. 00. W.

Temperature { Air in the shade 55 } Fahrenheit.  
{ Sea Water surface 36 }

Fresh breeze and hazy weather, with rain, sleet, and snow alternately—Wind S. S. E.—Passed a large Ice-berg this forenoon—*Faebella* in company—all well.

W. G. PARRY *Commander*

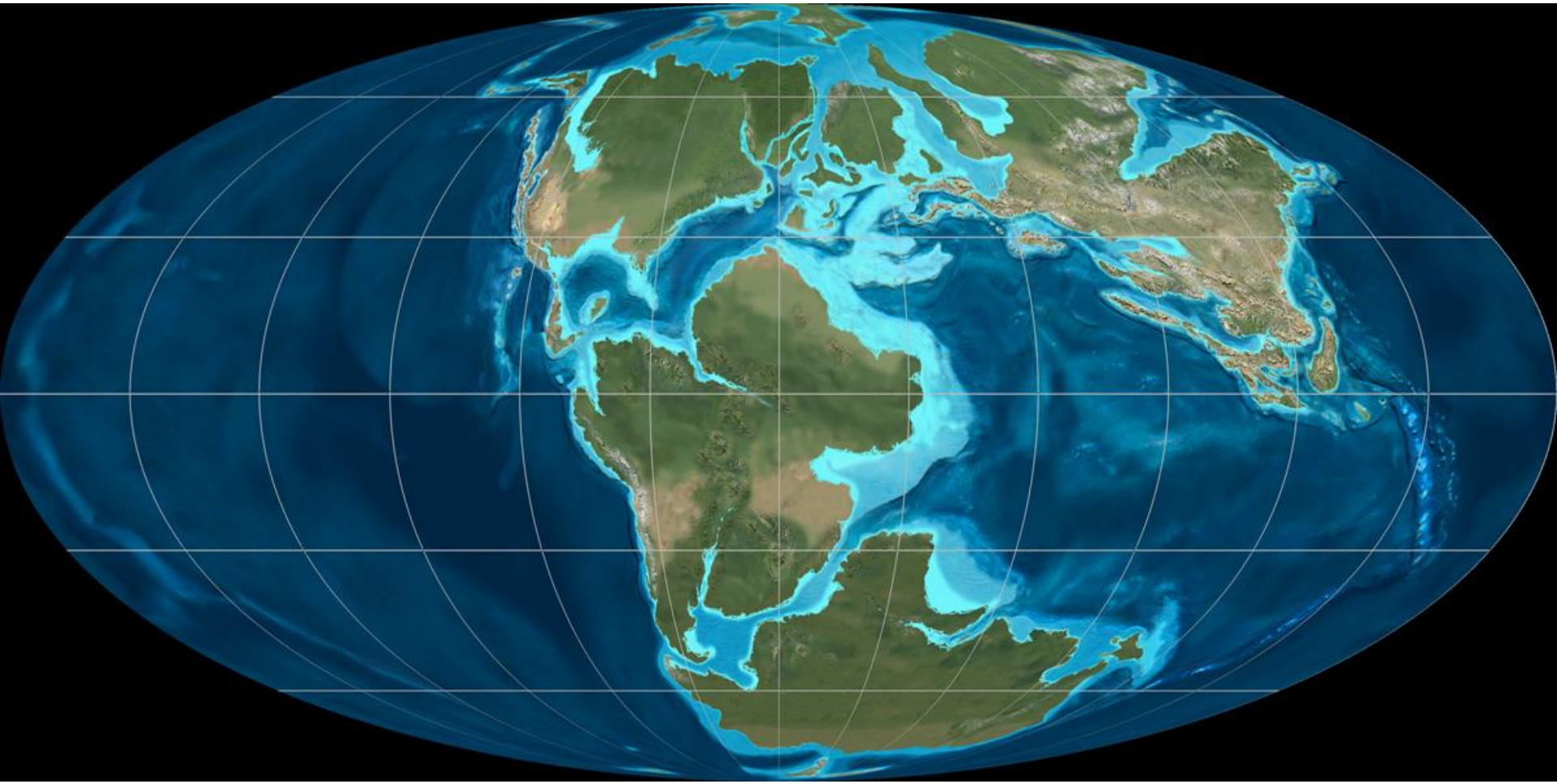




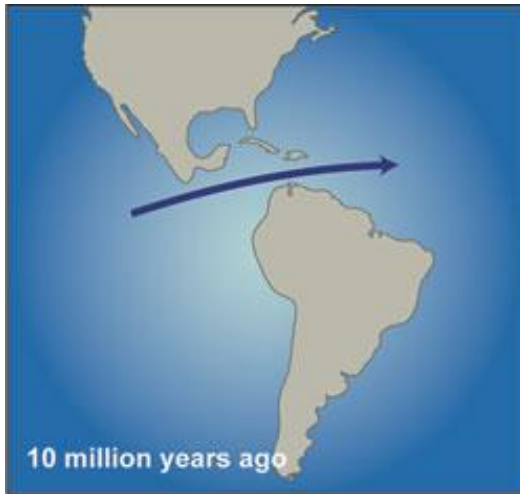
“What in the heck is that weed floating in the sea”













04/07/2012  
14:32 eastern time

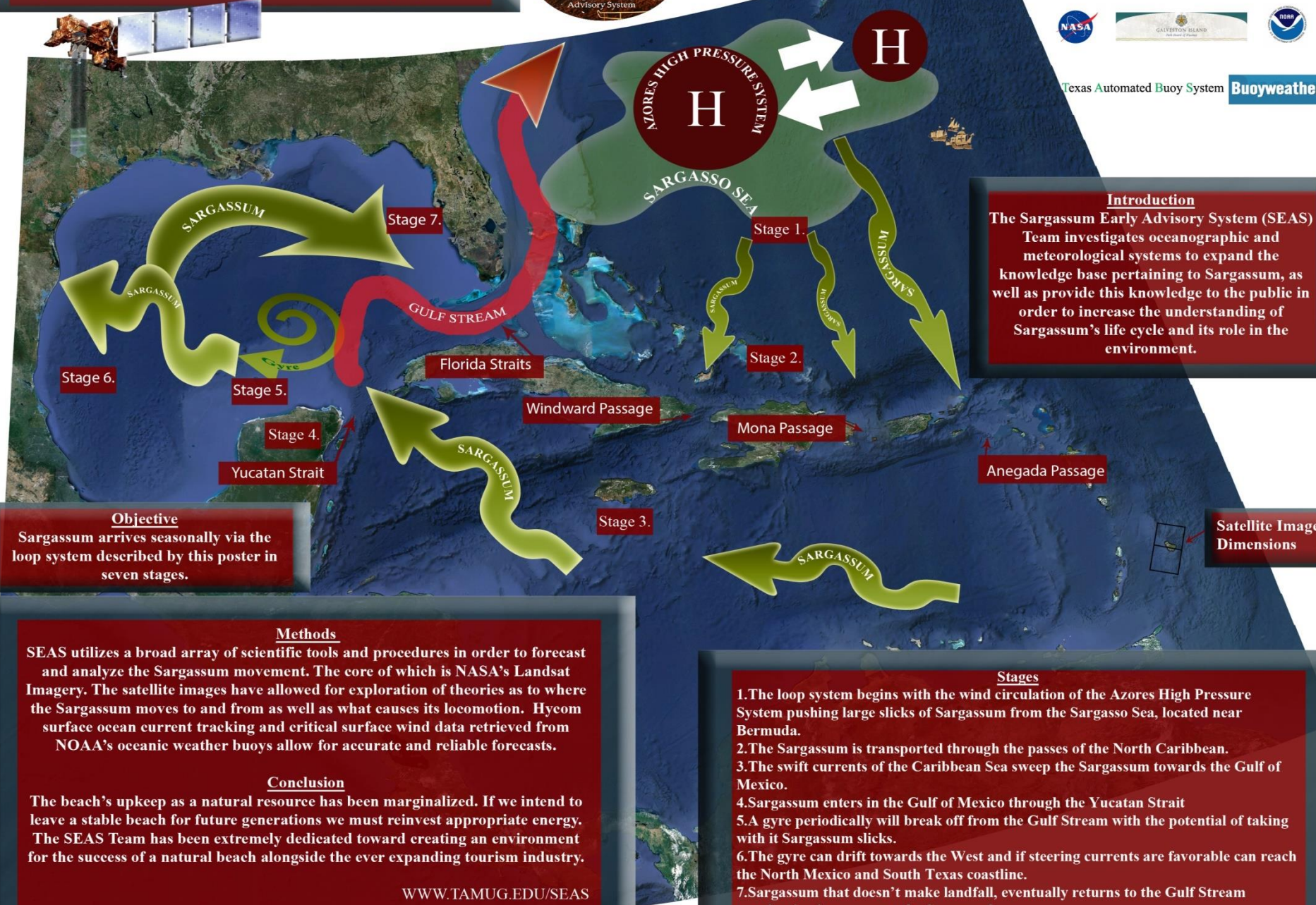
18.33037 N  
64.81718 W



# Sargassum Early Advisory System (SEAS) Explanation of the Sargassum Loop System



Texas Automated Buoy System **Buoyweather**



**Introduction**  
The Sargassum Early Advisory System (SEAS) Team investigates oceanographic and meteorological systems to expand the knowledge base pertaining to Sargassum, as well as provide this knowledge to the public in order to increase the understanding of Sargassum's life cycle and its role in the environment.

**Objective**  
Sargassum arrives seasonally via the loop system described by this poster in seven stages.

**Methods**  
SEAS utilizes a broad array of scientific tools and procedures in order to forecast and analyze the Sargassum movement. The core of which is NASA's Landsat Imagery. The satellite images have allowed for exploration of theories as to where the Sargassum moves to and from as well as what causes its locomotion. Hyeom surface ocean current tracking and critical surface wind data retrieved from NOAA's oceanic weather buoys allow for accurate and reliable forecasts.

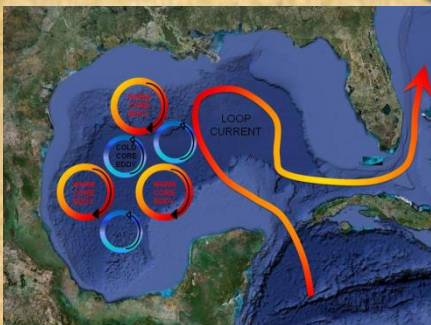
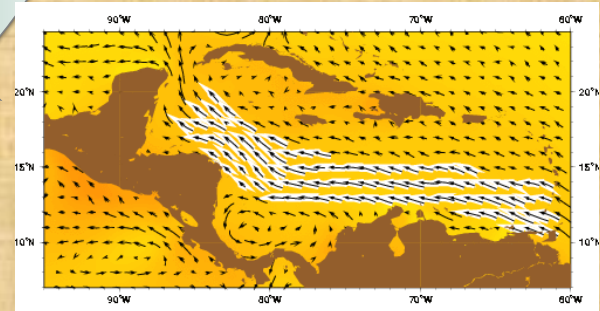
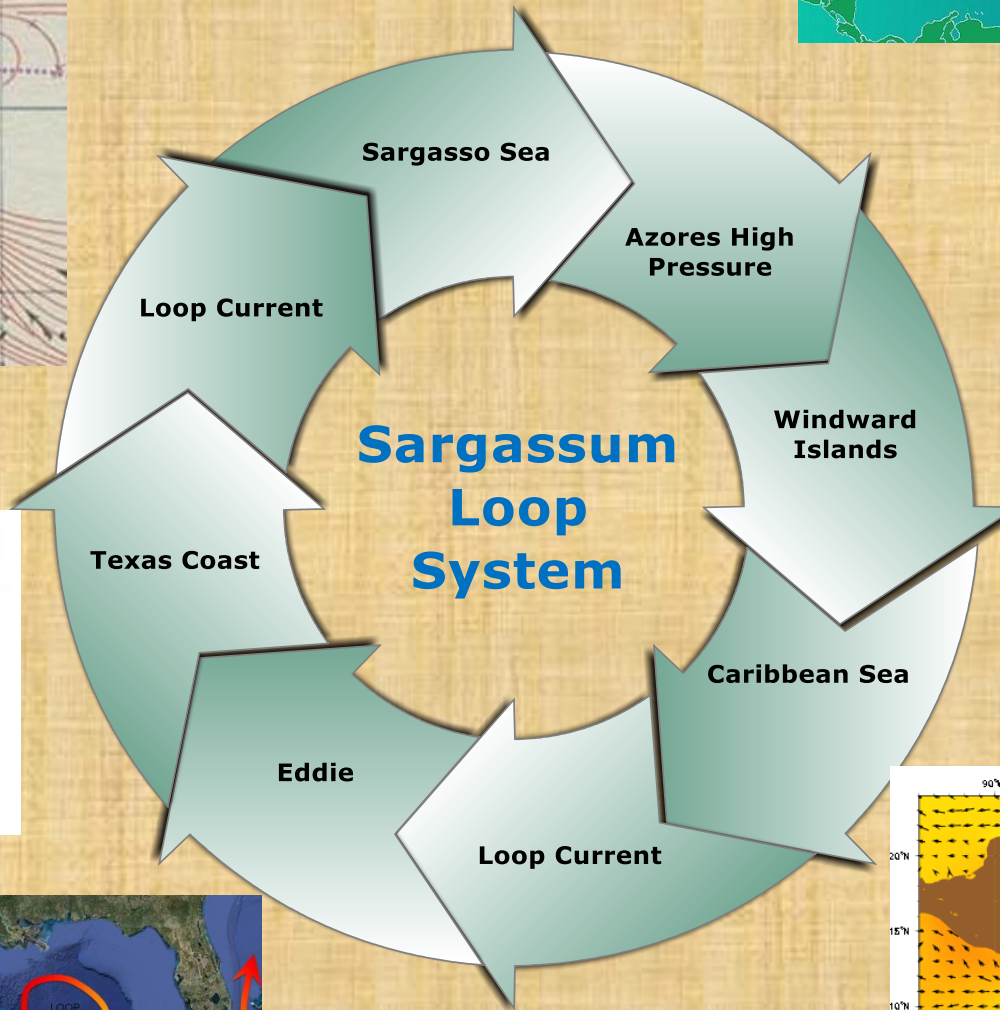
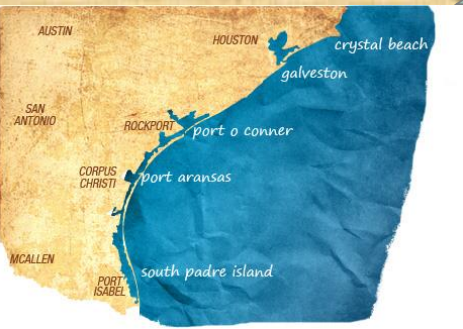
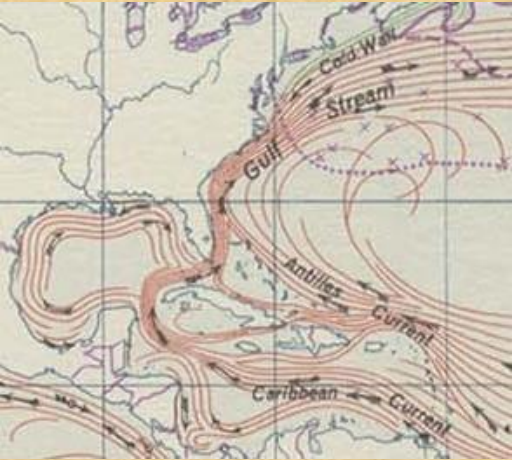
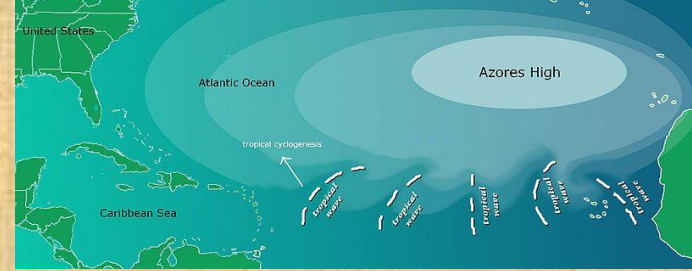
**Conclusion**  
The beach's upkeep as a natural resource has been marginalized. If we intend to leave a stable beach for future generations we must reinvest appropriate energy. The SEAS Team has been extremely dedicated toward creating an environment for the success of a natural beach alongside the ever expanding tourism industry.

WWW.TAMUG.EDU/SEAS

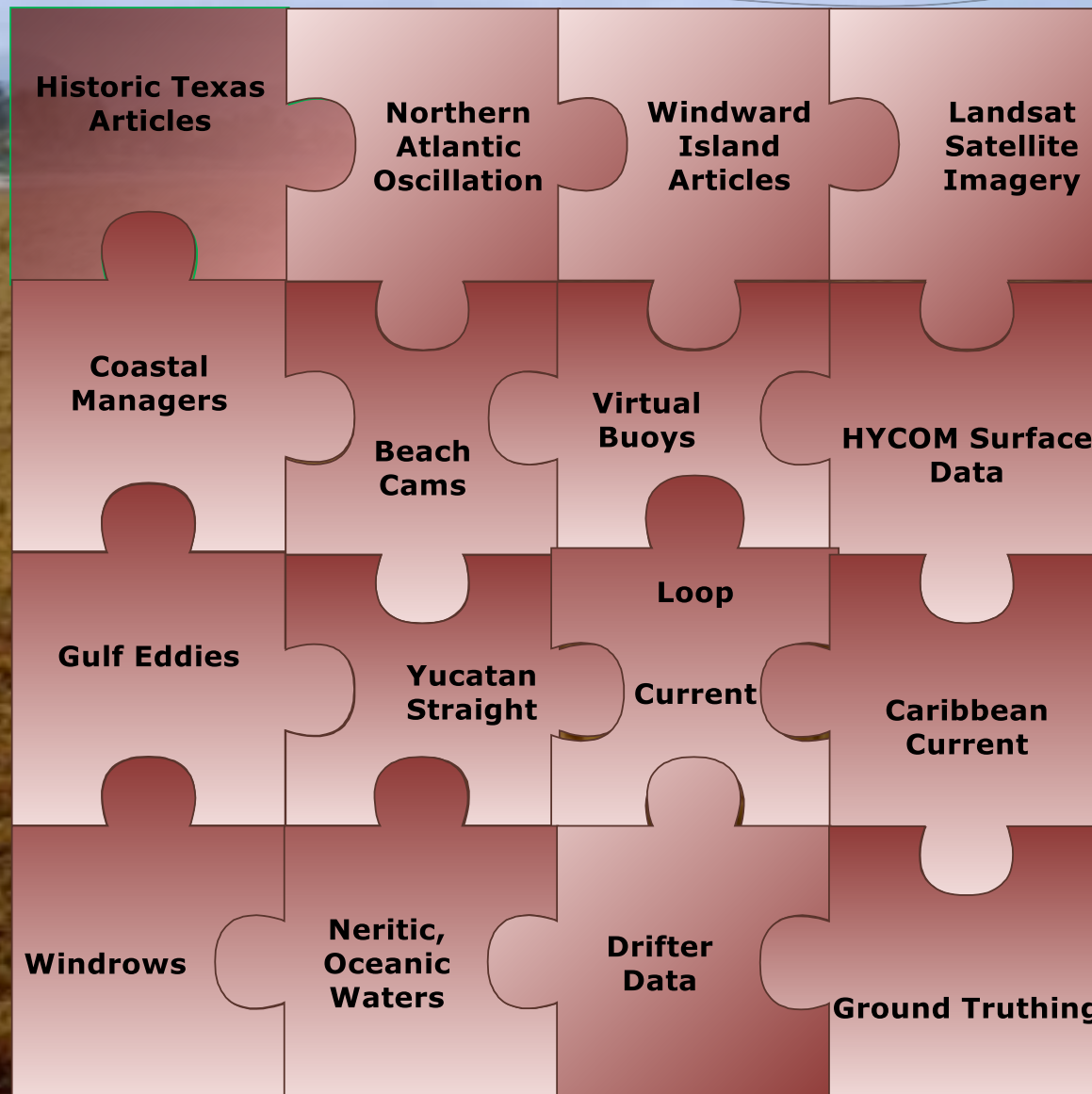
**Satellite Image Dimensions**

- Stages**
1. The loop system begins with the wind circulation of the Azores High Pressure System pushing large slicks of Sargassum from the Sargasso Sea, located near Bermuda.
  2. The Sargassum is transported through the passes of the North Caribbean.
  3. The swift currents of the Caribbean Sea sweep the Sargassum towards the Gulf of Mexico.
  4. Sargassum enters in the Gulf of Mexico through the Yucatan Strait
  5. A gyre periodically will break off from the Gulf Stream with the potential of taking with it Sargassum slicks.
  6. The gyre can drift towards the West and if steering currents are favorable can reach the North Mexico and South Texas coastline.
  7. Sargassum that doesn't make landfall, eventually returns to the Gulf Stream terminating its voyage at the Sargasso Sea.









# 2014 SEAS Website

Posters

Contact



Forecast

Webcam

Members

Historical

Media

Curiosities

Projects

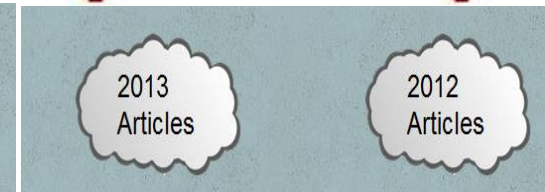
Outreach

Gallery

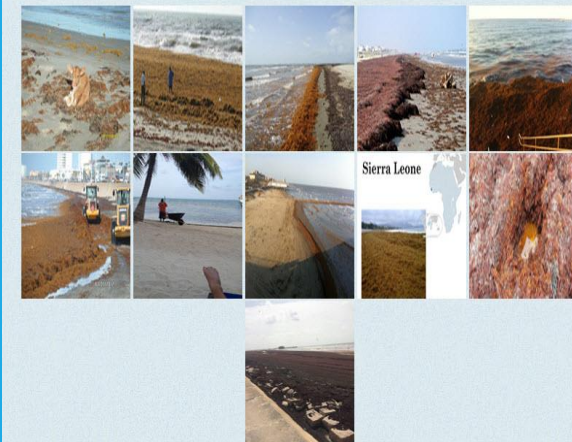
Wrack Measurements

Dunes Project

Sargasso Triangle



<b>SARWEST Flyover</b>	<b>SARCEN Flyover</b>	<b>SAREAST Flyover</b>
<b>Grand Isle West</b>	<b>Grand Isle</b>	<b>Mississippi Delta</b>
<b>Gulf Shores</b>		
<b>Florida Straight</b>	<b>Yucatan Passage</b>	<b>Mona Passage</b>
<b>Anegada Passage</b>	<b>Windward Passage</b>	







71088

ECONOSOURCE  
Folgers

Raymarine

Folgers

Stack of colorful plates (orange, pink, green, yellow)

White lab coat hanging on a rack

Large clear plastic bin containing pipettes

Row of glass jars containing liquid samples

Graduated cylinder with a yellow stopper

White plastic pipette

Pink and yellow bowls

White plastic bottle

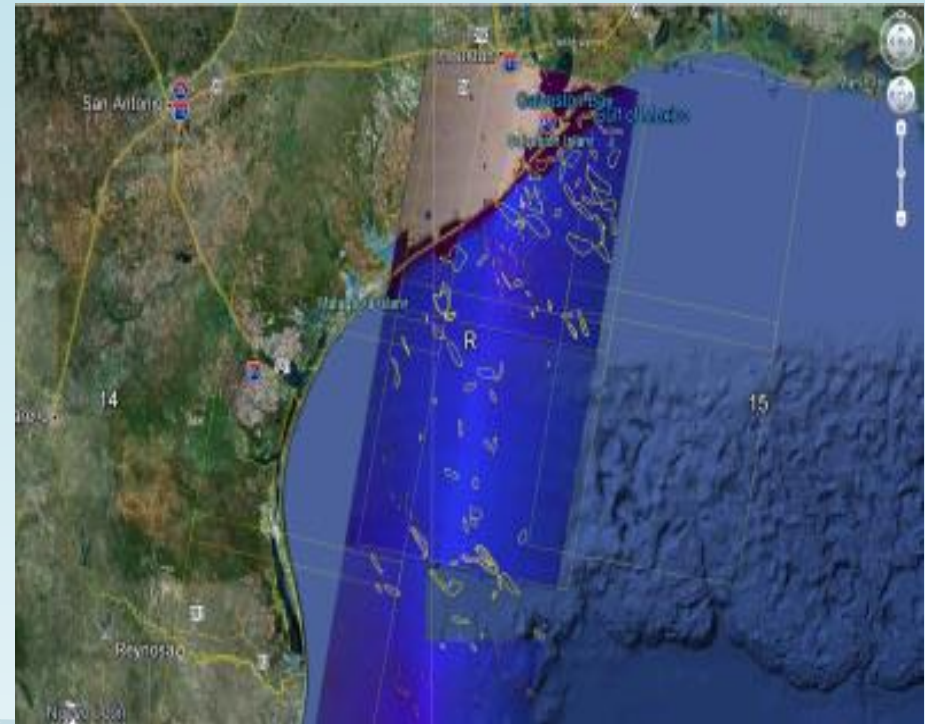








# NASA Flies In To Save The Day

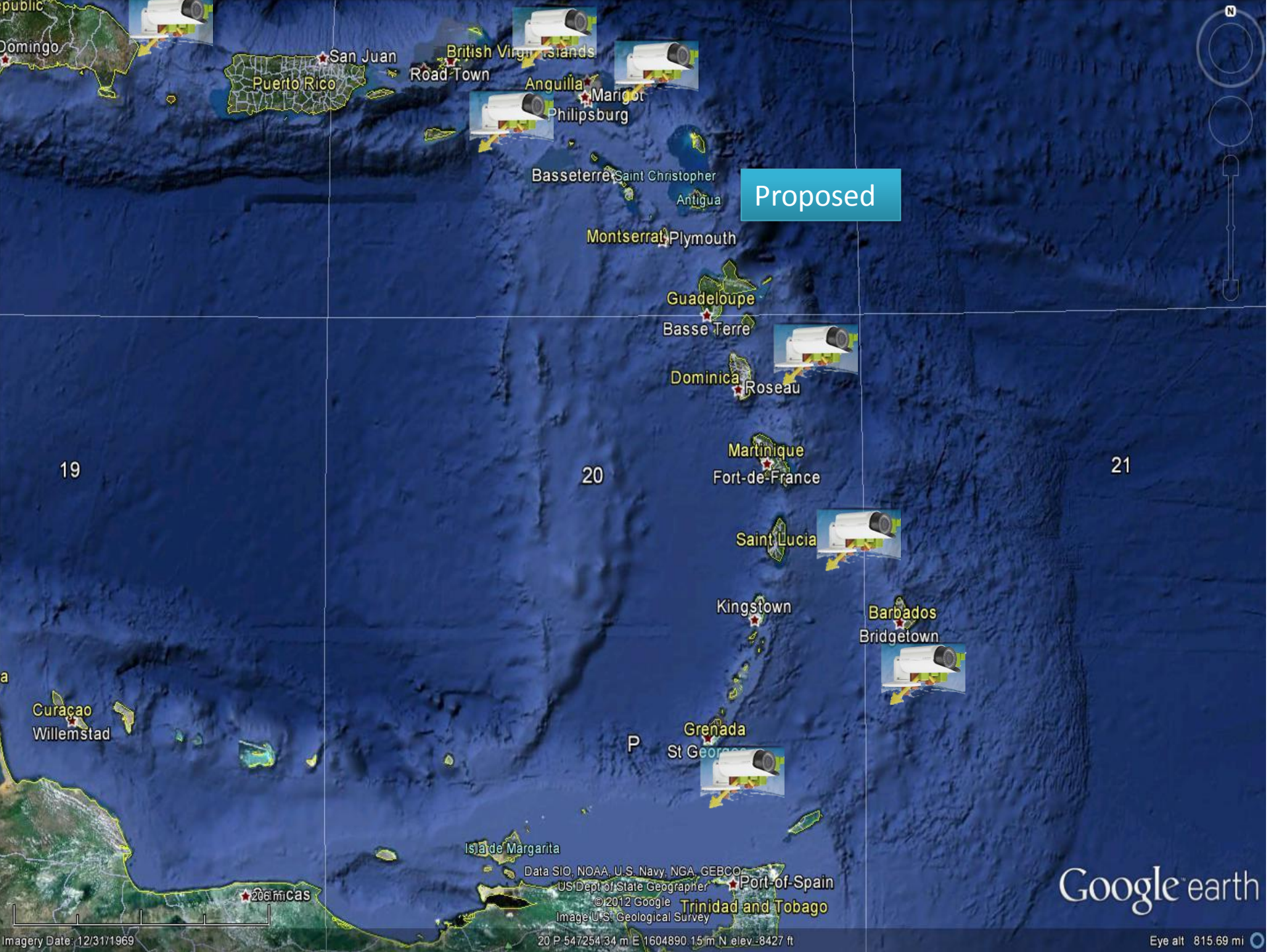




# Landsat Images







Domingo

San Juan  
Puerto Rico

British Virgin Islands  
Road Town

Anguilla  
Marigot  
Philipsburg

Basseterre  
Saint Christopher  
Antigua

Proposed

Montserrat  
Plymouth

Guadeloupe  
Basse Terre

Dominica  
Roseau

Martinique  
Fort-de-France

Saint Lucia

Kingstown

Barbados  
Bridgetown

Grenada  
St George

Curacao  
Willemstad

Isla de Margarita

Dominicas

Port-of-Spain  
Trinidad and Tobago

Google earth

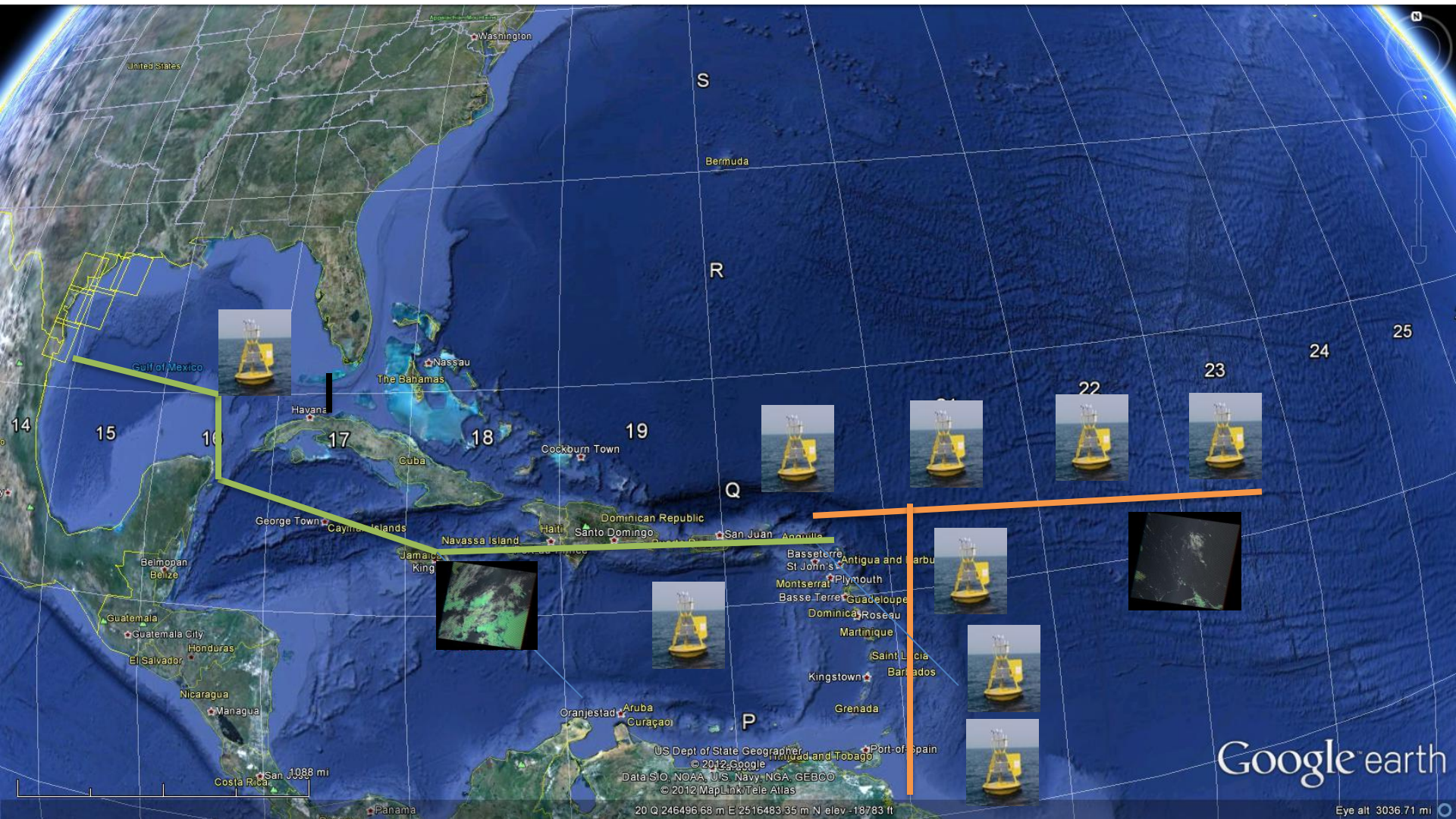
Imagery Date: 12/31/1969

20 P 547254.34 m E 1604890.15 m N elev: 8427 ft

Eye alt 815.69 mi

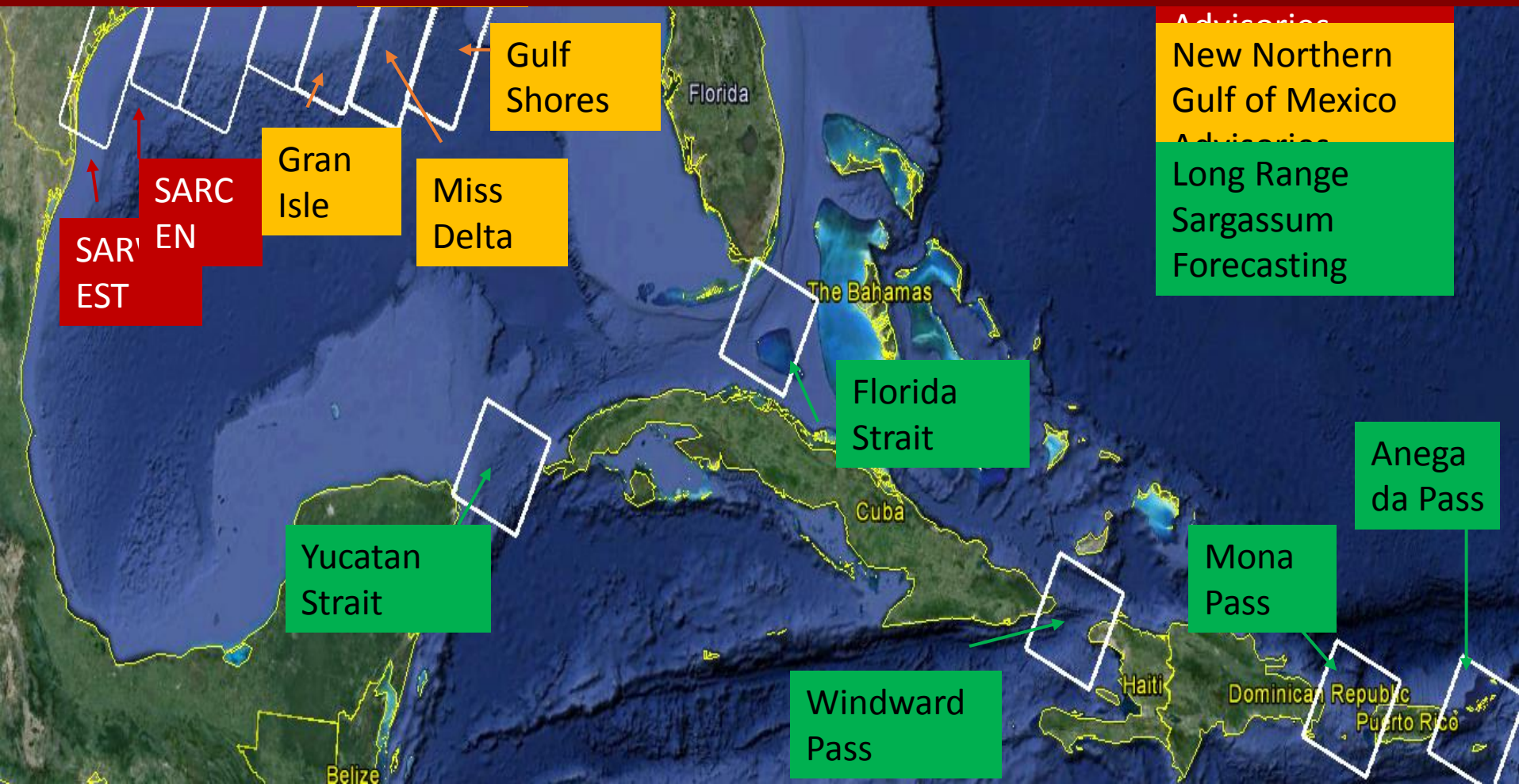


# Sargassum Tracking System





# Sargassum Early Advisory System Coverage for 2014 (SEAS)





05/18/2012

Galveston

Drift

15  
Wind

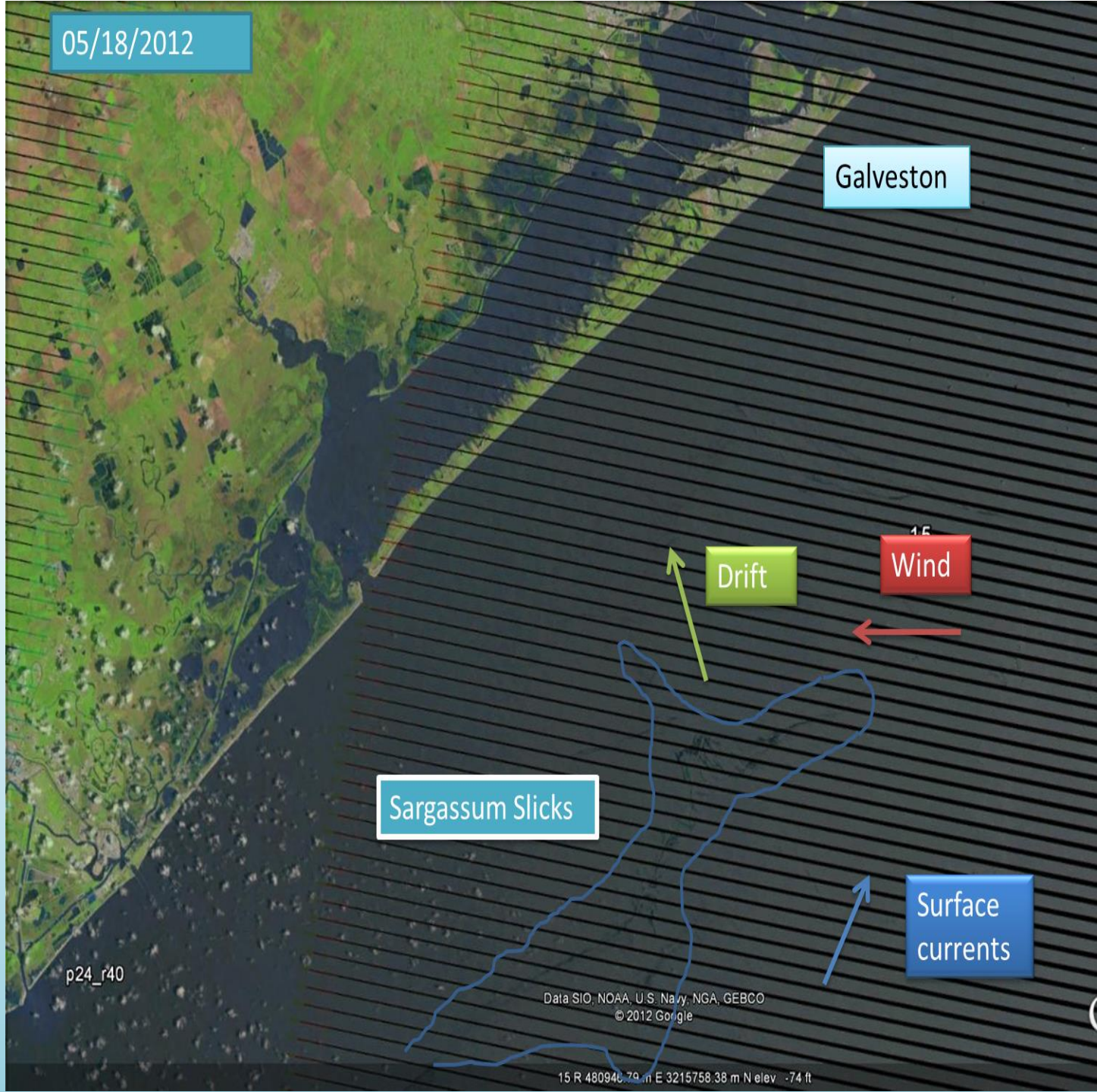
Sargassum Slicks

Surface  
currents

p24\_r40

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
© 2012 Google

15 R 480946.79 m E 3215758.38 m N elev -74 ft



# Evans Sand Sifter

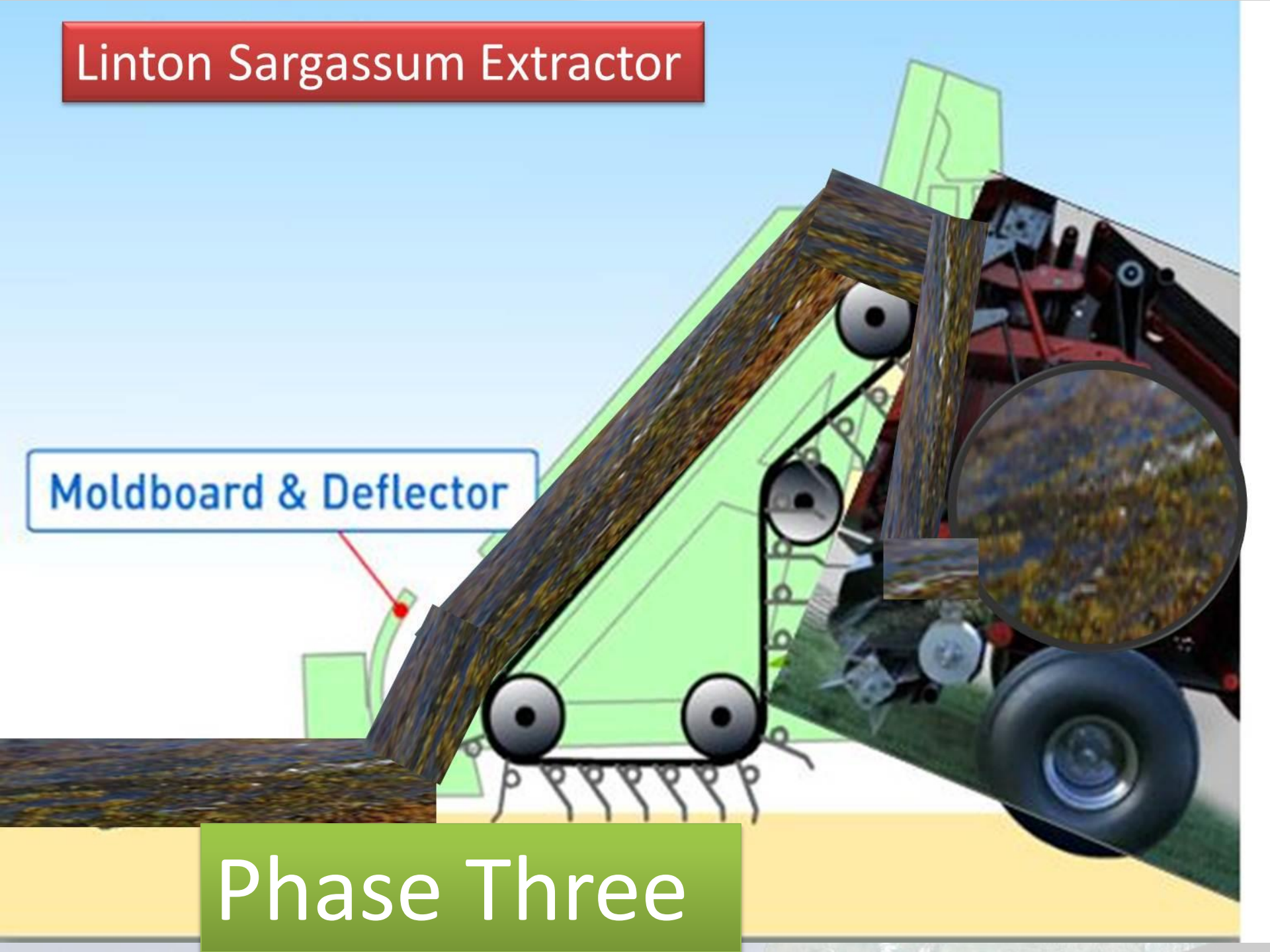


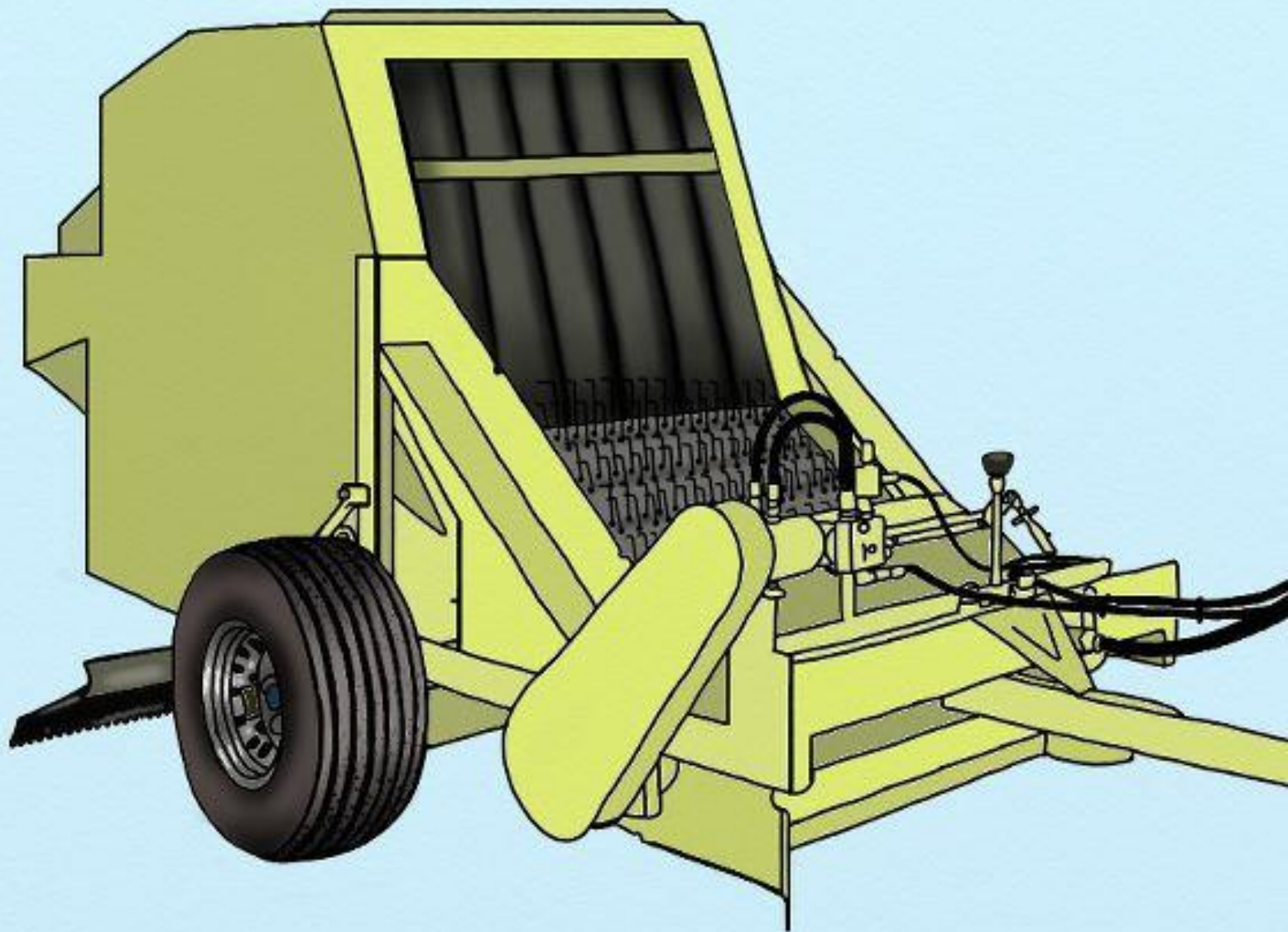


# Linton Sargassum Extractor

Moldboard & Deflector

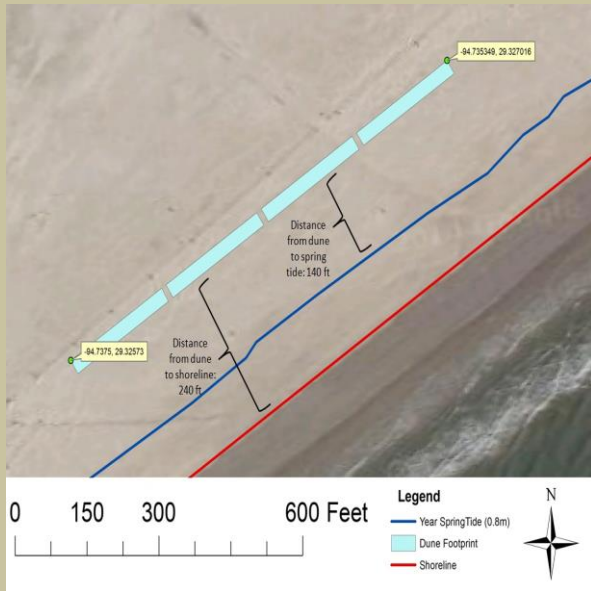
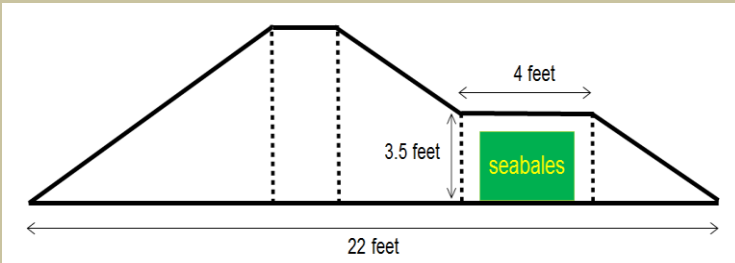
Phase Three







# ATTENTION: Scientific Study Underway



Top: Dune cross-section

Left: Dune footprint

This dune is part of a new pilot study conducted by researchers from Texas A&M University – Galveston Campus. Portions of this dune are reinforced with a seaweed core made of compacted Sargassum wrack material (“seabales”). We anticipate the compacted seaweed core to improve erosion resistance and spur vegetation growth on the dune. The goal is to retain Sargassum as a natural part of the beach-dune system while at the same time providing unrestricted access to the beach and water. This project is funded by a Texas General Land Office CEPRa grant with generous support from the Galveston Park Board of Trustees.

**PLEASE STAY OFF THE DUNE!**

For any questions or additional information, please contact:  
Dr. Jens Figlus at (409)741-4317 or [figlusj@tamug.edu](mailto:figlusj@tamug.edu)



Study  
Funded by:



**CAUTION: BEWARE OF SNAKES**



# Dimensioning Sargassum Wracks



## Equipment:

Device(s) which measure both vertically and horizontally (keeping in mind error propagation due to human interaction).

## Basic Beached Wrack Anatomy:

**Length (L):** Wrack length parallel to the waterline

**Width (w):** Wrack length perpendicular to the waterline

**Crest (z):** Maximum wrack "height" normal to the soil/sand



(Fig. 1) Aerial image showing three arbitrary lengths possible for separate measurements.

## Possible Calculations

**Wrack Volume ( $V_w$ ):**

$$V_w = 1/2[Lwz]$$

**Wrack Weight ( $W_w$ ):**

$$W_w = \rho V_w$$

## Constants:

Average Density ( $\rho$ ):  $89.98 \text{ kg/m}^3 = 5.62 \text{ lb}_m/\text{ft}^3$

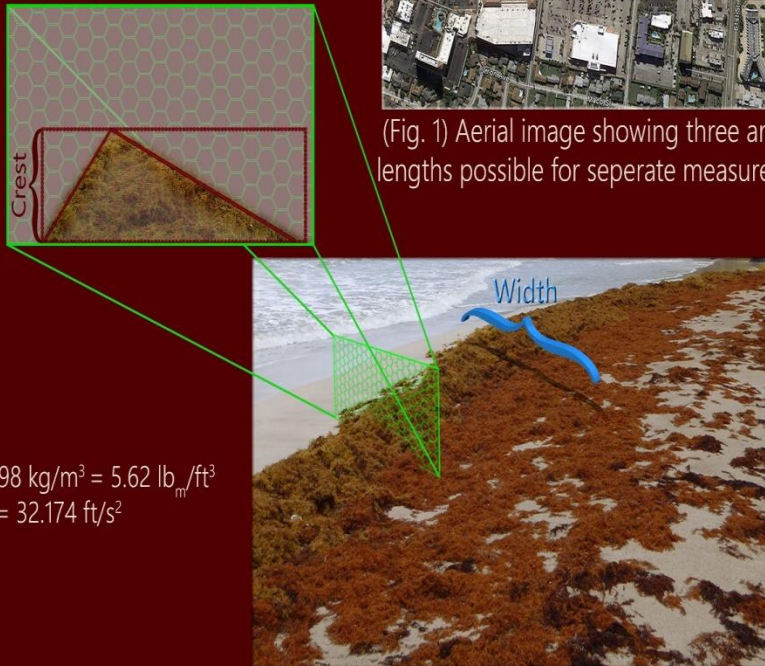
Gravity ( $g_j$ ):  $9.807 \text{ m/s}^2 = 32.174 \text{ ft/s}^2$

## Conversions:

$$1 \text{ m} = 3.28084 \text{ ft}$$

$$1 \text{ m}^3 = 35.3147 \text{ ft}^3$$

$$1 \text{ kg} = 2.20462 \text{ lb}_m$$

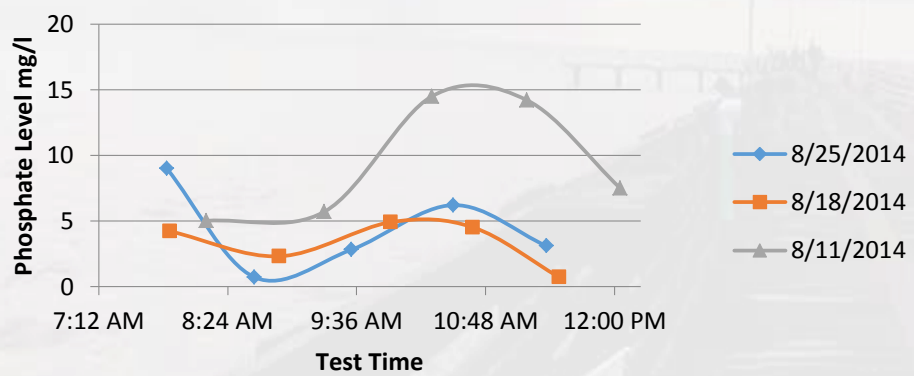


(Fig. 2) Illustration of the wrack's width and crest

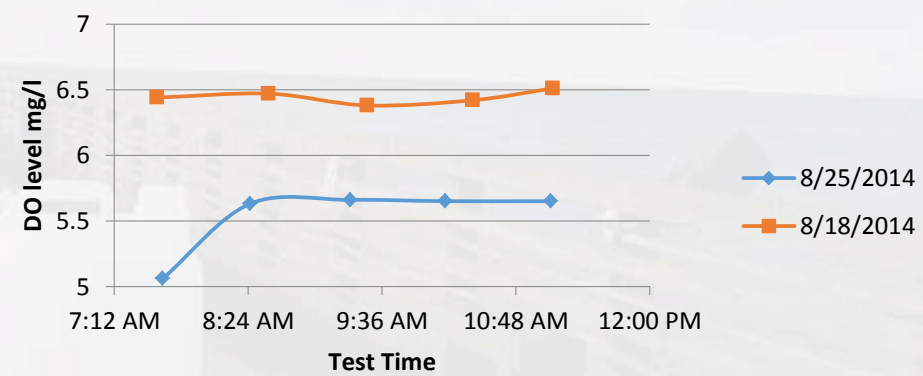


# Sargassum Early Advisory System (SEAS): Investigating the Hourly Growth Rate of Sargassum Natans and Fluitans While Suspended in the Neritic Coastal waters off of Galveston, Texas.

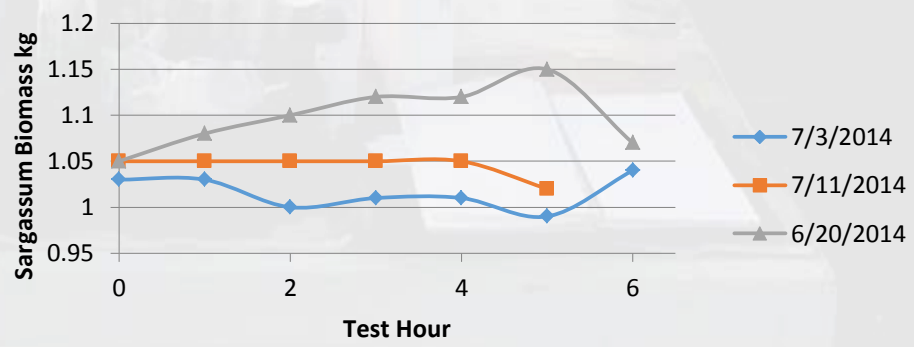
Data Collected three consecutive weeks; Iron, Nitrate and Ammonia not shown here.



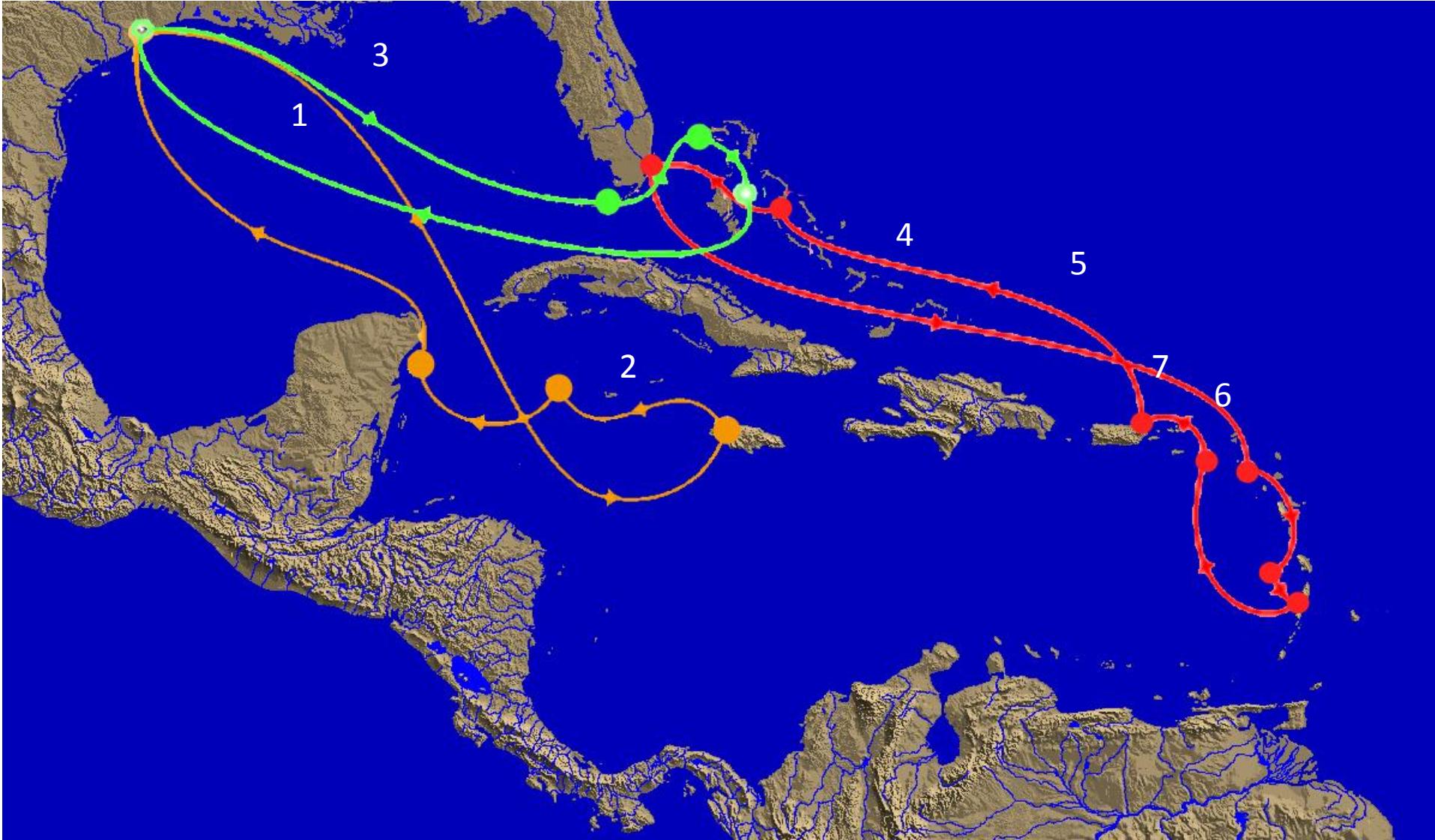
Dissolved Oxygen data collected via YSI has shown potential to affect Sargassum Growth significantly



Sargassum Suspension Growth Units Data  
Growth pattern from past year influenced by the excessive amount of Sargassum landings summer of 2014



# Groundtruthing

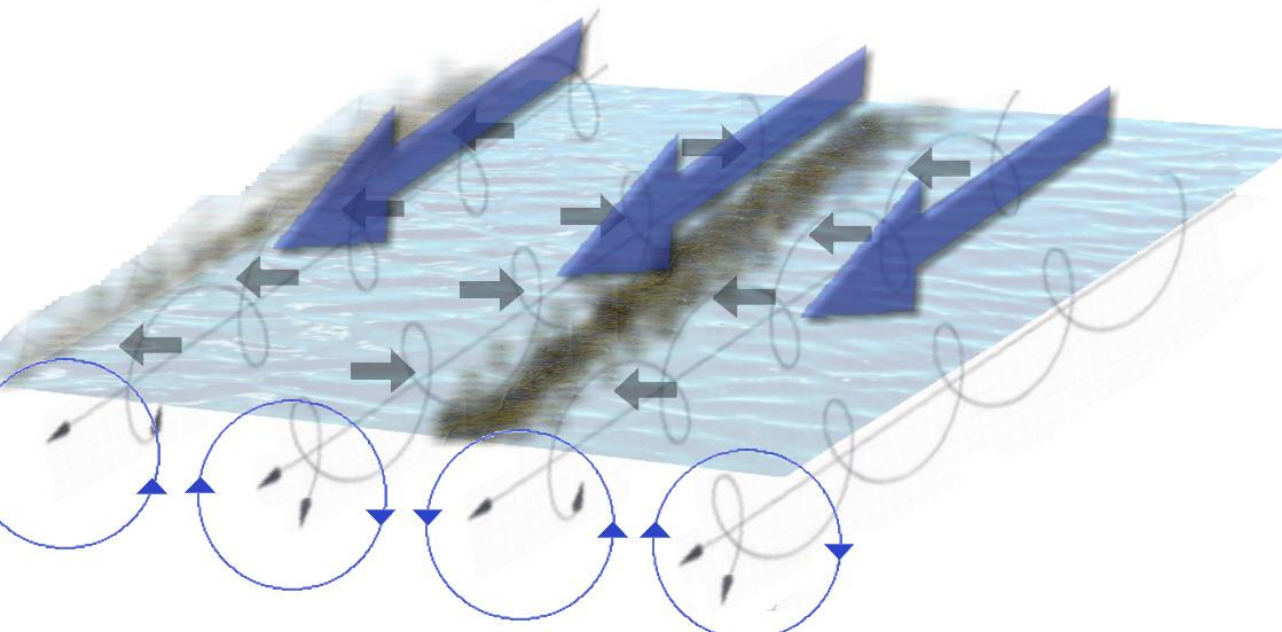
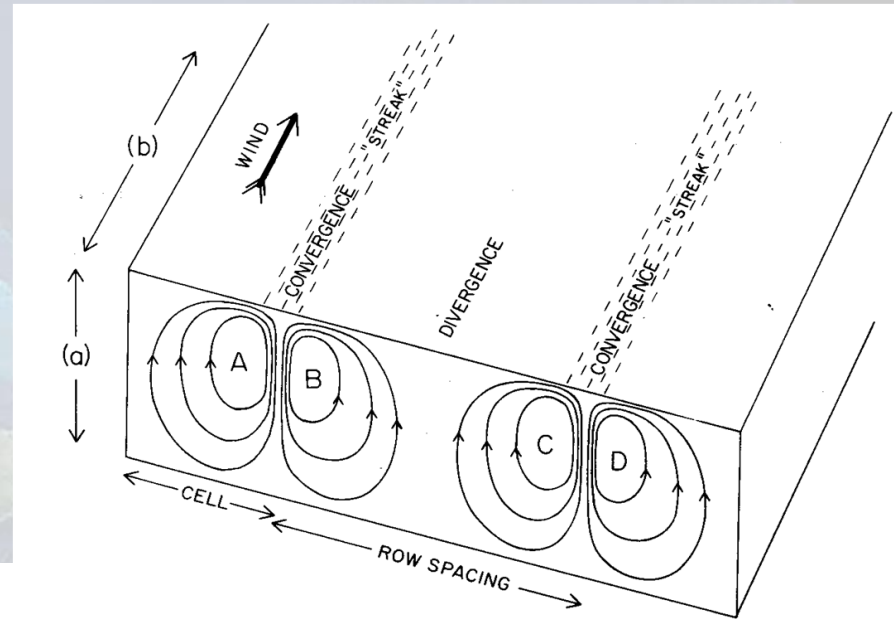




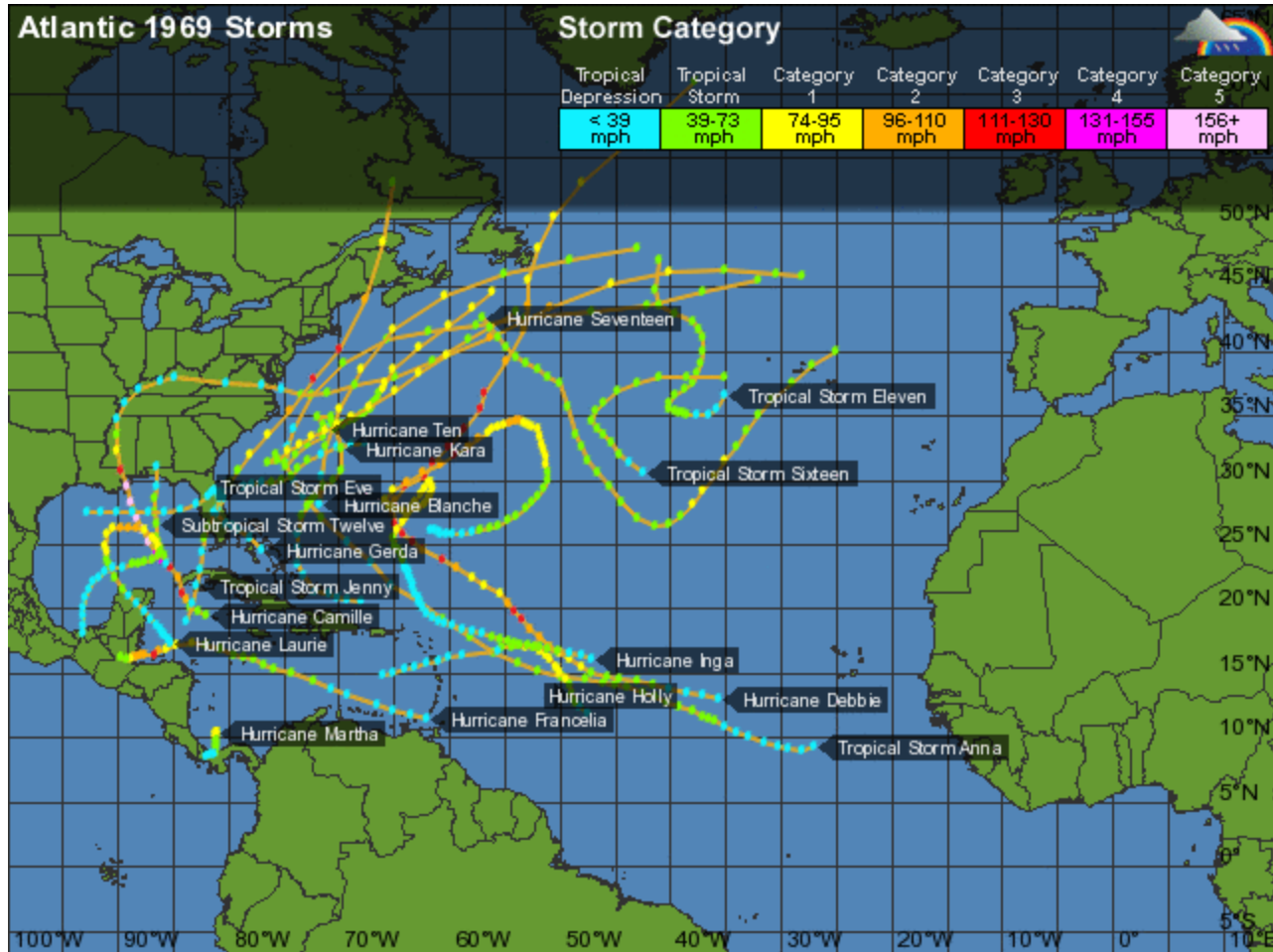
# Langmuir Circulation

When the wind is able to blow between three and thirteen meters per second in an individual direction for an extended length of time then the water will respond by forming parallel zones (cells) of convergent and divergent disruption.

These cells can range from a few meters up to several kilometers.

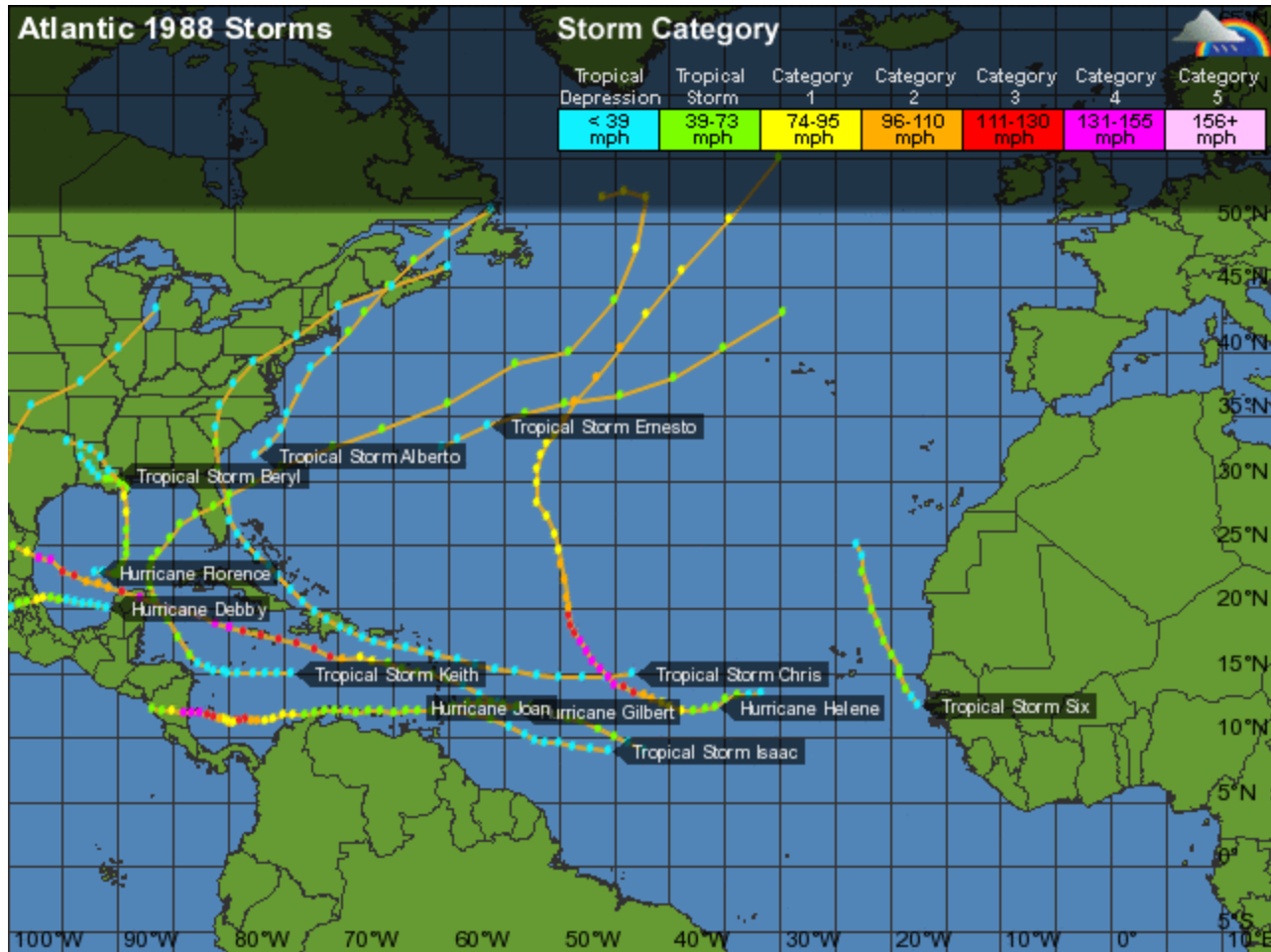


# 1970 One Sargassum Complaint





# 1989 20 Sargassum Complaints



**Thank you for your attention**

**Robert Webster**  
**Texas A&M at Galveston**  
**E-mail [Websterr@tamug.edu](mailto:Websterr@tamug.edu)**



# Beach Erosion

