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Intergovernmental
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Sub-Commission for the Caribbean
and Adjacent Regions

Subcomisión para el Caribe y
Regiones Adyacentes

Bogotá, Colombia
May 08 - 11, 2023



SATELLITE MONITORING, TRACKING AND RESEARCH OF PELAGIC SARGASSUM

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OF MEXICO REGIONAL NODE

NOAA/AOML



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CW/OW: Remote Sensing

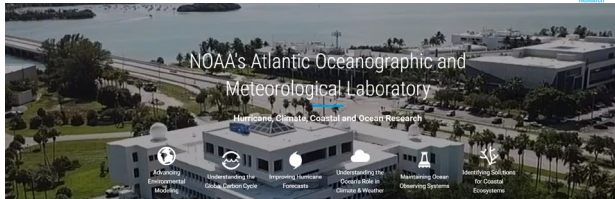
Mission statement

NOAA CoastWatch exists to help people access and use global and regional satellite data for ocean and coastal applications. Our satellite data products and services can support research, resource management, and decision-making on topics such as understanding, managing and protecting ocean and coastal resources and for assessing impacts of environmental change in ecosystems, weather, and climate.

Managed by NOAA/NESDIS.

Tools developed and implemented to deliver interoperable products through a service oriented architecture, using international recognized standards for data and metadata.

Caribbean node at NOAA/AOML in Miami.



Pelagic Sargassum

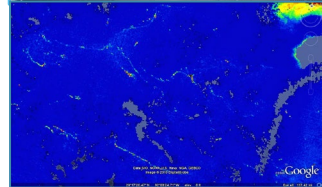
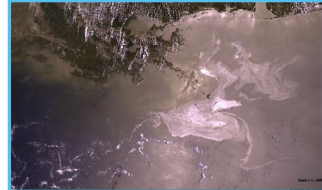
Floating macroalgae that forms large rafts that function as a drifting ecosystem, providing valuable habitat for diverse marine organisms.

Since 2011, massive amounts of pelagic Sargassum algae began washing ashore throughout the Caribbean Sea and Gulf of Mexico. Considered a HAB.

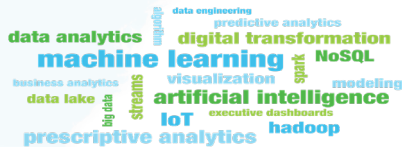
Disrupts shipping, tourism, fishing, industry, and coastal ecosystems. Public health impacts.

Questions: Effects of climate variability/change? Inter-Tropical Convergence Zone? Varying ocean currents. Nutrient fluxes from rivers? Upwelling? Saharan dust? We need to understand growth, transport.

What we do? Conduct research to monitor and track Sargassum using satellite and field observations. Determine trajectories through numerical modelling efforts.



Monitoring

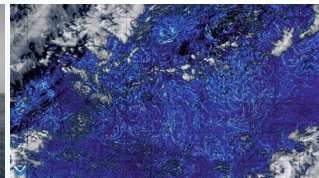
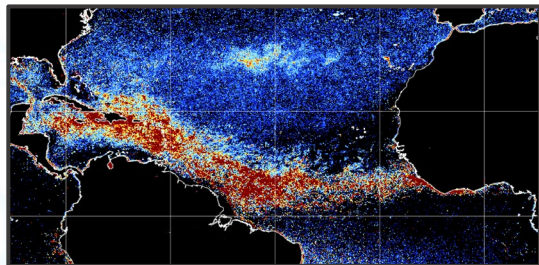


Technologies

Satellite, aircraft, drones, Geographic Information Systems, data integration, tagging, etc.

Why is monitoring important?

- Causes? Origin? Impacts?
- Spatial and temporal variability.
- Data assimilation.
- Validation.
- Mitigation strategies.
- Informed decision-making
- Time series. Operations.



Satellite Monitoring: Real Products

Goals: Near-real-time monitoring and tracking of pelagic Sargassum.

Products: AFAI, MCI, multi-index (MSI)

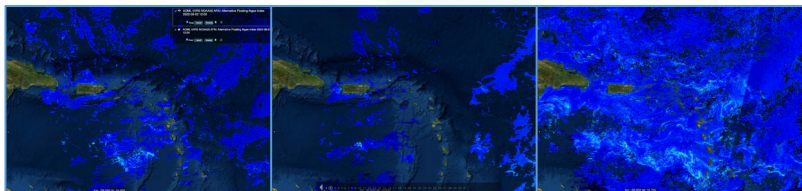
Revisit times: daily (MODIS , VIIRS), ~2 day (OLCI), ~5 day (MSI).

Coverage: Tropical Atlantic, GoM, Caribbean Sea, Western Africa.

VIIRS_J1

MODIS_TERRA

OLCI_S3+ VIIRS_J1+MODIS_TERRA



Continuous monitoring

Timely

Reliable

Cost-effective

Scalable

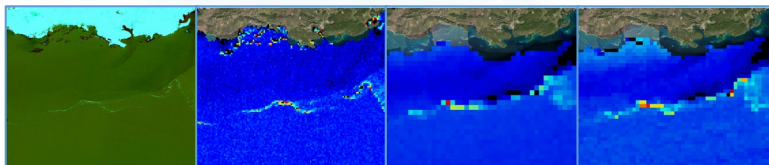
Multi-resolution

MCI_S2

OLCI_S3

MODIS_AQUA

VIIRS_N20



Forecast

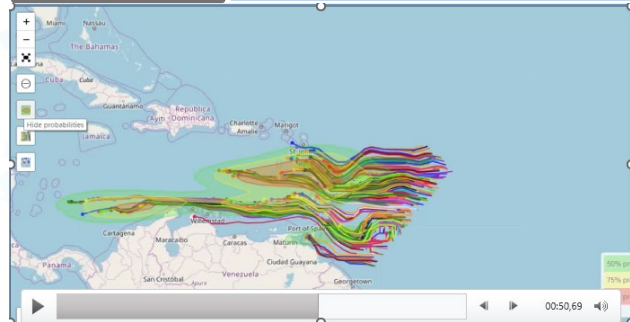
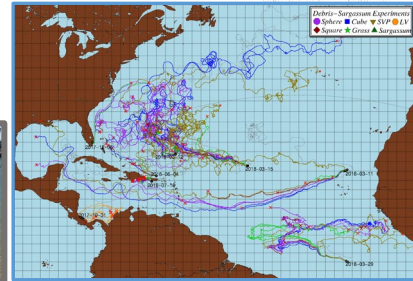
Goal: understand and assess impact of ocean dynamics and winds on Sargassum (and debris in general).

Respond to the following questions

Where? When? How much?

Why is forecasting important?

- Give us time to prepare and mitigate
- Planning: tourism, fisheries, ...
- Anticipate impacts
- Short-term: coastal/local dynamics
- Long-term: Identify key drivers



UN Ocean Decade: A Safe Ocean



Sub-Commission for the Caribbean and Adjacent Regions

Subcomisión para el Caribe y Regiones Adyacentes

Subcomisión del Caribe y Regiones Adyacentes

Tools and Processes

https://cwcgom.aoml.noaa.gov/UN_Ocean_Decade/

Satellite Monitoring of Pelagic Sargassum: Satellite Activity



AGENDA

HOME PAGE

RESOURCES

UN Ocean Decade



2021
2030

United Nations Decade
of Ocean Science
for Sustainable Development

Satellite Activity: Sargassum

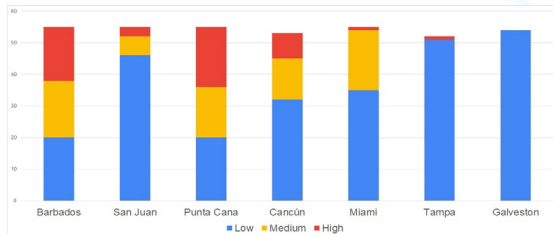
Updated on March 14, 2022

Pelagic Sargassum is a buoyant macroalgae that forms rafts at the ocean surface and serve as a biologically rich habitat for hundreds of diverse marine species. Since 2011, massive blooms of Sargassum have occurred in the tropical Atlantic and swept through the western tropical Atlantic, Caribbean Sea, and Gulf of Mexico. These recurring annual events have caused significant disruptions to coastal communities throughout the region, negatively impacting human health, tourism, fishing, navigation, coastal management operations, and nearshore ecosystems, and representing a challenge to national economies and the achievement of United Nations Sustainable Development Goals (SDGs) in the region.

Sargassum Inundation Risk

Goal: To monitor Sargassum and to provide an estimate of the risk of Sargassum coastal inundation in the Caribbean and Gulf of Mexico regions.

Weekly reports created as a response to the need to improve the **monitoring** and **management** of Sargassum influxes (e.g. coordinate clean-up), which have major economic, social, environmental, and public health impacts.



Joaquin Trinanes, N.F. Putman, G. Goni, C. Hu, M. Wang. [Monitoring pelagic Sargassum inundation potential for coastal communities.](#) *Journal of Operational Oceanography*. DOI: [10.1080/1755876x.2021.1902682](https://doi.org/10.1080/1755876x.2021.1902682)

<https://cwgom.aoml.noaa.gov/SIR/>

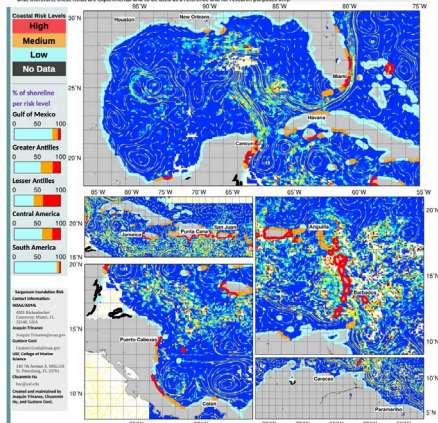


Experimental Weekly Sargassum Inundation Risk (SIR v1.3)

By the National Oceanic and Atmospheric Administration (NOAA), and the University of South Florida (USF)

Status: Apr 25-May 1, 2023

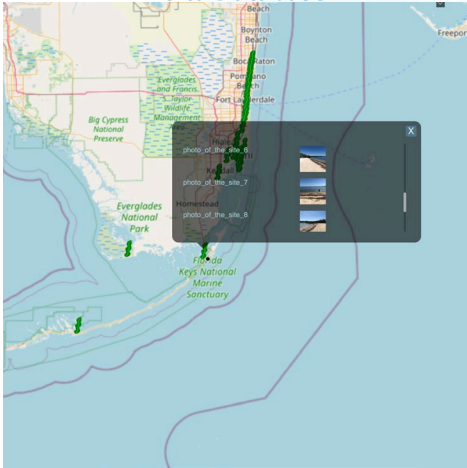
Since 2011, large amounts of Sargassum is a recurrent problem in the Caribbean Sea, in the Gulf of Mexico and tropical Atlantic. These events can cause significant economic, environmental and public health harm. These Sargassum Inundation Risk (SIR) fields provide an overview of the risk of sargassum coastal inundation in the Caribbean and Gulf of Mexico regions. Using as core inputs the AFAI (Alternative Floating Algae Index) fields generated by the University of South Florida (USF), the algorithm analyses the AFAI values in the neighborhood (50 km) of each coastal pixel and, computing the difference between those values and a multi-day baseline, classifies the risk into three categories: low (blue), medium (orange) and high (red). In black are areas with not enough data. The vectors in the images represent the geostrophic currents. SIR is the result of the collaboration between the Atlantic Oceanographic and Meteorological Laboratory (NOAA/AOML), NOAA-CenterWatch/OceanWatch, and USF. The methodology to compute these fields is under development and, therefore, these fields are experimental and to be used as a reference and for research purposes only.



References: [USF Sargassum Watch System](#) [Atlantic OceanWatch](#)

Disclaimer: This is an experimental product and SIR subject to validation by NOAA/AOML, NOAA-CenterWatch/OceanWatch, and USF.

Sargassum Observations In-situ Database



Database consolidation


















NOAA's Survey123 Multidevice data collection

<input type="checkbox"/> Washed-up on the shore	<input type="checkbox"/> Floating along the shoreline	<input type="checkbox"/> Floating in bays, channels, harbors
<input type="checkbox"/> Floating over reefs or seagrass	<input type="checkbox"/> Offshore	

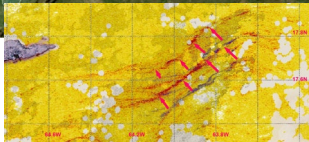
Sargassum Observed As

<input type="checkbox"/> Line(s) of Sargassum	<input type="checkbox"/> Mats/rafts	<input type="checkbox"/> Scattered clumps
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Species of Sargassum

<input type="checkbox"/> Natans I     	<input type="checkbox"/> Natans VIII     	<input type="checkbox"/> Fluitans III     
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Interoperable Environment



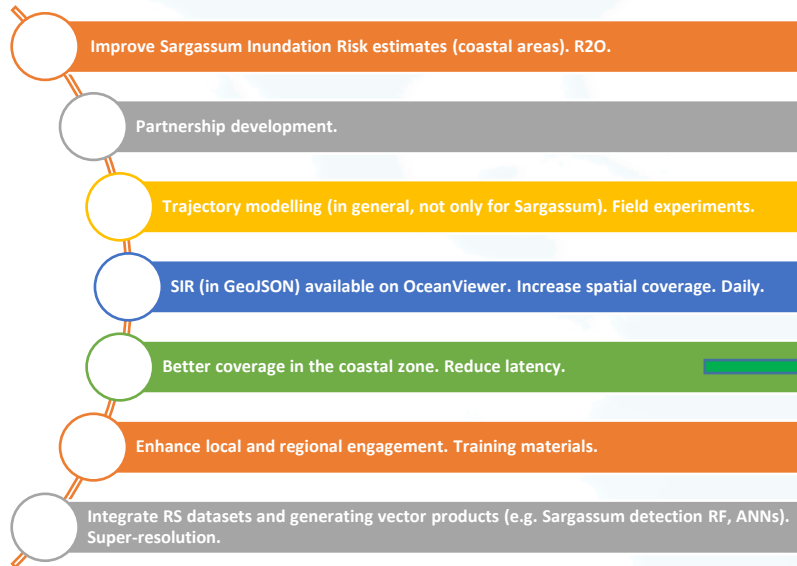
US Virgin Islands Sargassum Incident

Region 2 Crisis Action Planning Team

July 2022



Research and Collaboration Priorities



Ground truth (e.g. Citizen science projects, beach management agencies, autonomous vehicles)

Winds,
Currents (e.g.
HF radars),
Waves

Additional
satellite
sensors.

THANK YOU 

MUCHAS GRACIAS 

MERCI BEAUCOUP 