

# Following Sargassum, Connecting Communities

## Presentation 3: Introducing our forecast system and reflection on 2021 season

Bob Marsh, 13 December 2021



THE UNIVERSITY OF THE WEST INDIES  
AT MONA, JAMAICA

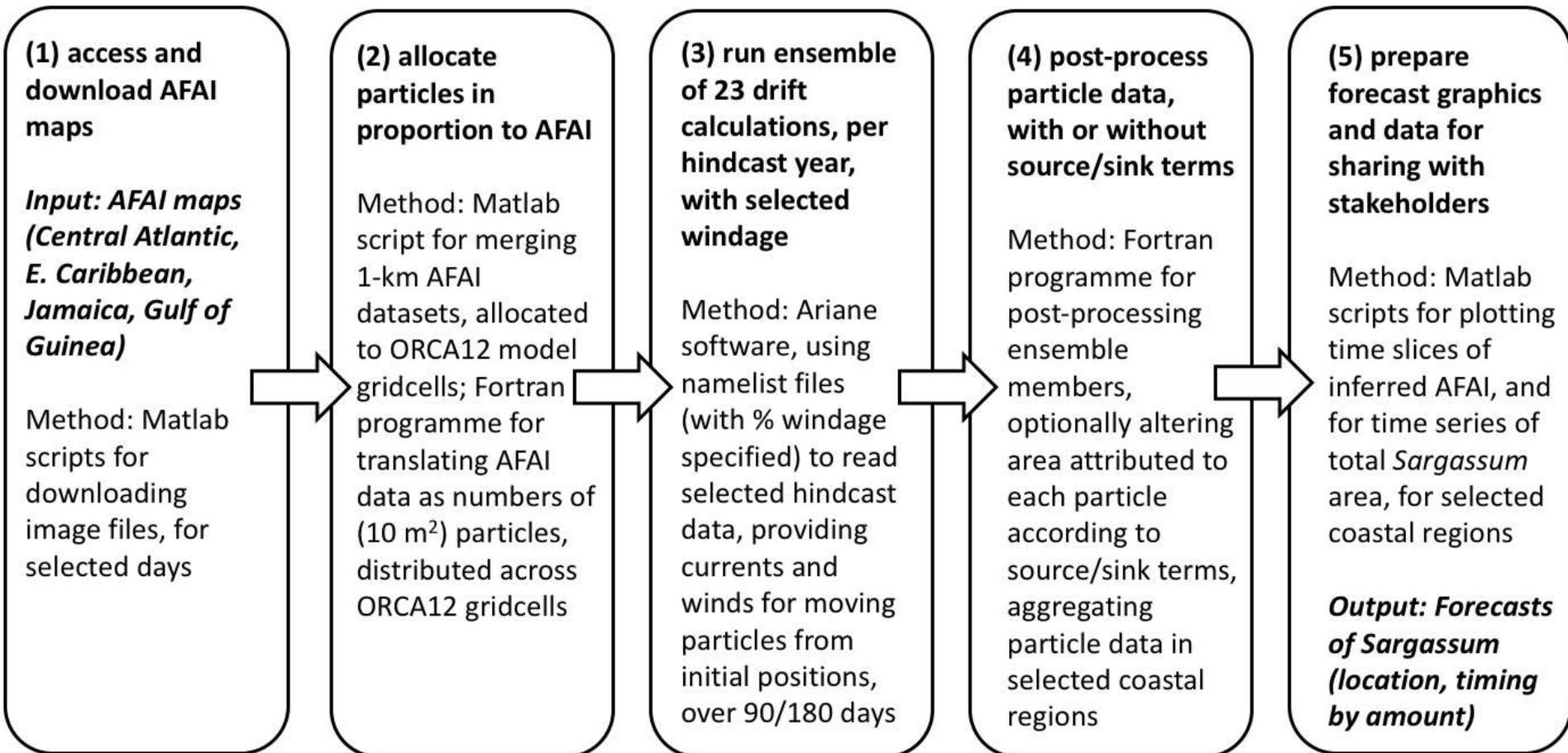


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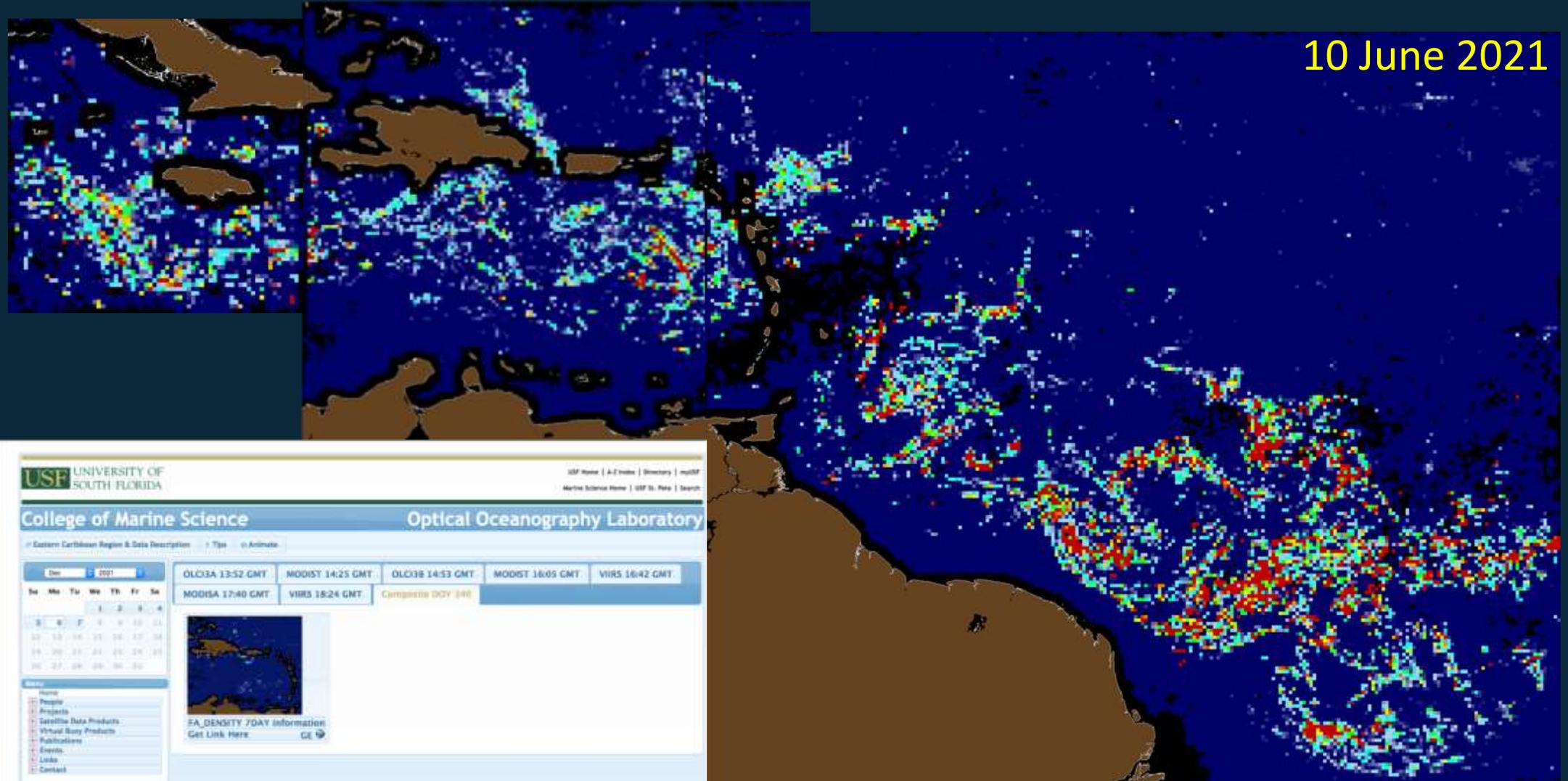
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# The SARTRAC Ensemble Forecast System (SARTRAC-EFS)



# (1) Access satellite data

10 June 2021



USEF UNIVERSITY OF SOUTH FLORIDA

College of Marine Science Optical Oceanography Laboratory

Eastern Caribbean Region & Data Description

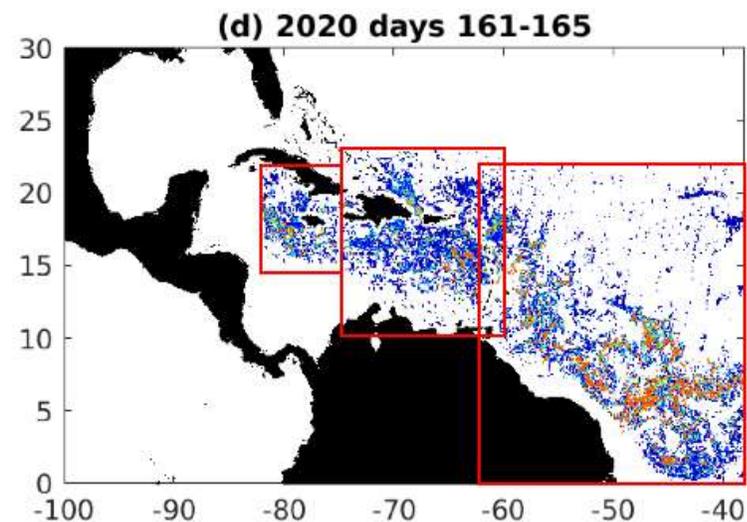
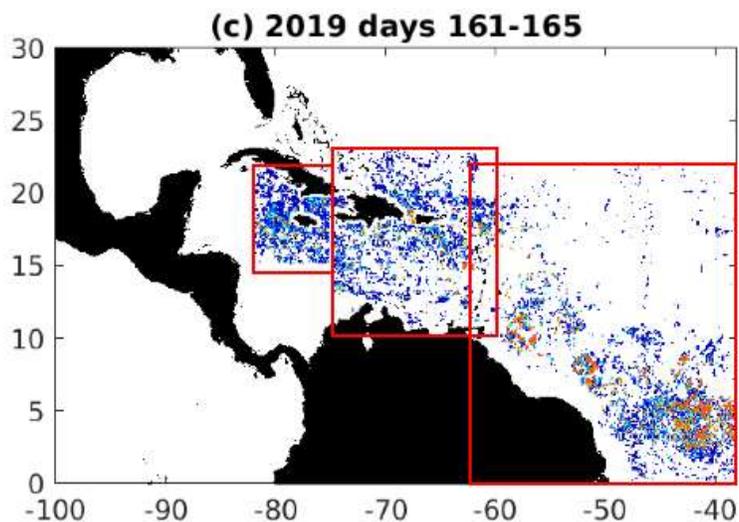
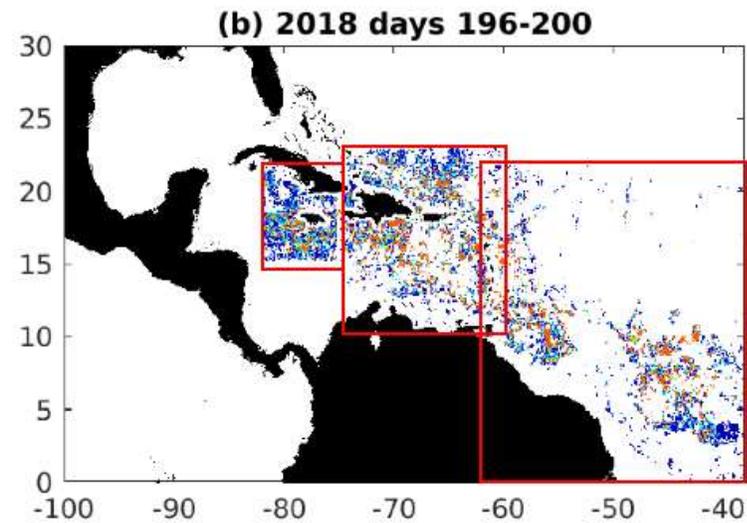
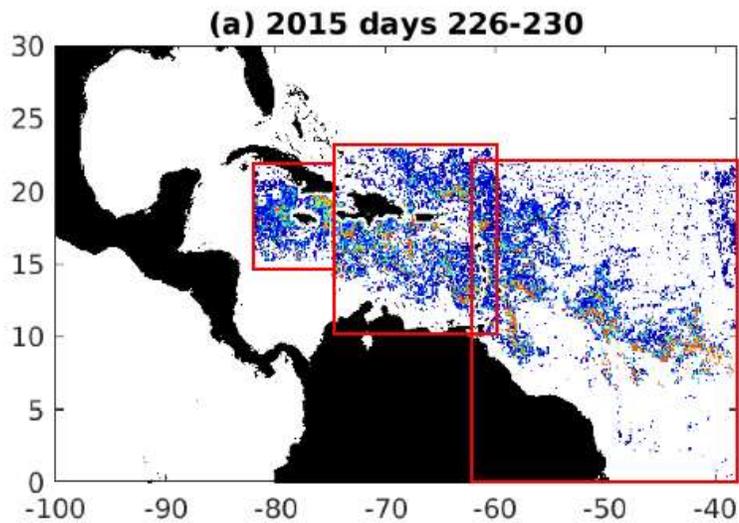
OLC3A 13:52 GMT MODIS1 14:25 GMT OLC3B 14:53 GMT MODIS2 16:05 GMT VIIRS 16:42 GMT  
MODISA 17:40 GMT VIIRS 18:24 GMT Composite DOY 340

EA\_DENSITY 7DAY Information  
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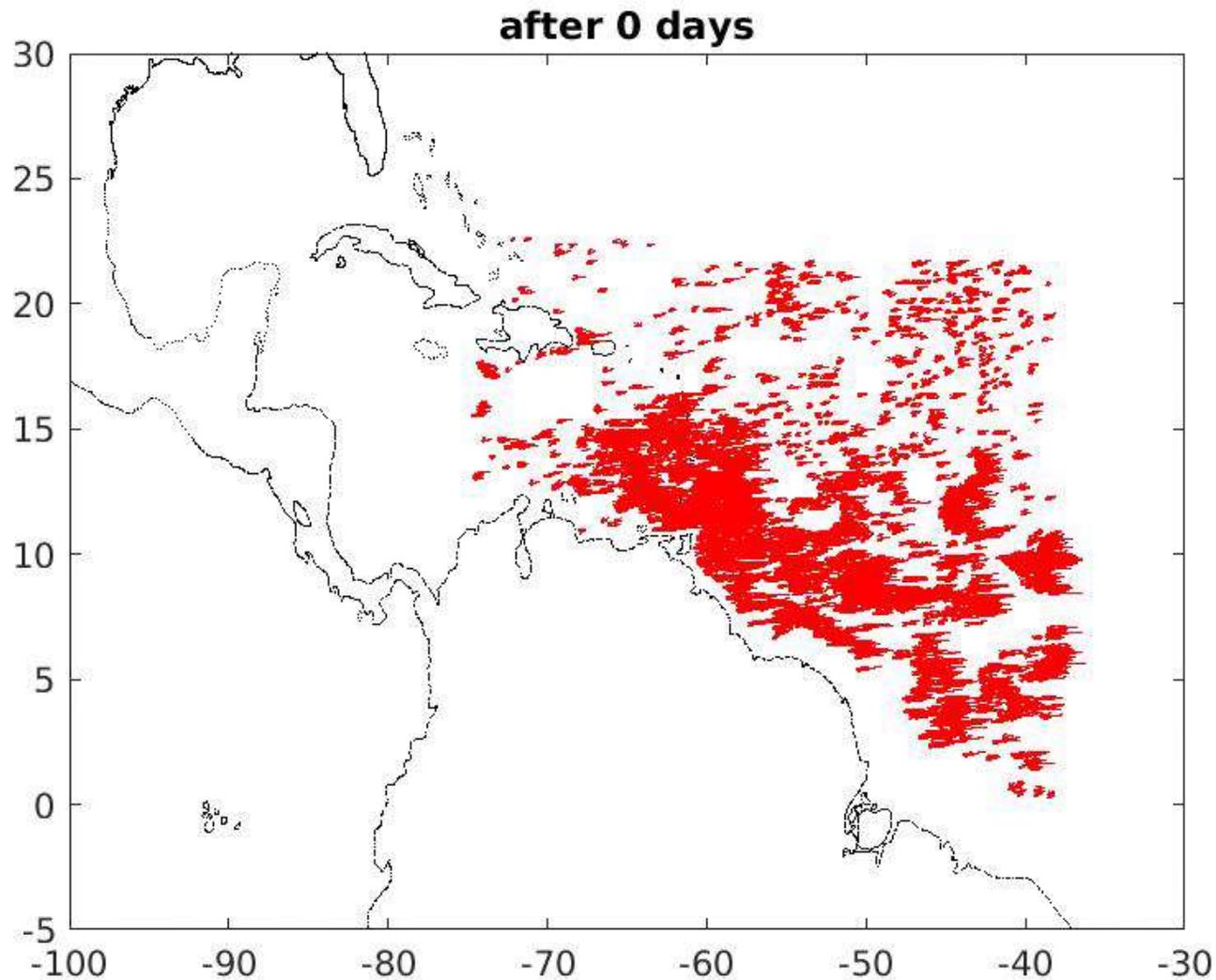
<https://optics.marine.usf.edu>

## (2) Initialize 'particles'



Allocate particles in proportion to gridded FAI data

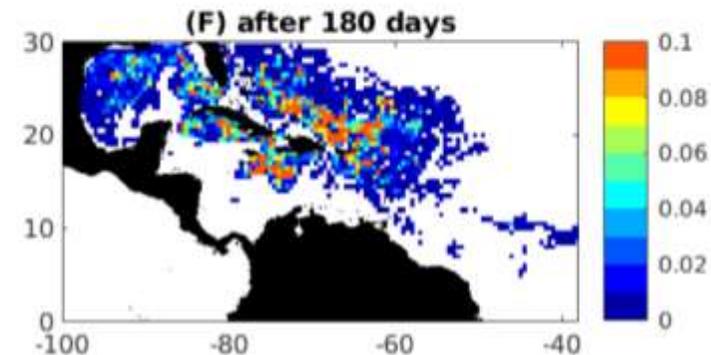
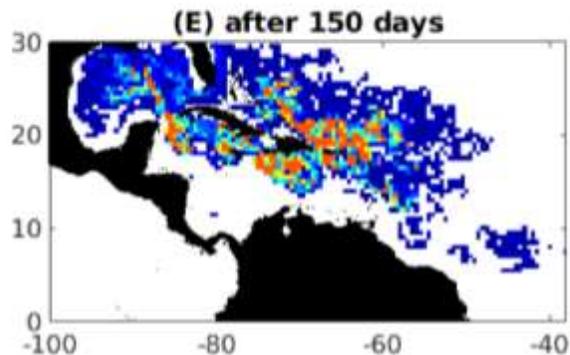
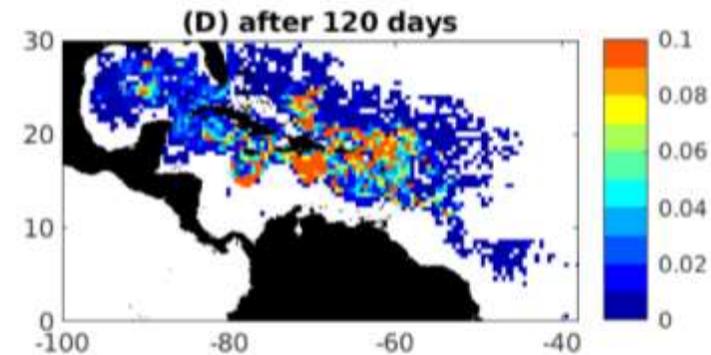
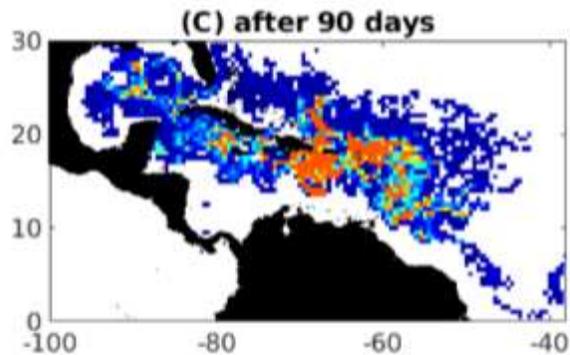
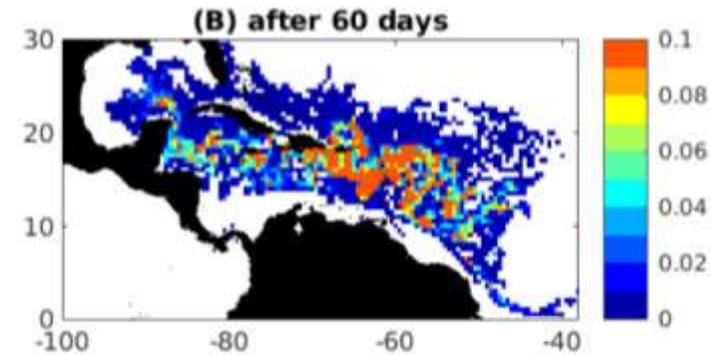
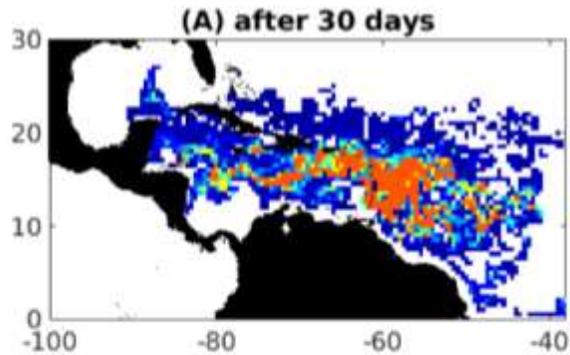
# (3) Track the particles forwards



Particle tracking with 'hindcast' surface currents and winds to compute offline particle trajectories

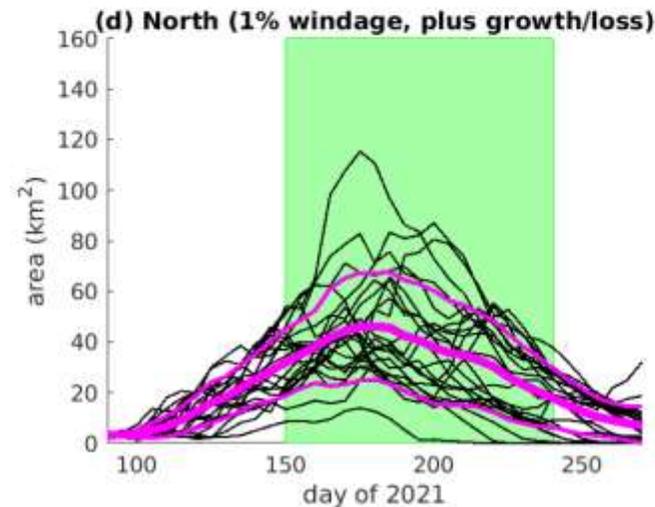
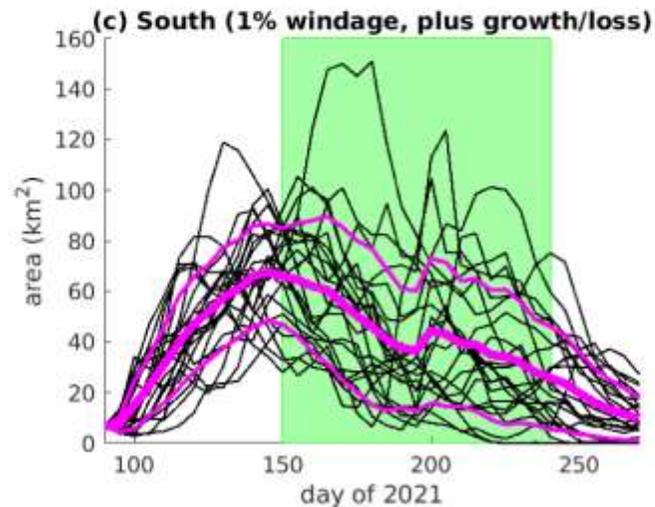
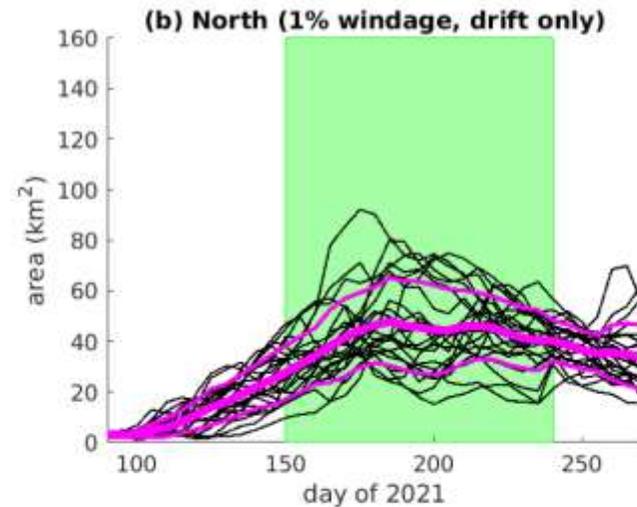
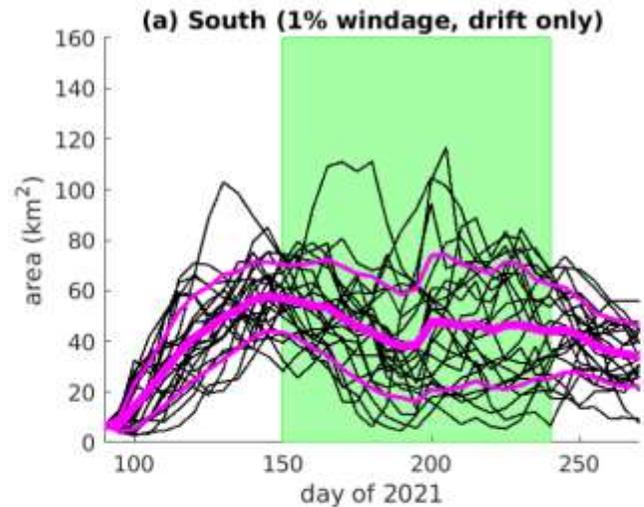
- e.g., 21 March 2020 distribution tracked with ocean currents for 95 days (1996 hindcast)
- using 1,139,428 particles

# (4) Grid particle trajectory data



Post-process particle data to obtain fractional coverage (%) on 50-km grid

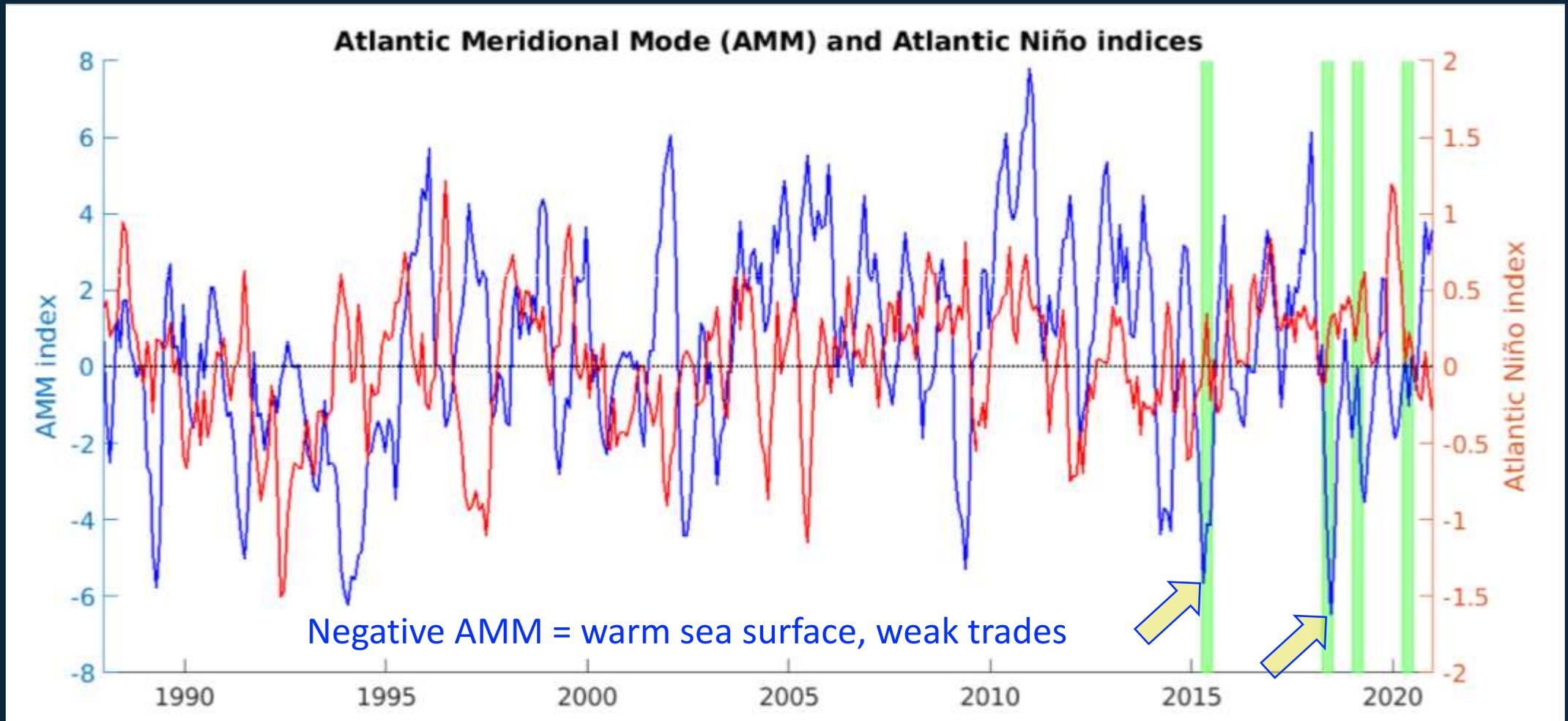
# (5) Prepare forecasts



Forecast total area of sargassum in selected locations

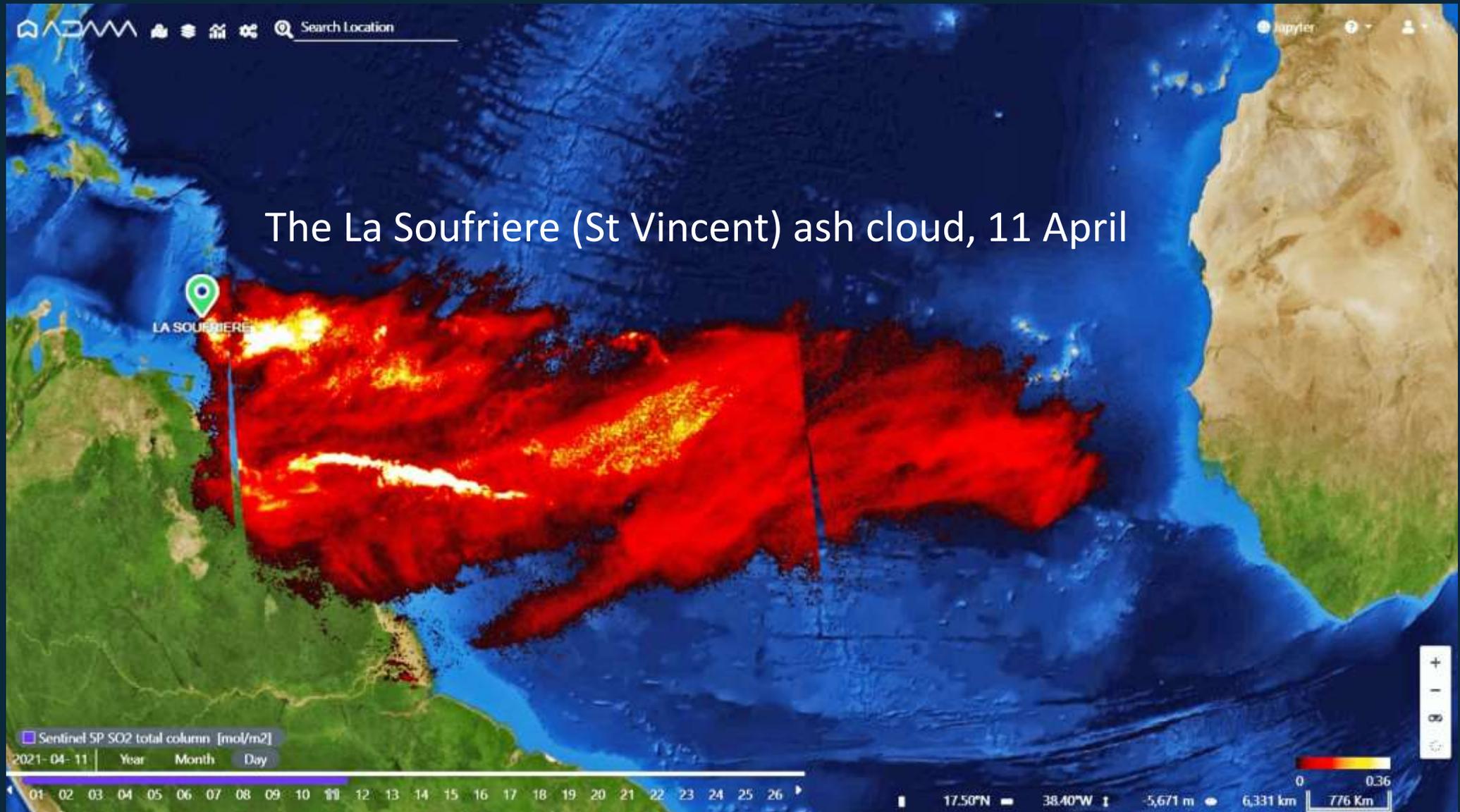
e.g., South (a,c) and North (b,d) of Jamaica for April-September 2021, assuming 1% 'windage' and drift only (a,b), including growth & loss factors (c,d)

# Relating interannual variations to climate

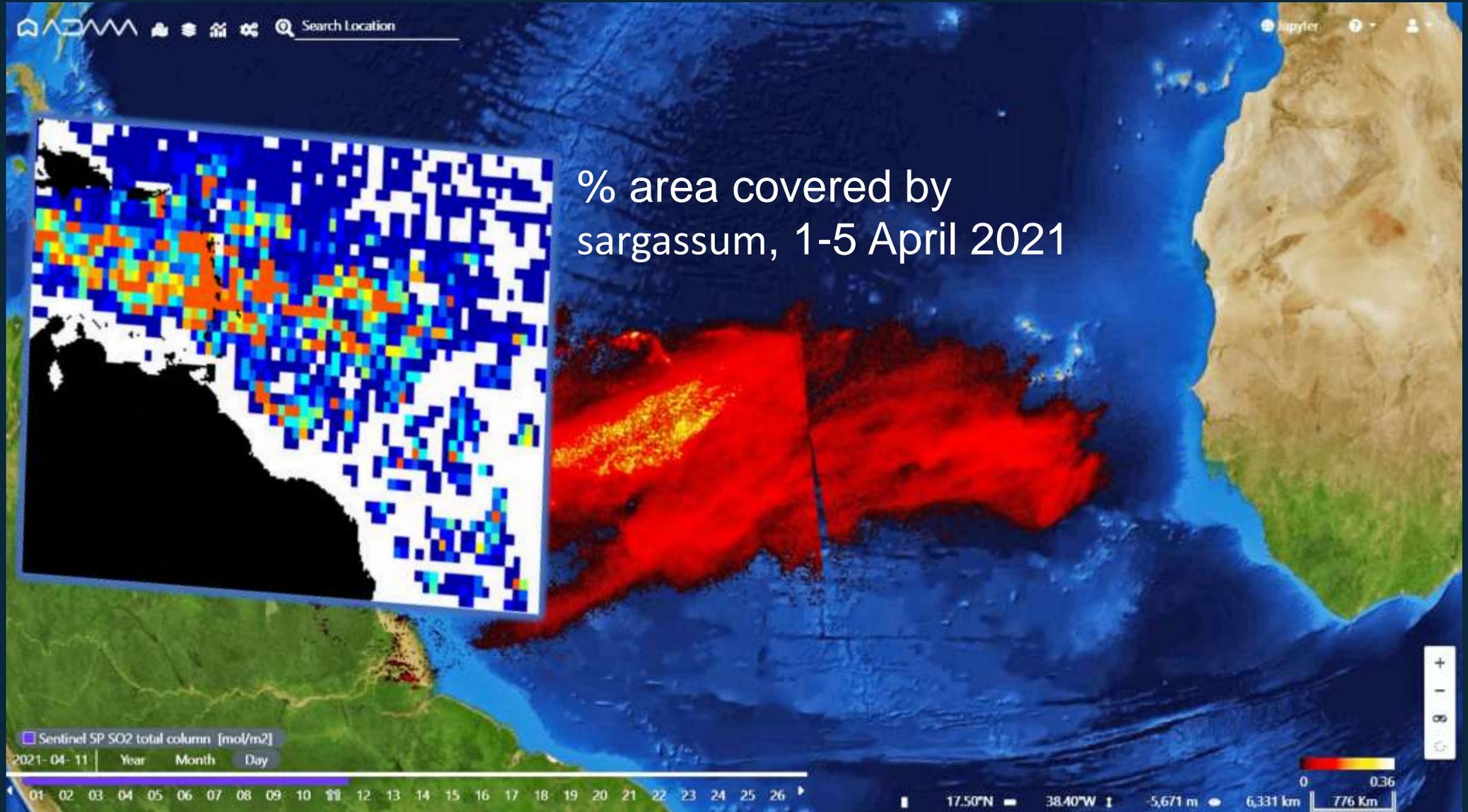


- AMM exerts a dominant influence on sargassum (negative phase = lots!)
- Developing from Nov, implies predictability months ahead of the season

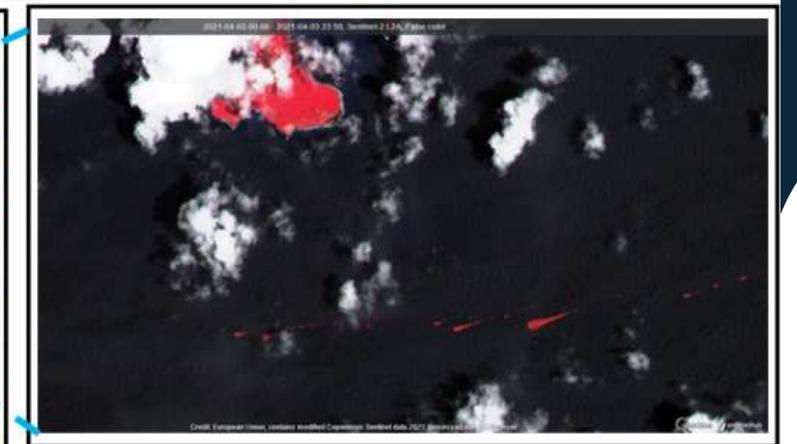
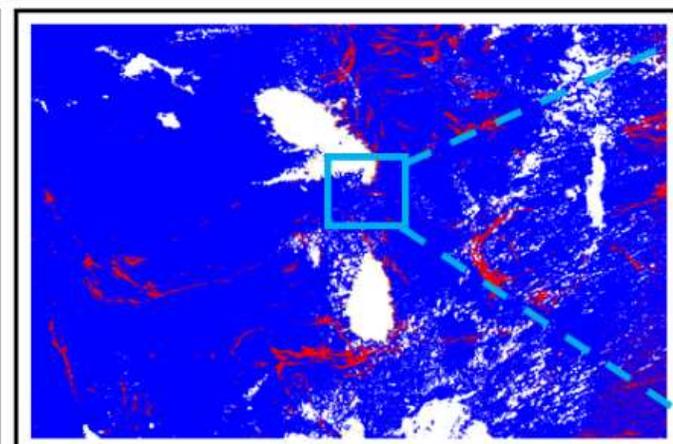
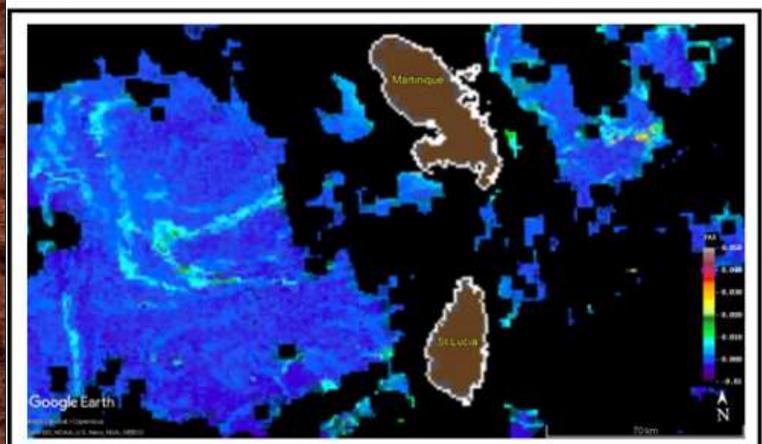
# The 2021 season – La Soufriere erupts



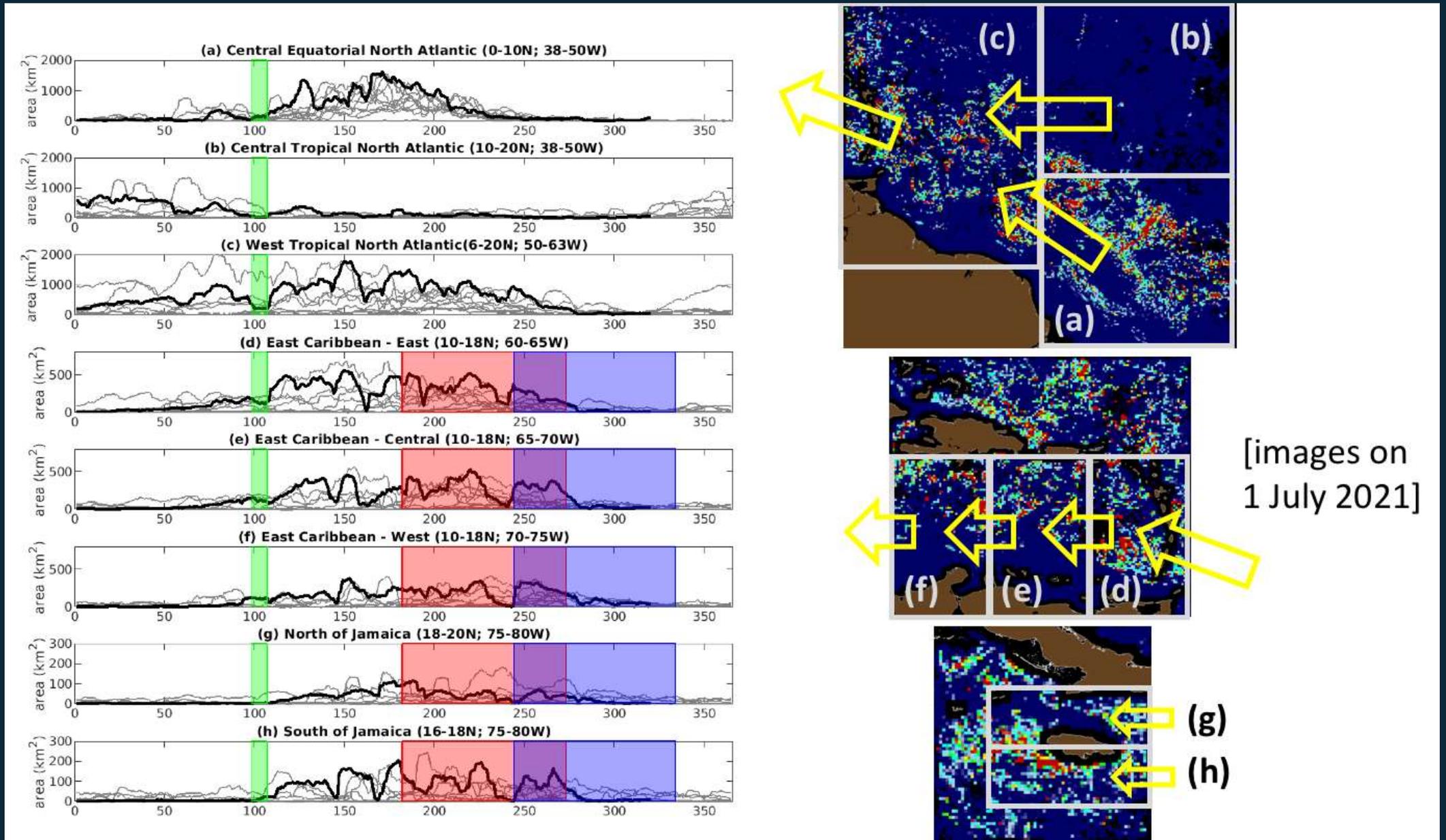
# Ash fallout over sargassum



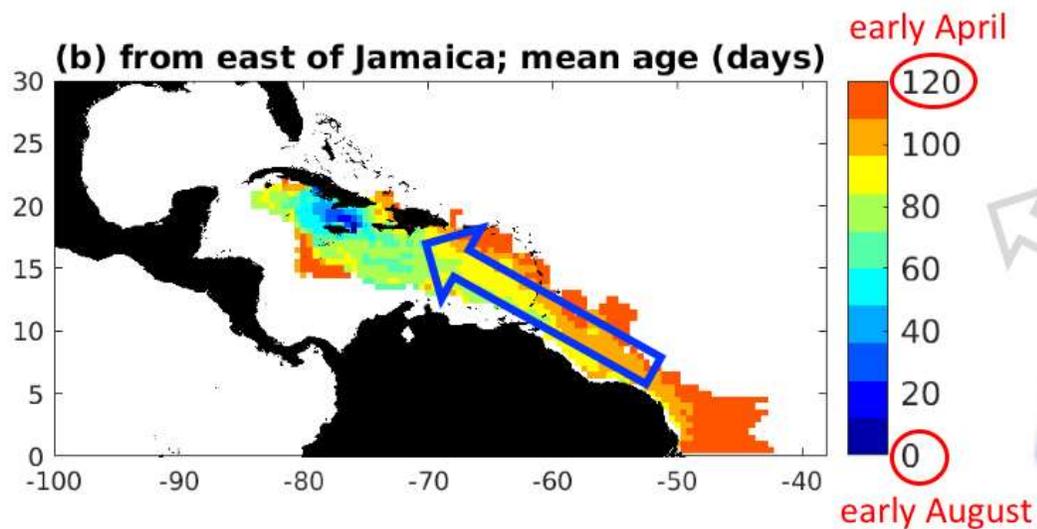
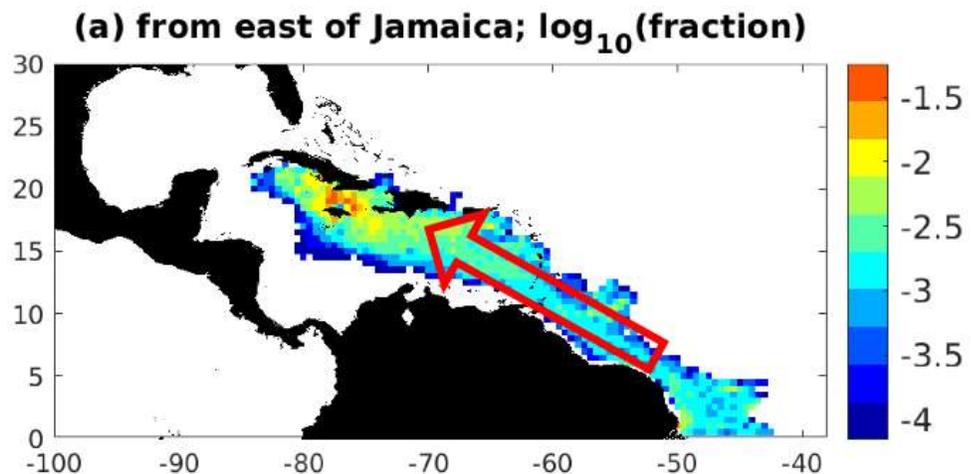
# Monitoring a large sargassum bloom subject to a major volcanic eruption (MONISARG)



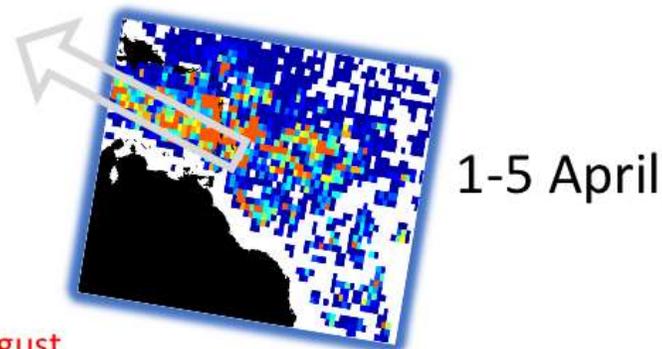
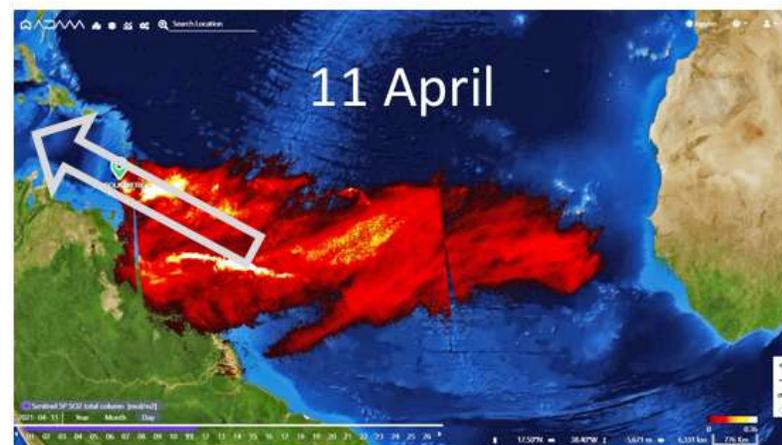
# Record late-season sargassum to the west



# Possible ash fertilization of sargassum?



Synthetic backward tracking  
from Jamaica (start early August)



# Takeaway Messages

## Strengths of SARTRAC-EFS

- Using regional satellite data
- Simulating drift with currents and winds highly resolved in space and time
- Account for windage
- Some growth/loss terms

## But we are currently missing:

- Currents and winds for the forecast months
- Wave action (which add drift)
- Full description of biology
- Description of some coastal processes that lead to beaching
- **We move forwards through close coordination of monitoring & forecasting**
- **Each season is different, and we keep learning!**



## Seasonal Predictions of Holopelagic Sargassum Across the Tropical Atlantic Accounting for Uncertainty in Drivers and Processes: The SARTRAC Ensemble Forecast System

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