



2021 SARTRAC SCIENTIFIC SARGASSUM SERIES

FOLLOWING SARGASSUM,
CONNECTING COMMUNITIES

Stakeholder engagement on monitoring & forecasting, emphasizing regional-scale connectivity; Caribbean experiences, for extension to West Africa.

DECEMBER 13TH, 2021
10:00 AM AST



ROBERT MARSH
Professor

REGISTRATION LINK:

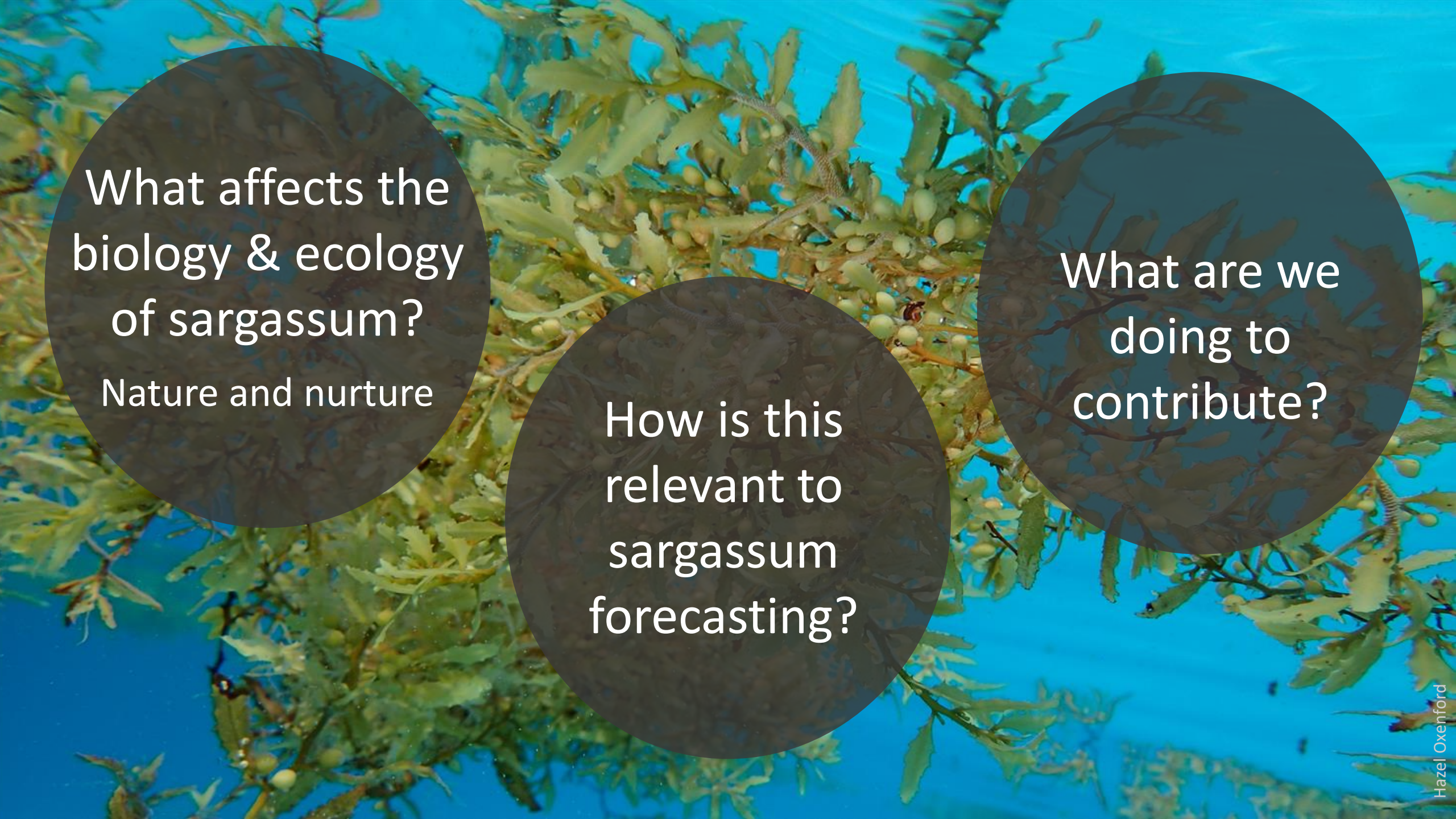
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Sargassum Biology: What we do and don't know of relevance to forecasting

Hazel A. Oxenford





What affects the
biology & ecology
of sargassum?
Nature and nurture

How is this
relevant to
sargassum
forecasting?

What are we
doing to
contribute?

Nature (genetic make-up)

We KNOW:

- Sargassum is a brown seaweed.
- >250 species of sargassum.
- Gas filled bladders keep the attached seaweed fronds erect.
- Vast majority are benthic.
- There are also unique pelagic (free floating) sargassum species.
- Spend entire life cycle afloat.
- Propagate asexually only.
- Currently accepted that pelagic sargassum comprises 2 species and several morphotypes



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Pelagic species morphotypes

- Most frequently occurring morphotypes are:



Sargassum fluitans III



Sargassum natans I



Sargassum natans VIII

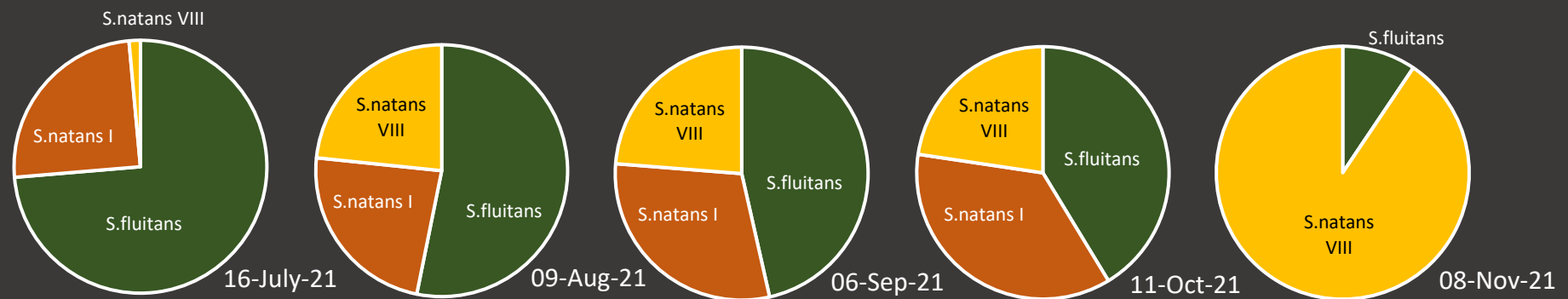
- Recent genetic-based taxonomic study suggests that all 3 are genetically distinct and likely different species

Pelagic species morphotypes

We KNOW

that morphotypes differ in:

- their growth form (shape);
- the biodiversity that they host;
- their growth rates under laboratory conditions;
- some chemical constituents;
- their relative abundance in sargassum mats over space (different locations) and time (weeks and years)



Relative species composition of stranded sargassum at Walkers beach, Barbados

Pelagic species morphotypes

We DO NOT KNOW

whether they:

- Cling together differently and therefore travel at different speeds
- Have inherently different physiological characteristics
 - propagation rate
 - lifespan
 - rate of senescence / sinking
- Differ in their response to changes in environmental conditions



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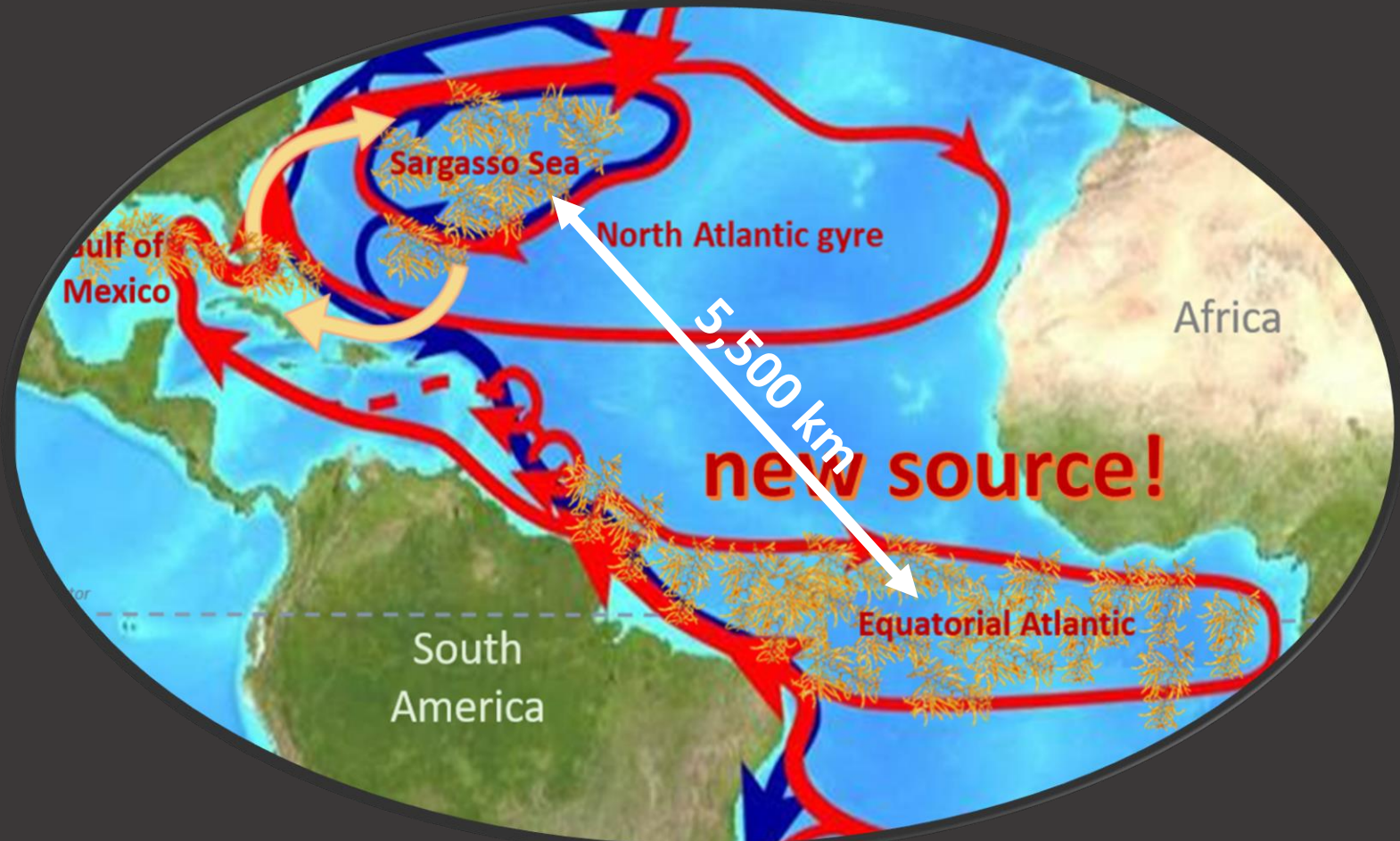
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Mix of morphotypes clinging together

Nature (environment)

We KNOW:

- Caribbean and African sargassum comes from a new source region
- Environment is very different from the original source regions



Environment

We KNOW

for NORTH ATLANTIC pelagic sargassum that:

- The pelagic sargassum population is sub-tropical.
- It circulates between the GoM and the Sargasso Sea?
- Sargasso Sea is nutrient poor so the sargassum relies on associated biodiversity for nutrients.
- Dominant species/morphotype is *S. fluitans* III, then *S. natans* I, whilst *S. natans* VIII is considered rare.
- High interannual variation in population size.



Environment

We KNOW

for NORTH ATLANTIC pelagic sargassum that:

- Reported growth rates suggest population could double in 9 – 20 days.
- Growth strongly influenced by temperature, salinity and nutrients.

- Growth rate highest at 26°C with 10% decline for $\pm 5^\circ\text{C}$.
- Significant mortality above 28°C.
- Growth rate increases as salinity rises from 24 to 36 psu.
- Growth rate increases with relative concentrations of nutrients (N, P).





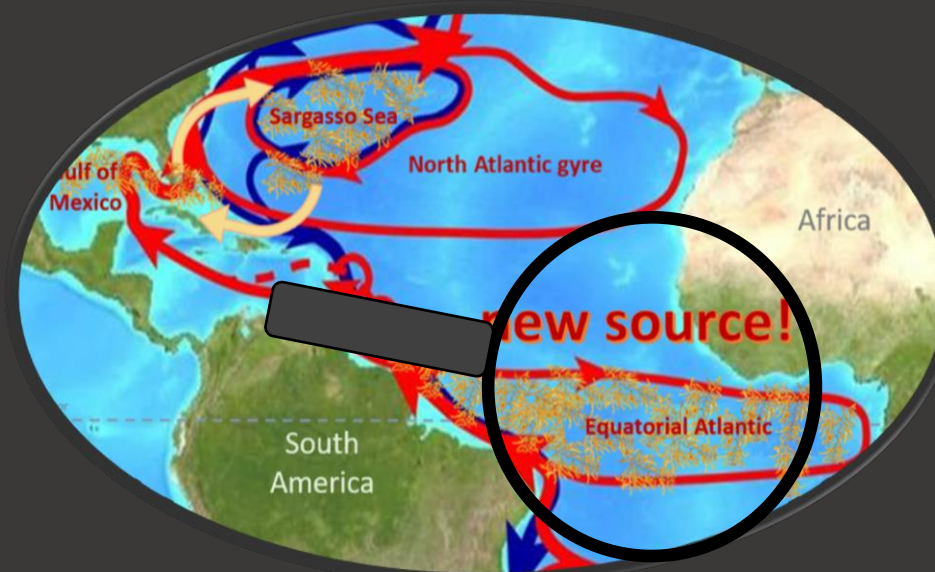
Nikita Poon

Environment

WE KNOW

for EQUATORIAL ATLANTIC pelagic sargassum that:

- The pelagic sargassum population is tropical.
- The accumulation regions are NOT nutrient poor.
- Sargassum is exported seasonally from the NERR to both the Caribbean and West Africa.
- Dominant species/morphotype is highly variable and that *S. natans VIII* is relatively common.
- High interannual variation in population size.

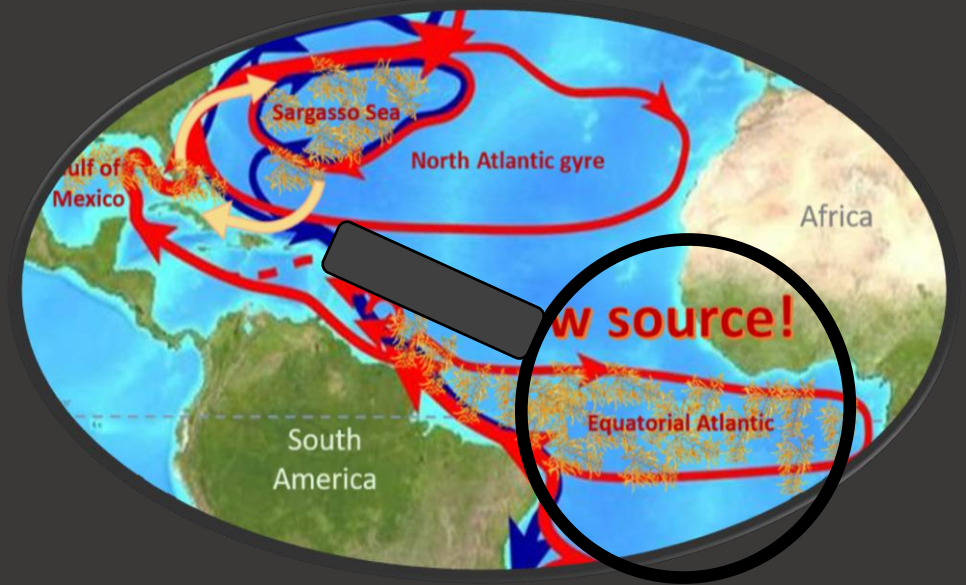


Environment

We DO NOT KNOW

for EQUATORIAL ATLANTIC pelagic sargassum:

- Growth rates for any of the 3 morphotypes.
- Influence of age on growth rate.
- Longevity or senescence and sinking rate.
- Optimal temperature and salinity ranges or tolerance limits.
- Impact of nutrient availability on growth.
- Whether sinking is influenced by sea conditions.



New



Old

Relevance to forecasting?

Sargassum influx forecasting methods use a combination of:

- Ocean current models and surface winds to predict transport of sargassum
- Satellite imagery to detect sargassum and 'seed' the transport model

PROBLEMS:

- Modeling inert particles, but Sargassum is not inert.
- Some models use 'proxy' measures for growth and mortality, but
- Proxies come from NORTH ATLANTIC sargassum studies.
- None factor impacts of changes in morphotypes, salinity, nutrients or age.

What are we doing?

In situ growth studies

SargAdapt and SarTrac projects are supporting an MSc sargassum growth study in Barbados to determine:

- Growth rate of each of the 3 morphotypes.
- Growth rate differences summer vs winter.
- Sinking rates?

SargAdapt



Floating growth cages containing 3 replicate samples of each sargassum morphotype



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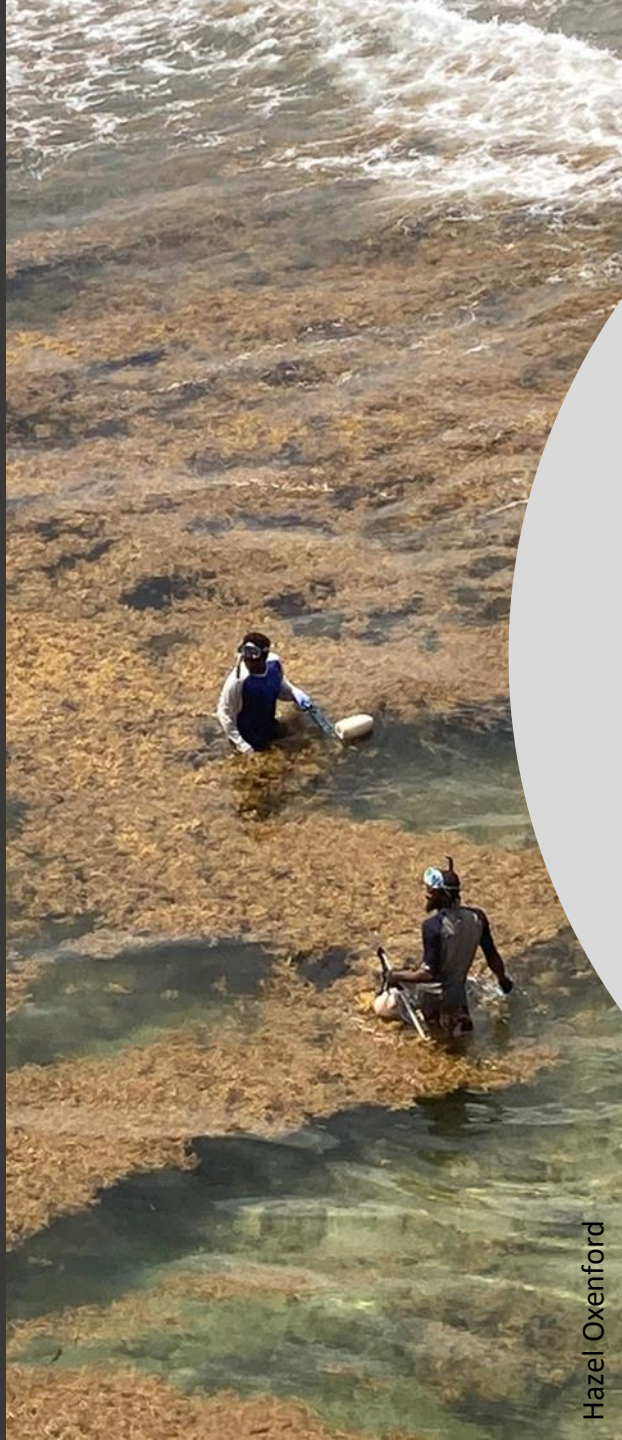
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Makeda Corbin



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Thank You

Please keep questions for panel discussion

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