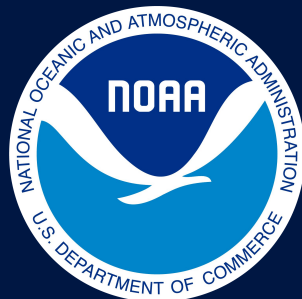




Routine monitoring of marine communities using 'omics approaches

Luke Thompson (presenter), Katherine Silliman, Enrique Montes & Emily Osborne



Atlantic Oceanographic & Meteorological Laboratory
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

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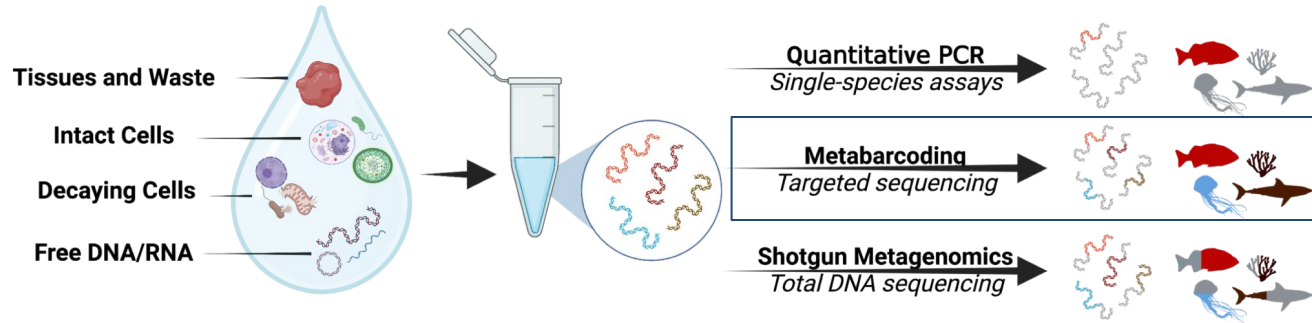
06 Global Ocean

07 Ocean Exploration



What is eDNA?

- **Environmental DNA (eDNA)** = DNA of whole/partial organisms, organismal traces (eg, skin, mucus, feces), plankton, or microbes in an environmental sample (eg, seawater).

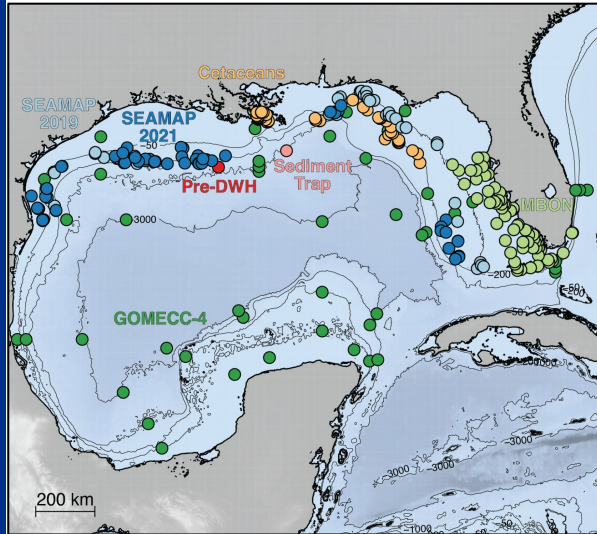


Why eDNA for Monitoring?

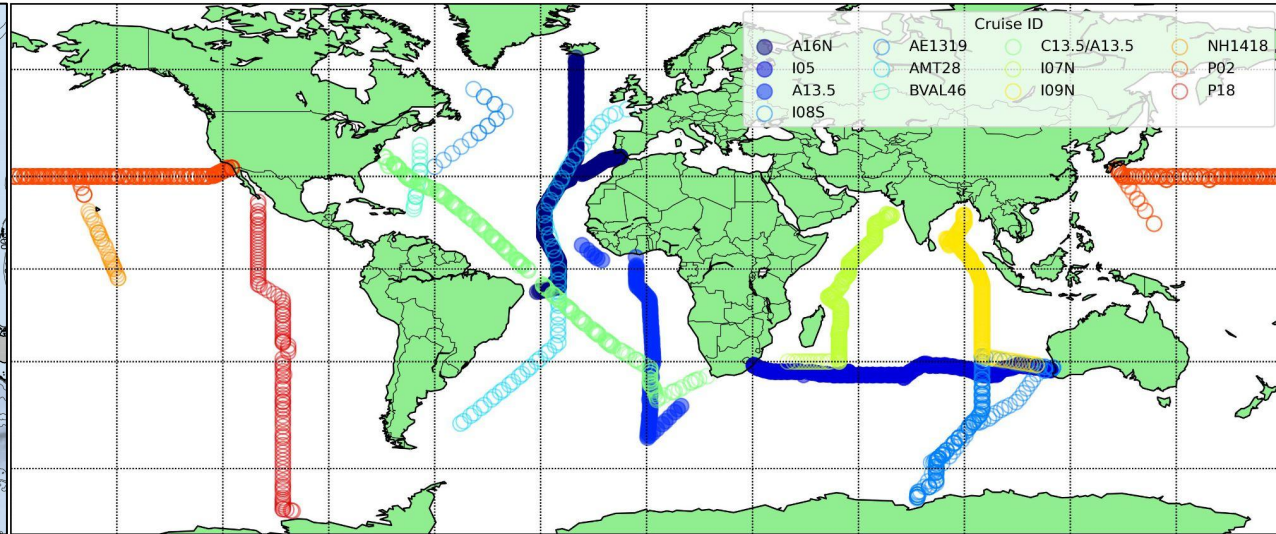
- **Non-Invasive:** No nets, trawls, or visual surveys, minimizing disturbances to ecosystems & species.
- **Enhanced Detection:** Detect rare and elusive species.
- **Comprehensive Biodiversity Assessment:** Simultaneous detection of multiple species from a single water sample, spanning whole tree of life with multiple assays (“microbes to mammals”).
- **Cost-Effective:** Opportunistic or autonomous sampling; sequencing costs dropping.

AOML 'Omics Global Reach

The Gulf Region

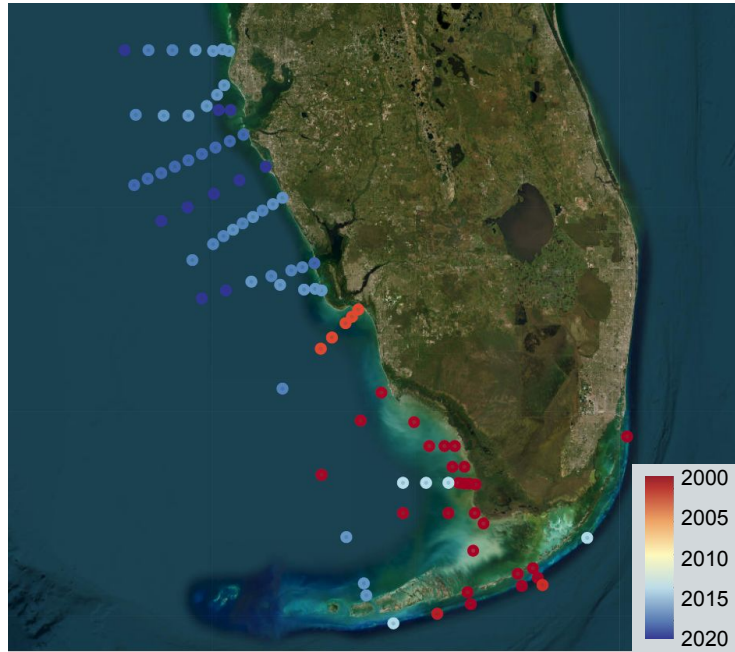


Global Ocean

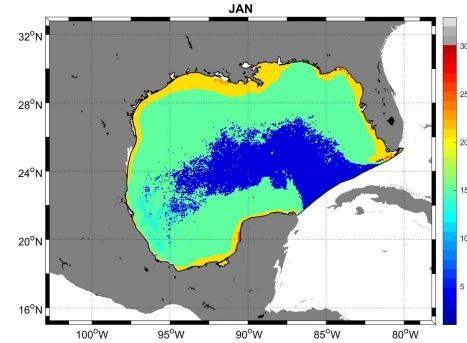


Standard sample and data processing for all eDNA monitoring projects that AOML works on.

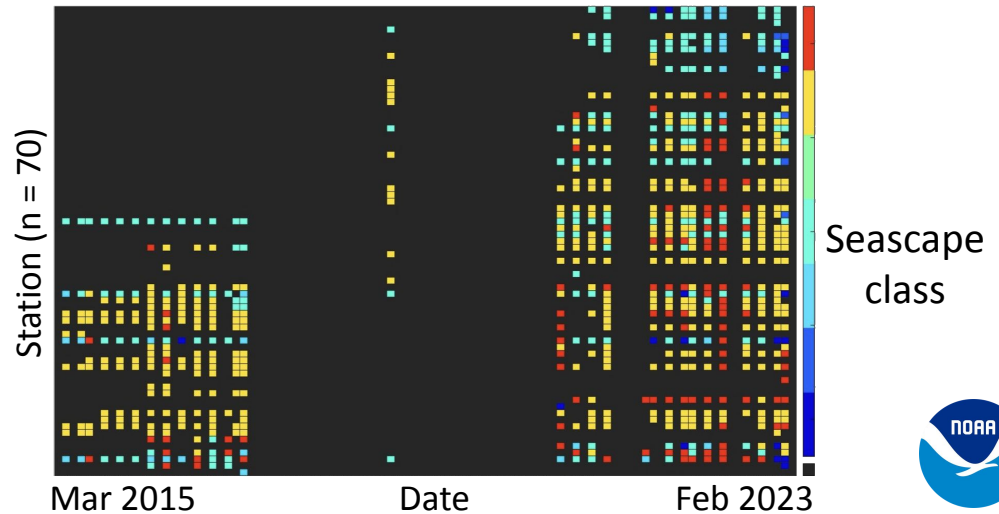
SE US Marine Biodiversity Observation Network (MBON)



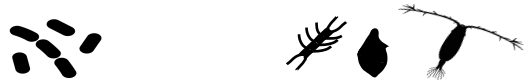
Regular monitoring of South Florida waters to efficiently detect biodiversity changes, water quality, and HABs.



eDNA sampling of S. Florida seascapes over a decade

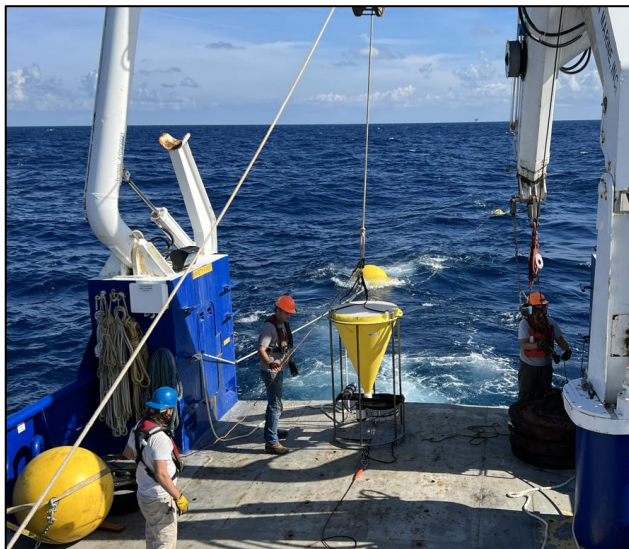


16S rRNA (bacteria, archaea) 18S rRNA (protists, metazoa)

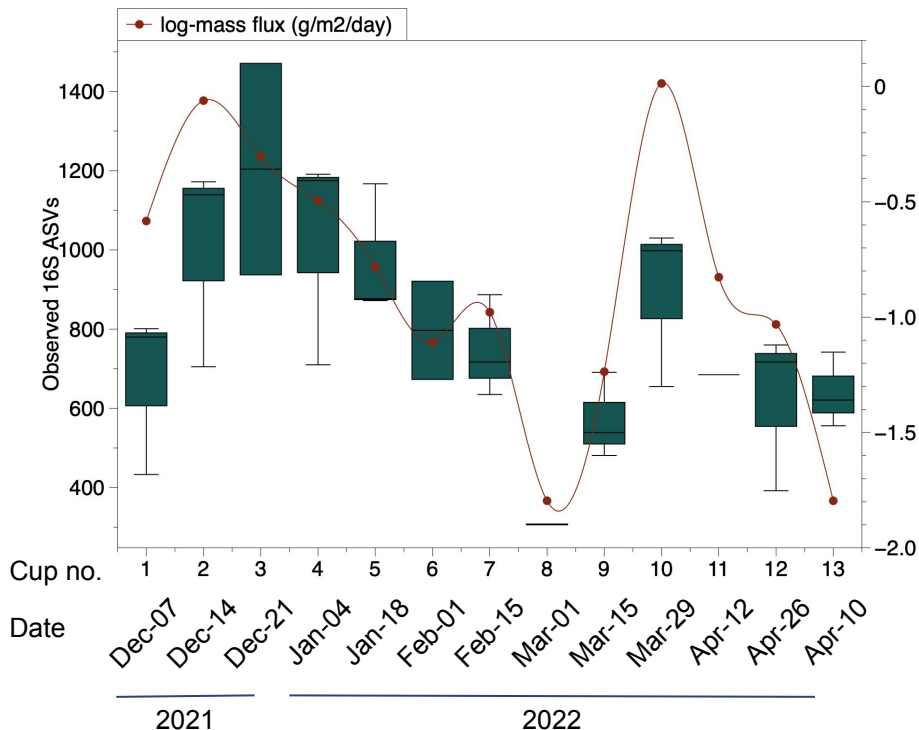


Northern Gulf of America Sediment Trap

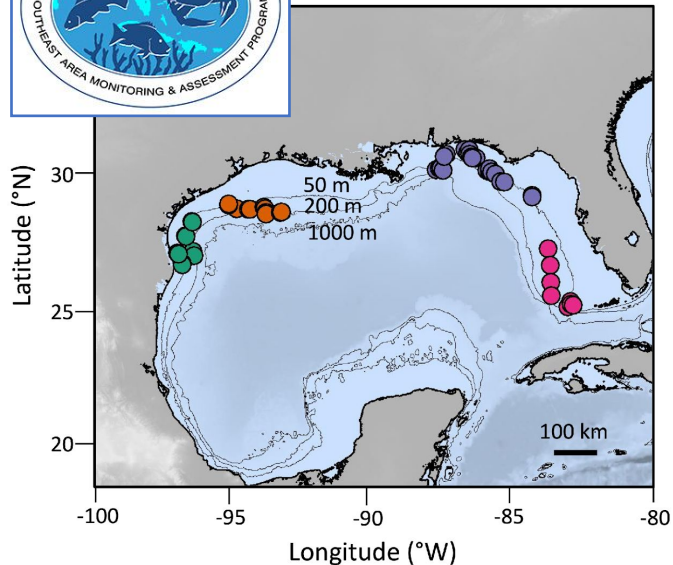
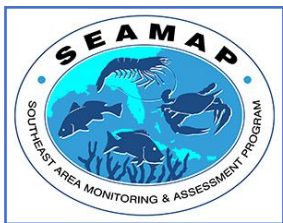
Continuous collection of marine snow to catalogue the organisms in the biological carbon pump.







Sedimentation flux & microbial diversity over time

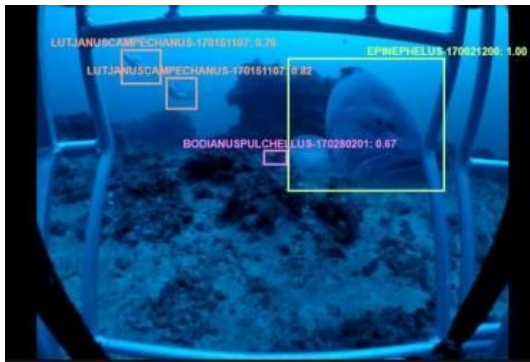


Fisheries eDNA Collaborations (SEAMAP/G-FISHER)

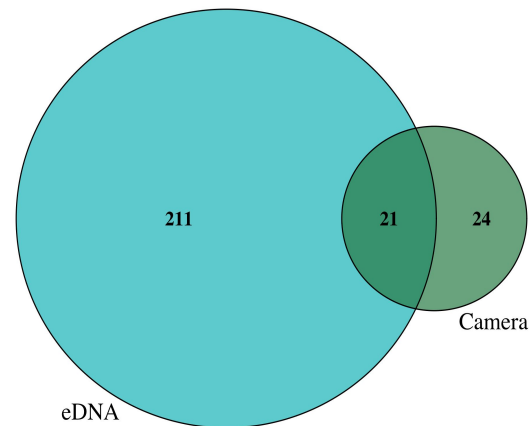


16S rRNA (bacteria, archaea)  18S rRNA (protists, metazoa)

 12S rRNA (fish)  



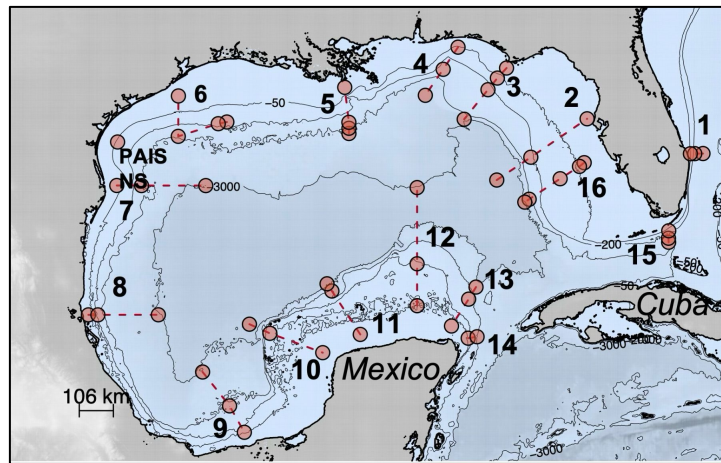
Comprehensive and efficient detection of fish species to inform sustainable fisheries.



eDNA enhances video survey with 5x more fish species detected

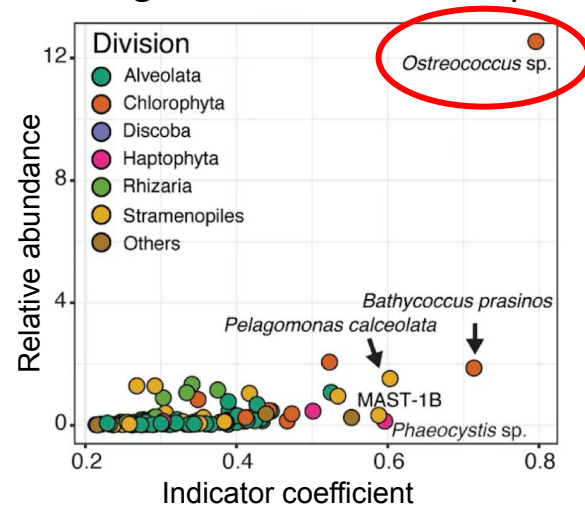


Coastal Ocean Acidification Cruises

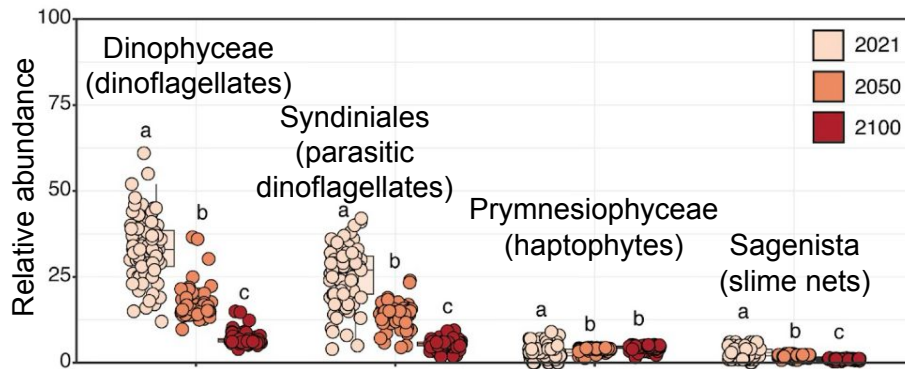


Unprecedented spatial genetic mapping of the Gulf to understand and predict the effects of ocean acidification.

Indicator taxa of high dissolved inorganic carbon and low pH

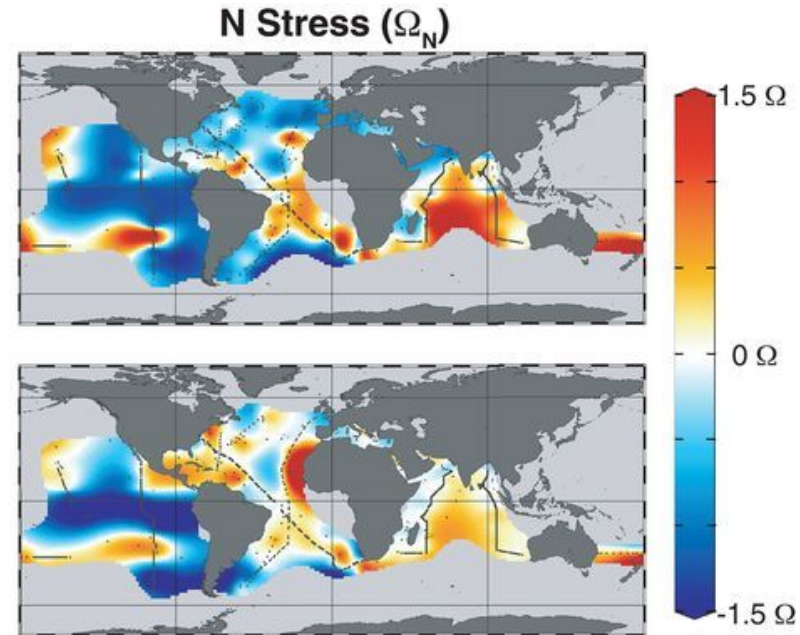
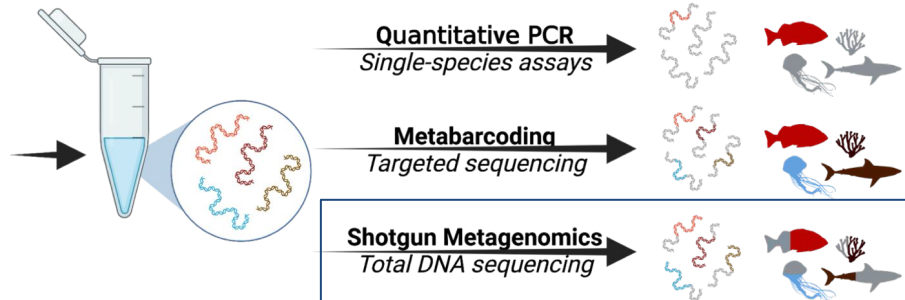
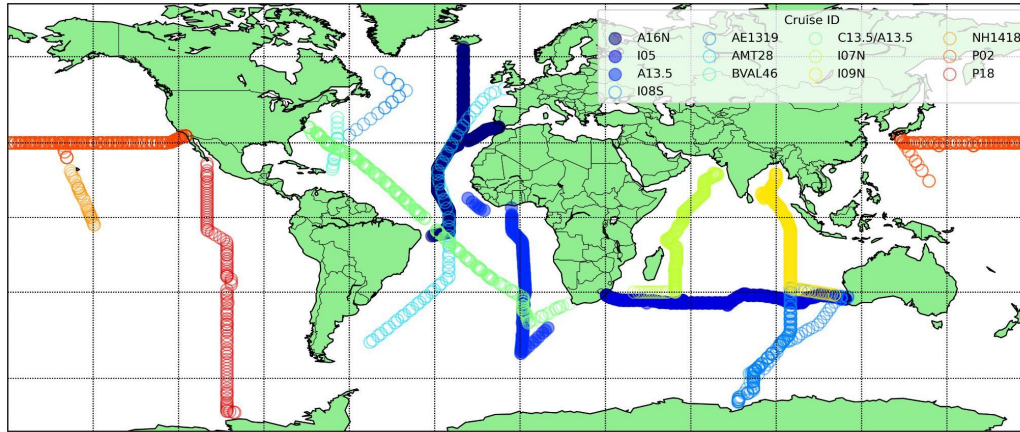


Predicted plankton relative abundance in future



Global Ocean Monitoring (Bio-GO-SHIP)

Sustained observing of global ocean biology to reveal the organizing rules of plankton ecology.



eDNA Data Analysis for NOAA

Access to eDNA monitoring data for all users regardless of technical skill level.

(2)

Processing on Northern Gulf Institute
High Performance Computing servers



(3)

Environmental and sample
metadata in **FAIR** eDNA format



(1)

eDNA data from
NOAA Ship
Okeanos Explorer



Findable
Accessible
Interoperable
Reusable



(4)

Data exploration and access on
NOAA Ocean DNA Explorer



NOAA Ocean DNA Explorer

NOAA Ocean DNA Explorer

HomeExploreSearchSubmitAssaysTourmalineAPIHelp

Sign In

Welcome

to the NOAA Ocean DNA Explorer

a data sharing platform, search engine, and visualization and analysis tool for ocean environmental DNA data

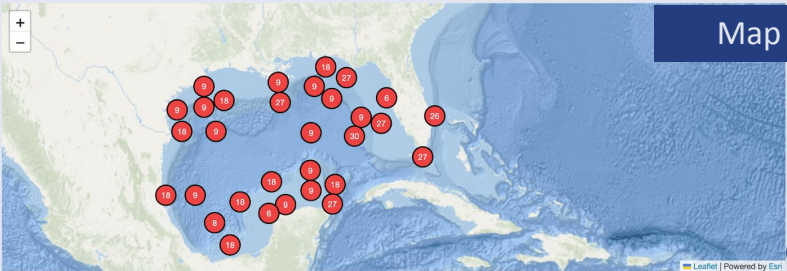
Start Searching

Homepage

MapTableCharts

+

-



Leaher | Powered by Esri

Map

NOAA

OCEAN EXPLORATION

MISSISSIPPI STATE UNIVERSITY™

NORTHERN GULF INSTITUTE

Support

NOAA Ocean DNA Explorer

HomeExploreSearchSubmitAssaysTourmalineAPIHelp

Sign In

noaa-aoml-gomecc4

eDNA from Gulf of Mexico Ecosystems and Carbon Cruise 2021 (GOMECC-4)

Total Samples
502

Total Analyses
3

Detection Type
Multi Taxon Detection

Study Factor
water column spatial series

Top Taxonomy
Eukaryota: 3661
Chloroplast: 2023
Cnid: 6: 1959
Bacteria: 1748
Cyanobacteria: 1741

Institution Information

Contact
Luke Thompson


Institution
NOAA/AOML


Institution ID
<https://www.aoml.noaa.gov/omics>

Last Modified
October 31, 2024

Project

Assays in this Project: 2

 16S rRNA
ssu16sv4v5

 18S rRNA
ssu18sv9

Samples:

MapTableCharts

Clear FiltersApply FiltersPer Page: 50

Previous

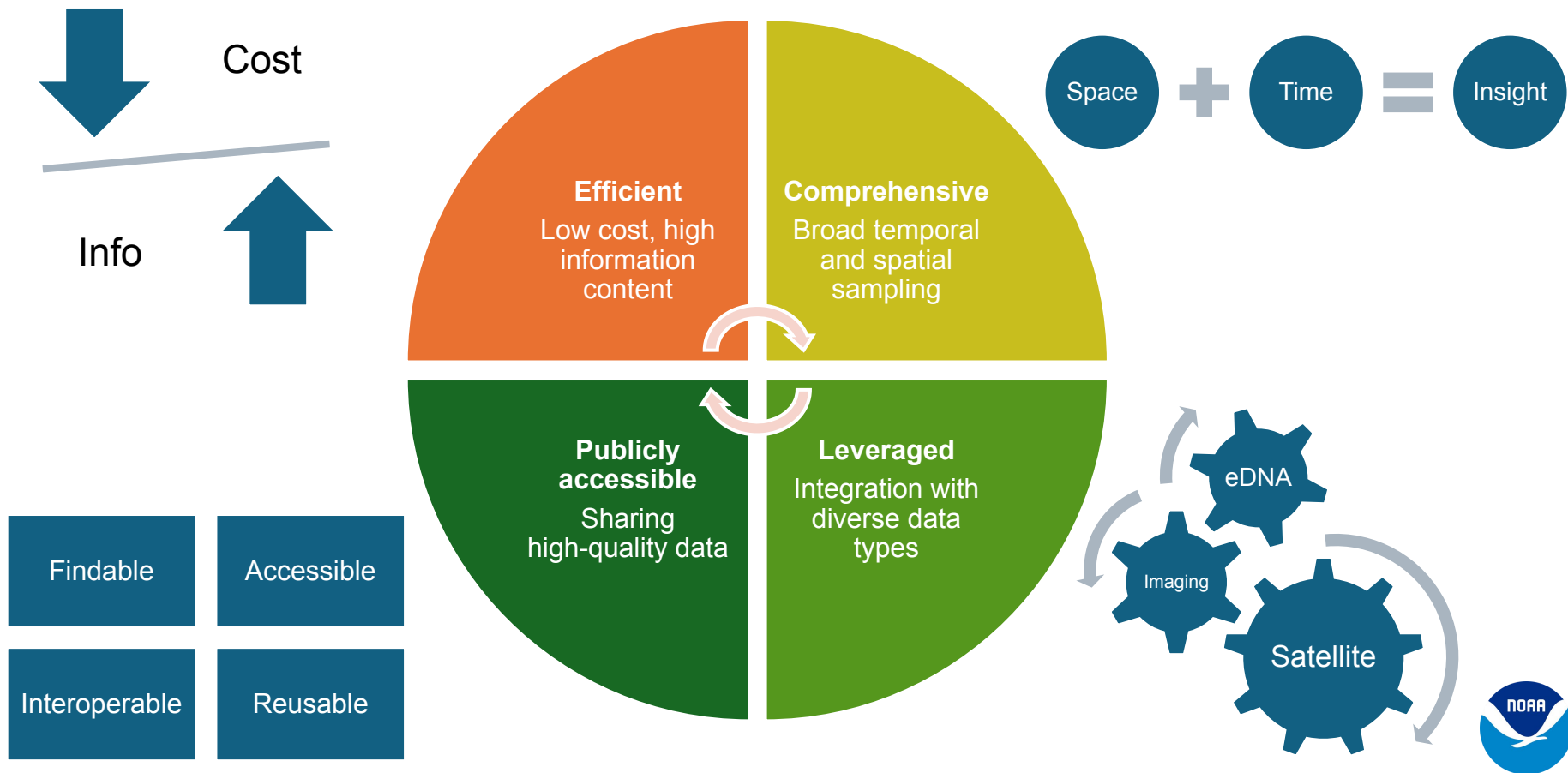
1-27 of 27

Next

Columns

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GOMECC4_MERIDA_Station4_Deep_B	GOMECC4_310	GOMECC4_MERIDA_Station4_Deep	MERIDA	Sta94	not provided	2
GOMECC4_MERIDA_Station4_Deep_C	GOMECC4_311	GOMECC4_MERIDA_Station4_Deep	MERIDA	Sta94	not provided	3
GOMECC4_MERIDA_Station4_DCM_A	GOMECC4_312	GOMECC4_MERIDA_Station4_DCM	MERIDA	Sta94	not provided	4
GOMECC4_MERIDA_Station4_DCM_B	GOMECC4_313	GOMECC4_MERIDA_Station4_DCM	MERIDA	Sta94	not provided	5
GOMECC4_MERIDA_Station4_DCM_C	GOMECC4_314	GOMECC4_MERIDA_Station4_DCM	MERIDA	Sta94	not provided	6
GOMECC4_MERIDA_Station7_Deep_A	GOMECC4_318	GOMECC4_MERIDA_Station7_Deep	MERIDA	Sta97	not provided	7
GOMECC4_MERIDA_Station7_Deep_B	GOMECC4_319	GOMECC4_MERIDA_Station7_Deep	MERIDA	Sta97	not provided	8
GOMECC4_MERIDA_Station7_Deep_C	GOMECC4_320	GOMECC4_MERIDA_Station7_Deep	MERIDA	Sta97	not provided	9
GOMECC4_MERIDA_Station7_DCM_A	GOMECC4_321	GOMECC4_MERIDA_Station7_DCM	MERIDA	Sta97	not provided	10

Benefits & Outcomes



Thank you

<https://www.aoml.noaa.gov/omics>

<https://nodedb.vercel.app>