



GENERAL LECTURE & SCIENTIFIC MEETING

**FishPhyto and Marine Environmental Monitoring for Disaster Mitigation of Harmful
Algal Blooms (HAB) and Ciguatera Fish Poisoning (CFP)**

Dissemination of Technology to Increase the Human Resource Capacity of Indonesian Coastal and Small Islands Communities

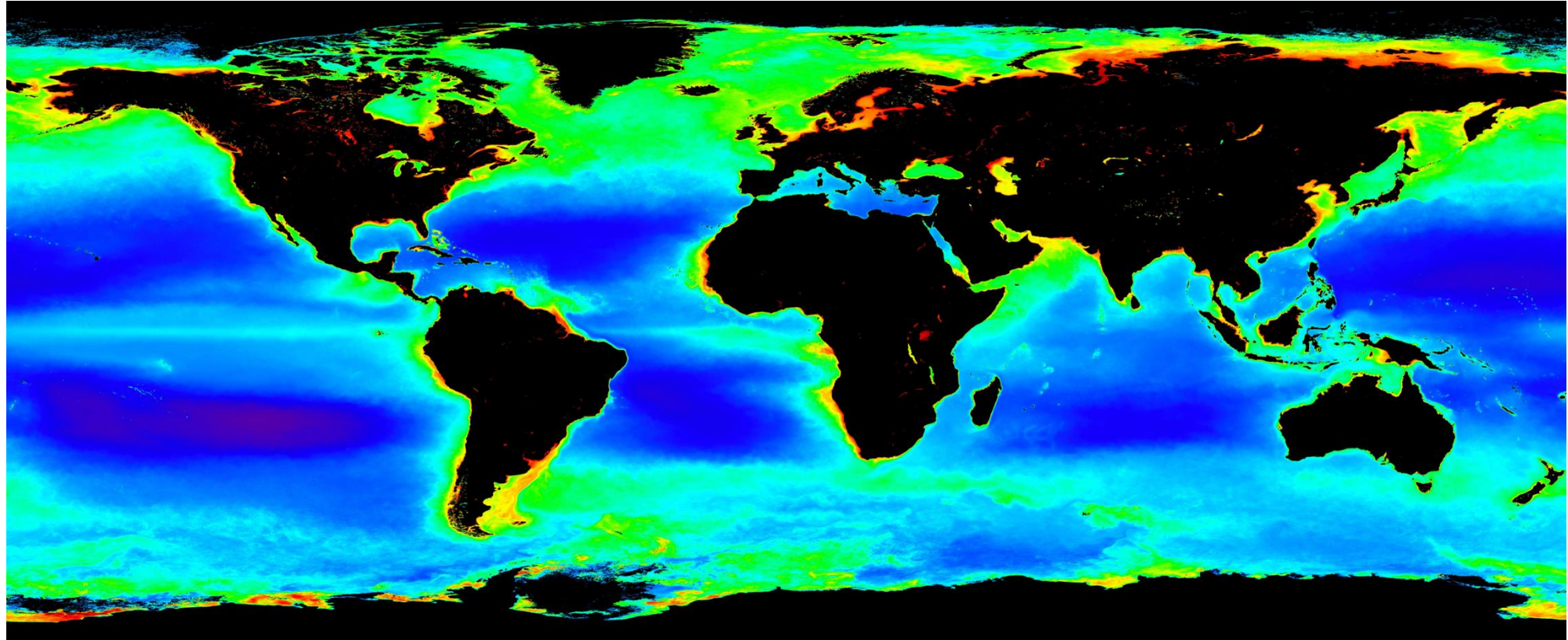
28TH MAY 2025

Planktoscope for Monitoring Marine Resources and Environment

Prof. Mark L. Wells



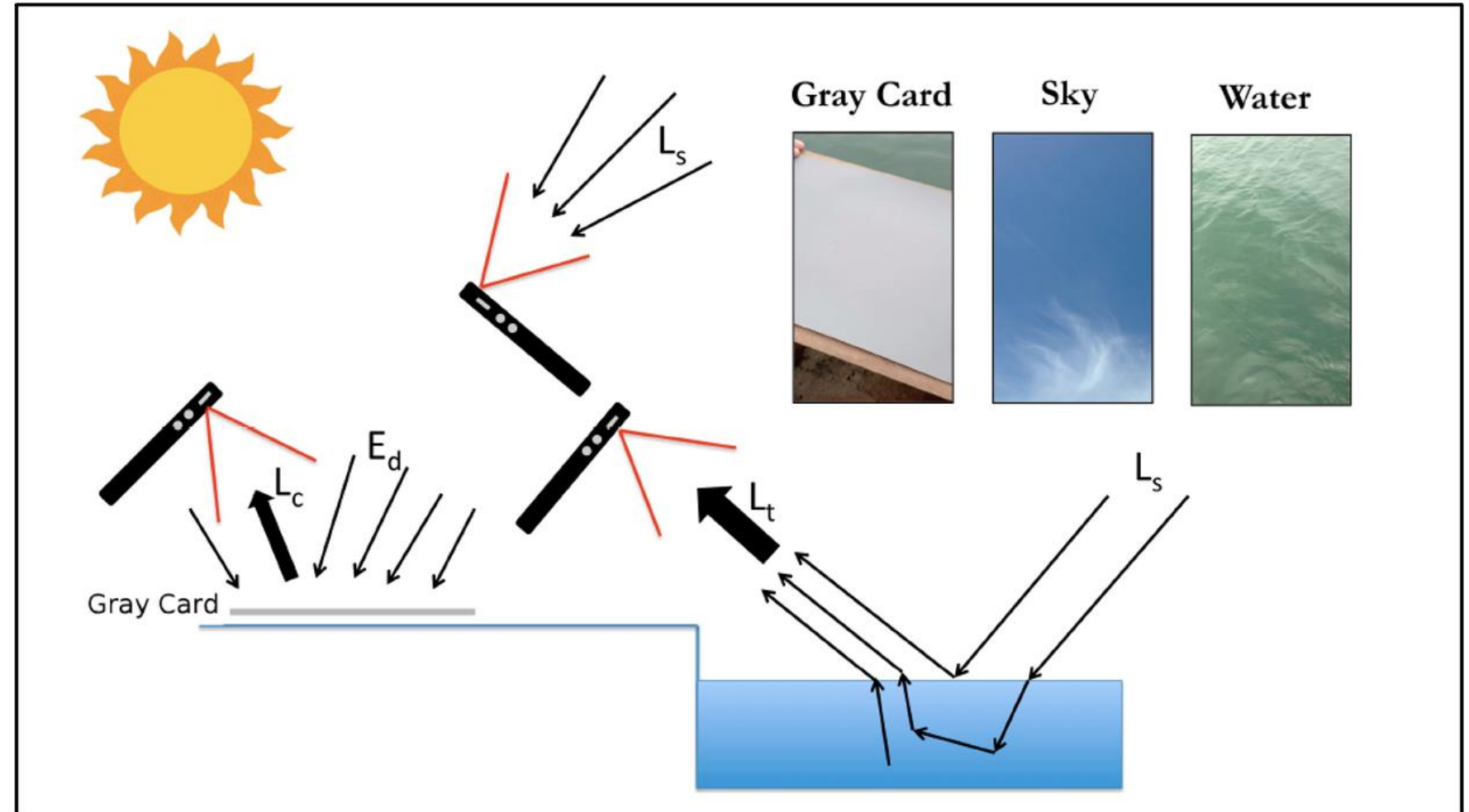
Annual Mean Phytoplankton Chlorophyll Biomass



More biomass generally indicates higher production — The grass of the sea

WATER QUALITY – How much phytoplankton biomass?

HydroColor
App



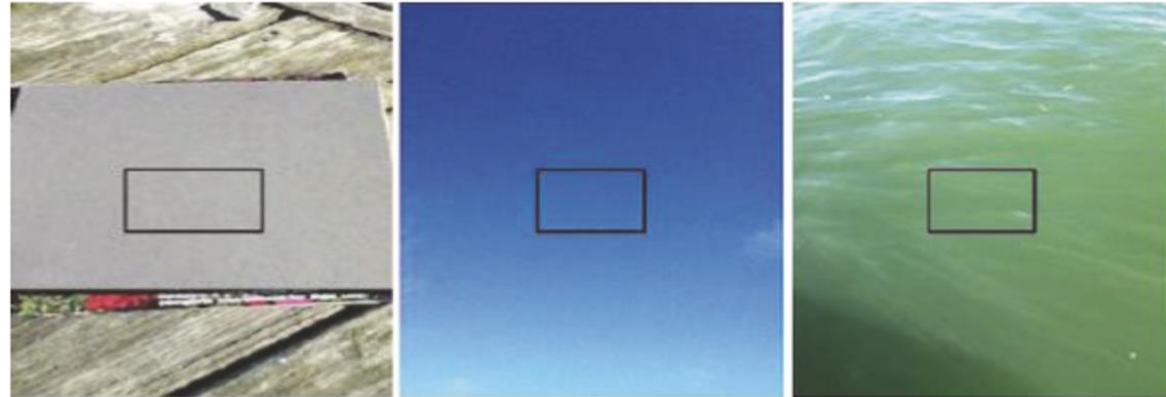
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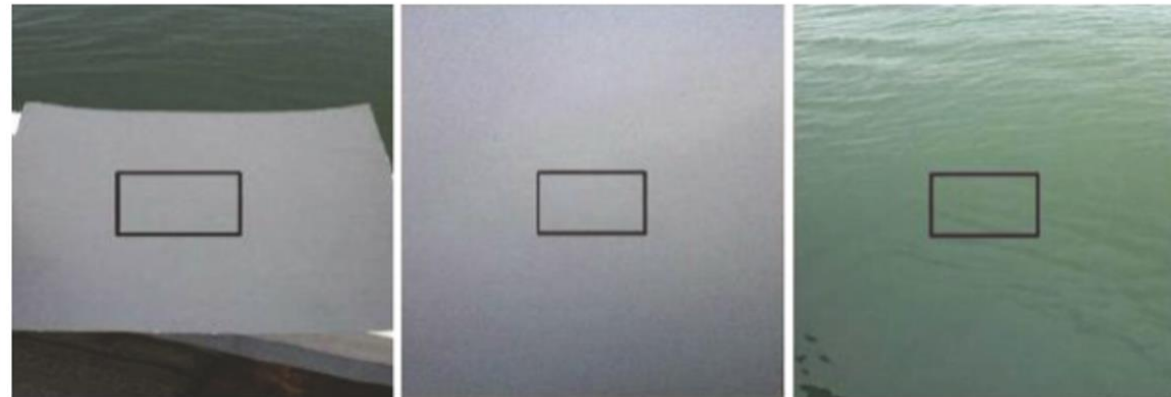
Grey Card

Sky

Water Surface

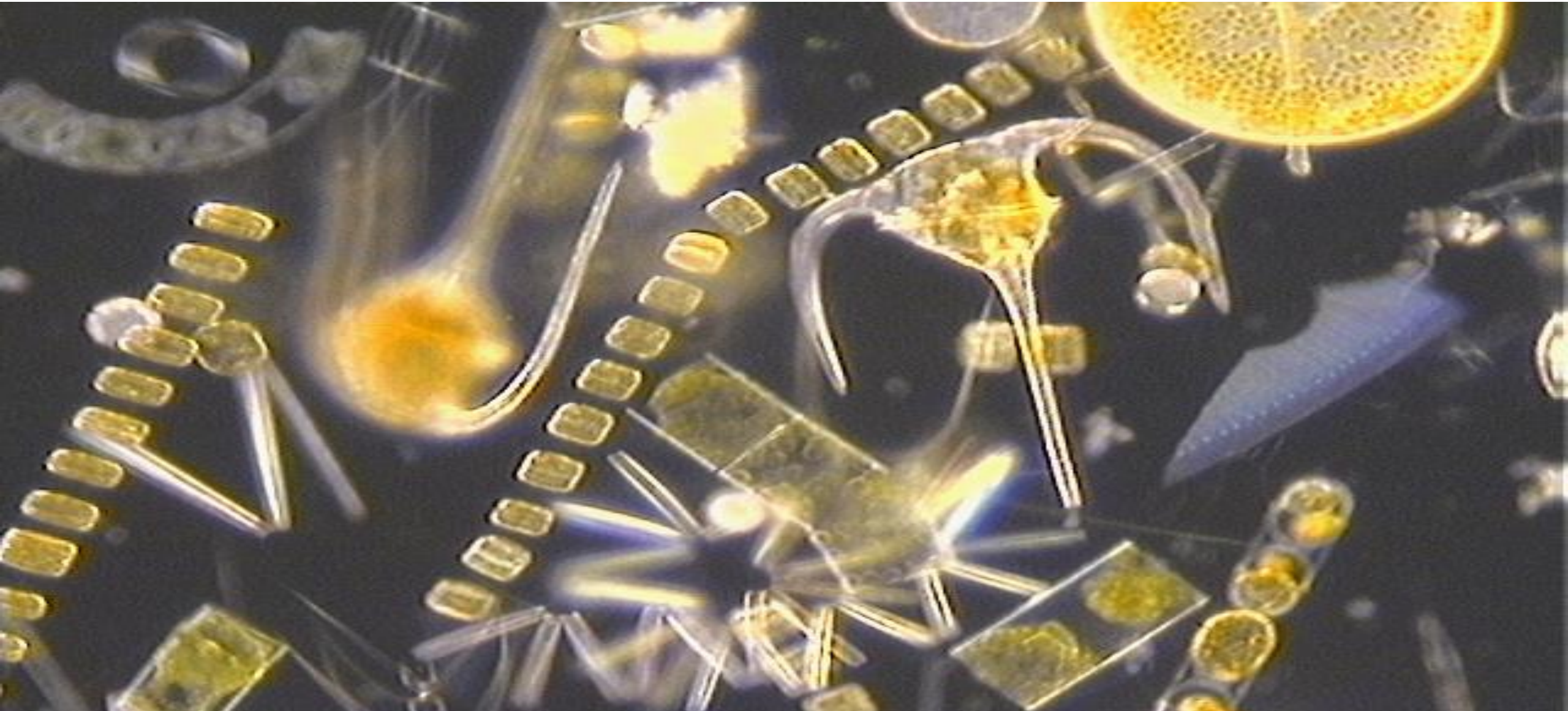


(a)

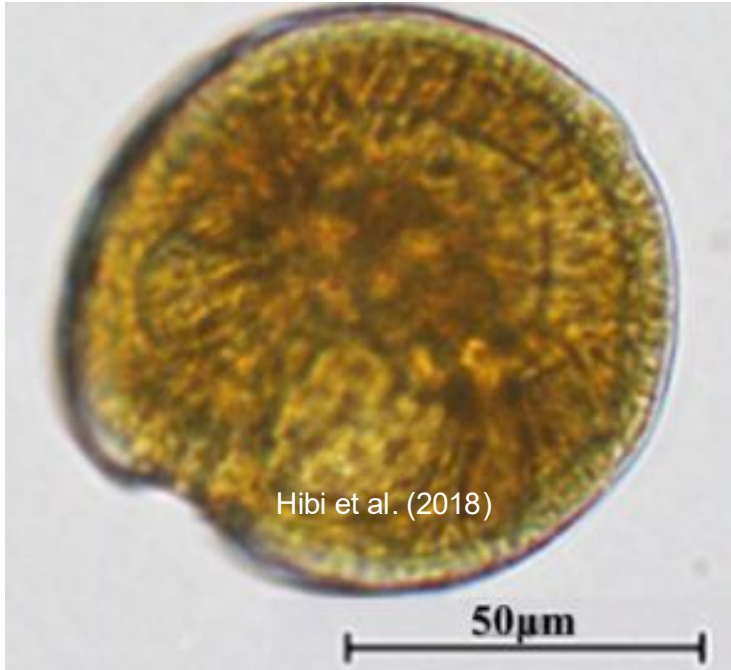


Available at
Bigbluenetwork.org

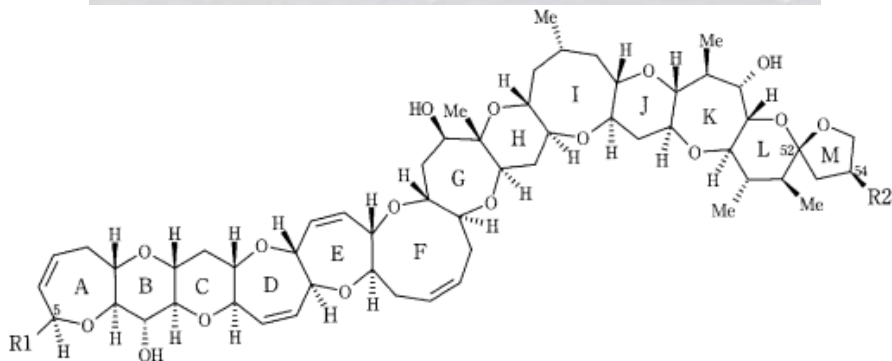
Phytoplankton — Who is There?



Ciguatera Fish Poisoning — A benthic Harmful Algal Bloom (bHAB)



- **Ciguatera Fish Poisoning** → From consumption of reef fishes that contain ciguatoxin (CTX)
- **CTX** is produced by several species of benthic dinoflagellates → e.g., *Gambierdiscus toxicus* that grow on corals, seagrass, and macroalgae
- **CFP symptoms** — diarrhea, nausea, vomiting, reversal of cold-hot sensation, muscles and joints pain, tingling (often painful), numbness on lips and tongue, hypotension (low blood pressure)



PlanktoScope — an automated microscope

A microscope which:

- takes images of all plankton in a water sample
- can automatically count each type of plankton

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- takes images of all plankton in a water sample
- can automatically count each type of plankton
- The plans are open source — components cost ~ \$800 USD
- Or... you can purchase an assembled planktoscope from **fairscope.com**

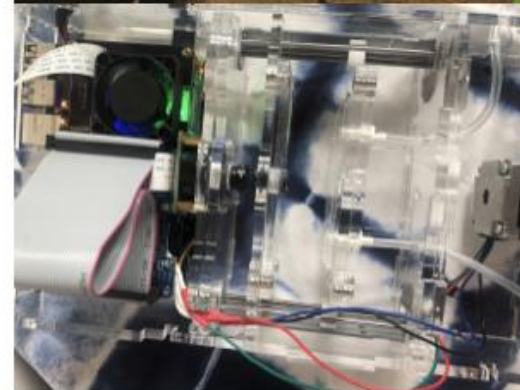
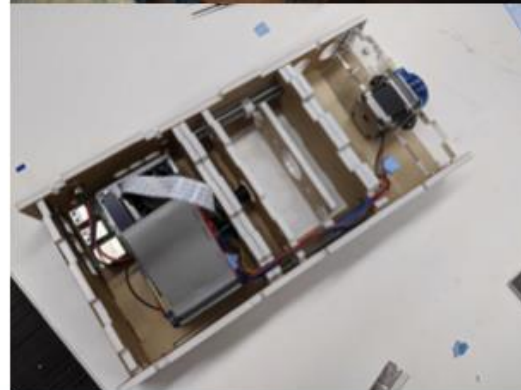
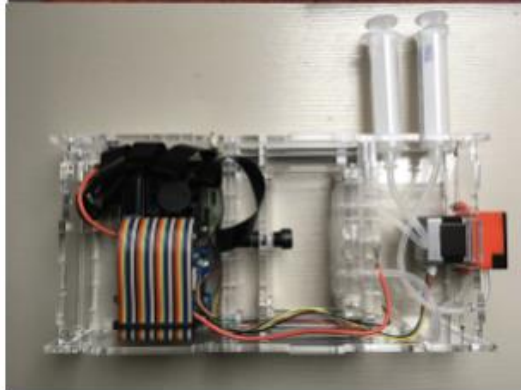
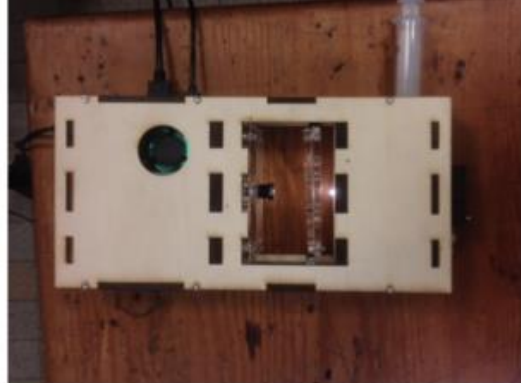
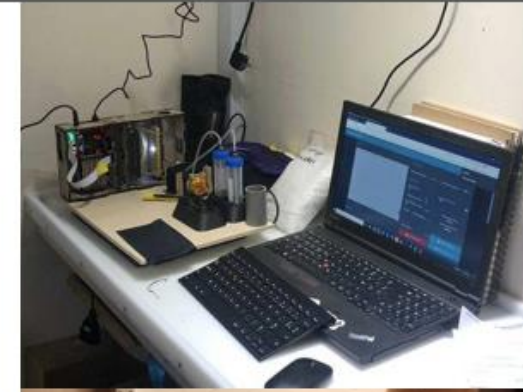
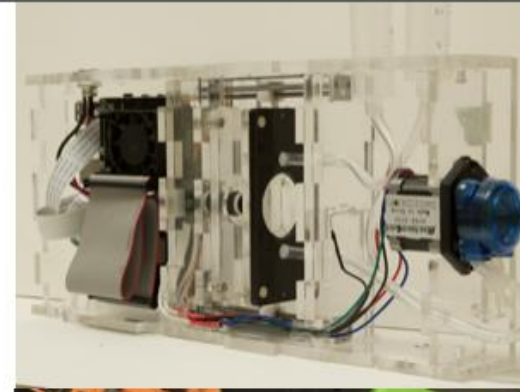


PrakashLab

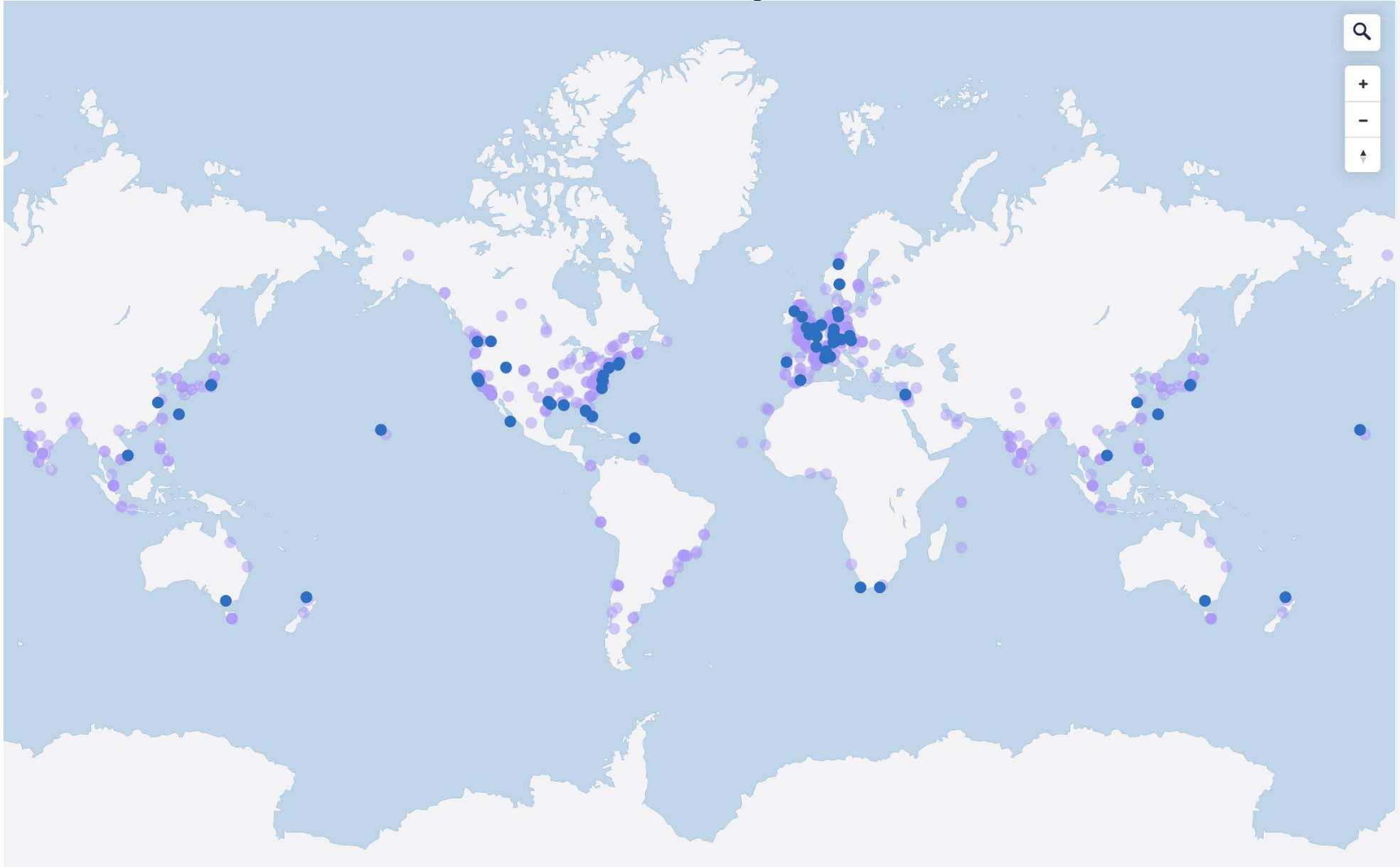
@PrakashLab
Stanford University

Bioengineering
Biology (courtesy)
Ocean; Hopkins Marine Station
Woods Institute of the
Environment
Center for Innovation in Global
Health

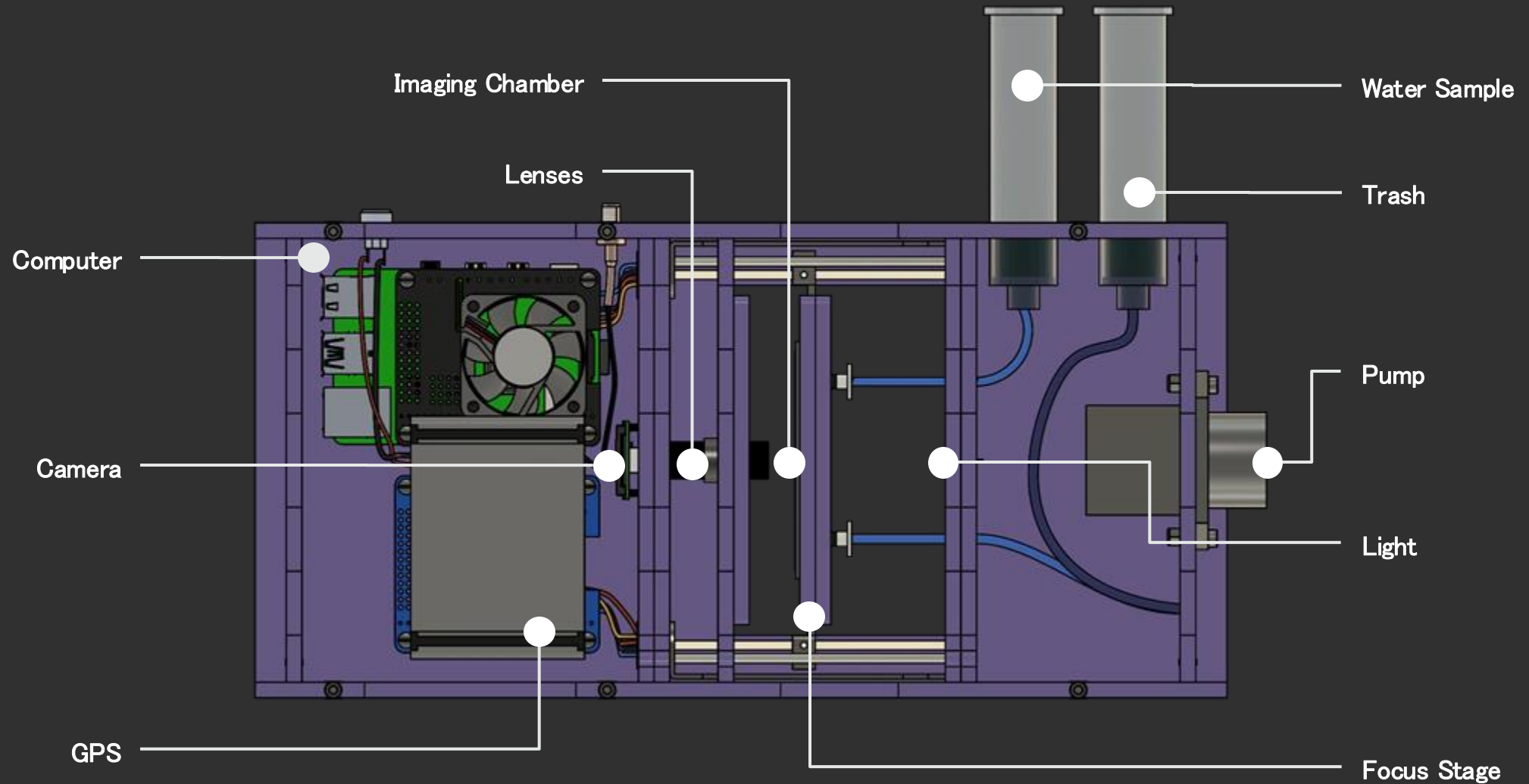
Deployment - Over 30 replications over the world



A Global User Community



How does PlanktoScope work?



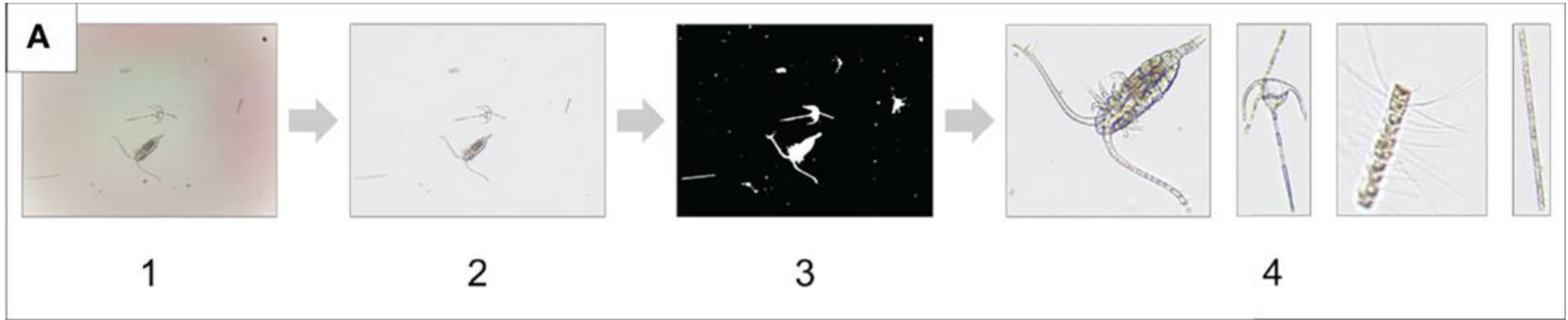


MOOSE @OS_MOOSE · Oct 2, 2022

Images of living plankton coming from the Planktoscope used onboard during the last MOOSE-GE cruise @MIOceanologie



What sort of data does Planktoscope produce?



What does EcoTaxa do?

EcoTaxa 2.5 Project Planktoscope FortM (0, 644, 0, 0 / 644) Run: 2 Error: 2 Done: 2 Fabien Lombard (log out)

Filter: Taxo= Ceratium sp. X Action

Update view & apply filter Select all Score Display Status All 100 30

Taxonomy filter

Other filters

Asterionellopsis 0 16

Copepoda 0 1

nauplii < Copepoda 0 146

Coscinodiscophycidae 2 44

Bacteriastrium < Chaetocerotales 0 208

Chaetoceros < Chaetocerotales 0 19

Dinophyceae 0 855

Ceratium sp. 0 644

Neoceratium 01 0 609

Neoceratium furca < Neoceratium 0 100

Neoceratium pentagonum 0 99

Noctiluca < Noctilucaeae 0 16

Oxytoxum 16 244

Pyrophacus 0 2

Ditylum 0 74

Eucampia 0 22

Eutintinnus 0 213

Ceratium sp. Score: 0.91

Ceratium sp. Score: 0.89

Ceratium sp. Score: 0.83

Ceratium sp. Score: 0.83

Ceratium sp. Score: 0.82

Ceratium sp. Score: 0.81

Ceratium sp. Score: 0.80

Ceratium sp. Score: 0.80

Ceratium sp. Score: 0.79

Ceratium sp. Score: 0.78

Ceratium sp. Score: 0.76

Ceratium sp. Score: 0.76

Ceratium sp. Score: 0.76

Ceratium sp. Score: 0.76

Ceratium sp. Score: 0.76

Ceratium sp. Score: 0.75

Ceratium sp. Score: 0.75

Ceratium sp. Score: 0.74

Ceratium sp. Score: 0.74

Ceratium sp. Score: 0.73

Ceratium sp. Score: 0.70

Ceratium sp. Score: 0.70

Ceratium sp. Score: 0.70

Ceratium sp. Score: 0.70

Ceratium sp. Score: 0.70

Ceratium sp. Score: 0.69

Ceratium sp. Score: 0.69

Ceratium sp. Score: 0.68

Ceratium sp. Score: 0.68

Ceratium sp. Score: 0.68

Ceratium sp. Score: 0.68

Ceratium sp. Score: 0.67

Ceratium sp. Score: 0.66

Ceratium sp. Score: 0.66

Ceratium sp. Score: 0.66

Ceratium sp. Score: 0.66

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“Creating a phytoplankton-fishery observing program for sustaining local communities in Indonesian coastal waters” ([FishPhytO](#))

BRIN and ITI professors and scientists now have expertise with using FishGIS, HydroColor, and Planktoscope.

It is time to help them put these important tools to use.

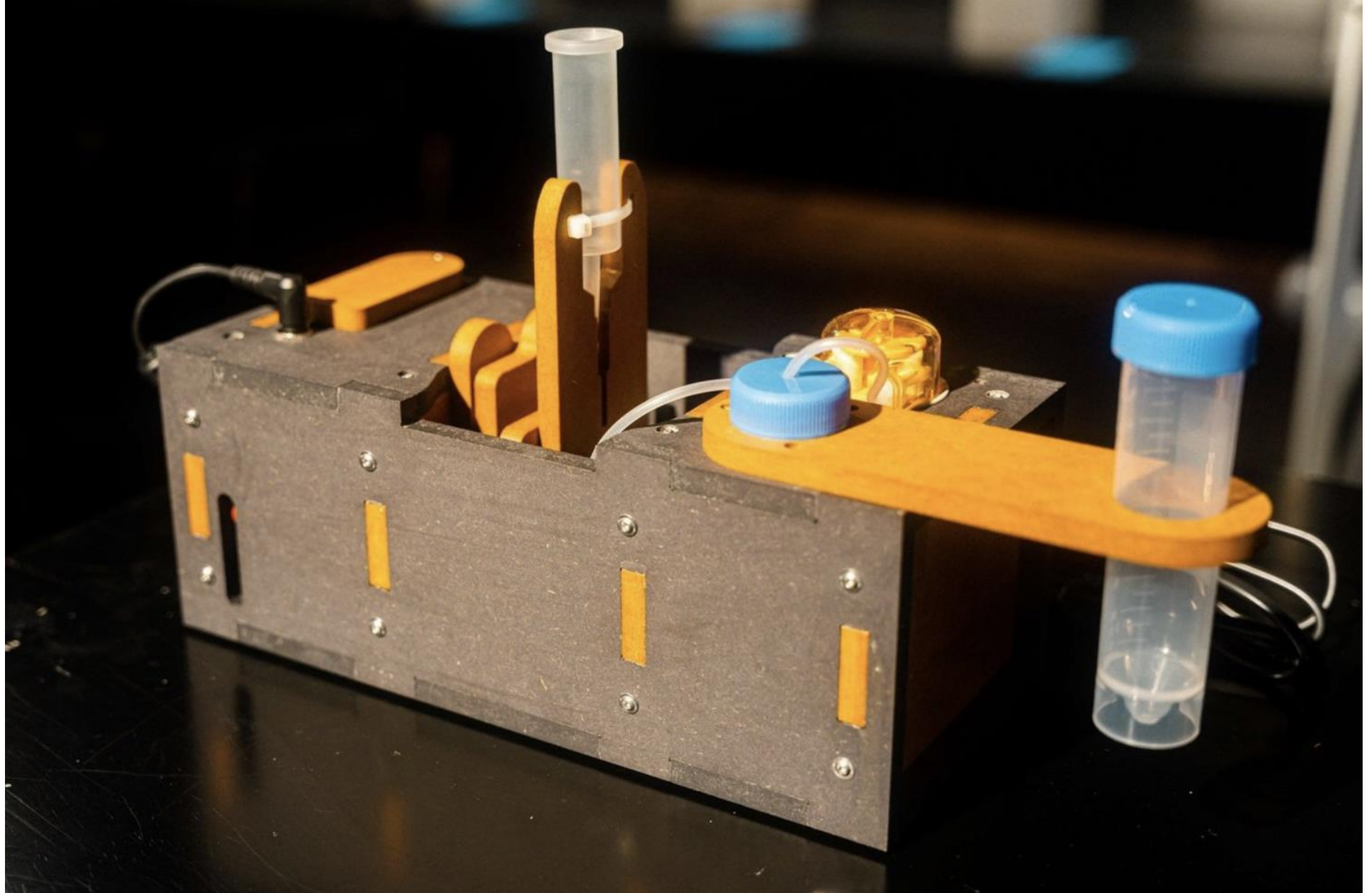
But... although observational data are critical, data alone are not sufficient — How will you utilize these data to help sustain your coastal waters and the people that rely on them?

Resources

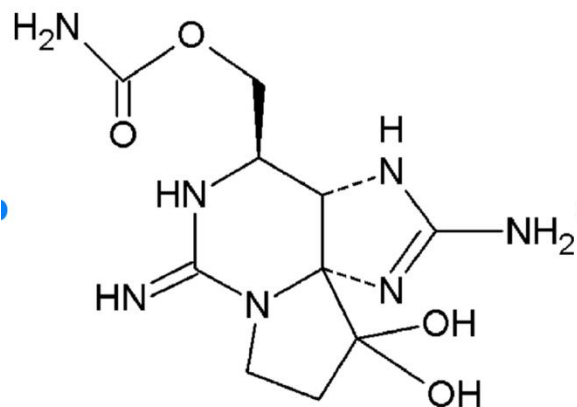
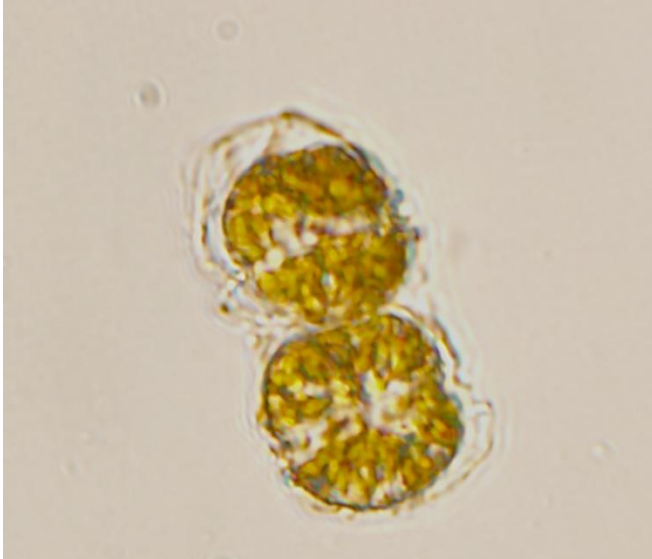
In English:

- Website: <https://www.planktoscope.org/>
- Paper by Thibaut Pollina, Adam G. Larson, et al. published in *Frontiers in Marine Science*, July 2022: <https://doi.org/10.3389/fmars.2022.949428>
- Usage instructions for scientists: <https://www.protocols.io/view/planktoscope-protocol-for-plankton-imaging-bytypwpw.html>





Paralytic Shellfish Poisoning — A pelagic Harmful Algal Bloom (HAB)



- **Paralytic Shellfish Poisoning (PSP →** From consumption of bivalves that contain saxitoxins (STX's)
- **STX's** are produced by several species of dinoflagellates → e.g., *Alexandrium spp.*
- **PSP symptoms** — tingling, numbness, and burning of the perioral region, ataxia, giddiness, drowsiness, fever, rash, and staggering, nausea, vomiting and diarrhea
- Severe cases lead to death.