Hello,

I am Wendy,
a designer/anthropologist,
an interdisciplinary
researcher in the art-
science and an educator.

こんにちは。

私はウェンディです。
デザイナー兼人類学者、
芸術科学の学際的研究者、
そして教育者です。

Making Sense of Beautiful Toxicities

美しい毒性を理解する

Anthropocene Curriculum

Research

CONVERSATION CARBON CRITICAL MATERIALS DEEP TIME DEGRADATION KNOWLEDGE TRANSFORMATION RADIOACTIVITY

Bernadette Bensaude-Vincent Andy Cundy Irka Hajdas Susan Schuppli Colin Waters

FINGERPRINTS OF THE NUCLEAR AGE

A seminar held during *Unearthing the Present*

AC-CS #49097

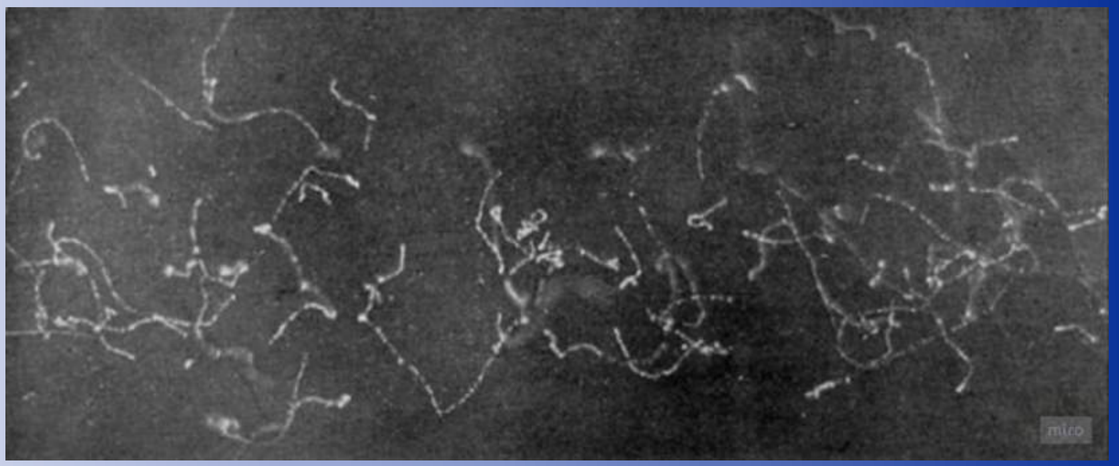
The spike in artificial radiation from nuclear bomb tests in the 1950s might mark the beginning of the Anthropocene. These radioactive products have left their residues in soil, sediment, ice, and even our bodies. How is it possible to measure, let alone visualize, these invisible, minuscule amounts of radiation that escape all sensory data? The materials gathered below are from the inar Fingerprints of the Nuclear Age, which was held during *Unearthing the Present* in May 2022. e seminar explored how the (in)visibility of radiation is linked to the legacy of the nuclear age, histories of public fear, political secrecy, and counter-expertise.

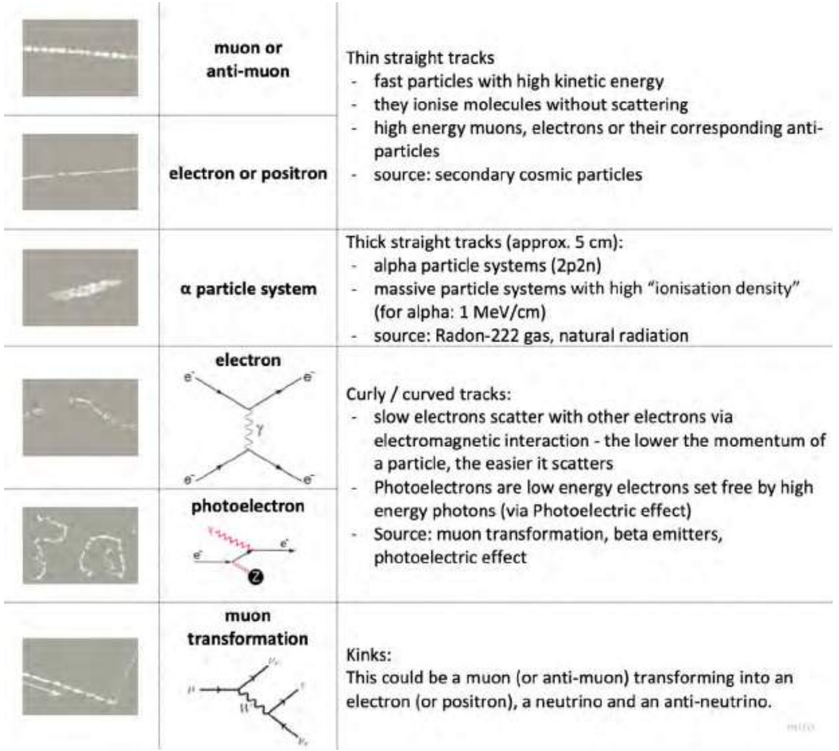
Diffusion Cloud Chamber

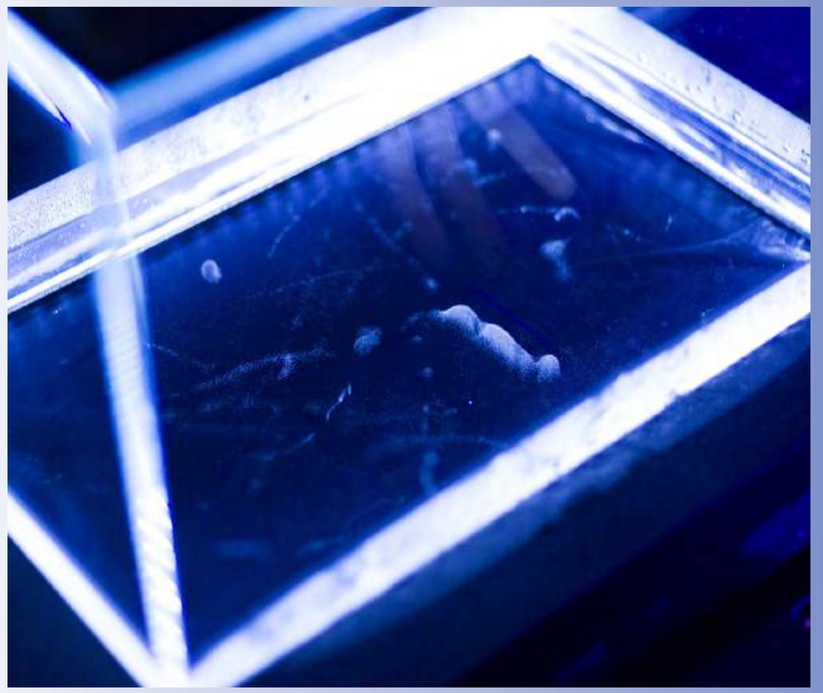
PDF

RADIATION: FEAR AND TRUST

Portable Gamma Camera
TOSHIBA





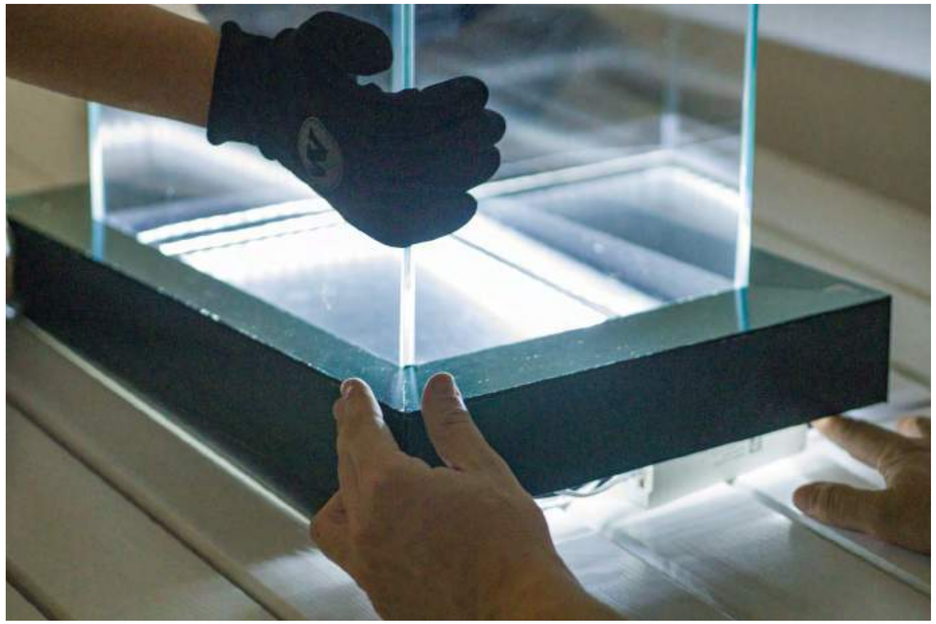


Cloud Traces

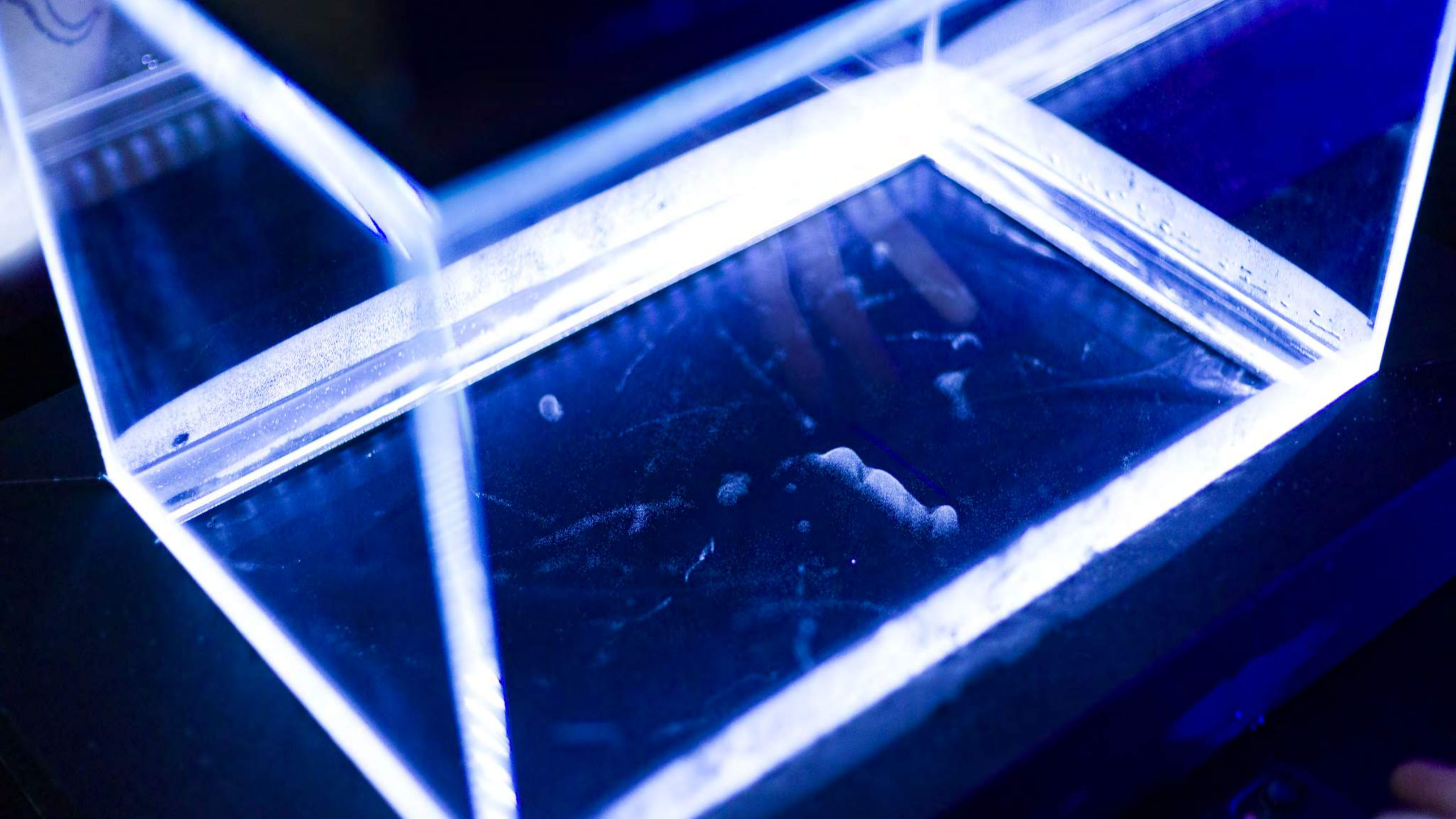
Humboldt Labor, Humboldt Forum Berlin, 2022

In collaboration with Andres Gatto, Belen Palacios, Julia Mieles


25"
24"
23"



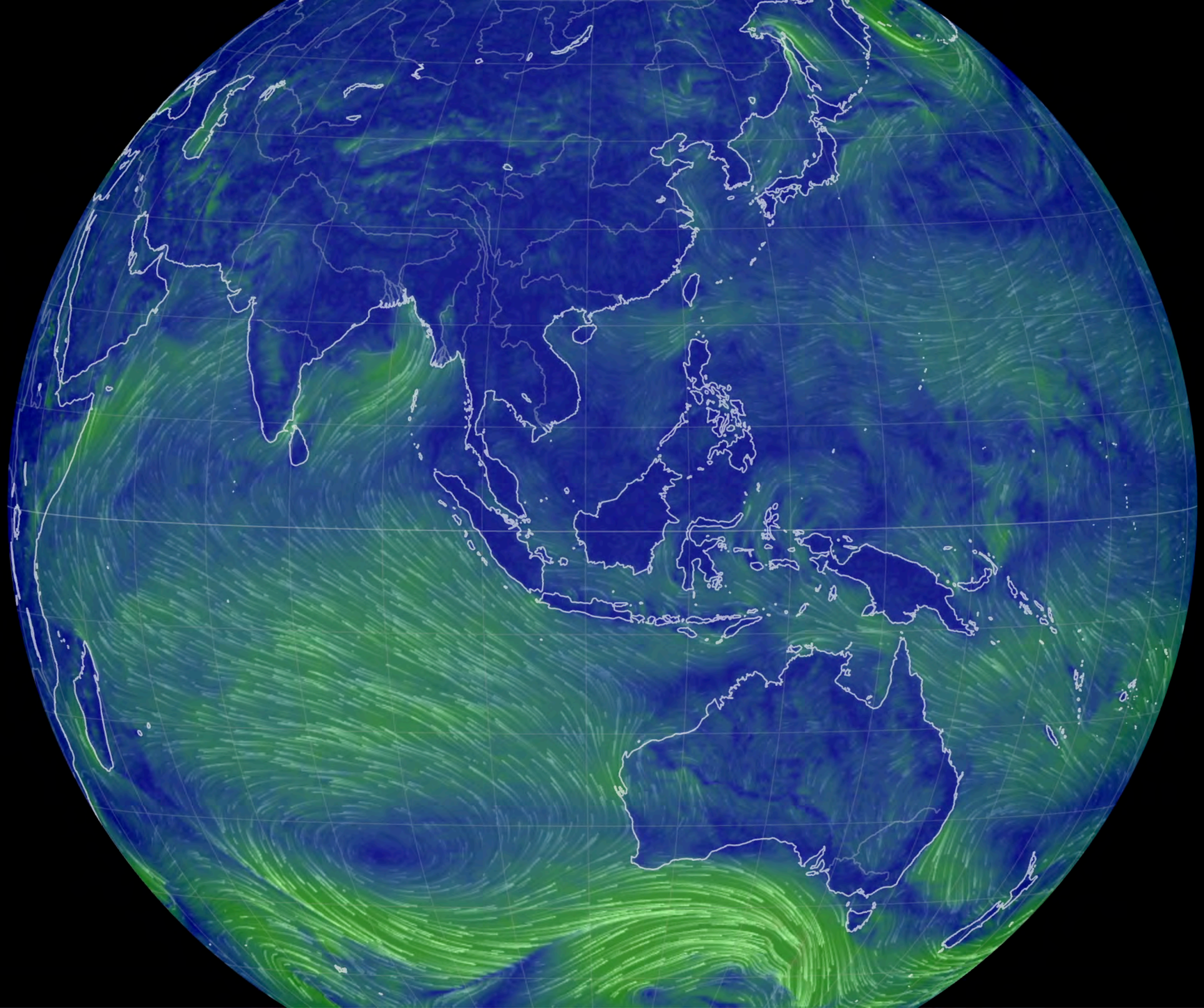

MENSCH-UMWELT-SYSTEME
IN TRANSFORMATION
TRANSFORMATION IN HUMAN-
ENVIRONMENT RELATIONS



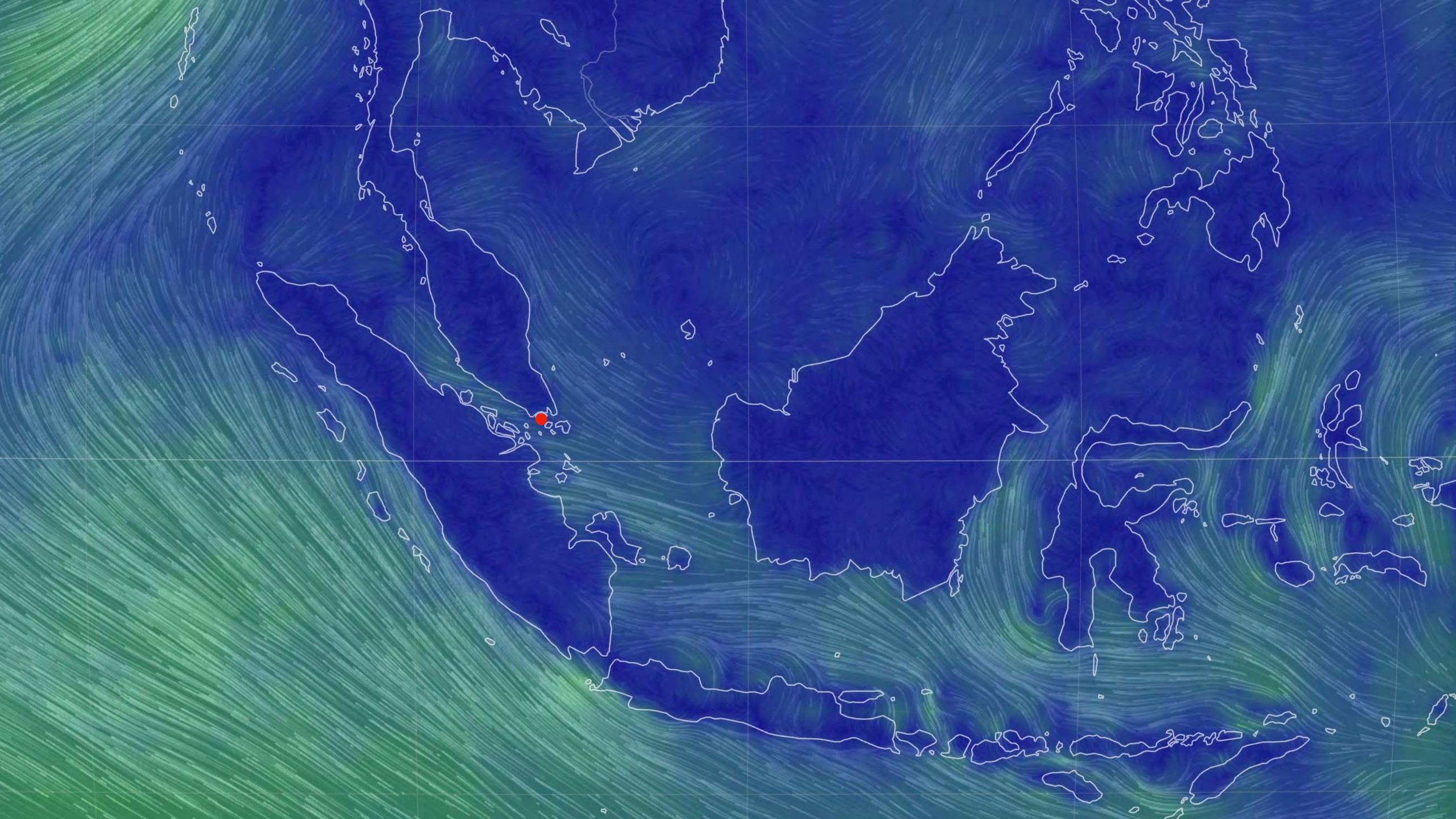
BLOOMS

Tieranatomisches Theater
TA T, BERLIN

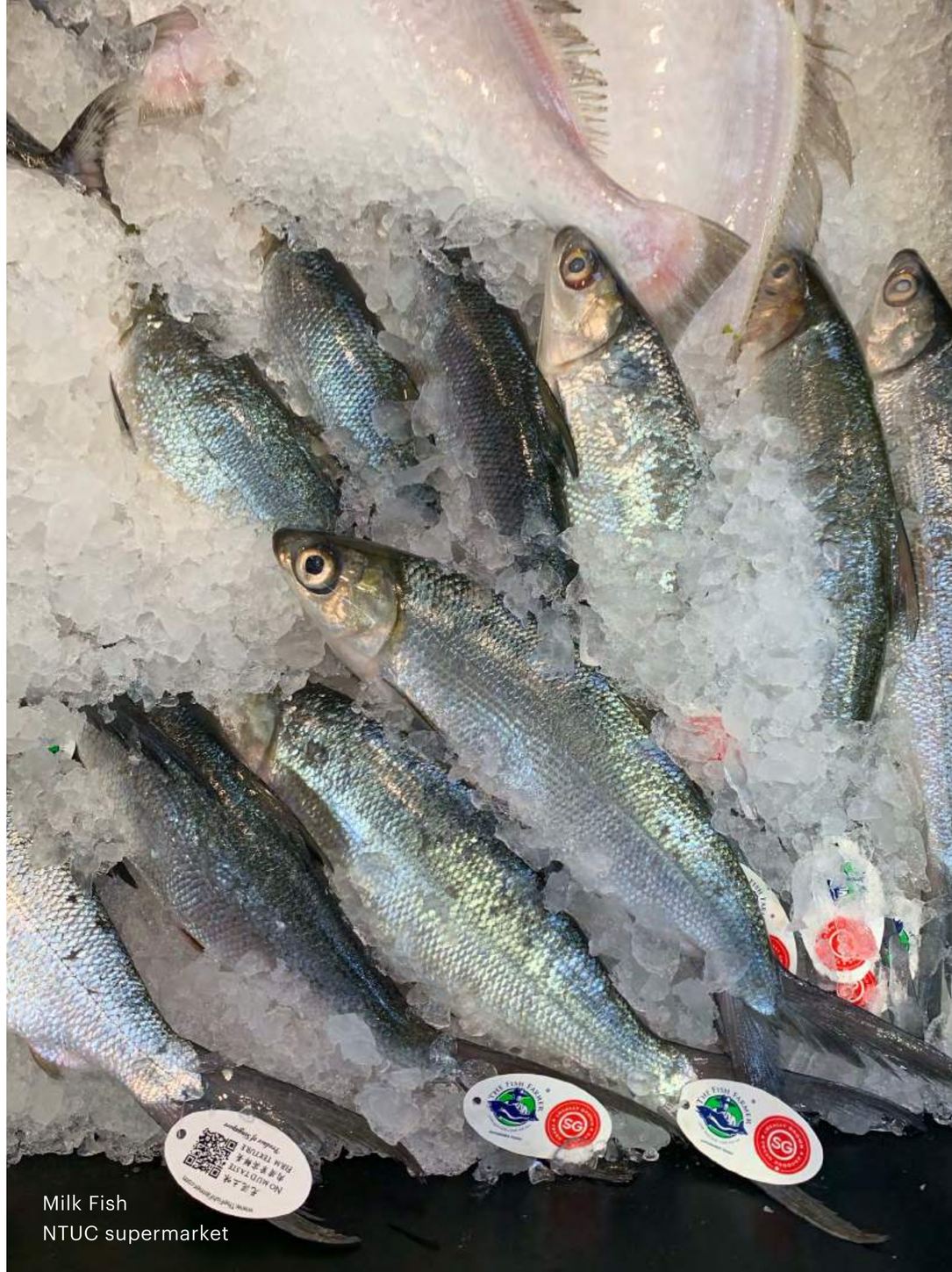
7 May – 28 June 2025



earth ≡



Ah Tee
Floating fishery farmer



Milk Fish
NTUC supermarket

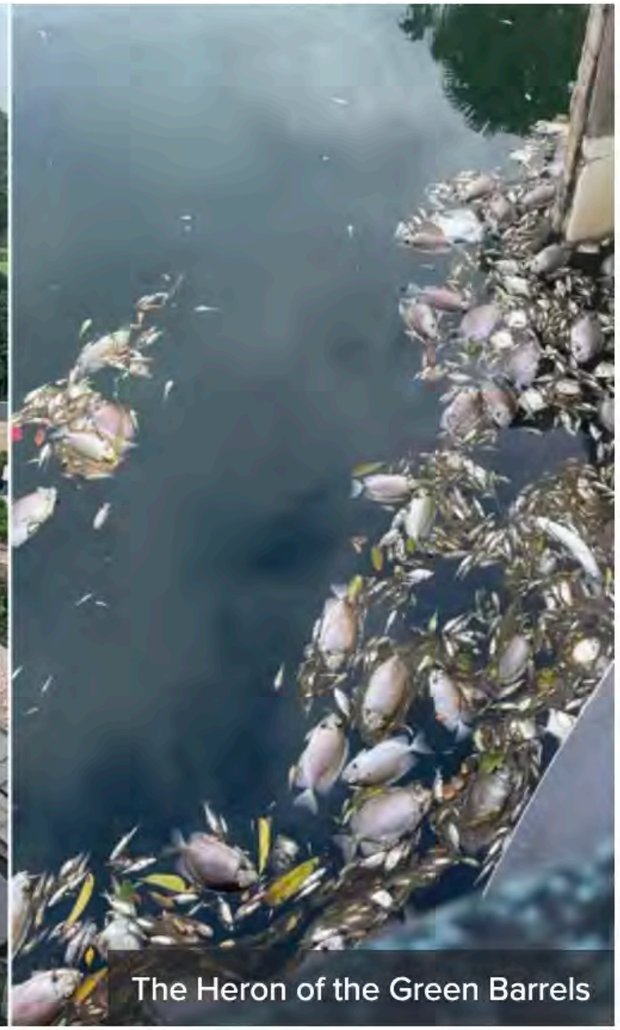
Fish deaths: Plankton bloom causing fish deaths 'likely to recur'

PUBLISHED 9 MAR 2015, 5:53 AM SGT

AVA and farmers must discuss best way to tackle challenge: Vivian

Sentosa Cove waters turn pink, smell rotten; one resident calls it an 'environmental disaster'

Published **January 13, 2021**

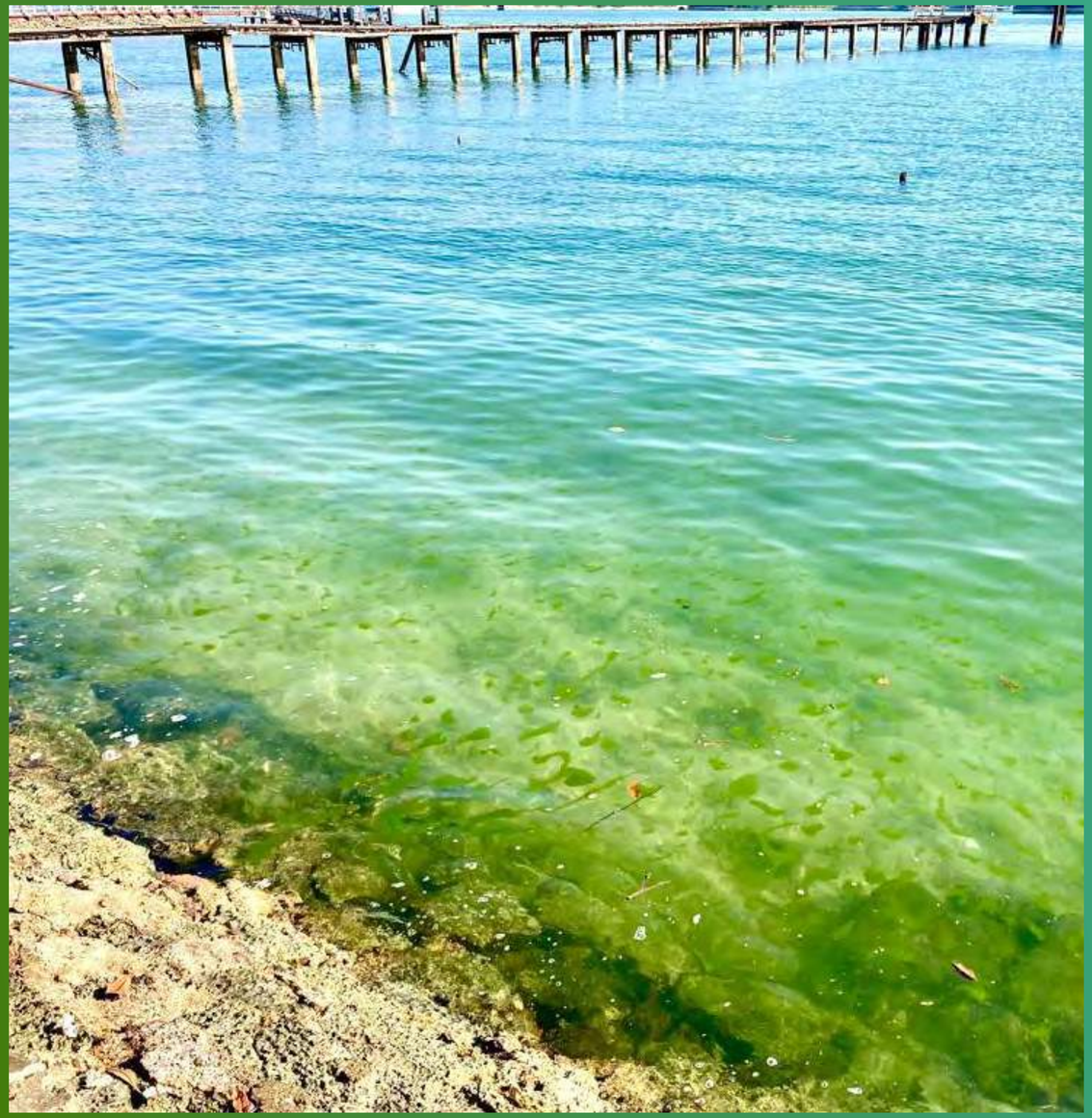


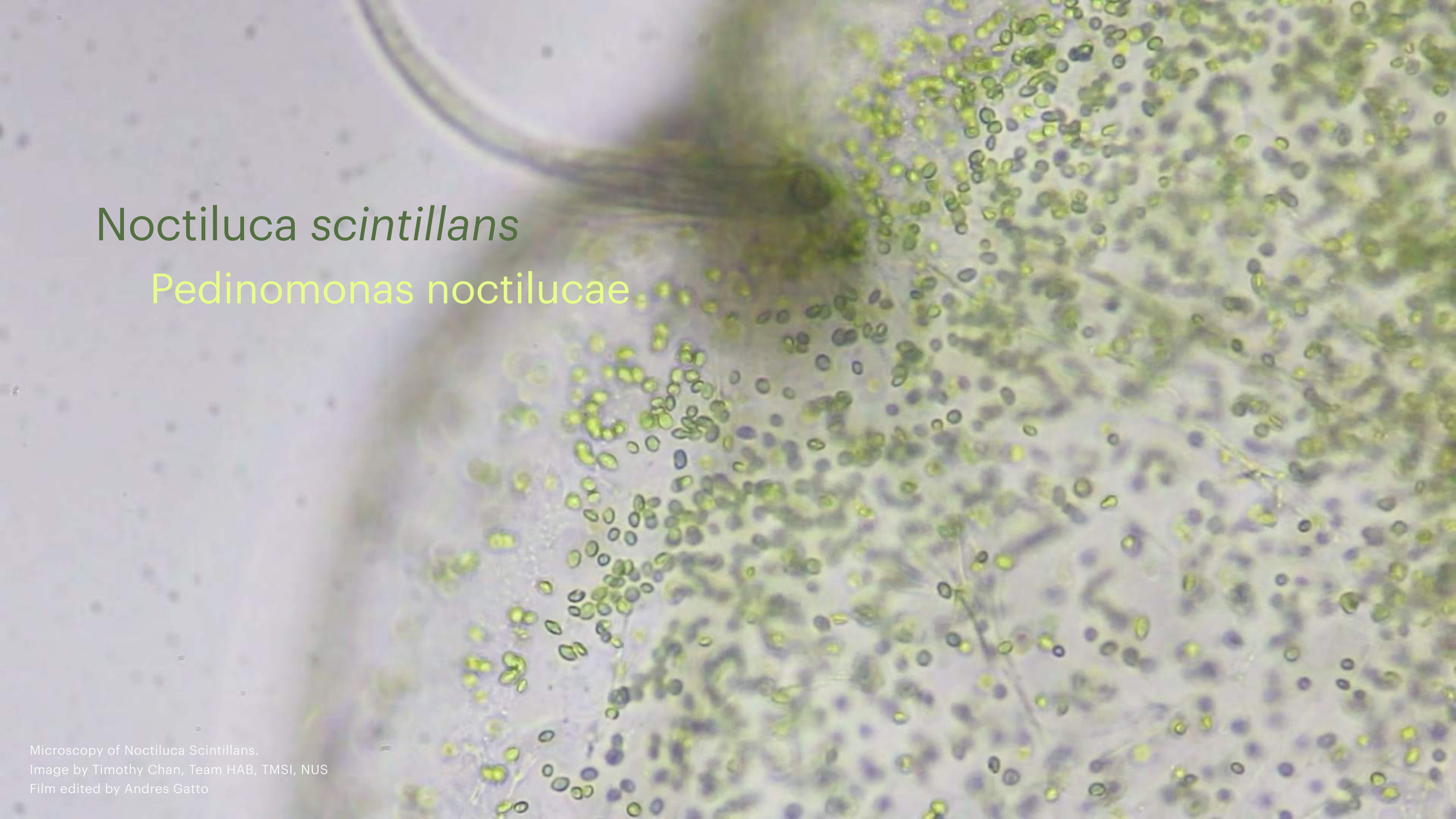
The Heron of the Green Barrels

Pasir Ris mass fish deaths may lead over $1 million loss for farmers

PUBLISHED 11 FEB 2014, 8:31 AM SGT

Beauty — Toxicities　美しさ — 毒性





Noctiluca *scintillans*

Pedinomonas noctilucae

Microscopy of Noctiluca Scintillans.
Image by Timothy Chan, Team HAB, TMSI, NUS
Film edited by Andres Gatto

Measuring Blooms　　藻類ブルームの測定

Research assistant Timothy Chan
Team HAB, TMSI, NUS

Measuring Blooms

Fieldwork with Harmful Algal Bloom scientists in the Johor Strait

藻類ブルームの測定

ジョホール海峡における有害藻類ブルームの研究者とのフィールドワーク

Credit: Team HABs, Tropical Marine Science Institute, National University of Singapore

EXO Sonde
Water monitoring system

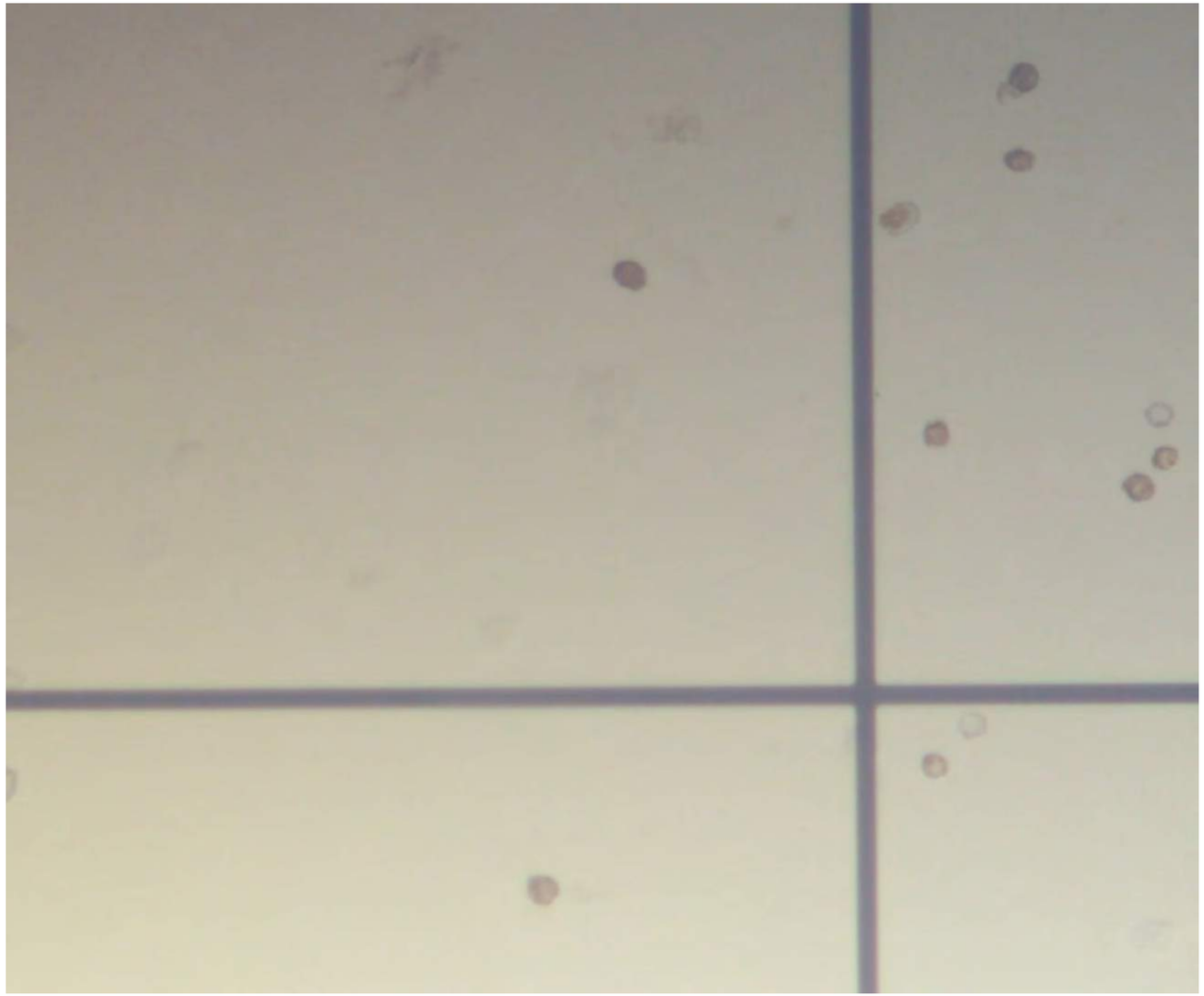
Research assistant Elisha
Team HAB, TMSI, NUS

Measuring Blooms

Saturation Thresholds

藻類ブルームの測定

飽和閾値



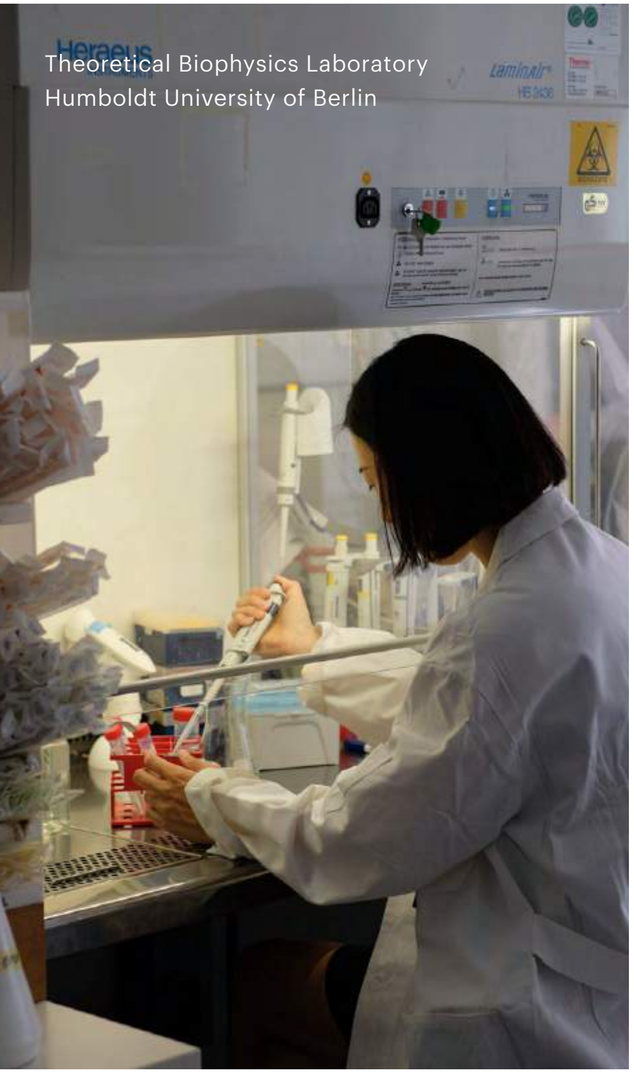
Lead researcher Dr Sandric Leong
Team HAB, TMSI, NUS

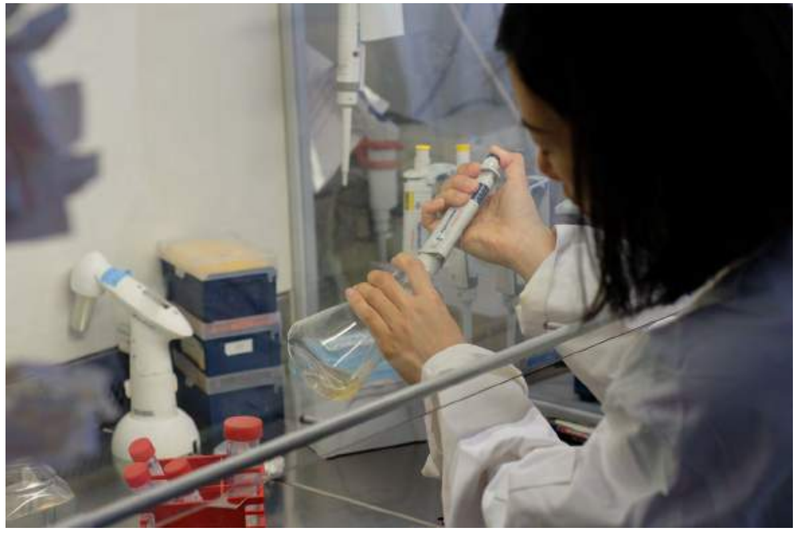
Measuring Blooms

Temperature Thresholds

藻類ブルームの測定

温度閾値





Measuring Blooms

Temperature Thresholds of Algae in Marine Heatwaves

藻類ブルームの測定

海洋熱波における藻類の温度閾値

Hypothesis

How would the toxic algal species Gonyaulax *spinifera* survive temperature spikes in marine heat waves?

Culture Strains:
Gonyaulax Spinifera
10 ml preculture tubes x 4

Culture Medium
F2 filtered seawater (nutrients)

Lighting
Cool white, or cool/warm white mix, fluorescent tubes or bulbs with full spectrum of 400 -700 nm

Irradiance intensity
30-40 µmol m-2s-1 (CCAP culturing conditions)
100 µmol m-2s-1 to induce growth for incubation experiment
Avoid stressing or inhibit growth by keeping to a maximum of 150 µmol m-2s-1.
Avoid going beyond 2500 µmol m-2s-1 which is equivalent to sunlight at noon.

Light Cycle
12h light : 12h dark (for faster growth try 16h:8h)

Temperature
15 - 20 ºC (CCAP)
20 ºC

Subculture Ratio
1:10 or 1:5

Culture Vessel
Conical flasks containing approx. 500ml culture

Culture Chamber
Each chamber measures 385 x 310 x 380 mm
Light bulb wired in chamber, set to timer.

ACDP Hazard Group 1
Non pathogenic / non hazardous. Unlikely to cause human disease.
Found to be a carrier of Yessotoxins in 2006[1] in New Zealand.

[1] Lesley Rhodes et al., "Yessotoxin Production by Gonyaulax Spinifera and Protoceratium Reticulatum," *Harmful Algae* 5, no. 2 (2006): 148.

Acclimatization
24 May — 8 June 2023 (16 days)

Aim: Keep culture alive and multiply, do not rush to grow cultures. Dino grow slower. Wait undisturbed 3-5 days.

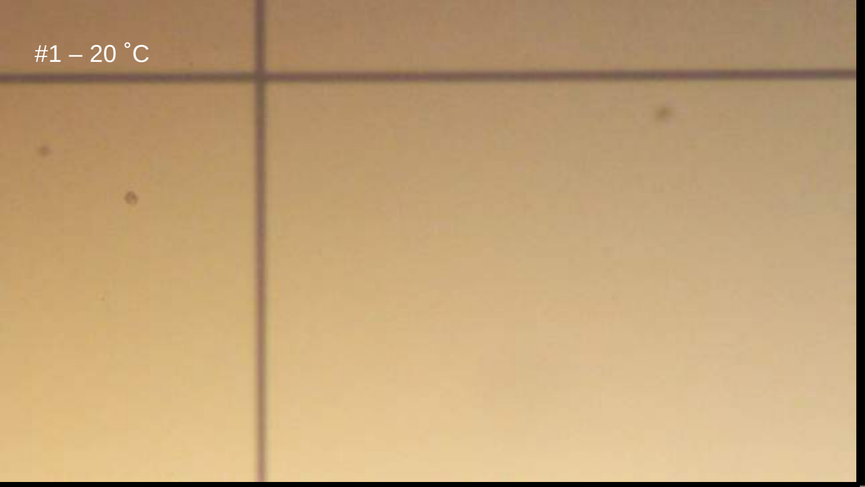
1. Upon arrival of cultures (4 tubes of 10ml), open and close caps.
2. Pour cultures (1-2ml) onto slides to check health.
3. Inoculate two tubes into fresh sterile medium in the ratio of 1:10 e.g. 5mls culture into no more than 50mls medium.
   If the culture is not in optimal condition or bacteria are obvious, then 1:5 may be necessary. Particularly dense cultures can be added to slightly larger volumes of medium.
4. Place 2 culture tubes (2 x 10ml) and 2 inoculated flasks in the chamber at 20 ºC (see table)
5. Light cycle of 12h:12h hours (10am – 10pm)
6. Adjust lighting to irradiance at 100 µmol $m^{-2}s^{-1}$
7. Provide air flow with foil cover
8. After 3 days, pipette 20-50 µL to observe. Leave it untouched until the cultures recovered (hundreds moving in 1 ml).
9. If all 4 tubes are healthy, combine into one stock culture of 1000 ml.
10. If cultures have recovered, subculture every 3 days to grow cultures to a cell density of 100 cells per ml.

NOTE
Use strict aseptic techniques throughout all subculturing within a laminar flow cabinet. Subculture cultures in fresh sterile medium after it arrives.

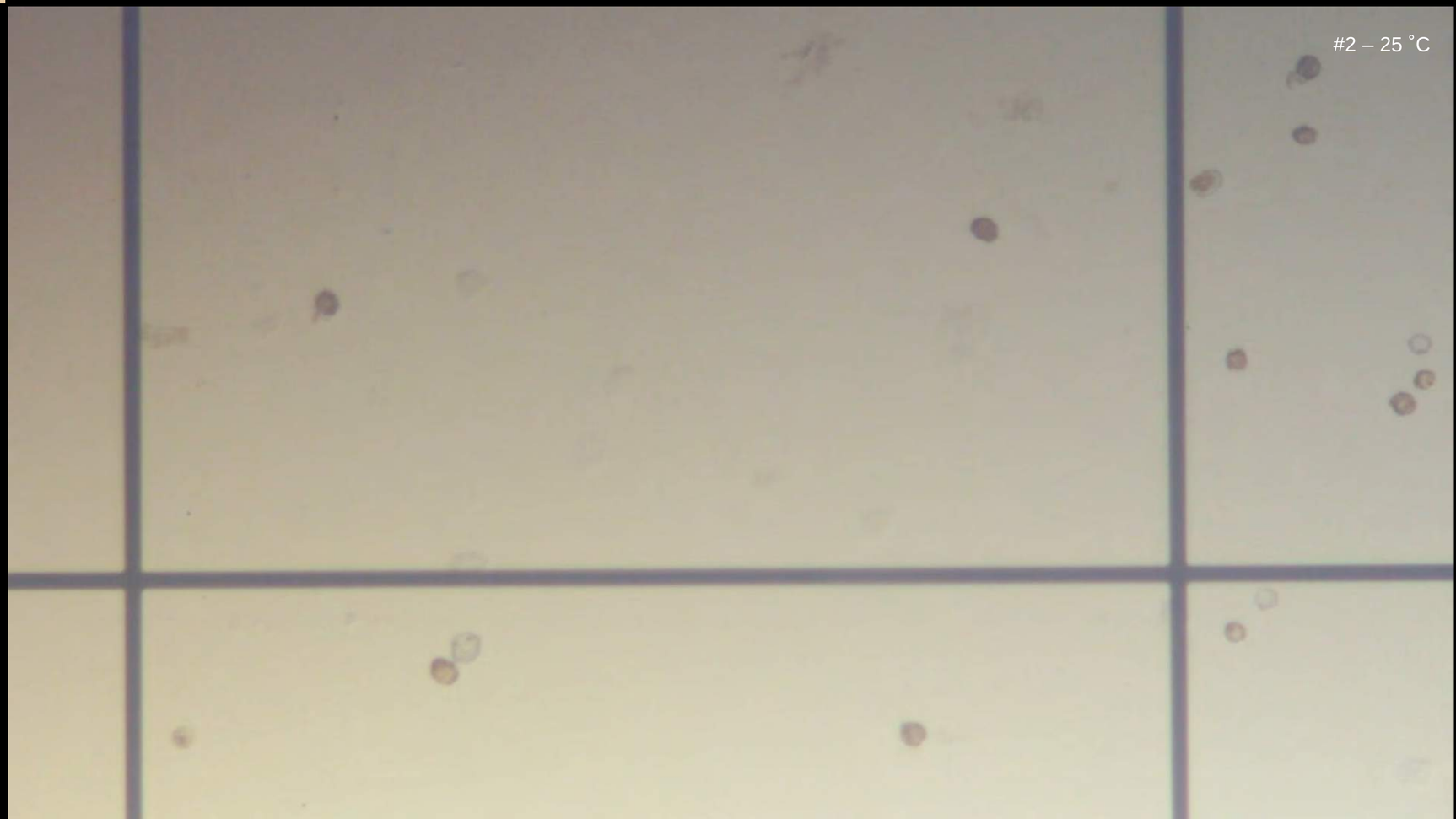
Experiment Procedure:

1. Once experiment begins, check cultures every 2 days on Monday, Wednesday, Friday at the same time (930am) each day.
2. Prepare four tube flasks mark them 1-4 to correspond to chamber #.
3. Take out flasks from chambers to pour approx. 10 ml into respective tubes
4. **Protocol for extracting cultures without dilution**
   1. Take out flask from chamber, swirl in gentle big circles.
   2. Pour 5 ml into tube and return flask to chamber
   3. Shake tube gently in big circles, in both directions (10 seconds) to remove aggregates
   4. Pipette 1ml/ 1000 µL from culture tube onto gridded rafter by moving in zig zag manner, maintain same action
   5. Slide slide cover to close rafter
   6. Place rafter in the fridge for 2-3 mins
   7. Remove rafter and place under microscope
   8. Observe under x5 to count live cells, brown cytoplasm. Do not count dead, transparent cells or green cysts
   9. Count cells based on counting protocol below
   10. Plot cells/ml every 2 days on Monday, Wednesday, Friday
   11. Plot growth curve
5. **Counting Protocol**: Counting cells by moving grid to grid
   1. Zig zag up and down, counting 10 columns of 200 squares. Count 3 different sets of columns to take an average.
   2. if the whole rafter < 400 cells, then count the entire rafter. Density is too low to take an average count.
6. Return flask back to the chamber
7. Wash gridded rafter for next count
   1. Discard used glass slide cover
   2. Pour it into a waste container
   3. Rinse with water
   4. Repeat 2 times
   5. Flush with tap water, wipe with a soft tissue
   6. Use clean rafter for next count and new glass slide cover
8. Repeat steps till Day 10 or 14

Gonyaulax *spinifera* cultures in chamber



Forest & Whale



Measuring Blooms

Temperature Thresholds of Algae in Marine Heatwaves

藻類ブルームの測定

海洋熱波における藻類の温度閾値

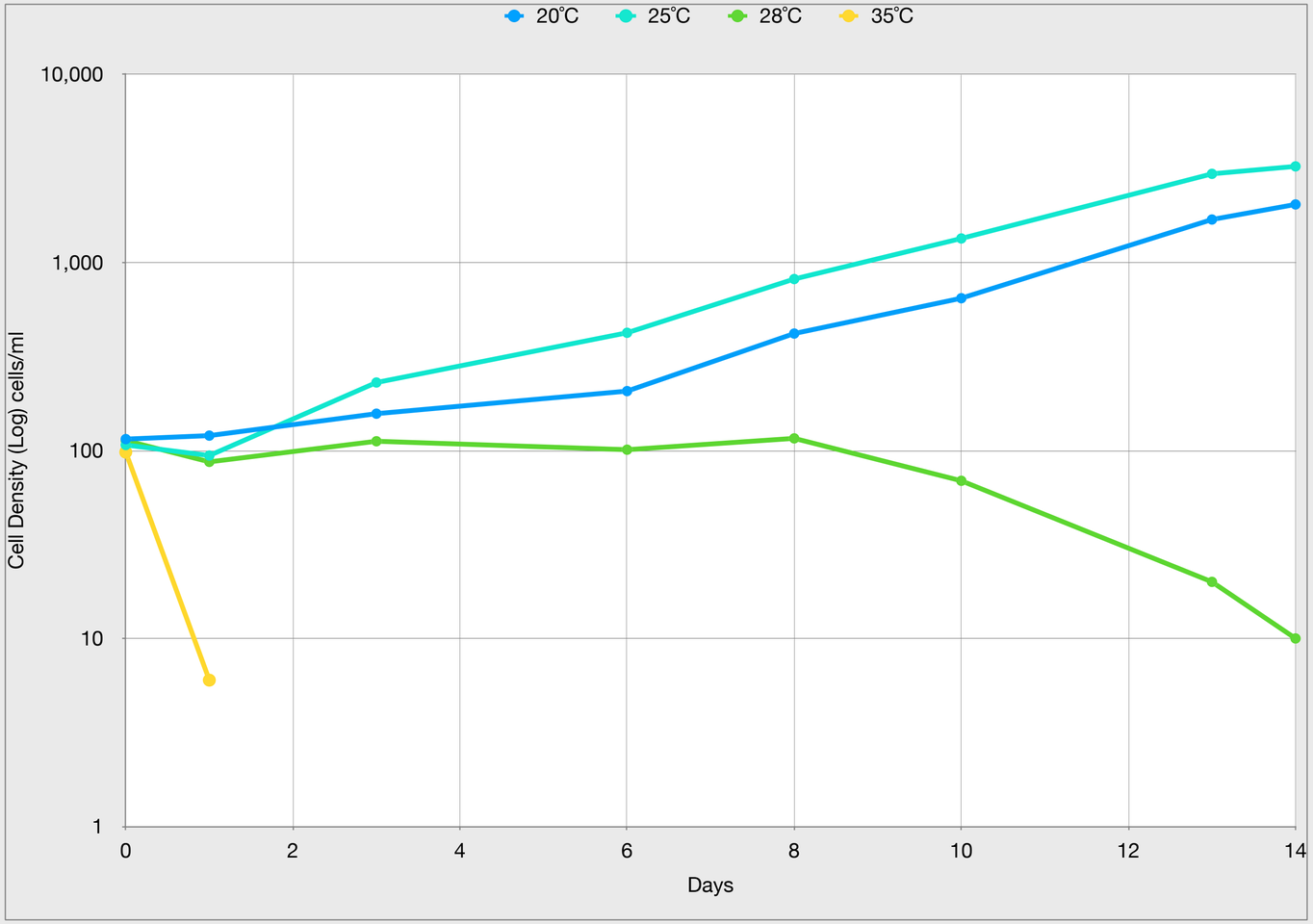
Results

20 ˚C
Constant growth

25 ˚C
Initial dip then pre-bloom trends as growth spikes under optimum conditions

28 ˚C
Shock to algal communities, slow cell death

35 ˚C
Shock and catastrophic death



As invisible wild fires rage unseen, we ask:
What are we not hearing?

目に見えない山火事が猛威を振るう中、私たちは問いかけます。私たちは何を聞いていないのでしょうか？

‘Unheard of’ marine heatwave off UK and Irish coasts poses serious threat

Sustained high temperatures over summer could trigger mass mortality of fish and oysters, say scientists

What you need to know about the 'extreme' heatwave hitting our oceans – video explainer

Helena Horton *Environment reporter*

Mon 19 Jun 2023 12.21 CEST

A humpback whale, nicknamed Festus, who died near Glacier Bay in June 2016 during a marine heatwave in the north-east Pacific. Starvation was given as the primary cause of death. Photograph: Craig Murdoch, taken under authority of NOAA Marine Mammal Health and Stranding

The age of extinction

Did a marine heatwave cause 7,000 humpback whales to starve to death?

Populations were recovering, but a new study reveals that numbers dropped by 20% coinciding with a period of record temperatures in the North Pacific

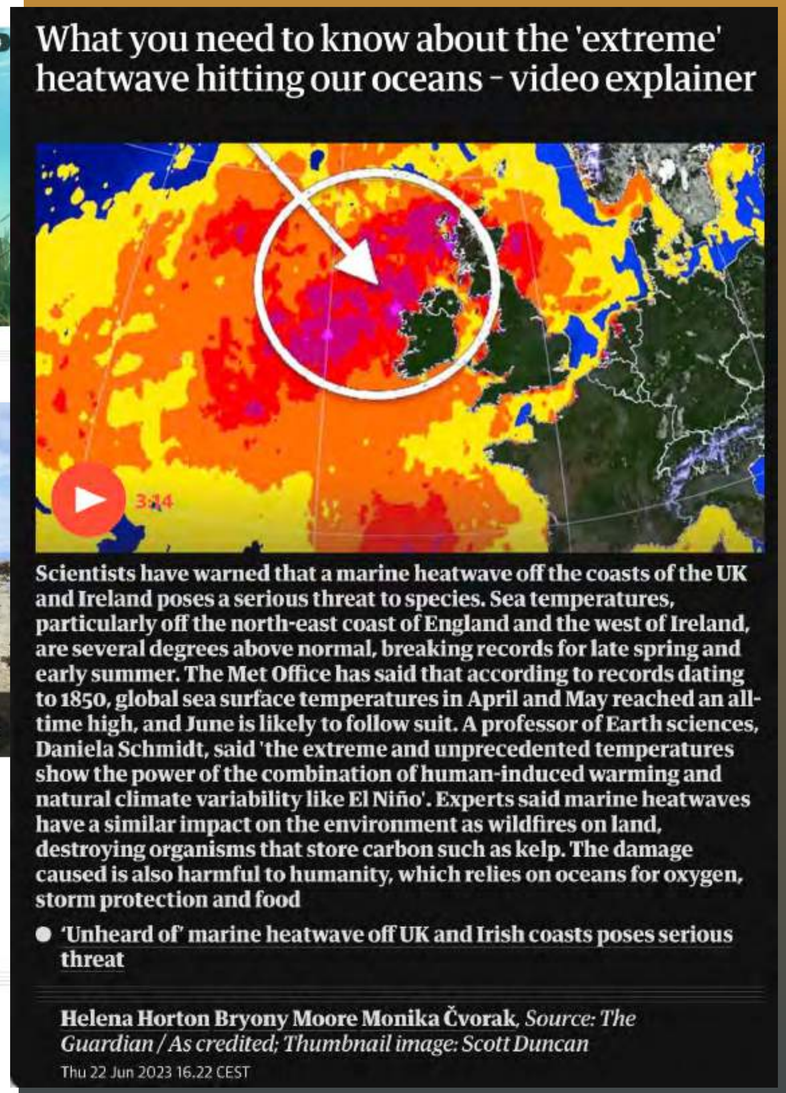
The age of extinction is supported by

the guardian .org

About this content

Brianna Randall

Wed 28 Feb 2024 08.01 CET



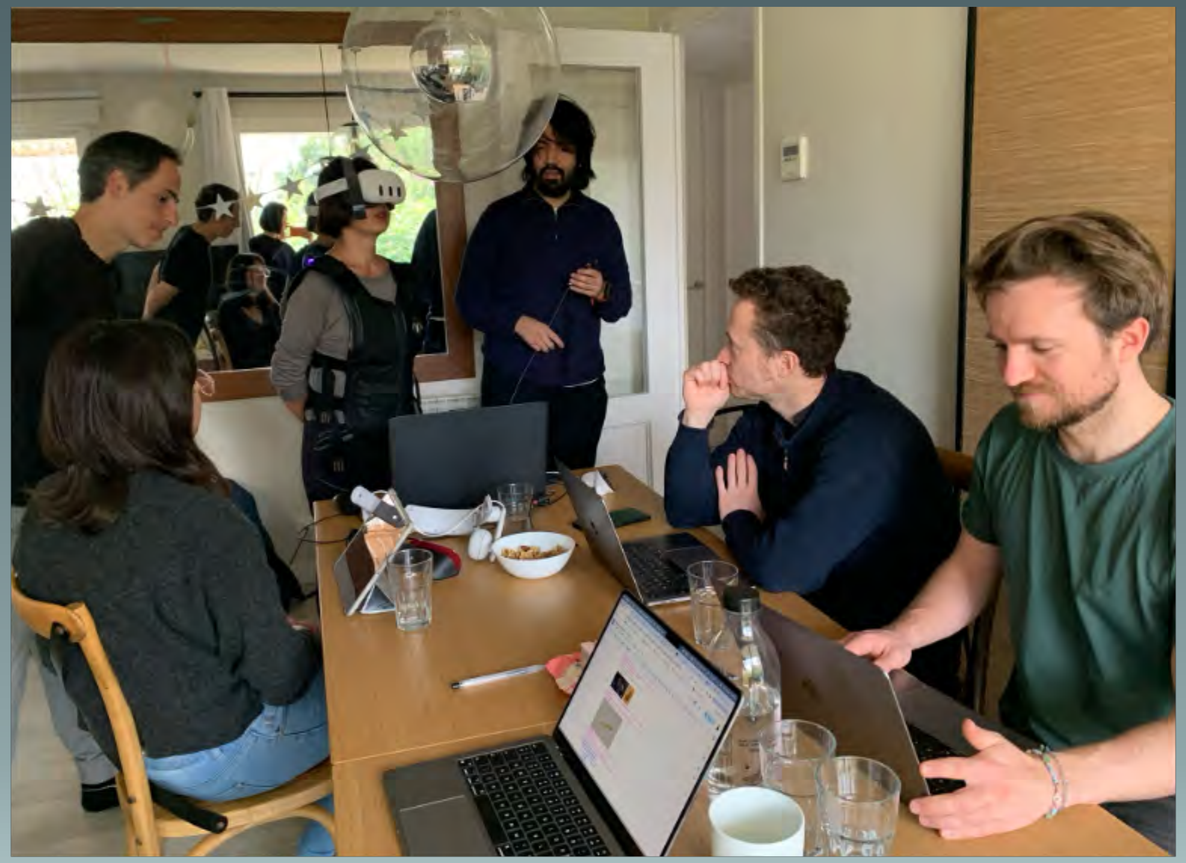
What you need to know about the 'extreme' heatwave hitting our oceans - video explainer

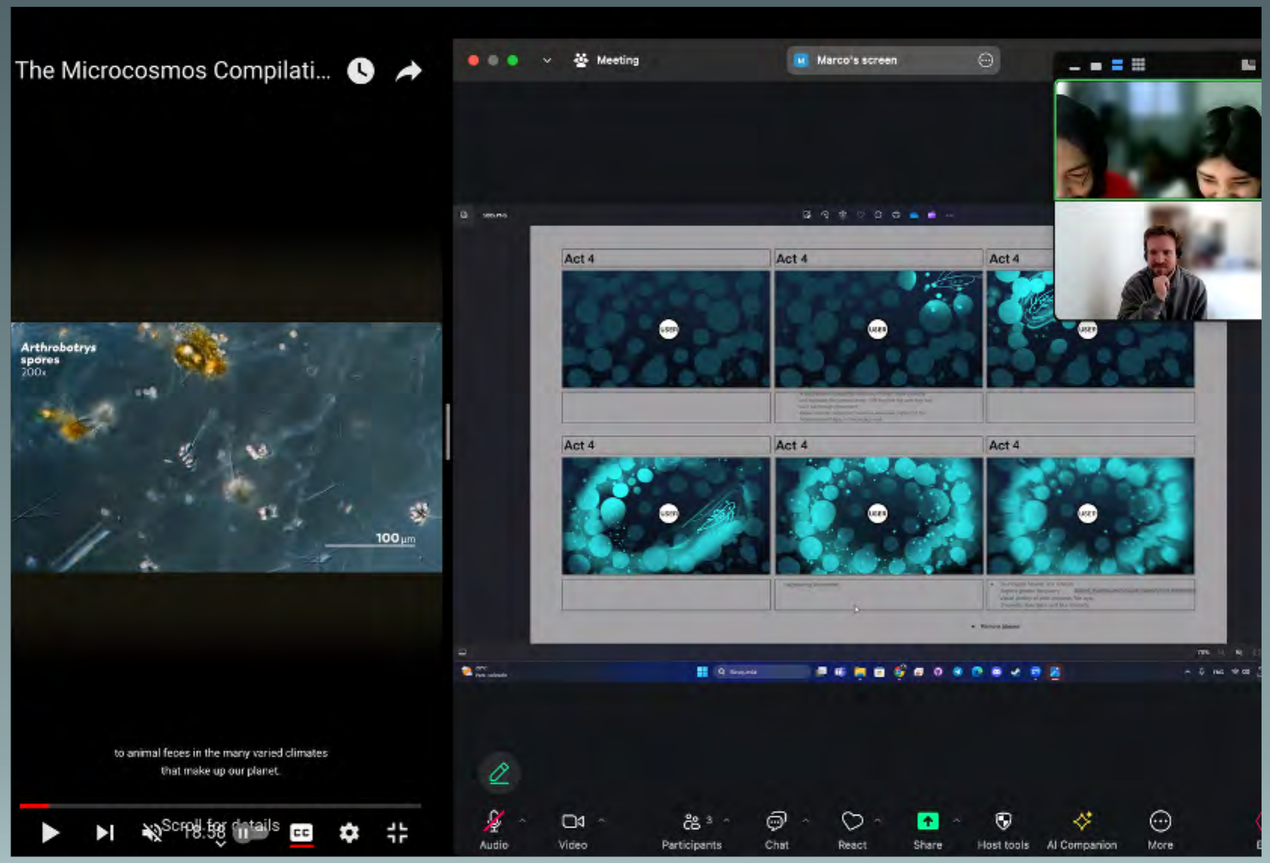
Scientists have warned that a marine heatwave off the coasts of the UK and Ireland poses a serious threat to species. Sea temperatures, particularly off the north-east coast of England and the west of Ireland, are several degrees above normal, breaking records for late spring and early summer. The Met Office has said that according to records dating to 1850, global sea surface temperatures in April and May reached an all-time high, and June is likely to follow suit. A professor of Earth sciences, Daniela Schmidt, said 'the extreme and unprecedented temperatures show the power of the combination of human-induced warming and natural climate variability like El Niño'. Experts said marine heatwaves have a similar impact on the environment as wildfires on land, destroying organisms that store carbon such as kelp. The damage caused is also harmful to humanity, which relies on oceans for oxygen, storm protection and food

- **‘Unheard of’ marine heatwave off UK and Irish coasts poses serious threat**

Helena Horton Bryony Moore Monika Čvorak, *Source: The Guardian / As credited; Thumbnail image: Scott Duncan*

Thu 22 Jun 2023 16.22 CEST



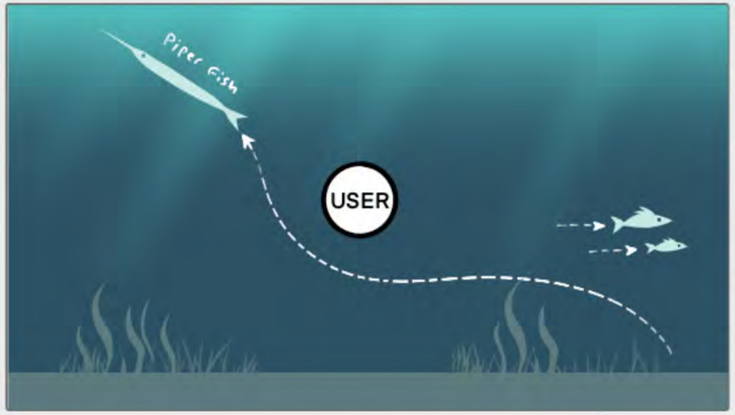


Gustavo Maggio, Joyce Koh, Christian Stein, Valentin Hanau, Marco, Romina, Andres Gatto

Act 2 [01:01] Act 2.1 2.1

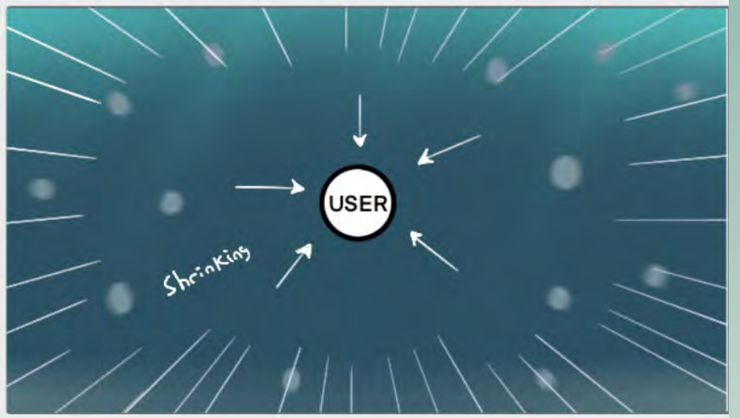
You are under the water now, looking from below to the water surface.
Sunlight flickers at the water surface.
#sea-wave simulation

Act 2 01:20 2.2



Fishes swimming around you that can return to you at a larger size
Pipefish

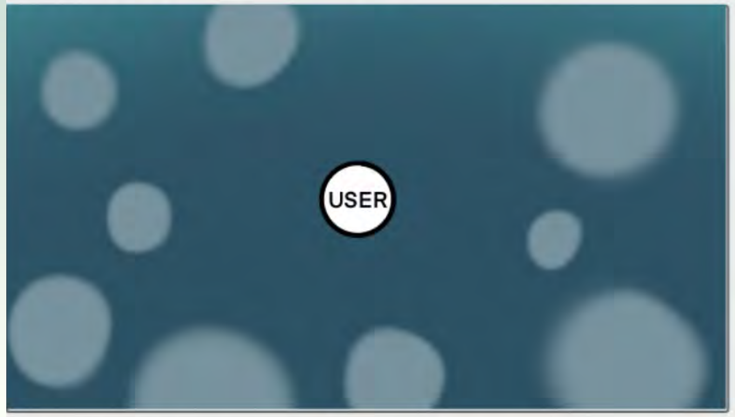
Act 2 2.3



- Microalgae Particles appear

[Change Scale to Microalgae]

Act 2 [02:20] 2.4



We might aim at 5 microplankton species

- Camera setting effects where only central area is in focus, the peripheral becomes blurred
- You **are at microscopic scale**

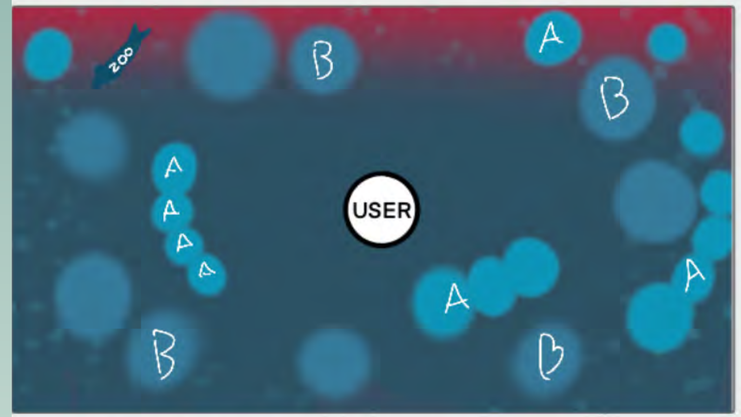
Fish Eye Effect

Act 2 2.5

Act 2 [02:30] Act 2.x – [03:30] 2.6

some swim or dance, some move in long chains moving to the sea currents (possible?)
Sometimes a larger fish/ zooplankton brush past and we know we are in a micro scale

Act 3 [03:30] Act 3.1 MHW Heat Transition



- [VR] Red gradient glow from surface and fade downwards
- [VR] heat haze effect
- [Global env] infra red light shining — heat to feel it

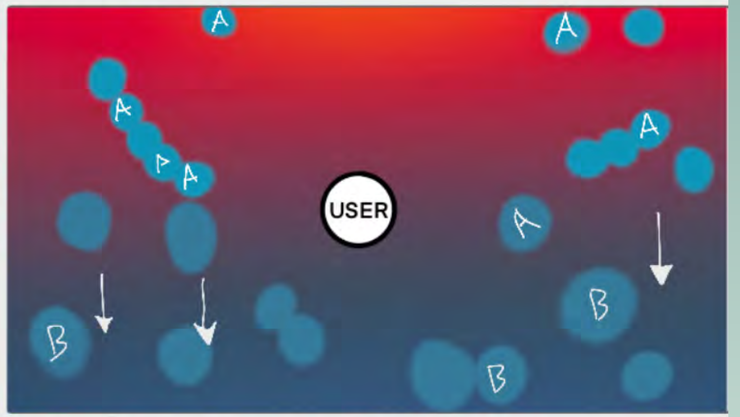
All the dinos and zooplankton freeze

Act 3 [04:00] Act 3.2 Blooming begins Main Act: Competing Blooms

We see crowding of species into the frame — pairs of cells in cell-division process, multiplying

- We dont need to see the actual cell division unfolding but cells in the divided states appearing around you
- Density of cells is increasing. = Reducing the visible space in the field of view
- Space for participant feels slowly enclosing
- Cells come closer to the camera

Act 3 3.3

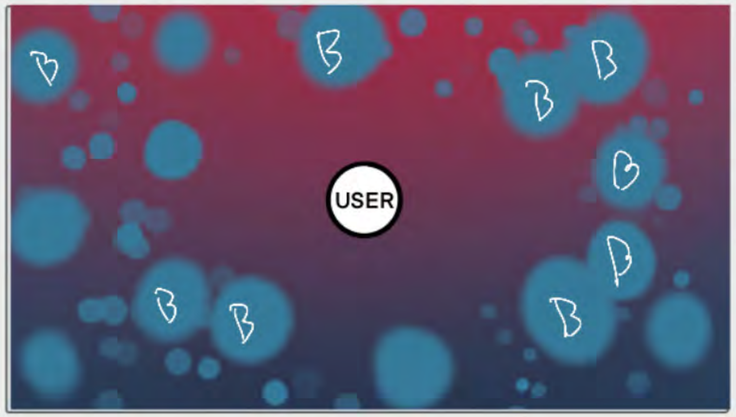


B can swim down (towards the cold). A stays in place

Act 3 3.4

A dies and B survives.
Bloom #1 slowly die out, long chains start to detach and die off
The diatom turn from green to grayscale crystalline structures
They slowly break into smaller chunks with X's
The crystalline cells fall gently as marine snow

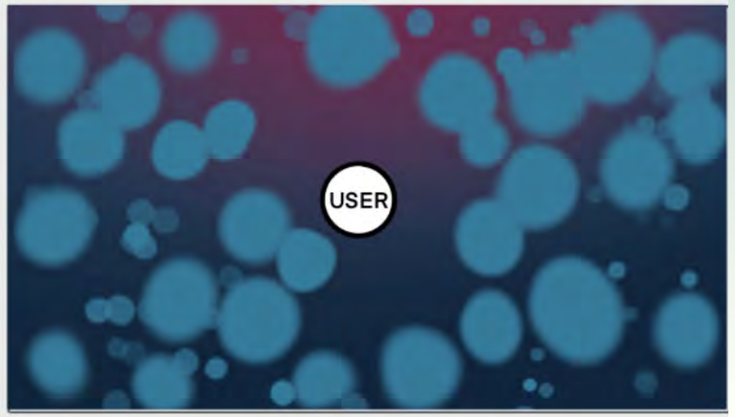
Act 3 3.5



Bloom #2 is starting to take over, and fill the screen

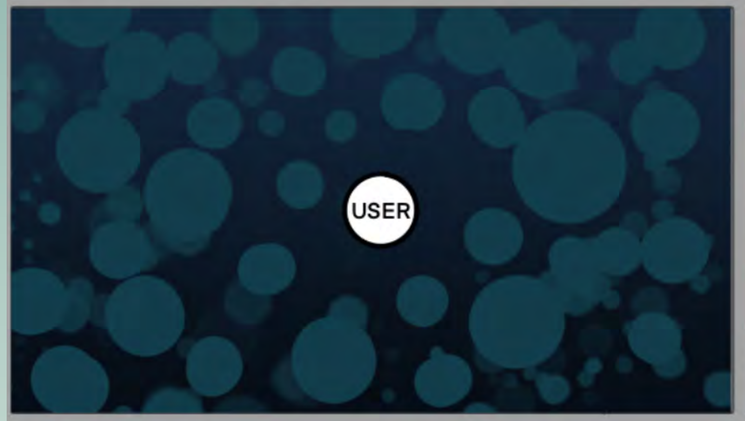
- They cannot form chains but their density increase
- They swim and proliferates and enter the field with the drift through the opacity change.

Act 3 3.6



It gets darker and darker. it's getting dark

Act 4 4.1



Act 4 4.2

A zooplankton copepod is swimming through close proximity and activates the luminescence - this teaches the user they can do it too through movement
Wave currents movement creates a wave-like rhythm for the bioluminescent light, in the background

Act 4 4.3

Act 4 4.4

Act 4 4.5

Heightening Discomfort

Act 4 4.6

- Sound gets heavier and intense
  Haptics greater frequency
  Visual density of cells increase, fish eye,
  chromatic aberration and blur intensify

Sound, Haptics and Visuals Intensify to a discomfort

Composition by sound artist
Joyce Koh

Tieranatomisches Theater
TA T, BERLIN

7 May – 28 June 2025


TAT


BLÜHT
BLOOMS

Field Sampling
Feldprobenahme

Site Name Sitename	Depth Tiefe *m*	Temperature Temperatur *°C*	Salinity Salzgehalt *psu*	Chlorophyll *ug/L*	Optical Dissolved Oxygen optisch gelöster Sauerstoff *mg/L*	Turbidity Trübung *NTU*
Sa5	0.003	29.609	29.34	0.38	3.64	2.08
Sa5	0.003	29.609	29.34	0.34	3.64	2.07
Sa5	0.004	29.607	29.34	0.36	3.64	2.07
Sa5	0.008	29.599	29.34	0.38	3.63	2.05
Sa5	0.013	29.587	29.35	0.34	3.63	2.05
Sa5	0.019	29.578	29.35	0.36	3.63	2.06
Sa5	0.037	29.571	29.35	0.34	3.63	2.06
Sa5	0.062	29.562	29.36	0.35	3.63	2.09
Sa5	0.086	29.554	29.36	0.34	3.62	2.09
Sa5	0.11	29.543	29.36	0.36	3.62	2.1
Sa5	0.14	29.533	29.37	0.41	3.62	2.12
Sa5	0.176	29.522	29.37	0.48	3.62	2.17
Sa5	0.232	29.511	29.38	0.45	3.61	2.19
Sa5	0.284	29.498	29.39	0.42	3.61	2.21
Sa5	0.339	29.485	29.4	0.42	3.61	2.24
Sa5	0.391	29.471	29.4	0.46	3.61	2.24
Sa5	0.433	29.461	29.41	0.49	3.6	2.24
Sa5	0.507	29.445	29.42	0.45	3.6	2.23
Sa5	0.556	29.434	29.43	0.51	3.6	2.24
Sa5	0.605	29.423	29.44	0.52	3.6	2.23
Sa5	0.651	29.412	29.45	0.52	3.6	2.23
Sa5	0.699	29.4	29.46	0.49	3.6	2.21
Sa5	0.735	29.386	29.46	0.53	3.6	2.23
Sa5	0.769	29.37	29.48	0.59	3.61	2.27
Sa5	0.802	29.348	29.49	0.61	3.61	2.31
Sa5	0.835	29.325	29.51	0.57	3.62	2.35
Sa5	0.876	29.295	29.52	0.55	3.63	2.39
Sa5	0.911	29.269	29.54	0.55	3.64	2.45
Sa5	0.951	29.225	29.57	0.51	3.65	2.52
Sa5	0.989	29.183	29.6	0.54	3.67	2.6
Sa5	1.029	29.117	29.64	0.52	3.69	2.65
Sa5	1.078	29.086	29.67	0.53	3.71	2.71
Sa5	1.12	29.026	29.7	0.53	3.73	2.74

Columnal Data Spaltendaten

MULTI PARAMETRIC SONDE


WAMBO
Calm


I AM Okay
GEHT AB!
Sometimes people choose not to listen
Thank you!
WAMBO
Dancing on water and Fire, Fire and water.
VIVA LOS GRELOS
Calm down
Mirror & Deep Listening als poetics of (un) sound
WAS IT DESIGNED?
SCIENCE IS BEAUTIFUL
Thanks for showing
HALLO ich Bin Lily
HOW CAN WE TEACH THE ART OF THE OCEANS IN SCHOOL?
UN OBTRUSIVELY ENGAGING ... SEDUCING ... SLOW? DANGER
pretty
grapes are
WHAT ARE WE NOT HEARING
Was hören wir nicht?
ERNST HAECKEL
Art Forms from the Ocean

BLOOMS

Base Milano
9 – 22 October 2025

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101070278.

S+T+ARTS

Re Silence

playersjourney

TAT

Cluster of Excellence Matters of Activity Image Space Material

Funded by DFG

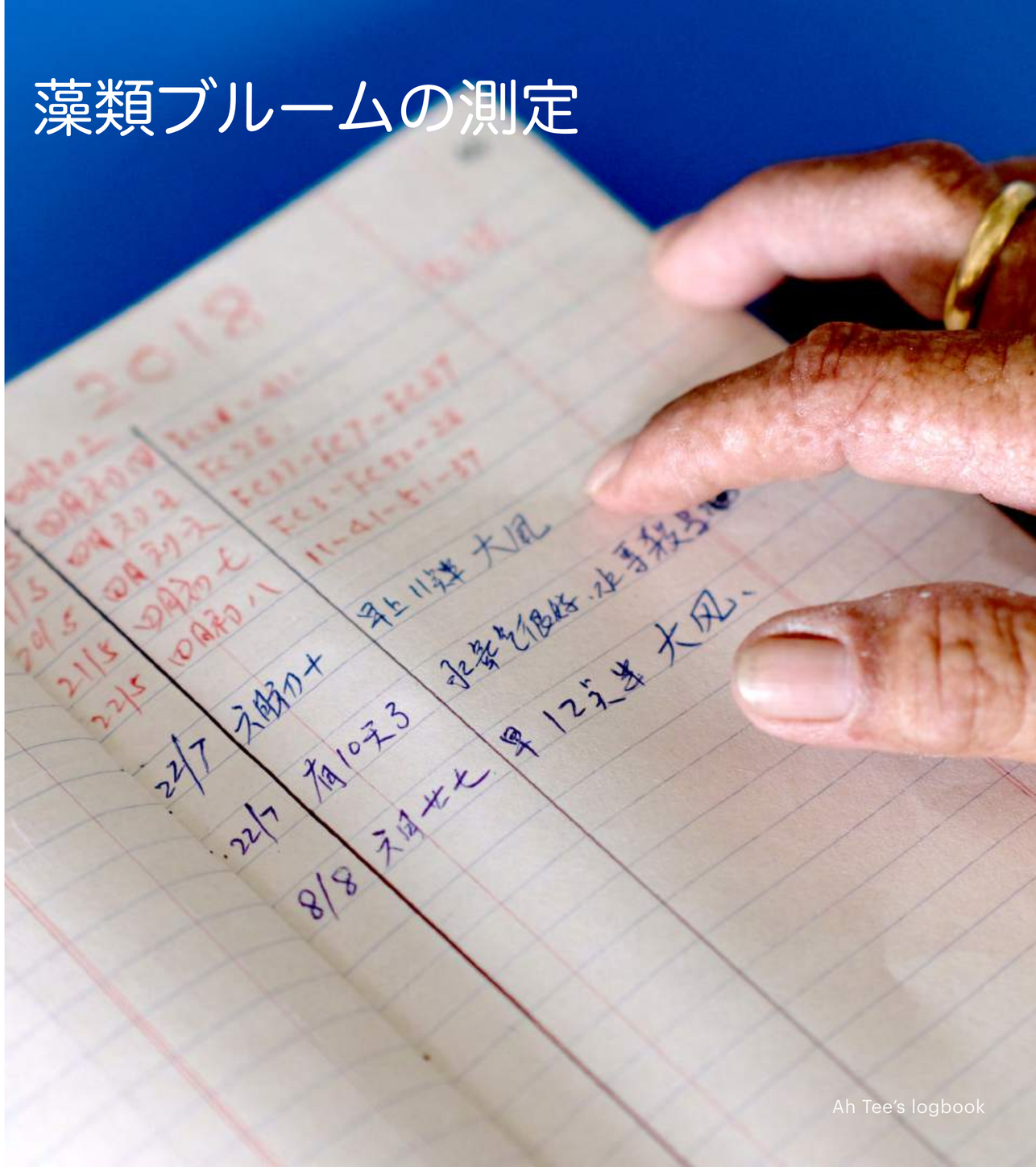
TMSI Tropical Marine Science Institute
National University of Singapore

Ah Tee and research assistant Amily from Team HAB

Measuring Blooms

Research assistant Denise
Team HAB, TMSI, NUS

藻類ブルームの測定



Ah Tee's logbook

Ismail Tan
Indigenous boat captain

Research assistants Shaun and Elisha
Team HAB, TMSI, NUS

Ah Tee
Floating fishery farmer

International Conference on Harmful Algae (ICHA) 2023
Hiroshima 広島市

福代 康夫
東京大学
名誉教授

Yasuwo Fukuyo
Professor Emeritus,
The University of Tokyo.

My longtime question to myself is:
There must be no microalga that wishes to harm to others.

Maybe the micro algae have specific abilities to survive in the struggle for life among plankton world. The abilities are fast uptake of organic substances, fast growth rate ...
it means the algae behave naughty in finding good condition for themselves then they can bloom.

Yasuwo Fukuyo
Professor Emeritus,
The University of Tokyo.

長年、私はこう自問しています。
他の生物に害を及ぼそうとする微細藻類は存在しないはずだ。

もしかしたら、微細藻類はプランクトン界での生存競争を生き抜くために、特別な能力を持っているのかもしれません。その能力とは、有機物の吸収速度の速さ、成長速度の速さなどです。つまり、藻類は自分にとって良い環境を見つけるために、いたずら好きな行動をとることで、繁殖できるのです。

福代 康夫
東京大学名誉教授

To people, the bloom shows unusual scenery, but it is not harm, unless people utilise coastal area and coastal seafoods. It means people change the (lovely) naughty algae to the one that has harm for others, becoming harmful algae.

Microalgae are friends struggling in the sea, in the same way as I do on land.

Yasuwo Fukuyo
Professor Emeritus,
The University of Tokyo.

人間にとって、藻類のブルームは異様な光景ですが、沿岸地域や沿岸の魚介類を利用しない限り、害にはなりません。つまり、人間が（愛らしい）いたずら好きな藻を、他者に害を及ぼす有害藻に変えてしまうのです。

微細藻類は、私が陸上で闘うのと同じように、海の中で闘う仲間なのです。

福代 康夫
東京大学名誉教授

DANCE OF THE DIATOMS

Sound Composition by sound artist Joyce Koh
Microscopy of Noctiluca Scintillans by Team HAB, TMSI, NUS
Film edited by Andres Gatto

BLOOMS TEAM

Wendy Chua Research and art direction
Joyce Koh Sound artist
Gustavo Maggio Product/ Space designer
Andres Gatto Media artist

Christian Stein VR creative director
Valentin Hanau VR project manager
Julian Dietz VR developer
Arthur Melzow VR developer
Marco Garcia VR developer
Romina Valdivia Sanz 3D artist

Dr Sandric Leong Marine Scientist
Audrey Lee Marine Science Researcher
Timothy Chan Marine Science Researcher

Manuel Cirauqui EU S+T+ARTS ReSilence curator
Berta Gutierrez EU S+T+ARTS ReSilence curator

wendy@forestandwhale.com