OceanICU
Understanding Ocean Carbon

OceanICU Youth Competition Webinar



Welcome and Thank You for Joining Us Today

4 November 2026

Co-funded by the European Union

UK Research and Innovation

This work was funded by the European Union under grant agreement no. 101083922 (OceanICU) and UK Research and Innovation (UKRI) under the UK government's Horizon Europe funding guarantee [grant number 10054454, 10063673, 10064020, 10059241, 10079684, 10059012, 10048179]. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

Agenda

Welcome, Housekeeping and Introduction

Ir. Nathalie Van Isacker, Moderator

Presentations

Dr. Eloise Savineau

Tiny but mighty ocean critters! Combining novel imaging devices with traditional net sampling to study zooplankton communities in the Atlantic Ocean.

Dr. Fabio Berzaghi

Combining climate and environmental sciences with economics to connect science to policy

Ir. Nathalie Van Isacker

Participating in the OceanICU Youth Competition: why, what, how and when?

Questions and Answers

About Today's Format

This webinar is being video recorded

- Cameras & Microphones have been disabled
- Questions posted in the Q&A will not be included in the video recording so your name will not be displayed.

Questions and Answers

- Please use the Q&A function to ask any questions you have.
- Questions will be directed to the appropriate panellist by the moderator during the Q&A session.
- Questions & Answers covered during the session, along with any that we did not have time to respond to, will be posted in text form on the OceanICU website; a link will be sent to you in a post-webinar email communication.

Any problems or comments during or after the session:

youthcompetition@ocean-icu.eu

OceanICU project

November 2022 – October 2027

OceanICU Youth Competition Webinar

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The Carbon Cycle

The present-day ocean carbon cycle involves a **complex interplay of physical, chemical, and biological processes**. Understanding the processes, interactions and feedbacks governing **ocean carbon uptake, cycling and storage** is essential for predicting future **climate** scenarios and developing effective mitigation strategies.

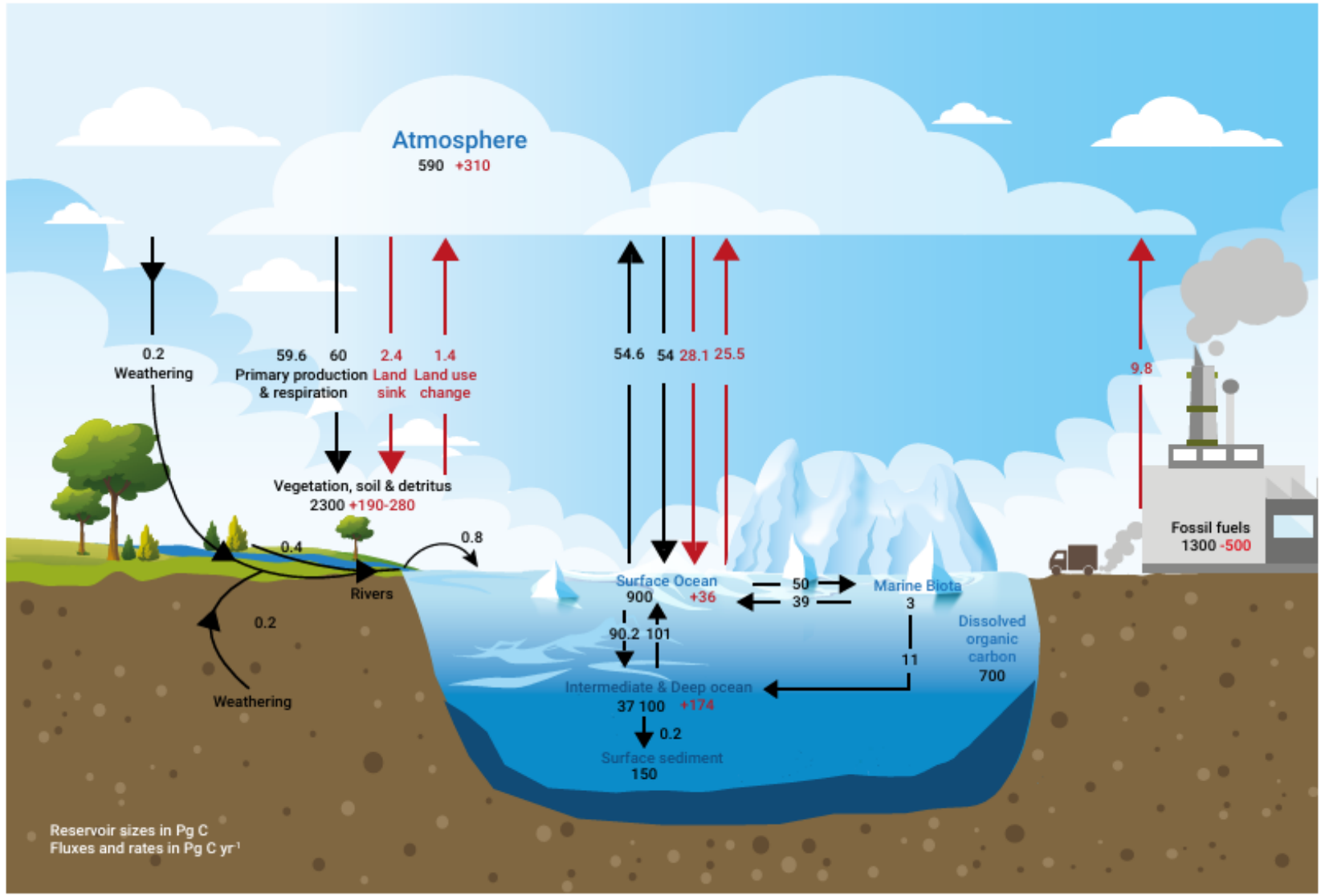
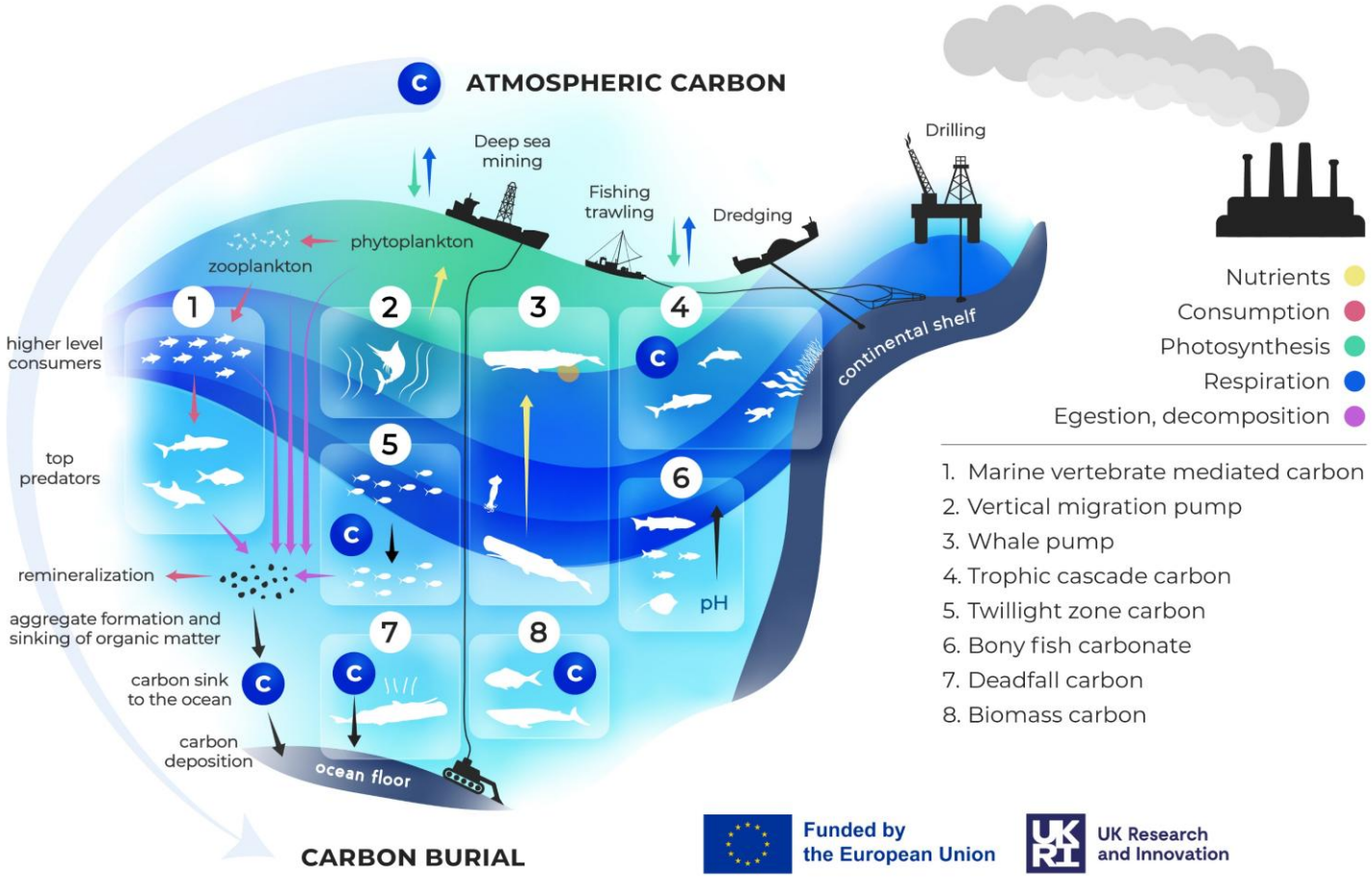


Figure 3 Inventories of major carbon reservoirs and transport between the reservoirs of the global carbon cycle, estimated for the period of 2015-2024. Black arrows and numbers indicate the natural carbon cycle fluxes and reservoirs, while red arrows and numbers indicate anthropogenic perturbations. The figure is adapted from Sarmiento and Gruber (2002), with the permission of the American Institute of Physics, updated to the period of 2014-2024 using values from Friedlingstein et al. (2025). Uncertainties in values range from 10-50%.

Extracted from:
IOC of UNESCO. 2026. Integrated Ocean Carbon Research: a vision primed for implementation. Paris, UNESCO. (IOC Technical Series, 214.) https://doi.org/10.71245/FULK2623

Understanding Ocean Carbon

Biological C pump processes considered in OceanICU



Created by Seascape Belgium for the OceanICU Horizon Europe project, adapted from Lutz and Martin 2014, Figure 2. A conceptual diagram of marine vertebrate carbon services | Version 1.9 - CC BY-NC-ND 4.0 DEED

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The Challenge

The EU Green Deal requires us to move to operating in a carbon neutral way

- How does this affect Ocean users?
- Need to compensate for:
  - Direct effects (e.g. GHG production by shipping)
  - Indirect effects (e.g. disturbances to seabed C storage by mining, disturbances to food webs by fishing or mining)
- How large are these indirect effects?
- How do they operate?
- What can we do to reduce or minimise them?



European Green Deal

OceanICU

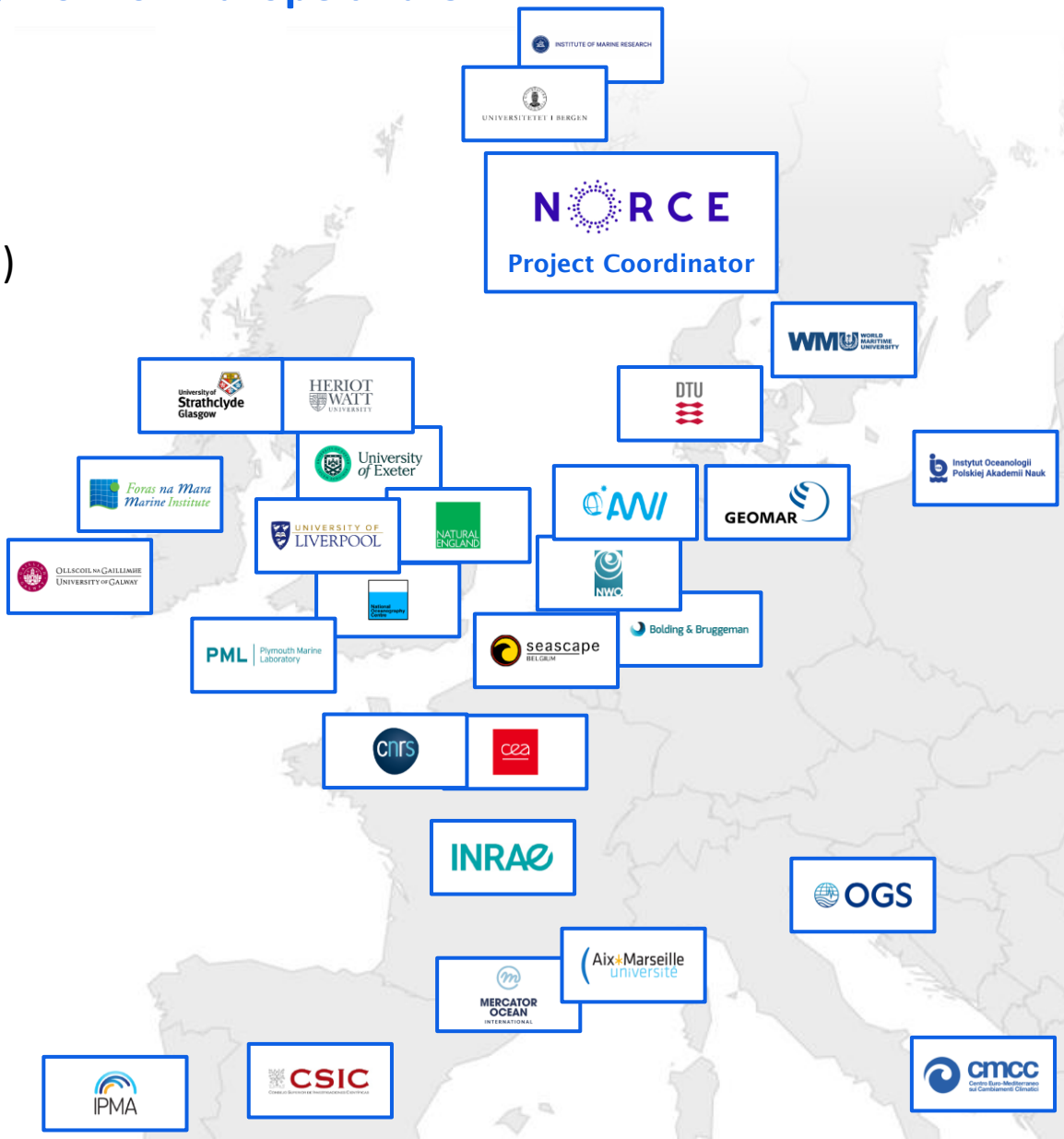
A Pan-European project funded by Horizon Europe and UKRI

Consortium & resources

- 31 Partners, 15 nations
- 60 months (Nov 2022 – Oct 2027)
- Funding: €13 102 052,75
- EU and UKRI Funding

Horizon Europe

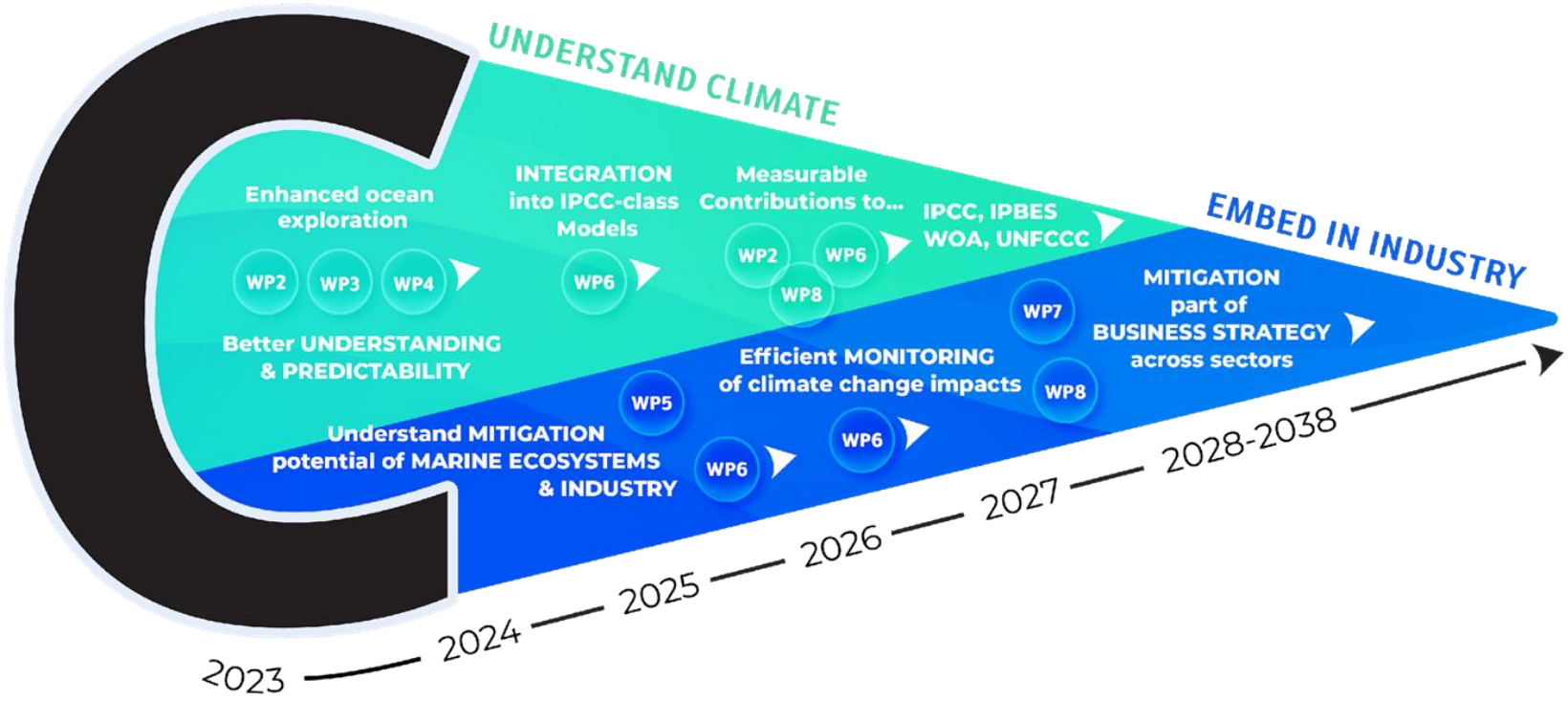
UKRI



Our ambition

OceanICU as a fundamental research-based pathway to impact

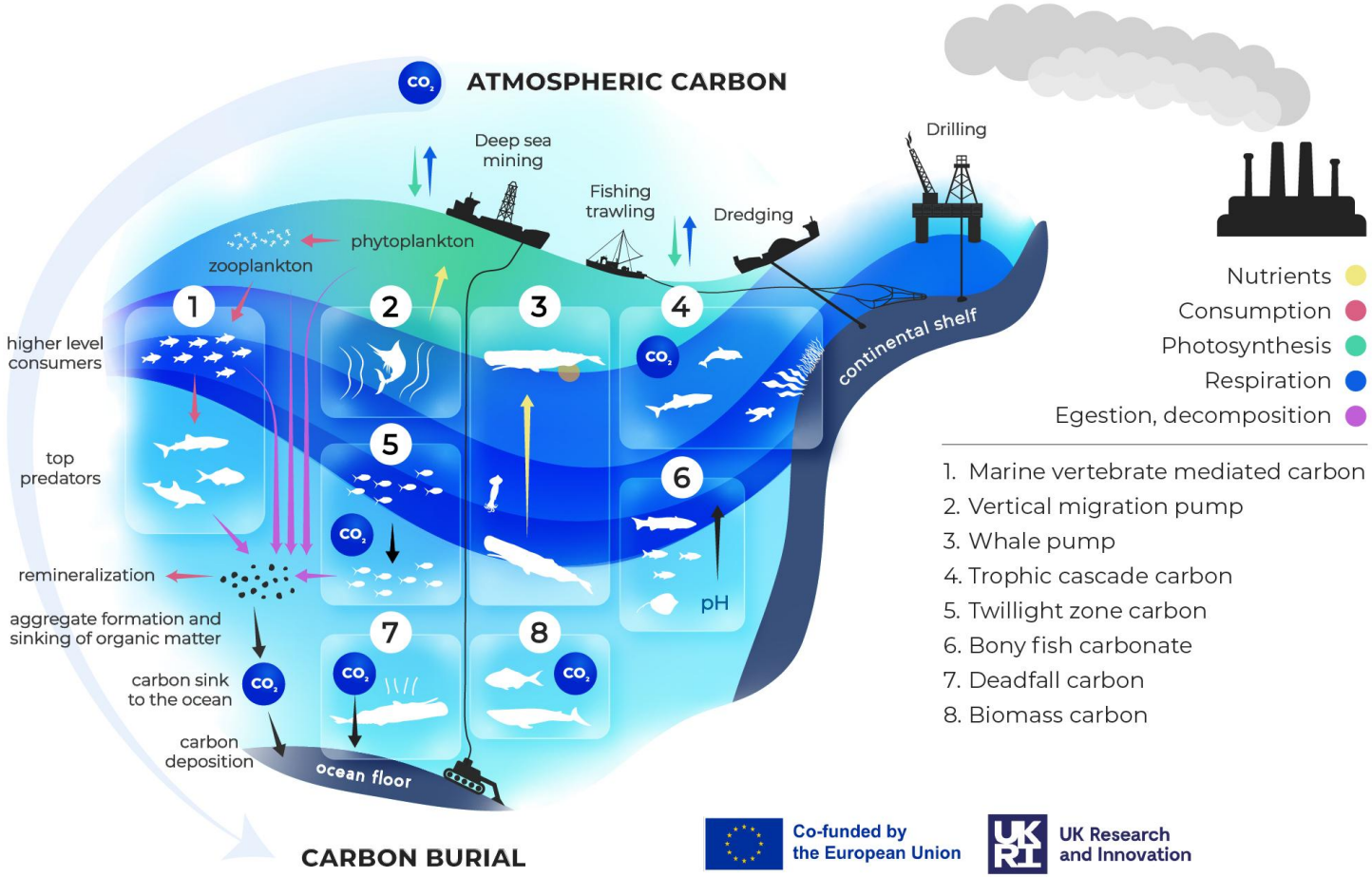
1. Define **current state of C cycle** (provide a baseline) and assess future climate driven change to Ocean C cycle
2. Quantify **key processes** relevant to these indirect effects
3. Incorporate key processes into **models** to enable indirect effects to be quantified
4. Translate the improved model skills into **new tools** that allow Ocean users and licencers to estimate C cycle impacts on industrial processes
5. Couple these to **estimates of future industrial processes**, fishing and climate change to estimate industrial impacts on Ocean C cycle



Key issues

Biological Carbon Pump (BCP) processes considered in OceanICU

- Most models include processes relevant to climate but do not include parameters relevant to industry
- There is a need to understand key processes and then model them to deliver overall vision
- Now models containing key processes need forcing with societally relevant scenarios



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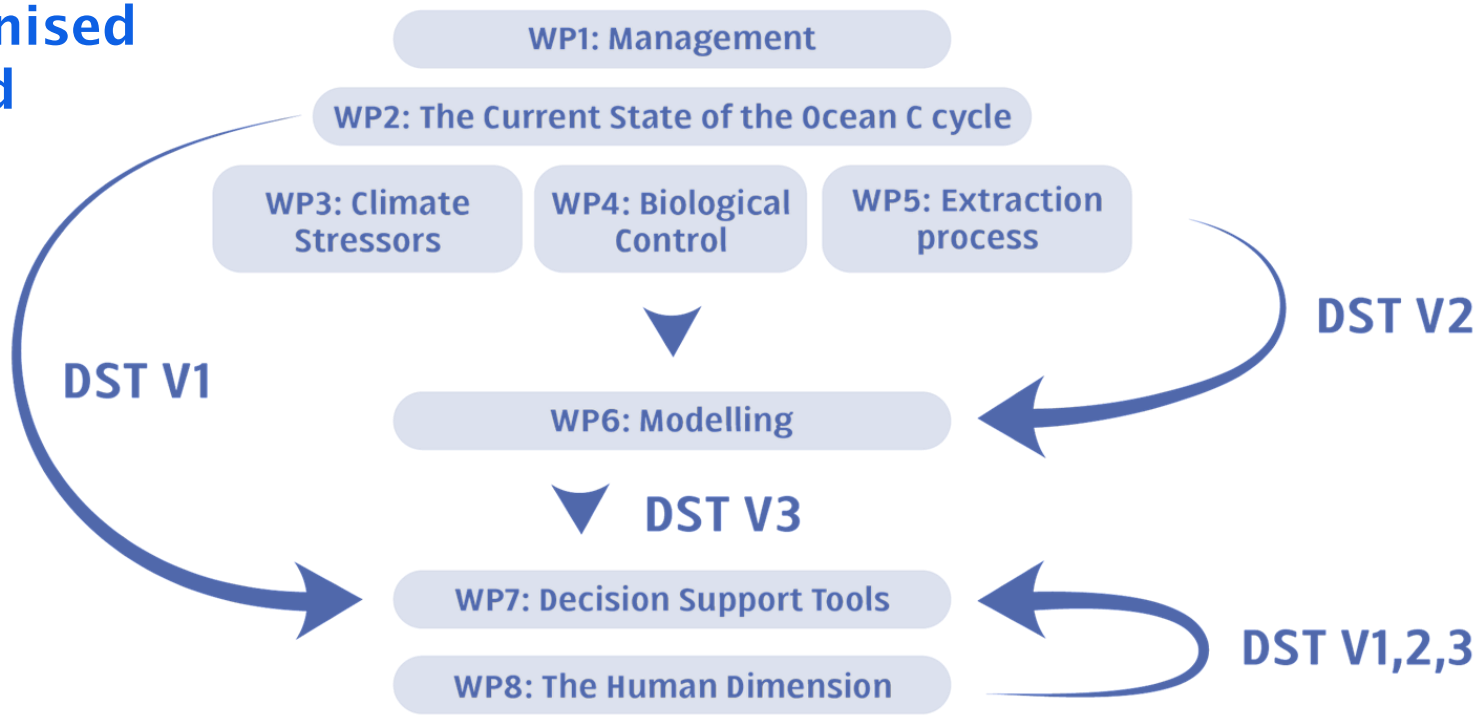
OceanICU Workplan

OceanICU is organised into eight focused work packages

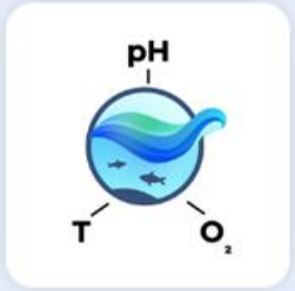




WP1



WP2



WP3



WP4



WP5



WP6



WP7



WP8

OceanICU
Understanding Ocean Carbon

Tiny but mighty ocean critters!

Combining novel imaging devices with traditional net sampling to study zooplankton communities in the Atlantic Ocean

WP4 | Ecosystem controls on carbon sequestration

Eloïse Savineau, Postdoctoral researcher, University of Exeter (UK)

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What are zooplankton and why are they important?

Zooplankton: “zoo” = animal, “plankton” = drifter
Mesozooplankton size range 0.2 mm to 20 mm

~1,000,000,000,000,000,000,000 copepods (1 sextillion, 10^{21})
(that’s more than all insects on land!)









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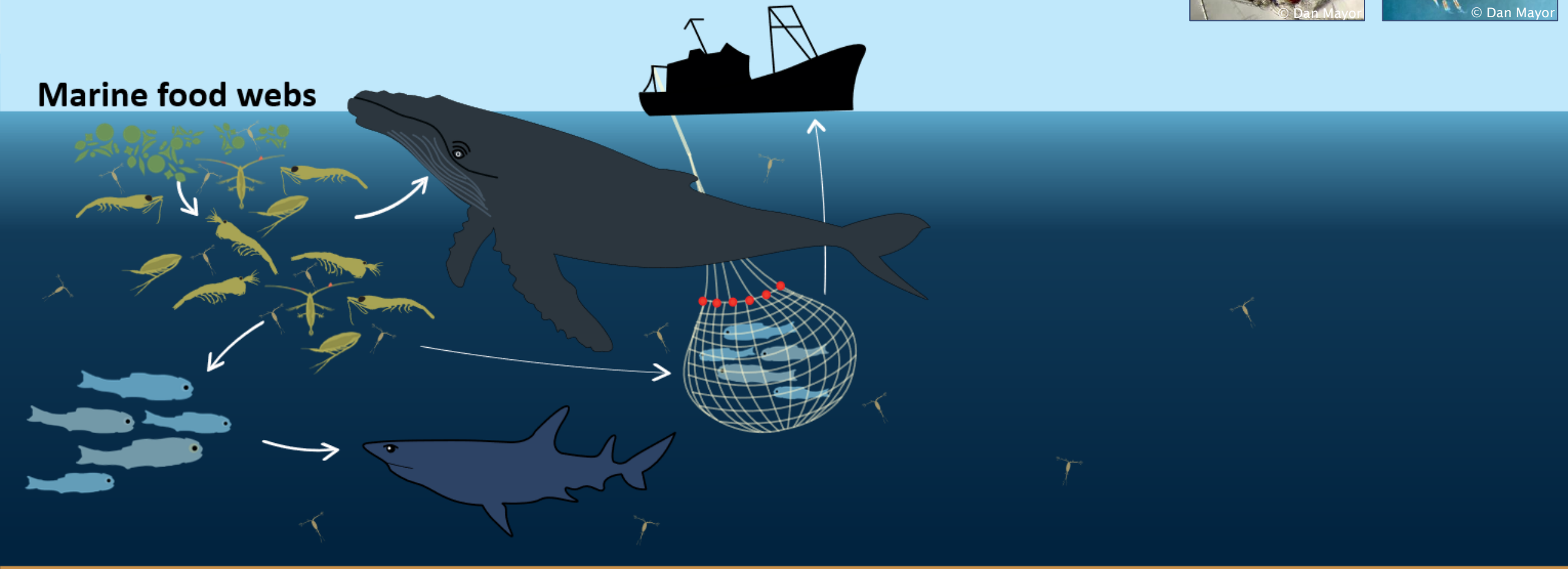

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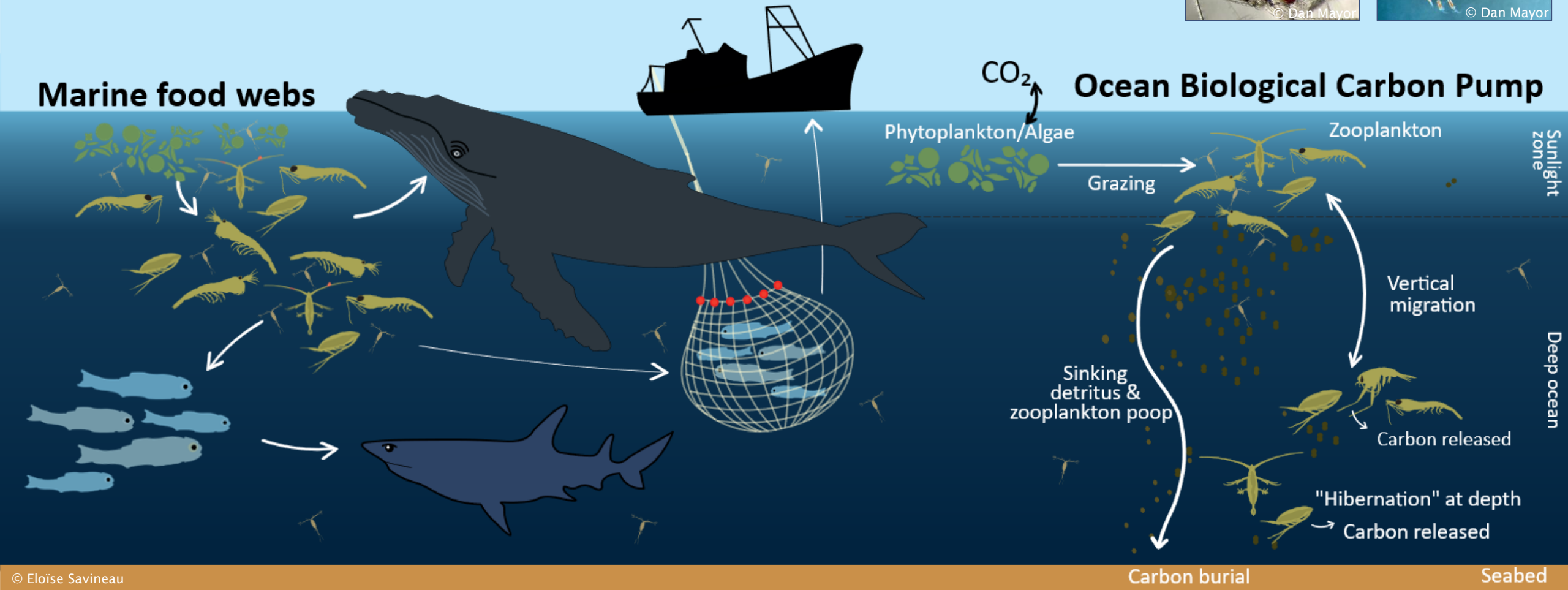

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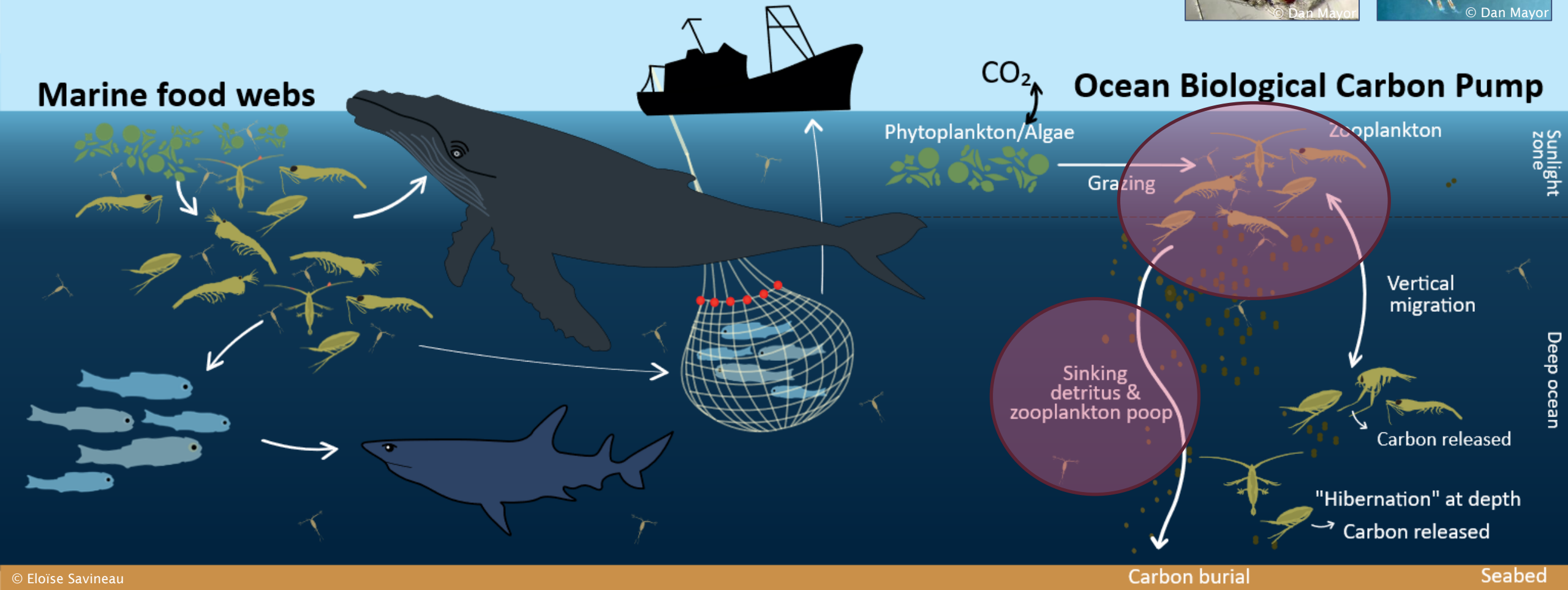

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How do I carry out my work?

Open ocean expeditions on research vessels

RRS Discovery – one the UK's world-class research vessels. A 99.7m long moving research laboratory

- Work, eat, sleep, repeat for 5 weeks at sea!









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- Work, eat, sleep, repeat for 5 weeks at sea!

Deploy nets to catch zooplankton
Process and preserve them in the lab on the ship



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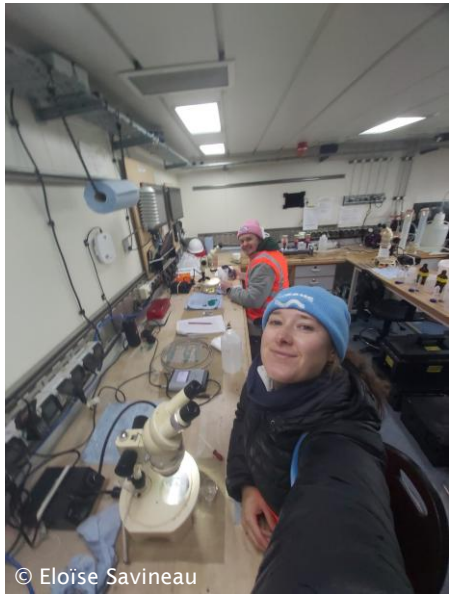
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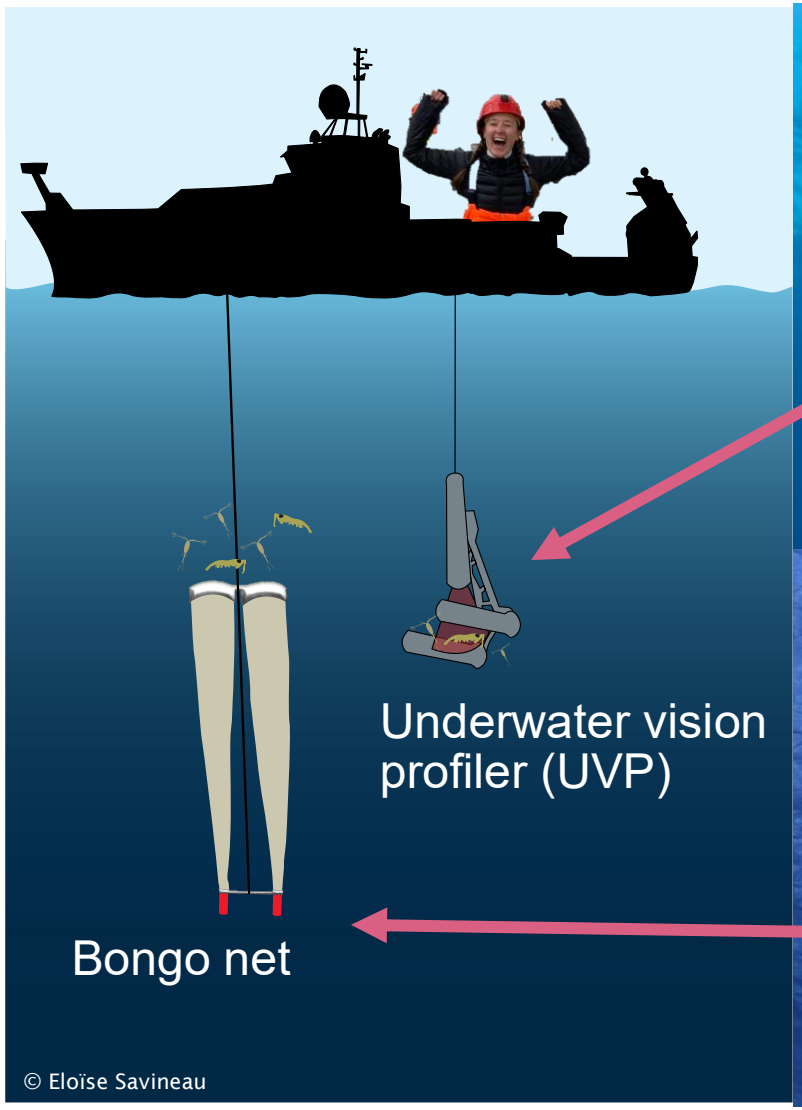
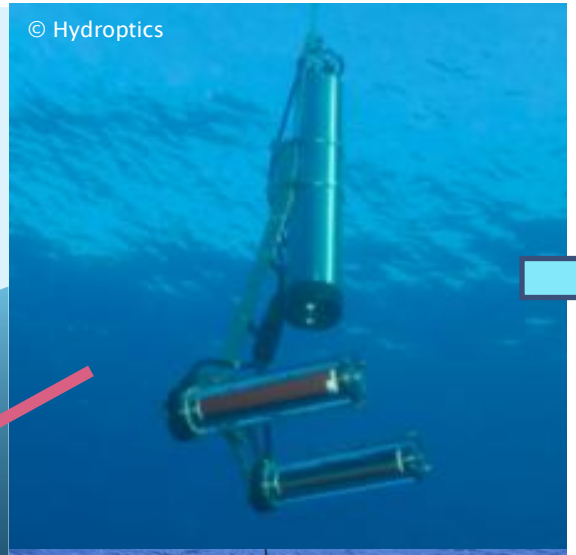
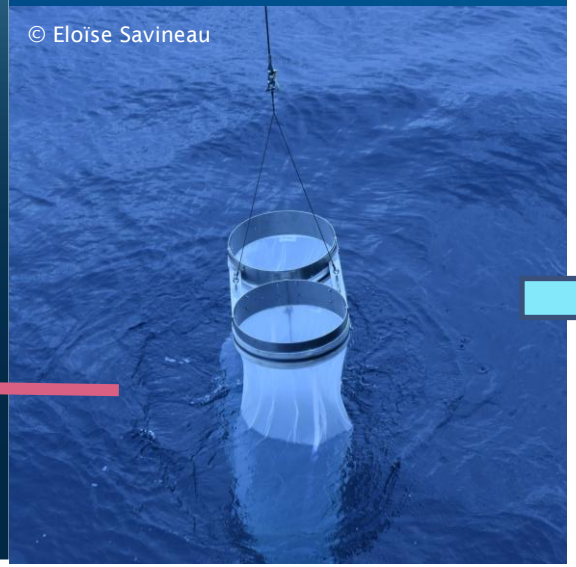
New plankton imaging technologies

Underwater vision profiler (UVP5) vs conventional “Bongo” nets



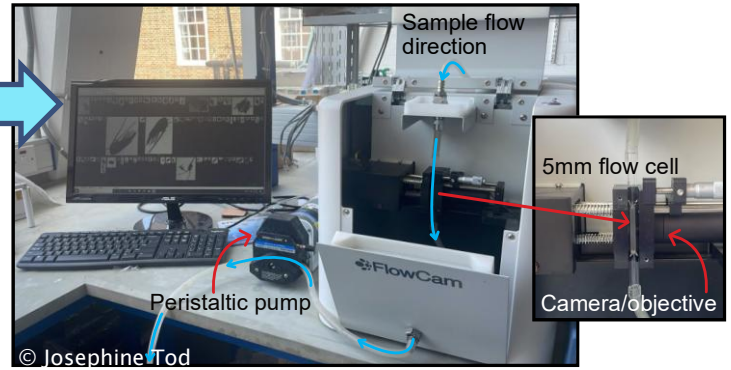


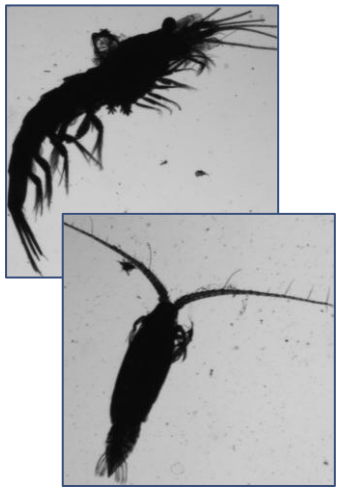


Takes in-situ images of zooplankton



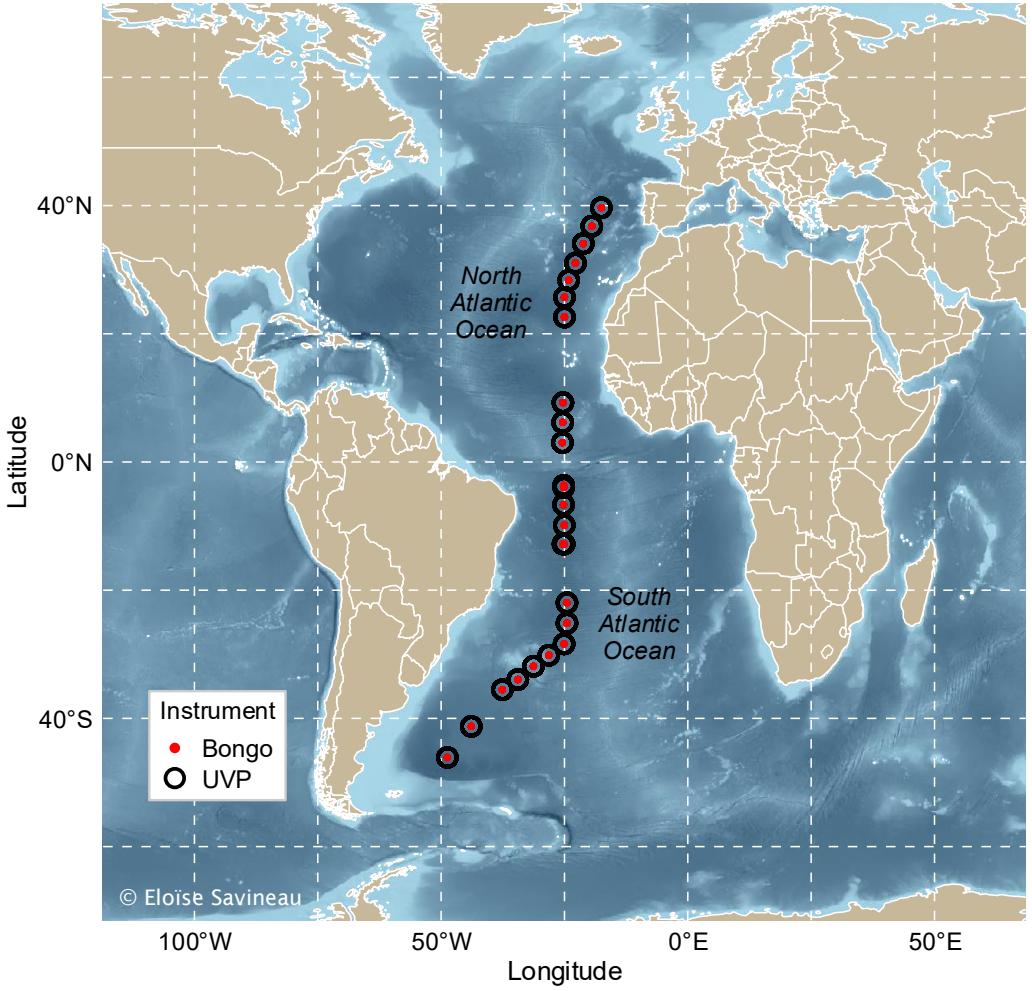
Collects physical samples. Analysed in the lab using imaging flow microscopy (FlowCam Macro)





Where do I carry out my work?

All along the Atlantic Ocean....



Atlantic Meridional Transect

Collected plankton samples from the Falkland Islands all the way back to the UK



How does my work contribute to OceanICU objectives?

WP4 | Ecosystem controls on carbon sequestration

Work package objectives

- Quantify the role of higher trophic levels in attenuating particle flux via fragmentation and feeding.
- Quantify the contribution of higher trophic levels to the biological carbon pump via active fluxes and shunts.
- Determine interior respiration and dark carbon fixation,
- Develop an internally consistent carbon budget in one location to test our understanding.
- Develop parameterisations linking key processes to environmental and biological parameters.

Understanding:

- Zooplankton species composition and abundance
- Trophic ecology and life histories
- What and where they are eating / pooping / living

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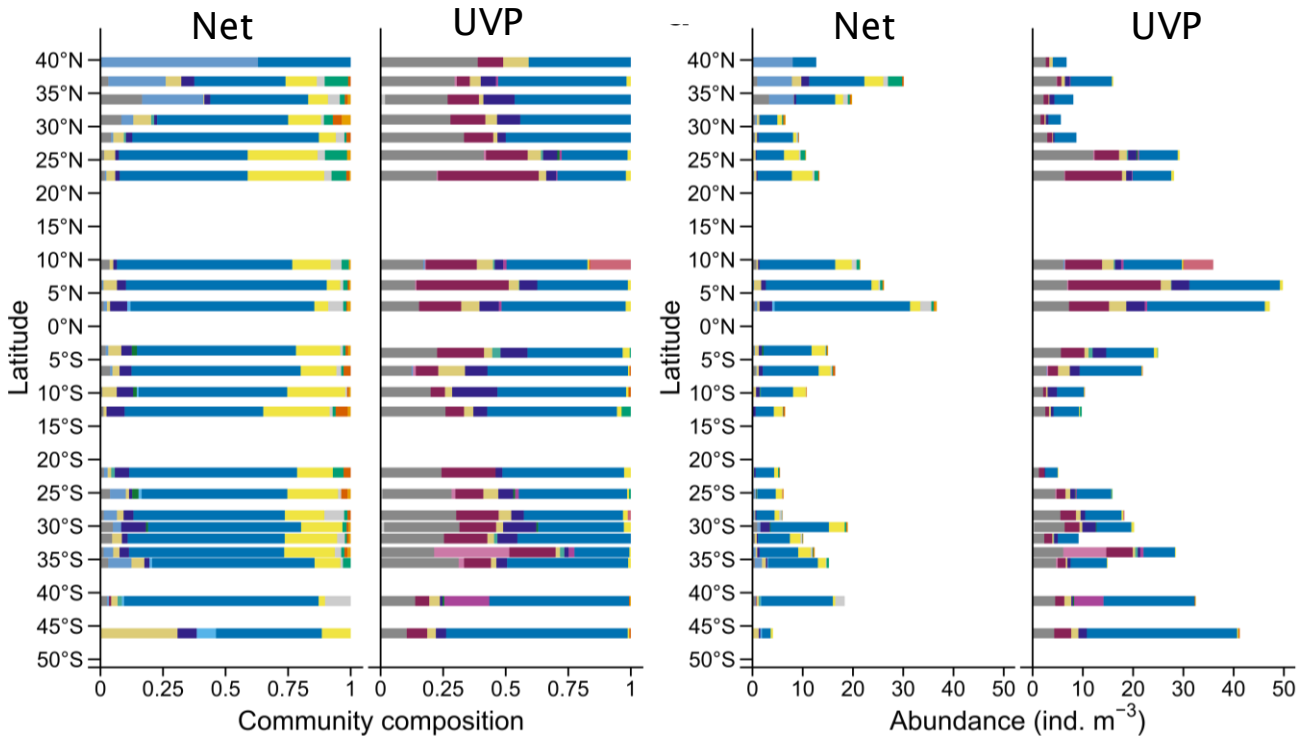











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Combining nets and imaging instruments to:

- Better partition the contribution of zooplankton to total sinking particle counts using in-situ imaging devices.
- How much of current particle flux is actually live zooplankton?

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Detritus behaves differently to zooplankton and have very different influences on ocean ecology and carbon cycling.

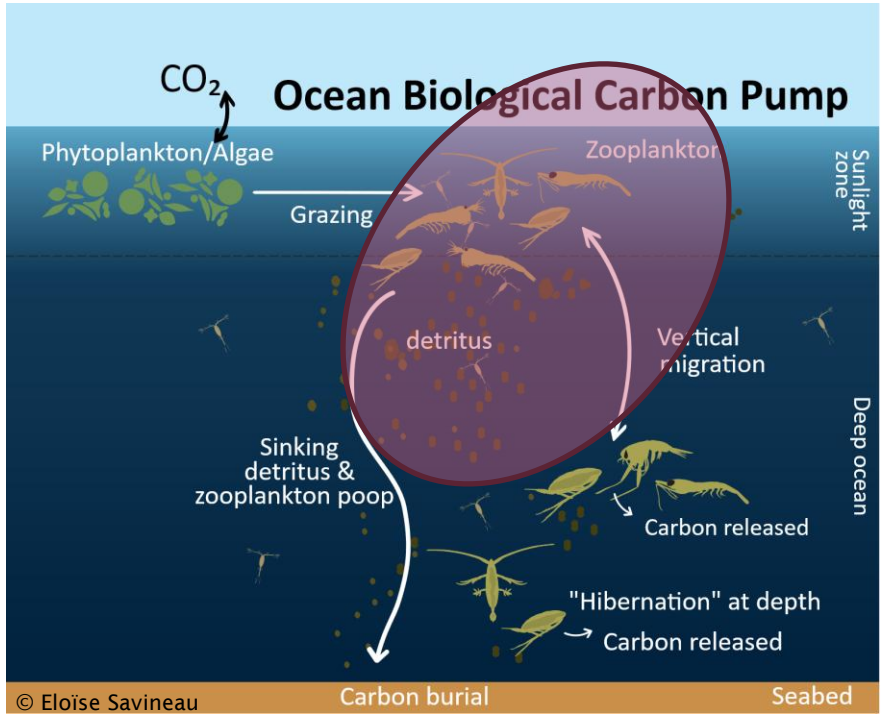
Analogy:

detritus vs zooplankton

=

compost vs rabbits

Make sure we are correctly estimating particle flux (e.i. detrital/carbon sinking to deep sea)



OceanICU



Eloïse Savineau
Post-doctoral research associate, University of Exeter
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Combining climate and environmental sciences with economics to connect science to policy

Fabio Berzaghi
Senior Researcher

INTERNATIONAL MARITIME ORGANIZATION

WMU-Sasakawa
Global Ocean Institute

WORLD MARITIME UNIVERSITY

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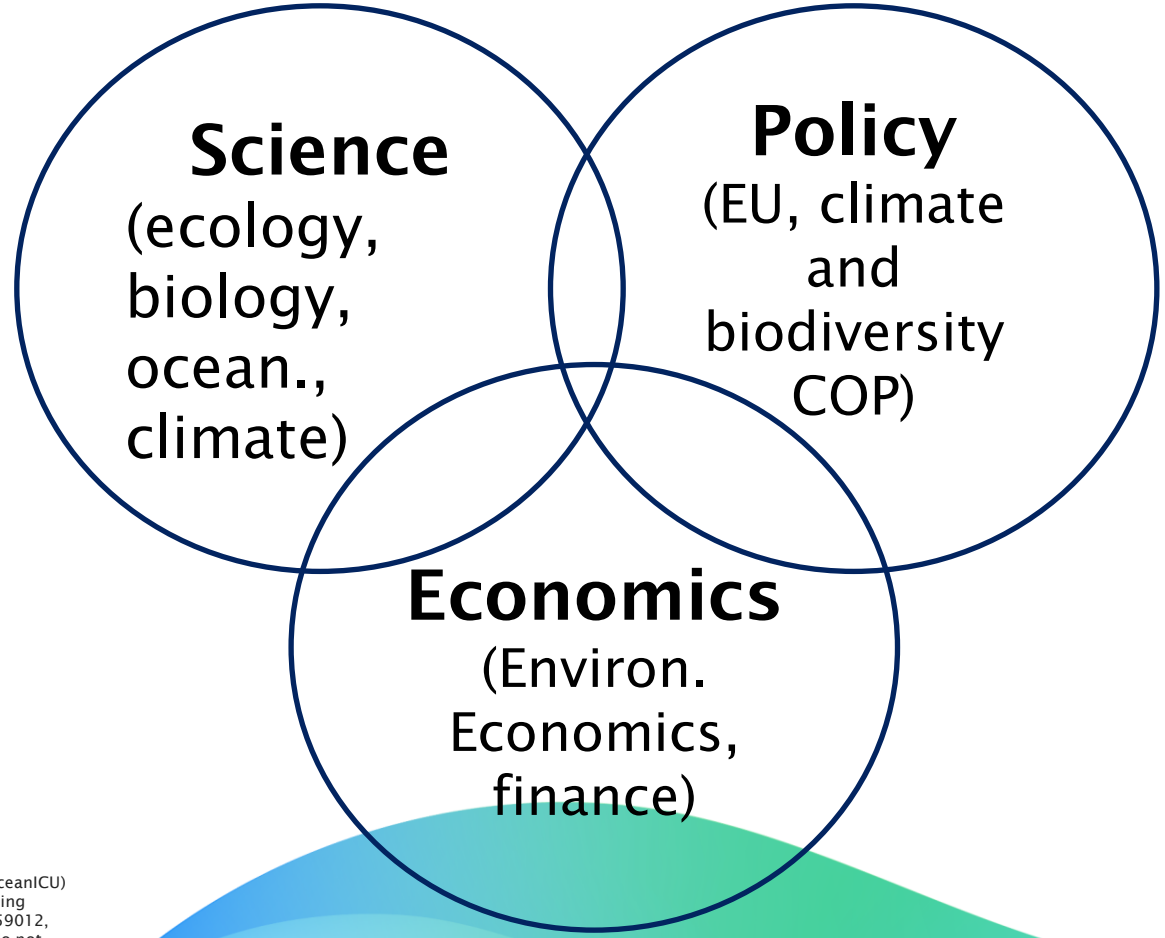

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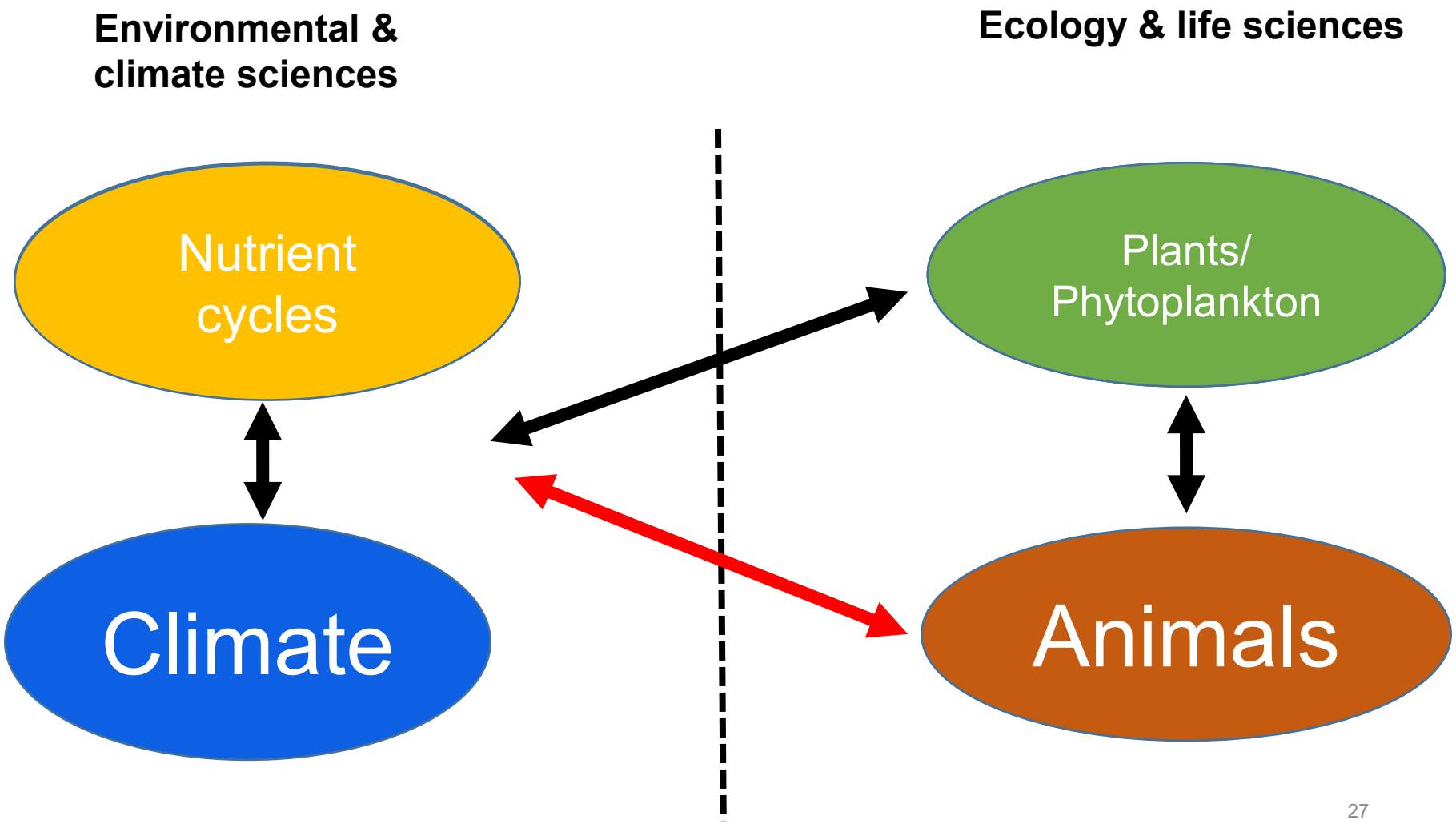
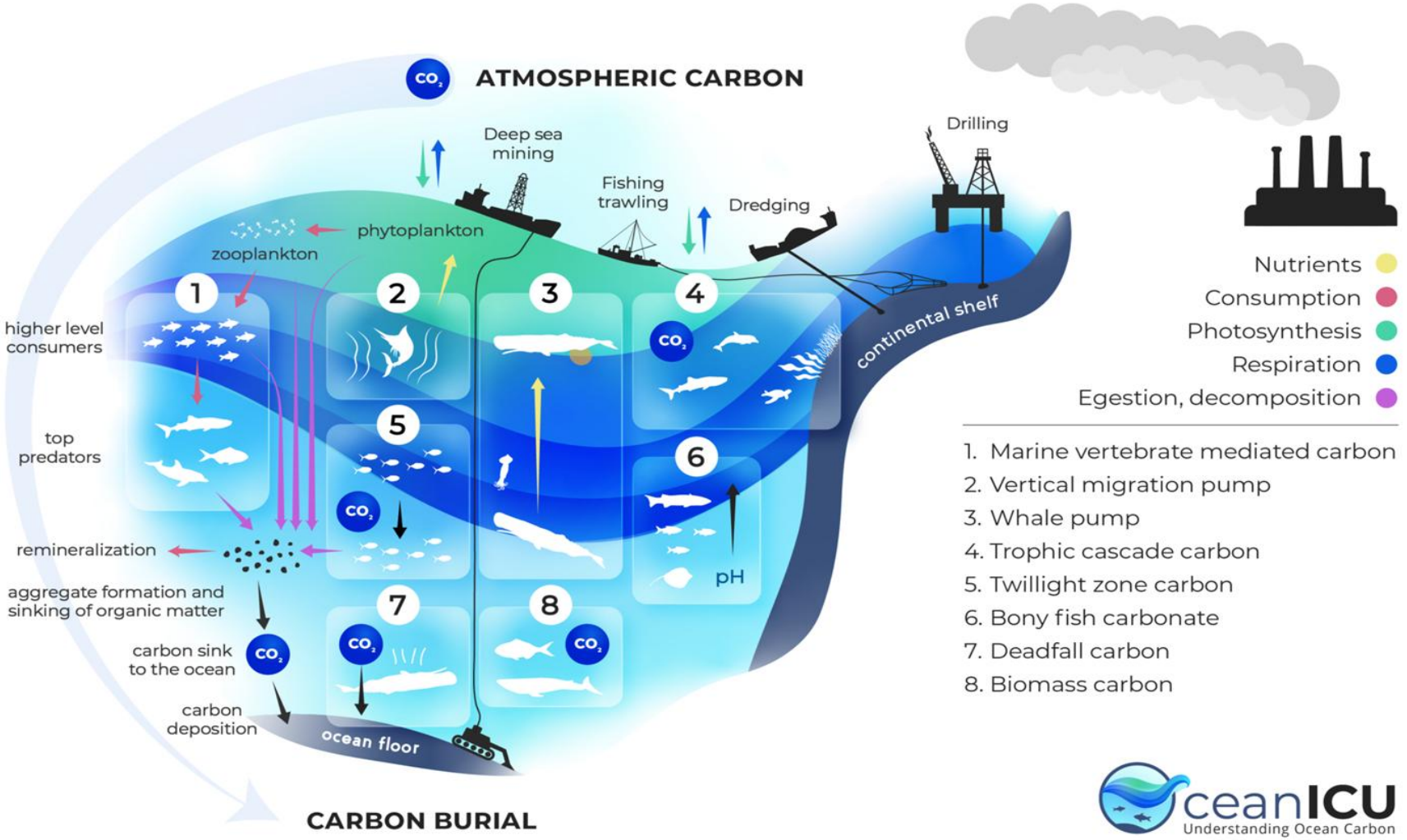
Animals, biogeochemical cycles, climate



Interdisciplinary research for solving complex problems

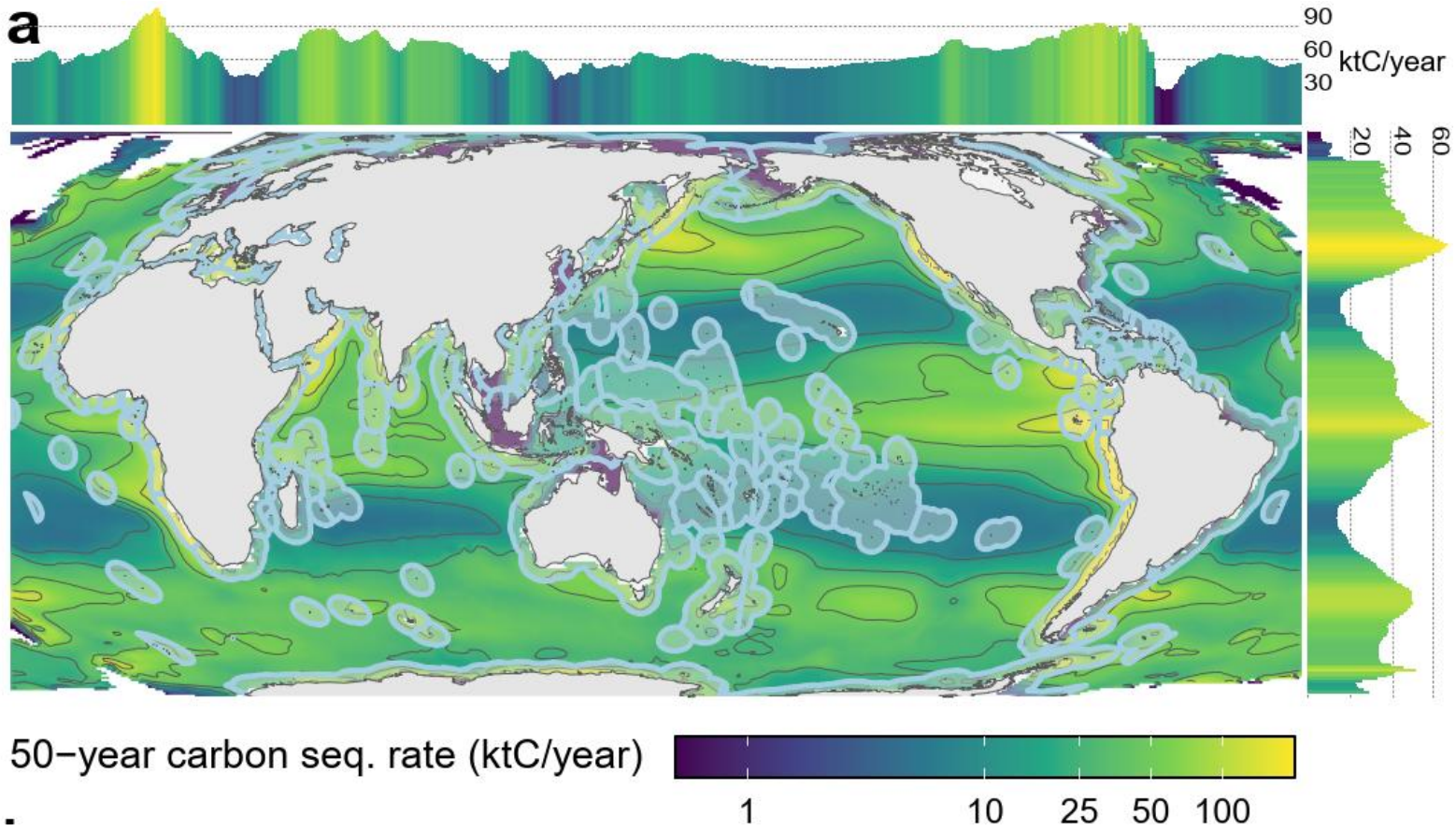
Roles of marine organisms in the ocean carbon cycle (Environmental and climate sciences)



OceanICU Understanding Ocean Carbon

Infographic created by Seascape Belgium for the OceanICU Horizon Europe project, adapted from Lutz and Martin 2014, Figure 2. A conceptual diagram of marine vertebrate carbon services | Version 1.3

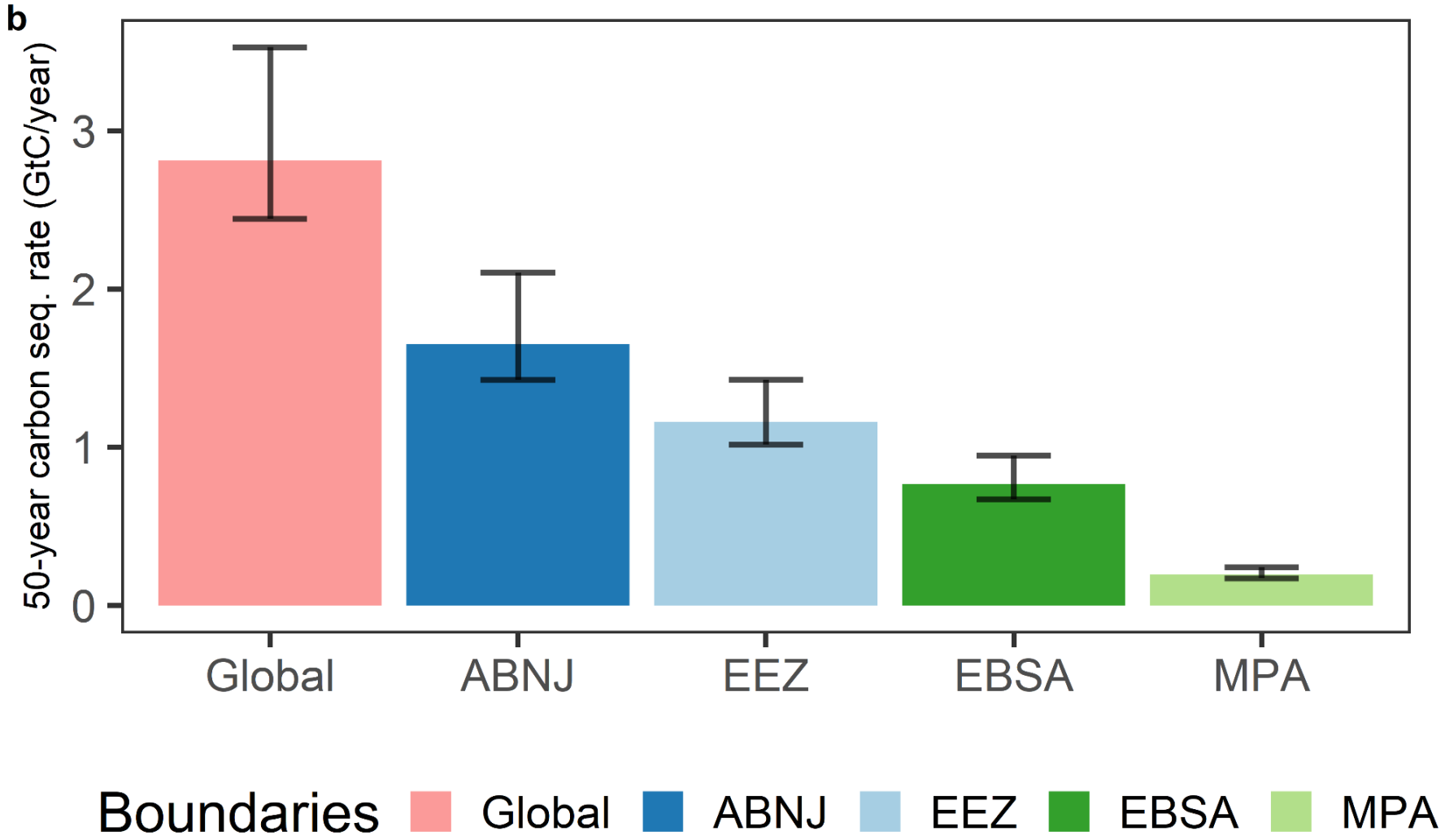
Mapping the Biological carbon pump (BCP), where and how much



Annually the BCP adds 2.81 Gt of carbon in the ocean (range 2.44 - 3.53) with a sequestration time of at least 50 years (±25 years)

Berzaghi et al., *2025 – Nature Clim. Change*

Analysis across management and political boundaries



Areas beyond national jurisdiction (**ABNJ**), Exclusive Economic Zones (**EEZ**), ecologically or biologically significant marine areas (**EBSA**), marine protected areas (**MPA**)

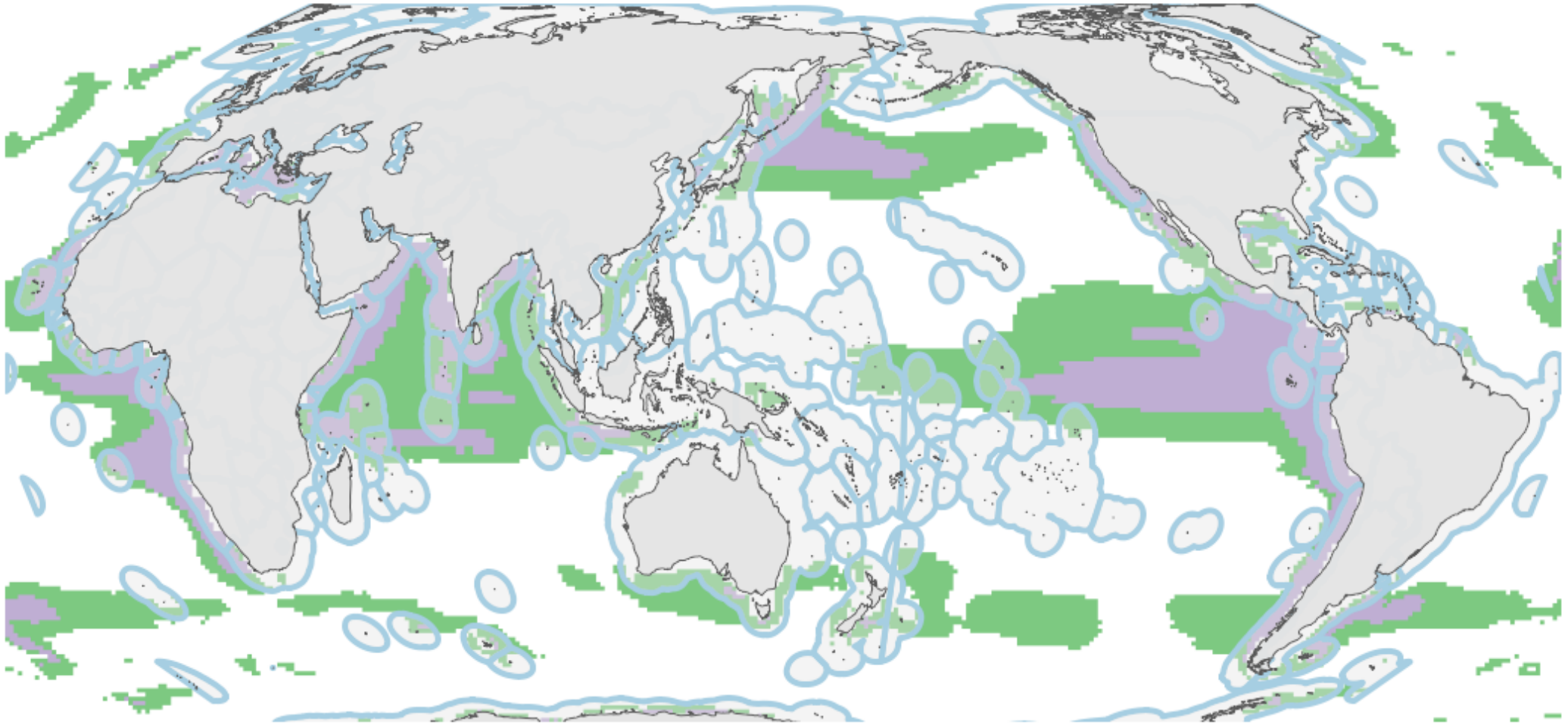
Berzaghi et al., *2025 – Nature Clim. Change*

Marine protected areas (MPA), Exclusive Economic Zones (EEZ),



Berzaghi et al., *2025 – Nature Clim. Change*

30x30 initiative



30% surface coverage − 58% of global BCP seq.

10% surface coverage − 30% of global BCP seq.

Berzaghi et al., *2025 – Nature Clim. Change*

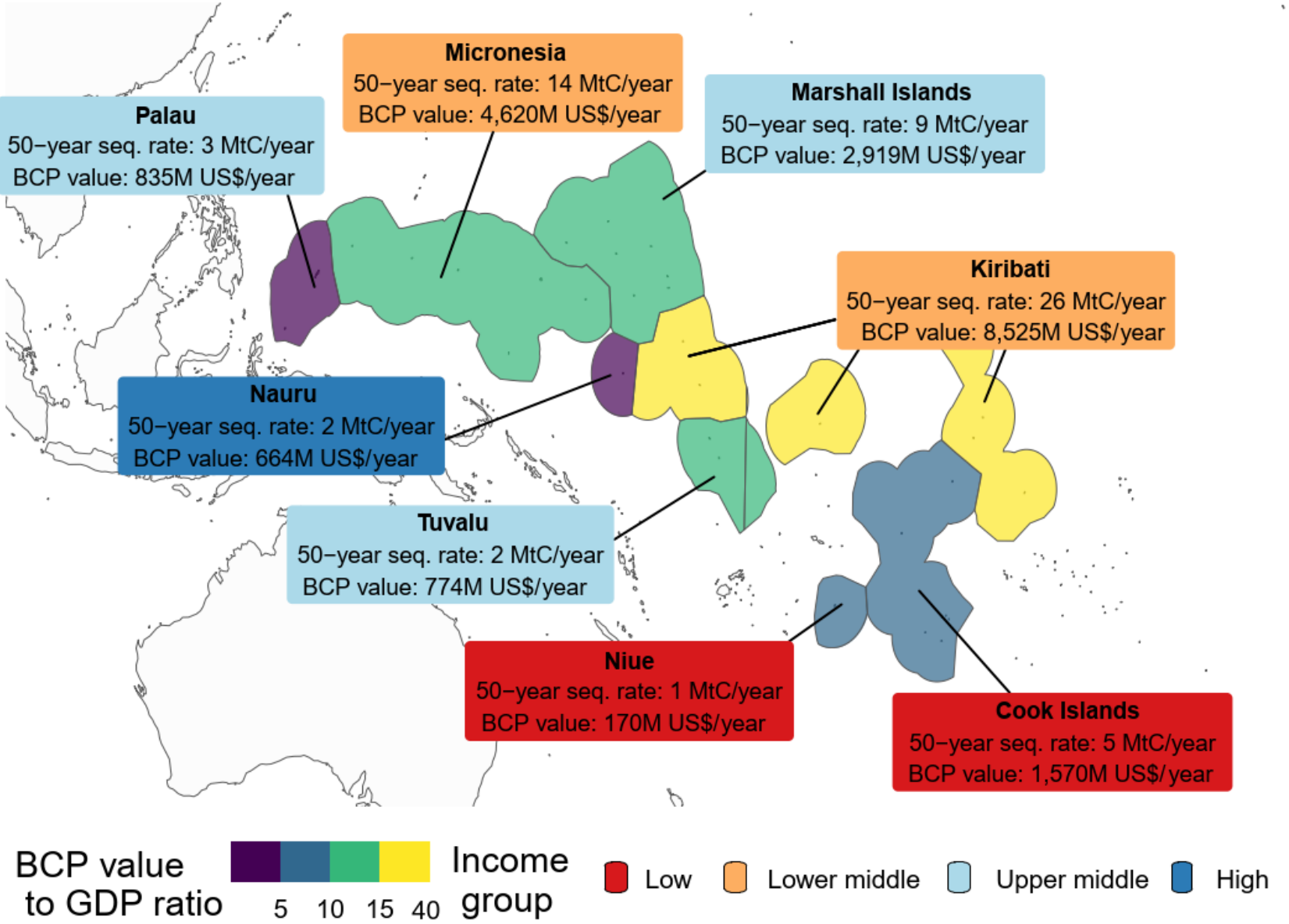
Value of biological carbon pump
(based on price of carbon)

- The BCP carbon services are worth US$383 billion/year in all national waters ($336-471 billion/y)

- US$545 billion/year (471-694) in international waters

- A large value for humanity

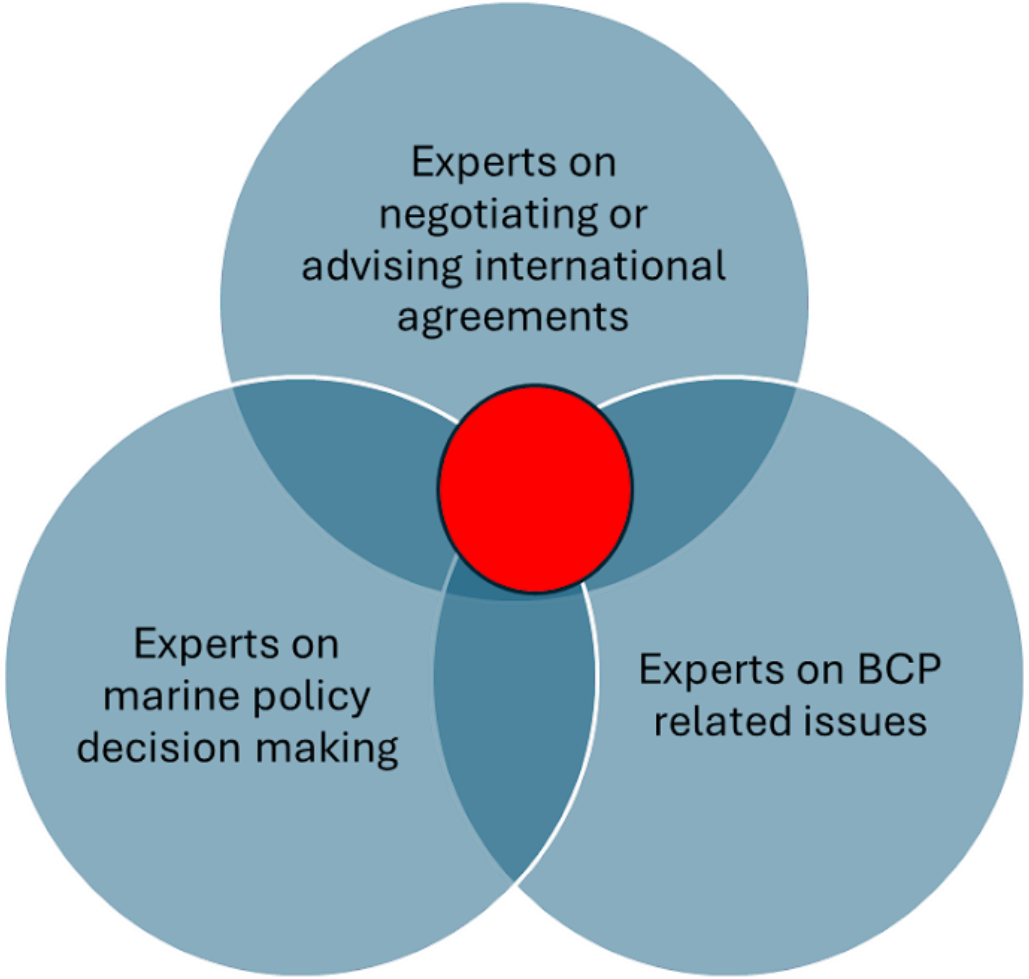
Small Islands Nations



Gross Domestic Product (GDP)

Berzaghi et al., *2025 – Nature Clim. Change*

Interviews with experts



Results

Educate policymakers

Economic valuation tools for the BCP

Policy engagement and access

Transdisciplinary research

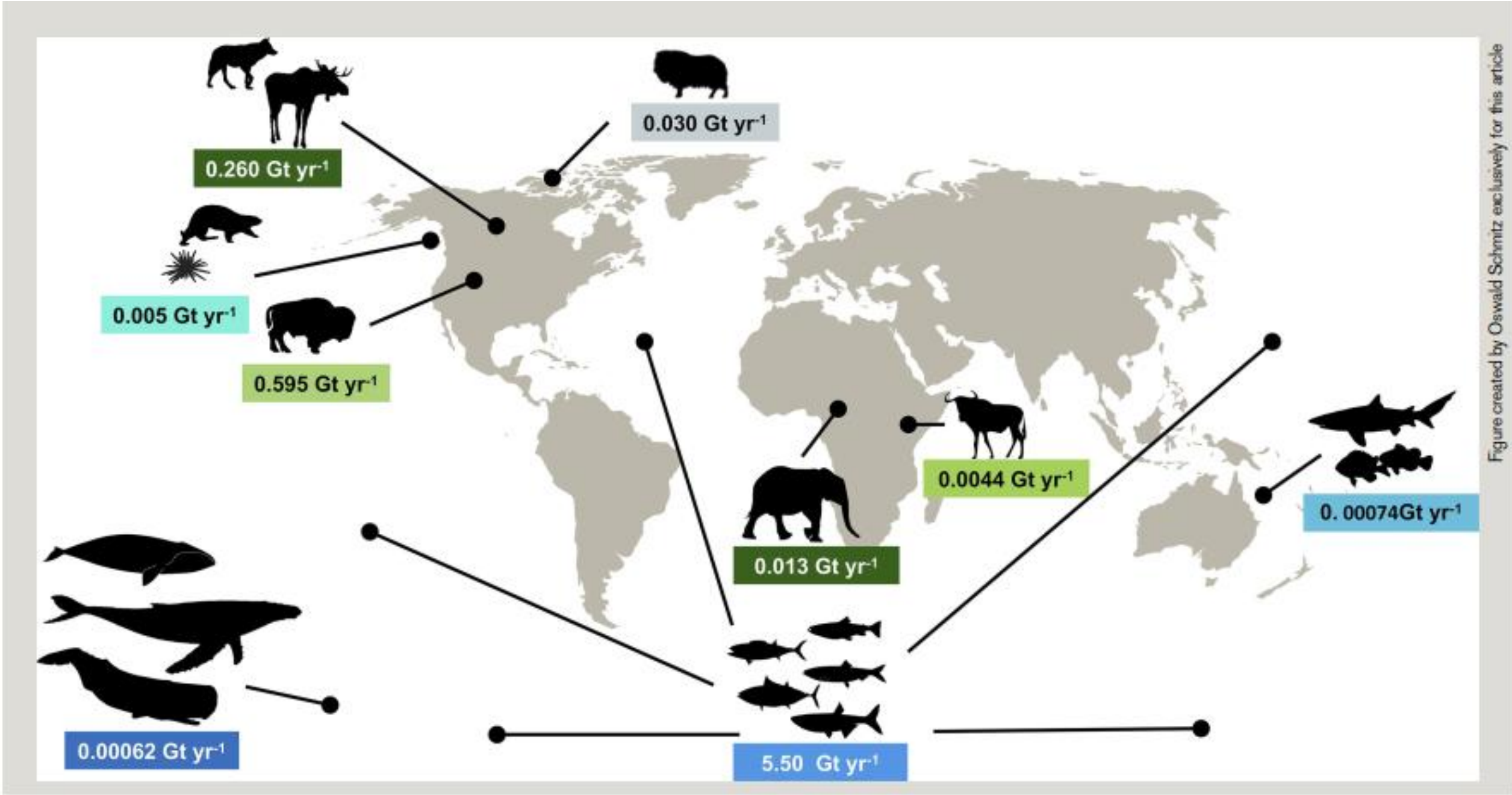
Develop negotiation strategies

Effective compliance mechanisms

A need for an umbrella umbrella approach

Independent science

Power plays and power dynamics



Schmitz et al., *2023 – Nature Clim. Change*

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OceanICU Youth Competition



OceanICU Youth Competition – Who?

The Youth Competition is open to all young people aged 14 to 30 years old worldwide.

The competition includes three age groups:

- young people aged 14 to 18 years old
- young people aged 19 to 24 years old
- young people aged 25 to 30 years old



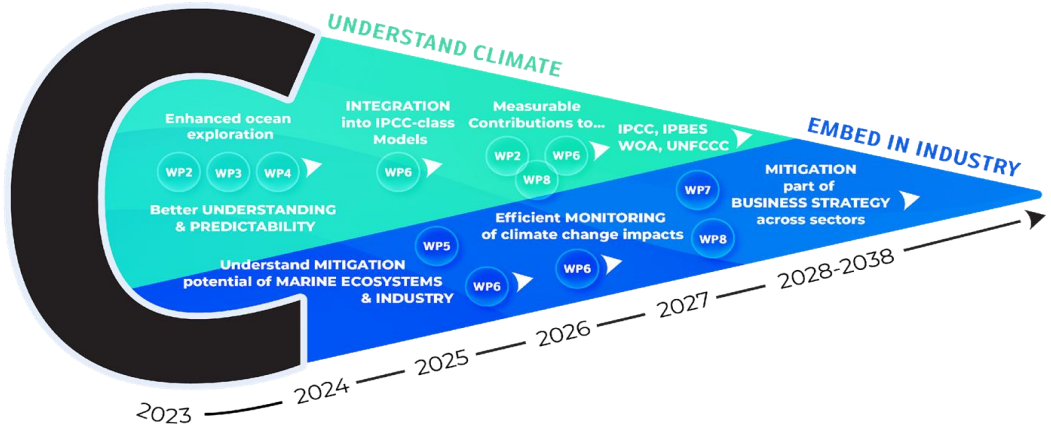
Mandatory: If you are below 18 years old, please note that we ask you to upload authorisation from your parents to participate in the competition when you submit your application.

OceanICU Youth Competition – Why?

Learn
- how the ocean captures and stores carbon
- why it is important to understand this in the context of climate change
- how scientific research has been carried out

Discover
- multiple aspects of the OceanICU project

Get
- new knowledge and skills in science communication
- visibility for your work
- a certificate of participation in the competition



Become a laureate
- your science outreach material will be published on the OceanICU website
- you will be invited to write a blog post for the OceanICU website and record a short video
- you will get the opportunity to participate in an online meeting with a member of the team

OceanICU Youth Competition – How?

Develop a science outreach material on one of these questions

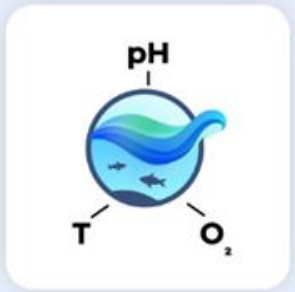
1. Why is it important to understand how the biological carbon pump works?
2. How do scientific researchers carry out their work in the OceanICU project (e.g. methods of collecting samples, data analysis, modelling, remote sensing, laboratory experiment, stakeholder focus groups)?
3. How does research on whales / fish / cold water corals / zooplankton / marine particles help us understand ocean carbon? [select one of the five options]
4. What makes OceanICU an interdisciplinary project and why is interdisciplinarity important for researching the biological carbon pump?
5. What tools does OceanICU develop to make better decisions for sustainable management of the ocean in the future?
6. How have human activities and pressures influenced the ocean carbon cycle, and how has OceanICU contributed to this research field?



WP1



WP2



WP3


WP4


WP5


WP6

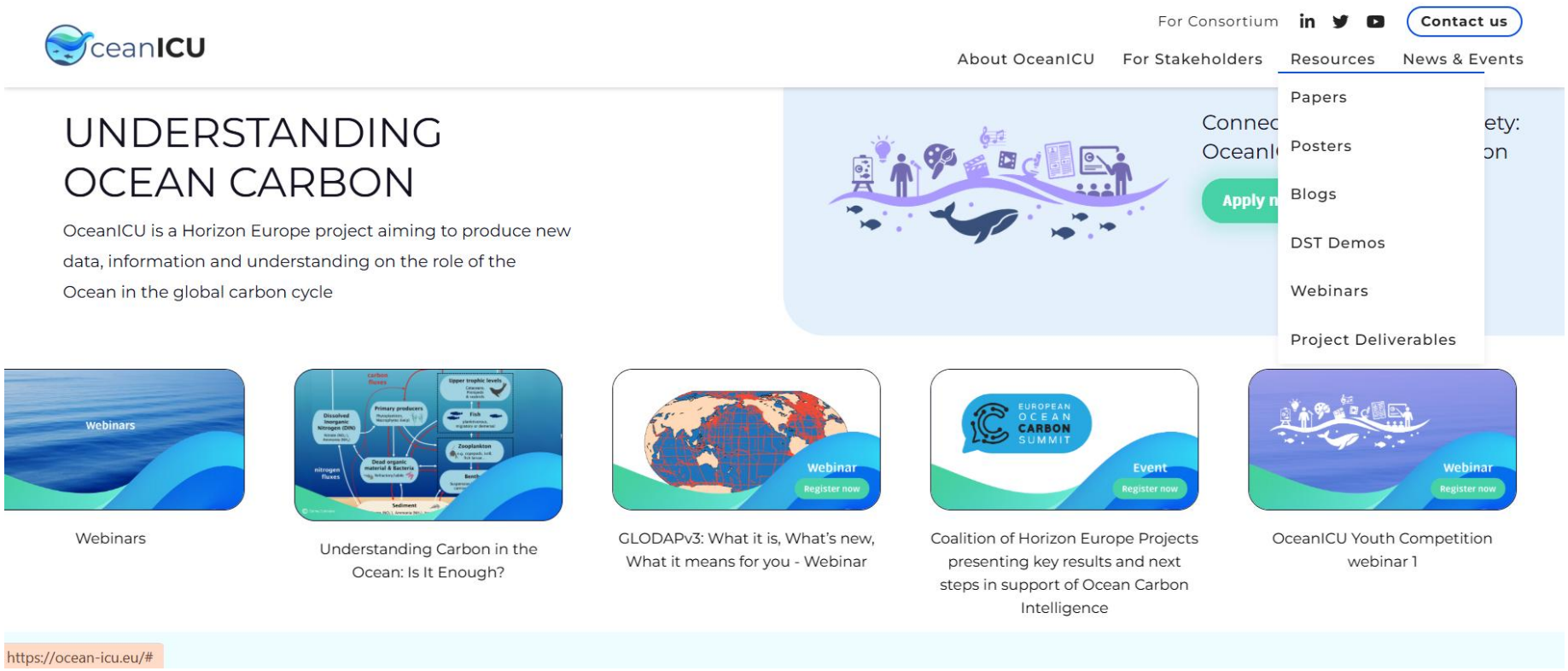


WP7


WP8

OceanICU Youth Competition – Good reads

Website



Webinars

Understanding Carbon in the Ocean: Is It Enough?

GLODAPv3: What it is, What's new, What it means for you - Webinar

Coalition of Horizon Europe Projects presenting key results and next steps in support of Ocean Carbon Intelligence

OceanICU Youth Competition webinar 1

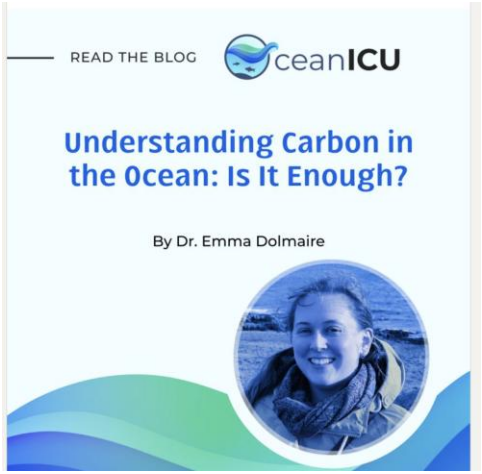
Newsletter

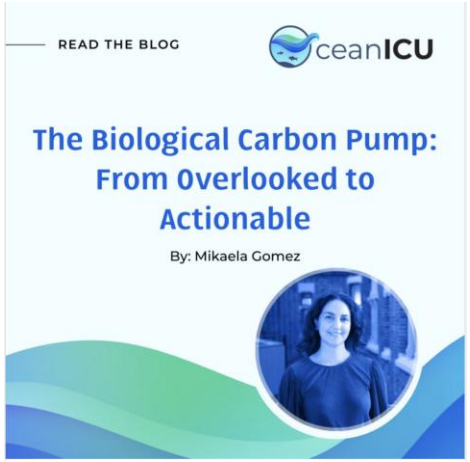
Follow the latest OceanICU news Newsletter

Credits on website

OceanICU Youth Competition – Good reads

Blogs

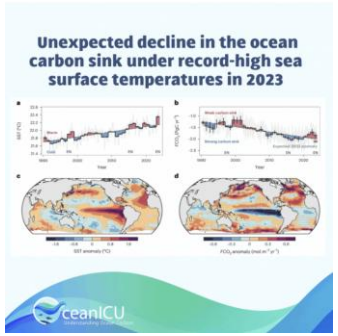


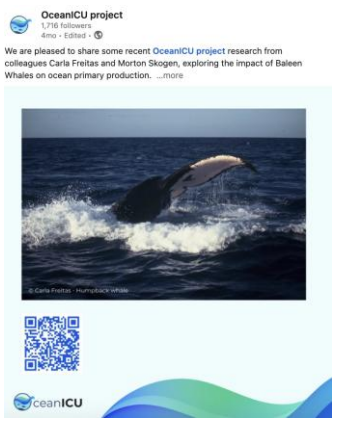


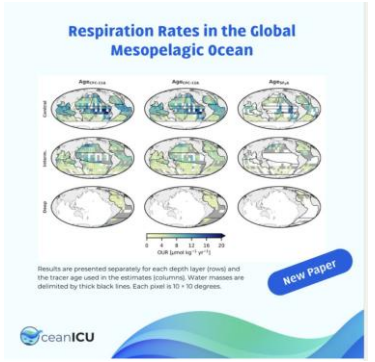


Papers

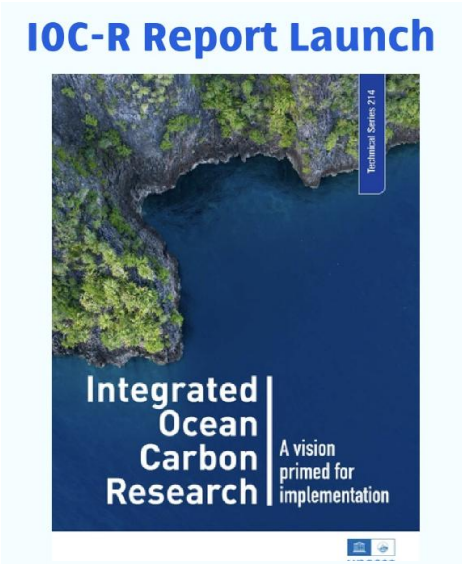








IOCR Report



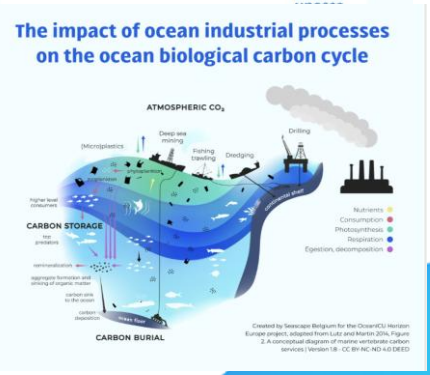


Photo credits on website

OceanICU Youth Competition – How?

Type	Format	Examples	Accepted size
Document	PDF	Poster Blog post text Written interview Poem Quiz Board game	1-5 pages File size: maximum 20MB
Presentation	PDF	Slideshow with or without voice over and video recording	Maximum 10 slides File size: maximum 20MB
Storytelling	PDF	Story booklet Comics	Maximum 5 pages File size: maximum 20MB
Images	PDF JPEG	Infographic Drawings	File size: maximum 20MB
Short videos	Link to YouTube video	Animation Hands-on experiment Interview Artwork Art performance	Maximum 5 minutes
Short sound recording	Link to the recording on a podcast channel	Podcast Song	Maximum 5 minutes

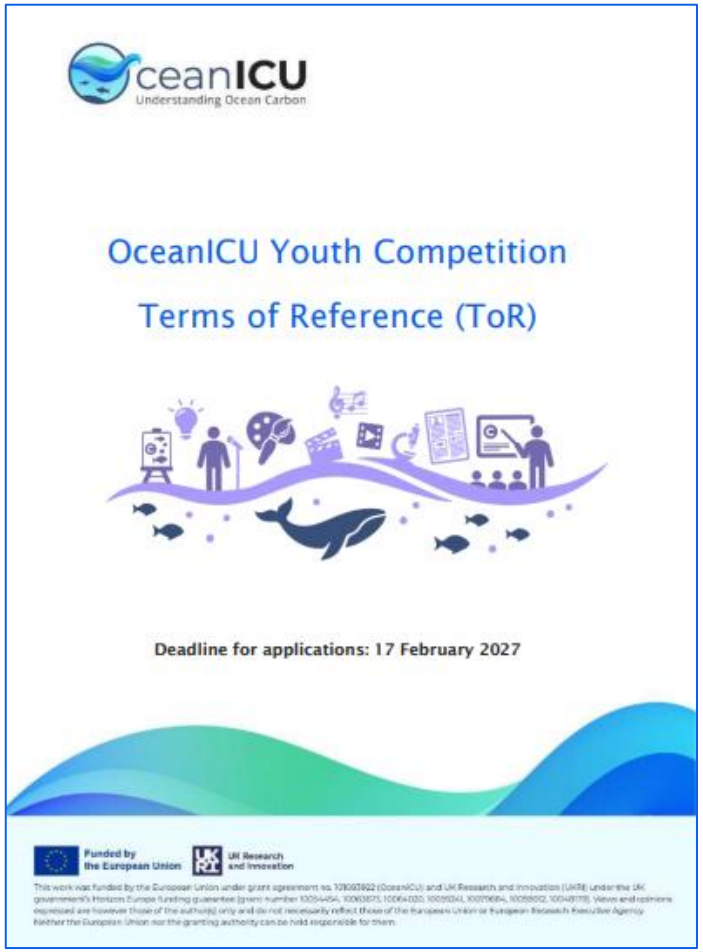
Do not include your name in the science outreach material directly. Include it under credit in the application form.

OceanICU Youth Competition - Eligibility Criteria

- ✓ you are **aged 14 to 30 years old**
- ✓ your application is submitted in **English**
- ✓ your science outreach material is **in English** or includes **subtitles in English**
- ✓ your science outreach material **does not include** illegal, offensive, inappropriate, or objectionable materials not infringe any person's or organisation's rights to privacy
- ✓ **respect of copyrights**: all images, graphs and visuals used are original or openly licensed and correctly credited
- ✓ **respect of the right of image**: if people appear in your science outreach material, they are not recognisable or, if they are, you have received written consent from them - and their parents if they are not yet 18 years old
- ✓ your application correctly addresses the selected topic of **ocean carbon** and the **biological carbon pump**

OceanICU Youth Competition - Eligibility Criteria

- ✓ the **application form is fully completed**, including all **consent form questions**
- ✓ the **format of your science outreach material** respects the guidelines provided in these Terms of Reference
- ✓ your science outreach material is **original work** you have created
- ✓ any **AI tools** used in support of your work (e.g. subtitles, translations, checking grammar or supplementing your own research) are declared in the application form.



OceanICU Youth Competition – When?



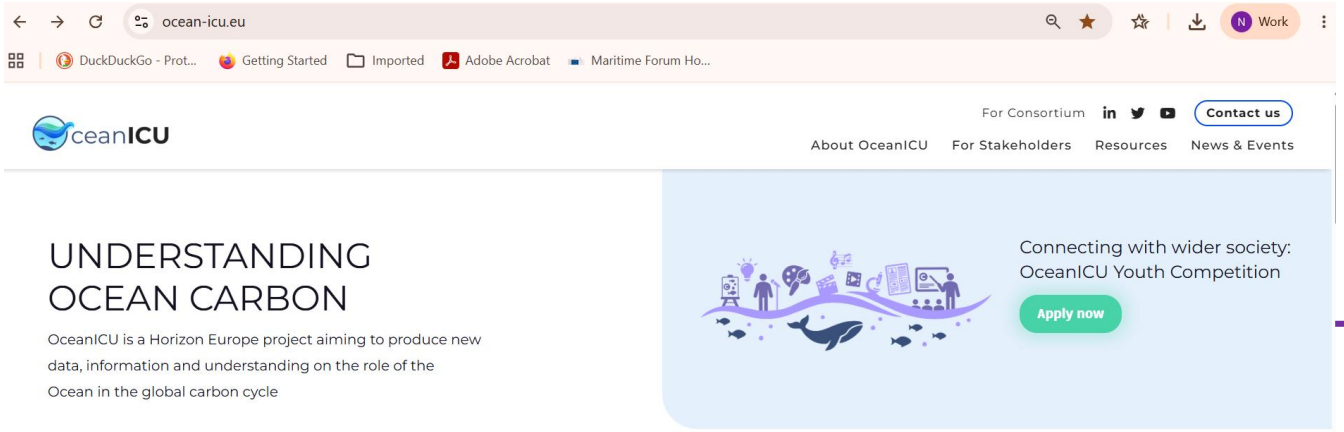
OceanICU Youth Competition – Jury evaluations

Evaluation Criteria	Number of points	How can I / we get a good score?
Relevance to the topic of the Youth Competition	20	Read section 2 on the topic of the Youth Competition carefully and make sure you have understood it well. Do some background reading using the references included under section 2.2 to define what you will communicate about.
Quality of scientific content	20	Search the OceanICU website and the suggested documentation for information about the topic. If needed, search for additional information. Use only reliable references. Participate in the two planned online meetings with members of the OceanICU project team to learn more about the project and ask questions.
Clear message for a wide audience	20	Show your science outreach material to people around you and ask them what they have learned from it.
Creativity	20	Use your talents to communicate! Science outreach includes many forms of communication including visuals, video, animations and art (e.g. poetry, songs, theatre performance).
Accessibility and potential outreach impact	20	Ask yourself: can everyone benefit from my work? Are there barriers to understanding my work? If so, how can I resolve this?
Total	100	

OceanICU Youth Competition - Laureates

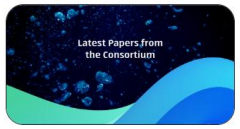
Age category	Laureates
Young people aged 14 to 18 years old	Ranking 1st Ranking 2nd
Young people aged 19 to 24 years old	Ranking 1st Ranking 2nd
Young people aged 25 to 30 years old	Ranking 1st Ranking 2nd

OceanICU Youth Competition – Get all details!

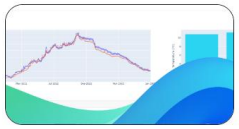




OceanICU Youth Competition webinar 1



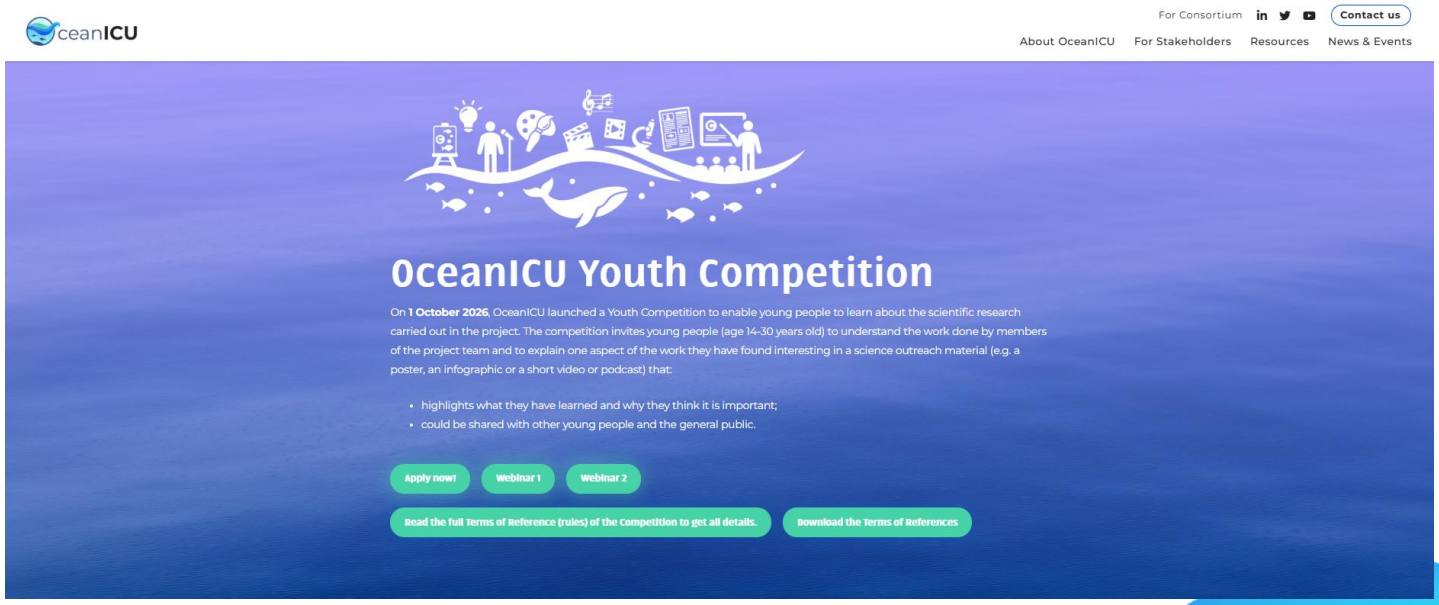
OceanICU has contributed to 65+ papers in high-profile journals



Decision Support Tools



Webinars



https://ocean-icu.eu/

Questions?

youthcompetition@ocean-icu.eu

OceanICU – Upcoming webinar



Join OceanICU at COP31 in the Virtual Ocean Pavilion!

OceanICU – Upcoming webinar

OceanICU

For Consortium Contact us

About OceanICU | For Stakeholders | Resources | News & Events

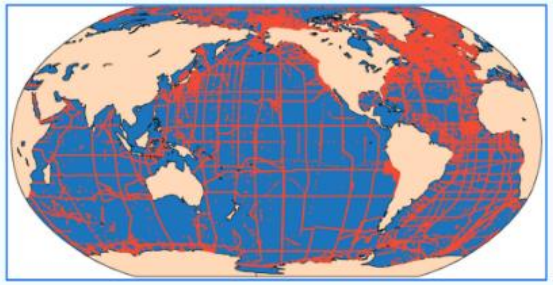
GLODAPv3: What it is, What's new, What it means for you

Thursday 12 of November | 15:00 (subjected to change)

The latest version of the Global Ocean Data Analysis Project will be unpacked in a webinar. **12 of November** (15:00/ subjected to change). Whether you are new to GLODAP or have worked with previous versions, this webinar will provide a brief overview of GLODAP and its evolution from v2, before taking a closer look at what has changed in v3 and the implications for using the dataset in ocean carbon research. **Nico Lange**, **Matthew Humphreys, Ryan Woosley** will present, with a Q&A following.

READ MORE

REGISTER NOW



Map showing all stations in GLODAPv3.

OceanICU

GLODAPv3: What it is, What's new, What it means for you

Thursday 12 November 15:00 (CET)

Webinar

Moderator



Siv Lauvset
NORCE



Nico Lange
NORCE



Matthew Humphreys
NIOZ



Ryan Woosley
MIT

OceanICU Youth Competition – Next webinar

Home | Webinars | OceanICU – Webinar – OceanICU Youth Competition webinar 2

OceanICU Youth Competition webinar 2

Wednesday 13 January 2027 | 17:30 – 18:30 CET

This one-hour webinar is organised by the OceanICU project in the framework of its **Youth Competition**. The competition invites young people (age 14-30 years old) to understand the work done by members of the project team and to explain one aspect of the work they have found interesting in a science outreach material. During the webinar, participants will be able to:





Bianca M. Thobor
GEOMAR

READ BIO



Delon Earle
National University of Ireland, Galway

READ BIO



Carla Freitas
Institute of Marine Research

READ BIO

Understanding Ocean Carbon

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