

Inaugural Webinar Welcome and overview

Richard Sanders NORCE



OceanICU is co-funded by the European Union, Horizon Europe Funding Programme for research and innovation under grant agreement No.101083922 and by UK Research and Innovation

OceanICU Inaugural Webinar



MEET THE PANELLISTS



Richard Sanders

MODERATOR

Coordinator of the OceanICU project



Andrew Watson FRS

Royal Society Research Professor, Global Systems Institute, University of Exeter



Carla Freitas

Senior Researcher, Marine Biologist, Institute of Marine Research in Norway, with focus on top predator ecology



Morten D. Skogen

Research Scientist, Ecosystem Modelling Institute of Marine Research, Bergen



Pernille Schnoor

Senior Researcher, Ocean Social Scientist, World Maritime University. Former member of the Danish Parliament

Welcome and Thank You for Joining Us Today

Agenda

- Brief intro to OceanICU Richard Sanders
- Panellist Presentations
 - Andrew Watson FRS: Understanding the current state of the global carbon sink
 - Carla Freitas: Whale Carbon Fluxes
 - Morten Skogen: Modelling the Whale Carbon Pump
 - Pernille Schnoor: Roadmap to Impact
- Open discussion around OceanICU and its role in the Ocean science landscape
 - Ideas for extra activities
 - Links to other programmes
- Questions and Answers



About Today's Format

This webinar is being video recorded

- Cameras & Microphones have been disabled
- Chat has been disabled

Questions and Answers

 Please email questions at any time during the webinar to: hello@ocean-icu.eu

(ask to be anonymous if you do not want your name read out when questions are being addressed

- Questions will be directed to the appropriate panellist by the moderator
- Questions & Answers will be posted on the OceanICU website by early next week; a link will be sent to you in a post webinar communication.

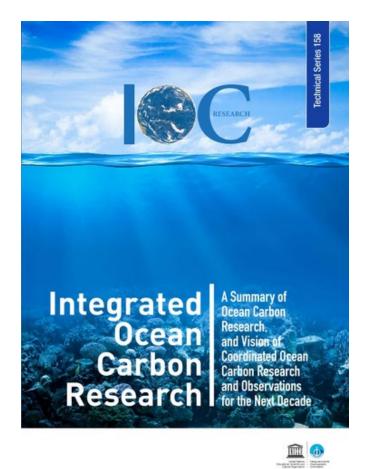
Any problems or comments during or after the session: Email: hello@ocean-icu.eu

Climate Change is the single largest issue we face

Scean**ICU**

Fundamentally driven by accumulation of CO₂ in the atmosphere

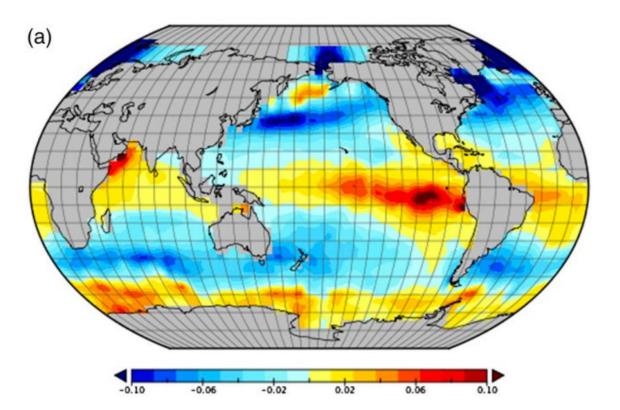
- The EU Green Deal requires us to move to operating in a carbon neutral way
- How does this affect Ocean users?
- Need to compensate for
 - Direct effects (e.g. GHG production by shipping)
 - Indirect effects (e.g. disturbances to seabed C storage by mining, disturbances to food webs by fishing or mining)
- How large are these indirect effects?
- How do they operate?
- What can we do to reduce or minimise them?



General Strategy



- 1. Define current state of C cycle (provide a baseline)
 - Assess future climate driven change to Ocean C cycle
- 2. Quantify key processes relevant to these indirect effects
- 3. Incorporate key processes into models
 - Evaluate significance
 - Quantify indirect effects
- 4. Build new tools to support decision making
 - Allow Ocean users to estimate C impacts of industry and fishing
- 5. Couple these to future fishing and industrial scenarios
 - Estimate industrial impacts on Ocean C cycle







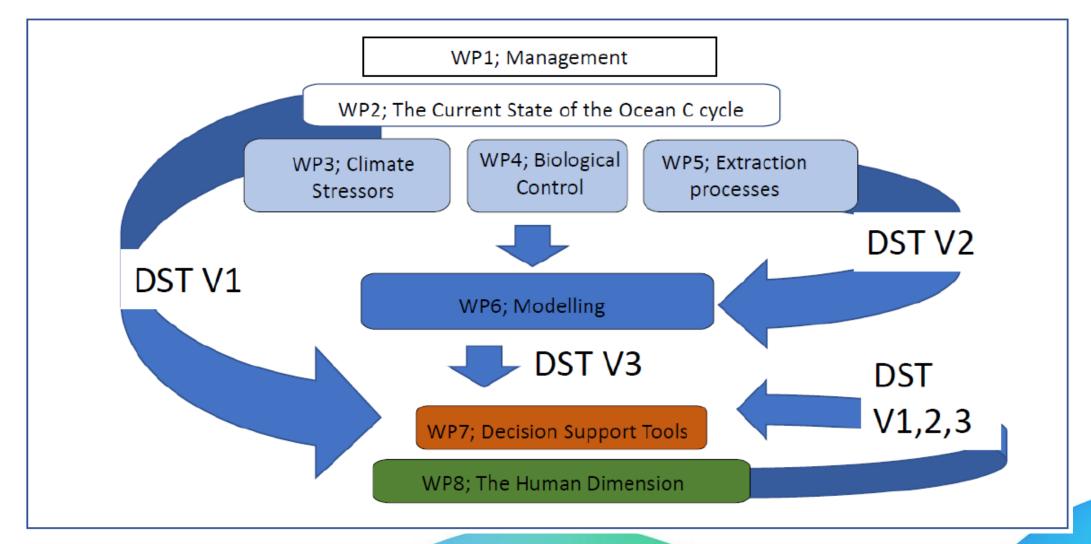


Connecting OceanICU to end users

OceanICU will acquire knowledge of the global carbon cycle to provide practical tools for policy makers, regulators and Ocean users

Work Packages (WPs)







Understanding the current state of the global carbon sink

Andrew Watson FRS

28-09-2023



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WP2: The Current State of the Ocean C Cycle



What do we know, (or think we know)? Provide a baseline.

1) How much of the CO₂ emitted by humans to the atmosphere is taken up by the ocean?

• How has this varied in past decades and how much do we expect it to change?

2) What are the mechanisms causing this uptake? How much biology, how much physics?

3) How much do human marine activities affect this the marine C cycle?

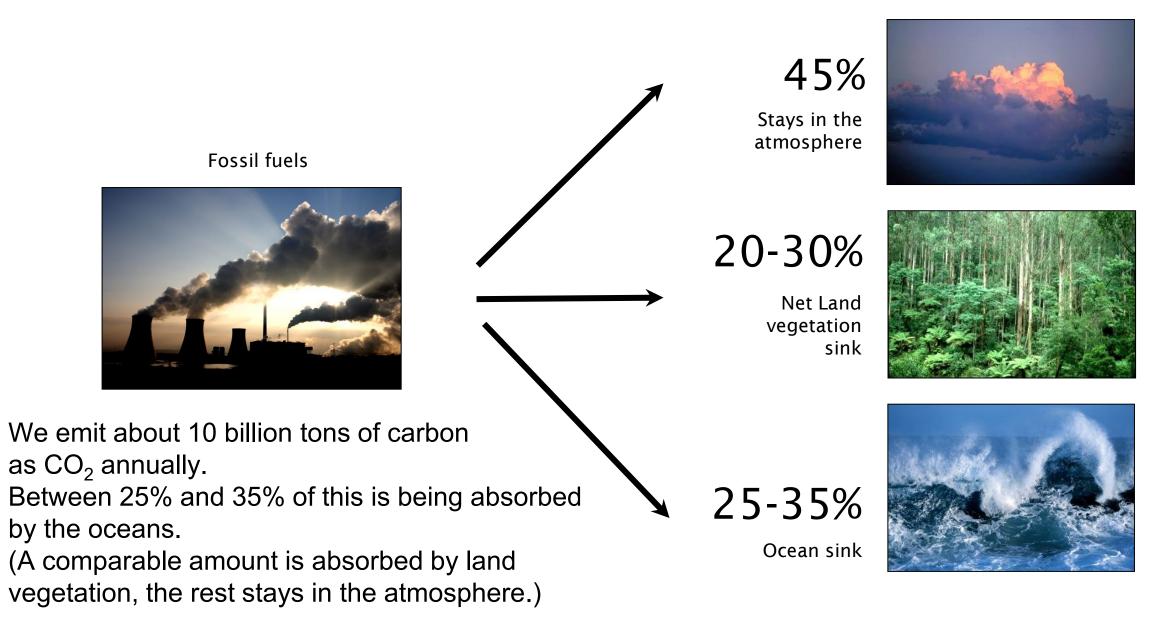
- Fishing (coastal and deep sea)?
- For the future: Deep sea mining? Offshore C sequestration?



Where does all the CO₂ go?



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WP2: How much CO₂ emitted by humans is taken up by the ocean?

What do we know, (or think we know)? Provide a baseline.

We want to know more accurately the ocean uptake, but there are problems:

- 1. Different observational methods disagree
- 2. Models disagree with the observations.



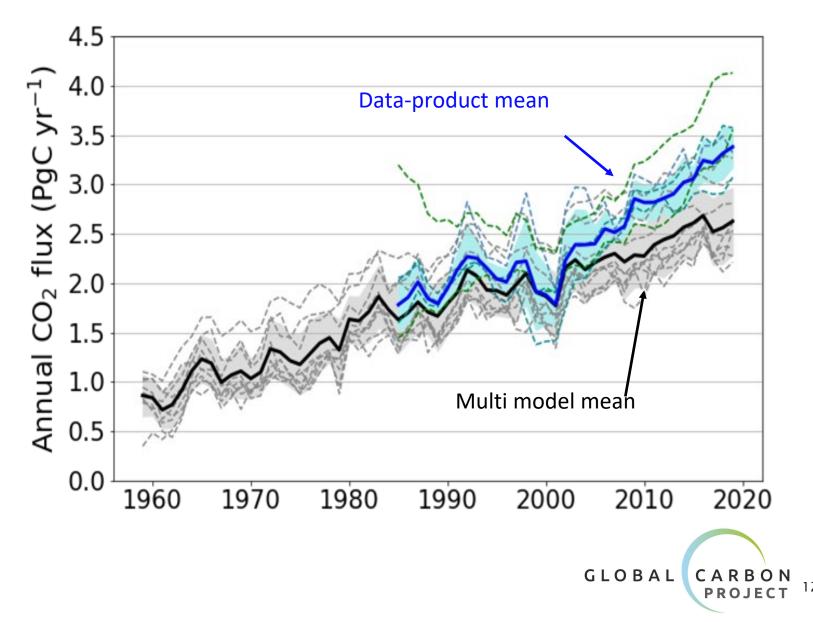


Global Carbon Budget estimates of the ocean sink



Models and observation estimates

- Ocean model represent our best synthesis of what we think we know.
- They disagree with observational estimates
- The discrepancy is increasing



Ocean carbon synthesis products



Estimates of ocean uptake based on observations

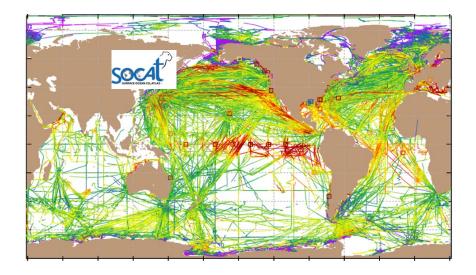
• Enable estimates of ocean uptake

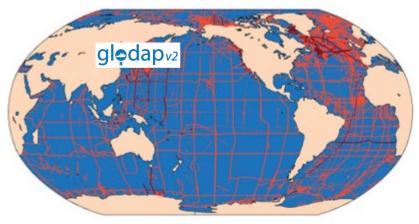
Surface Ocean CO₂ Atlas (SOCAT)

- *In situ*, surface ocean CO₂ measurements
- 33 million CO₂ values (1957-2020)

Global Data Analysis Project (GLODAP)

- Interior ocean carbon and other observations
- 946 cruises (1972-2019)

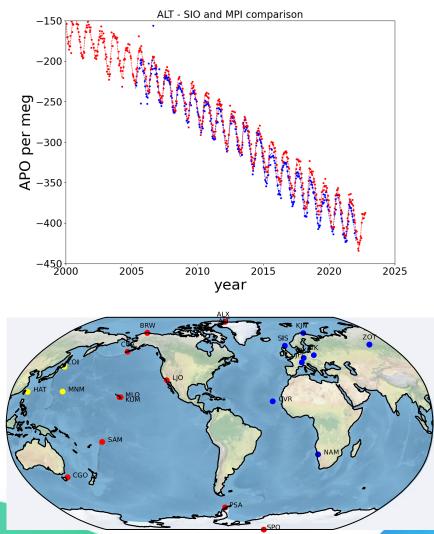




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WP2: How much CO₂ emitted by humans is taken up by the ocean?

- Review and summarize the existing ocean-based observational methods
- Compare with independent methods:
 - Atmospheric oxygen observations
 - New ocean inversion techniques
- Synthesize for a 'best' estimate of ocean uptake





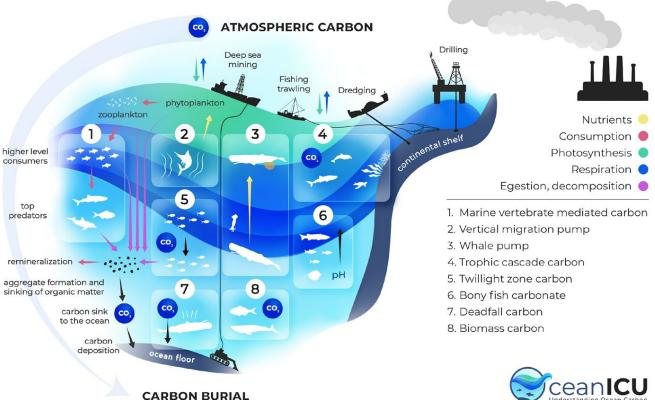
WP2: Biological vs physical processes and CO₂ uptake



What do we know, (or think we know)?

- What is known about the effects of biology on the ocean carbon cycle and CO₂ uptake?
- We know that biological processes are very important in setting the pre-industrial CO₂ content of the atmosphere
- Current models (IPCC, global carbon project) usually assume a 'steady state' – no change in biological fluxes.
- Is this right?

Biological C pump processes considered in OceanICU



WP2: Biological vs physical processes and CO₂ uptake



What do we know, (or think we know)?

Human marine activities: Fishing, mining,

- Few studies of the impact of these marine industries on the ocean carbon cycle.
- Not included in models of future change.
- Assess their current impact and their capacity to drive change in the future.





Contribution of whales to the biological carbon pump

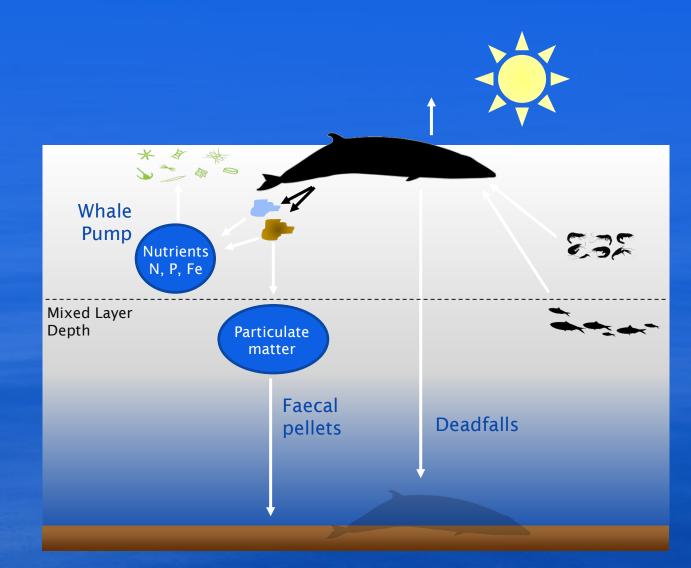
Carla Freitas, Kjell Gundersen, Morten Skogen Institute of Marine Research, Norway

28-09-2023



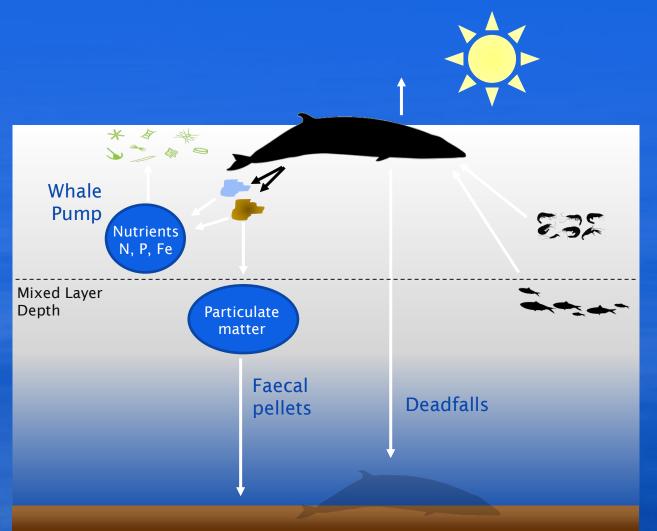
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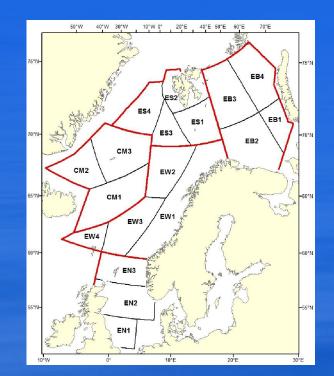




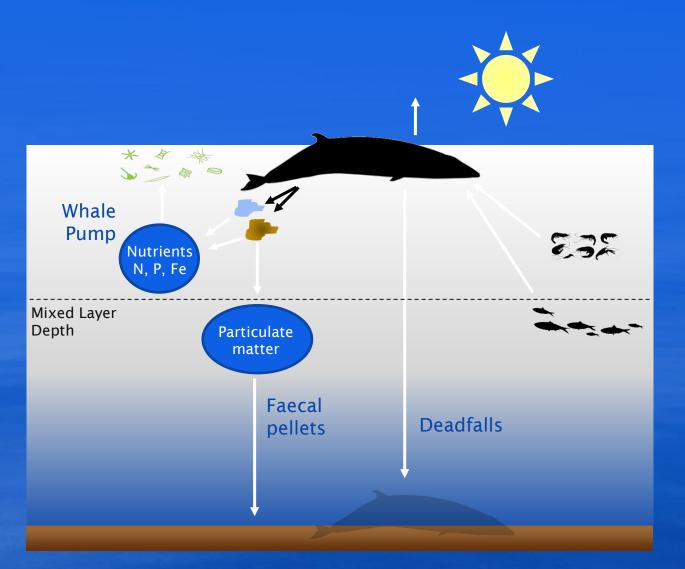








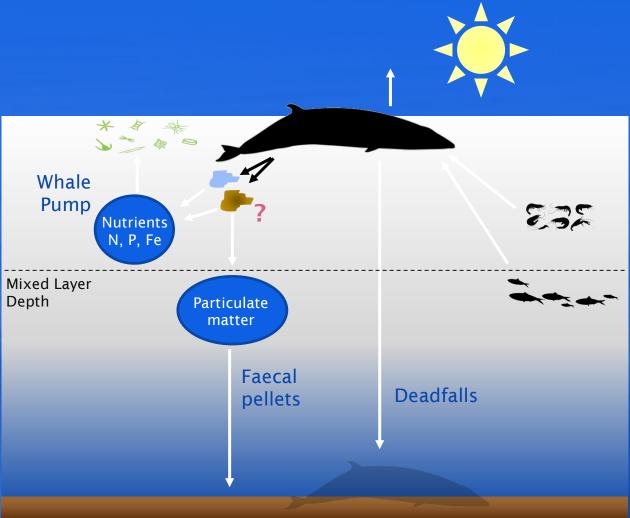
Study area: Nordic Seas







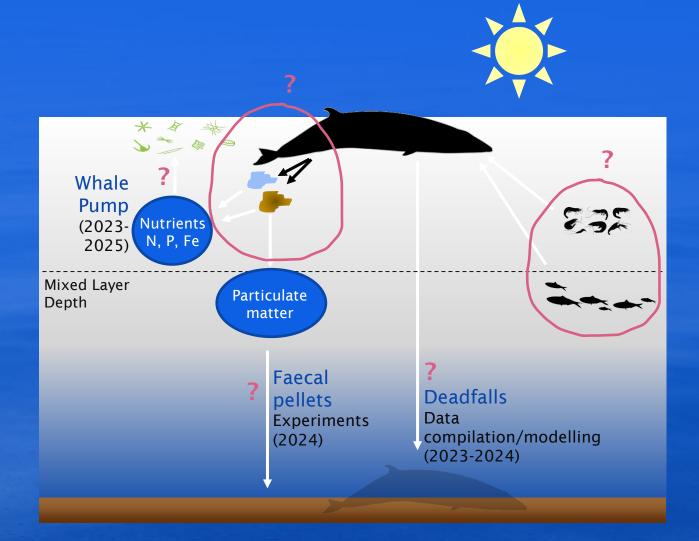
Minke whales around Svalbard excrete 600 tonnes of poo each day



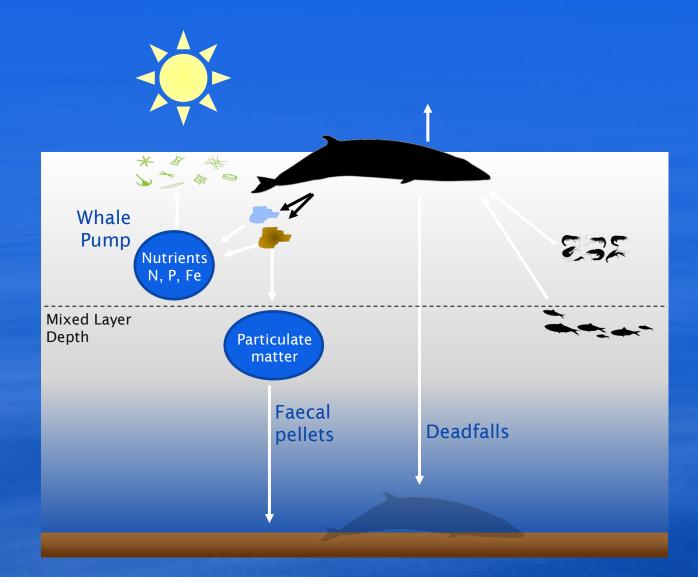
ceanICU

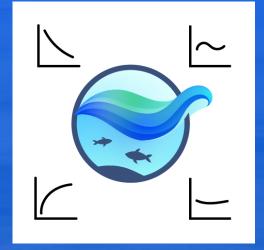
Remaining questions

- Nutrient concentrations change with diet, season, species?
- N in urine?
- Totals excreted?
- Minke whale diving behavior?
- Response of phytoplankton?
- N, P, Fe dissolution vs. sink?
- Impact of whales on regional primary production?









All data will be delivered to carbon models (WP6)



Modeling the Whale Carbon Pump

Morten D Skogen & Carla Freitas Institute of Marine Research, Norway

28-09-2023

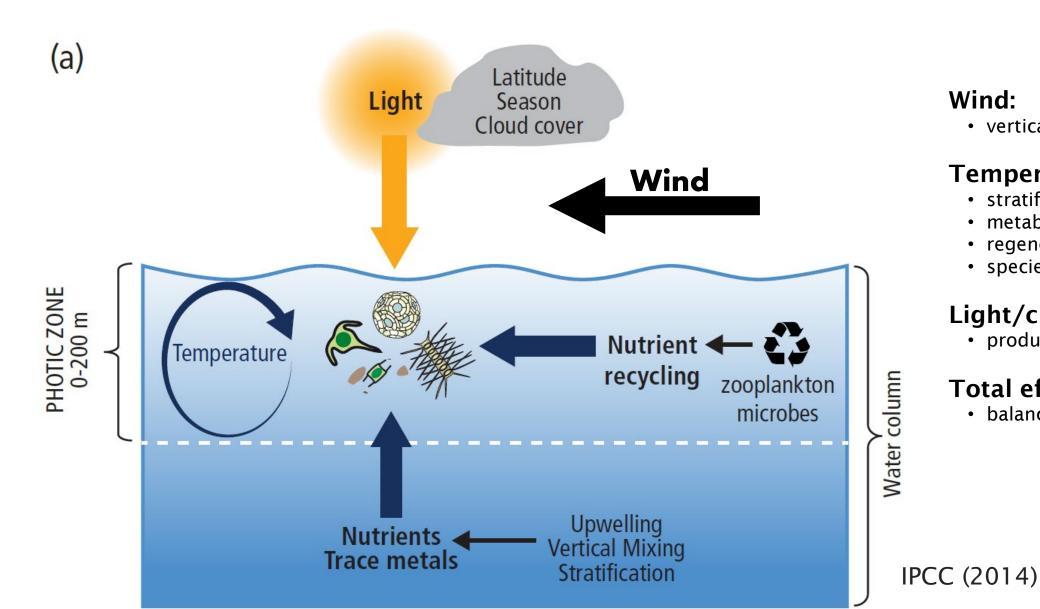


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Physical processes regulating primary production





Wind:

vertical mixing

Temperature:

- stratification
- metabolic rates
- regenerated production
- species composition

Light/cloud cover:

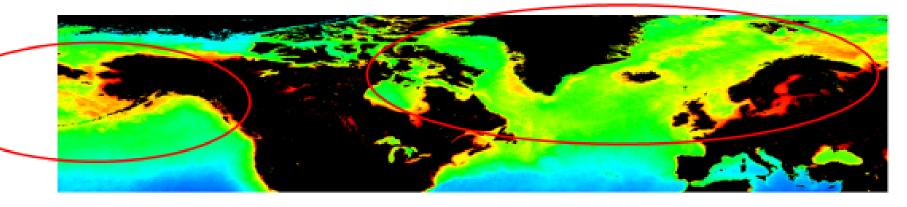
• production rates

Total effect of climate

• balancing...



The high-latitude spring-bloom ecosystems

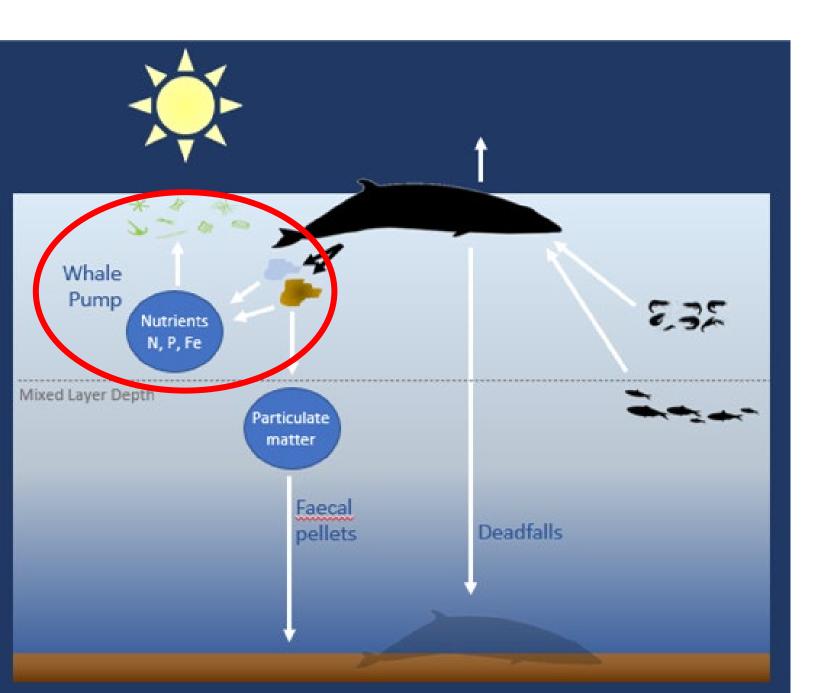


Assumed critical factor for primary production:

Global climate change increases the ocean temperature giving increased regenerated production.

> Increased primary production

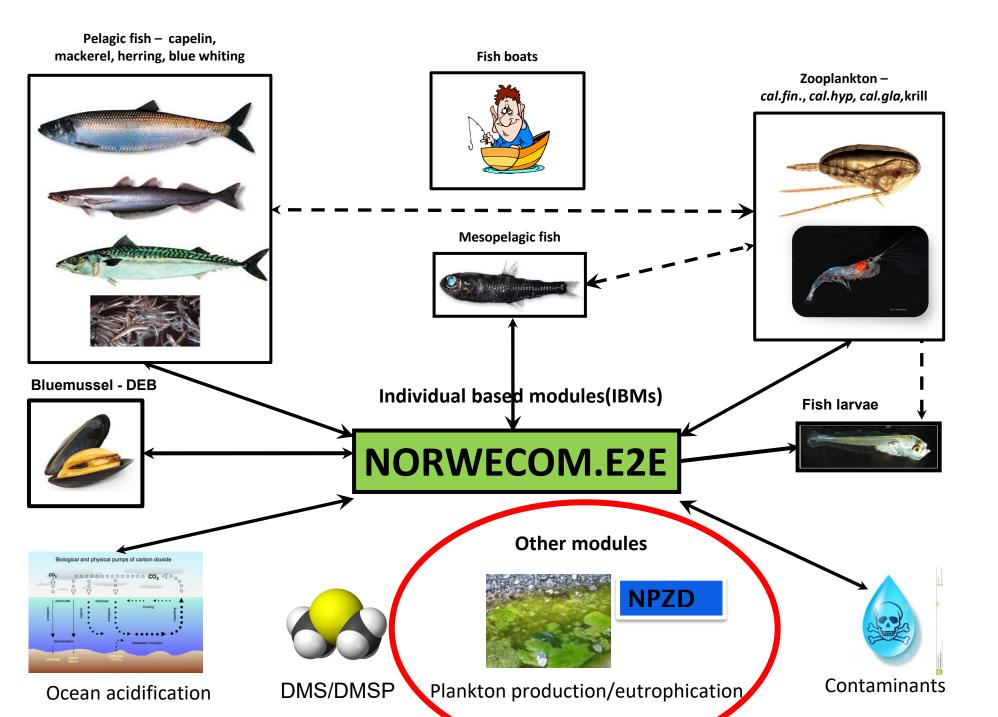




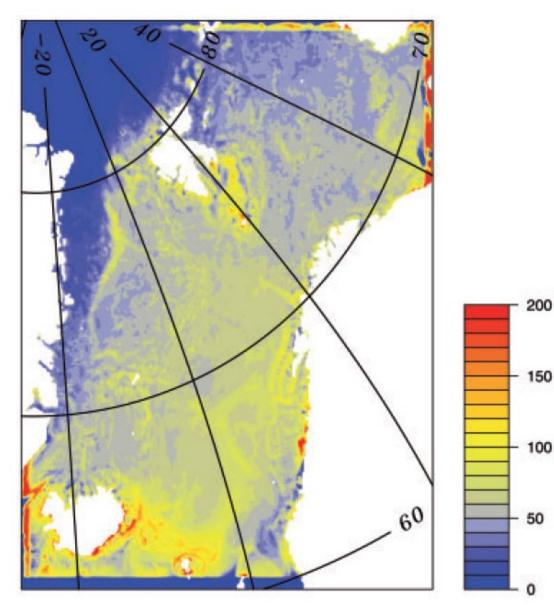


Faeces and urine from whales represent an **extra** source of nutrients (N,P) that will have an impact on the ocean primary production.

Using such data as inputs, we will use ecosystem models to simulate this impact and assess its magnitude/importance.



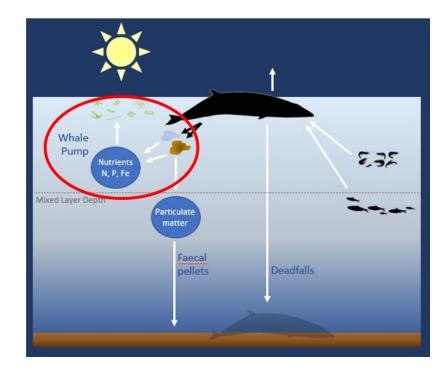




Mean annual (2006-2015) depth integrated net primary production (gC/m2/year) from the NORWECOM.E2E model



First step will be to perform two simulations, with and without whales excretion inputs, to simulate the effect from whales on the ocean primary production.





Roadmap to impact

WP8 | Connecting OceanICU to Society

Pernille Schnoor Mary Wisz, Fabio Berzaghi, Mikaela Gomez

28-09-2023



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Integrated Ecosystem Approach

...the comprehensive integrated management of human activities based on the best available scientific knowledge about the ecosystem and its dynamics, in order to identify and take action on influences which are critical to the health of ecosystems, thereby achieving sustainable use of ecosystem goods and services and maintenance of ecosystem integrity (UNEP, 2009)

Multiscale! A tool for Science Diplomacy or vice versa?



This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 862428 (MISSION ATLANTIC). This output reflects only the author's view and the Research Executive Agency (REA) cannot be held automatic function of the function of the

www.missionatlantic.eu

WP8 | Connecting OceanICU to Society Part of this WP:

- Identify gaps, synergies and opportunities among policies to protect and enhance the biological carbon pump.
- Assess uncertainties in decision making processes, such as the influence of power plays and decision silos.







Integration of science in policy is still not sufficient

"The newest proof that we must do more in science-informed policy making is the recently concluded climate COP27. In spite of being informed by the freshest edition of IPCC's assessment reports, parties failed to adopt bold language in relation to the need for peaking of global emissions by 2025 or taking decisive path to phase out fossil fuels globally. This shows that integration of science in policy making is still not sufficient."

Jan Dusik, Deputy Minister of Environment of Czech Republic and Head of the Czech Presidency Delegation to COP27

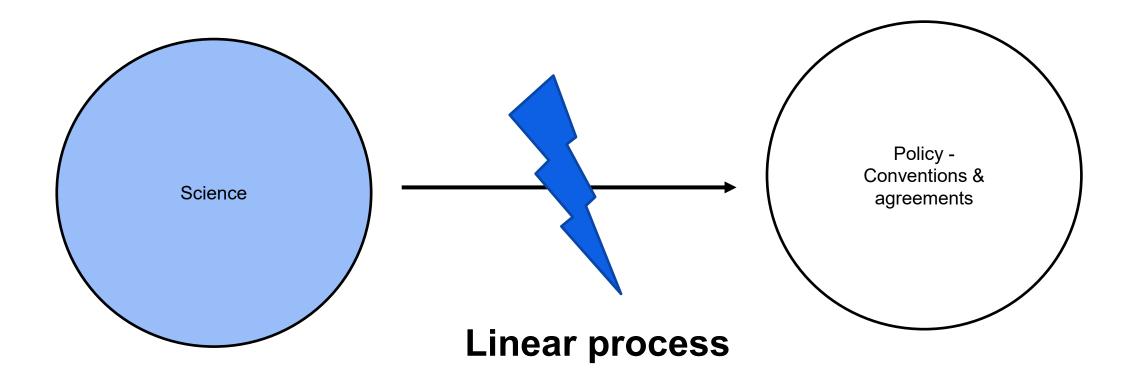




Roadmap to impact



Science-to-policy disconnect





BRIEF ON THE SECOND WORLD OCEAN ASSESSMENT AND CLIMATE CHANGE IN THE OCEAN

REGULAR PROCESS FOR

GLOBAL REPORTING AND ASSESSMEN OF THE STATE OF THE MARINE ENVIRONM BRIEF ON THE SECOND WORLD OCEAN ASSESSMENT AND SUSTAINABLE DEVELOPMENT GOAL 14: LIFE BELOW WATER 世界海洋评估 _{和海洋生物多样性}

第二次

简报

Simplistic, linear models of the policy process, according to which policymakers are keen to 'utilise' expertise to produce more 'effective' policies

海洋环境状况 包括社会经济方面问题 全球报告和评估经常程序

POLICY BRIEF

THE CONTRIBUTION OF MARINE PROTECTED AREAS TO CLIMATE CHANGE ADAPTATION

STATE OF THE EVIDENCE AND POLICY RECOMMENDATIONS





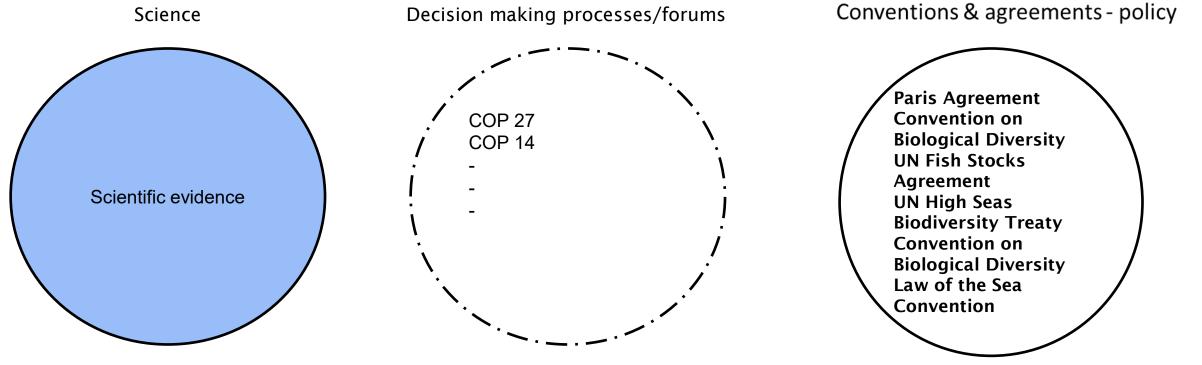
Consumption, Technology and Wellbeing¹



Contribution. Development. Impact.

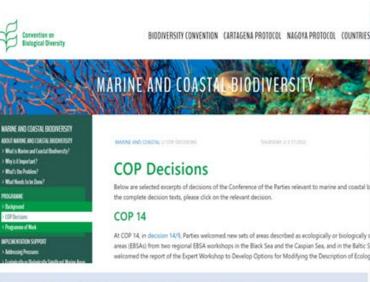
Roadmap to impact

Science-to-policy





On 1 November 1967, Malta's Ambassador to the United Nations, Arvid Pardo, asked the nations of the world to look around them and open their eyes to a looming conflict that could devastate the oceans, the lifeline of man's very survival. In a <u>speech to the United Nations</u> <u>General Assembly</u>, he spoke of the super-Power rivalry that was spreading to the oceans, of the pollution that was poisoning the seas, of the conflicting legal claims and their implications for a stable order and of the rich potential that lay on the seabed.





The First Global Integrated Marine Assessment

WORLD OCEAN ASSESSMENT I



2015, the United Nations General Assembly adopted resolution 70/235 on "Oceans and the law of the sea," in which it welcomed with appreciation the first global integrated marine assessment and approved its summary.

•Are COP26 outcomes on climate change mitigation good enough for the ocean?

TO WHAT EXTENT HAS THE OCEAN
BEEN INTEGRATED IN THE
INTERNATIONAL CLIMATE CHANGE
REGIME?

The Glasgow COP

The historical mandate to integrate the ocean in all areas of work under the United Nations Framework Convention on Climate Change (UNFCCC) at the <u>Glasgow COP</u> in November 2021, and the Ocean-Climate Dialogue at the UNFCCC <u>Intersessional Meeting</u> at Bonn in June 2022

the <u>"Ocean for Climate</u>" Declaration endorsed by more than 100 civil society organisations – NGOs, scientists, companies and international organisations. This mobilisation ocean community has paid off to the ocean being mentioned preamble of the Glasgow Pact, <u>Contribution</u> "the importance of ensuring the integrity

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	. d		Duit. GENERAL	
		Convention on Biological Diversity	UNEP-CBD-COP/DEC/VIE5 13 April 2004	
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			URTHES TO THE CONVENTION ENTIL MEETING	
	V + WORLD	diversity		
		MARITIME	9	
	U	NIVERSITY	mentation of the programme of work plementation has been undertaken by	
ion. I	Developmen	t. Impact.	and coastal biological diversity must	

e three electrons of the Convertion, notes the need to ensure integration between the programmers of work, ne protocol areas and on one and cound hological diversity, and in particular the programmer element on marine and cound exceed areas, to assure effective econolastion in their implementation;

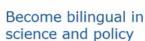
3 Agrees that the programme of work on marine and countal biological diversity should be



No agreed way of tracking research impacts







Contextualise, provide synthesis, provide options



values and background Be clear about

Be aware of your

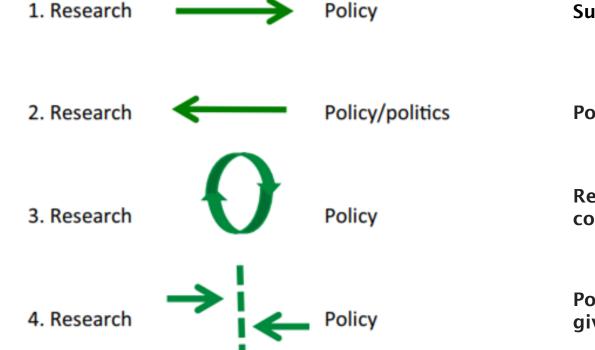


European Commission



We need to rethink policy impact models Research-policy relations





Supply-model

Political power shapes knowledge

Research knowledge and governance are co-produced through an ongoing process

Politics only selectively appropriates and gives meaning to scientific findings



From Boswell & Smith, 2017

We need to rethink policy impact models The co-production model





This model requires quite resource-intensive methodologies, as well as forms of expertise that are not necessarily available across disciplines.



We need to rethink policy impact models The 'cultural-gap' model



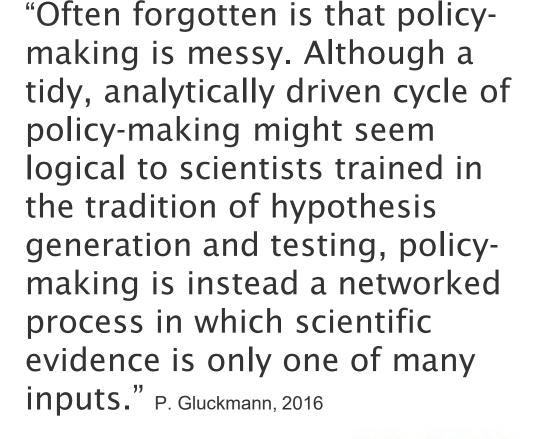
Viewed from 'inside' of each system, the other remains a 'black box'. Science operates according to a binary code of true/false. It defines relevant communication based on whether it is concerned with establishing truth claims. The political system selects and gives meaning to communication based on its relevance to the pursuit of political power and the capacity to adopt collectively binding decisions.







Policy-making is messy







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