US-UK scientific forum

Shifts and tipping points in ocean systems

19 – 20 May 2026

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NATIONAL ACADEMY OF SCIENCES

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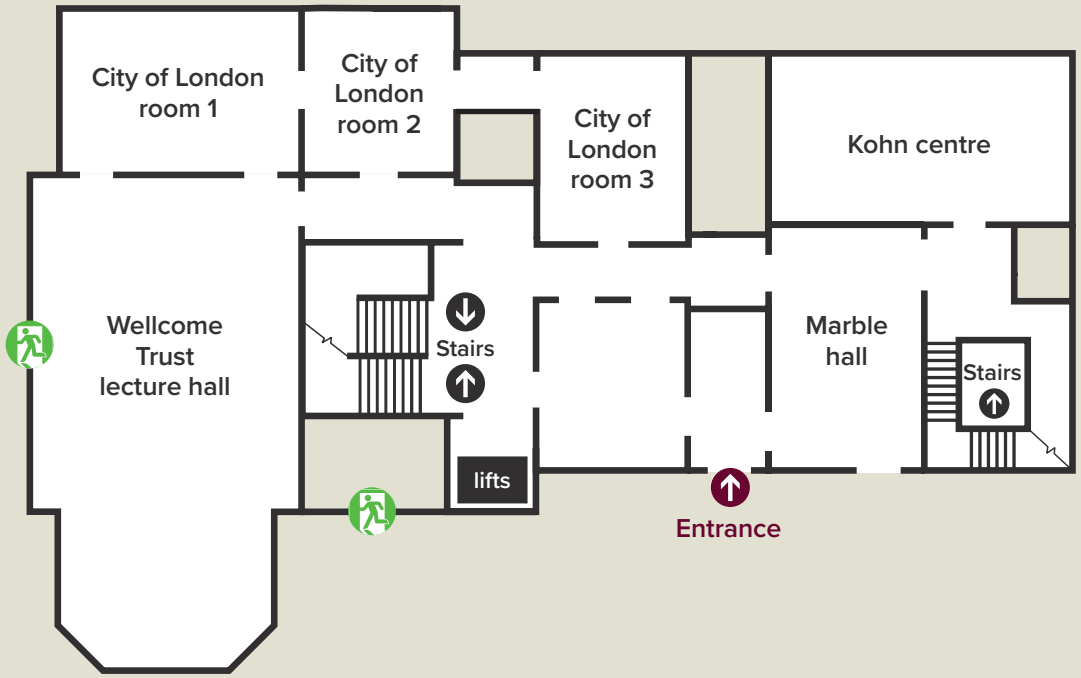

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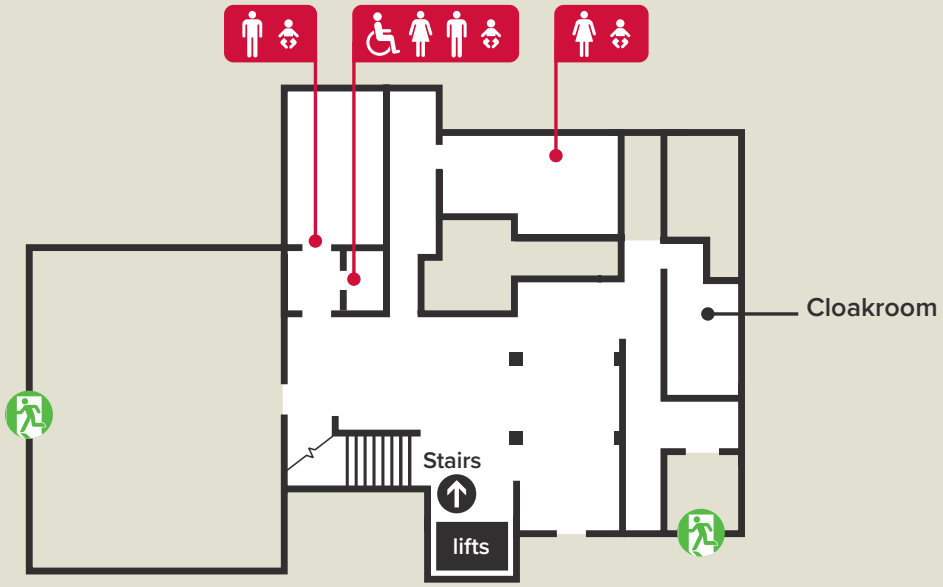

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Contents

The Royal Society

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- Corporate and governance

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- Stephen Hawking
- Dorothy Hodgkin

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Organising Committee Members

John Bruno
The University of North Carolina at Chapel Hill, US

John Bruno is a marine ecologist and the Chi Omega Distinguished Professor in the Department of Biology at The University of North Carolina at Chapel Hill, USA. John grew up surfing, fishing, and SCUBA diving in south Florida. He came to UNC in 2001 after a post doc at Cornell University, and a PhD at Brown University where he worked on the ecology of wetland plant communities and coral disease ecology. His research is focused on marine biodiversity, particularly the impacts of climate change on marine ecosystems. John and his students work in the Caribbean and Galápagos on understanding how human activities alter marine ecosystem and what local conservation strategies are effective in mitigating these impacts. At UNC he teaches Marine Ecology, Seafood Forensics, and the Future of Food.

Co-chair: Scott Doney
University of Virginia, US

Scott Doney is an oceanographer and biogeochemist and the inaugural Joe D. and Helen J. Kington Professor in Environmental Change at the University of Virginia (UVA). He graduated with a B.A. in chemistry from the University of California, San Diego and a Ph.D. in chemical oceanography from the Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography. He was a postdoctoral fellow and scientist at the National Center for Atmospheric Research and then a scientist at the Woods Hole Oceanographic Institution before moving to UVA. He served as the Assistant Director for Ocean Climate Science and Policy in the White House Office of Science and Technology Policy. An elected member of the National Academy of Sciences, he was also awarded the James B. Macelwane Medal from the American Geophysical Union and the Huntsman Award for Excellence in Marine Science from the Royal Society of Canada. He is also a fellow of the American Geophysical Union, the Aldo Leopold Leadership Program, the American Association for the Advancement of Science, and the Association for Sciences of Limnology and Oceanography.

Ida Kubiszewski
University College London, UK

Dr Ida Kubiszewski is an Associate Professor at the Institute for Global Prosperity at University College London (UCL) and a Fellow of the Royal Society of Arts. Her work focuses on ecological economics, ecosystem services, and sustainable wellbeing. She has authored or co-authored more than 90 scientific publications and several books on sustainability, natural capital, and wellbeing economics.

Dr Kubiszewski has held roles across academia, policy, and industry. She previously served as CEO of Downforce Technologies, an ag-tech company using remote sensing to measure natural capital on land, and participated in international climate negotiations for the Dominican

Republic. She also serves as an associate editor or editorial board member for multiple journals. Her research and leadership aim to bridge science, policy, and practice to develop solutions to some of the world's most pressing sustainability challenges."

Professor Tim Lenton OBE
University of Exeter, UK

Professor Tim Lenton OBE is Chair in Climate Change and Earth System Science at the University of Exeter, where he was founding Director of the Global Systems Institute. He has more than 25 years research experience, focused on modelling life's coupling to the Earth system, biogeochemical cycles, climate dynamics, and associated tipping points. Tim is world-renowned for his work identifying climate tipping points, which informed the setting of the "well below 2°C" climate target. Recently he has highlighted the opportunities for positive tipping points to accelerate social change towards net zero greenhouse gas emissions and global sustainability. In 2025 he was awarded an OBE "for services to understanding climate tipping points".

Co-chair: Professor Corinne Le Quéré CBE FRS
University of East Anglia, UK

Corinne Le Quéré is Royal Society Research Professor of Climate Change Science at the University of East Anglia (UEA), UK. She conducts research on the interactions between climate change and the carbon cycle, including those mediated by marine ecosystems. She spearheads the development of marine carbon-cycle models that include the representation of marine ecosystems regrouped by Plankton Functional Types (PFTs). She instigated and led for 13 years the annual update of the global carbon budget within the Global Carbon Project, and was author of three assessments reports by the Intergovernmental Panel on Climate Change, and is former Director of the Tyndall Centre for Climate Change Research. She is member of the UK Climate Change Committee and was the founding Chair of France's High Council on climate, two independent committees that advise their respective Governments on how to respond to climate change.

Professor Michael Meredith
British Antarctic Survey, UK

Michael Meredith is Joint Director of the UK National Climate Science Partnership (UKNCSP), an initiative that is linking together the climate science capability of seven national research institutes to generate climate solutions for Government and stakeholders. He is senior ocean scientist at the British Antarctic Survey (BAS), and Professorial Fellow in Oceanography at Murray Edwards College, University of Cambridge. He has previously served as Coordinating Lead Author for the IPCC Special Report on Oceans and Cryosphere in a Changing Climate, and as President of the Challenger Society for Marine Science, the UK's pre-eminent learned body for research of the ocean.

Professor Malin Pinsky
University of California, Santa Cruz, US

Malin Pinsky is a biologist with expertise in marine ecology, climate change, and genomics, and he leads the Global Change Research Group as a Professor at the University of California Santa Cruz. He is a Fellow of the American Association for the Advancement of Science, an Earth Leadership Fellow, an Early Career Fellow of the Ecological Society of America, an Alfred P. Sloan Fellow in Ocean Sciences, and a Kavli Fellow. He was awarded the 2024 Peter Larkin Award in Fisheries Science. Pinsky is a science advisor for the Beijer Institute of the Royal Swedish Academy of Sciences, and an editor for Ecology Letters and The Philippine Journal of Fisheries. He holds a Ph.D. from Stanford University and an A.B. from Williams College.

Anastasia Romanou
NASA Goddard Institute for Space Studies, US

Anastasia Romanou is a senior research scientist at NASA Goddard Institute for Space Studies in New York and affiliated faculty at the Department of Applied Physics and Applied Mathematics, at Columbia University, also in New York. She completed her bachelor studies in the Physics Dept. in the University of Athens in Greece and did her PhD in Geophysical Fluid Dynamics at Florida State University where she studies turbulent boundary layers in the ocean. She is currently interested in large scale ocean circulation, variability, trends and abrupt shifts and tipping points as well as the carbon cycle and how it connects to climate and is shaped by the ocean.

Programme

Monday 18 May	
6:30 pm – 8:30 pm	Welcome Reception One Great George Street, London SW1P 3AA

Day 1 - Tuesday 19 May	
08:30 am	Arrival refreshments City of London Room One and Two
Keynote Session: Shifts, Tipping Points, and Systems Dynamics	
9:00 am	Session introduction Corinne Le Quéré CBE Professor of Climate Change Science, School of Environmental Sciences, University of East Anglia
9:05 am	Tim Lenton OBE Chair in Climate Change and Earth System Science, University of Exeter
9:35 am	Lisa A Levin Distinguished Professor of Biological Oceanography and Marine Ecology, Scripps Institution of Oceanography
10:05 am	Speed Networking
Session 2: Shifts and Tipping Points in Ocean Circulation	
10:30 am	Session introduction Michael Meredith Joint Director, UK National Climate Science Partnership; Senior Scientist, British Antarctic Survey; Professorial Fellow in Oceanography, Murray Edwards College, University of Cambridge
10:35 am	Stefan Rahmstorf Co-Head of Research Department on Earth System Analysis, Potsdam Institute for Climate Impact Research (PIK); Professor of Physics of the Oceans, University of Potsdam
11:00 am	Sophie Nowicki Empire Innovation Professor, Department of Earth Sciences, University at Buffalo
11:25 am	Alejandra Sanchez-Franks Senior Scientist, National Oceanography Centre
11:50 am	Alberto Naveira Garabato Regius Professor of Ocean Sciences, University of Southampton
12:15 pm	Lunch
Session 3: Shifts and Tipping Points in Ocean Biogeochemical Cycles	
1:15 pm	Session introduction Anastasia Romanou Adjunct Associate Professor of Applied Physics and Applied Mathematics and Physical Research Scientist, NASA Goddard Institute for Space Studies

1:20 pm	Jaime B Palter Associate Professor of Oceanography, The University of Rhode Island
1:45 pm	Ros Rickaby Professor of Biogeochemistry, University of Oxford
2:10 pm	James Rae Professor, School of Earth & Environmental Sciences, University of St Andrews
2:35 pm	Nicole Lovenduski Professor and Director, Institute of Arctic and Alpine Research, University of Colorado Boulder
3:00 pm	Break
Session 4: Shifts and Tipping Points in Marine Ecosystems	
3:10 pm	Session introduction Malin Pinsky Professor, Department of Ecology & Evolutionary Biology, University of California, Santa Cruz
3:15 pm	Samantha Siedlecki Associate Professor of Marine Sciences, University of Connecticut
3:40 pm	Stephanie Henson Principal Scientist, National Oceanography Centre
4:05 pm	Lisa C McManus Associate Research Professor, Hawai‘i Institute of Marine Biology, University of Hawai‘i at Mānoa
4:30 pm	Michael T Burrows Professor of Ecology, Scottish Association for Marine Science
5:00 pm	Breakout Group Discussion: What Is the State of Knowledge Today?
5:45 pm	**Reception and dinner**

Day 2- Wednesday 20 May	
8:30 am	Arrival refreshments City of London Room One & Two
Session 5: Tipping Points in Ecosystem Services	
9:00 am	Session introduction Ida Kubiszewski Associate Professor, Institute for Global Prosperity, University College London
9:05 am	Emma Cavan Associate Professor, Department of Life Sciences, Imperial College London
9:30 am	Adrian Stier Associate Professor, Ecology Evolution, and Marine Biology, UC Santa Barbara
9:55 am	Will White Associate Professor, Oregon State University
10:20 am	Dan Smale Senior Research Fellow, Marine Biological Association
10:45 am	Break
Session 6: Human Dimensions of Ocean Tipping Points	
10:55 am	Session introduction Corinne Le Quéré CBE Professor of Climate Change Science, School of Environmental Sciences, University of East Anglia
11:00 am	‘Aulani Wilhelm Chief Executive Officer, Nia Tero
11:10 am	Laurie Laybourn Executive Director, Strategic Climate Risks Initiative
11:20 am	Panel discussion
11:50 am	Lunch
12:50 pm	Breakout Group Discussion – What Are the Opportunities to Close Knowledge Gaps?
1:50 pm	Forum closing remarks Corinne Le Quéré, Forum Co-Chair
2:00 pm	**End of Forum**

Meeting day 1 - Tuesday 19 May 2026

Keynote Session: Shifts, Tipping Points, and Systems Dynamics

Chair: Professor Corinne Le Quéré CBE FRS
University of East Anglia, UK

Corinne Le Quéré is Royal Society Research Professor of Climate Change Science at the University of East Anglia (UEA), UK. She conducts research on the interactions between climate change and the carbon cycle, including those mediated by marine ecosystems. She spearheads the development of marine carbon-cycle models that include the representation of marine ecosystems regrouped by Plankton Functional Types (PFTs). She instigated and led for 13 years the annual update of the global carbon budget within the Global Carbon Project, and was author of three assessments reports by the Intergovernmental Panel on Climate Change, and is former Director of the Tyndall Centre for Climate Change Research. She is member of the UK Climate Change Committee and was the founding Chair of France's High Council on climate, two independent committees that advise their respective Governments on how to respond to climate change.

Professor Tim Lenton OBE
University of Exeter, UK

Professor Tim Lenton OBE is Chair in Climate Change and Earth System Science at the University of Exeter, where he was founding Director of the Global Systems Institute. He has more than 25 years research experience, focused on modelling life's coupling to the Earth system, biogeochemical cycles, climate dynamics, and associated tipping points. Tim is world-renowned for his work identifying climate tipping points, which informed the setting of the "well below 2°C" climate target. Recently he has highlighted the opportunities for positive tipping points to accelerate social change towards net zero greenhouse gas emissions and global sustainability. In 2025 he was awarded an OBE "for services to understanding climate tipping points".

Ocean tipping points
This talk will introduce Earth system and ocean tipping points, highlighting the risks they pose and the potential to get early warning of them. It will focus on the Atlantic Meridional Overturning Circulation (AMOC) as a connector of tipping elements that could mediate a damaging 'tipping cascade'. It will also highlight the need for positive tipping points that accelerate change towards net zero emissions and nature regeneration, showing some encouraging marine examples.

Lisa A Levin
Scripps Institution of Oceanography, University of California San Diego, US

Lisa A Levin is a Distinguished Professor Emerita of biological oceanography at the Scripps Institution of Oceanography, University of California, San Diego. Her current research examines deep-sea biodiversity and effects of climate change and human impacts on deep-ocean ecosystems. Levin has participated in or leChad over 50 research

cruises and made 70 submersible dives in the Pacific, Indian and Atlantic Oceans. Dr Levin is active in bringing deep-sea science to policy makers and has contributed to multiple IPCC reports and World Ocean Assessments, UNFCCC Ocean Dialogues and COPs, as well as the BBNJ Agreement and International Seabed Authority negotiations.

Environmental and Human Drivers of Abrupt Ocean Ecosystem Transitions: Ecological Tipping Points, Thresholds and Shifts
This presentation will address why we need to understand what triggers ecosystem change and mechanisms driving abrupt ecological transitions including loss of habitat-forming species, physiological intolerances, trophic controls (by predators or food), and cumulative impacts. Examples will be drawn from coral reef, kelp forest, wetland and deep-sea ecosystems. The role of human activities in generating ecosystem shifts, opportunities for positive national and international interventions, and research needs will be discussed.

Session 2: Shifts and Tipping Points in Ocean Circulation

Chair: Professor Michael Meredith
British Antarctic Survey, UK

Michael Meredith is Joint Director of the UK National Climate Science Partnership (UKNCSP), an initiative that is linking together the climate science capability of seven national research institutes to generate climate solutions for Government and stakeholders. He is senior ocean scientist at the British Antarctic Survey (BAS), and Professorial Fellow in Oceanography at Murray Edwards College, University of Cambridge. He has previously served as Coordinating Lead Author for the IPCC Special Report on Oceans and Cryosphere in a Changing Climate, and as President of the Challenger Society for Marine Science, the UK's pre-eminent learned body for research of the ocean.

Professor Stefan Rahmstorf
Potsdam Institute for Climate Impact Research, Germany

Stefan Rahmstorf is Professor of Physics of the Oceans at the University of Potsdam and heads the Earth System Analysis Department at the Potsdam Institute for Climate Impact Research in Germany. Rahmstorf served on the German government's Scientific Advisory Council on Global Change (WBGU) from 2004-2013. Rahmstorf has published over 140 scientific studies, including 42 in the leading journals of Nature, Science, and PNAS, as well as four popular science books. In 2024 he was awarded the European Geosciences Union's Alfred Wegener Medal for his scientific achievements, and he has received several awards for climate communication, including the Climate Communication Prize of the American Geophysical Union and the Stephen H. Schneider Award**.**

Is the Atlantic Overturning Circulation approaching a tipping point?
The Atlantic Meridional Overturning Circulation (AMOC) has a major impact on climate, not just around the northern Atlantic but globally. Paleoclimatic data show it has been rather unstable in the past, leading to some of the most dramatic and abrupt climate shifts known.
These instabilities are due to two different types of tipping points, linked to amplifying feedbacks in the large-scale salt transport and in the convective mixing which drives the flow. These tipping points present a major risk of abrupt ocean circulation and climate shifts as we push our planet further out of the stable Holocene climate into uncharted waters.
There is evidence that the AMOC has already weakened in response to global warming. The current generation of climate models (CMIP6) predicts that the AMOC will further weaken substantially during this century, and suggests a major risk that the AMOC will shut down after the year 2100. The tipping point putting the AMOC on course to shutdown may already be passed in the next few decades. Also, substantial and abrupt impacts of AMOC change on our climate might arise already from the 2040s.

Professor Sophie Nowicki
University at Buffalo, US

Sophie Nowicki is a French-American glaciologist who serves at University at Buffalo (UB) as an Empire Innovation Professor in the Department of Earth Science. Prior to joining (UB) she was a civil servant in the Cryospheric Science Laboratory of NASA Goddard Space Flight Center. Professor Nowicki's research focus is ice sheets change, their interactions with the Earth's climate and their contributions to sea level. Her works uses satellite observations, numerical modeling, applied mathematics and AI. She co-chairs the Ice Sheet Model Intercomparison for CMIP7 (ISMIP7), an international consortium that advances sea level projections arising from the Greenland and Antarctic ice sheets. She is also a co-lead for research and innovation for the NASA Sea-Level Change Team and is the Application Lead for the new NASA Earth Dynamics Geodetic Explorer. She was a Lead Author of the IPCC AR6 report Chapter 9: Oceans, Cryosphere and Sea Level Change. The Nowicki Forland in Antarctica was named in recognition of her leadership in increasing understanding of sea level rise.

Can Ice Sheets Become Drivers of Ocean Circulation Tipping Points?
Ice sheets have long been regarded as largely passive components of the climate system. However, recent satellite observations revealing accelerating mass loss from both the Greenland and Antarctic ice sheets have challenged this paradigm. These observations have led to a revised understanding of ice sheet–climate interactions and have motivated the development of a new generation of ice sheet and fully coupled climate–ice sheet models.

Both the Greenland and Antarctic ice sheets have the potential to initiate self-reinforcing feedback mechanisms. Enhanced ice mass loss increases freshwater fluxes to the ocean, which can alter ocean stratification and density-driven circulation, including the Atlantic Meridional Overturning Circulation. A resulting slowdown in ocean circulation may induce regional climate shifts that, in turn, further destabilize ice sheets, amplifying mass loss. These coupled processes raise the possibility that ice sheets may act not only as responders to climate change but also as active drivers of tipping behaviour within the Earth system.

Here, we review the current understanding of ice sheets as potential drivers of ocean circulation tipping points. We further discuss key challenges, including the representation of relevant processes across disparate spatial and temporal scales, and the identification of robust early warning indicators for ice sheets.

Dr Alejandra Sanchez-Franks
National Oceanography Centre, UK

Dr Alejandra Sanchez-Franks is a physical oceanographer at the National Oceanography Centre (NOC) in Southampton, UK. Her research focuses on North Atlantic dynamics – the Atlantic Meridional Overturning Circulation and the Subpolar Gyre, in particular – integrating sustained ocean observations and models to further understanding of our changing oceans. She currently leads the SORTED project, an initiative funded by the UK's Advanced Research + Invention Agency (ARIA), integrating long-term observational data with artificial intelligence

and climate models to detect early warning signs of a potential collapse in the Atlantic Subpolar Gyre.

The Subpolar Gyre: Dynamics, Drivers, and Potential Collapse
The subpolar gyre (SPG) in the North Atlantic Ocean represents a critical climate tipping element, with potential for rapid collapse of its deep convection on decadal timescales. Such a collapse is the primary tipping mechanism of the SPG and can trigger a cascade leading to the destabilization of the Atlantic Meridional Overturning Circulation (AMOC). However, significant observational gaps and limitations in climate models pose major challenges to understanding and predicting potential SPG tipping behaviour. Here we review SPG tipping dynamics and challenges, with a particular focus on our observational records. We also explore the potential of recent advances in artificial intelligence to gain new insight into the state of the SPG. By reviewing these developments, we evaluate open questions, outstanding challenges, and what is needed to develop an early warning system (EWS) for potential SPG tipping.

Professor Alberto Naveira Garabato
University of Southampton, UK

Alberto C Naveira Garabato is an oceanographer interested in the processes governing ocean circulation and its role in climate. His research focuses on unravelling the dynamics connecting the breadth of scales of oceanic flow —from small-scale turbulence to the basin-scale circulation— and shaping their climate impacts, through the development and application of new approaches to measure the ocean. He is the Regius Professor of Ocean Sciences at the University of Southampton, co-Director of the EPSRC Centre of Doctoral Training on the Mathematics for our Future Climate, and an Honorary Fellow of the British Antarctic Survey.

The tipping-like behaviour of Antarctic sea ice and its impacts on the ocean's structure
Antarctic sea ice is an important component of the climate system, in part through its profound influence on ocean circulation, oceanic heat and carbon uptake, and marine biological productivity. After four decades of relative stability, an abrupt and sustained reduction of Antarctic sea ice extent took place in 2015-2016, prompting a vigorous debate on its likely causes and potential reversibility. Whether this rapid sea ice decline manifests the passing of a tipping point is still an open question – one that we will consider how to answer here. We will search for clues in the physics governing the recent Antarctic sea ice reduction, the bidirectional feedbacks between sea ice and ocean, and the far-field impacts (in space and time) of the Antarctic sea ice cap on the ocean's structure.

Session 3: Shifts and Tipping Points in Ocean Biogeochemical Cycles

Chair: Anastasia Romanou
NASA Goddard Institute for Space Studies, US

Anastasia Romanou is a senior research scientist at NASA Goddard Institute for Space Studies in New York and affiliated faculty at the Department of Applied Physics and Applied Mathematics, at Columbia University, also in New York. She completed her bachelor studies in the Physics Dept. in the University of Athens in Greece and did her PhD in Geophysical Fluid Dynamics at Florida State University where she studies turbulent boundary layers in the ocean. She is currently interested in large scale ocean circulation, variability, trends and abrupt shifts and tipping points as well as the carbon cycle and how it connects to climate and is shaped by the ocean.

Professor Jaime B Palter
The University of Rhode Island, US

Dr Palter works as a professor in ocean circulation and biogeochemistry at the Graduate School of Oceanography at the University of Rhode Island. She has published extensively on large-scale ocean circulation and its impact on climate and biogeochemistry, frequently combining insights from models and observations. She has studied the circulation and variability of the subpolar North Atlantic and Gulf Stream, and the transfer or gases like oxygen and carbon dioxide from the atmosphere to the ocean. Since 2020, she has been involved with scientific assessment of marine Carbon Dioxide Removal with a particular focus on Ocean Alkalinity Enhancement.

Implications of large-scale circulation tipping points on ocean ventilation
Some of the most studied tipping elements in the Earth System concern possible shifts in large-scale ocean circulation. In this talk, I will explore how the ocean ventilation of oxygen and carbon may change in response to a reorganization of the large-scale circulation. Results of a unique observational study in the Labrador Sea reveal the distinct roles of overturning and horizontal circulation in ventilating the deep North Atlantic. These observational insights will contextualize ocean model simulations used to separate the various mechanisms that can deplete ocean oxygen, including isopycnal and diapycnal mixing and changes in the overturning circulation.

Professor Ros Rickaby
University of Oxford, UK

Ros Rickaby is a marine biogeochemist, currently the Chair of Geology at the Department of Earth Sciences, University of Oxford, having been Professor of Biogeochemistry since 2010, on the dark side (of blue!), as well as mum to two boys. She received her MA and PhD from Magdalene College, Cambridge University, finally leaving (!) in 1999 to study at Harvard for her post-doc with Dan Schrag before being appointed to a Lectureship in Oxford in 2002. Ros has pioneered an interdisciplinary blend of biology and chemistry to define the evolving role

of the mineralising phytoplankton, in driving climate. She has had the luck to be a scientific mentor to a number of brilliant young scientists and proud to have helped guide nearly 20 of her OceanBug group to faculty posts around the world. For her research, she has won 20 years of continuous ERC funding, and been recognised by prestigious medals including from the European Geosciences and American Geophysical Union and was appointed FRS in 2022.

Shelf Matters: Implications of sea-level change on the carbon sinks
The importance of the hypsography and degree of inundation of the shelf as an amplifying feed-back on climate and the carbon sink has never been fully resolved. New multi-proxy evidence from the geological record shows that the sea-level influence on the areal extent of high sedimentation in shelf regions acts as a first order control on phosphate availability for new production, respiratory demand, and ocean oxygenation. The data also reveal the existence of a threshold in ocean oxygenation which drives a positive feed-back on glacial inception, via a self-rectifying instability between the carbon source and sink. This talk will explore the implications of the non-linear relationship between sea level and these interlinked biogeochemical cycles for the organic carbon and carbonate cycles.

Professor James Rae
University of St Andrews, UK

James Rae is a geochemist and climate scientist in the School of Earth and Environmental Sciences at the University of St Andrews. His research uses the geochemistry of sediments, ice, and fossils to reconstruct past climates. Much of his work has focussed on development of the boron isotope proxy for ocean pH and atmospheric CO2. Particular interests include the climates of the ice ages, changes in ocean circulation, biomineralization in calcifying organisms, and reconstructing ocean pH and atmospheric CO2 over geological time.

Ocean carbon release due to abrupt shifts in circulation and calcification
Oceanic carbon uptake plays a critical role in modulating atmospheric CO2 and ameliorating future warming. However paleo records show that the ocean has the ability to switch rapidly into modes of carbon release. Here, we highlight two such modes, one triggered by changes in ocean circulation, the other by calcifying plankton.First, we show how abrupt changes in AMOC during the last deglaciation led to circulation change and carbon release in both the Southern Ocean and the North Pacific, resulting in multi-decadal to centennial scale CO2 rise.

Second, we describe an unexpected feedback in pelagic calcification following past acidification and warming events, which lowered ocean alkalinity and thus delayed CO2 and climate system recovery.
Each of these results in additional CO2 rise and so, if triggered in the future, could lead to prolonged and exacerbated global warming.

Professor Nicole Lovenduski
University of Colorado Boulder, US

Nikki Lovenduski is a Professor of Atmospheric and Oceanic Sciences at the University of Colorado Boulder, where she is currently serving as Director of the Institute of Arctic and Alpine Research. She and her group conduct modeling and observational studies of all aspects of modern-day ocean biogeochemistry, with a focus on the oceanic carbon cycle and its connection with the atmospheric carbon dioxide concentration.

Predicting ocean biogeochemical variations months to years in advance

This talk will describe how Earth system models run in 'forecast' mode can be used to assess the predictability of near-term (months to years in advance) ocean biogeochemical variations and extreme events. By quantifying predictability using forecasts of the past, we gain information about the potential to make predictions of the future. We will also discuss the observational requirements for the production of reliable, near-term ocean biogeochemical forecasts.

Session 4: Shifts and Tipping Points in Marine Ecosystems

Chair: Professor Malin Pinsky
University of California, Santa Cruz, US

Malin Pinsky is a biologist with expertise in marine ecology, climate change, and genomics, and he leads the Global Change Research Group as a Professor at the University of California Santa Cruz. He is a Fellow of the American Association for the Advancement of Science, an Earth Leadership Fellow, an Early Career Fellow of the Ecological Society of America, an Alfred P. Sloan Fellow in Ocean Sciences, and a Kavli Fellow. He was awarded the 2024 Peter Larkin Award in Fisheries Science. Pinsky is a science advisor for the Beijer Institute of the Royal Swedish Academy of Sciences, and an editor for Ecology Letters and The Philippine Journal of Fisheries. He holds a Ph.D. from Stanford University and an A.B. from Williams College.

Samantha Siedlecki
University of Connecticut, US

As an oceanographer, Professor. Siedlecki focuses on coastal regions, implementing numerical simulations to identify processes responsible for biogeochemical dynamics in modern and future oceans. She earned her PhD from the University of Chicago, focusing on theoretical ocean systems. As a postdoctoral fellow at JISAO, University of Washington, she began simulating Washington and Oregon water responses using realistic ocean acidification and hypoxia variables, developed by the Coastal Modeling Group. At JISAO, she extended that work to include seasonal (J-SCOPE) and short-term (LiveOcean) forecasts. Now an associate professor at the University of Connecticut, she explores regional climate projections of ocean conditions on both U.S. coasts. Through collaborations in NCAR's Early Career Faculty Innovators Program and several funded projects, she partners with social scientists to incorporate these tools into climate resilience decisions for marine resources. She is a member of the Integrated Ocean Carbon Research programme (IOC-R), the Carbon and Climate section for PICES, co-champion of OARS Outcome 5 (Prediction), and the UN Decade Programme CoastPredict.

Compound change: impacts for marine resources and implications for recovery
Climate-driven stressors such as warming, deoxygenation, and acidification extend into coastal regions, but local physical and biogeochemical processes transform these global signals into compound coastal change that is more extreme and ecologically consequential. Using multi-decadal historical and future simulations of ocean conditions, shelf-specific processes are shown to disproportionately intensify compound change in subsurface shelf waters, where oxygen declines and Ω shoals at rates exceeding those in offshore source waters. Localized climate information, forecasts, and long-term monitoring—or coastal intelligence—are needed for communities to plan for irreversible future change.

Professor Stephanie Henson

National Oceanography Centre, UK

Professor Stephanie Henson is a Principal Scientist at the National Oceanography Centre and Honorary Professor at the University of Southampton. She leads a large, active research group in global biogeochemical oceanography. Her particular research interests aim at understanding the natural variability and climate change effects on phytoplankton populations, and subsequent impacts on the biological carbon pump. Her research exploits autonomous vehicles, satellite and in situ data, as well as output from biogeochemical models. In 2024, she received the European Geosciences Union's Fridtjof Nansen medal for "outstanding research into the ocean's role in the carbon cycle, built on her extraordinary ability to combine diverse observational data with novel biogeochemical models." She was a lead author on the Intergovernmental Panel on Climate Change's 6th Assessment Report, on the chapter "Carbon and other biogeochemical cycles and feedbacks".

Abrupt Shifts in Phytoplankton Communities

Plankton form the base of the marine food web and underpin important ecosystem functions, such as primary production and biological carbon storage. Abrupt shifts have occasionally been identified in long time series of plankton community structure, however no consistent picture has emerged of how the changing marine environment might drive plankton shifts. This may partly be due to non-linear responses of plankton to shifts in the physical environment, and/or to inherent resilience and adaptive capacity within plankton communities, as well as patchy observations. In this talk, I'll present the evidence for past abrupt shifts in plankton communities and highlight several open questions that limit our current understanding of how plankton will respond to future ocean conditions.

Dr Lisa C McManus

Hawai'i Institute of Marine Biology, University of Hawai'i at Mānoa, US

Lisa McManus is a theoretical marine ecologist interested in coral reef dynamics, climate change impacts, and human-environment interactions in reef systems. She received her B.S. from the University of Miami's Rosenstiel School of Marine and Atmospheric Science and her Ph.D. in Ecology and Evolutionary Biology from Princeton University. After a postdoctoral fellowship at Rutgers University, she joined the Hawai'i Institute of Marine Biology at the University of Hawai'i at Mānoa, where she is now an Associate Professor. McManus's research uses mathematical and computational approaches to predict eco-evolutionary responses to environmental change in marine systems. Her current work focuses on coral-algal regime shifts, adaptive potential in coral networks, and the implications of conservation actions across reef ecosystems.

New perspectives on coral persistence and regime shifts from eco-evolutionary theory and scientific machine learning

Climate change is reshaping coral reef ecosystems worldwide, requiring new approaches to quantify their adaptive potential and predict critical transitions. Using eco-evolutionary models forced with downscaled climate projections for Hawaiian reefs, we find that population growth rate and adaptive capacity—not thermal tolerance—are the strongest

predictors of long-term coral persistence. We also apply universal differential equations to detect and explain regime shifts on coral reefs, finding that the effectiveness of this approach depends on reef type and environmental context. Together, these results highlight the need for integrative frameworks that combine ecological, evolutionary, and data-driven perspectives to understand coral reef futures.

Professor Michael T Burrows

Scottish Association for Marine Science, UK

Mike Burrows is a shallow water marine ecologist working on environmental drivers and spatial and temporal trends in populations and communities. His work has focussed on populations of climate-sensitive seabed species in shallow water in cold temperate environments but has recently included fish and plankton species for examining climate change responses at ocean basin scales.

Species responses to climate depend on location in their global thermal range: concepts and evidence from meta-analyses and time series data

Multiple lines of evidence suggest that responses across species to short and long-term climate warming are strongly modified by their geographical location relative to their thermal limits. Populations in the cold half of the species' thermal range respond positively to warming and those in the warm half of the range respond negatively. In this talk I explore methods for detecting these range-location specific effects and using thermal performance curves for projecting the consequences for biodiversity change through species turnover in marine communities.

Meeting day 2 - Wednesday 20 May 2026

Session 5: Tipping Points in Ecosystem Services

Chair: Ida Kubiszewski
University College London, UK

Dr Ida Kubiszewski is an Associate Professor at the Institute for Global Prosperity at University College London (UCL) and a Fellow of the Royal Society of Arts. Her work focuses on ecological economics, ecosystem services, and sustainable wellbeing. She has authored or co-authored more than 90 scientific publications and several books on sustainability, natural capital, and wellbeing economics.

Dr Kubiszewski has held roles across academia, policy, and industry. She previously served as CEO of Downforce Technologies, an ag-tech company using remote sensing to measure natural capital on land, and participated in international climate negotiations for the Dominican Republic. She also serves as an associate editor or editorial board member for multiple journals. Her research and leadership aim to bridge science, policy, and practice to develop solutions to some of the world's most pressing sustainability challenges."

Dr Emma Cavan
Imperial College London, UK

Emma is an Associate Professor at Imperial College London based in the Department of Life Sciences at Silwood Park. Her expertise lie with carbon cycling by marine life, specifically within the ocean biological carbon pump. She investigates the role of zooplankton, Antarctic krill and their faeces in sinking carbon to the deep ocean, and microbial turnover of carbon and sequestration times. She is also interested in the impacts of fishing on oceanic carbon, and co-chairs an ICES working group/workshop on this subject.

The Biological Carbon Pump: Who Tips the Balance?
The open-ocean biological carbon pump (BCP) driven by planktonic life, transfers gigatonnes of carbon from the surface ocean to the deep each year. The BCP is not static. Over geological time, physical perturbations — shifts in circulation, stratification, and nutrient supply — have pushed it across tipping points, with consequences for the Earth System. Today, anthropogenic pressures compound these natural dynamics: warming, deoxygenation, acidification, and the largely overlooked impact of industrial harvesting on the marine food web that sustains the pump.
In this talk, I will outline the major threats to the BCP, and explore how emerging international policy frameworks — from the High Seas Treaty to blue carbon markets — offer new levers for protection. Central to this is the proposed Biological Carbon Pump Fisheries Code: a potentially controversial mechanism for embedding BCP integrity into fisheries governance and incentivising sustainable ocean resource management. Could such a Code work? Should it? And what science, policy architecture, and international will it require? These are questions we can no longer defer.

Professor Adrian Stier
UC Santa Barbara, US

Adrian Stier is an Associate Professor of Ecology, Evolution, and Marine Biology at the University of California, Santa Barbara. His research is driven by both a fundamental interest in how ecosystems are assembled and an urgent need to inform sustainable management of coastal marine systems. Broadly, his work focuses on how species interactions shape ecosystem assembly, influence biodiversity, and determine ecological resilience.

Dr Will White
Oregon State University, US

Dr Will White is an Associate Professor in the Coastal Oregon Marine Experiment Station at the Hatfield Marine Science Center, Oregon State University. Dr White earned his Ph.D. from the University of California Santa Barbara in 2007, studying the ecology of coral reef fish populations. He then did postdoctoral research at the University of California Davis, and was on the faculty of the University of North Carolina Wilmington before coming to Oregon State in 2017. Dr White's research group uses mathematical modelling and statistical approaches to answer basic and applied questions in a wide range of study systems, from oyster reefs to kelp forests to sea turtles. His work has informed marine conservation policy at the state and federal level, particularly in the realm of marine fisheries and marine reserves.

When and how local management actions can improve resilience to climate-change-driven tipping points: examples from kelp forest ecosystems
Marine heatwaves have become widespread stressors affecting coastal ecosystems worldwide, pushing them across tipping points into degraded states. Though the ultimate problem is global, there is a short-term need to find conservation tools that can enhance ecosystem resilience of ecosystems at a local scale. In the case of kelp forest ecosystems, heatwaves both reduce kelp growth and increase kelp herbivory by sea urchins, tipping systems into a persistent, degraded 'urchin barren' state. There are a variety of management actions that could improve resistance and resilience, from physically removing sea urchins to re-seeding kelp to protecting fish that eat urchins from fishing. However, it is challenging to know how much of any one of those activities, or in what combination, would be the best use of limited resources. In this talk I will show how using mathematical models of kelp forest communities can guide those management decisions, and lead to different recommendations in different ecological contexts.

Dr Dan Smale
Marine Biological Association, UK

Dan is a marine ecologist with broad interests and a particular focus on climate change impacts in coastal marine ecosystems. He has worked extensively on kelp forest ecosystems globally and has spearheaded recent research on marine heatwaves. Dan leads a team at the Marine Biological Association of the UK, in Plymouth.

The impacts of marine heatwaves on coastal biodiversity and the provision of ecosystem services

Climatic extremes are becoming increasingly common under global warming. In the oceans, the frequency and duration of marine heatwaves (MHWs)—periods of anomalously warm water—have increased significantly over the past century, with wide-ranging impacts on ecosystems and coastal societies. Several recent high-profile MHWs have driven phase shifts of entire ecosystems, with major implications for biodiversity and ecological functioning. Our work on MHW impacts on ecosystem service provisioning has revealed significant socioeconomic consequences, and also highlighted opportunities and examples of successful management interventions. MHWs are increasingly recognised as forceful agents of disturbance to coastal and oceanic ecosystems. Improved forecasting combined with a wider range of adaptation measures will facilitate management decisions and help guide conservation efforts, which will be vital for future-proofing marine biodiversity in a warmer, more extreme ocean.

Session 6: Human Dimensions of Ocean Tipping Points

Chair: Corinne Le Quéré CBE FRS
University of East Anglia, UK

Aulani Wilhelm
Nia Tero, US

Aulani Wilhelm is the CEO at Nia Tero, an international organization dedicated to Indigenous Peoples' guardianship and the role Indigenous Peoples have played — and continue to play — in protecting lands, waters, and ocean areas. 'Aulani has spent her career bridging culture, community, and science to drive innovations in ocean policy and governance. Prior to joining Nia Tero, she served as the Assistant Director for Ocean Conservation, Climate and Equity at the White House Office of Science and Technology Policy and Senior Vice President for Oceans at Conservation International where she co-founded the Blue Nature Alliance and the Coral Reefs of the High Seas Coalition. She holds a MS from Stanford University and a BA from the University of Southern California. 'Aulani was named one of the TIME100 most influential climate leaders of 2025.

Because knowing isn't enough: Next steps, and the opportunity of Indigenous Peoples' guardianship
Tremendous growth in human knowledge and scientific advancement is occurring alongside the accelerated decline in the health of the natural world; the former is not stopping the latter. How can we mobilize science to take the actions necessary for future generations? Drawing from the need to bridge worlds, we will explore why Indigenous Peoples' guardianship is essential to the survival of humanity, and how scientific communities focused on the ocean and the natural world can better reach their goals through true collaboration with Indigenous Peoples.

Laurie Laybourn
Strategic Climate Risks Initiative (SCRI), UK

Laurie Laybourn is Executive Director of the Strategic Climate Risks Initiative (SCRI), a think-do tank that develops capabilities for securing a better world even as complex environmental-driven risks escalate. An award-winning researcher, Laurie also holds fellowships at Chatham House, the University of Exeter, and the Institute for Public Policy Research (IPPR). Laurie is also an advisor to the UK Climate Change Committee and adelphi think tank, and sits on the boards of Carbon Tracker and the Economic Change Unit, an organisation he founded. Previously, he led the UK Health Alliance on Climate Change and has worked at the LSE, Oxford University, and the UK Parliament. Laurie regularly writes for a range of publications and appears on TV and radio.

Tipping point research and 'decision-usefulness'
We will explore ways in which tipping points in ocean systems pose severe risks to societies, the profound challenges to decision-making created by uncertainties and other factors, and some approaches to helping tackle these challenges, including the methods for effectively working with important decision-makers in developing and communicating scientific information.

Forum Participants

Dr Alaa Al Khourdajie
Imperial College, UK

Dr Alaa Al Khourdajie is an Advanced Research Fellow at Imperial College London whose work focuses on climate mitigation pathways under disruptions and climate impacts. He also contributes to major scientific assessments, including the IPCC AR7, and the WCRP assessment on high-impact climate events and tipping points, where he co-leads the section on Threshold breaching and tipping points in impacts.

Professor Peter Ashwin
University of Exeter, UK

Professor of mathematics with expertise in dynamical systems, computational modelling and applications. Particularly interested in understanding the links between bifurcations, ergodicity and critical transitions/tipping points in systems that are nonautonomous, nonlinear and stochastic. He has worked with a variety of experts in interdisciplinary collaborations, especially in biomedical and earth/climate sciences.

Dr Laurinne Balstad
UC Davis, US

Dr Laurinne Balstad is a theoretical ecologist studying how management actions shape eco-evolutionary outcomes and how managers can account for and leverage ongoing evolution to achieve their goals. Her work spans the basic-applied spectrum and explores various host-pathogen systems, with a particular emphasis on marine ecosystems. She uses a mix of quantitative approaches including mathematical models, simulations and statistical analysis. She is currently a postdoctoral researcher at the University of British Columbia.

Daniele Bianchi
UCLA, US

Daniele Bianchi is an associate professor of oceanography in the Department of Atmospheric and Oceanic Sciences at UCLA. His research examines interactions among ocean circulation, biogeochemistry, and marine ecosystems, using a combination of observations and numerical models. He focuses on the cycling of carbon, nitrogen, and oxygen, the California Current System, and global fisheries. His work has contributed to the IPCC Sixth Assessment Report, including estimates of oceanic nitrous oxide (N_2O) emissions and projections of marine fish biomass under climate change through the FISH-MIP collaboration. He received his PhD in Atmospheric and Oceanic Sciences from Princeton University and previously held postdoctoral positions at McGill University and the University of Washington.

Dr Francis Chan
Institute for Marine Ecosystem and Resources Studies (CIMERS). US

Dr Francis Chan is an Associate Professor in the Department of Integrative Biology and the Director of the Cooperative Institute for Marine Ecosystem and Resources Studies (CIMERS). Chan is an ecosystem ecologist whose research examines the impacts of climate change on oxygen and carbon cycling in coastal ecosystems. His research also focuses on the co-development of solutions to ocean climate change. His recent work engages transdisciplinary teams that bring ocean observations, experimental biology, climate modeling, and management modeling to climate-ready fisheries. Chan received his B.S. from Hampshire College and his Ph.D from Cornell University.

Christopher Costello
UC Santa Barbara US

Christopher is the Research Director of the Environmental Markets Lab and a Professor of Resource Economics at the Bren School at UC Santa Barbara. His research focuses on natural resource economics, incomplete property rights, and decision making under uncertainty, with a particular emphasis on the value and effect of information on management decisions. In his work, he combines theoretical micro-economics with modeling and empirical analysis to inform policy on fisheries management, biological diversity, introduced species, industrial regulation, and marine policy. He has worked closely with national governments, international organizations, NGOs, and other partners from around the world to translate his research into on-the-ground action in a diverse spectrum of developed and developing countries. He currently serves as an advisor to California's Governor Newsom on the Council of Economic Advisors and as the Chief Economist at the Environmental Defense Fund. Chris holds a Ph.D. in Agricultural and Resource Economics from the University of California, Berkeley.

Elena Couce
Centre for Environment, Fisheries, and Aquaculture Science (CEFAS)

Elena Couce is a quantitative marine ecologist based at the Centre for Environment, Fisheries and Aquaculture Science (Cefas), where she works within the Biodiversity Science Team. Her research applies spatial data analysis, GIS, and macroecological modeling to understand marine biodiversity, ecosystem change, and the impacts of climate change on ocean environments, including coral reef systems. Couce's work integrates ecosystem modeling and large-scale environmental datasets to support marine conservation and climate adaptation policy.

Professor Thomas Frolicher
University of Bern, Berlin

Thomas Frölicher is a climate physicist and professor in the Division of Climate and Environmental Physics at the University of Bern, where his research focuses on the role of the ocean in the climate system, with particular emphasis on extreme events and tipping points. He serves as Coordinating Lead Author of Chapter 8 on tipping points in the Working Group I contribution to the IPCC Seventh Assessment Report (AR7).

Eric Galbraith
ICTA-UAB Universitat Autònoma de Barcelona

Eric Galbraith is an ICREA Research Professor at the Universitat Autònoma de Barcelona. He completed his PhD in oceanography at the University of British Columbia in 2006, and previously worked as a research associate at Princeton University and as a professor at McGill University where he held the Canada Research Chair in Human-Earth System Dynamics. His research uses numerical models and data analysis to better understand global sustainability challenges at the intersection between climate change, ecosystems and human societies. He has worked on both past and anticipated climate changes, changes in ocean circulation and biogeochemical cycles, macroecology, the global marine fishery, and the technosphere.

Professor Jean Philippe Gibert
Duke University, US

Jean-Philippe Gibert is the Joanne W. Markman and A. Morris Williams Jr., Associate Professor of Biology at Duke University. He holds a bachelor's degree from the Universidad de la República (Uruguay), and a PhD from the University of Nebraska–Lincoln (USA). He was a James S. McDonnell Foundation Postdoctoral Fellow prior to joining Duke, and currently is a Simons Foundation Early Career Fellow in Aquatic Microbial Ecology and Evolution. His work aims to understand and predict the response of (often microbial) food webs to global climate change with emphasis on rapid evolutionary or plastic change in the traits that mediate predator-prey interactions. His lab does so by merging mathematical modeling, computational approaches, and data from both laboratory microcosms and field-based studies. His work has been funded by the US Department of Energy, the Simons Foundation, and the US National Science Foundation.

Professor Claudine Hauri
University of Alaska Fairbanks, US

Claudine Hauri is a Research Professor and Deputy Director for International Relations and Science Collaboration at the International Arctic Research Center, University of Alaska Fairbanks. Her work focuses on Arctic and sub-Arctic ocean change, with expertise in ocean acidification, biogeochemical modeling, ecosystem impacts, and the development of ocean forecasts that support community and management decision-making. She leads and contributes to regional ocean modeling efforts for Alaska and the Arctic, including high-

resolution physical-biogeochemical simulations that connect climate change, marine ecosystems, and fisheries-relevant conditions. Claudine's work increasingly centers on equitable co-production of knowledge with Indigenous scholars, organizations, and communities, ensuring that ocean science is grounded in both academic research and Indigenous Knowledge systems. She is active in international ocean acidification and Arctic science networks and works across science, policy, and community partnerships to advance actionable, societally relevant ocean research.

Professor Kate Hendry
British Antarctic Survey, UK

Prof Kate Hendry is a chemical oceanographer and marine biogeochemist in the Polar Oceans Team, British Antarctic Survey. Her research interests surround the impact on marine nutrient cycling of climate change in the Arctic and Antarctic. Kate has published over 90 papers in international journals, and has won almost £5M in grant funding as Principal Investigator, and collaborated on several national and international projects. She led a European Research Council funded project investigating nutrient cycling in glaciated margins off Greenland, and now leads a NERC Pushing the Frontiers grant investigating Arctic and Antarctic coastal biogeochemistry. She won the Geological Society of London Bigsby Medal in 2025, and the EAG Houtermans medal in 2016.Kate is Chair of Antarctic Science Ltd, vice chair of the UK Arctic and Antarctic Partnership, the geosciences representative for the UK National Committee for Antarctic Research, and honorary secretary of the Challenger Society for Marine Science.

Dr Tereza Jarníková
University of East Anglia UK

Dr Tereza Jarníková is a senior research associate at the University of East Anglia, UK. Her research focuses on the physical and biogeochemical controls on ocean carbon cycling on scales ranging from the submesoscale to the global ocean. She has shown that the importance of carbon-climate feedbacks in the Southern Ocean will likely decrease this century, and is currently investigating the impacts of tipping in the Atlantic Meridional Overturning Circulation on ocean carbon and ecosystems. She developed diagnostics to assess ocean acidification effects in Pacific Northwest fjord systems as well as automated instrumentation for trace gas measurement on sea-going vessels. Dr Jarníková leads the UEA contribution to the Global Carbon Budget's ocean sink assessment, is a contributor to the upcoming WMO's Ozone Assessment, and an active science communicator, with involvement in initiatives such as the Czech Facts on Climate initiative.

Vadim Karatayev
University of Maryland, US

Vadim Karatayev is the William J. Higgins Assistant Professor of Biology, with affiliations in the Biological Sciences (BISI) graduate program, including Behavior, Ecology, Evolution, and Systematics (BEES). His research integrates theory and large-scale field data to understand the conditions that erode or reinforce resilience in complex ecosystems. His work addresses fundamental questions at the intersection of community ecology, landscape ecology, and network dynamics.

Christina Last
Massachusetts Institute of Technology, US

Christina is the Director and CEO of TipplyAI, a startup building world models for autonomous systems. TipplyAI works with ARIA (UK DARPA) creators to enable autonomous data collection for weather and climate. Previously, Christina was a Machine Learning Scientist at Mila, where she developed causal AI models to learn physical drivers behind extreme weather. She graduated from MIT as a Fulbright Scholar, where she developed computer vision-based world models. Earlier in her career, she build UNICEF's open source AI models to identify air pollution hotspots, and received the largest international prize for contributions to peace as an undercover investigative journalist, exposing environmental corruption in Iraq, Nigeria, and Namibia (press in Guardian/Telegraph/Al Jazeera

Wei Liu
UC Riverside, US

Wei Liu is an associate professor in the department of Earth and Planetary Sciences at University of California Riverside.
His research focuses on the stability, variability and climate impact of the Atlantic Meridional Overturning Circulation.

Dr Holly Moeller
UC Santa Barbara, US

Dr Holly V Moeller is an Associate Professor of Ecology and Evolution at the University of California, Santa Barbara, where her group works on acquired metabolism using a combination of mathematical models, laboratory experiments, and field observations. Among the group's interests are conservation bioeconomics (specifically, using optimal control theory to identify synergies between conservation and economic benefits using marine reserves) and photosymbioses. For example, her group's current work on acquired photosynthesis traces the evolutionary origins of marine phytoplankton, as well as the consequences of plastid acquisition for future evolutionary responses to climate change. Recent mathematical modeling has also explored the bioenergetic causes of coral bleaching. In addition to her scientific work, Holly is a bit of a 'math evangelist,' who tells everyone that she meets about the vital role of mathematics in biology. More recently, she has begun a project to revise

the teaching of first-year calculus at UCSB, grounding mathematical concepts in biological examples more tractable for undergraduate biology students.

Dr Clare Ostle MBA
Marine Biological Association UK

Dr Clare Ostle is a marine biogeochemist at the Marine Biological Association in Plymouth, UK. Her research focuses on the role of plankton communities in regulating ocean biogeochemistry, with particular emphasis on the biological carbon pump and how plankton dynamics influence carbon uptake and storage in the ocean. Clare works extensively with data from the Continuous Plankton Recorder Survey, one of the world's longest-running marine monitoring programmes, using long-term observations to investigate ecological change in the North Atlantic and beyond. She has a strong interest in advancing plankton observation technologies and integrating biological observations with environmental data to improve understanding of ocean ecosystem change. Clare currently serves as Chair of the Global Alliance of CPR Surveys, coordinating international collaboration among plankton monitoring programmes to strengthen global observations of marine ecosystems and their role in the Earth system.

Paul Pierce-Kelly
Zoological Society of London, UK

Paul Pearce-Kelly is Senior Curator of Invertebrates and Fish at the Zoological Society of London and specialises in the development and management of species conservation programmes. He serves on the Strategic Committee of IUCN's Conservation Planning Specialist Group, in addition to the Coral Specialist Group. His main research interest is on climate change impacts on species and ecosystems, with particular emphasis on coral reefs and associated biodiversity. He was closely involved with the 2023 and 2025 Global Tipping Point reports (https://global-tipping-points.org/) and associated overshoot considerations (https://iopscience.iop.org/article/10.1088/1748-9326/ae3cad).

Professor Viktoria Spaiser
University of Leeds UK

Viktoria Spaiser is Professor of Climate Politics and Computational Social Science at the School of Politics and International Studies and the Priestley Centre for Climate Futures, University of Leeds. She currently holds the prestigious UKRI Future Leaders Fellowship, studying social change in response to climate change. She has contributed to both Global Tipping Points Reports 2023, 2025 across a range of chapters, examining in particular negative social tipping points and societal impacts of Earth System Tipping Points (ESTP), as well as ESTP impact governance options and positive social tipping points with a focus on the role of civil society and AI.

Professor Alessandro Tagliabue
University of Liverpool, UK

Alessandro is a Professor at the University of Liverpool and an ocean biogeochemist. He is interested in how the cycling of resources in the sea affects biological activity and vice-versa. Alessandro is particularly interested in trace micronutrients and how they interact together to shape primary production, ecosystem structure and the global carbon cycle. Alessandro's science links numerical models, at both global and idealised scales, with both fieldwork and synthesis of datasets. Alessandro was a lead author on the IPCC sixth assessment report special report on oceans and cryosphere in a changing climate and is a current lead author on the working group 1 seventh assessment report.

Professor David Thornalley
University College London, UK

David Thornalley is a Professor of Ocean and Climate science at University College London (UCL), with over 20 years' experience investigating the Atlantic Meridional Overturning Circulation (AMOC). He obtained his PhD in Earth Sciences at Cambridge University, followed by postdoctoral positions at Cardiff University and the Woods Hole Oceanographic Institution. At UCL, he leads a research group that studies the circulation of the Atlantic Ocean, its marine ecosystems and its role during climate change - past, present and future. He is currently contributing to the EU EPOC project (Evaluating and Predicting the Ocean Conveyor) and he co-Leads the ARIA funded VERIFY project, which is combining paleoclimate data and models to develop an early warning system for the future potential tipping of the Greenland Ice Sheet and subpolar North Atlantic circulation.

Dr Ben Ward
University of Southampton, UK

Ben Ward is a theoretical ecologist working at the University of Southampton. His research seeks to understand the structure and function of plankton communities through mechanistic and trait-based frameworks. This work has focussed on key ecophysiological traits and their roles in ecosystem function and evolution, from the modern ocean to the Proterozoic. Ward's recent publications also explore how rapid evolution shapes marine microbial biodiversity, highlighting the overlapping timescales of selection, dispersal, and adaptation in the plankton.

Dr Richard Wood
Met Office Hadley Centre, UK

Richard Wood has over 30 years experience in developing ocean and climate models and applying them to problems of climate change. He has a particular interest in how to manage the risks from tipping points of the Atlantic Ocean circulation, and has published widely on this topic. Recently he has been exploring the use of traceable model hierarchies, from simple models through to full ESMs, to better understand the potential for future tipping events.

Maya Zeff
Pinsky Global Change Research Group, UC Santa Cruz, US

Maya Zeff is a marine ecologist, poet, and educator whose research focuses on how climate change and environmental disturbances reshape species interaction networks in marine ecosystems. She combines field experiments, molecular tools, and quantitative network analysis to study ecological resilience and biodiversity in changing oceans. In parallel with her scientific work, Zeff develops ecopoetic workshops and creative practices that explore themes of climate anxiety, interdependence, and sustainability.