

AMEMR 2024
8 - 11 July 2024
Plymouth, UK

ADVANCES IN MARINE ECOSYSTEM MODELLING RESEARCH

8 – 12 July 2024 – Plymouth, UK

Programme And Posters

Open Consultation

Permanent Stand - **UK Marine ecosystems impacts under future climate scenarios. **Louise Rutterford**. CEFAS.

Oral Presentations

**Early Career Researcher

Monday 8th of July

Theme 1 – Model Mechanics

09:00 Conference Introduction. **Jerry Blackford**, Plymouth Marine Laboratory

Session 1 - Model Mechanics

Chair – Gennadi Lessin, Rebecca Millington

09:15 Modelling impact of climate change on distribution and population dynamic of marine megafauna a new dynamic modelling approach. **Sevrine Saille**. Plymouth Marine Laboratory.

09:30 **Unveiling spatio-temporal dynamics of the Great Barrier Reef using connectivity kernels. **Javier Porobic**. CSIRO – Environment.

- 09:45 **Modelling the early marine migration of Atlantic salmon. *Aislinn Borland*
University of Strathclyde.
- 10:00 **Copepods in Arctic seas: implementing an effective dialogue between models
and in situ imaging. *Lucie Bourreau*. Université Laval.
- 10:15 **Inference of interactions between marine foundation species and associated
fauna: a trait-matching approach. (*Virtual presentation*) *Thomas Benoit*. Ifremer,
DYNECO.
- 10:30 Break and Posters

Session 2 - Model Mechanics

Chair – Yuri Artioli, Deniz Disa

- 11:00 **From physics to fish: impact of two-way coupling between a higher and lower
trophic level model on carbon cycling on the Northwest European Shelf. *Helen
Powley*. Plymouth Marine Laboratory.
- 11:15 **Trait-based modeling of marine mesozooplankton feeding strategies at global-
scale. *Lisa Di Matteo*. Sorbonne Université.
- 11:30 Simulating the relationship between zooplankton size and physiology in a global
biogeochemical model, using the statistical method of moments. *Camille
Richon*. Sorbonne Université.
- 11:45 Keynote Lecture 1 - Uncertainty in modelled zooplankton: what matters and
what to do about it. *Wendy Gentleman*. Dalhousie University.
- 12:05 Discussion - What can be done to make end-to-end models robust in the
middle?
- 12:45 Lunch and Posters.

Session 3 - Model Mechanics

Chair – Morgane Travers-Trolet, Samantha Grusd

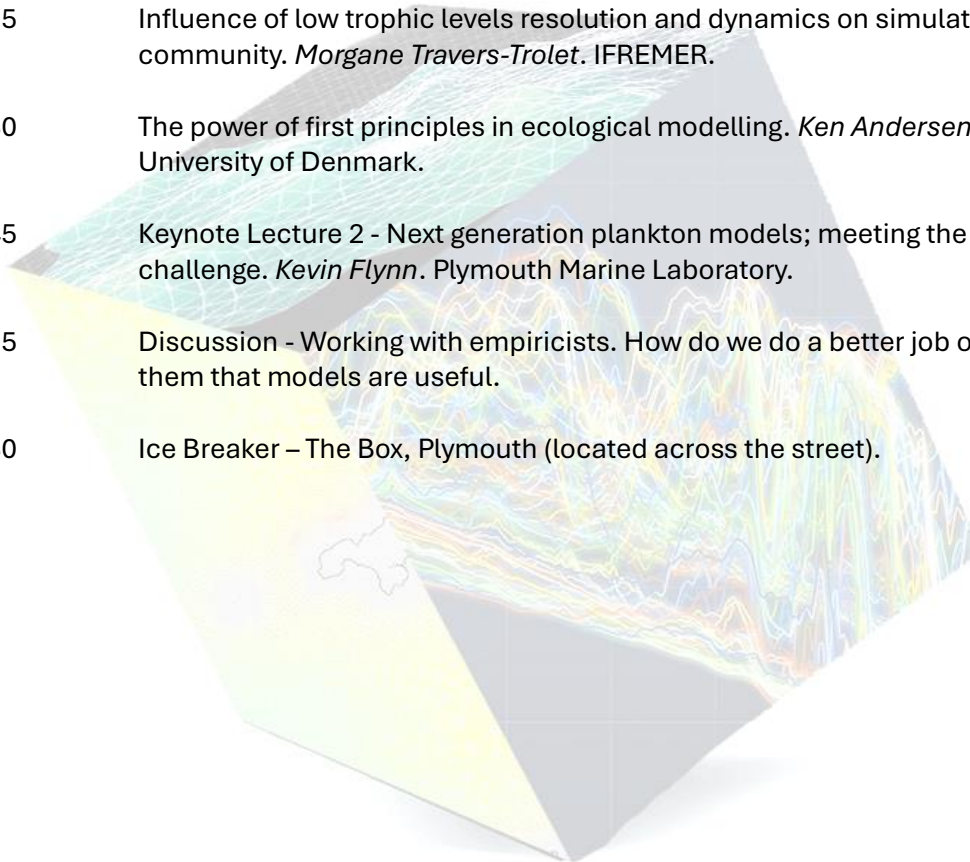
- 13:45 Flash Presentations
- 14:00 **An Individual-Based Model of Basking Sharks in Ireland. *Chelsea Gray*. (*Virtual
Presentation*). George Mason University.
- 14:15 **Towards a Lagrangian Individual-Based Model for the Galician Octopus. *Luz
Garcia*. Centro Oceanográfico de A Coruña.
- 14:30 **Building a novel spatialized model of regional seagrass dynamics: Coupling an
ecological probabilistic Dynamic Bayesian Network with a deterministic regional
ocean model. *Carolyne Chercham*. Ifremer, DYNECO.
- 14:45 Bridging physiology and oceanography with thermal time to model biologically
relevant time-scales in a changing climate. *Anna Neuheimer*. Aarhus University.

- 15:00 **Bioenergetics in the multispecies model Bioen-Osmose to reproduce past fish dynamics in the Bay of Biscay. *Maël Gernez*. Ifremer.
- 15:15 **Improving the reliability of food web and ecosystem models from individual life-cycle modelling. *Pierre Bourdaud*. France Energies Marines.
- 15:30 *Break and Posters*

Session 4 - Model Mechanics

Chair – Jerry Blackford, Al Azhar

- 16:00 Flash Presentations
- 16:15 Influence of low trophic levels resolution and dynamics on simulated fish community. *Morgane Travers-Trolet*. IFREMER.
- 16:30 The power of first principles in ecological modelling. *Ken Andersen*. Technical University of Denmark.
- 16:45 Keynote Lecture 2 - Next generation plankton models; meeting the digital-twin challenge. *Kevin Flynn*. Plymouth Marine Laboratory.
- 17:05 Discussion - Working with empiricists. How do we do a better job of convincing them that models are useful.
- 17:30 Ice Breaker – The Box, Plymouth (located across the street).



Tuesday 9th of July

Theme – Model Mechanics

Session 1 - Model Mechanics

Chair – *Liuqian Yu, Molly James*

- 09:00 Global distribution of non-cyanobacterial N₂ fixers in sinking marine particles. *Subhendu Chakraborty*. Leibniz Centre for Tropical Marine Research (ZMT).
- 09:15 **Effects of ecosystem complexity on the air-sea CO₂ flux in an ocean biogeochemistry model. *Miriam Seifert*. Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung.
- 09:30 **Control of carbon sequestration by the interaction between fishes and benthic fauna. *Rebecca Millington*. Plymouth Marine Laboratory.
- 09:45 **Integrated Nested Model Approach for Understanding the Transboundary Plastic Pollution in Norwegian Fjords. *Prithvinath Madduri*. University of Bergen.
- 10:00 **Spatialised ecosystem modelling to evaluate the influences of marine protected areas and provisioning ecotourism on the distributional response of top predators on the South-East coast of South Africa. *Samantha Grusd*. University of Cape Town.

Theme – The Human Dimension

- 10:15 **Co-producing knowledge with ocean industry stakeholders to understand the impact of activities on ocean carbon. *Fiona Culhane*. Marine Institute Ireland.
- 10:30 Break and Posters

Session 2 - The Human Dimension

Chair: **SCOTT CONDIE, LEE DE MORA**

- 11:00 Early-warning system: Climate-smart spatial management of UK fisheries, aquaculture and conservation. *Ana Queiros*. Plymouth Marine Laboratory.
- 11:15 Bridging the Gap: Integrating Human Dimensions into Global Ocean Dynamic and Biogeochemistry Models. *Katya Popova*. National Oceanography Centre.
- 11:30 Significant benefits from international cooperation over marine plastic pollution. *James Clark*. Plymouth Marine Laboratory.
- 11:45 *Panel session - Fiona Culhane, Ana Queiros, Katya Popova, James Clark*
- Where and why has ecosystem modelling led to changed socio-economic practices and where and why has it failed (lessons learnt)?
- 12:45 Lunch and Posters

Session 3 - The Human Dimension **Chair – Susan Kay, Javier Porobic Garate**

- 13:45 Flash Presentations
- 14:00 Modelling the influence of conservation zoning on the Great Barrier Reef ecosystem. *Scott Condie*. CSIRO.
- 14:15 **Use of the result of simulations with FVCOM in the zoning of a Multiple-Use Marine Protected Area (*Virtual presentation*). *Sergio A. Rosales*. Universidad Católica del Norte.
- 14:30 **Using social influence modelling to plot a pathway out of marine-based conflict. *Corrine Condie*. CSIRO.
- 14:45 **Modelling cross-jurisdictional management interventions for Australia's Great Southern Reef. *Julia Sobol*. University of Tasmania.
- 15:00 Deriving pre-eutrophic conditions from an ensemble model approach for the North-West European Seas. *Sonja van Leeuwen*. NIOZ.
- 15:15 Towards a cross-scale trait-based modelling framework of seascape habitat features. *Martin Marzloff*. Ifremer.
- 15:30 Break and Posters

Session 4 - The Human Dimension **Chair – Sevrine Saille, Paula Silvar**

- 16:00 **Potential impacts of offshore hydrogen production on seasonally-stratified coastal waters. *Nils Christiansen*. Insitute of Coastal Systems, Helmholtz-Zentrum Hereon.
- 16:15 Cumulative effects of Offshore Windfarms on the future North Sea ecosystem. *Ute Daewel*. Helmholtz-Zentrum Hereon.
- 16:30 From Shipping to the Ecosystem: A Coupled Model System Based on Observations Details the Influence of Scrubber Discharge to Support Marine Environmental Protection Measures. *Christoph Stegert*. Bundesamt für Seeschifffahrt und Hydrographie.
- 16:45 **Exploring fish aggregation dynamics in POSEIDON, an Agent-Based Model, by simulating the Eastern Pacific Ocean tropical tuna fishery. *Alexandra Norelli*. University of Oxford.
- 17:00 **Advancements in Modelling Early Life Stages: A focus on Atlantic Iberian Sardine. *Adrian Sanjurjo*. Centro Oceanográfico de A Coruña (COAC - IEO), CSIC.
- 17:15 Is harvesting of mesopelagic fish stocks sustainable? *Douglas Speirs*. University of Strathclyde.
- 17:30 Posters Reception and Posters

Wednesday 10th of July

Theme - Ecosystems and cycles under change

Session 1 - Ecosystems and cycles under change Session 1

Chair – Wendy Gentleman, Robert Wilson

- 09:00 **Agent-based models for modelling small pelagic life history traits under climate change. *Elisa Donati*. National Institute of Oceanography and Applied Geophysics.
- 09:15 **Dissolved organic carbon dynamics in a changing ocean: A COBALTv2 Earth System Model analysis. *Lana Flanjak*. Climate and Environmental Physics, Physics Institute, University of Bern.
- 09:30 Evaluating impacts of climate and human pressures on primary production, with implications for management. *Solfrid Hjøllo*. Institute of Marine Research.
- 09:45 **Modelling thermal niche of marine calcifying zooplankton from past to future. *Rui Ying*. University of Bristol.
- 10:00 Marine heatwaves & cold spells around the UK: a cause for concern for marine ecosystems & the blue economy?. *Zoe Jacobs*. National Oceanography Centre.
- 10:15 **Extreme and compound ocean events are key drivers of projected low pelagic fish biomass. *Natacha Legrix*. Oeschger Centre for Climate Change Research, University of Bern.
- 10:30 Break and Posters

Session 2 - Ecosystems and cycles under change

Chair – Iris Kriest, Bettina Fach

- 11:00 **Emergent ecosystem distributions from 100-model simulations with the PlankTOM12 model. *Rebecca Wright*. Online. University of East Anglia.
- 11:15 Climate change may unleash the ghost of past species' ecological niches. *Mathieu Chevalier*. Ifremer.
- 11:30 **Panel session** - *Zoe Jacobs, Mathieu Chevalier, Yuri Artioli, Kelly Ortega-Cisneros*
- How do we reduce and communicate uncertainty about climate-related changes to ecosystems?
- 12:30 Lunch and posters

Session 3 - Ecosystems and cycles under change

Chair – Dale Partridge

- 13:30 **Variability and Future Trends in Chlorophyll-a Concentration Across Coastal Upwelling Systems. *Shailee Patel*. National Oceanography Centre.
- 13:45 Variability of annual primary production in the North Sea from 1983 to 2014: diatoms and non-diatoms show different trends. *Johannes Pätsch*. Institute of Carbon Cycles, Helmholtz-Zentrum Hereon.
- 14:00 **Observations and biogeochemical modeling reveal chlorophyll diel cycle with near-sunset maxima in the Red Sea. *Yixin Wang*. King Abdullah University of Science and Technology (KAUST).
- 14:15 Impacts of Climate Change on the Ascension Island Marine Protected Area and its Ecosystem Services. *Lee de Mora*. Plymouth Marine Laboratory.
- 14:30 **Modelling global carbon fluxes and sequestration from fish. *Yixin Zhao*. Center for Ocean Life, DTU Aqua, Technical University of Denmark.
- 14:45 **Potential continental shelf carbon sequestration by a harvested fish species. *Paula Silvar*. Marine Institute Ireland.
- 15:00 Break and Posters

Session 4 - Ecosystems and cycles under change

Chair – Luca Polimene, Helen Powley

- 15:30 **Impact of Pacific Ocean heatwaves on phytoplankton community composition (*Virtual presentation*). *Lionel Arteaga*. NASA GSFC.
- 15:45 Modelling the complete life cycle of an arctic copepod reveals complex trade-offs between concurrent life cycle strategies. (*Virtual presentation*) *Catherine Brennan*. Bedford Institute of Oceanography, Fisheries and Oceans Canada.
- 16:00 Quantification of Carbon Fluxes along a Gradient from the Wadden Sea Lagoon to the North Sea and Atlantic Ocean. *Anouk Blauw*. Deltares.
- 16:15 **SISSOMA: A mechanistic approach in modelling the dynamics of marine aggregates. *Athanasios Kandyas*. DTU Aqua.
- 16:30 A coupled phytoplankton-flocculation model to quantify suspended particulate matter dynamics on the Belgian shelf. *Nathan Terseleer*. Institute of Natural Sciences.
- 16:45 **Modelling sediment-water fluxes: impacts on water column biogeochemistry in a large eutrophic estuary. *Zheng Chen*. The Hong Kong University of Science and Technology (Guangzhou).

Thursday 11th of July

Session 1 - Ecosystems and cycles under change

Chair – *Katya Popova, Yaru Li*

- 09:00 **Impact of Tropical Storms on the Alkalinity of Two Contrasting Tidal Tributaries in a Coastal Plain Estuary. *Alexa Labossiere*. Virginia Institute of Marine Science, William & Mary.
- 09:15 Assessing climate change impacts in the Southern Benguela: a model inter-comparison. *Kelly Ortega Cisneros*. University of Cape Town.
- 09:30 **IRMA: An index to predict mass fish mortality during harmful algal blooms in tropical estuaries. *Jose Ernesto Mancera Pineda*. Universidad Nacional de Colombia.
- 09:45 **Development of a three dimensional multispecies small pelagic fish model for the Mediterranean Sea. *Thanos Gkanasos*. HCMR, Institute of Oceanography.
- 10:00 **Assessing the impacts of climate change and fishing on the ecosystem recovery dynamics in the Celtic Sea. *Mikaëla Potier*. Institut Agro, Ifremer.
- 10:15 **Impacts of environmental pressure on the survival of early life stages of the European Smelt using an Individual-based modelling approach. *David Drewes*. Helmholtz-Zentrum hereon.
- 10:30 Break and Posters

Theme - Digital innovation

Session 2 – Digital Innovation

Chair – *Kevin Flynn, Jim Clark*

- 11:00 Keynote Lecture 3: Can digital twins help define a safe operating space for the seas? Transforming the regional seas: Digital Twin Demonstrators. *Baris Salihoglu*. Middle East Technical University.
- 11:20 Keynote Lecture 4: Digital twin simulations support resource management decisions in a complex coastal ecosystem with salmon aquaculture. *Karen Wild-Allen*. CSIRO Environment.
- 11:40 **Discussion** - Challenges and opportunities for AI in marine ecosystem research
- 12:20 Lunch and Posters

Session 3 – Digital Innovation

Chair – Guttorm Alendal, Marius Dewar

- 13:20 New reanalysis for ecosystem indicators with ensemble-based uncertainty estimates in the UK regional waters. *Jozef Skakala*. Plymouth Marine Laboratory.
- 13:35 **Evaluating the skill of hybrid statistical species distribution models trained with mechanistic model output. *Dante Horemans*. Virginia Institute of Marine Science, William & Mary.
- 13:50 **A dual machine learning and mechanistic approach to modelling future zooplankton prey for forage fish. *Emma Tyldesley*. University of Strathclyde.
- 14:05 **Parameterizing 3D Marine Biogeochemical Models: Surrogate-Based Optimization for Parameter Estimation and Performance Enhancement. *Hoa Nguyen*. Helmholtz Zentrum hereon.
- 14:20 **Delineating robust cores in marine spatial structure: Applications to Atlantic sea scallop (*Placopecten magellanicus*) connectivity. *Karsten Economou*. Department of Engineering Mathematics and Internetworking, Dalhousie University.
- 14:35 **Benefit of assimilating BGC-Argo observations for investigating the air-sea CO2 flux in the Southern Ocean. *Andrea Rochner*. Met Office.
- 14:50 A solution for autonomous, adaptive monitoring of coastal ocean ecosystems: Integrating ocean robots and operational forecasts. *David Ford*. Met Office.
- 15:05 Break and Posters

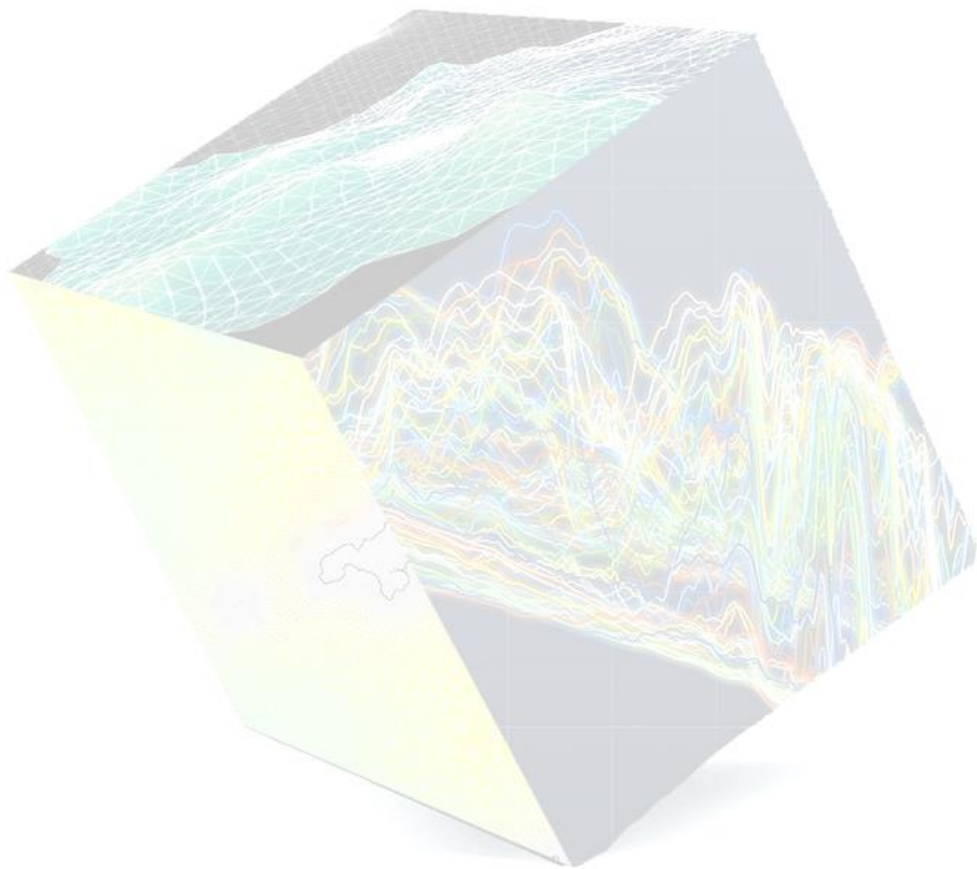
Session 4 – Digital Innovation

Chair – Stefano Ciavatta, Marius Dewar

- 15:30 **Representing uncertainties in global (calcifying) phytoplankton stocks. *Joost de Vries*. University of Bristol.
- 15:45 Review of the Copernicus Marine Service Global biogeochemical reanalysis : modelling, Ocean Color and Carbonates data assimilation and validation against BGC-Argo-based in situ datasets. *Coralie Perruche*. Mercator Ocean.
- 16:00 Keynote Lecture 5 - Bridging the gap: Integrating models and observations for better ecosystem understanding. *Morten D Skogen*. Institute of Marine Research.
- 16:20 **Discussion** - Novel kinds of observations that can be used to improve our models.
- 16:50 Closing remarks - Jerry Blackford
- 17:00 End of sessions

18:15 Doors open at National Marine Aquarium

19:00 Conference Dinner – National Marine Aquarium ([last orders at 23:45](#), [closing at 00:30](#)).



Posters

Theme - Ecosystems and cycles under change

- 1 Modelling offshore benthic blue carbon. *John Aldridge*. CEFAS
- 2 **Modelling ecosystems and fisheries in the Bazaruto Archipelago, Mozambique, using Ecopath with Ecosim (EwE). *Darcie Anderson*. University of Cape Town.
- 3 **How climate-driven changes in primary production, physiological rates and non-indigenous species will affect the Eastern English Channel-Southern North Sea ecosystem structure and functioning.? *Emma Araithous*. France Energies Marines.
- 4 **Modelling ecosystem impact of offshore wind farm structures in the Northwest European shelf. *Muchamad Al Azhar*. Plymouth Marine Laboratory.
- 5 **Spatio-Temporal variability of Chla and phytoplankton functional types (PFTs) from satellite ocean color data in the Bay of Bengal. *Imtiaj Ahmed Easty*. Noakhali Science and Technology University.
- 6 Impact of cross-shelf exchange events on eutrophication and primary production variability in the Black Sea. *Bettina Fach*. Middle East Technical University.
- 7 Two-way physics-biogeochemistry coupling constrained by ocean colour data assimilation. *David Ford*. Met Office.
- 8 A model-based analysis of summertime oxygen deficiency in the Elbe Estuary (Germany). *Fabian Große*. Federal Institute of Hydrology.
- 9 **Poor performance of regime shift detection methods in marine ecosystems. *Hannah Haines*. AWI.
- 10 **Modelling mid-21st century Chesapeake Bay hypoxia: The role of climate changes at the ocean, land, and atmospheric boundaries. *Colin Hawes*. Virginia Institute of Marine Science.
- 11 **Plankton community size structure in UK coastal waters. *Greg Macmillan*. University of Strathclyde.
- 12 **Seawater turbidity on the Northwest European Shelf (NWES). An investigation into the effects of light attenuation on marine biogeochemistry and ecosystem diversity in a 1D ERSEM Model. *Rhiannon Morton*. University of Exeter.
- 13 **Modelling marine nitrogen budgets to assess drivers and impacts of nitrogen pollution. *Dale Partridge*. Plymouth Marine Laboratory.
- 15 **Modelling overgrazing of temperate kelp forests due to invasive tropical herbivorous fish. *Rachel Spencer*. University of Exeter.

- 16 **Relative importance of factors driving hypoxia onset in the Chesapeake Bay. *Olivia Szot*. Virginia Institute of Marine Science.
- 17 The fate of the terrestrial dissolved organic matter in a partially mixed estuary: The Tamar, UK. *Ricardo Torres*. Plymouth Marine Laboratory.
- 18 Regions of riverine influence in the global ocean. *Sarah Wakelin*. National Oceanography Centre United Kingdom.
- 19 **Mechanisms governing nutrient transport from the Gulf of Aden into the Red Sea. *Yixin Wang*. King Abdullah University of Science and Technology (KAUST).
- 20 **Quantifying bivalve aquaculture-environment interactions using a coupled bioenergetic and biogeochemical model. *Liuqian Yu*. The Hong Kong University of Science and Technology (Guangzhou).
- 21 **A simple two-layered ecosystem model for the permanently stratified ocean. *Qi Zheng*. University of Exeter.

Theme – The Human Dimension

- 22 **Impacts of blue mussel mitigation farms in coastal ecosystems: Skive Fjord, Denmark, a model study. *Tobias Andersen*. Technical University of Denmark.
- 23 **Potential and uncertainties of ocean alkalinity enhancement in the Baltic Sea according to in-silico experiments. *Anna-Adriana Anschütz*. Leibniz Institute for Baltic Sea Research Warnemünde.
- 24 Modelling the spatio-temporal variability of the variegated scallop *Mimachlamys varia*, in order to help restoration habitat effort in the bay of Brest (French Atlantic coast). *Philippe Cugier*. Ifremer.
- 25 **The direct and indirect impacts of harvesting mesopelagic fishes on carbon export. *Deniz Disa*. METU-IMS.
- 26 **The bio-physical impacts of offshore wind turbines in the North Sea. *Jenny Jardine*. National Oceanography Centre.
- 27 The role of ecosystem modelling in promoting ocean and water literacy. *Gennadi Lessin*. Plymouth Marine Laboratory.
- 28 "Coral Hospital" concept: a green management approach to coral reef conservation and restoration." *Chiahsin Lin*. National Museum of Marine Biology and Aquarium.
- 29 **Satellite-based data enables high-resolution monitoring of maritime traffic during a global crisis. *Alexandra Loveridge*. Marine Biological Association.
- 30 Seaweed cultivation potential on EU marine regions. A modelling approach. *Diego Macias* European Commission.

- 31 **Deep-sea benthic ecosystem recovery after deep-sea mining: a modelling approach. *Sophy Oliver*. National Oceanography Centre.
- 32 Integrating stakeholder knowledge and observations to assess key vulnerabilities in the southern Benguela system, South Africa. *Kelly Ortega Cisneros*. University of Cape Town.
- 33 A model-based, generalised eutrophication index for European Seas. *Luca Polimene*. Joint Research Centre.
- 34 **Impacts of bottom trawling on carbon dynamics in the North Sea: Insights from a coupled Physical-Biological-Carbon model. *Pooja Tiwari*. Helmholtz Zentrum Hereon.

Theme - Model mechanics

- 35 The Nutrient-Unicellular-Multicellular (NUM) approach to zooplankton modelling. *Ken Andersen*. Technical University of Denmark.
- 36 Recent and future biogeochemical trends in the Atlantic Ocean: a look into the importance of structural uncertainty. *Yuri Artioli*. Plymouth Marine Laboratory.
- 37 **Prediction of potential foraging areas for the North Atlantic right whale in its main summer habitat. *Andeol Bourgouin*. Université Laval.
- 38 Investigating the hydrodynamic connectivity of eelgrass *Zostera marina* population along French Atlantic coast to help management and conservation effort. *Philippe Cugier*. Ifremer.
- 39 **Refining Temperature-Dependent Phytoplankton Growth Functions in Global Ocean Models: Insights from the REcoM Model. *Hannah Haines*. AWI.
- 40 **Trait-based modelling in the eddy world. *Trine Hansen*. University of Southern Denmark.
- 41 Assessing the influence of numerous river discharge on the modulation of shelf circulation in the Ganges-Brahmaputra-Meghna estuary. *Tasin Sumaia Khan*. Bangabandhu Sheikh Mujibur Rahman Maritime University.
- 42 As good as it gets: Exploring the role of different data sets for global biogeochemical model calibration. *Iris Kriest*. GEOMAR Helmholtz Centre for Ocean Research.
- 43 **Modeling the Sinking Dynamics of Tyre-wear Microplastics in an urban fjord in western Norway. *Prithvinath Madduri*. University of Bergen.
- 44 **Exploring the impact of fragmentation and diel vertical migration on particle sinking (in a mechanistic model). *Aaron Naidoo-Bagwell*. University of Bristol.
- 45 **Addition of faecal pellets processes in a biogeochemical model. *Margaux Perhirin*. Sorbonne Université.

- 46 **Interpreting the seasonal succession of Prochlorococcus phenotypes and Synechococcus near Bermuda. *Junkun Ren*. Massachusetts Institute of Technology.
- 47 **To be or not to be mixotroph? How niche modeling can help to inform the distribution of dinoflagellate trophic strategies in marine ecosystems. *Gaspard Rihm*. Institut de Systématique.
- 48 Coupling ocean biogeochemistry to a global Earth System model. *Michael Mehari*. SAIC.
- 49 **Characterization and evolution of micronektonic biomes and feedbacks on biogeochemical cycles. *Sarah Albernhe*. Collecte Localisation Satellites.
- 50 **Dining in danger: Resolving adaptive fish behavior increases realism of complex ecosystem models. *Nicolas Schnedler-Meyer*. Technical University of Denmark.
- 51 **A biogeochemical model including toxic and allelopathic interactions among marine plankton. *Olumayowa Taiwo*. University of Reading.
- 52 **The impacts of adapting the light climate on nutrient levels in a 3D-ecosystem model for the Wadden Sea. *Daniel Thewes*. Universität Hamburg.
- 53 Zooplankton and micronekton population dynamics based on a spatial ecosystem model using Yin-Yang grid. *Olivier Titaud*. Collecte Localisation Satellites.
- 54 Higher-trophic fish and macrobenthos biomass models based on ECOSMO E2E compatible to multiple lower trophic level model hosts. *Vijayakumaran Vijith*. Helmholtz Zentrum Hereon.

Theme – Digital Innovation

- 55 New opportunities to develop, test and share process models in a common framework." *Jorn Bruggeman*. Bolding & Bruggeman ApS/Plymouth Marine Laboratory.
- 56 **Ensemble assimilation of satellite-derived carbon measurements into a global model. *Yumeng Chen*. University of Reading.
- 57 **Ensemble programming for oceanic modelling. *Michal Grossowicz*. Gigablue
- 58 Developments in operational biogeochemical modelling at the UK Met Office. *Susan Kay*. Met Office/Plymouth Marine Laboratory.
- 59 Model calibration: Treating selected parameters as random variables. *Volkmar Sauerland*. GEOMAR Helmholtz Center for Ocean Research.
- 60 Improved understanding of eutrophication trends, indicators and problem areas using machine learning. *Jozef Skakala*. Plymouth Marine Laboratory.
- 61 EnsAD: Assimilation of hyperspectral satellite data into the marine ecosystem model HBM-ERGOM using optical plankton classes. *Johannes Timm*. Federal Maritime and Hydrographic Agency.

- 62 The two-echelon covering tour problem with varying coverage: application in carbon storage monitoring. *Guttorm Alendal*. University of Bergen.
- 63 **Incorporating a spatially varying attenuation coefficient improves the simulation of the summer blooms in the southern Red Sea. *Yixin Wang*. King Abdullah University of Science and Technology (KAUST).
- 64 **Global patterns of marine calcite production resolved using machine learning models. *Nicola Wiseman*. University of Bristol.

