

# IMA SUPPORTS KE WITH MARINE BIOGEOCHEMISTRY\*

F. DE MELO VIRÍSSIMO<sup>1†</sup>

<sup>1</sup>*Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science, London, WC2A 2AE, United Kingdom.*

I led the mini-symposium ‘Mathematical and Computational Perspectives in Marine Biogeochemistry and the Ocean’s Carbon Cycle’ on 15 July 2022, as part of the hybrid SIAM Conference on Mathematics of Planet Earth, hosted in Pittsburgh, USA. The mini-symposium brought together mathematicians, biogeochemists and other researchers interested in the application of novel computational, mathematical, and statistical techniques in marine biogeochemical modelling, with the aim of fostering new collaborations and supporting knowledge exchange between these fields.

Marine biogeochemistry is a broad, multidisciplinary part of Earth science that describes the coupling of physical, chemical, geological and biological processes in the marine environment. The Ocean plays a crucial role for our society having, to date, removed about 26% of post-1850 anthropogenic emissions of carbon dioxide from the atmosphere. This impacts the tiny planktonic organisms, which form the base of the food-web that sustain our fisheries, and the role they play in sequestering additional carbon in the ocean. Global-scale marine biogeochemical models have therefore become a crucial component of Earth system models that now underpin the future projections found in the IPCC reports.

The mini-symposium featured eight talks, given by mathematicians and marine biogeochemists, covering a range of multidisciplinary topics in marine biogeochemistry. The talks were divided into two sessions over the day, and were attended by both in person and virtual audiences.

I opened the event with an overview talk giving a brief historical account of how these disciplines have interacted over the years. For example, marine biogeochemical modelling relies heavily on numerical integration, which often limits the number of experiments and depth of analysis. This session addressed this and other questions, highlighting new techniques that are enabling the community to explore marine biogeochemistry in increasing detail. My presentation was followed by a series of specialised talks which expanded on topics including: network theory and its applications to ocean circulation, marine ecology, and climate sciences; machine learning-based methods and their applications to the carbon cycle; and cross-scale oceanic drivers of human activity in the ocean, such as fishing. The full list of talks and abstracts can be found on the conference website.

The session was attended by Jillian Kunze from SIAM News who wrote an article ([tinyurl.com/siamnews-bgc](https://www.siamnews.com/siamnews-bgc)) on the event.

The organisation of this mini-symposium was only possible due to the generous funding provided by the IMA via their Small Grant Scheme, to which I am very grateful. I also benefited from an ECR Travel Grant from the London Mathematical Society. Finally, I would like to thank my co-organiser, Dr Jamie Wilson (University of Bristol) for all his work in helping to put this event together.

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\*Article submitted to *Mathematics Today*, accepted on the 15th September 2022.

†Corresponding Author. e-mail: [f.de-melo-virissimo@lse.ac.uk](mailto:f.de-melo-virissimo@lse.ac.uk).