

Name: Maria Grigoratou

Grant: Early Career Scientist Mobility

Home Institute: Gulf of Maine Research Institute, Portland, ME, USA

Host Institute: University of Bergen, Department of Biological Sciences, Bergen, Norway



My visit to the University of Bergen in fall 2021 (September – November) was a great experience. I had close interactions with Prof. Øyvind Fiksen, the Theoretical Ecology Group members, and other scientists while staying at beautiful Bergen.

I am a Biological Oceanographer, passionate about (zoo)plankton ecology. Since 2008, I was given the opportunity to study marine zooplankton ecology via a wide range of approaches and methods, from the field, molecular analysis, lab culture and mesocosms experiments to trait-based modelling. For my Postdoc project, I use size and trait-based models to explore how warming influences the ecology of plankton and fish communities and their interactions. Fish ecology is a new topic for me and visiting Ø. Fiksen was a great opportunity to learn more about mechanistic approaches to fish ecophysiology and ecosystem dynamics. Ø. Fiksen is a world leader in studying the effect of behaviour in aquatic interactions from microbes to high predators.

As a Theoretical Ecology Group (TEG) member, I was fully integrated into all research group activities, including the Monday science seminars, the TEG and Evofish retreat, and lunch arrangements. Through TEG and Ø. Fiksen I also learnt a lot about fisheries and Arctic Research in Norway. While in Bergen, with the FILAMO support, I joined the annual meeting of the Norwegian Association of Marine Scientists (Havforsker møtet 2021, 22-24/11/2021). Havforsker møtet was a great opportunity for me to learn more about the ongoing research in Norway from plankton to high predators, eDNA, -omics and applications of marine observation technology. I also expanded my network with many great researchers and scientists, from master students to senior professors. Additionally, I had the opportunity to present my ongoing work to the TEG group and the conference and receive valuable feedback from the community.

During my stay, Ø. Fiksen and I developed a conceptual framework for evolutionary plankton ecosystem models. In the ocean, species survival depends on their behaviours which constantly change with the environment, as species choose to invest in growth, protection from predation, or reproduction. Most zooplankton species sense the prey and predators of their surroundings via chemical and movement signals, while planktivorous fish primarily via visibility. As animals become more fearful of predation, they can become less accessible to predators by investing more in growth demanding defence mechanisms (e.g., spines, shells, toxins), movement reduction, or migration to habitats with lower predation risk. Though, this protection investment comes with trade-offs in growth as species need to either invest more energy for escaping tactics (e.g., armour tools, migration) or become less efficient feeders with ambush strategies. Thus, behavioural decisions and responses of individuals are crucial for population and community dynamics, food web stability, energy fluxes and functional diversity. Despite the importance

of animal behaviour in ecosystem services, most marine ecosystem models still include a caricature of zooplankton that has raised concerns about our forecasting tools and predictability. Our conceptual framework tries to fill that gap and identify (1) how the environment and animal behaviour shape plankton communities and diversity and (2) how much complexity is needed for the models to provide trustworthy close to realism projections. This conceptual framework is the core of the proposals I prepared in Bergen for the Marie Skłodowska-Curie Individual Fellowship and Researcher Project for Young Talents with Ø. Fiksen as my primary supervisor.