

Zooplankton play a significant role in the marine ecosystem as a main top-down control on marine primary production. Additionally, they contribute largely to the export of organic carbon to the deep ocean as well as transferring energy to high trophic levels and thereby impact the climate system via the carbon cycle. Planktic foraminifera play a particular role as they produce calcium carbonate which contributes to the ballast of organic carbon and the carbonate pump. However, as we cannot culture them through their entire life cycle, assessing and predicting their response to a changing climate, especially the impact of multiple drivers on physiology, distribution, and carbonate production is challenging. We thus take here a novel approach based on traits and trade-offs combining observations and new ecosystem modelling to investigate drivers of zooplankton diversity, their impact on ecology and ultimately response to climate change. Furthermore, for the first time, we will try to investigate the relationship between foraminifera and other zooplankton, and the impact of changing foraminifera ecosystem structure on the carbon cycle. First, we will present laboratory work on how to better estimate abundance and biomass of different size classes of zooplankton using the image analysis method. This technique is important to validate trait-based models as size is a key ecological trait. We will then show preliminary work on how to test trade-offs using the Darwin-MIT ecosystem model which accounts for a diverse and adapted population of marine plankton in a global ocean.