

BGeoPlast - Impact of Microplastics on biogeochemical cycling of carbon in benthic sediments

Benthic sediments are an important ecosystem that plays a major role in the biogeochemical cycling of carbon and other elements. They are also widely recognized as the major sink of Microplastics (MP). Conventionally, MPs are considered a source of recalcitrant carbon (C). However, this assumption has been put to test in light of the recent studies that have shown that dissolved organic carbon (DOC) leached from MP could stimulate microbial activity and modify the natural dissolved organic matter (DOM) pool of the near-surface environments. However, the existence of similar biogeochemical interactions between MP and benthic sedimentary microbial communities remains poorly understood. In particular, the kinetics of MP degradation in the benthic environment has yet to be explored.

This study proposes the use of experimental and modeling approaches to quantify the kinetics of MP mineralization in sediments, generating powerful fundamental insights about the impact of MP on the biogeochemical cycling of carbon in the benthic ecosystem. Additionally, the outcomes of this work will result in the development of the first diagenetic model for quantifying the MP-derived organic carbon degradation dynamics in the sediments at a local scale but will also open opportunities for upscaling the framework to other depositional environments for the determination of MP fate.

Overall, the proposed study has the potential to transform our current understanding of MP fate in benthic ecosystems.