

**CONSIGLIO NAZIONALE DELLE RICERCHE  
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## **CICLO DI SEMINARI**

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### **Plastic in the biogeochemistry of the ocean**

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The ubiquitous presence of microplastics in marine habitats has potential impacts on biogeochemical cycling as well as ecological consequences across trophic levels. Microplastics provide increased surface area for microbial growth, with consequences on carbon and nutrient dynamics at the basis of all marine food webs. Despite their high and increasing concentration in the ocean, microplastics' influence on the transformation and composition of marine organic matter is largely unknown. At the same time, the understanding of residence times of these anthropogenic particles once they reach our ocean is debated. Observations report a mismatch between estimates of plastic loads (from worldwide plastic production and mismanaged plastic waste) and actual plastic concentration seen floating at the sea-surface. Biofouling might be an important factor for the removal efficiency of plastics at sea and a likely explanation for the “missing plastic”.

This talk discusses the impact of microplastics on the microbial processing of organic matter as well as how the interaction of plastic with microbially-derived biogenic polymers can explain particles' transfer from the surface to the deep ocean. Studies were conducted in controlled marine conditions, by a series of laboratory microcosms experiments and in a large scale outdoor mesocosm experiment, and *in situ*, by deploying drifting sediment traps in the North Atlantic Gyre down to 600 m depth to track particles fluxes and removal rates.

Results from these studies identify a common ground where, by interacting with microbial organisms and processes, plastic may play an important role in the ocean carbon biogeochemistry. This allows to recognize knowledge gaps where new research efforts should be focused, to better determine potential feedbacks of plastics on the carbon biogeochemistry of a changing ocean.