
Composition of the plastisphere in a subtropical estuary: influence of season, incubation time and polymer type

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Abstract

Plastics are artificial substrates in aquatic systems that can host a wide variety of organisms (plastisphere), with complex, yet not well understood, ecological interactions. Data on the diversity and ecological role of the plastisphere is still limited for many environments, including estuaries. Here we investigated the diversity of the plastisphere in Patos Lagoon Estuary (PLE), the world’s largest coastal lagoon, through an in situ experiment. Polyethylene (PE) and polypropylene (PP) plates were incubated in shallow waters and sampled after 15, 30, 60 and 90 days of incubation within each season, over one year. A DNA-metabarcoding approach (genes 16S, and 18S-V4 and V9 regions) was used to identify the diversity of taxa. Fifteen prokaryotic phyla and thirty-seven eukaryotic groups were observed in the overall dataset. Between polymer types, the Operational Taxonomic Units (OTUs) richness varied significantly only for eukaryotes within the 18S-V4 dataset, in which PP showed a greater OTU richness. However, community composition was not significantly variable between polymers in any of the datasets. Amongst seasons, only prokaryotes showed significant seasonal variation in OTU richness, which was greater in autumn and winter, corroborating the hypothesis that the bacterial community in the plastisphere is influenced by seasonality. Community composition significantly varied for both prokaryotes and eukaryotes according to season, with higher diversity in autumn and winter. There was no difference in OTU richness or community composition between the different incubation times. We found microbial species (e.g. *Vampirovibrio* sp. and *Acinetobacter* sp.) that are putative pathogens for aquatic organisms such as algae, shrimps and fishes, including commercial species. This study is the first to assess - using molecular tools - the diversity and factors that influence the composition of the plastisphere in a subtropical estuary, extending the knowledge on the plastisphere in estuarine regions.

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