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Impact of ocean dynamics on microplastics distribution in two oceanic eddies

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Plastic pollution has become a significant issue in marine ecosystems, with microplastics posing unique challenges due to their size and widespread dispersal. These particles tend to get accumulated in oceanic structures like eddies, which often act as attractors, where microplastic distribution is shaped by complex circulation patterns. We study the distribution and concentration of microplastics within two distinct oceanic eddies downstream of the Canary Islands, an anticyclonic and a cyclonic eddy sampled during two recent oceanographic campaigns in 2021 and 2022 respectively. We focused on characterizing the spatial distribution of microplastic particles, specifically distinguishing between fragments and fibers, to understand their prevalence and variability within each eddy. By analyzing these patterns, we aim to elucidate the physical processes that may govern the accumulation and dispersal of microplastics in these mesoscale structures.

To contextualize our observations, we utilized trajectory data from an eddy trajectory atlas to track the development and movement of each eddy over time. This enabled us to map the eddies' lifecycles and physical characteristics, such as amplitude, effective radius, and shape, which may influence microplastic transport and retention. Through this combined approach, we explore how each eddy's unique dynamics affects vertical microplastic distribution.

Preliminary findings suggest that microplastic fibers and fragments exhibit distinct spatial distributions within cyclonic versus anticyclonic eddies, influenced by differential dynamics. Our results provide awareness into the role of mesoscale oceanographic features in shaping microplastic distribution and transport.