MICROPLASTICS DISTRIBUTION ON MESOSCALE EDDIES AT THE WATER COLUMN UP TO 1100 METERS DEPTH

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Abstract:
During April 2021 an anticyclonic eddy passed by south of El Hierro Island (Canary Islands). Ten months later, in February 2022, a cyclonic eddy also moved along the same area. Physical characteristics of both eddies as density, temperature, salinity or oxygen concentration were determined up to 1100 meters depth. Microplastics (MPs) concentration was also determined at 50, 150, 600 and 1100 meters depth for both eddies. Fragment, fibers, lines, films and microbeads present in each sample were identified and quantified.

Below the sea surface, all MPs found were smaller than 1 mm and most of them had a size lower than 300 µm. MPs are present at every single sampled depth, but their distribution is not homogeneous, and it is clearly related with the ocean dynamics. MPs distribution varies with depth and also with the convergence-divergence areas, being different between cyclonic and anticyclonic eddies (Brach et al., 2018; Van Sebille et al., 2020).

MPs transport and distribution are related with ocean dynamics not only at the sea surface but also along the whole water column (Vega-Moreno et al., 2021). The drift of these small particles (mainly lower than 300 µm) is clearly not influenced by density forces. MPs are being transported as passive drifters by currents following physical patterns of these mesoscale processes as eddies. Moreover, this behaviour is similar at macroscale processes at the water column (at least up to 2000 meters depth), being MPs transported with the water masses as Mediterranean Water (MW). Maximum concentrations of small MPs (around 100 µm particle size) are found at 1100 meter depth (higher than at the sea surface). These MPs have been transported with the water mass from the strait of Gibraltar to the Canary Islands, and from the sea surface to 1100 meters depth where MW is located at this region.

Key words: microplastics, deep samples, eddies, transport, ocean dynamic, water mass.

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