

TARA Mediterranean expedition: Assessing the impact of microplastics on Mediterranean ecosystem

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Keywords: Microplastic, Zooplankton, TARA-Mediterranean expedition.

Main topic: B) Microplastics in the Mediterranean Sea

Preferred type of presentation: Oral

The accumulation of plastic debris on the surface of the oceans is widely recognized as a newly emerging problem for worldwide marine systems. To better understand the impact of plastic on the Mediterranean ecosystem, TARA-Méditerranée expedition crossed the entire Mediterranean Sea in 2014 to study the distribution of plastic fragments and zooplankton. Surface samples were collected with a 330 µm Manta net and plastics were sorted from 124 samples and digitally imaged with the Zooscan system. Particle characteristics as size, surface area and circularity were determined and the distribution and concentration of floating microplastics were compared to the abundance of the neustonic zooplankton.

The first global biogeography map of the 98 dominant zooplankton groups and 6 categories of plastic particles in the basin were established. Results showed that plastic fragments were present in all Manta tows. The plastic samples analyzed contained mainly fragments but different typology described as foam, filaments, polystyrene and row pellets and fibers were also present.

The average surface debris concentration over the entire survey was 2×10^5 particles km² with values varying from 2×10^3 particles km² in the Eastern basin, to more than 2×10^6 particles km² in the Western basin. Coastal zones of Naples, Corsica and Marseille were clearly identified as areas of particularly high plastic concentration. The high ratio of plastic abundance to zooplankton abundance may suggest a potential impact of microdebris on various taxa and their incorporation into the neustonic food web, with consequences on the pelagic biota in the most polluted areas.

The next step is to link the basin wide distribution of plastic fragments to surface circulation models in order identify hotspots of plastic accumulation and predict the pathways and fate of plastic debris in the Mediterranean Sea. Ecological implications of plastic fragments in the Mediterranean is the subject of work in progress conducted by the 20 partner institutions of TARA-Med Consortium.