

## Neustonic microplastics in the Southern Adriatic Sea

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Neustonic micro-plastic abundance and polymeric composition were determined after a cruise conducted in the Southern Adriatic Sea between May 9th and 17th 2013. Plankton samples were collected using a Neuston net (200  $\mu\text{m}$  mesh size) which sampled the first 50 cm of the sea surface at a speed of  $\sim 2$  kts for 5-6 minutes. Samples were then stored in ethanol 70% and in the laboratory micro-plastics were hand-picked using a dissecting stereomicroscope, counted, weighed and split into 7 different size classes. On a subset of collected particles ( $> 0.7\text{mm}$ ) FT-IR analyses were performed to characterize the polymeric composition of the items. All 29 surface tows contained plastic particles of various typologies (e.g. filaments, fragments, thin plastic films), colours and sizes. A total of 5940 plastic particles were collected during the survey, the vast majority of which were hard plastic fragments (78.5%) or synthetic fibers and filaments (19.2%). Most particles were white (27.8%), transparent (22.5%) or black/grey (21.4%). 98.2% of all the particles were  $< 5$  mm and plastic abundance markedly increased with decreasing size (i.e. 52.8% of all the particles were smaller than 0.5 mm), indicating very high fragmentation rates. Overall, an average concentration of  $1.05 \pm 1.13$  particles/ $\text{m}^2$  and  $442.88 \pm 1145.96$  g/ $\text{km}^2$  was observed throughout the study area, with micro-plastic densities ranging from 0.10 particles/ $\text{m}^2$  to a maximum of 4.86 particles/ $\text{m}^2$ . FT-IR analyses indicated polyethylene as the predominant polymer (41%), followed by polyester and paint (12%), polypropylene (10%), polystyrene and polyimide (5%), polyamide (3%), paraffin (4%) and 1% bioplastic (i.e. polycaprolactone). In addition, 7% of the items were characterized as non-plastic materials (i.e. minerals, cellulose and cotton fabric), suggesting a potential bias when visually sorting for micro-plastics. On the whole, very high levels of plastic pollution have been found in our study area. Despite any clear geographical pattern in plastic distribution was identified, the conspicuous spatial heterogeneity in plastic abundances and polymeric compositions seem to confirm the existence of multiple pollution sources insisting on the Adriatic Sea.