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Microplastics in surface waters from the northwestern Black Sea.: An abundance and composition approach

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The high rates of contribution of microplastic discharged into the Western Black Sea could be a result of critical level of pollution related to harbors and dense localities and touristic resorts from the western Black Sea coast and from the Danube River - one of the most navigated waterway inside EU. Unfavorably, the Black Sea did not have a decent characterization on microplastics degree pollution; alone one study describes the South-Eastern coast (Aytan et al., 2016).
In the present study we aimed for first characterizing the microplastic abundance in western Black Sea surface waters. Furthermore, the abundance of the particles identified in sample stations could be associated with surface currents of the Western Black Sea, described in the past (Mihailov et al., 2012) as a North to South movement of both water body and floating particles.
Floating microplastic particles were sampled with a Neustonic Net (HydroBios, 200μm mesh size) from the surface water along Western Black Sea coast. A total of 12 samples were collected from 2 main areas: south-east of Danube Delta and east of populated coast area (Constanta-Mangalia). For the samples, the organic matter was digested using a reagent composed of equal volumes of 10 M KOH and 30 % H_2O_2, then, the (micro)plastic particles were isolated from the supernatant by pressure filtration. Analysis was done by visual inspection and selected particles (PP, PE, PAN and PS) were measured with pyrolysis GC-MS.
The first results of the water samples reveal an average concentration of 9 particles per m3. Among microplastic particles 74.6% are identified as fibers, flakes represent 13% and 10.85% are fragments. Fiber clumps, spherules and pieces are also present in low amounts.
Due to the high discharge of Danube into the Black Sea it was obvious that the samples collected close to the mouths of Danube Branches could be a considered hotspot for microplastic particles. Also, southern samples adjacent to Mangalia town and harbor are distinct with an important abundance in microplastic particles.
Although a standardized methodology is not settled for any type of samples for microplastic studies yet, a considerable number of research publications were taken in account (Aytan et al., 2016, Miller et al., 2017, Mani et al., 2017). Even though the analytical methods are not identical with the publications took into the account for this study, the results and concentrations are veritable, naturally, with anomalies related to territorial sources of plastic pollution.

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