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Microplastics pollution on the beaches at the northern Black Sea coast during the tourist seasons 2016–2017

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Within the framework of the monthly monitoring astudy of qualitative and quantitative composition and distribution of microplastics on sandy and pebbly beaches of Sevastopol (∼420,000 of inhabitants in 2016) is conducted. Such the studies are carried out for the first time on the northern Black Sea coast. Microplastic abundance is estimated on two of the most popular urban beaches: Omega and Uchkuevka.

The samples were collected during the tourist seasons (May–September) 2016–2017. We collected the samples from the top 5 cm of the numerous square areas (1×1 m) placed at the four, 20 m-long transects located perpendicularly to the 100-meter-lines along the shore . Three types of stainless steel sieves were used: with the mesh sizes of 5 mm, 1 mm and 0.3 mm. In the laboratory, the collected sediments were put into a glass tank with a high concentration of sodium chloride (NaCl) 140 g•l-1. The floating plastic particles were recovered, sorted and categorized by type, usage and origin.

High quantitative indexes of microplastics are detected in sediments of the investigated beaches. The highest parameters are registered on Omega beach in May2017 (6.9 ± 0.3 items•m-2) and on Uchkuevka beach in August 2016 (3.5 ± 0.1items•m-2). The average quantitative indexes of microplastics during the tourist season (May–September) were on Omega beach: 5.1 ± 0.1items•m-2 in 2016 and 5.8 ± 0.2 items•m-2 in 2017; and on Uchkuevka beach: 3.0 ± 0.1in 2016 and 1.9 ± 0.1in 2017.

If we assume approximately equal anthropogenic pressure on each investigated beach during the tourist seasons, one can conclude that Omega beach is more polluted by microplastics than Uchkuevka beach due to limited circulation in the Omega Bay.

Our data provide baseline knowledge for designing the monitoring and modeling strategies in the Black Sea.