

Pollution of the Arctic Ocean Seas by Tire Wear Products

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Abstract: The article considers the results of the study of the quantitative and physicochemical composition of tire and road wear particles (TRWP) identified as part of the total micro-sized pollution of the Russian Arctic waters. When entering the environment, TRWP is absorbed by marine organisms, which disrupts their vital processes. Despite the existing opinion about the detrimental impact of TRWP on the environment, their concentration, physicochemical properties and biological effects have not been fully studied. Studies have shown that the TRP concentration in the marginal seas of the Arctic Ocean (AO) was $0.25 \text{ pcs}/(\text{km}^3 \cdot 10^{-6})$. It was found that the Pechora Sea was characterized by the highest concentration of tire wear debris ($20.76 \text{ pcs}/(\text{km}^3 \cdot 10^{-6})$), while the Barents and Laptev Seas had the lowest concentrations of 0.68 and $0.39 \text{ pcs}/(\text{km}^3 \cdot 10^{-6})$, respectively. It was revealed that in the Laptev Sea, tire wear debris were found at the shortest distance from the coast and had the greatest mass. Tire and road wear debris from the Chukchi Sea were found at the greatest distance from the coast and had the lowest mass; from the Barents Sea, they contained non-toxic paraffins and plasticizers; from the Chukchi Sea, they consisted of toxic calcium stearate, and tire wear debris from the East Siberian Sea consisted of toxic polyurethane varnish. It has been established that the concentration and properties of TRWP differ between the marginal seas of the Arctic Ocean, which dictates the need for further study of their nature, migration strategy and assessment of the impact on the environment.