# Microplastics transfer from the ocean to the atmosphere through aerosolization

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Microplastics have become a topic of concern in the last decade, as their occurrence in the environment is a potential threat to organisms, ecosystems, and human health. Plastic debris do not readily degrade, and their accumulation in marine environments is now recognized as a high priority issue for environmental research and policy. Microplastics (MPs) are small plastic particles (0.001 - 5 mm) produced by fragmentation of larger debris or manufactured as microbeads and directly released into the environment. Currently, MPs can be found in all aquatic environments, including rivers, ponds, lakes, oceans, and even drinking water for human consumption. Furthermore, MPs have recently been reported in the atmosphere. They can be transported all around the globe, even to remote locations (e.g., the arctic, deep sea, high mountains, and great lakes). There are still important knowledge gaps about the distribution and fate of MPs in the marine environment. Up to now, water currents and runoff, wave action, and wind have been assumed to play the most important role in the transport of plastic particles to deposition locations. However, recent research has hypothesized that the ocean can transfer particles to the atmosphere through aerosolization processes. Allen et al. (2020) suggested that, along with sea salt, bacteria, viruses, and algae, some plastic particles leave the sea and enter the atmosphere through bubble burst ejection and wave action. Nevertheless, there is no evidence yet to fully support the role of SSAs in the transfer of MPs from seawater to the atmosphere, and very little is known about the role of aerosolization on the pathway of MPs from the ocean to the atmosphere. Preliminary results show that aerosolization of small MPs (1 µm) by bubble bursting is feasible and occurring under artificial settings. In the next phase, we will use a Marine Aerosol Reference Tank (MART), a portable system designed to accurately mimic the naturally occurring physical production mechanisms for SSA particles. We expect that our results will contribute to the understanding of the transport and fate of microplastics in the environment.

Reference

- Allen, S., Allen, D., Moss, K., Le Roux, G., Phoenix, VR, et al. (2020) Examination of the ocean as a source for atmospheric microplastics. PLOS ONE 15(5): e0232746

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