Research quantifies how much microplastic is emitted into the atmosphere by sea spray

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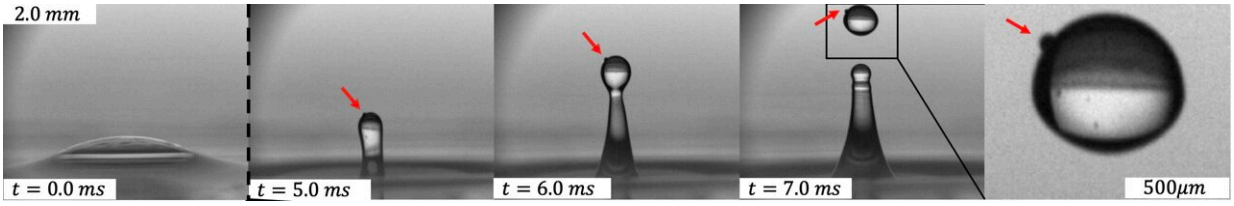

A 1.9 mm bubble bursting to produce a jet drop, which can transport 100 μm diameter polyethylene microplastic pieces. Credit: Shaw et al.

A new study quantifies the amount of microplastic exported into the atmosphere from sea spray. When bubbles burst on the surface of the sea, small particles, such as salt or bits of organic matter, can be flung into the air. This process moves significant amounts of matter, enough to affect global climate dynamics by influencing the radiative balance of the atmosphere and serving as cloud condensation nuclei. But can sea spray also toss microplastics, which are now ubiquitous in the ocean, into the atmosphere?

Luc Deike and colleagues explored the physical processes behind bubble-bursting ejection of microplastic in laboratory experiments using high speed photography. The authors demonstrate that microplastic particles with diameters from 10 μm–280 μm are transported out of seawater and into the air by small droplets known as "jet drops" that are ejected by a

bursting bubble of sea froth. Their findings have been published in *PNAS Nexus*.

These small drops become airborne with their plastic cargo. Once airborne, the water may evaporate, leaving the plastic aloft in wind currents. Using estimations of the concentration of microplastics in the sea, the total amount of microplastics emitted by the world's seas can then be estimated.

The authors calculate that between 0.02 and 7.4 Mt of plastic—with a best guess of .1Mt of plastic—is emitted by the ocean each year. Inventories of ocean microplastics concentrations are now needed to reduce uncertainties in quantifying oceanic emissions of microplastics, according to the authors.

More information: Daniel B Shaw et al, Ocean emission of microplastic, *PNAS Nexus* (2023). DOI: 10.1093/pnasnexus/pgad296

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