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Editorial Note for Atmospheric micro plastics

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A Microplastic is not among the type of plastics but is a plastic particle or fragment ranging from size 5mm to 100nm in size. According to the latest definition it is defined as per the standard international unit (SI) nomenclature as the plastic particle ranging from 5mm to 1micrometre.

Nanoplastics are defined as the plastic fragments smaller than 1micrometre.Microplastics are generally classified into two main types i.e., primary microplastics and secondary microplastics. Primary microplastics are produced intentionally (for example production of microbeads). Secondary microplastics are the ones that are produced unintentionally. They are created by degradation and fragmentation of macroplastics that includes synthetic fibres from textile industries.

Microplastics are ubiquitous and are found in diverse media ranging from soils to acquatic systems and also in the digestive systems of several vertebrates and invertebrates. Deposition of microplastics in the water bodies through rivers and flow off is usually studied but the deposition in atmosphere is overlooked.

The major source of atmospheric micropollutants is road transport i.e., through TWP- tyre wear particles and BWP- break wear particles. A Tyre is made up of elastomers such as rubbers that may be natural or synthetic, carbon black, steel cord, fibres and other organic and inorganic materials that are in use to improve their stability. The shear forces between the tyre and the road surface leads to the generation of microplastics. The car breaking systems usually consists of disc or drum with pair of shoes or pads mounted in calipers. Brake linings are made up of binders, fibers, fillers, frictional additives lubricants and abrasives. Therefore BWP'S is the complex mixture of metal and plastic. The BWP emissions varies depending on the frictional material, severity and frequency of braking, speed weight and the maintenance of automobile. As the TWP's and the BWP's can be present at sizes <10micrometre, they can remain airborne for longer period of time in the atmosphere.

Recently different types of microplastics are already been detected in the urban areas, suburban, and even remote areas far away from source regions of microplastics, showcasing their potential to travel through long distances in the atmosphere. The occurrence, fate, transport, and effect of atmospheric microplastics remain unexplained due to limited physical analysis and understanding of atmospheric microplastic pollution. In the environment microplastics are found in diverse shapes and sizes. Mostly they are found in spheres, beads, pellets, foam, fibres, fragments, films, and flake. The shape of the pollutant depends on the original form of primary microplastics, the degradation and erosion processes of plastic particle surface, and time of residence in the environment.

It is suggested that the degraded microplastics with sharp edges indicates a recent introduction into the environment while smooth edges are associated with a large residence time. In Dongguan, Shanghai, Yantai, and Paris (urban centres), fibres were the dominant shape (>60%) for the atmospheric microplastics.

Whereas, in Hamburg, the dominant shape of atmospheric microplastics detected were fragments, contributing to 95% of the total particle numbers and only 5% comprised fibres. The relation between the transportation and the shape of the microparticle has been noticed. For example, films that are very thin and flat provide a greater surface area for atmospheric conveyance when compared to fragments of the same mass. The influence of shape on atmospheric transport requires further research. Microplastics have been reported in a range colours, including red, orange, yellow, brown, tan, off white, white, grey, blue, green, and so on. The most common ones are blue and red fibres.