

Microplastic Contamination History in New York City

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In 2016, world-wide plastics production reached 335 million tonnes, with plastic textile fibers accounting for 16%, or roughly 60 million tonnes. During their degradation, plastic textile fibers generate fibrous microplastics (MPs), which have frequently been found in the atmosphere, posing a potential risk for human health. The purpose of our project was to reconstruct the history of atmospheric microplastics in New York City through analysis of sediment cores from Central Park Lake. Prior work on Central Park soils and lake sediment cores indicated for several metals that the lake represented atmospheric deposition from the late 1860s through the 20th century. X-ray fluorescence (XRF) was utilized for trace metal analysis on select cores collected in 2008 in a coordinated order for gamma counting for providing independent dating constraints. Nile Red was used to selectively stain microplastics and enumerate them within core sections using fluorescence microscopy. Additionally liquid chromatography-mass spectrometry (LC-MS) was used to measure bisphenol A (BPA), a very common, major plastic additive. Under normal conditions, BPA can leach out from plastics into liquids and is considered a health hazard because it can cause endocrine disruptions. To investigate the history of microplastic contamination in New York City, we used BPA as an indicator for microplastic concentration in sediment and augmented these with microscopic enumerations of microplastic fibers. Our study revealed that the profile of BPA concentration within the core mirrors the global trend of plastic production. Also, we didn't find any microplastic particle larger than 10 mm in all samples, suggesting the major source of BPA in the sediments is atmospheric deposition.