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Deep Sea Sediments of the Arctic Central Basin: A Potential Sink for Microplastics

Colleen McMaken
Nova Southeastern University

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The discovery of microplastics in the Arctic Central Basin sediment provides a preliminary look at how the deep basin sediment potentially acts as a sink for microplastics.

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By Colleen McMaken ***30 March 2020***

Microplastics were once thought to be limited to the upper surface waters of the ocean. However, recent studies have begun to report microplastics in deep sea sediments throughout the world. Now La Daana et al. provide new evidence for the pervasiveness of microplastics in the marine environment, demonstrating that plastic can reach the deep-sea sediments of the Arctic Central Basin.

Microplastic refers to any piece of plastic that is less than five millimeters. They come from a variety of sources including larger plastic debris that has degraded into smaller pieces and the microbeads that are added to health and beauty products as exfoliates. These microplastics pose a potential threat to the stability and health of marine ecosystems as they can enter the food web and can transport additional chemical pollutants.

Hazardous microplastic fragments have been found in various components of the ocean, including the water column, sea ice, organisms, and sediments at different depths. Because microplastics are widespread throughout the water column it is speculated that they are transported from the surface layers down to the deep waters. As the microplastics reach the ocean bottom, they begin to accumulate in the deep sediments, which potentially act as a natural reservoir, or “sink.”

To better understand if deep sea sediments are a sink for microplastics, the researchers analyzed sediment samples from eleven different regions of the Arctic Central Basin. Each sample was collected using sediment corers and were examined after filtration in the laboratory under a polarizing light microscope. The microscopy analysis visually identified fifteen distinct microplastic particles from the sediment samples.

These fifteen particles were isolated, processed, and transferred to a petri dish for further assessment by Fourier transform infrared (FT-IR) spectroscopy to identify polymer matches. The results of the analyses showed that no polyethylene (the most popular plastic in the world due to its simple chemical structure) had made it to the bottom of the Arctic Central Basin. Despite a lack of polyethylene, seven out of the eleven sediment samples contained between one and two pieces of synthetic polymers. Natural cellulose fibers and a macroplastic synthetic polymer were also identified amongst the isolated plastic particles.

This study demonstrated that microplastics are appearing in the deep-sea sediments of the Arctic Ocean, which is one of the most remote oceanic basins in the world. It is also the first preliminary look at how sediment is acting as a potential sink for microplastics in the Arctic Ocean. Finding these microplastics within the sediment suggests that there is vertical transport of microplastics through the water column to depth. It also suggests that deep sea organisms, some of the most isolated organisms on the planet, could be impacted by anthropogenic plastic pollution. This preliminary assessment of microplastic in the Arctic can be used as a foundation for future work seeking to quantify microplastic abundance, distribution, and

composition. Furthering the knowledge of microplastic accumulation throughout ocean basins is important in order to establish the impact these particles have on deep-sea communities and related ecosystem services.

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