

Discovery suggests there may be trillions of tiny bits of material pollutants trapped in Arctic ice

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(Phys.org) —A team of researchers with Dartmouth College in the U.S. and the University of Plymouth in the U.K. has found that a massive amount of tiny bits of rayon, plastics and other man-made materials are embedded in Arctic sea ice. In their paper published in the journal *Earth's Future*, the team describes how they found evidence of the materials in core samples taken in 2005 and 2010 and note that as Arctic sea ice melts, the embedded material will be released into the ocean, likely causing problems for marine life.

We all use plastics and other materials every day, but few of us give much thought to what happens to it after we toss it in the trash after it's no longer useful to us. A lot of it winds up in landfills, of course, but a

lot goes missing and now it appears that the researchers studying [core samples](#), may have found where it's gone: it's been captured in Arctic sea ice, torn apart into tiny pieces during the journey there.

The rayon and plastic bits aren't noticeable to a person walking around in the Arctic because the pieces are so small, typically less than 5 millimeters in length. It's in the form of beads, fibers or irregular fragments. Scientists have observed such material in the ocean before, particularly around garbage islands such as the Great Pacific Garbage Patch. But never before have scientists noticed them in ice cores taken from the top of the world.

The researchers don't see any imminent threat from the embedded materials—the problem is that global warming is causing Arctic [sea ice](#) to melt, and as it does so, it will release the captured material into the sea, and no one knows what sort of impact that will have. Most of the materials aren't expected to be toxic, but many are known to soak up chemicals, like a sponge. If the chemicals are toxic and an animal eats them, it likely would get sick or die.

In counting the number of bits of material in the ice cores and estimating the amount of ice they are in, the researchers have concluded that there might be in the neighborhood of a trillion pieces of the stuff in position ready to be released into the world's northern oceans. A little over half of the bits were rayon, the researchers report—others were polypropylene, acrylic, nylon, polyester, polyethylene and polystyrene.

More information: Global warming releases microplastic legacy frozen in Arctic Sea ice, *Earth's Future*, DOI: 10.1002/2014EF000240

Abstract

When sea ice forms it scavenges and concentrates particulates from the water column, which then become trapped until the ice melts. In recent

years, melting has led to record lows in Arctic sea ice extent, the most recent in September 2012. Global climate models, such as that of Gregory et al. [2002], suggest that the decline in Arctic sea ice volume (3.4% per decade), will actually exceed the decline in sea ice extent, something that Laxon et al. [2013] have shown supported by satellite data. The extent to which melting ice could release anthropogenic particulates back to the open ocean has not yet been examined. Here we show that Arctic sea ice from remote locations contains concentrations of microplastics at least two orders of magnitude greater than those that have been previously reported in highly contaminated surface waters, such as those of the Pacific Gyre. Our findings indicate that microplastics have accumulated far from population centers and that polar sea ice represents a major historic global sink of man-made particulates. The potential for substantial quantities of legacy microplastic contamination to be released to the ocean as the ice melts therefore needs to be evaluated, as do the physical and toxicological effects of plastics on marine life.

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