

# Polar ice contaminated with nanoplastics

January 20 2022

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Jean-Louis Tison (co-author) and a team of scientists drilling sea ice cores in the Antarctic. Credit: Bruno Delille

Decades-old polar ice contains significant amounts of nanoscale plastic particles. Studying ice cores from Greenland and Antarctica, an international team of scientists have identified several types of nanoplastic particles, including particles that originate from tires. As nanoplastics may cause toxic effects, the researchers address that remote and pristine areas may contain more nanoparticle pollution than expected.

Polar regions are regarded as some of the last areas on Earth that are pristine and relatively untouched by human influences. Yet, both North and South polar ice appear to contain significant amounts of nanoplastics, or plastic particles smaller than a micrometer in size. Nanoplastics may cause [toxic effects](#) in organisms, but since they're difficult to measure, the worldwide extent of [nanoplastic pollution](#) remained unclear until now.

Using new methods to measure nanoplastics, an international team of scientists have now identified nanoscale plastic particles in ice samples from Greenland and Antarctica. The samples were derived from 14-meter-deep ice cores from Greenland and sea ice cores from Antarctica. Researchers from Utrecht University, the University of Copenhagen and the [Université Libre de Bruxelles](#) were involved in this study.

## **A bigger pollution problem**

Earlier studies have already suggested that nanoplastic can be carried over long distances by wind and water currents. Still, the research team was surprised to find substantial quantities in their samples. "Now we know that nanoplastics are transported to these corners of the Earth in these quantities. This indicates that nanoplastics is really a bigger pollution problem than we thought," said Dušan Materić, lead author of the study. In an earlier study, using the same techniques, his team

identified nanoplastic particles in samples the Alps.

## **Pollution dates to 1960s**

Although Materić's team are the first to identify nanoplastics in polar ice, their results show that nanoplastic contamination has been taking place for decades. "Our data suggest that nanoplastics pollution is not a new problem," said Materić. "We are only now becoming aware of it, because we have recently developed the right method to measure it. In the Greenland core, we see nanoplastics pollution happening all the way from 1960s. So organisms in that region, and likely all over the world, have been exposed to it for quite some time now."

## **Different types of plastic**

The teams identified several types of nanoplastic particles in polar ice. The most prominent nanoplastic type was polyethylene, which accounted for more than half of the particles. In the Greenland ice core, the team also found significant amounts of nanoparticles originating from tire wear. The amount of nanoplastic particles appears to differ between the North and South ice [core](#) samples. The Greenland ice contained 13.2 ng/mL on average, whereas the Antarctic Sea ice contained 52.3 ng/mL.

## **Constraining sources**

Given the large range of areas in which nanoplastics have now been identified, Materić and his team urge for more research into its toxicity and the extent of the pollution. The nanoplastic contamination in the polar ice samples most likely involves a combination of complex processes that carried the particles. This could include both atmospheric and marine transport, (re)emission, deposition and ice incorporation. "Further studies are clearly needed to better constrain the source of

theses contaminants to the [polar regions](#)."

**More information:** Dušan Materić et al, Nanoplastics measurements in Northern and Southern polar ice, *Environmental Research* (2022).  
[DOI: 10.1016/j.envres.2022.112741](https://doi.org/10.1016/j.envres.2022.112741)

Provided by Utrecht University

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