

IOW press release, 22 October, 2026

Microplastics in Sediments as an Indicator of Human Activity

In a review article recently published in the journal Earth-Science Reviews, researchers from the Leibniz Institute for Baltic Sea Research Warnemünde (IOW), in collaboration with colleagues from the University of Leicester (United Kingdom), report on how human activity has altered Earth's sediments over the decades. New synthetic materials are continuously invented and used, and subsequently enter the environment through improper disposal, where they are deposited in sediment layers. The researchers propose using small plastic particles (1 μm –5 mm in size, microplastics) in sediment as markers for the so-called Anthropocene (a proposed new geologic epoch shaped by humans).

The Anthropocene as a New Geologic Epoch

Geologists categorize the 4.567 billion years of Earth's history into so-called chronostratigraphic units, each characterized by specific rock formations. Due to the significant impact of human activity, an Anthropocene Working Group proposed that the new geologic epoch can be referred to as the Anthropocene. However, this proposal was rejected in March 2024. Despite the efforts by the Anthropocene Working Group, it remains unclear at this time whether the Anthropocene will be officially included in the International Chronostratigraphic Chart even though the human influence on the earth is undeniable.

Microplastics can be found in the environment globally—but what exactly are they?

Microplastics are plastic ranging in size from 1 μm to 5 mm, which are usually formed in the environment through the weathering and subsequent fragmentation of larger plastic objects. These can include plastic fibers from synthetic clothing, plastic fragments, and plastic films (from larger plastic sheets, such as those used in agriculture). However, microplastics are also produced directly at this size and are present in products, such as exfoliating agents in cosmetics. Due to their small size, microplastics can easily be ingested by animals along with their food; they can be transported over long distances by the wind and accumulate in terrestrial, freshwater, and marine sediments far from human activity. For this reason, researchers propose them as a marker—that is, a sedimentary reference point—for the Anthropocene epoch.

What makes microplastics such a suitable marker for the Anthropocene?

Microplastics are well protected in the sediments from sunlight, rain, and heat, and therefore presumably remain relatively unchanged, making them a useful, long-lasting geological marker. The researchers also say that different amounts and types of microplastics can be found in sediment layers of varying ages, depending on which types were most commonly used at the time. For example, Bakelite was one of the first types of plastic, but is hardly used today. Consequently, it is more likely to be found in older, deeper sediment layers. Researchers also think that events such as the COVID-19 pandemic between 2020 and 2022 can be detected in sediments. For example, the pandemic led to a sharp increase in the production and prevalence of items such as face masks, plastic gloves, and packaging for disinfectants. Once released into the environment, these items would be broken down into microplastics through weathering and would then be deposited in sediment in a characteristic pattern. Due to their variety of shapes and polymer types, microplastics can therefore serve as geological markers that provide valuable information about human activity. According to IOW oceanographer and lead author of the review article, Dr Juliana Ivar do Sul—who has been a member of the Anthropocene Working

Group since 2015—microplastics can be used as an Anthropocene marker worldwide due to their global distribution in terrestrial, aquatic, and marine ecosystems.

Moving forward, the review establishes a clear framework for future research to test and validate microplastics as definitive planetary markers. Dr Ivar do Sul explains: “The next step for international research groups is to analyze sediment cores globally to verify whether the distribution of specific polymers, such as polypropylene (PP), polyethylene (PE) and polyethylene terephthalate (PET), in the sediment layers precisely mirrors their commercial production timeline since the mid-20th century.” Additionally, she says that future field studies will focus on testing the predictability of particle movement within these sediment layers. “Demonstrating that these buried particles remain stable over geological timescales, away from sunlight and oxygen, is essential for establishing microplastics as a reliable, predictable and permanent diagnostic tool for mapping the Anthropocene worldwide,” she concludes.

Original publication:

Ivar do Sul, J. A., Reineccius, J., Waters, C. N., Zalasiewicz, J., Waniek, J. J. (2026). *Microplastics and the Anthropocene: Towards a new class of planetary markers*. Earth-Science Reviews 281, 105619. <https://doi.org/10.1016/j.earscirev.2026.105619>

Scientific contact:

Dr. Juliana Ivar do Sul | Tel.: +49 381 5197 3497 | Email: juliana.ivardosul@iow.de

IOW Media contact:

Dr. Sonja Ehlers | Tel.: +49 381 5197 109 | Email: presse@iow.de

The Leibniz Institute for Baltic Sea Research Warnemünde (IOW) investigates natural and anthropogenic changes in coastal and marginal seas using a system-wide and interdisciplinary approach, ranging from fundamental to applied research. The Baltic Sea serves as an ideal case study on the institute's doorstep. An important mission of the IOW is to engage in knowledge-based dialogue with policymakers, stakeholders, and society, thereby contributing to the sustainable development of coastal seas. www.iow.de