
Plastitar records worldwide from 1973 to 2023

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Abstract

Plastics embedded in crude oil residues encrusting rocky shorelines have been described as "plastitar" on the Canary Islands, NE Atlantic Ocean in 2022. Here, we review plastitar records reported by ten studies in the marine pollution literature (under various descriptions and terms including "tar-bonded beach-conglomerate tarcrete", "plasto-tar crust", "plasto-tarball", "plastitar" and "petroplastic") worldwide from 1973 to 2023. These records were made in India (Arabian Sea), Bermuda (Sargossa Sea), the Bahamas (NW Atlantic Ocean), the United Arab Emirates (Arabian Gulf and Gulf of Oman), Malta (central Mediterranean Sea), Croatia (Adriatic Sea), Italy (Adriatic and Ligurian Sea), Cabrera island, Menorca island and Sardinia island (western Mediterranean Sea), Sri Lanka (Indian Ocean) and Indonesia (Java Sea). We provide plastitar records that we made during field surveys in Japan (Sea of Japan) in 2022 and on Mallorca island (western Mediterranean Sea) in 2023. We found that earlier records (1974 to 2011) were based on plastitar sightings, while later records (2020 to 2023) verified the plastic and tar components using chemical approaches including Fourier-transform infrared spectroscopy (FTIR) and pyrolysis-gas chromatography-mass spectrometry (PY-GC/MS). A distinction can be made between pelagic plastitar (plastics embedded in crude oil residues floating at sea or stranded ashore) and benthic plastitar (plastics embedded in crude oil residues encrusting benthic substrate). This suggests that plastitar can form in pelagic and benthic environments. Yet, information on plastitar generation and degeneration is still missing. Including all plastitar records in a global map indicated that all records occurred along marine oil transportation routes, near maritime disasters or near marine oil fields which corroborates the notion that plastitar occurrence is closely linked to crude oil transport and extraction. Overall, our study shows that plastitar is a long-overseen and widespread "plastic form" (geochemically or –physically altered plastic) and pollutant in marine and coastal environments worldwide.

Keywords: plastic, tar, tarcrete, plasto, tar crust, plasto, tarball, crude oil, plastic forms

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