

Beach litter of Karasu coast in Black Sea (Turkey): Sources, Composition, Fate and Suggestions

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Study Objective: show an example of microplastic pollution in the Black sea

In this study, plastic litter on the coastline in the northeast part of the Marmara Region were examined with a monitoring according to OSPAR.

Keywords: Pollution, marine, beach litter, ATR-FT-IR analysis, oil derivative, engine oils

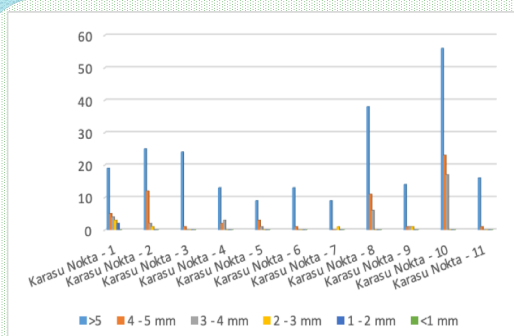
Materials and methods

Sampling was carried out in Sakarya province Karasu beach (41.1109175, 30.6945646). The collected wastes were examined in detail one by one, categorised, counted, and ATR-FT-IR Spectrophotometer analyzes were performed to determine the polymer derivative of the wastes. In addition, it is known that recyclable large bottles such as glass bottles are collected by some groups in the examination area. Litter found on the beach was also categorized in terms of erosion and it was determined that the existing litter was mostly eroded-aged litter. In this study, waste with a visible size was taken into consideration. For this reason, when evaluated in terms of size of the plastic litter found on the beach, it is often large enough to be included in the mesoplastic and macroplastic group.

Conclusions

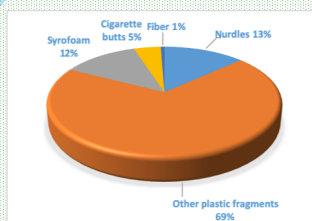
The size and aging of the litter found on the beaches; It is also closely related to environmental and meteorological factors such as sunlight, seasonal changes, temperature, wave, wind and etc. In the ATR-FT-IR analyzes, the most common plastic litter types on the beach are; polyethylene, polypropylene, polystyrene, polyethyleneterephthalate, polyvinylchloride, polyurethane, white rubber (LDPE+EVA 7%). In addition, it is noteworthy that in some direct FT-IR analyzes of plastic litter found on the beach, it is found that motor oils (Factory Fil Oil SAE) are stuck on these wastes. Considering the touristic activities of the Karasu district, it is estimated that a large part of the waste on the coastline originates from visitors and tourists, while the other part is transported from the seas to the coastline due to waves and currents.

Results



Plastic sizes at different sampling places

A total of 338 pieces of plastic from 11 different sampling points; 236 pieces are larger than 5mm, 60 pieces are 4 - 5mm, 34 pieces are 3 - 4mm, 6 pieces are 2 - 3mm, 2 pieces are 1 - 2mm.



- 18% of the collected plastic waste is PE plastic pellets (nurdles). Of the 338 plastics collected, 102 are microplastic and the others are mesoplastic.
- ATR-FT-IR analysis was performed on plastic particles that were collected in the same way and different polymers were found.
- Mostly Low Density Polyethylene and Polypropylene.



Plastic types	Number
LOW DENSITY POLYETHYLENE (PE-LD)	67
POLYPROPYLENE %10 TALC (PP)	26
POLYPROPYLENE (PP)	8
LOW DENSITY POLYETHYLENE + ETHYLENE VINYL ACETATE (LDPE + EVA %7)	8
BLEND OF POLYPROPYLENE and ETHYLENE PROPYLENE (PP + EPDM)	8
POLYURETHANE - REACTION INJECTION MOLDED POLYURETHANE-GLYCOL (PUR-RIM-GLYCOL)	7
POLYPROPYLENE (PP) WITH TiO2.5	6
HIGHT IMPACT POLYSTYRENE (HIPS)	5
POLYDIMETHYLSILOXAN USP REFERENCE (PDMS)	4
POLYVINYL CHLORIDE - PHENOLIC (PVC - P)-0	4
POLYSTYRENE (PS)	2
CALCIUM CARBONATE MILICARB-FILTER	2
STYRENE BUTADIENE COPOLYMER (SBC) STYROFLEX 3G-46.1	2
ACRYLONITRILE STYRENE ACRYLATE POLYAMIDE (ASA + PA) TERBLEND N NM-NM-31.1	1
THERMOPLASTIC STYRENE COPOLYMER-ELASTOMER (TPE-S) CAWITON PR 010113.0	1
POLYETHYLENE POLYPROPYLENE BLEND (EPR) TAFMER P0860.0	1
POLYVINYL CHLORIDE - HARD (PVC - HARD).2	1
STYRENE-LIQ. MONOMER.0	1
POLYDIMETHYLSILOXAN	1
HIGHT DENSITY POLYETHYLENE (PE-HD)	1
THERMOPLASTIC POLYURETHANE (TPU)	1

