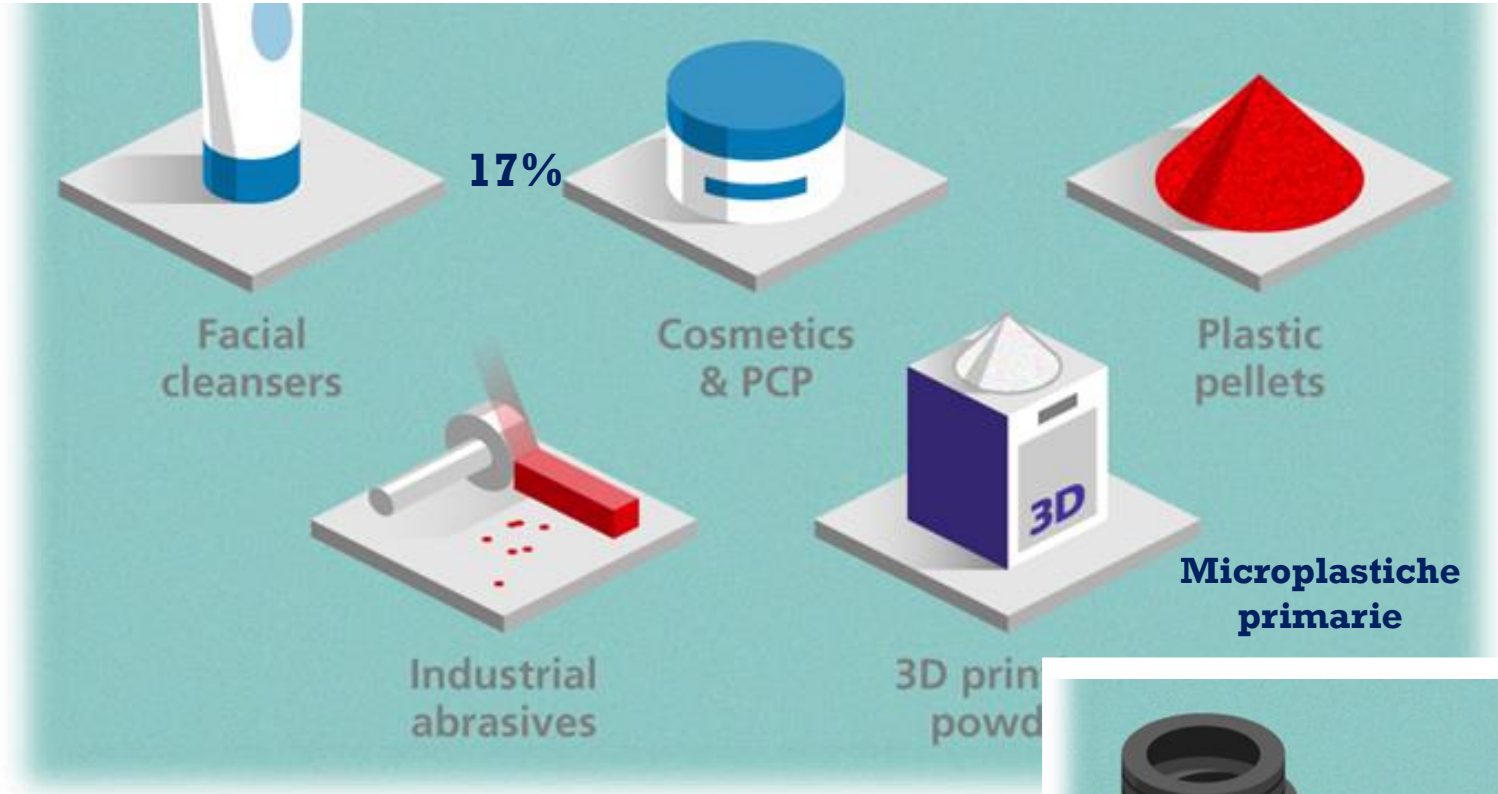
Microplastiche: Casi di studio

Fabiana Corami - CNR ISP Sede di Venezia

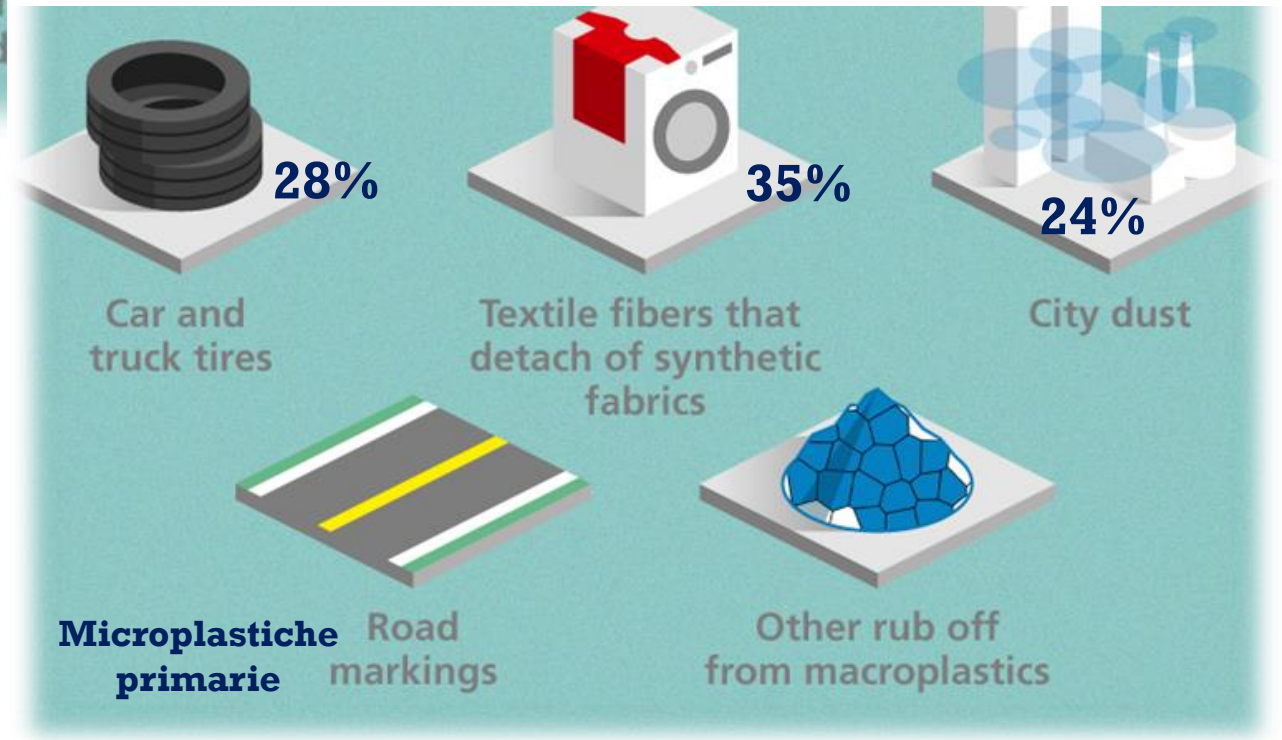


Particelle: 1 nm- 5 mm
Fibre: 3 nm- 15 mm

Identificazione del polimero

(ECHA, 2019)

Con il termine microplastiche si intendono quindi particelle contenenti polimeri solidi alle quali possono essere aggiunti additivi o altre sostanze. (ECHA, 2019)



Chemosphere 238 (2020) 124564

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

A novel method for purification, quantitative analysis and characterization of microplastic fibers using Micro-FTIR

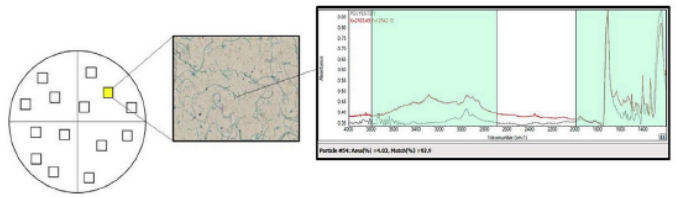
Fabiana Corami [a, *], Beatrice Rosso [b], Barbara Bravo [c], Andrea Gambaro [b], Carlo Barbante [a, b]

[a] Institute of Polar Sciences, CNR-ISP, Campus Scientifico - Ca' Foscari University of Venice, Via Torino, 155, 30172, Venezia-Mestre, Italy
[b] Department of Environmental Sciences, Informatics and Statistics, Ca' Foscari University of Venice, Via Torino, 155, 30172, Venezia-Mestre, Italy
[c] Thermo Fisher Scientific Spa, Strada Rivoltana, 20090 Rodano, Italy

HIGHLIGHTS

- Microplastics are quantified and simultaneously identified with Micro-FTIR.
- A purification step improves the quantification and the identification of fibers.
- Anodisc filters (0.2 μm) allow the retention of very small fibers.
- Polyester release is preeminent compared to that of polyamide.

GRAPHICAL ABSTRACT



ARTICLE INFO

Article history:
Received 10 April 2019

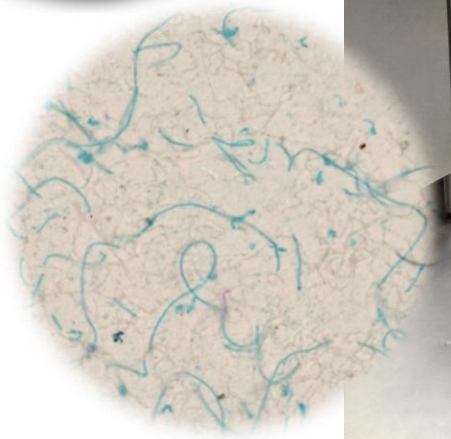
ABSTRACT

Microplastics pose a worldwide risk for the environment. Microplastic fibers, which are released during the household washing of synthetic fabrics, are a substantial percentage of microplastics in rivers and in

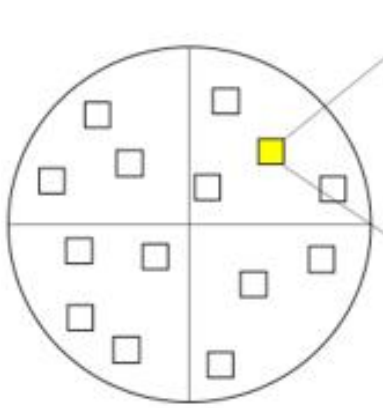
Le fibre sintetiche (microplastiche) più utilizzate: Poliammide (nylon) e Poliestere

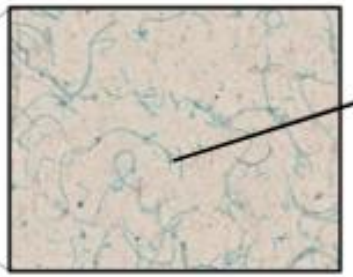
Plastic Free Clean Room ISO 7

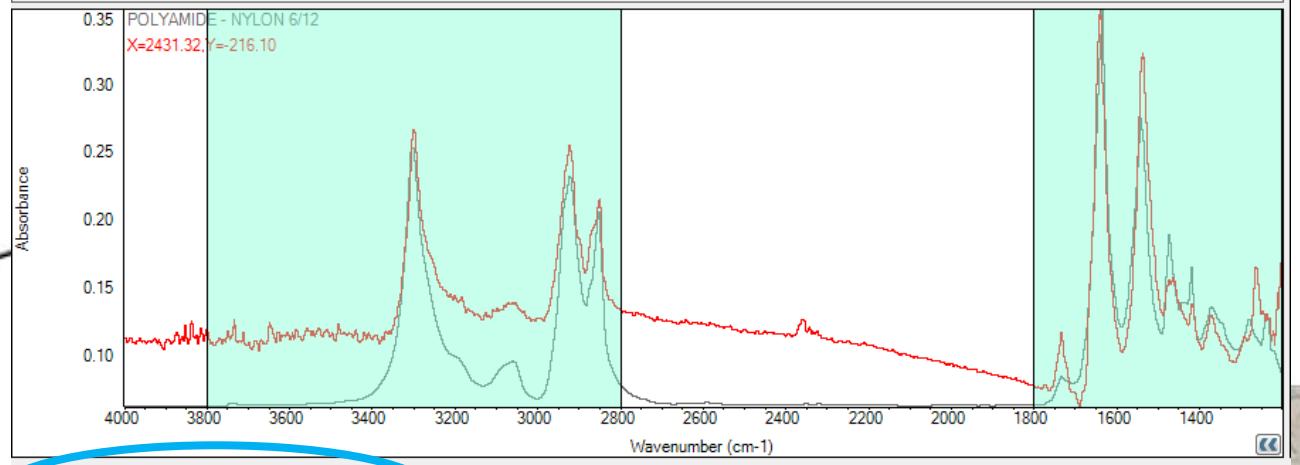
[MicroFT-IR Nicolet™ iN™ 10](#)
CNR-IDPA Laboratory
(Venezia-Mestre)



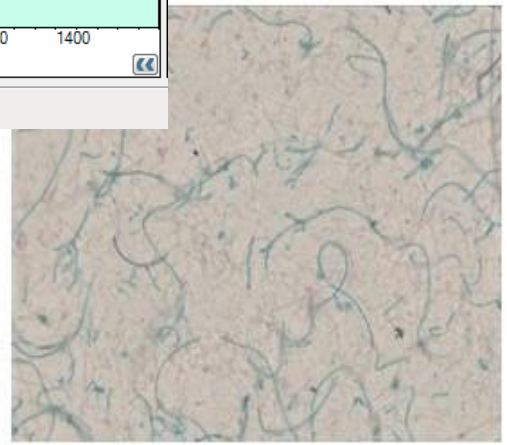
[SEM PhenomProX](#)
Reckitt Benkiser Laboratory
(Mira, VE)

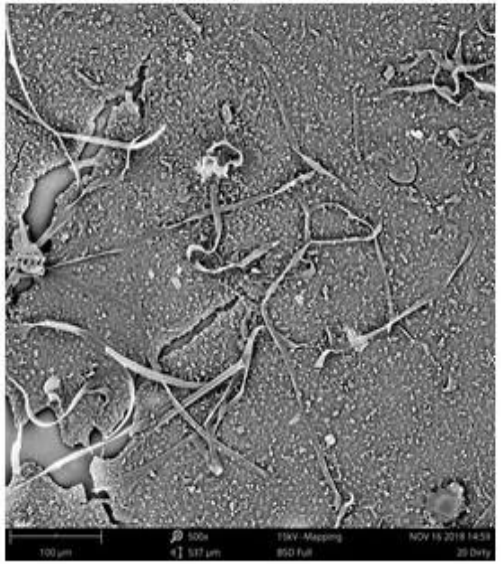


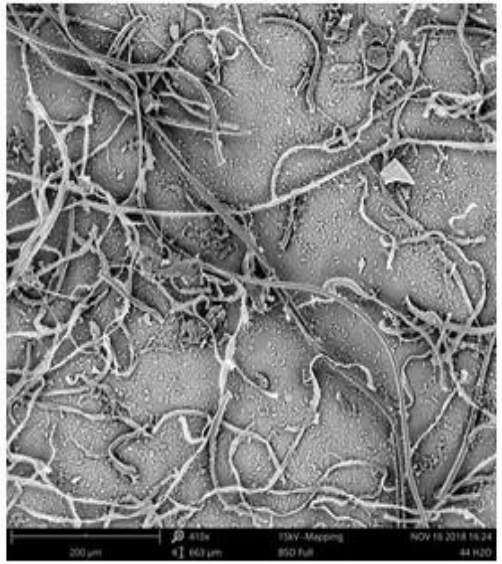


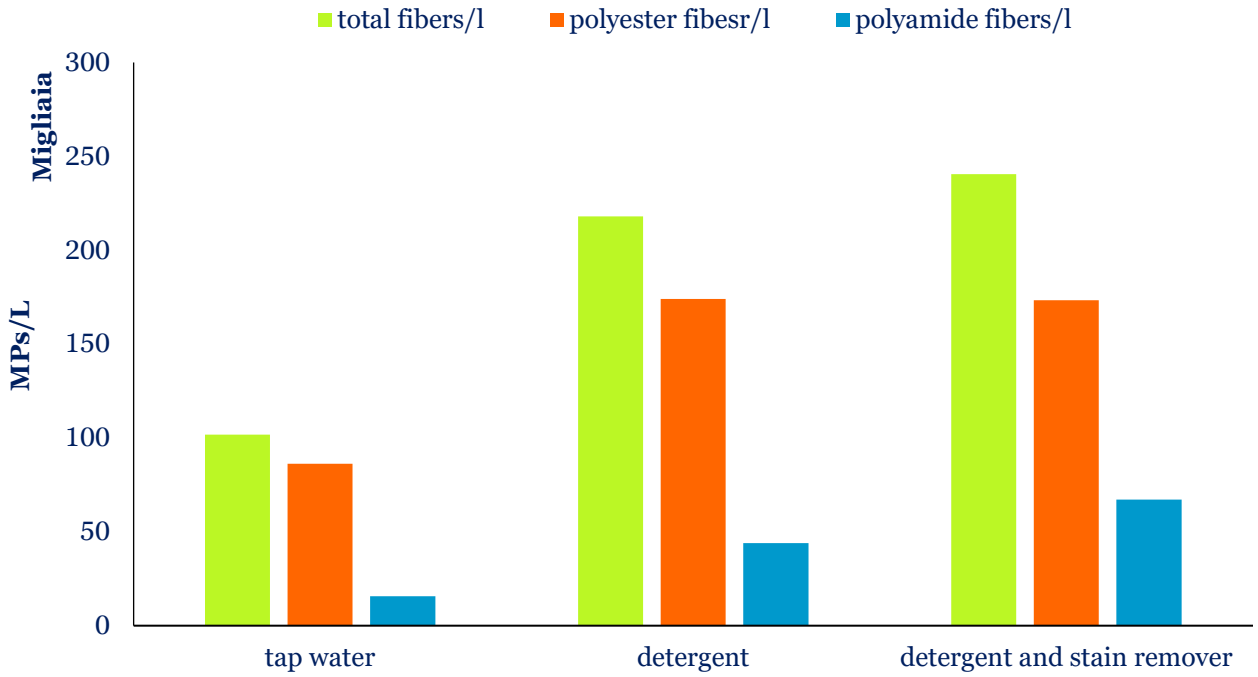


Particle #5: Area(%) =1.4, Match(%) =87.7







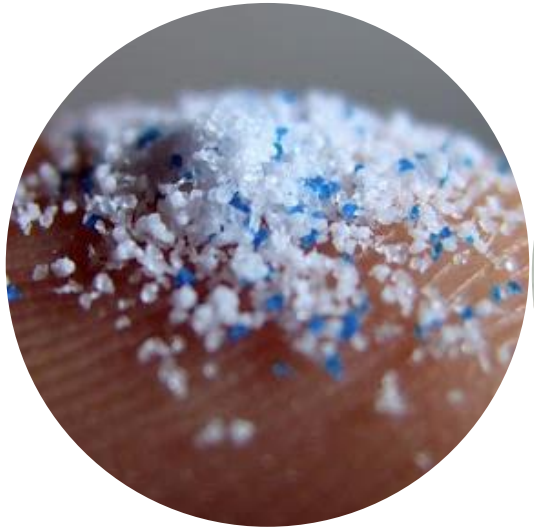


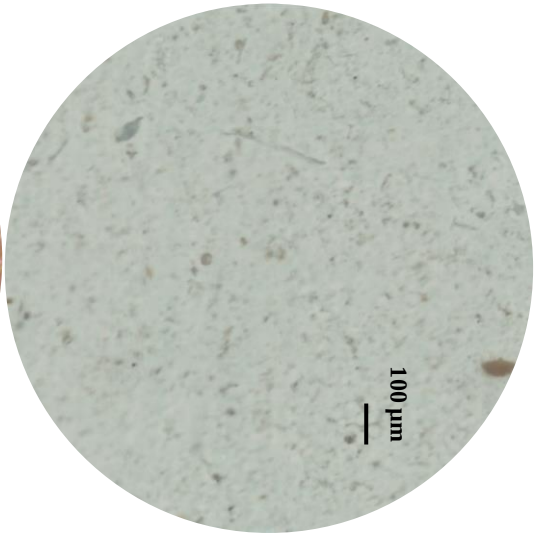
Simulations with tap water

Quanto sono piccole le microplastiche?

Macroplastiche

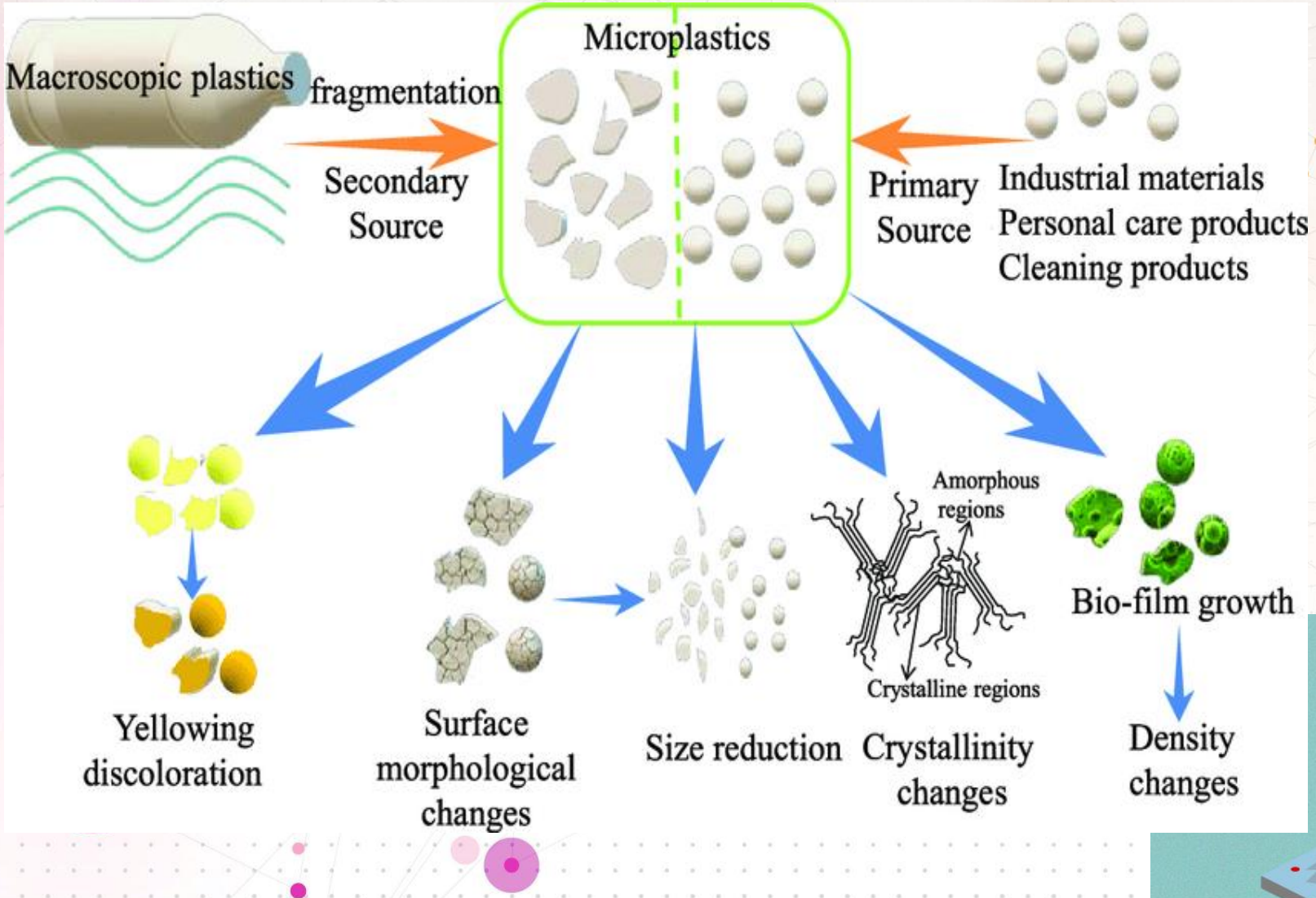
Mesoplastiche

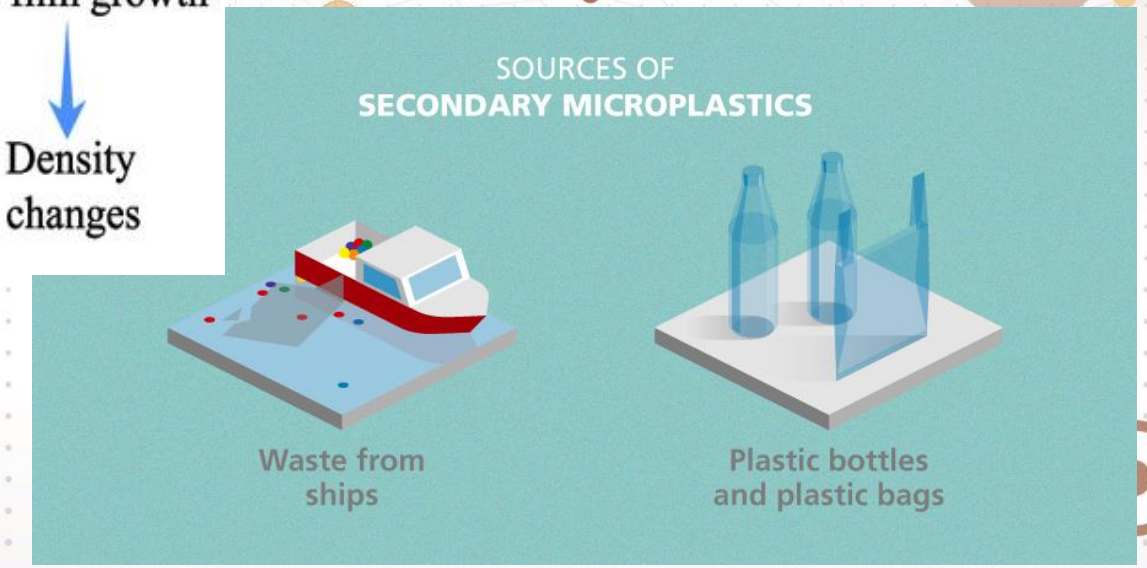




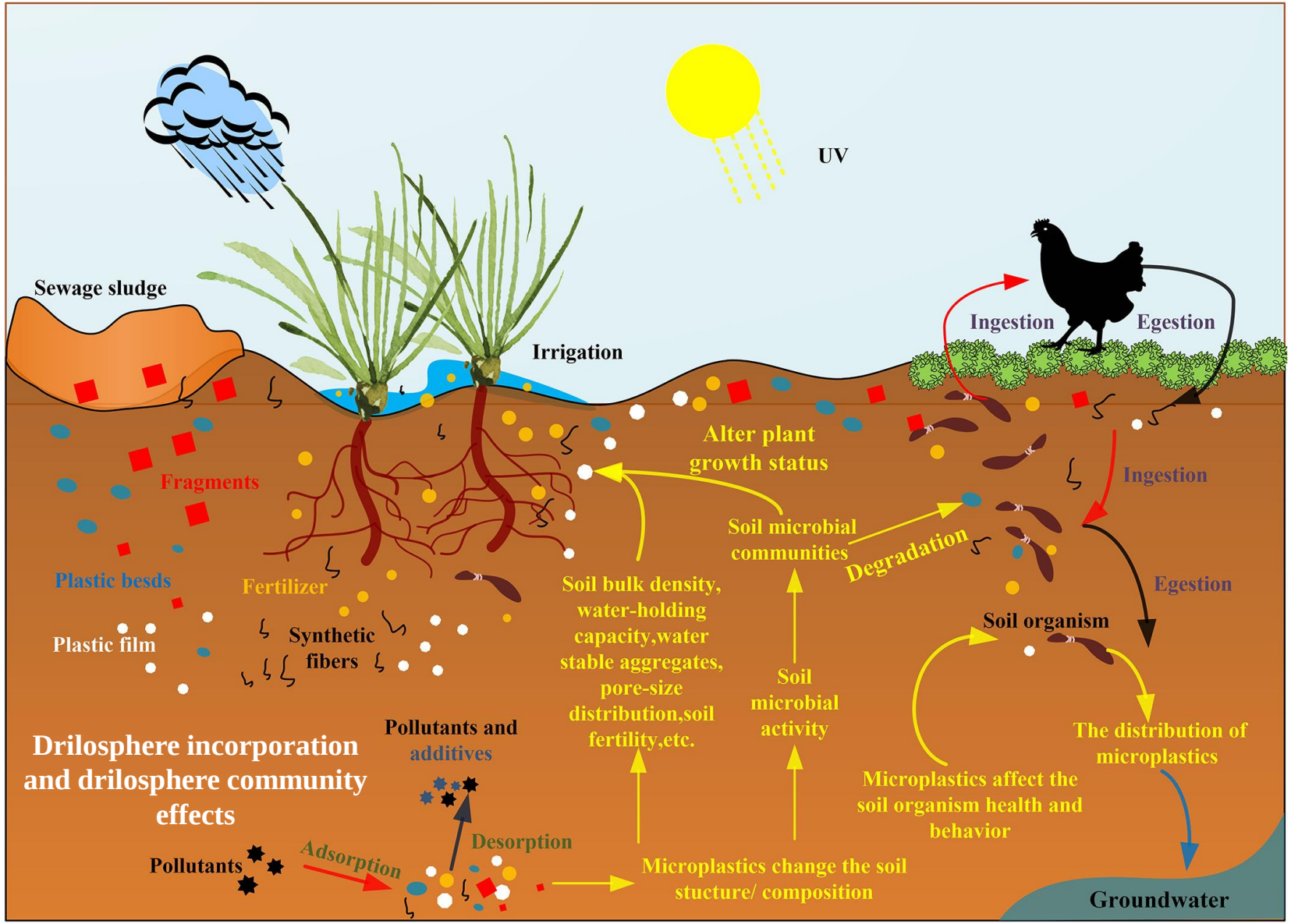
Microplastiche

ISP Istituto di Scienze Polari
Consiglio Nazionale delle Ricerche


Macroscopic plastics
fragmentation
Secondary Source
Microplastics
Primary Source
Industrial materials
Personal care products
Cleaning products
Amorphous regions
Crystalline regions
Yellowing discoloration
Surface morphological changes
Size reduction
Crystallinity changes
Bio-film growth
Density changes


SOURCES OF
SECONDARY MICROPLASTICS
Waste from ships
Plastic bottles and plastic bags

Microplastiche nei suoli



Journal of Chemical Technology & Biotechnology, 2020, Volume: 95, Issue: 8, Pages: 2052-2068. DOI: (10.1002/jctb.6334)

Environmental Research 179 (2019) 108811

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Short communication

First evidence of microplastics ingestion in benthic amphipods from Svalbard

Valentina Iannilli[a,*], Vittorio Pasquali[b], Andrea Setini[b], Fabiana Corami[c]

[a] ENEA, C.R. Casaccia, Via Anguillarese, 301 00123, Roma, Italy
[b] Sapienza Università di Roma, Piazzale A. Moro, 5 00185, Roma, Italy
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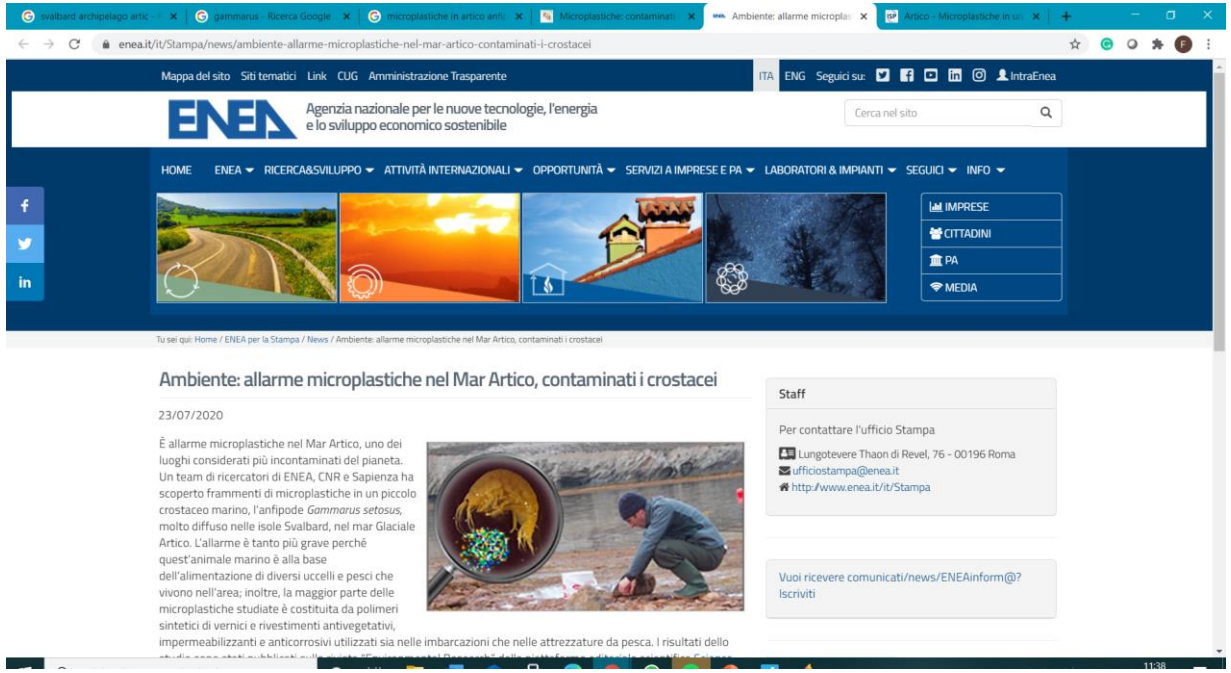
ARTICLE INFO

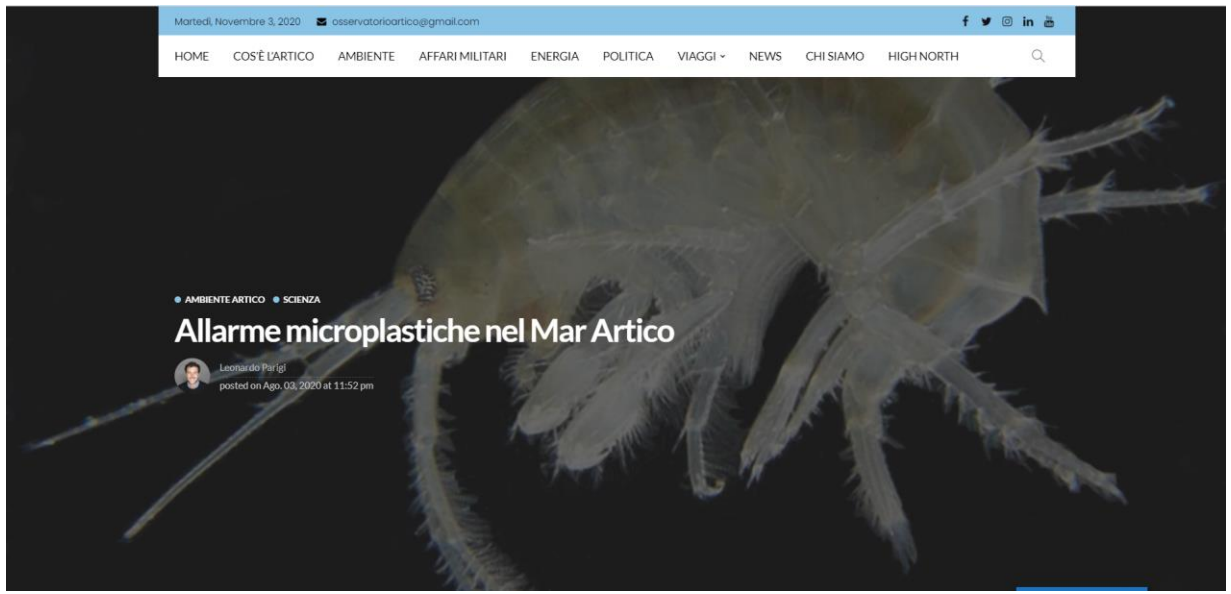
Keywords:
Gammarus setosus
Nile red
Micro FT-IR
Arctic
Ingested plastic

ABSTRACT

The present paper provides the first record of ingestion of microplastics in natural context by *Gammarus setosus* from Svalbard Archipelago. The plastic particles were identified both by Nile Red staining and Micro FT-IR spectroscopy. The species studied ingests microplastic particles in natural conditions if present in its habitat, probably mistaking them as food. The microplastic particles ingested may be available for uptake to predators that consume this Arctic amphipod, producing consequences to the food web.

Artico e microplastiche

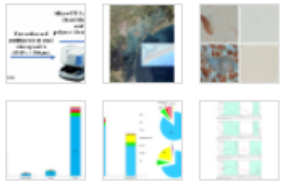




Allarme microplastiche nel Mar Artico

Outline

Figures (9)



Show all figures

Extras (1)

Supplementary material

ELSEVIER

Marine Pollution Bulletin
Volume 160, November 2020, 111606

Baseline

Evidence of small microplastics (<100 μm) ingestion by Pacific oysters (*Crassostrea gigas*): A novel method of extraction, purification, and analysis using Micro-FTIR

F. Corami [a, b], B. Rosso [b], M. Roman [b], M. Picone [b], A. Gambaro [b], C. Barbante [a, b]

Show more

https://doi.org/10.1016/j.marpolbul.2020.111606

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Highlights

- New methods developed for gills and hepatopancreas of *Crassostrea gigas*
- Quantification and identification of small microplastics (<100 μm) using Micro-FTIR
- Quantification and identification of additives and natural fibers using Micro-FTIR

Abstract

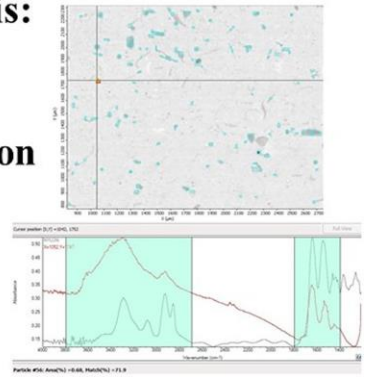
Microplastics (MPs) are present in fresh, brackish, or marine waters. Micro- and macroinvertebrates can mistake MPs or small microplastics (SMPs, <100 μm) to be food particles and easily ingest them according to the size of their mouthparts. SMPs may then block the passage of food through the intestinal tract (i.e. hepatopancreas), accumulate within the organism, and enter the food web. Pacific oysters (*Crassostrea gigas*) are allochthonous filter-feeding bivalve mollusks, which have been introduced in coastal seas around the world in both natural banks and farms. Considering their economic and ecological value, these bivalves have been chosen as a model to study the ingestion of SMPs. A novel method for the extraction and purification of SMPs in bivalves was developed. Quantification and simultaneous polymer identification of SMPs using Micro-FTIR (Fourier Transform Infrared Spectroscopy) were performed, with a limit of detection for the particle size of 5 μm.

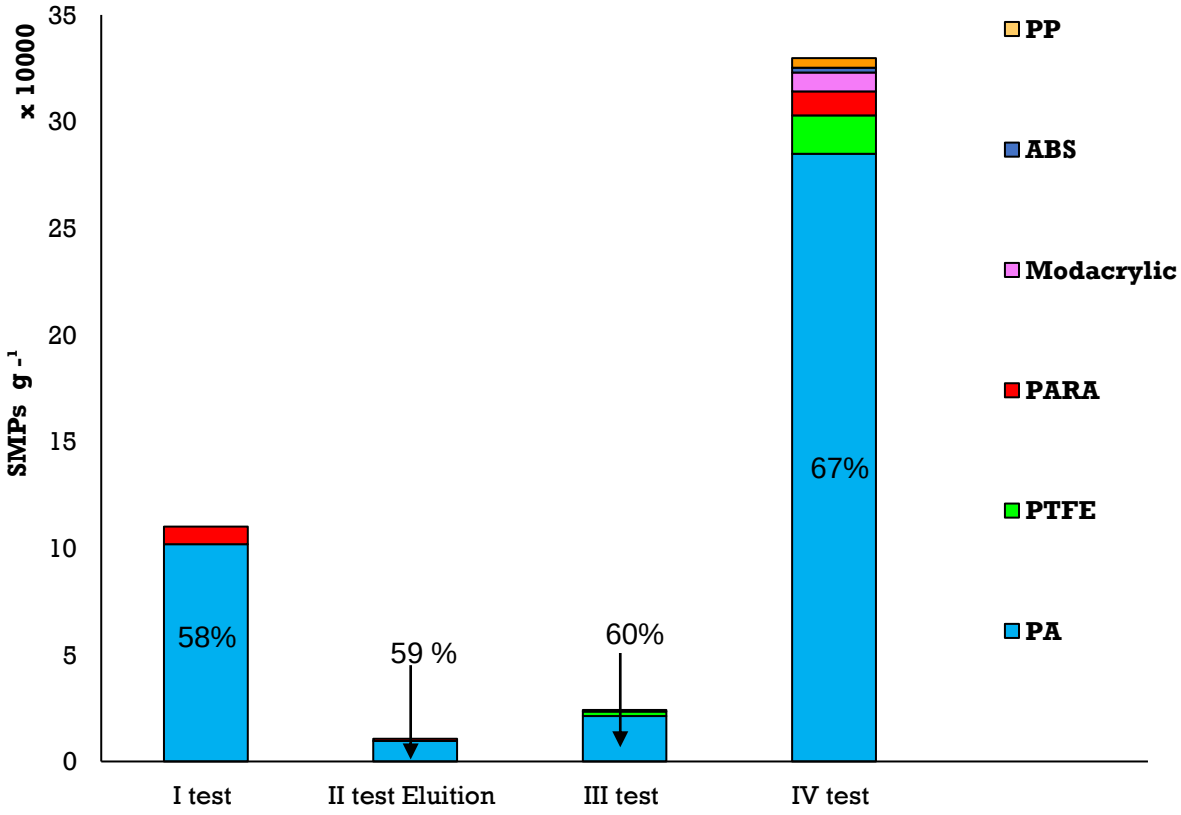
Gills

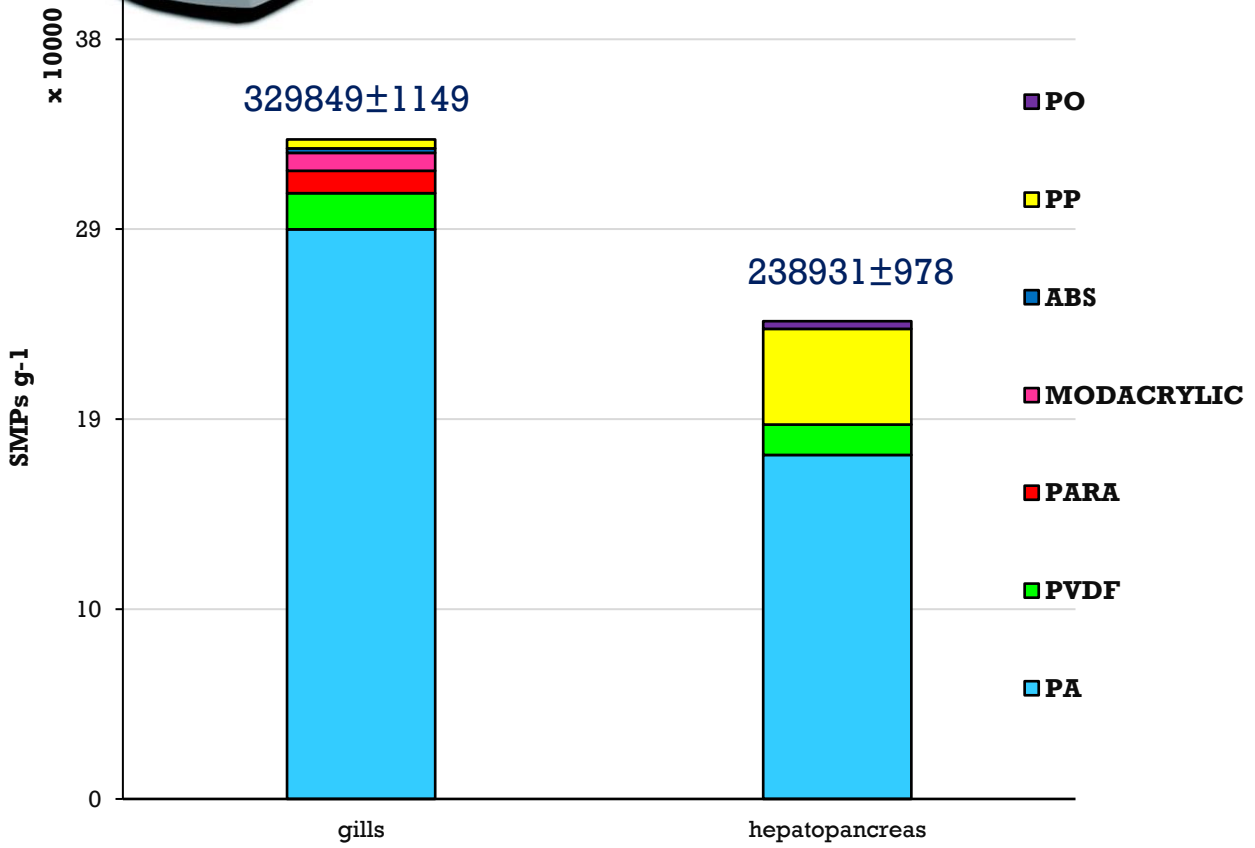
Hepatopancreas

Extraction and purification of small microplastics (SMPs, <100 µm)

Micro-FTIR analysis: Quantification and polymer identification







Sei siti con diverse fonti e caratteristiche

plastic free Clean Room (ISO 7)

From Corami et al. Small microplastics (< 100 µm), plasticizers and additives in seawater and sediments: a method of oleo-extraction, purification, quantification, and polymer characterization using Micro-FTIR submitted to STOTEN

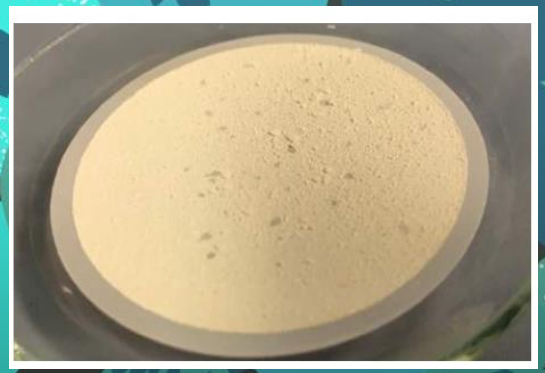
Sviluppo di un metodo di estrazione e purificazione per l'analisi quantitativa e la caratterizzazione delle SMPs nei sedimenti e nelle acque

Rimozione del materiale organico particolato: ossidazione cruciale

Estrazione

Flottazione
NaCL
NaI
$ZnCl_2$

Flottazione e Oleoestrazione (Chricton et al., 2017)



plastic free Clean Room (ISO 7)

From Corami et al. Small microplastics (< 100 µm), plasticizers and additives in seawater and sediments: a method of oleo-extraction, purification, quantification, and polymer characterization using Micro-FTIR submitted to STOTEN

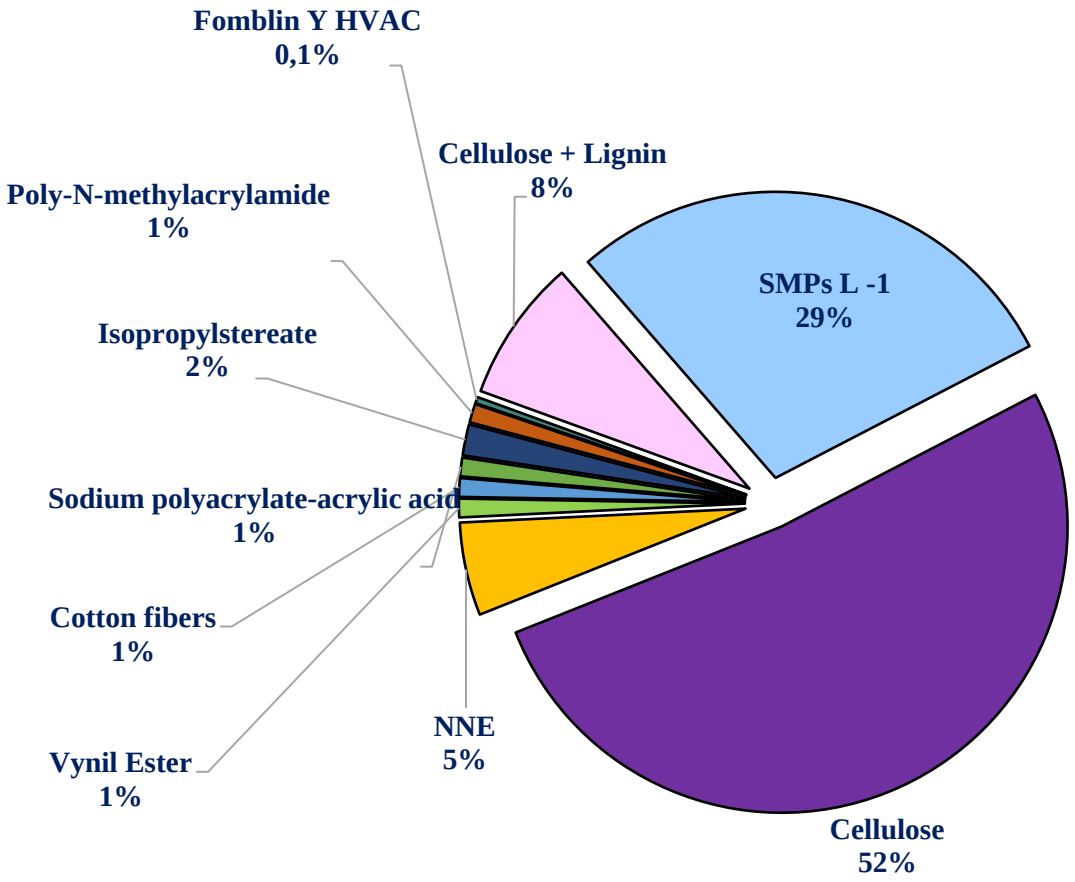
Sviluppo di un metodo di estrazione e purificazione per l'analisi quantitativa e la caratterizzazione delle SMPs nei sedimenti e nelle acque

Messa a punto di Oleoestrazione e Purificazione

plastic free Clean Room (ISO 7)

From Corami et al. Small microplastics (< 100 µm), plasticizers and additives in seawater and sediments: a method of oleo-extraction, purification, quantification, and polymer characterization using Micro-FTIR submitted to STOTEN

SE



From Corami et al. Small microplastics (< 100 µm), plasticizers and additives in seawater and sediments: a method of oleo-extraction, purification, quantification, and polymer characterization using Micro-FTIR submitted to STOTEN

Environmental Science and Pollution Research (2020) 27:14711–14722
https://doi.org/10.1007/s11356-020-07954-7

RESEARCH ARTICLE

Plastic abundance and seasonal variation on the shorelines of three volcanic lakes in Central Italy: can amphipods help detect contamination?

Valentina Iannilli[1] · Fabiana Corami[2] · Patrizia Grasso[1,3] · Francesca Lecce[1] · Memmo Buttinelli[3] · Andrea Setini[3]

Received: 19 August 2019 / Accepted: 30 January 2020 / Published online: 12 February 2020

Abstract

Despite the exponential increase of studies on plastic debris in recent years, there are still few works focusing on the problem as it relates to inland waters: little is known about the accumulation and dispersion dynamics on lake shores, and there are no standardized sampling methods for monitoring purposes. The accumulation of plastic litter in natural habitats also threatens the resident organisms. In this paper, we investigated the abundance and accumulation of plastic particles, ranging in size from 1 to 50 mm, from the beach sediment of three volcanic lakes in Central Italy: Albano, Bracciano, and Vico. The collection was designed to define the most important variables that one must consider in order to obtain a representative sample of plastic litter in a lake environment. In view of the high heterogeneity of sampling protocols used, comparison among the obtained results is limited and sometimes impossible. By using one of the proposed sampling methodologies, and critically analyzing the results, we aimed to highlight a possible monitoring criterion and to identify specific elements that can be meaningful and representative. The samples were collected in May and September 2017. For each lake, we sampled plastic items and sediments from two beaches. Albano contained the largest amount of plastic (in weight), while Bracciano had the largest number of particles. Our observations lead us to infer that the number of particles is the parameter most sensitive to environmental variations, as well as the more suitable for monitoring with greater definition the differences between sites. Moreover, sampling should be taken in different seasons, following a sampling pattern that includes at least two beaches placed in strategic positions with respect to wind and waves.

In order to identify new indicators to evaluate the entry points of plastic into the food web, we collected, from the same sites analyzed, some specimens of the Talitrid Amphipod *Cryptorchestia garbinii*, a detritivorous species having a critical role in

Environment International 137 (2020) 105587

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

Microplastic accumulation in benthic invertebrates in Terra Nova Bay (Ross Sea, Antarctica)

Andrea Augusto Sfriso[a], Yari Tomio[b], Beatrice Rosso[b], Andrea Gambaro[b], Adriano Sfriso[b], Fabiana Corami[c], Eugenio Rastelli[d], Cinzia Corinaldesi[e], Michele Mistri[a,*], Cristina Munari[a]

[a] Department of Chemical and Pharmaceutical Sciences, University of Ferrara, Via Fossato di Mortara 17, 44121 Ferrara, Italy
[b] Department of Environmental Sciences, Informatics and Statistics, Ca'Foscari University of Venice, Via Torino, 155, 30172 Venezia-Mestre, Italy
[c] Institute of Polar Sciences, CNR-ISP, Campus Scientifico, Ca'Foscari University of Venice, Via Torino, 155, 30172 Venezia-Mestre, Italy
[d] Department of Life and Environmental Sciences DISVA, Università Politecnica delle Marche, Via Brecce Bianche, 60131 Ancona, Italy
[e] Department of Materials, Environmental Sciences and Urban Planning SIMAU, Università Politecnica delle Marche, Via Brecce Bianche, 60131 Ancona, Italy

ARTICLE INFO

Handling Editor: Da Chen

Keywords:
Antarctica
Benthos
Microplastics
Food web
FTIR
Nile red

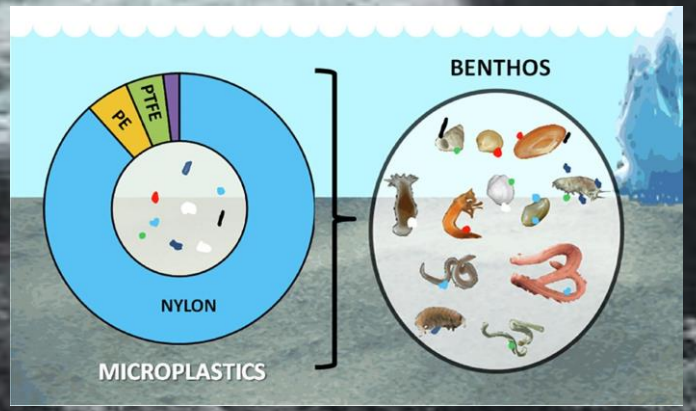
ABSTRACT

Microplastic contamination of the benthic invertebrate fauna in Terra Nova Bay (Ross Sea, Antarctica) was determined. Twelve macrobenthic species, characterized by different feeding strategies, were selected at 3 sampling sites at increasing distance from the Italian Scientific Base (Mario Zucchelli, Camp Icarus, Adelie Cove). The 83% of the analyzed macrobenthic species contained microplastics (0.01–3.29 items mg^{-1}). The size of the particles, measured by Feret diameter, ranged from 33 to 1000 μm with the highest relative abundance between 50 and 100 μm. Filter-feeders and grazers displayed values of microplastic contamination from 3 to 5 times higher than omnivores and predators, leading to the hypothesis that there is no evident bioaccumulation through the food web. The prevalent polymers identified by micro-FTIR were nylon (86%) and polyethylene (5%); other polymers identified in Antarctic benthos were polytetrafluoroethylene, polyoxymethylene, phenolic resin, polypropylene, polystyrene resin and XT polymer.

1. Introduction

The world plastic production from the year 1950 has increased from

plastic pieces leading to their progressive fragmentation (Artham et al., 2009; Muthukumar et al., 2011). Eventually the action of fouling (Fazey and Ryan, 2016; Galloway et al., 2017) increase the density of

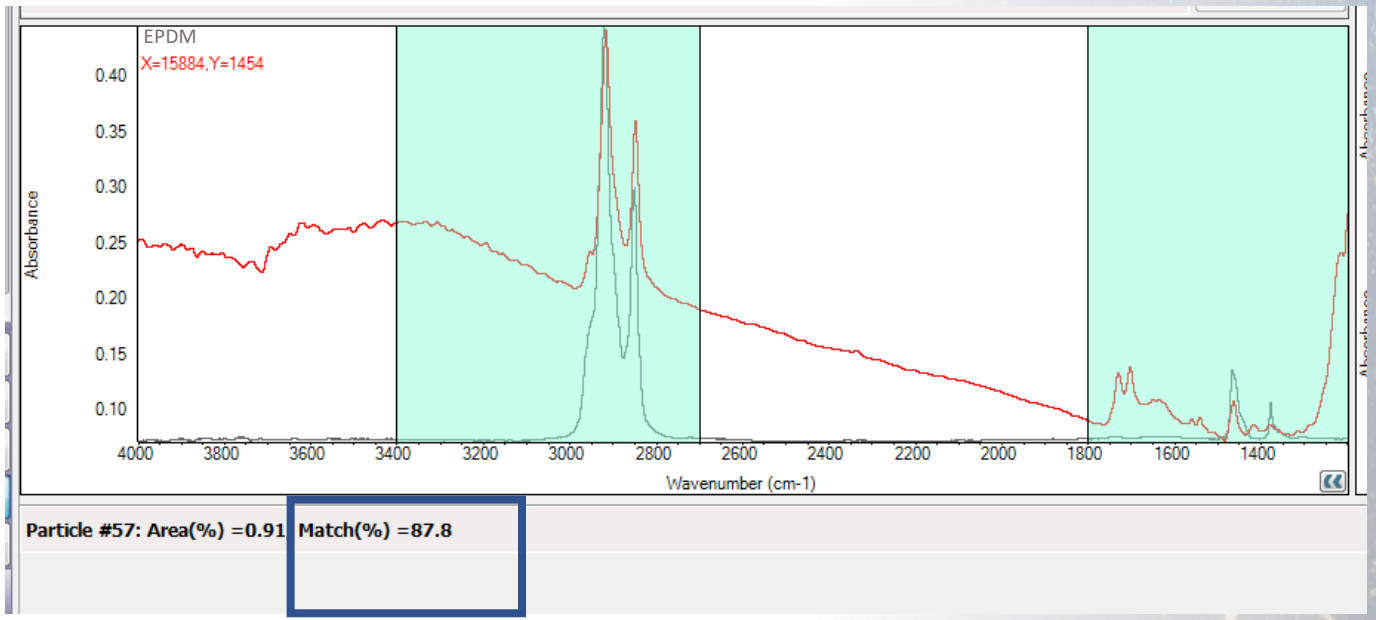


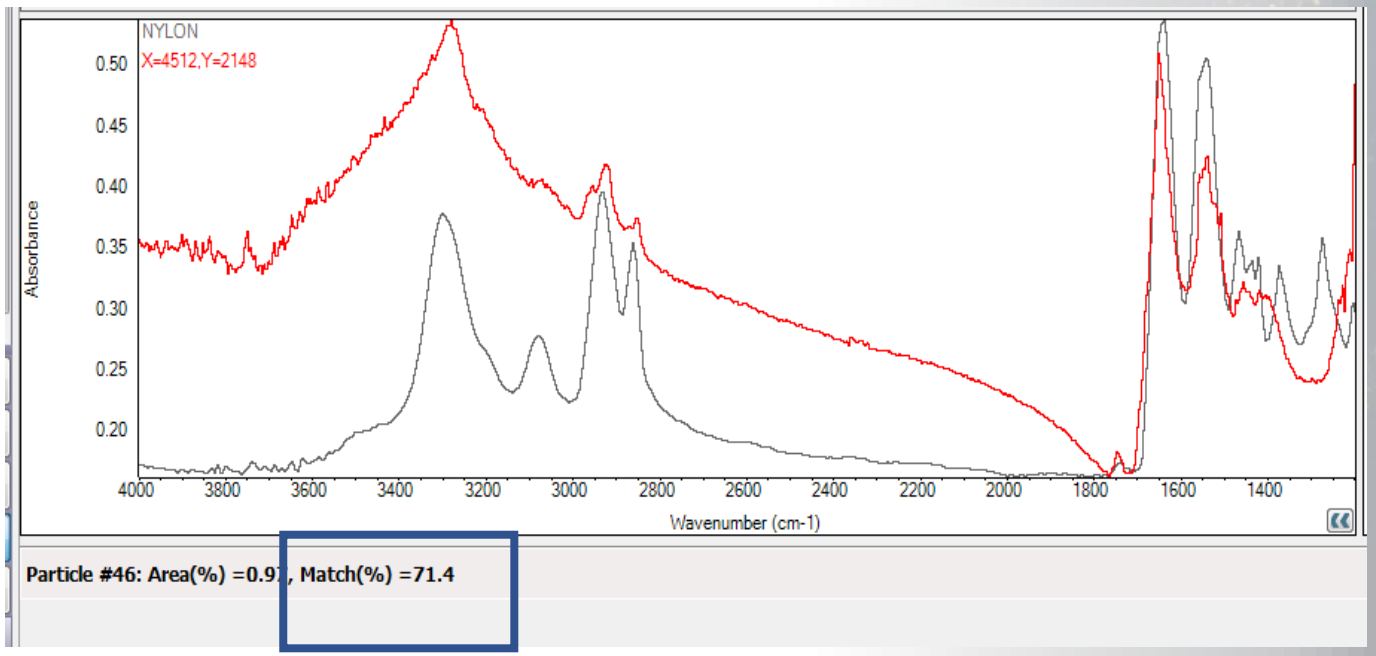
Sviluppo di un metodo per la quantificazione e caratterizzazione delle SMPs (< 100µm) nel Particolato Armosferico

ISP Istituto di Scienze Polari
Consiglio Nazionale delle Ricerche

plastic free Clean Room (ISO 7)

From Corami et al. Airborne Small Microplastics (< 100 µm): a novel method for quantification and characterization using Micro-FTIR IN PREPARATION





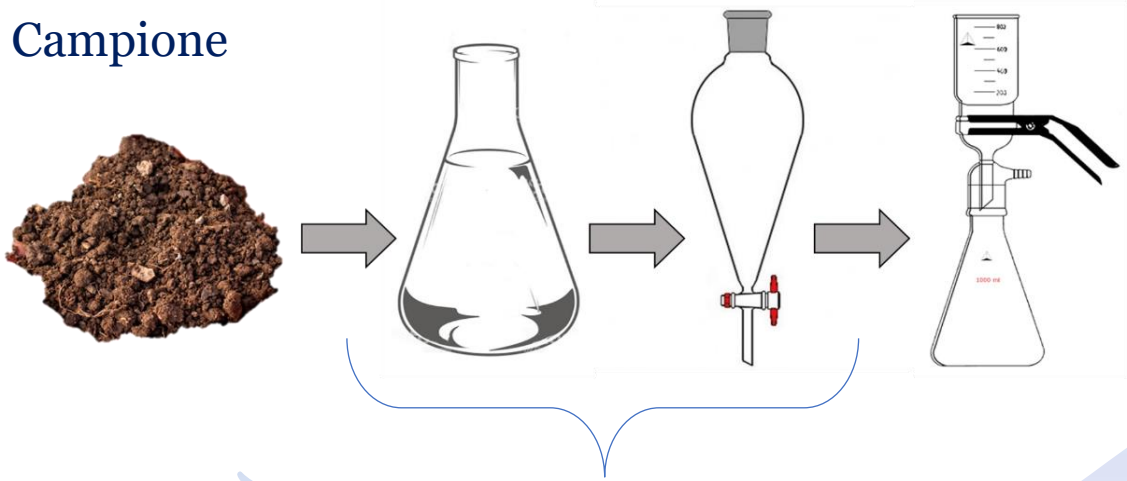
From Corami et al. Airborne Small Microplastics (< 100 µm): a novel method for quantification and characterization using Micro-FTIR IN PREPARATION

Artico – SMPs nel permafrost

ISP Istituto di Scienze Polari
Consiglio Nazionale delle Ricerche

Filtrazione e purificazione

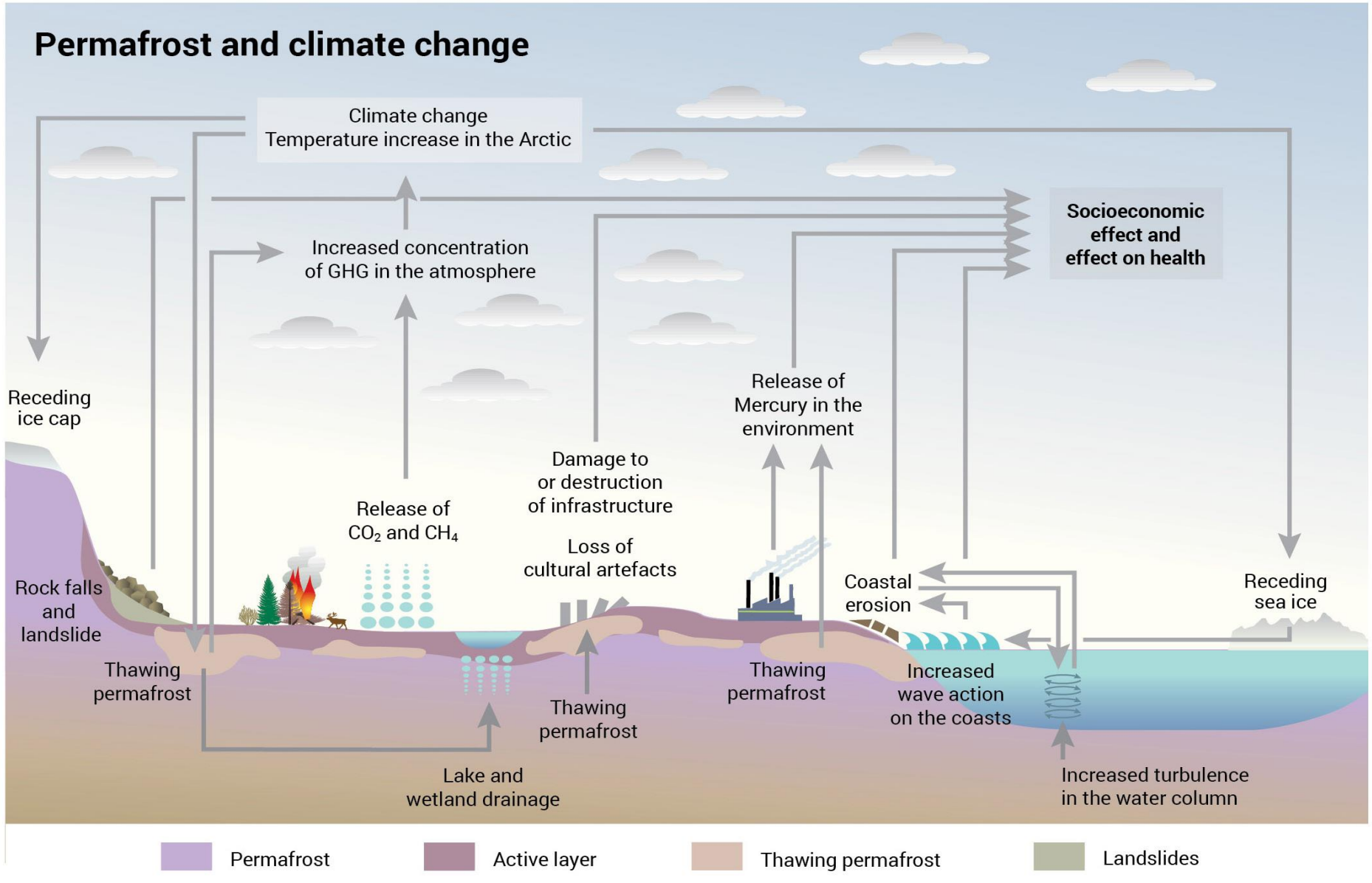
Campione

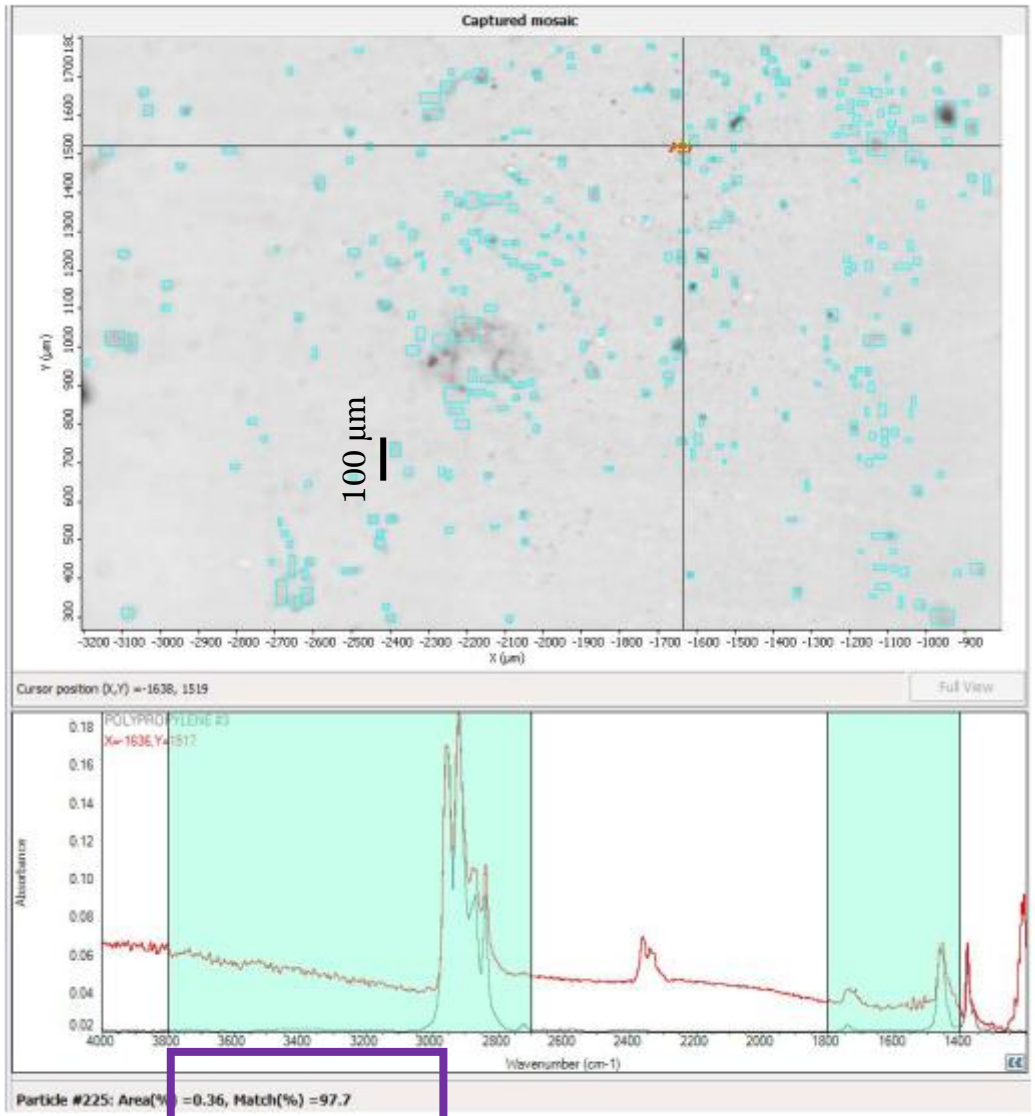


Estrazione

A method for extraction, purification and characterization via MicroFTIR of small microplastics in soils. F. Corami, B. Rosso, V. Colizza, A. Gambaro, C. Barbante. *In preparation*


AIR
MINE
OSS
Kongsfjorden
Kongsbrebukta
Jakobskjelda
London
Tviskjera
Rundholmen
Kalkgrunnen
Eskjeret
Juttaholmen
Observasjonsholmen
Sigridholmen
Storholmen
Midtholmen
Lovenøyane
Leirholmen
Sarsvatnet
Ossian Sarsfjellet
Brandalpynten
Knudsenheia
Morebreen
Scheteligfjellet
Hamnerabben
Ny-Ålesund
Leirhaugen
Prins Heinrichøya
Broggerdalen
Dietrichholmen
Mietheholmen
Gluudneset
Gåsebu
Kloten
Broggerbreane
Zeppelinfjellet
Broggerhalvøya
Vestre Lovénbreen
Breskjera
Isgrunnen
Raudvika
Broggerfjellet
Lundryggen
Sherdahlfjellet
Lovénbreane
Berteltoppen
Slåttofjellet
Haavimbfjellet
Grønlietoppen
Kronebukta
Colletthøgda
Åmdalen
Skarsnuten
Skaret
Steenfjellet
Knuten
Bjørvigfjellet
Dolotoppen
Skifertoppen
Nielsenfjellet
Nobilefjellet
Edithbreen
Bogetoppen
Botnfjellet


Permafrost and climate change
Climate change
Temperature increase in the Arctic
Increased concentration
of GHG in the atmosphere
Socioeconomic
effect and
effect on health
Receding
ice cap
Release of
Mercury in the
environment
Damage to
or destruction
of infrastructure
Release of
CO_2 and CH_4
Loss of
cultural artefacts
Rock falls
and
landslide
Coastal
erosion
Receding
sea ice
Thawing
permafrost
Thawing
permafrost
Thawing
permafrost
Increased
wave action
on the coasts
Lake and
wetland drainage
Increased turbulence
in the water column
Permafrost
Active layer
Thawing permafrost
Landslides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100 µm
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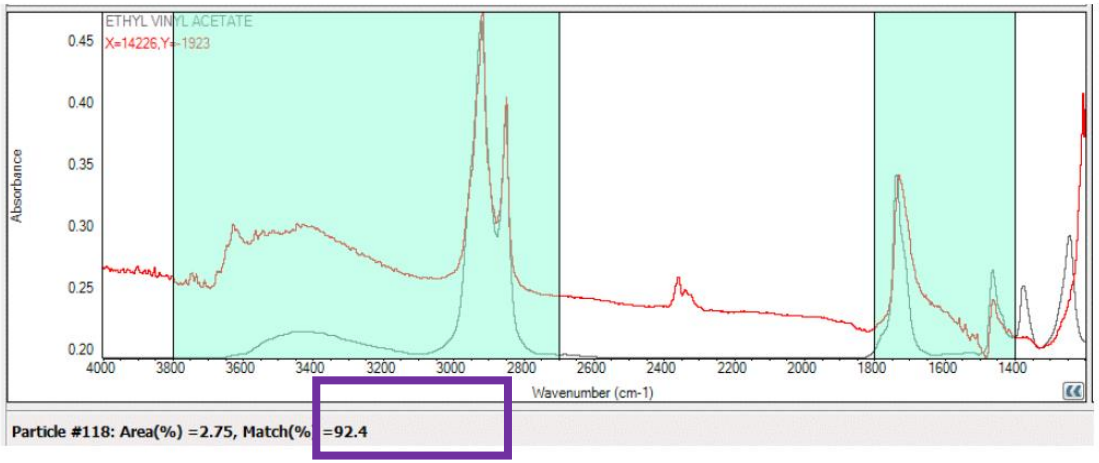
Full View
POLYPROPYLENE #3
X=-1636,Y=1517
Absorbance
Wavenumber (cm-1)
Particle #225: Area(%) =0.36, Match(%) =97.7


ETHYL VINYL ACETATE
X=14226,Y=-1923
Absorbance
Wavenumber (cm-1)
Particle #118: Area(%) =2.75, Match(%) =92.4

Standardizzazione dei metodi

Cross-validazione con altre tecniche

Esposizione e tossicità

Bioindicatori

Vettori di inquinanti, quali?

Vettori di microrganismi, quali?

Altri comparti ambientali

Fonti e percorsi

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