Microplastics in the snow of the north-western Italian Alps: analysis of distribution and typology

C. Galletti[1], S. Fraterrigo Garofalo[1], F. Borgogno[2], D. Fino[1]

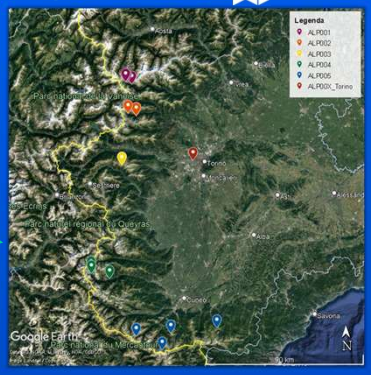
[1]Department of Applied Science and Technology, Politecnico di Torino, Turin, 10146, Italy
[2]Environmental Department, European Research Institute, Turin, 10122, Italy

Introduction

Pollution caused by the presence of microplastics (hereafter MPs) is a very trending and debated topic. Many years elapsed since the first studies about their presence in marine environment and sea life, but there is a lack of research into other contexts. This work tries to evaluate and explain the presence of MPs (in form of particles and fibers) in the snow collected during the 2020-2021 winter season on Piedmont (Italy) mountains, with the partnership of the project "ALP-Stop the ALPs becoming Plastic Mountains" which collaborates in the sampling phase. The restriction in movements due to the state of emergency, caused by the COVID-19 pandemic, gives the opportunity to study the human activity impact on snow pollution.

The novelty of this study is related to the fact that in general literature is focused on the presence of microplastics in the seas, neglecting other environments and the diffusion of plastics transported by atmospheric phenomena.

Samples collection



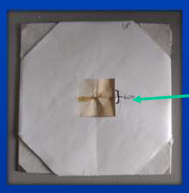
Samples preparation

1. separation by density of the suspension, solubilizing NaCl up to saturation value;
2. digestion by means of hydrogen peroxide at 30%;
3. filtration by gravity;
4. drying for a night in the oven.

Analysis methods

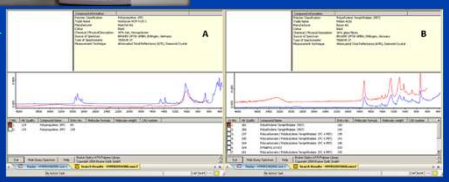
Optical analysis - counting

allow to perform a quantitative count of particles and fibers present in the samples



Spectroscopic analysis – micro-FTIR

with the porpouse to identify the polymeric species, using the OPUS software

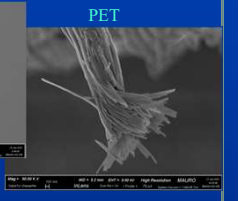


Polypropilene Polyethilene terphtalate

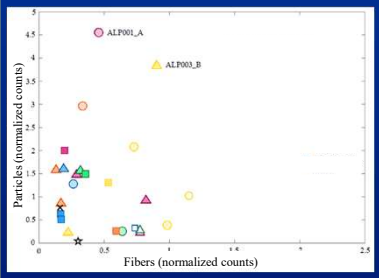
Microscopic analysis – FESEM

through high magnifications it allows to identify both natural and synthetic fibers

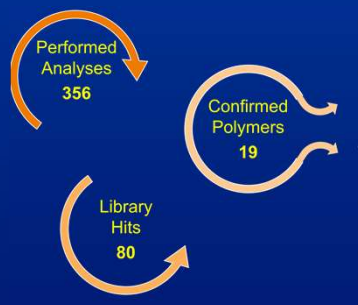
Natural fiber



Results & Discussion



✓ More particles than fibers



Major Polymers
- PET
- PP
- PS

Traces of…
- ABS
- PBT
- PVB
- PVC+PVA
- PP+EPDM
- Epoxy Resins

Sample	Performed Analyses	Library Matches	Confirmed Polymers	Identified Polymers
ALP001	70	24	8	PS, PP (PVC, PVB, PBT)
ALP002	65	19	2	PP, PET
ALP003	107	19	1	PET
ALP004	37	5	5	PET (PVB, PP, EPDM)
ALP005	63	11	3	(PV, ABS, PVA)
Total	**356**	**80**	**19**	

Major Polymers:

✓ Packaging ✓ Disposable tableware
✓ Bottles ✓ Sportswear

✓ There are no differences between the snow samples collected in the more and less accessible areas.
✓ PET and PP detected in almost all samples.

Conclusions

The analysis shows rather little number of MPs of very moderate dimension, which for the most part is microfibre. The absence of larger MPs is coherent with the reduced tourism in the selected locations, leading to the observation of a similar condition in every analyzed site regardless the level of the accessibility.

The authors would like to express appreciation for the support of the Project