PLASTICDUSTCLOUD
MICROPLASTICS IN THE AIR ■ ALL AROUND THE WORLD

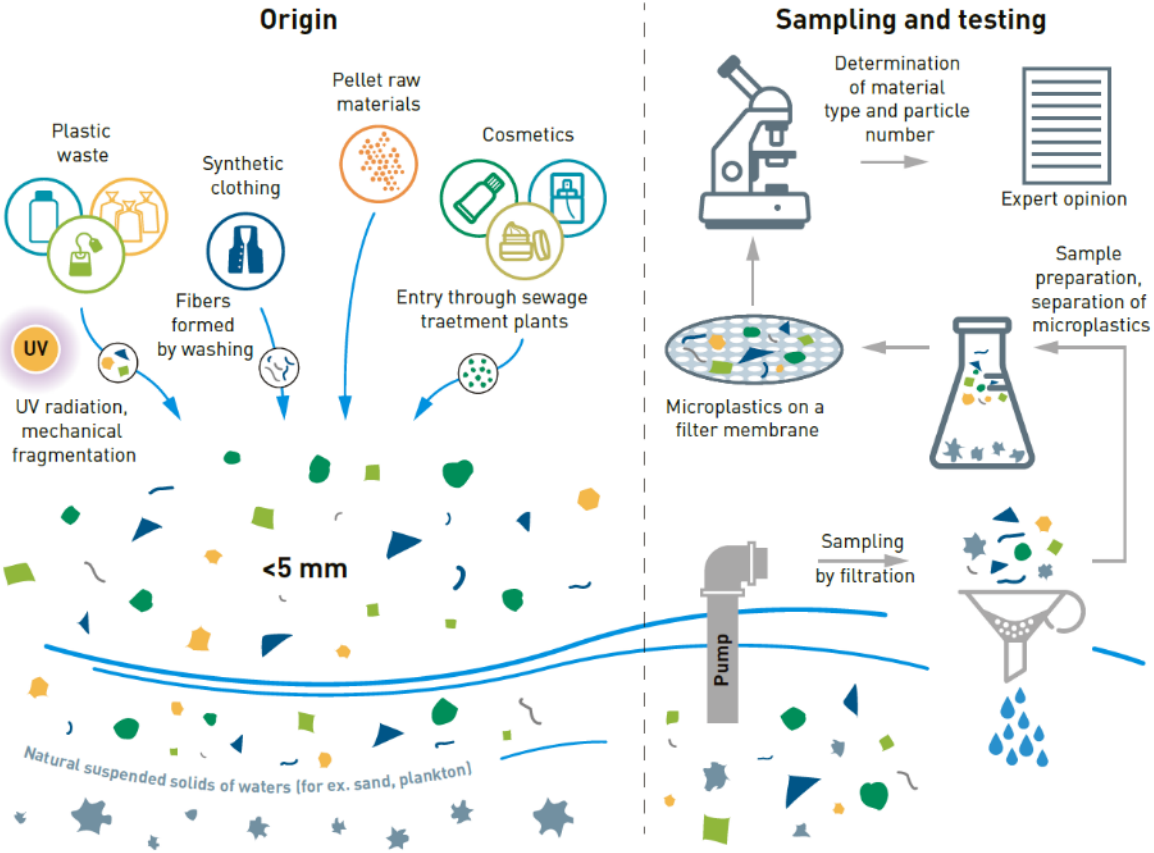
Interreg Danube Region
Co-funded by the European Union
MicroDrink

eurofins

Microplastic sampling and analysis - MicroDrink and PlasticDustCloud projects

Gabor Bordos

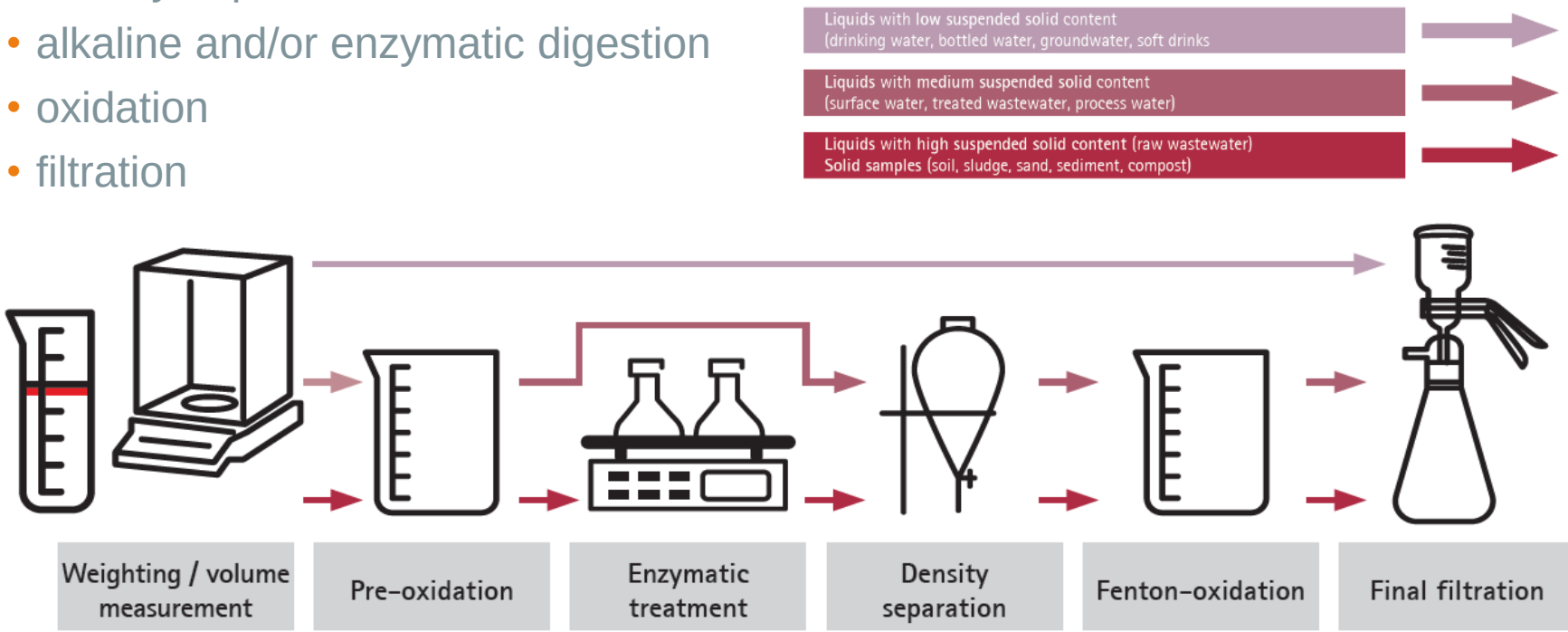
MPs in the environment, sampling & analysis



MP workflow – analysis

Sample preparation

- density separation
- alkaline and/or enzymatic digestion
- oxidation
- filtration



MP workflow – analysis

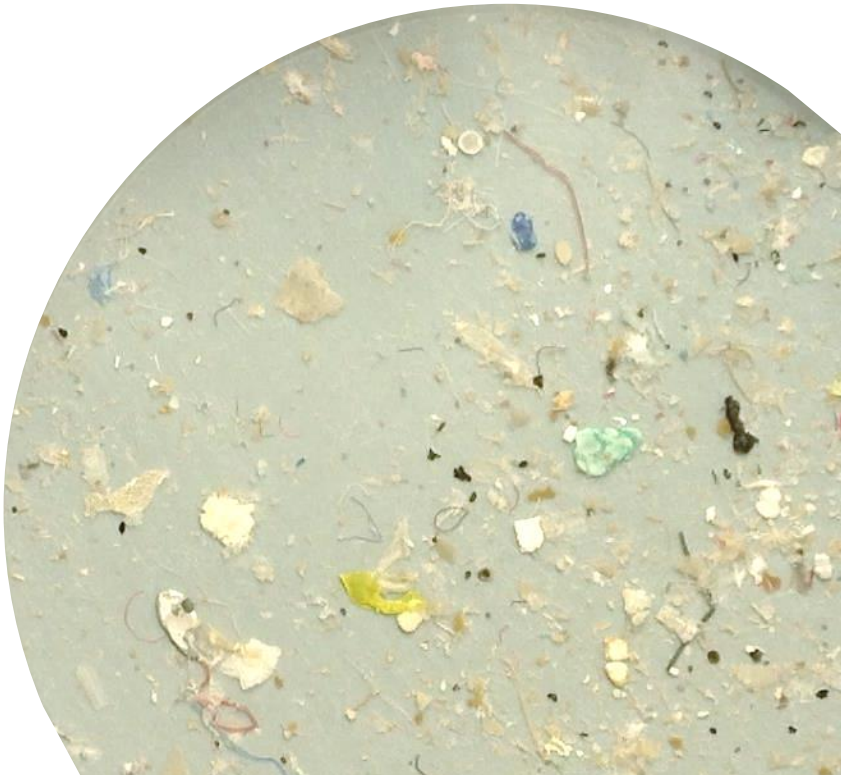
Analysis

FTIR microspectroscopy (ca. 20 polymers)

- **Particle numbers**
- Down to 5 um
- Polymer types
- Particle sizes
- Shapes (fragment, fibre)

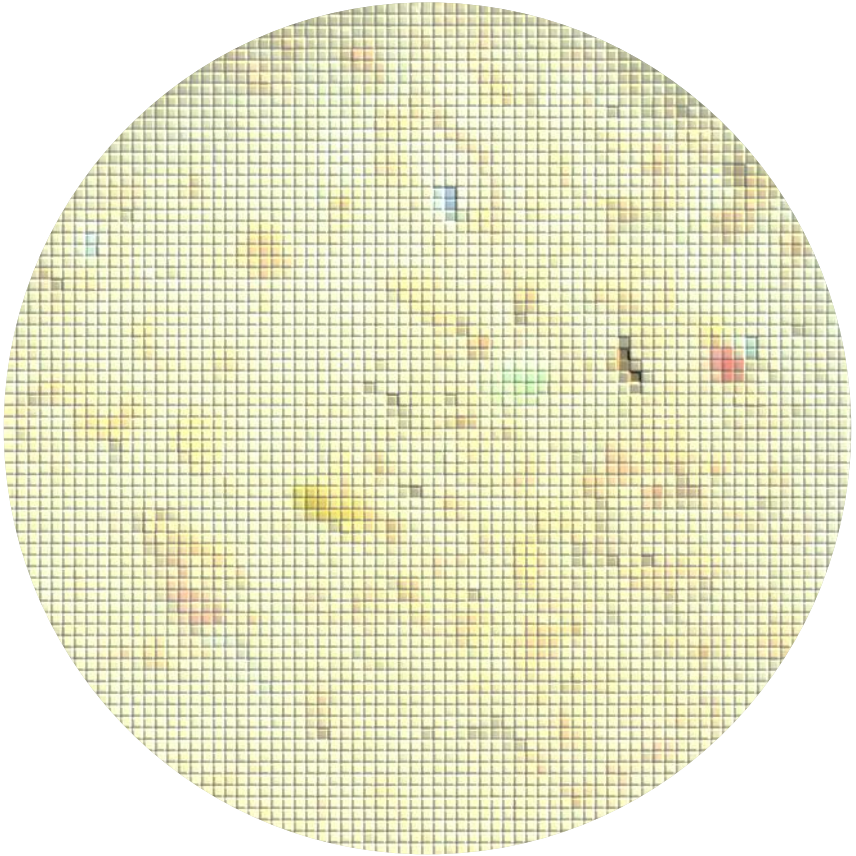
Pyrolysis GC-MS (12 polymers+rubber)

- **Total polymer mass**
- Down to 1 ug/sample
- Polymer types

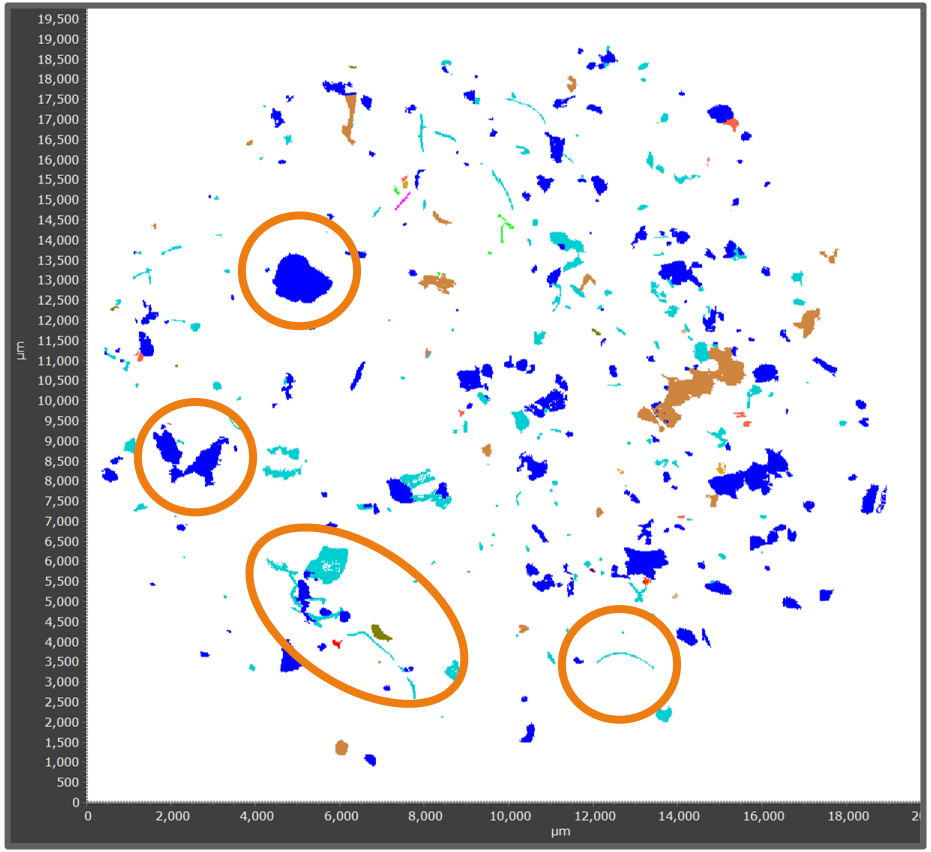


MP workflow – analysis

FTIR Imaging

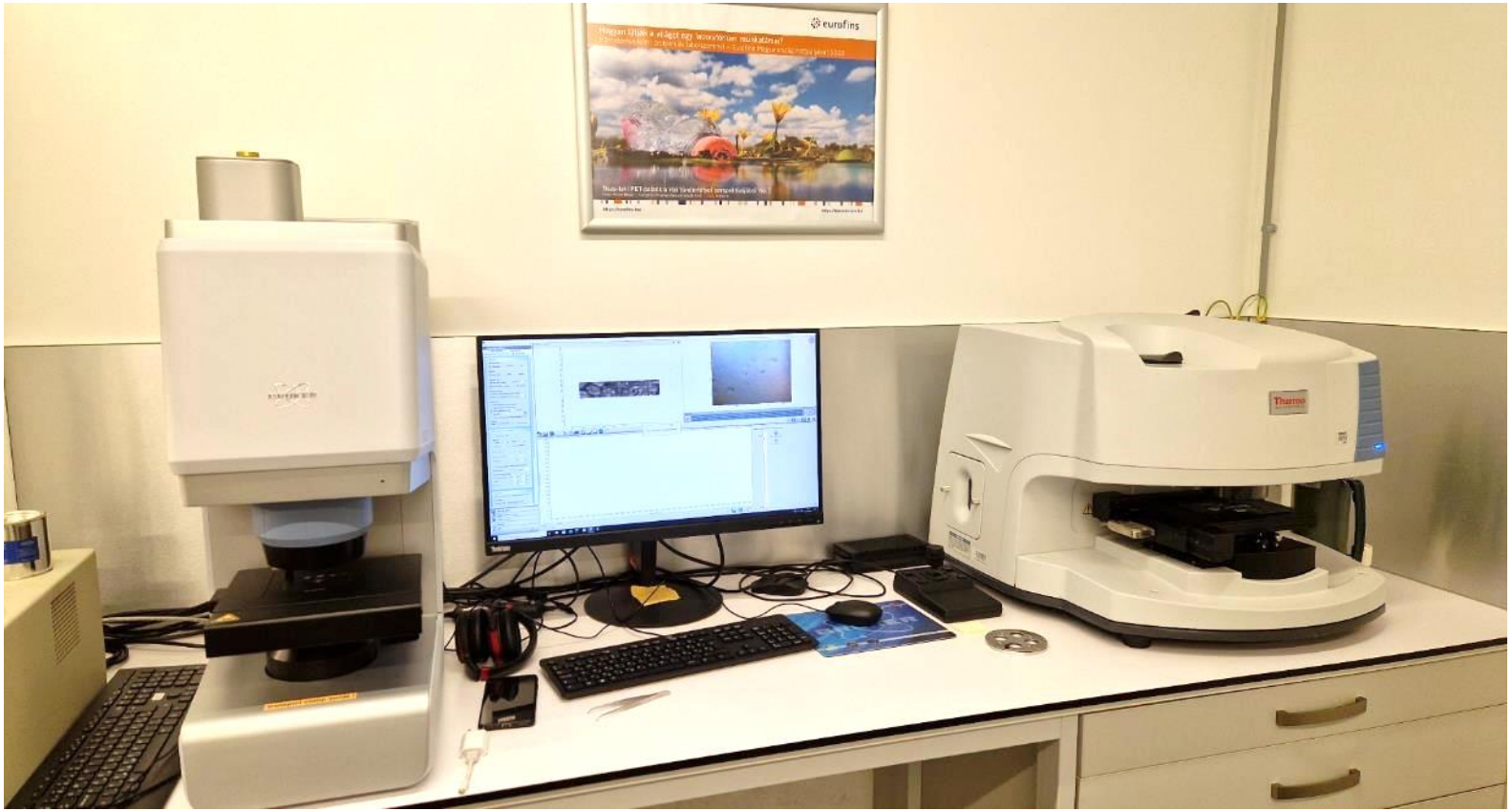


MP workflow – analysis



Instrumentation

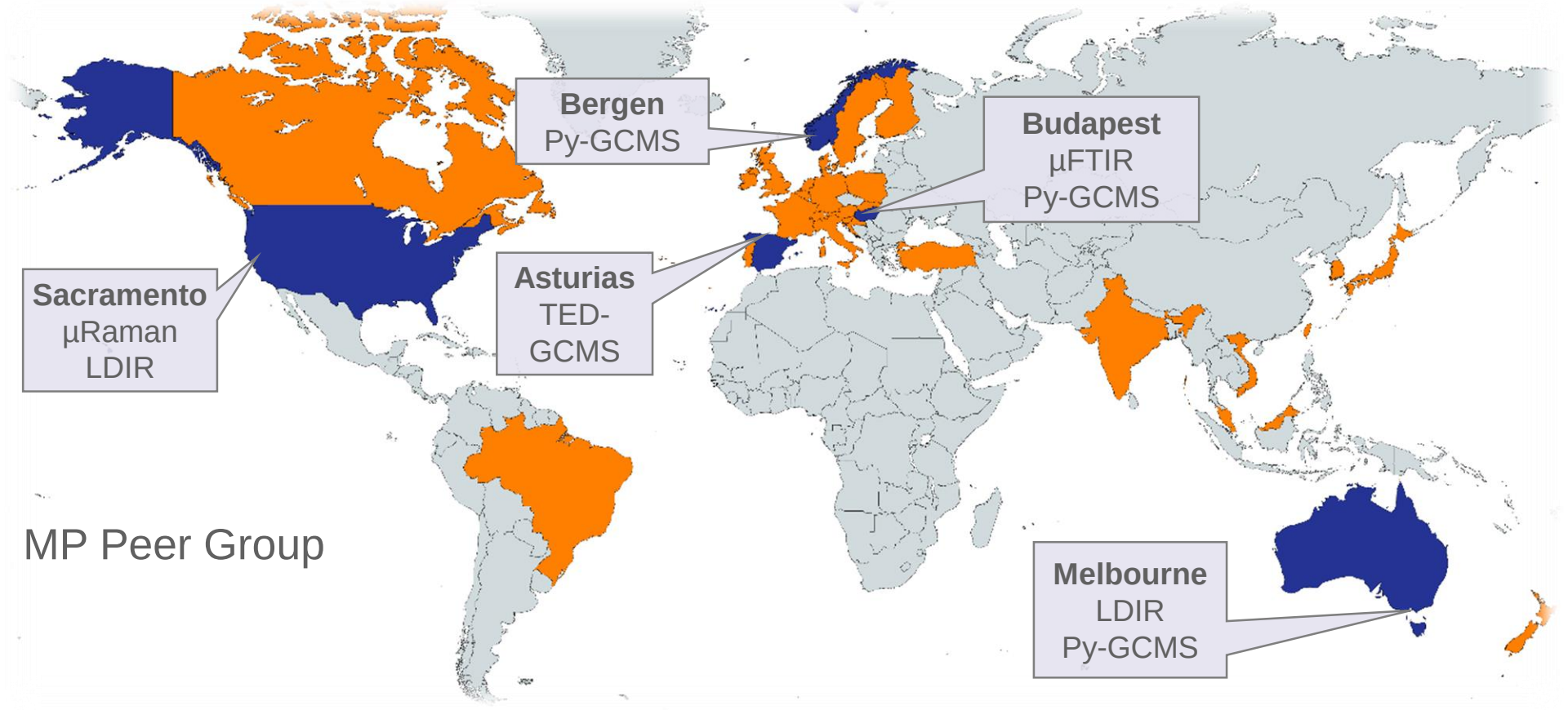
FTIR microscopes (particle number)



Instrumentation

PYR-GC-MS (total polymer mass)

Microplastics @ Eurofins



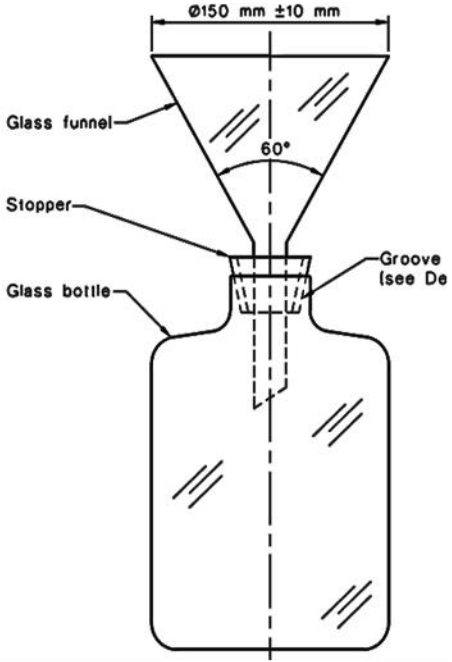
MP Peer Group

Aims

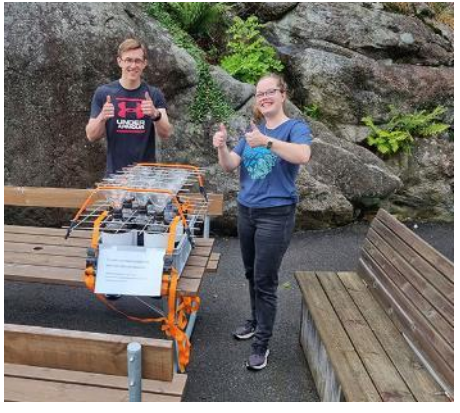
- investigate the presence of **MPs in air samples**
- on a **global** scale
- using **harmonized sampling** (passive wet and dry deposition)
- **replicate samples** to analyse **influence of analytical methodology**

Methods

3 continents | 9 coutries | 12 locations

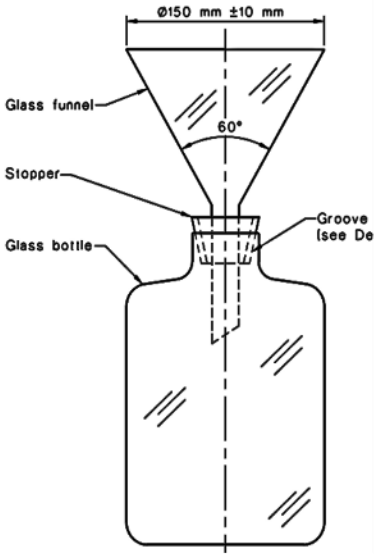


Methods



Methods

12 locations (incl.5 labs with 5 techniques)



8 parallels

- to home technique
- to home technique
- to home technique
- to other technique
- to other technique
- to other technique
- to other technique
- backup sample

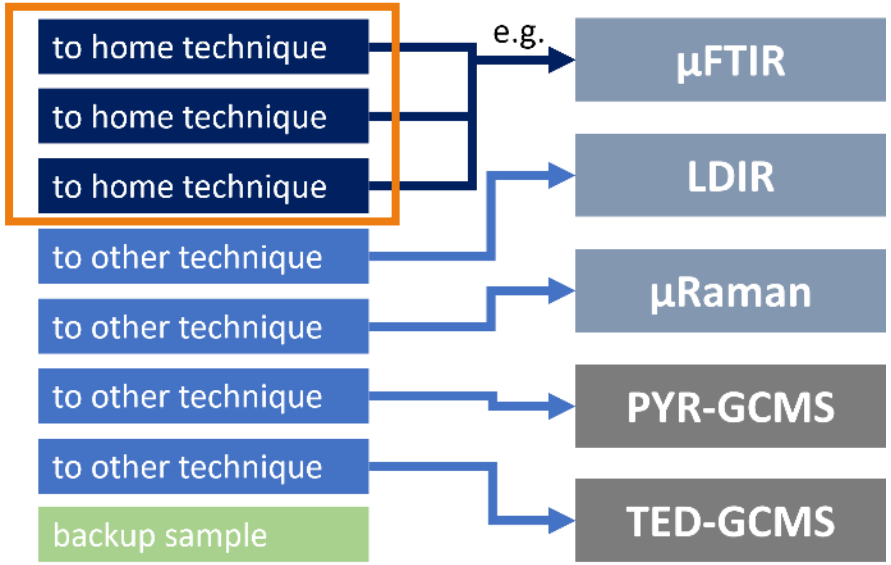
e.g.

- µFTIR
- LDIR
- µRaman
- PYR-GCMS
- TED-GCMS

Methods

Sites having lab: 8 replicates (variability check)

Sites no lab: 5 replicates



All site with all technique:

- Comparision of methods per site
- Comparision of spatial variations per method

Results

- **Overall low concentrations,** median (min-max):

  143 MP/m²/day (n.d. – 1253 MP/m²/day) for spectroscopy

  19 µg/m²/day (n.d. – 3112 µg/m²/day) for thermoanalytics

- **Rubbers 2,4 µg/m²/day** (n.d. – 304 µg/m²/day)
- Values fall within or slightly exceed previously reported wet-dry deposition results

Results

- **PE** and **PP** were the most abundant polymers
- **SBR** and **PIP** were the most common rubber type detected
- The majority of particles detected were **<100 µm**.
- Morphology
  - 85% fragments
  - 10% were fibres
  - 5% were beads

Conclusions

- one of the **most geographically broad** and methodologically integrated investigations on airborne MPs using the wet-dry deposition
- **variability** in sampling, sample preparation, and QA/QC practices leads to wide ranges in reported concentrations
- **move away from seeking a single "correct" concentration** value and instead focus on identifying trends and correlations
- this **study support benchmarking** for future global monitoring and standardization initiatives in atmospheric microplastic research

Plasticdustcloud.com

plasticdustcloud.com

Importált

Minden könyvjelző

eurofins

HOME ABOUT US MP IN THE AIR RESEARCH

PLASTICDUSTCLOUD

MICROPLASTICS IN THE AIR ■ ALL AROUND THE WORLD

WE MEASURE MICROPLASTICS IN THE AIR!
3 CONTINENTS, 12 LOCATIONS, SAME METHODE.
A GLOBAL STUDY. RESULTS COMING SOON.

12 LOCATIONS

THE PROBLEM

- The presence of microplastics in the atmosphere is underestimated
- Microplastics go round and round in an endless cycle
- They reach the clouds by evaporation from the sea
- They migrate from continent to continent with air currents

MAIN QUESTIONS

- How much microplastic is in the air?
- How much MP-s are in the countryside and in the cities?
- How much is in the air? how much comes from the rain?
- How much microplastic is there in Europe, Australia and America?

THE ANSWER IS COMING

- We are measuring microplastics in the air for the first time
- On 3 continents, in 12 locations around the world
- Uniform method, comparable results
- Sampling and measurement: August – September,
- Results: October

MicroDrink projekt

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FAU Friedrich-Alexander-Universität Erlangen-Nürnberg

KOVOD

HGI 1909 HRVATSKI GEOLOŠKI INSTITUT CROATIAN GEOLOGICAL SURVEY

- Danube Interreg Program
- 30 months, 2024-2026
- 9 countries
- 11 project partners, 19 ASP

SO1: transnational database

SO2: monitoring

SO3: capacity building

ZAVOD ZA JAVNO ZDRAVSTVO ZADAR

ZAVOD ZA JAVNO ZDRAVSTVO FBiH INSTITUTE FOR PUBLIC HEALTH FB&H

ЈКП ДРУГИ ОКТОБАР ВРШАЦ

VÚV TGM

OVF

MAVÍZ

FEJÉRVÍZ ZRT

UNIVERZA V LJUBLJANI University of Ljubljana

umweltbundesamt ENVIRONMENT AGENCY AUSTRIA

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MicroDrink project

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SO2: Knowledge transfer, pilot area sampling & analysis

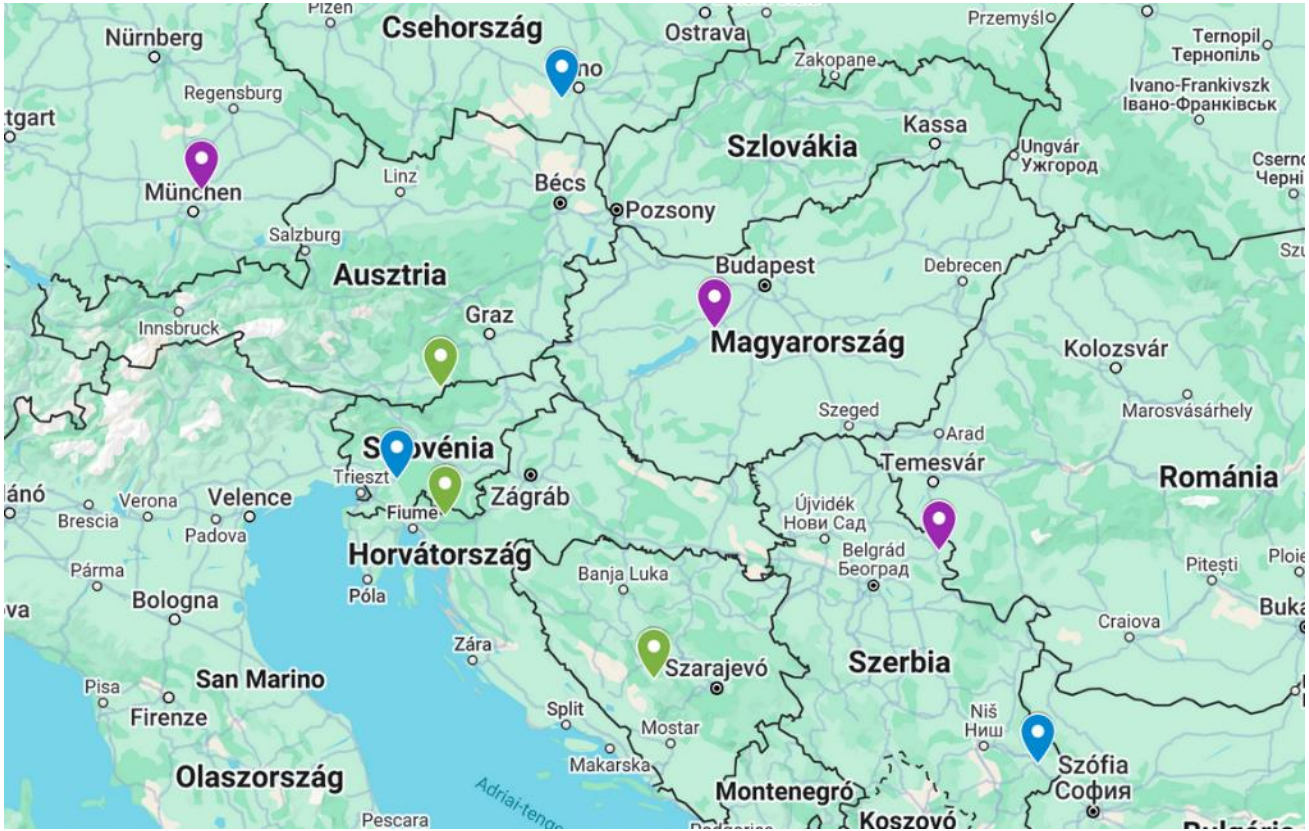
- 9 pilot area
- Cover 3 main water resource in DRB
  - carst
  - intergranular
  - bank filtration / surface

MicroDrink project

Croatia

MicroDrink project

MicroDrink project



Carst

Bleiburg

Gornji Vakuf-Uskoplje

Iševnica

Intergranular

Versec

Neufahrn bei Freising

Szabadbattyán

Bank filtration

Postojna

Pirot

Ivančice

Sampling

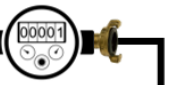
DRINKING WATER SAMPLING

Joints with triclamp

1" rubber hose, 4m

Stainless steel filter holder stand

1" water meter



Flow direction

Stainless-steel housing and cartridges

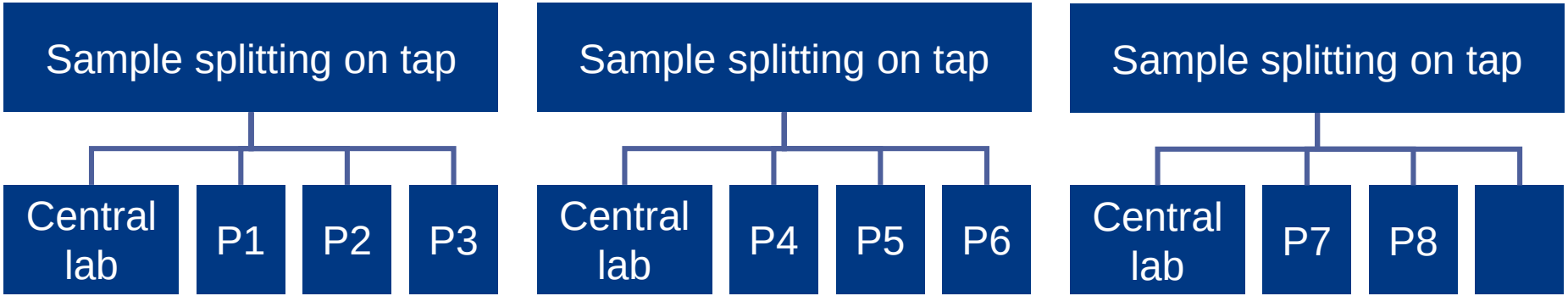
Filtration range: 100-20-20 µm

Sampling tap

Appropriate jont to convert sampling tap to triclamp joint

1" PVC effluent hose, 10 m

Joint sampling training event



- Monitoring in 2025
- PP + central lab samples quarterly on all sites

Joint sampling

https://www.youtube.com/watch?v=atAYwaUDxas

MicroDrink project

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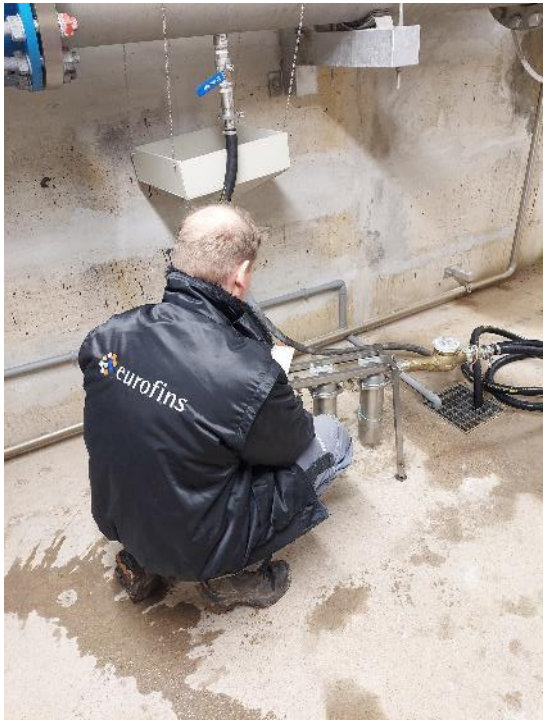
Hungary

Czech Republic



Slovenia

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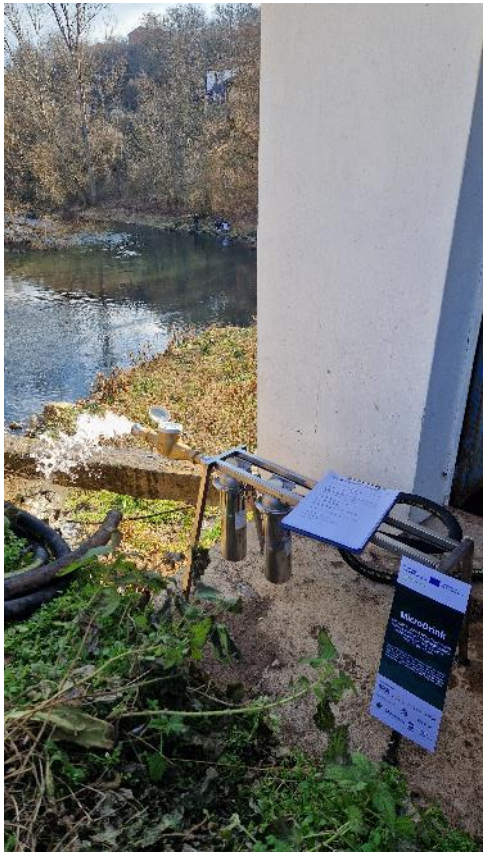
Serbia, Pirot



MicroDrink project

Serbia, Vrsac

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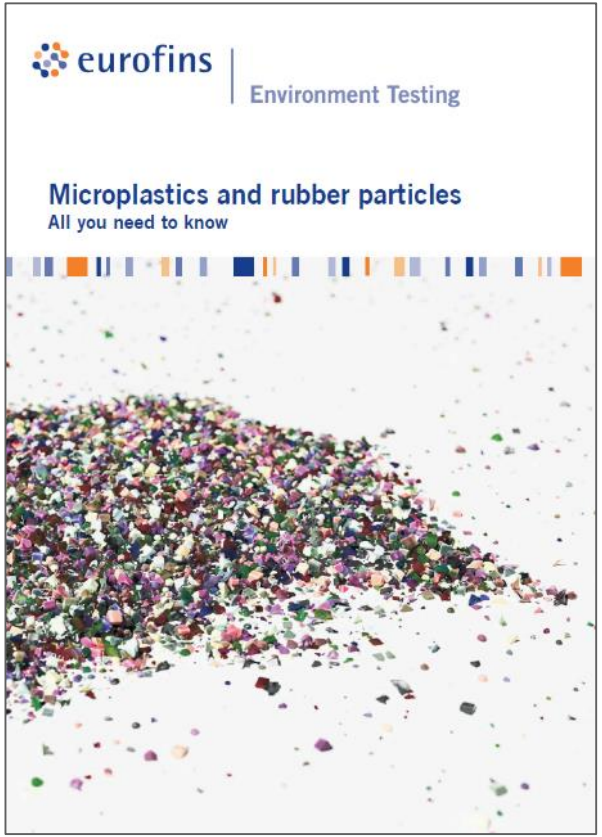
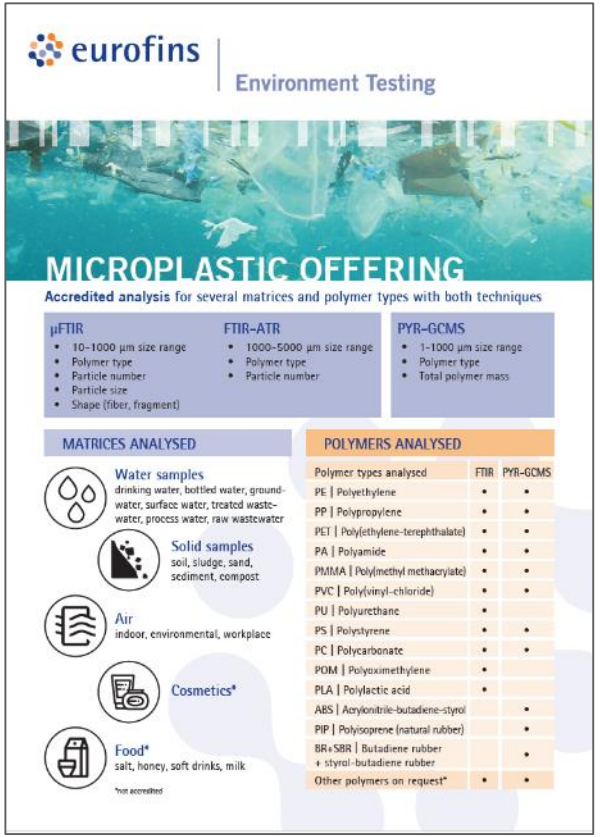
Bosnia and Herzegovina

Broschures


eurofins | Environment Testing
Microplastics and rubber particles
All you need to know


eurofins | Environment Testing
MICROPLASTIC OFFERING
Accredited analysis for several matrices and polymer types with both techniques
µFTIR
10–1000 µm size range
Polymer type
Particle number
Particle size
Shape (fiber, fragment)
FTIR-ATR
1000–5000 µm size range
Polymer type
Particle number
PYR-GCMS
1–1000 µm size range
Polymer type
Total polymer mass
MATRICES ANALYSED
Water samples
drinking water, bottled water, ground-water, surface water, treated waste-water, process water, raw wastewater
Solid samples
soil, sludge, sand, sediment, compost
Air
indoor, environmental, workplace
Cosmetics*
Food*
salt, honey, soft drinks, milk
*not accredited
POLYMERS ANALYSED
Polymer types analysed | FTIR | PYR-GCMS
PE | Polyethylene
PP | Polypropylene
PET | Poly(ethylene-terephthalate)
PA | Polyamide
PMMA | Poly(methyl methacrylate)
PVC | Poly(vinyl-chloride)
PU | Polyurethane
PS | Polystyrene
PC | Polycarbonate
POM | Polyoximethylene
PLA | Polylactic acid
ABS | Acrylonitrile-butadiene-styrol
PIP | Polyisoprene (natural rubber)
BR+SBR | Butadiene rubber + styrol-butadiene rubber
Other polymers on request*

This publication is based upon work from COST Action CA20101 Plastics monitoRIng detectiOn RemedIaTion recoverY – PRIORITY, supported by COST (European Cooperation in Science and Technology). www.cost.eu

Thank you

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