

MONITORING MICROPLASTICS IN WASTEWATERS UTILIZING MICROSCOPIC AND ANALYTICAL PYROLYSIS TECHNIQUES

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1 BACKGROUND

Microplastics (MPs, plastic items < 5mm) have been spotted in various substrates around the world. To throw light on the distribution profiles and for delivering a starting point for risk assessments, inclusive data on MP concentrations and polymer compositions are required. According to the available scarce literature, these microscopic items have been detected in wastewaters since the current and conventional treatment processes cannot effectively remove them. Thus, a quantity of MPs are released into ecosystems and thus **Wastewater Treatment Plant (WWTP)** is one of the main pathways for MPs deposition into the environment.

2 AIM

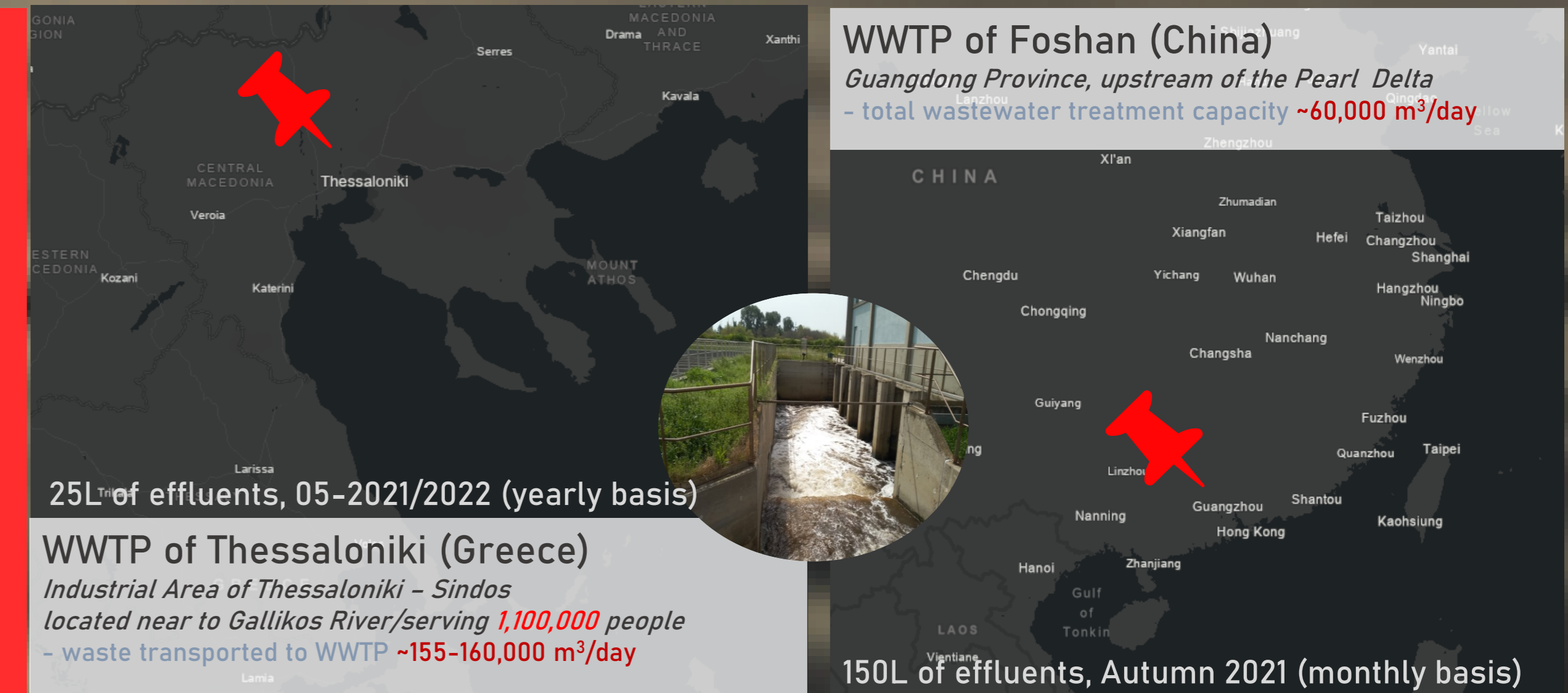
Monitoring of MPs occurrence in the WWTP of Thessaloniki (Greece) & Foshan (China) and examine the occurrence of MPs in response to weather phenomena and seasonal trends.

3 ANALYSIS

1 Stereoscopic Microscope
 ◇ Mapping of filters under a stereoscopic Microscope
 ◇ Categorization of particles according to their size, shape and color

2 Pyrolysis-Gas Chromatography/Mass Spectrometry (Py-GC/MS)
 ◇ Analysis of the GF filters
 ◇ Identification of polymer types through the characteristic degradation products of MPs (mass spectra and NIST11.0 library)
 ◇ Quantification of polymeric particles based on calibration curves constructed from reference polymers

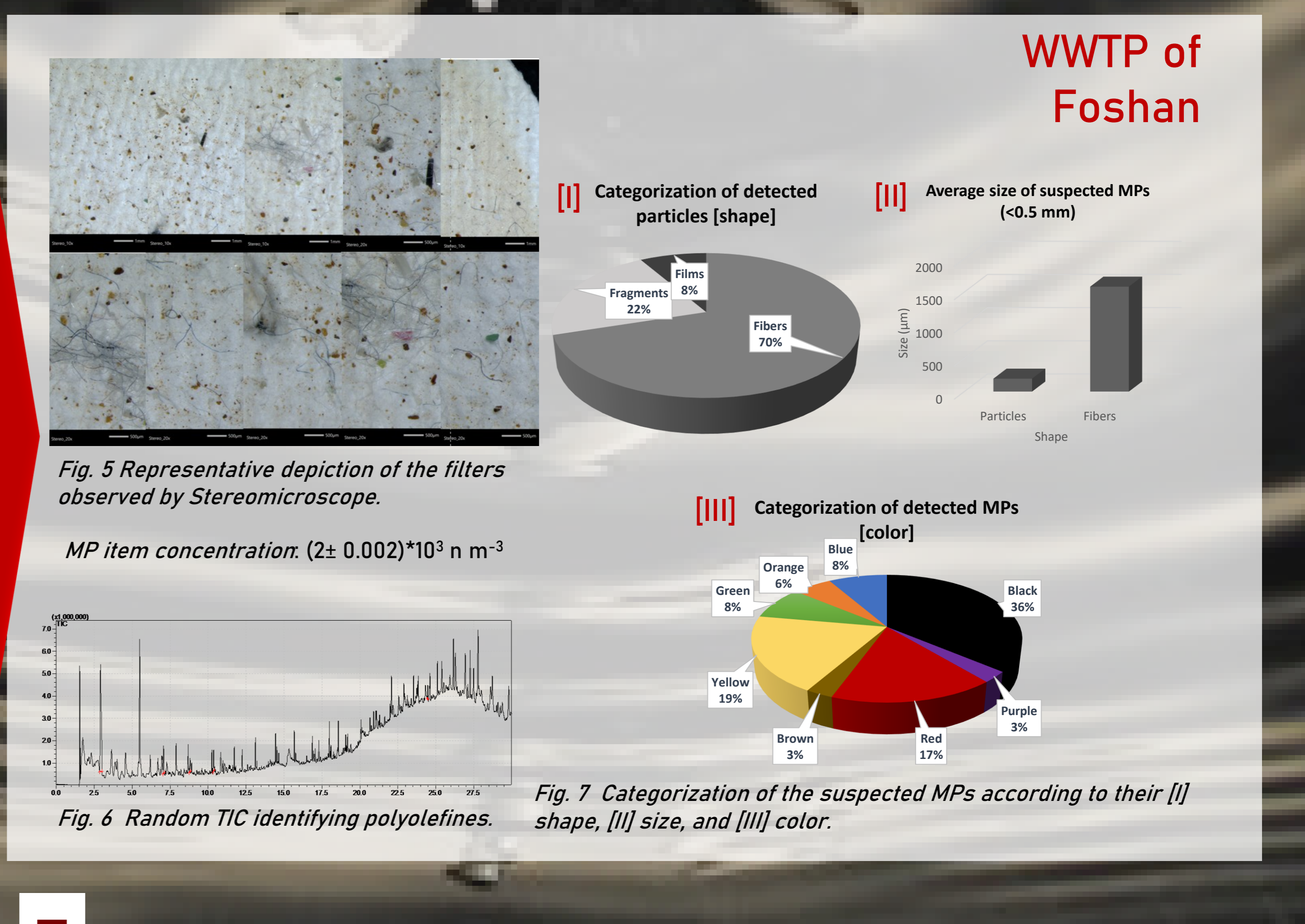
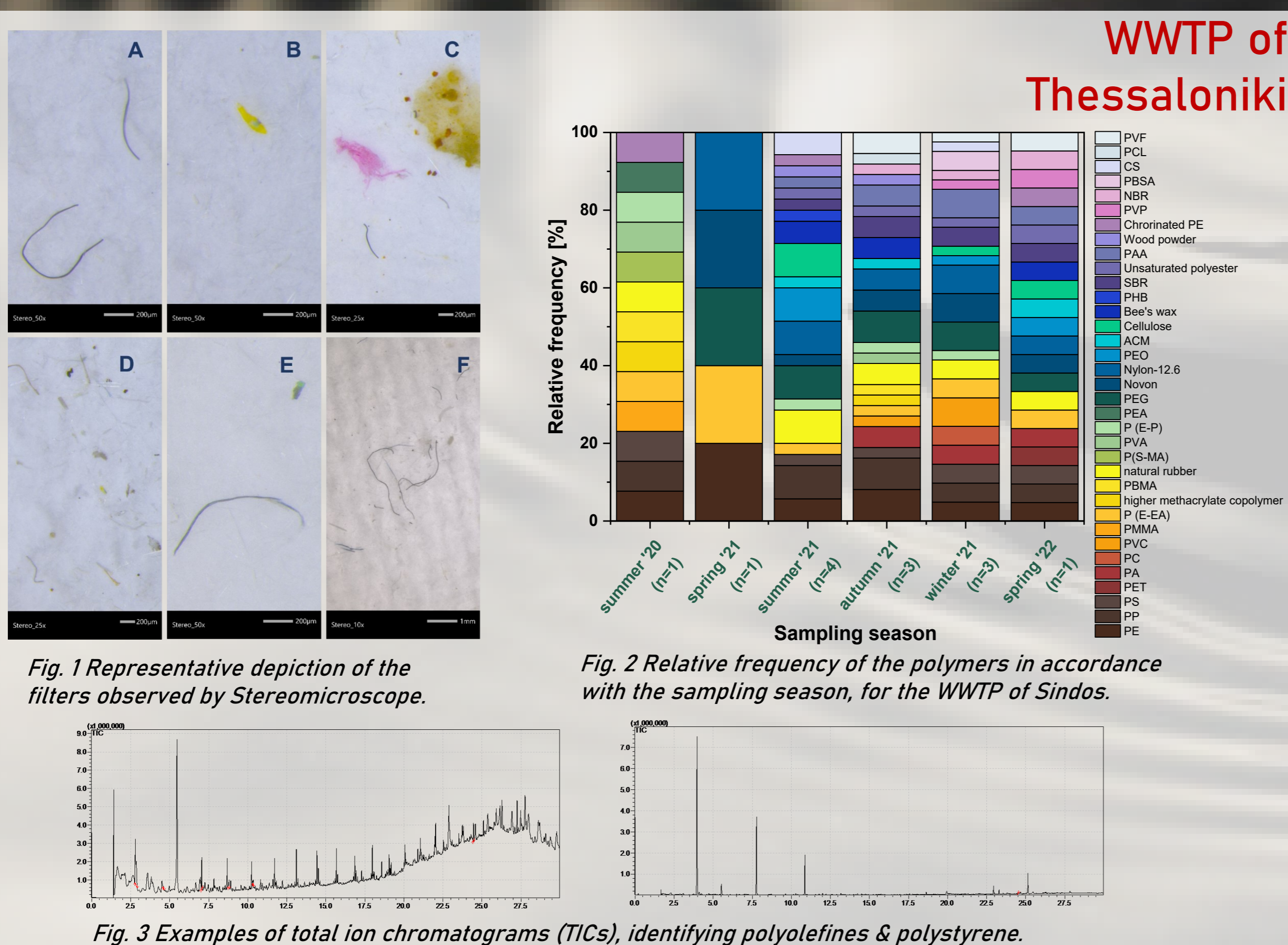
3 STUDY AREA



4 PRE-TREATMENT

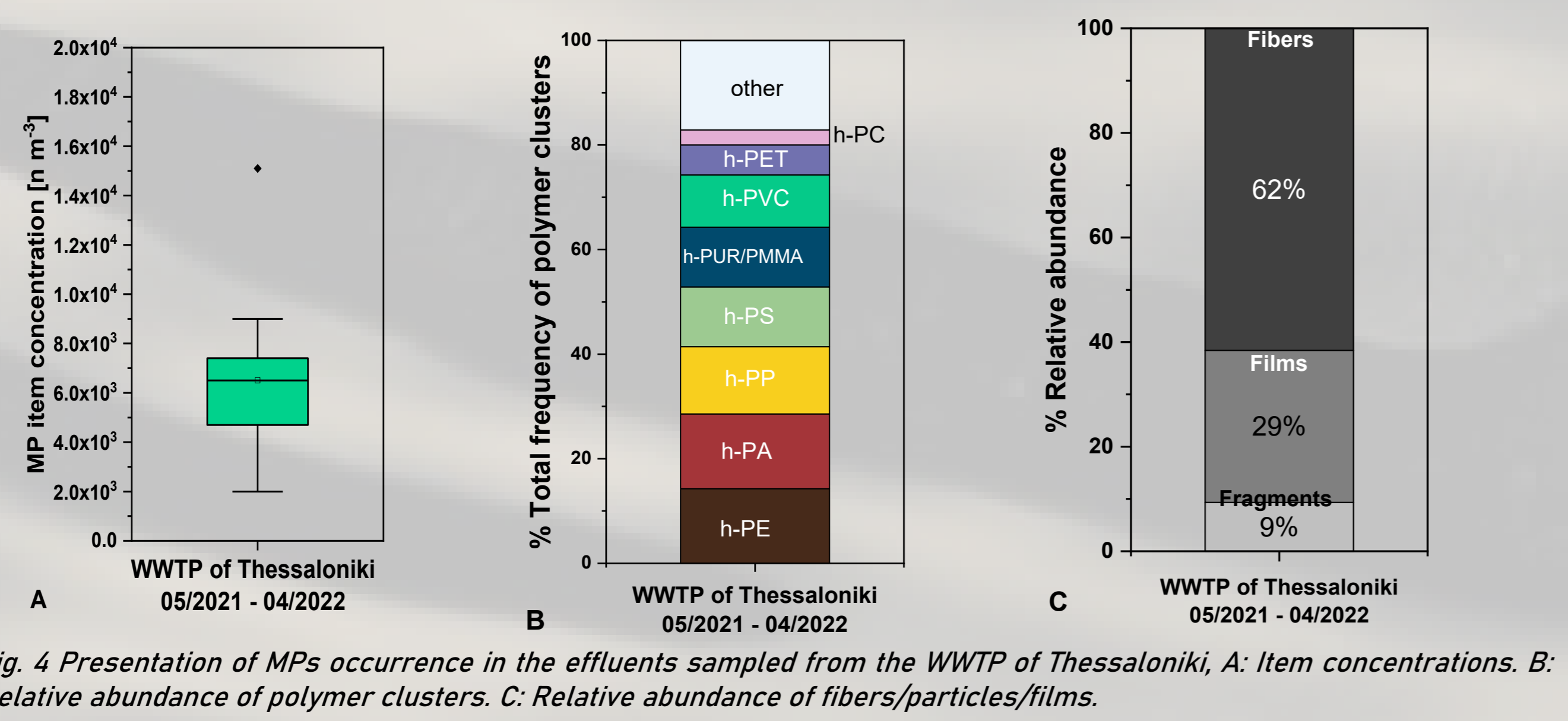
- [I] Collection of the samples from the effluent stream
- [II] Sieving with metal sieves (4, 2, 1, 0.5 and 0.125 mm) to obtain a concentrated sample
- [III] Filtering of the concentrated samples through 1.6 μm pore size fiberglass filters
- [IV] Oxidative digestion of the filters with H₂O₂ for 3 days at RT and mild stirring
- [V] Rinsing of filters with UP H₂O and filtering again
- [VI] Drying of filters in a fume hood and storage (dryer)

6 RESULTS & DISCUSSION



7 CONCLUSIONS

- ✓ Various MPs were detected in the effluent stream of 1.Thessaloniki's/ 2.Foshan WWTPs during the periods 1.May 2021-2022/ 2.October 2021, respectively.
- ✓ Fibers were found to be the dominant shape of MPs for both studied WWTPs.
- ✓ Polyolefines held the first place among the detected polymer types for both WWTPs.
- ✓ A significant number of MPs are released in the environment, and possibly affect to marine ecosystem of *Thermaic Gulf (Greece) & Pearl River Delta (China)*. Thus, the necessity for the assessment of background parameters in upcoming MPs monitoring studies in both countries, Greece and China, is underlined.



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