Microplastics as Vectors of Organic Contaminants on Southern California Beaches: A TD/Py-GC×CG-TOFMS Study

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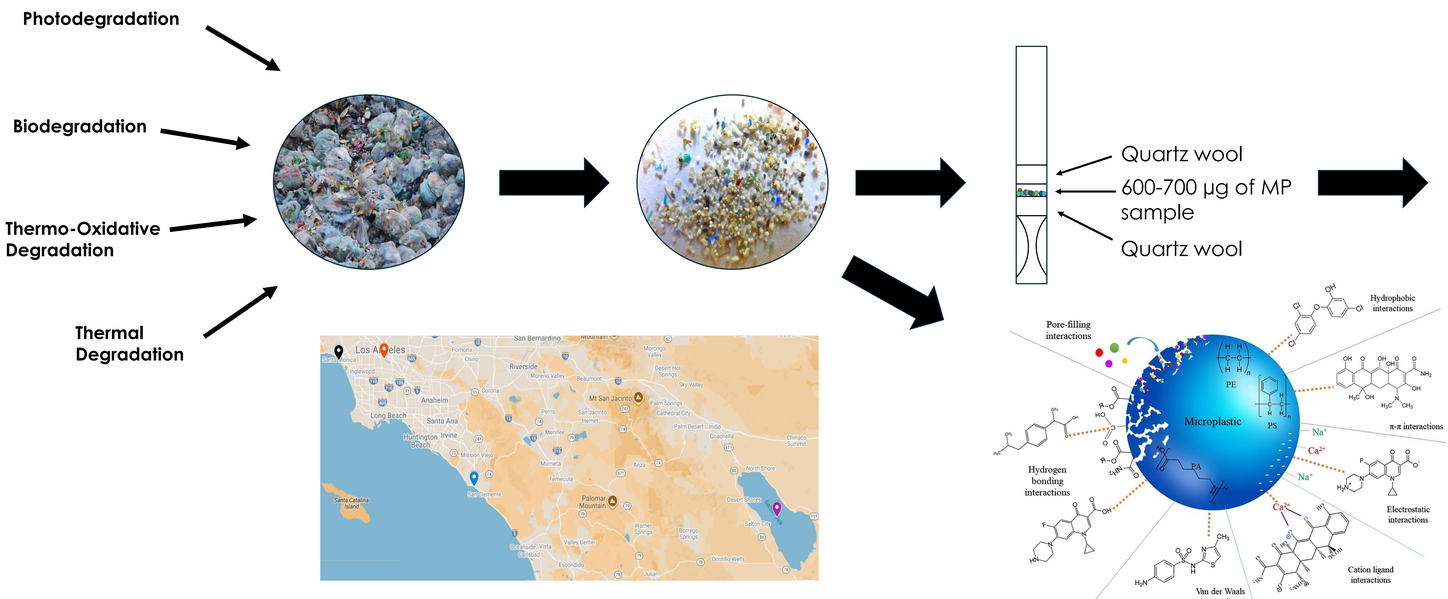
Introduction

It is estimated that global plastic waste emissions amount to 52.1 [48.3-56.3] million metric tonnes (Mt) per year[1]. Plastics are synthetic materials made from various organic polymers and are not biodegradable. Instead, through various degradation pathways (e.g., photodegradation, biodegradation, thermo-oxidative degradation, and thermal degradation)[2] break down into small fragments (<5 mm) known as microplastics (MPs). MPs are pervasive pollutants throughout our local marine environments. They serve as vectors for organic compounds[3]; however, the variability of contaminants adsorbed onto them remains poorly understood. The aim of this study is to qualitatively analyze organic compounds adsorbed onto MPs using TD/Py-GCxGC-TOFMS.



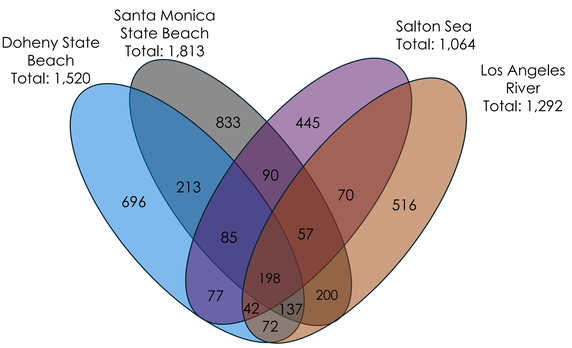
Methods

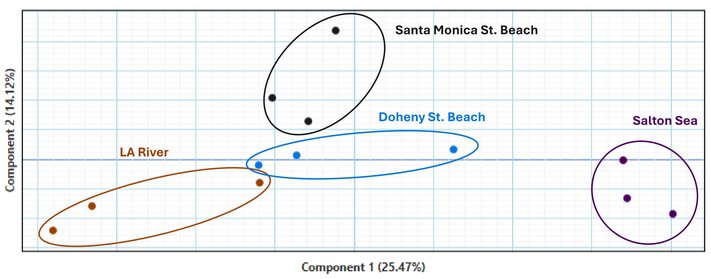
HT-TD/Py conditions	
Initial Temperature	40 °C
Final Temperature	285 °C
Ramp Rate	2.0 °C/sec
Column Flow	1.3 mL/min

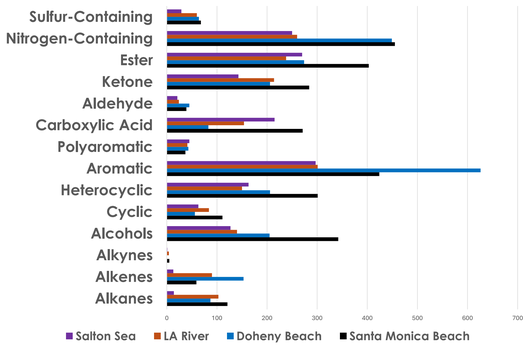
GC×GC conditions	
Initial Temperature	40 °C
Final Temperature	285 °C
Ramp Rate	3 °C/min
Column Flow	1.3 mL/min
Secondary Oven Temp. Offset	10 °C
Modulator Temp. Offset	20 °C

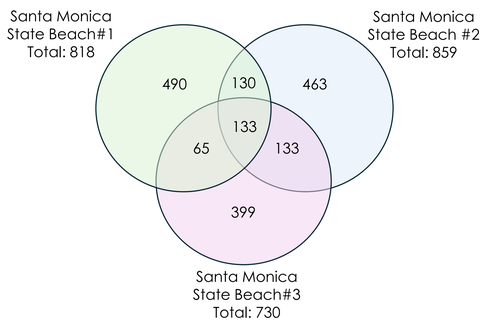
TOF-MS conditions	
Acquisition Delay	200 sec
Acquisition Rate	200 spectra/sec
Mass Range	40-600 amu
Electron Energy	70 eV
Transfer Line Temp.	300 °C
Ion Source Temp.	250 °C

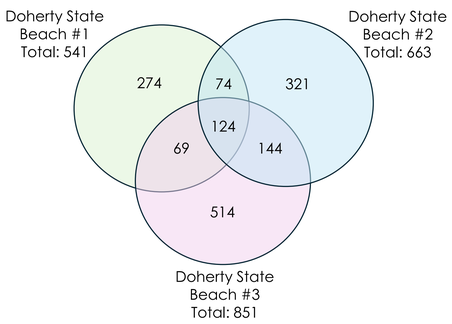
Preliminary Results

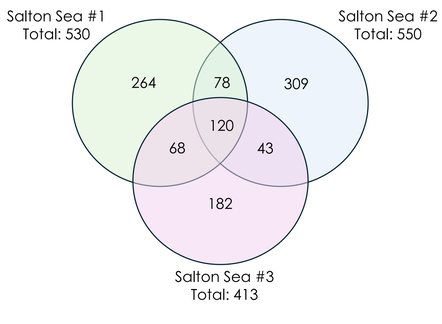


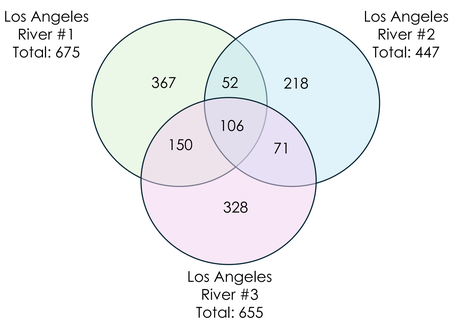












References

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Acknowledgements

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