Investigation into the migration of microplastics through soil

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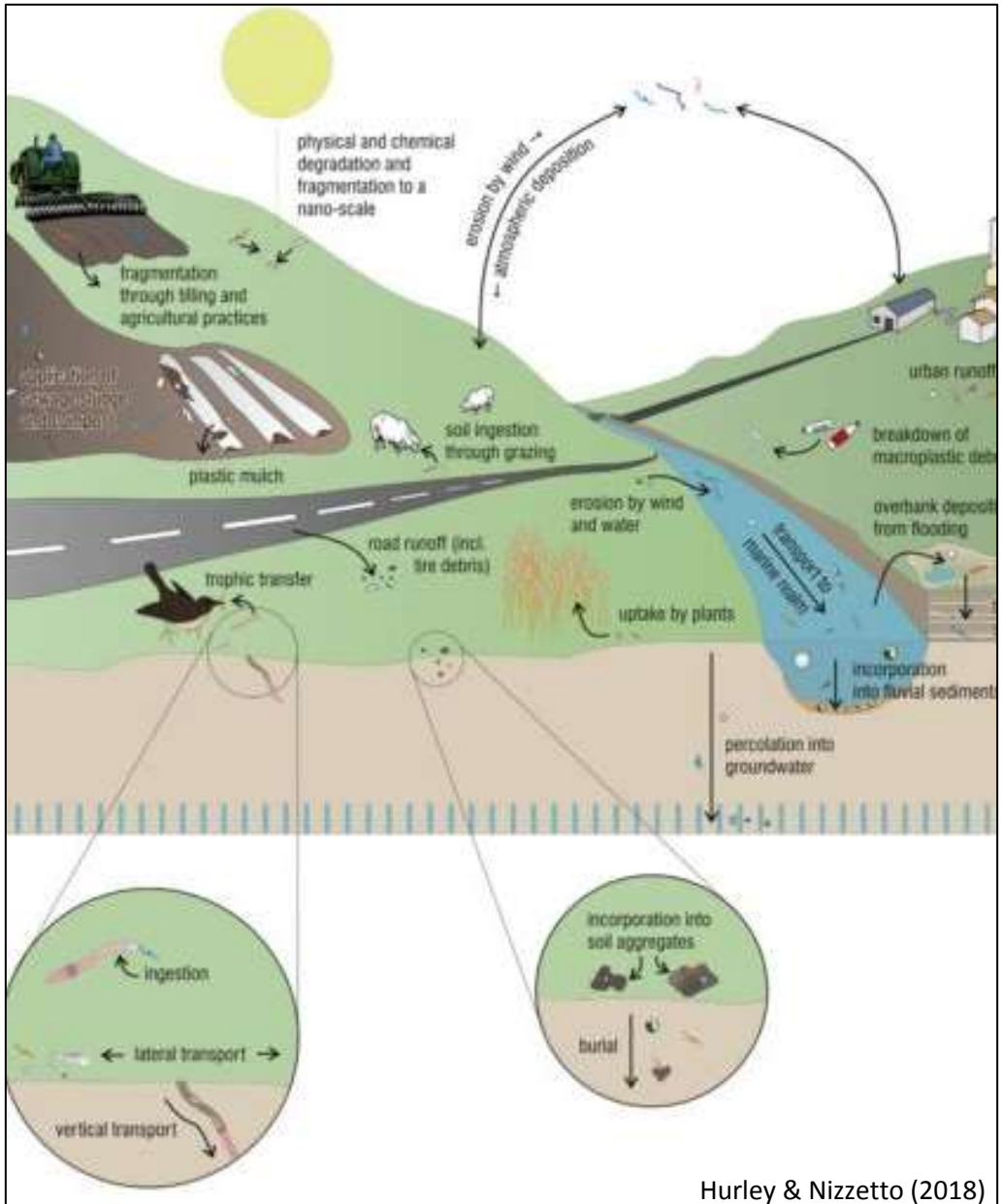
Project Overview

- Funded by the Environmental Protection Agency of Ireland
- Led by Galway-Mayo Institute of Technology, involving University College Dublin and Wageningen University, The Netherlands
- Aims to investigate the sources, pathways and environmental fate of microplastics from land-based sources to rivers

Project Overview



Hurley & Nizzetto (2018)

Terrestrial Sources of Microplastic

Approx. 80% of sewage sludge spread on land in Ireland

Soils as Sinks?

Science of the Total Environment 612 (2018) 422–435

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

Review

Plastics in soil: Analytical methods and possible sources

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HIGHLIGHTS

- Analytical methods and possible input pathways of plastic in soil were discussed.
- Organic matter challenges plastic quantification in soil.
- Soil amendments and irrigation are likely major plastic sources in agricultural soils.
- Flooding, atmospheric input and littering can potentially pollute even remote soil.
- Leaching of small plastics from soil into groundwater cannot be excluded.

GRAPHICAL ABSTRACT

Available online at www.sciencedirect.com

ScienceDirect

Current Opinion in Environmental Science & Health

Fate and occurrence of micro(nano)plastics in soils: Knowledge gaps and possible risks

Rachel R. Hurley and Luca Nizzetto

Abstract

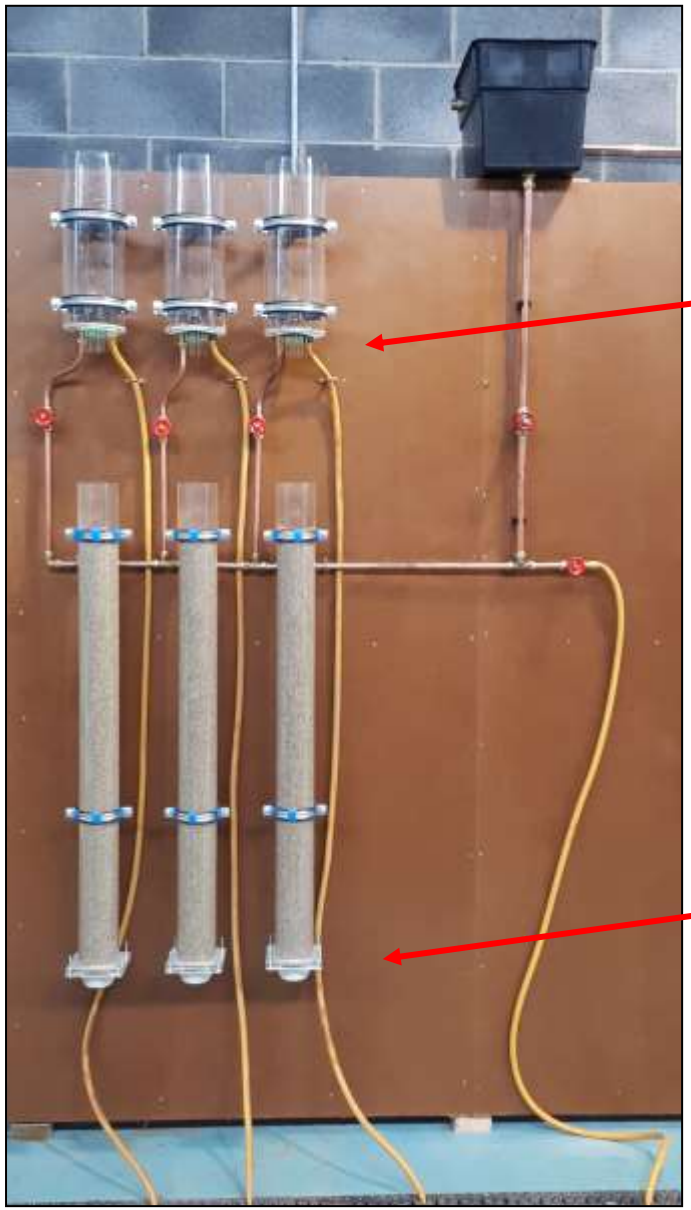
The majority of micro(nano)plastic research has been concentrated on the marine environment. Whilst the ocean represents an ultimate sink for contamination, this focus overlooked key processes and pathways of micro(nano)plastics in the terrestrial environment that are of critical importance for their global environmental budget and exposure of humans and biota. Lack of robust analytical methods for the isolation of these materials from complex, organic-rich soil matrices represent a major hindrance. Regardless, soils in agricultural and urban areas are expected to represent major environmental reservoirs of micro(nano)plastics, possibly compre-

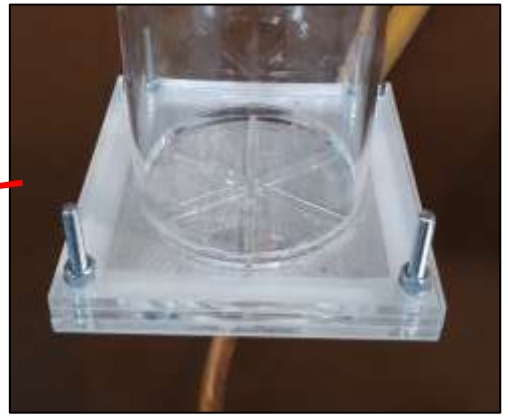
plastics and draws upon wider material to infer potential sources and fate of small plastic particles within soils. We focus primarily on research published in the last two years with the purpose of identifying recent advances relevant to the soil micro(nano)plastics research domain.

Existing research

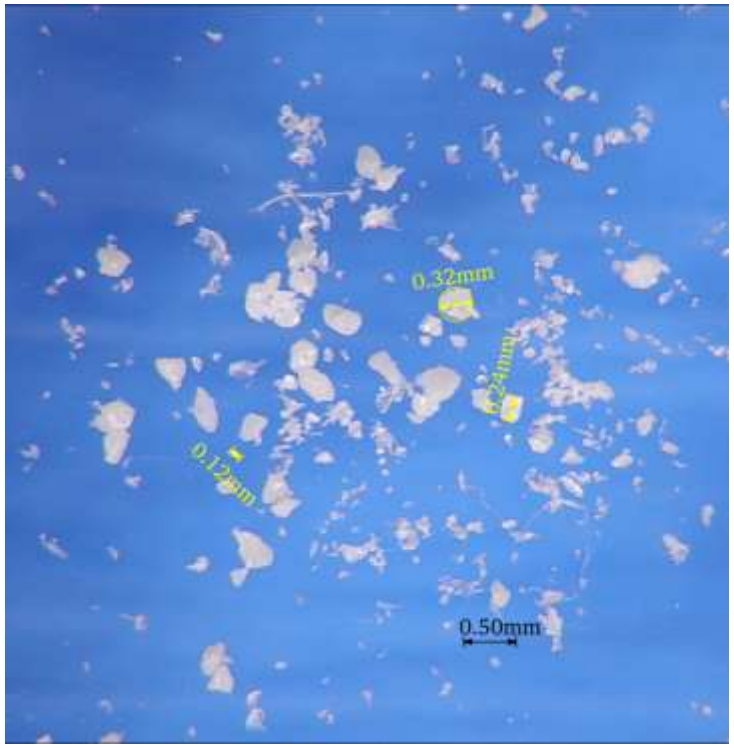
Early studies identified synthetic fibres in soils treated with sewage sludge [11,12] and the potential for soil microplastic contamination was first reviewed by Rillig [6]. Recently, a large portion of soil microplastic research

Soil Column Experiments



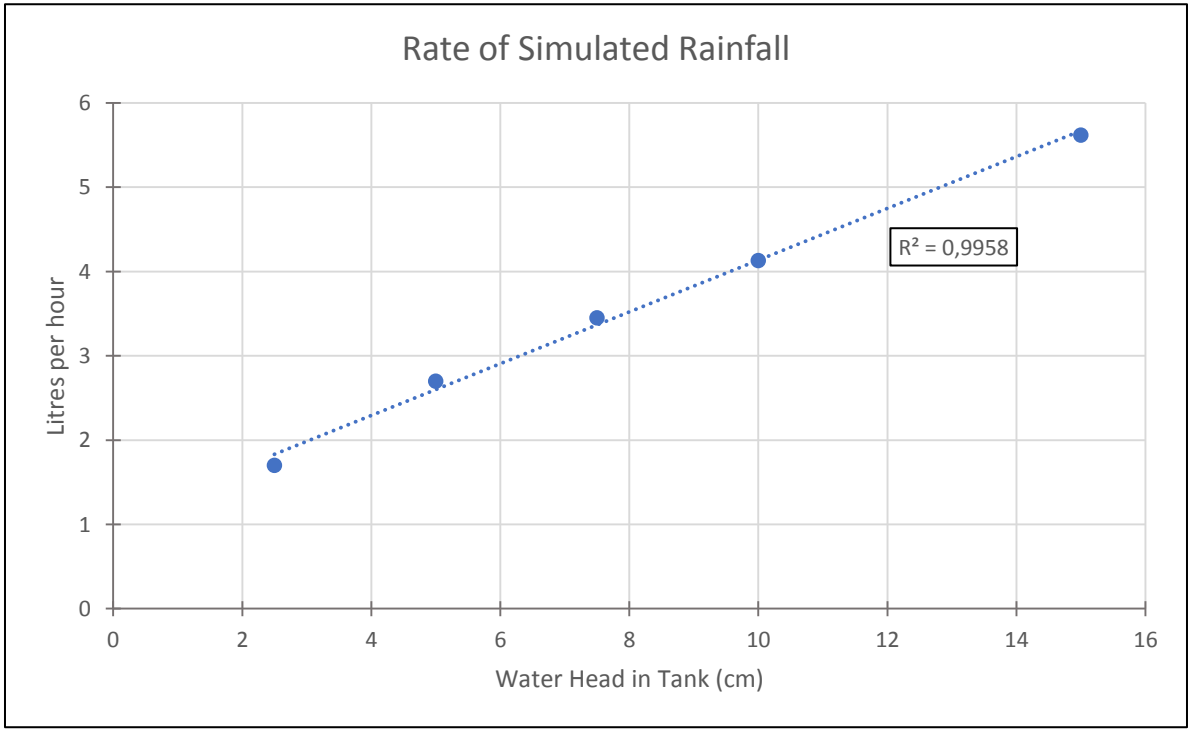


Experimental Material

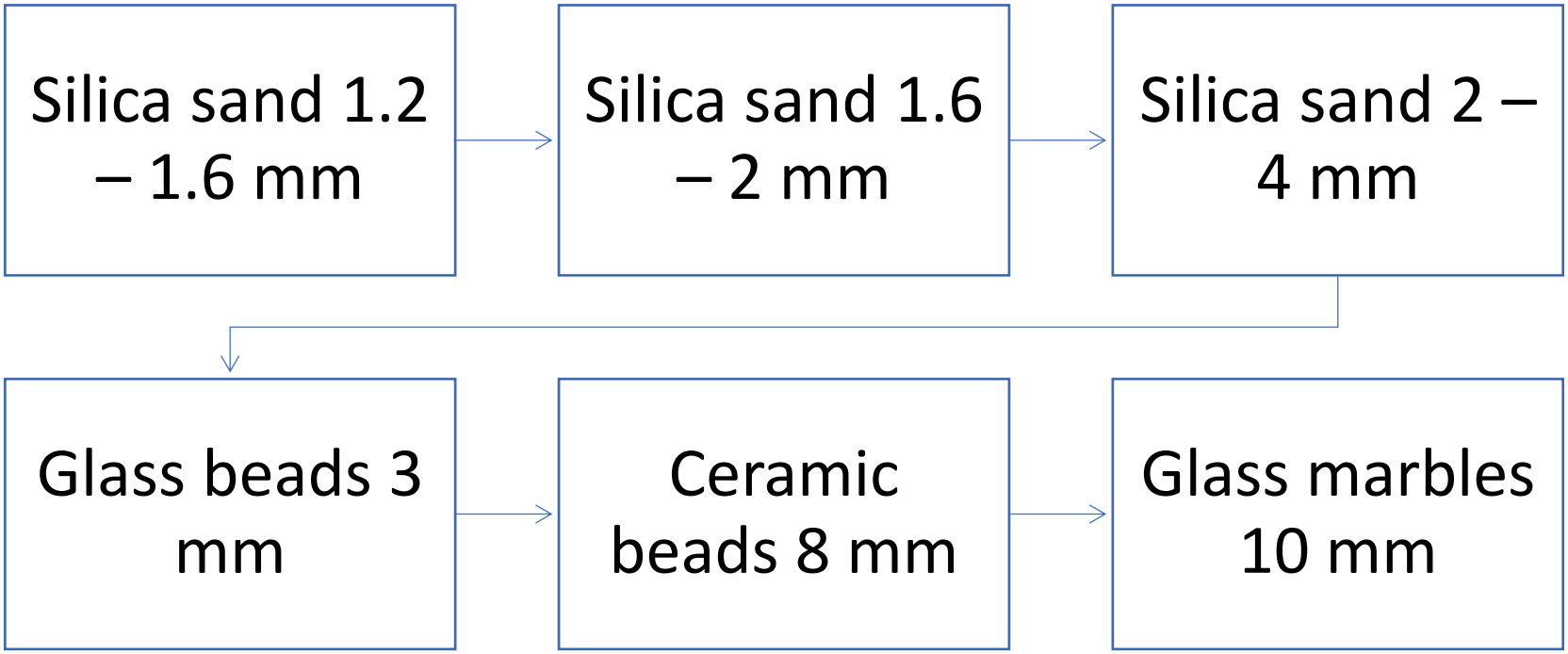


Rainfall Rate Simulation

- Rainfall simulator tested for a range of intensities



Experimental Method



Preliminary Results

Adherence observed of MP to surface of all porous media

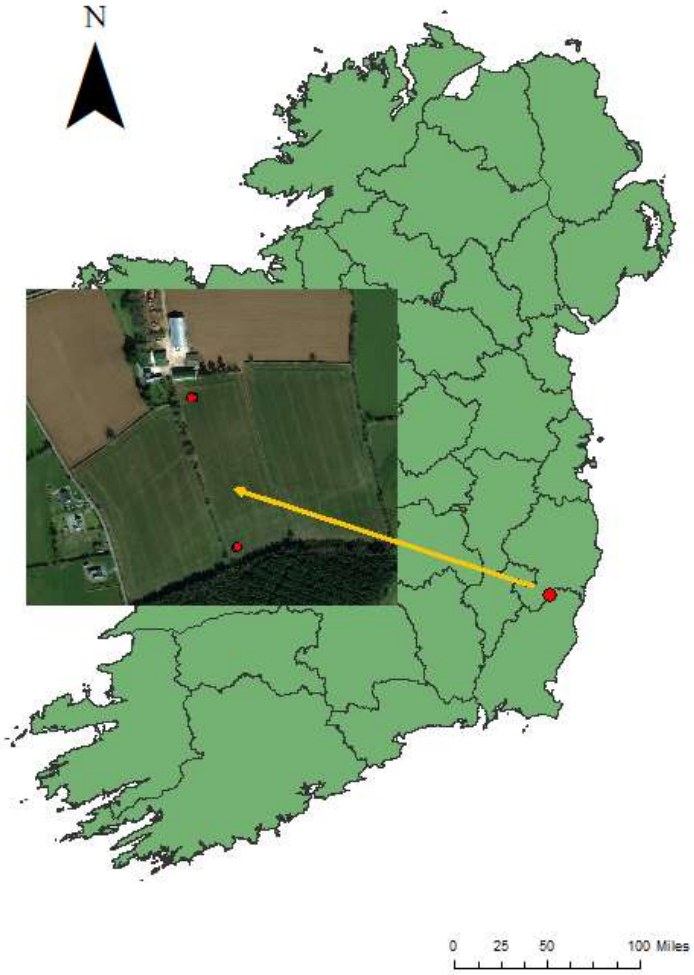
Addition of Surfactant

Without surfactant

With surfactant

Experiment picture

Field Core Extraction



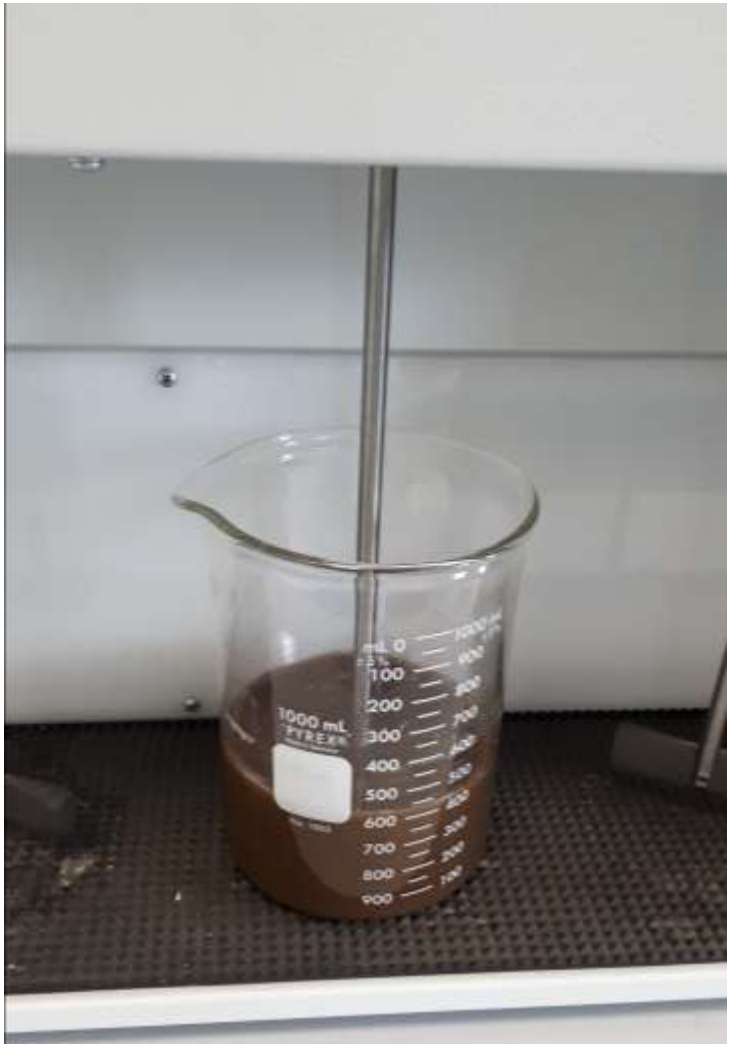
Field Core Extraction

Percussion drilling

Core extraction

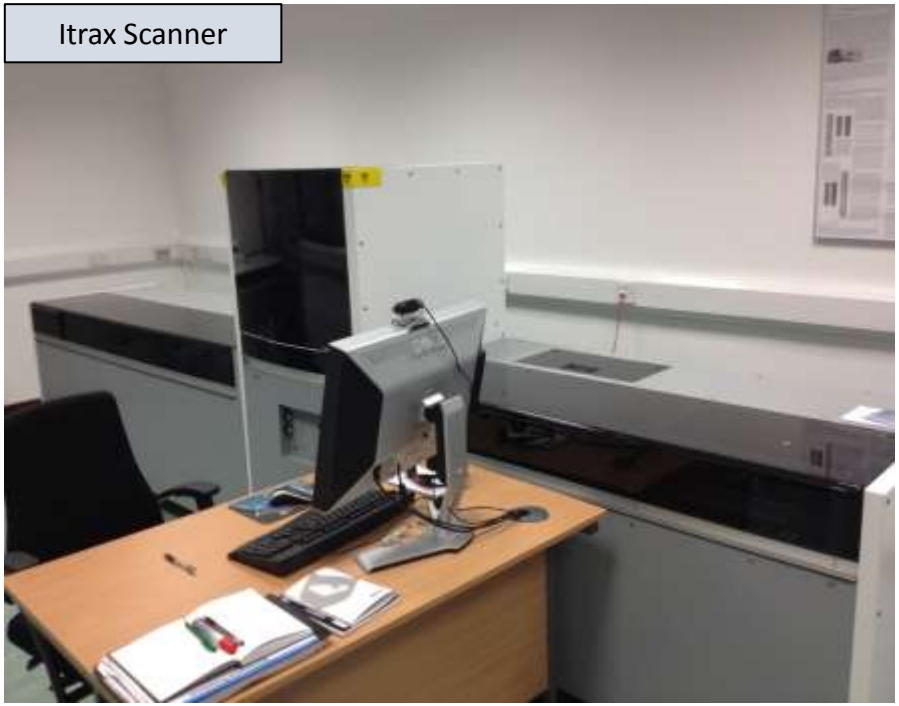
Slicing Cores

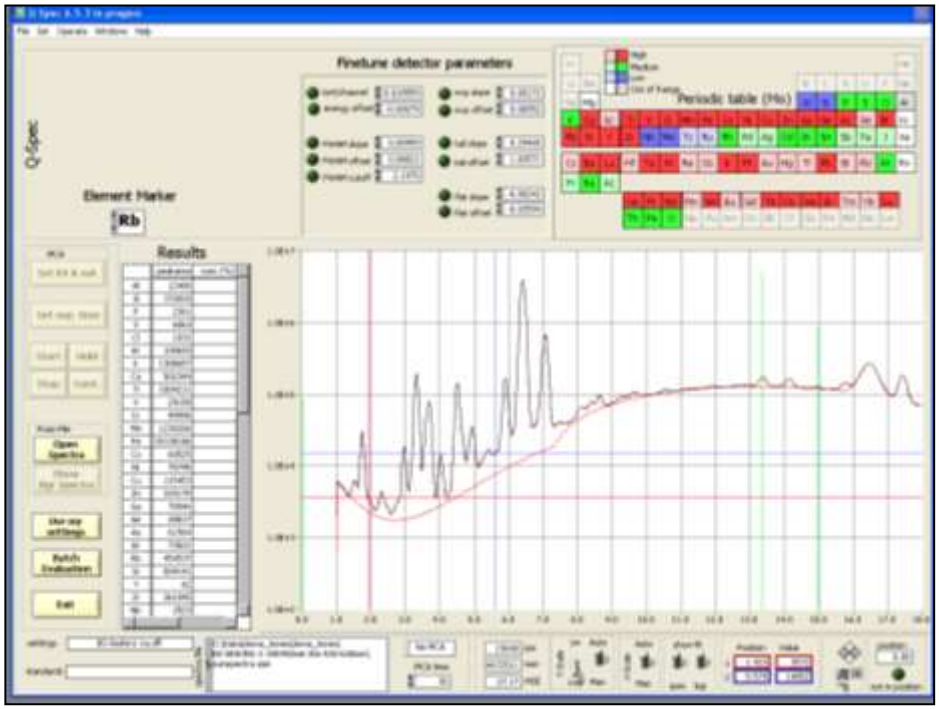
Sample Analysis

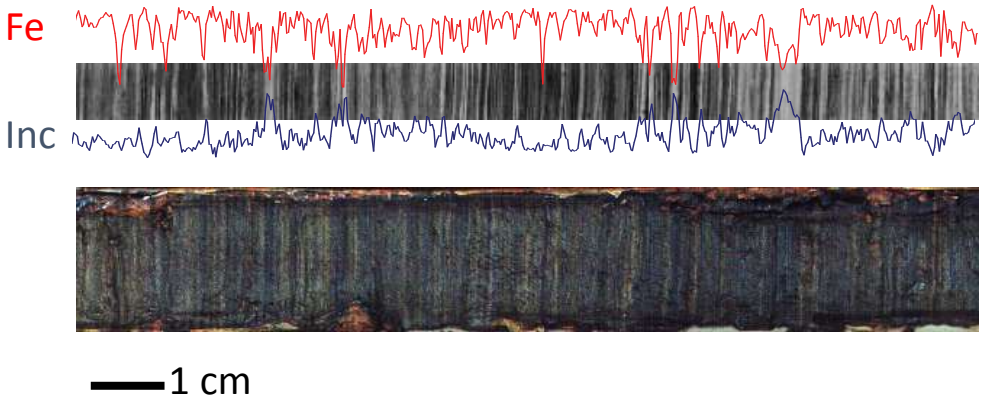


Additional Analysis

Itrax Scanner







Projected Outcomes

- To further understand processes governing MP movement in soil
- Further understand concentrations of MP in agricultural land in Ireland
- Contribute to growing body of research in this area
- Inform policy makers on risk of terrestrial based MP to groundwater

Thank you for listening!

To follow progress on this project, check out
https://freshwatermicroplastics.com/