
Distribution and characterization of microplastics in the Scheldt estuary (Belgium)

Mathilde Falcou-Prefol*^{†1,2}, Tom Maris¹, Tomma Feltgen^{1,3,4}, Lennert Bertels^{1,5}, Maaïke Vercauteren², Jana Asselman², Colin Janssen², Ronny Blust¹, and Raewyn M. Town¹

¹University of Antwerp (UA) – Antwerp, Belgium

²Ghent University (UG) – Ostend, Belgium

³Nantes University (Nantes Univ) – Nantes Université – Nantes, France

⁴University of Freiburg [Freiburg] (UF) – Freiburg, Germany

⁵AP Hogeschool Antwerp (AP) – Antwerp, Belgium

Abstract

Since the 1950's, plastic production and use have exponentially increased. A large proportion of plastic materials is discarded into predominantly terrestrial and freshwater environments, and eventually degraded into smaller particles e.g. microplastics (size from 1 to 5000 μm), and ultimately reaches marine ecosystems where its ubiquity and persistence pose a potential threat for the ecosystem. Rivers and estuaries can thus serve as transport pathways and/or accumulation areas for plastic particles. A pilot campaign was led to study the distribution of microplastics along the Scheldt estuary in Belgium. This transition environment is facing multiple types of pollution inputs due to the very high and diverse anthropogenic pressures in the region. The sampling strategy involved water samples collected at three different depths at 5 locations at winter and spring, and sediment collection at different positions on the mudflat at 23 locations. State-of-the-art methods were employed, including enzymatic and alkaline digestion procedures to extract microplastics from the matrices, and μFTIR spectroscopy to characterise the microplastics size and polymer type. Microplastics were found at every location. The concentration ranges from 67 to 688 microplastics/litre in the water column. In the sediment matrix, 10 to 1031 microplastics/kg were detected. In both matrices, the lowest concentrations were observed in a sub-tributary from the Scheldt river, and the highest concentrations at one location in a tributary from the Scheldt river. The aims of this research are to assess the concentration, size distribution, and chemical characterisation of the microplastics in the Scheldt and its tributaries along a gradient from freshwater to brackish water in abiotic matrices taking in account the relationship between the distribution of microplastics and the potential sources of pollution. Furthermore, we aim to get insight into the vertical distribution of microplastics in the water column and to study their accumulation on the mudflat.

Keywords: distribution, quantification, characterization, estuary, water column, mudflat, salinity gradient, μFTIR

*Speaker

[†]Corresponding author: Mathilde.Falcou-Prefol@uantwerpen.be