3.1.V-15 Whereabouts of Microplastics and Their Flux Towards the Marine Environment

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Plastics are globally dispersed and reported at increasing concentrations in marine ecosystems. Due to their persistence in aquatic environments the global plastic litter problem will last for decennia. Hence, plastic detection methods and plastic remediation measures are urgently needed and may become obligatory in the near future. A first prerequisite to take effective plastic remediation measures is to know where and when action should be taken. However, to date there is a critical knowledge gap about the whereabouts of plastics and their flux towards the marine environment. Part of the PLUXIN project aims to close this knowledge gap by using numerical modelling to gain insight into the fate and transport of plastic debris across environmental compartments (www.pluxin.be). The model is calibrated and validated using field sampling and experimental data. More than 130 microplastic (100 ?m – 5 mm) samples have been collected at 20 sampling locations in port of Nieuwpoort (River Yser), port of Ostend, port of Antwerp, North Sea Ports and the river Scheldt in Belgium. Information on microplastic concentrations in the field was combined with settling experiments to study the behavior of microplastics in the water column by determining their vertical flux as a function of polymer type, shape, size, degree of biofouling, and weathering. A depth-averaged, two-dimensional-horizontal coupled Eulerian particle transport model for the Scheldt Estuary and Belgian Coast was set up using open-source TELEMAC software. Based on the preliminary results accumulation hotspots were pinpointed and the total flux from rivers and harbors towards the marine environment can be quantified.

3.1.V-16 Microplastics and the Water Industry: Studying Source, Transfer and Fate Within the Microplastic Cycle

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Biosolids are recovered as a by-product from sewage treatment works and, in the UK, are typically used as a fertilizer and means of returning organic matter to agricultural land. Application of biosolids is potentially a major source of microplastics in soils as the biosolids can retain over 90% of the microplastics present in the wastewater entering a sewage works. This study will assess the presence of microplastics in sewage sludge produced by sewage treatment plants in the south west of England. Microplastics will be extracted from the sludge by density separation using saturated $ZnCl_2$ followed by peroxide digestion of organic matter and filtration. Microplastics will be retained on the filter paper. The size, shape and colour of the microplastics will be determined using stereomicroscope observations; Fourier Transform Infrared Spectroscopy will be used to identify the polymer types present. The same approach will be used for soil samples obtained from agricultural soils where biosolids have been applied. Soil from agricultural land that has not had biosolid applications, but which has similar land use history and similar chemical, physical and landscape scale properties will be used as controls for identifying non-sludge derived microplastics. Site selection will be based on data gathered from farmers and data records held by the sewage treatment plant. This project will also investigate the potential risks of microplastics to soil inhabiting invertebrates, alteration of soil properties due to the accumulation of microplastics and whether microplastics are likely to be retained in the soil or transferred into aquatic systems via runoff from agricultural land contributing to diffuse pollution downstream.

3.10 Microplastics in the environment: Behaviour, transport, fate, risks, and alternatives to conventional plastics (Poster)

3.10.P-We061 The Occurrence of Waterborne Pathogens Colonizing Different MPs Polymers

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Microplastics (< 5 mm, henceforth designated as MPs) have been shown to serve as a new habitat for microbial community, by forming the so-called “plastisphere”. The colonization of MP surface by biofilm-forming bacteria is a coin of double face since this biofilm can contain human and animal pathogens (e.g., the genus *Vibrio*) and hydrocarbon-degrading bacteria, which can potentially influence the fragmentation and degradation of plastic waste. It has been shown that this community differs from the community in the surrounding waters and plastic polymer types. Thus, this study aims to disclose the microbial communities forming the plastisphere in different types of microplastics. To accomplish this, the microbial community was isolated from two impacted aquatic systems and incubated with 1-2 mm MP particles of 5 different plastic polymers (polypropylene (PP), polystyrene (PS), expanded polystyrene (EPS), polyethylene terephthalate (PET) and polyethylene (PE)). After 1, 3, and 7 days of incubation at room temperature with a low-speed shake (100 rpm), MP samples were collected for: (a) DNA extraction and quantification; (b) extracellular polymeric substances detection and quantification; (c)16S rRNA amplification (PCR and metabarcoding with 16SV1V3 and 16SV3V5 primers). After 30 days of incubation, MPs particles were collected for analysis by FTIR spectrum. The results showed the existence of DNA and extracellular polymeric substances associated with all five MPs particles assessed. The highest amount of DNA quantified was found in the PET particles while the PP category showed higher polymeric substances formation. Concerning the microbial community composition, a diverse community composed of *Vibrio* sp., *Pseudomonas* sp., *Catenococcus,* and *Shigella* sp., was found, with *Vibrio* sp. showing higher occurrence. Some pathogenic species showed high similarity with the amplified sequence, including *V. campbelli*, *V. paraemolyticus*, *V. fortis*, *V. ichthyoenteri*, *V. pelagius,* and *S. dysenteriae*. Higher diversity was found for PS particles. The FTIR spectrums showed some differences