3.1.V-09 Micro- and Macroplastic Concentrations in the WATER Column and Sediment of Belgian Sea Ports and Estuaries

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Society is surrounded by a wide range of plastic objects, ranging from everyday items to complex products and machines. During production, use and waste management, there is a potential emission of plastics of all sizes (micro – macro) to various environmental compartments. This includes emissions to the environmental compartments such as air, soil, freshwater and the aquatic environments. Plastic particles and filaments are known to settle in riverine sediments, and/or to flow downstream and eventually reach the marine environment. Until now, there is however little information about the three-dimensional distribution of plastic in water bodies, including the influence of abiotic conditions in plastic debris fate. Within the PLUXIN project, one of the objectives is to map and quantify plastic waste accumulation zones and the plastic flux from Flemish estuaries and ports to the southern North Sea. More than 130 microplastic (100 ?m – 5 mm) and 260 macroplastic samples have been collected in the water column and sediment at 20 sampling locations in the port of Nieuwpoort (Yser estuary), port of Ostend, port of Antwerp, North Sea Port and the Scheldt estuary in Belgium. The sampling strategy included three types of campaigns to account for spatial and temporal variation in the concentrations of plastics in different environmental compartments. We performed: (1) seasonal multi-day campaigns; (2) 13h tidal cycle measurements; and (3) bimonthly spot sampling campaigns. We report on in situ observations of micro- and macroplastic, including their horizontal and vertical distribution in the water column and their presence in the sediment at predefined locations. In addition to location-specific concentrations, the polymer types and size-frequency distributions of the simultaneously sampled micro- and macroplastics are determined.

3.1.V-10 Microplastic Contamination in Flanders: Identification of Sources, Pathways and Mitigation Strategies

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Plastic industry is a booming business but unfortunately, part of the produced plastics end up in the environment. Once in the environment, the plastic will fragment into small particles, called microplastics (MP, smaller than 5 mm). Despite large (inter)national research efforts, many questions remain unanswered, especially at a local or regional scale. Therefore, the aim of the current study was to explore the MP pollution in the freshwater environment in Flanders. This research processed and analysed 210 samples collected from eight different matrices distributed in the geographic region Flanders (Belgium). Plastics were identified using Fourier-transform infrared spectroscopy. It was evident that MP are omnipresent in the freshwater ecosystems of Flanders. One litre of surface water contained 0.48 MP particles (ranging between 0 and 4.8 MP per litre). The sediment of the waterways contained on average 2,990 MP particles per kg of dry weight sediment (ranging between 610 and 9,558 MP per kg). The risk of adverse effects of MP pollution for the Flemish waterways are low to negligible. The current research quantified the MP present in domestic waste water as one of the sources of MP pollution. Per litre of domestic waste water, 0.96 to 39.8 microplastic particles were found. In 83% of the households, the domestic waste water is being transported to an active waste water treatment plant (WWTP), which are able to remove 97.5% of the MP before discharged in the waterway. Another source of MP contamination in the environment are the microscopic rubber tire wear particles that are formed due to the friction between the tires and the road. Based on the run-off samples, an estimated emission of 10.8 mg tire wear particles per driven km was calculated. The emissions of both above mentioned sources were extrapolated to whole Flanders region area. From the yearly MP pollution in the domestic waste water, 623 kg of MP particles will end up in the aquatic environment. The highest losses originate from the households that are not connected to a WWTP. The yearly net emission of tire wear particles in Flanders is estimated to be 245,926 kg, a remarkably higher emission compared to the estimated MP emission from domestic waste water. In conclusion, this research was able to demonstrate that MP are ubiquitous in the Flemish environment, but this data offers some clear perspectives on mitigation measures to reduce MP emission to the freshwater ecosystem.

3.1.V-11 Microplastic Distribution in Seagrass Sediments From a Tropical Atoll, Belize

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Microplastics (MPs) are widespread, but the key factors affecting their fate and distribution remain to be fully elucidated. One of the factors that is believed to significantly influence microplastic transport and sequestration is the presence of aquatic plants, including seagrasses, which reduce the velocity of water flows leading to sediment deposition. For this study, we collected sediment samples from seagrass meadows on the Turneffe Atoll, Belize, with replicate samples taken from four sites representing a range of anthropogenic and hydrodynamic influences. Each sample was collected within a quadrat, in which % seagrass cover was estimated using drone imagery. It was hypothesised that: a) microplastic concentrations would vary between sites due to broadly different anthropogenic influences and hydrodynamics (affecting site energetics), with high energy sites containing fewer MPs due to less deposition of particles overall, b) increased seagrass cover would lead to higher concentrations of MPs in the underlying sediments, and c) smaller-grained sediments (and thus lower energy environments) would be associated with higher local concentrations of MPs. Samples were processed using an oil separation method to separate MPs from inorganic particles, followed by H_2O_2 digestion to remove organic material. Samples were analysed using 25 µm resolution µFTIR and spectral maps processed using siMPle software. Sediment grain size was measured for each sample. Contrary to hypothesised, microplastic