

Impact of microplastics on settling behavior of sediments (and vice versa)

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Introduction: The awareness that microplastics are becoming more of a problem in our rivers and seas is increasing [1]. The difference with 'traditional' pollutants is that the plastics are solid particles. These particles can settle or float, erode and be transported in water bodies [2]. To be able to make a mass balance showing where micro plastics are emitted and where they settle and accumulate, it is necessary to understand their behavior in water bodies in relation to suspended sediments and the sediment bed. Since the density of these particles is so close to the density of (sea) water, changes in water density due to the suspended sediment concentration, water temperature or salinity impacts their settling behavior. In this study, we focus on the settling behavior of microplastics in relation to the settling behavior of suspended sediments. Are micro plastics trapped when suspended sediments settle, do micro plastics hinder settling of suspended sediments and how do changes in salinity impact the settling behavior of both suspended sediment and micro plastics, by influencing either the density difference between the particles and water or the attraction or repulsion between the particles.

Methods: To test the impact of microplastics on suspended sediment settling, we used UV sensitive spheric microplastics of 300 μm in diameter. The experiments were carried out in settling columns and time lap pictures were taken with both visible light (capturing the suspended sediment concentration in the column) and UV light (to highlight the micro plastics).

Results: The experiments are ongoing and will be finished in January 2017.



Fig. 1: Settling column, sediment, normal light.



Fig. 2: Settling column, microplastics, UV light.

Discussion: Our hypothesis is that settling of microplastics is influenced by the settling of suspended sediments (due to trapping). On the other hand, the microplastics will probably have no (or a limited) impact on the settling of suspended sediments due to their relative low concentration and small surface charge (limited repulsion or attraction of sediment particles). By quantifying this correlation, we will be able to better predict if microplastics discharged in the EU rivers will accumulate in the sediment bed or be discharged to the sea.

References:

- [1] IVM (2013), Microplastic survey of the Dutch environment, report.
- [2] Dafne Eerkes-Medrano et al., Microplastics in freshwater systems, Water Research (2015) p 63-82.