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Field studies for detecting microplastic in environmental compartments and a novel tomography approach for analysis of undisturbed soil or sediment cores

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In recent years we all had to realize that plastics has not only been accumulating in the oceans, but as microplastics also has entered surface waters, soils and partly organisms in large numbers. Thus, as with other pollutants in the environment in the past, we need detection and monitoring methods for quantifying their distribution, fate and pathways. By that we can better understand where they are emitted, where they are present and what are the key mechanisms they undergo. However, this means a new challenge and need for novel approaches because they are different to other pollutants. In one study we have monitored presence of microplastic particles and some of their properties in a surface water course and groundwater wells close the river banks, detecting them by a novel and fast imaging technique after processing of surface water samples. Furthermore, soil and sand samples from different places were separated by density and then manually analyzed, and the results indicated an extensive presence of microplastic particles. Finally, we have developed a tomography approach to detect microplastic particles also in undisturbed sandy soil or sediment samples. This has the advantage that cores can be taken and analyzed that show the real distribution of microplastic particles, and obtain also some information on their size and shape. Overall, this also can contribute to understand their deposition and displacement in the past. We will demonstrate how a combination of X-ray and neutron tomography could be used to identify microplastic particles non-invasively, for test samples as well as first environmental samples.