
Comparison of two different process of MP identification in Danube River

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Abstract

Microplastics (MPs) have gained a lot of attention these years, and the understanding of their abundance in the environment differs from research to research because of the lack of standardisation. To better understand the effect of different methodologies in MP research, two well-established processes, AAU and Wessling methodology, were selected. The main differences are related to (i) the sample preparation protocols, (ii) the optical substrate (Anodisc filter and Zinc selenide window), and (iii) Fourier transform infrared spectroscopy (FTIR) imaging settings. These two methodologies were used to quantify MPs in the Danube River to investigate if there is any methodology-based difference in the result, and where these differences come from. Sampling was conducted on the Hungarian stretch of the Danube River on four occasions. Samples were combined to get a representative sample over time, and further divided into subsamples to better ensure environmental relevance and homogeneity of the test samples that were used in triplicates, and then analysed with the different methodologies. As observed in our study, these samples are not homogeneously divided, still, there are differences between these two methods, the AAU process showed a higher MP abundance and estimated mass concentration. As for the characteristic of MPs, a similar polymer type composition was found with both methodologies and fragments were the dominant type of shape. Moreover, the Wessling methodology is time- and economic-efficient and less prone to fragmentation of MPs, while the AAU methodology has a higher extraction efficiency from the matrix, and provides more control for loading the optical substrate for analysis. In conclusion, the two methodologies might lead to a difference in MP number and mass concentration, but the shape characteristics seemed to be similar.

Keywords: Microplastics, Sample Preparation, Methodologies, Comparisons, FTIR imaging

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