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Postprocessing methods based on minimum detectable amount and method blank for data reporting of particle count and refining estimation of matrix spike recovery in environmental microplastics analysis

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ABSTRACT

Data handling that converts the raw data into a deliverable dataset is a necessary step in any analytical work. This procedure involves applying detection limits to shaping the raw data to form a deliverable dataset. The detection limit for microplastics analysis is the minimum detectable amount (MDA) that can be calculated from the particle counts of procedural blank samples following the rules of the Poisson distribution. Currently, there is a lack of adequate data reporting guidance encompassing the MDA for microplastics analysis. The goal of this study was to establish a robust protocol for processing count-based raw data using the particle counts of the MDA and the procedural blank. Utilizing the dataset of an interlaboratory comparison exercise, effectiveness of the protocol was elaborated to generate a deliverable dataset and to accurately define the matrix spiking recoveries. The guidance was applied to the raw data of all size fractions (1 - >500 µm), four individual size fractions (>500, 212–500, 20–212, 1–20 µm), and two morphologies (fiber and non-fiber). Six possible data reporting scenarios were identified, with the raw data ranging well above the MDA to below the critical value. One-third (12 of 34) of the raw data for all size fractions needed blank-MDA corrections. The mean values of the spiking recoveries decreased by up to 10 % after performing the data reporting guidance. Application of this suggested data reporting guidance may be beneficial for high quality data for microplastics analysis.

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