Taking CONTROL of microplastics data

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Abstract

Although significant headway has been achieved regarding method harmonisation for the analysis of microplastics, analysis and interpretation of control data has largely been ignored or overlooked. There is currently no consensus on the best method to utilise data generated from controls, and consequently many methods are currently employed globally, with little empirical guidance on the appropriateness of each method. This study identified at least 6 different approaches commonly used, with many variations on these core methods possible. These were: a) No correction; b) Subtraction of the total; c) Subtraction of mean; d) Spectral Similarity; e) Limits of detection/ limits of quantification (LOD/LOQ) or f) statistical analysis. This study evaluated 51 different methods, based on variations of the above 6 core methods, to determine the most suitable method for application to MP datasets. These methods were applied to a dummy dataset to correct for contamination. Overall, most of the methods tested were too prescriptive to allow for the inherent variation present in microplastic data. Only 7 of the 51 methods tested (six LOD/LOQ methods and one statistical method) managed to remove on average 95% of the contaminant data. Data correction methods based on subtraction of the total were unable to remove even 50% of the dataset, and hence are not recommended for use to correct MP datasets. All methods based on average subtraction, LOD/LOQ and spectra similarity were successful at removing at least 50% of the data. These seven methods show promise for further validation using real environmental datasets. This study has taken the first steps towards exploring harmonising control analysis and data correction strategies, further highlighting the important role of controls in detecting trace levels of microplastics and confidently report detection above the background level.

Keywords: Quality assurance Quality control (QA/QC), Negative controls, Background contamination, Data analysis, Methods

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