

## Supplementary Material

# Opening Space for Plastics—Using Soil Science to Understand (micro-)Plastic Pollution

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**Table S1.** Definitions of selected questions and for categorized responses from the applied questionnaire.

ID	Requested information	Question definition	Categorized answers definition	
2-3	Single location	The term "single location" refers to a sampling conducted on a spatially confined unit, which is clearly separated from other areas (e.g., single arable field, single sampling point).		
2-6	Map	The question asks about the availability of a geographical map illustration in the respective publication, independent of the object depicted (e.g., topographic map, soil map).		
3-6	Depth sampling according	The questions ask about the method how depth samples were subdivided: Either by soil horizons (e.g., A, B horizon boundary) or metric depth intervals	horizon	Depth sampling according soil horizons: Boundaries between different depth samples according soil horizon boundaries
			depth	Depth sampling according metric depth values: boundaries between different depth samples according fixed depth levels
3-8	Lateral sampling scale	The term "lateral sampling scale" refers to the spatial scale covered by the sampling and ranges from the consideration of individual points to several points in a larger spatial unit (e.g., nation)	single	Sampling of a single soil sample or soil profile (including several depth samples possible)
			local	Sampling of an undefined number of soil samples or soil profiles on a confident spatial unit (e.g., single arable field)
			regional	Sampling of an undefined number of soil samples or soil profiles in a wider spatial unit, but limited to regional spatial boundaries (e.g., a landscape unit, a political region)
			superregional	Sampling of an undefined number of soil samples or soil profiles in a large-scale spatial unit, limited only by large-scale spatial boundaries (e.g., national borders)
3-9	Systematic sampling	The term "systematic sampling" asks for the implementation of a systematic, spatial sampling approach, which either follows a clear spatial pattern (e.g., grid sampling) or is based on predefined spatial criteria (e.g., distance from plastic source)		

**Table S2.** Recommendation on basic spatial positioning and soil data for MP research together with easy access pathways and global dataset examples.

Data class	Parameter	Advantage for MP research	Data record		Data access or helpful tools examples <sup>1</sup>
			Professional	Easy access	
<b>Spatial reference data</b>	Coordinates	For each sample point: clear spatial location, globally retrievable and usable for global databases	<i>Global Positioning System (GPS) or Differential Global Positioning System (DGPS)</i>	Smartphone GPS sensors	Easiest access for others through sharing geodata in common formats (e.g., kml, .shp, .txt)
	Topographic maps	For study area: Spatial impression of lateral contexts and possible local plastic sources in the surroundings	Geographic information system (GIS) software solutions	Freely available online GIS tools	Google Earth (Software, Google LCC) QGIS.org, 2022. QGIS Geographic Information System. QGIS Association. <a href="http://www.qgis.org">http://www.qgis.org</a>
<b>Soil context data</b>	Land use	For each sample point: Direct impression on local MP sources	Field observation and classification	Field observation	Buchhorn et al. (2020): Copernicus Global Land Service: Land Cover 100m: collection 3: epoch 2019: Globe <a href="https://lcviewer.vito.be/2015">https://lcviewer.vito.be/2015</a>
	Land use practice	Especially for agricultural land: information on agricultural MP sources	Interview land owner	Interview land owner	-
	Land use change	Detection of past plastic sources and influences on soil structure (e.g., construction activities)	Self-evaluation of satellite or aerial photo data	Use of global land use change datasets	Buchhorn et al. (2020): Copernicus Global Land Service: Land Cover 100m: collection 3: epoch 2019: Globe <a href="https://lcviewer.vito.be/2015">https://lcviewer.vito.be/2015</a>
	Soil type (name)	Soil names provide a unique description of a soil, its major properties and soil forming processes each effecting MP retention and mobility	F <sup>2</sup> : Full soil survey according FAO (2006) and classification via WRB (2015)	Use of global soil data, regional or local soil maps	FAO (2022): Legacy Soil Maps and Soils Databases <a href="https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/en/">https://www.fao.org/soils-portal/data-hub/soil-maps-and-databases/en/</a>

<sup>1</sup> Examples for usable global datasets or free technical tools; <sup>2</sup> Field work; <sup>3</sup> Lab work; <sup>4</sup> Soil organic matter

Data class	Parameter	Advantage for MP research	Data record		Data access or helpful tools examples <sup>1</sup>
			Professional	Easy access	
Additional soil data	Texture	Basic information on physical soil properties with regard to MP displacement processes. Indication of soil pore space and possible MP transport.	F <sup>2</sup> : Finger test (FAO, 20016) L <sup>3</sup> : Texture analysis	Use of global soil data, regional or local soil maps	ISRIC World Soil Information:  WISE - Global Soil Profile Data, version 3.1 <a href="https://data.isric.org/geonetwork/srv/eng/catalog.search#/metadata/a351682c-330a-4995-a5a1-57ad160e621c">https://data.isric.org/geonetwork/srv/eng/catalog.search#/metadata/a351682c-330a-4995-a5a1-57ad160e621c</a>
	pH	Information on the pH milieu concerning the activity of soil organisms (e.g. earthworms) and the associated MP shift through bioturbation.	F: Soil sampling, L: measurement (pH meters)	Use of global soil data	SoilGrids — global gridded soil information <a href="https://soilgrids.org/">https://soilgrids.org/</a>
	SOM <sup>4</sup>	Information on the SOM content regarding the proportion of organic substances and consequences for MP analysis	F: Soil color (Munsell soil color charts)	Use of global soil data	

<sup>1</sup> Examples for usable global datasets or free technical tools; <sup>2</sup> Field work; <sup>3</sup> Lab work; <sup>4</sup> Soil organic matter