

Earth Syst. Sci. Data Discuss., referee comment RC2
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Comment on **essd-2022-140**

Anonymous Referee #2

Referee comment on "Hyperspectral reflectance dataset of pristine, weathered, and biofouled plastics" by Giulia Leone et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-140-RC2>, 2022

Overall impression

This study is a thorough investigation of plastic examples under conditions which have been under-investigated in previous research. The conditions which each of the plastic samples were investigated under is well documented and described, and assists in studying plastics under conditions like they are found in after weathering and natural processes have taken their toll on them. That the data was released as open access in the same format as the referenced previous studies is progress towards a more complete picture of the spectral properties of plastic litter under differing physical and observational conditions.

I feel that there are a few issues with how the setup to this experiment is presented in this paper, which makes it difficult to understand fully. There could also be more discussion of how the measurements made in this study compare to those from other studies given the additional conditions considered for this experiment. The studies referenced in the introduction (eg, Garaba *et al.*, 2020) provide notes on how the plastic and measurement properties change the appearance of the spectra in each case. A similar approach could be employed here for the novel aspects of the measurements made in this study, for the case of the biofouling and the UV exposure spectra for each type of plastic. See the notes below for more detailed comments.

Specific queries

Line 64 – Data Collection – For the pseudo-replicates, how much are you moving the plastic samples each time in between each of the measurements? Looking at the samples chosen in Table 1, some of the spectra will more significantly change with a small movement, as stated, but for some of the food packaging items with prominent logos there will be a significant change as the sensor is over the logo/non-logo parts of the

plastic.

Line 81 – Table 1 – The size of the table is substantial due to the image sizes. This table could be moved to an annex section to preserve the flow of the paper, or the types and conditions of plastics could be summarised into a more concise format with the images removed to keep the table as a summary of the plastics used.

Line 81 – Table 1 – Some of the images are not too clear on the type of plastic they are showing. Specifically, the plastic sheets and pristine plastics look like white squares in the images. Whilst this is likely the case in person for these items, the picture does not add to the table in a meaningful way. A wider-angle image would provide some better context on the appearance of the piece of plastic being tested.

Line 88 – Pristine Plastic specimens – The mention of additives here could form a point of analysis later in the paper, as the pristine plastics are compared to the non-pristine plastics. It is good that pristine plastics are provided alongside the packaging samples, but a follow-up description of how they are different would be good to include.

Line 98 – Weathered plastics – Good that UV weathering of plastic litter is being spectrally measured under lab conditions.

Line 128 – Figure 2 – The image could more clearly show the selection of plastic collected. If the items were spread onto a flat surface and categorised by type then it would provide a clearer impression of what was collected during this survey collection.

Line 128 – Figure 2 - From the way the collection of plastic items is being referenced in the main body of text, the figure may not be necessary. Just mentioning that items were collected during 2020 from the Port of Antwerp would be enough, and the figure could be removed.

Line 143 – Experimental Setup – To accompany this description, a labelled diagram or clear labelled image of the experimental setup would be useful to visualise how all the components fit together.

Line 200 – Data description – A comparison of this dataset with the datasets you referenced in the introduction would be beneficial to this paper, highlighting specifically in the spectral plot the differences from biofouling or UV degradation occur. Whilst presenting the dataset as an addition to the community is valuable, a discussion of initial findings from this dataset compared to contemporaries would improve it further, especially as the introduction references these alternative plastic and observation conditions as

being the main motivation for collecting these measurements.

Line 218 – Figure 3 – The plots after the correction has been applied (right) show negative reflectance for the plastic in the < 700nm range. Is the correction applied to a larger range of data than just the discontinuity highlighted in the image on the left? This may need fixing if so.

Line 232 – Conclusions – Additional comparisons of how the unique features measured as part of this dataset contribute to the measured spectra against samples without those features would be good to include here, or in a separate discussion section. Specifically the biofouling, UV, and sediment measurements provide opportunities to make observations on these effects.

Technical corrections

Line 59 – Data collection – Grammar, “Data collection consisted *in* measuring....” -> “Data collection consisted *of* measuring....”

Line 157 – Silo tank setup – How the measurements of the tank are displayed (2 top diameter x 3 depth m) is not immediately clear by the way this is written. Diameter 2m, Depth 3m is clearer. This is another chance to include a setup diagram to supplement the description.

Line 209 – Data description – Typo, ensures -> ensure.