

Earth Syst. Sci. Data Discuss., author comment AC2
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Reply on RC2

Giulia Leone et al.

Author 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-AC2>, 2022

We thank the handling Editor and the reviewers for thanking the time to review our manuscript and providing us with constructive feedback, which led to significant revisions in the manuscript.

Below, we provide point-by-point replies to each and every reviewer's comment (specified lines refer to the revised version of the manuscript).

We thank Dr.

Best regards,

Giulia Leone, on behalf of all authors

Reviewer #2:

Comment 2.1 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.

Response: We thank the reviewer for these kind words, and we are hopeful that the presented dataset will be useful to depict a clearer picture of the spectral properties of plastic debris.

Comment 2.2 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.

Response: We understand the comment posed by the reviewer and agree that a discussion on how the presented dataset compares with the existing literature as well as what results can be extracted by this dataset is crucial. For this reason, and to clarify the point raised by the reviewer, we have included in the revised version of the manuscript, Table 1, which aims at illustrating a comparison between the presented dataset and studies referenced in the introduction. However, as this manuscript is intended as a data description paper, we have explicitly avoided a detailed result section or interpretation of the dataset in this specific manuscript.

Comment 2.3 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.

Response: The question asked by the reviewer raises an important point. The samples were slightly moved in between each measurement of a few millimeters. It was not our intention to measure a label or a different color within the sample, but to capture the heterogeneity of a polymer. We do understand the point raised by the reviewer with respect to the food packaging for instance, as these items might indeed have logos or different colors. This change was taken to obtain a more realistic overall reflectance (i.e., mean of the pseudoreplicates) of the environmentally or artificially weathered and biofouled polymer within the same portion of the sample.

Comment 2.4 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.

Response: We agree with the reviewer; the size of the table is substantial. Therefore, in the revised version of the manuscript we have moved Table 1 from the original version of the manuscript into the supplementary material.

Comment 2.5 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.

Response: This is a very relevant concern. To clarify we have retaken the pictures of the pristine plastic sheets.

Comment 2.6 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.

Response: We thank the reviewer for this relevant comment. The use and effect of additives in plastics and how they could modify plastics' optical features is indeed an interesting and important point of discussion. However, we intentionally did not include any discussion on the type of samples selected for the experiments, but merely describe them.

Comment 2.7 Line 98 – Weathered plastics – Good that UV weathering of plastic litter is being spectrally measured under lab conditions.

Response: We thank the reviewer for this comment and we agree that the use of reproducible methods to weather plastics are critical for comparability purposes.

Comment 2.8 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.

Response: The comment posed by the reviewer is extremely valid. It is true that if the items were spread onto a flat surface and categorized by type the Figure would provide a better overview. Because the overview of the samples is already present in Table 1S, this picture has been removed from the revised version of the manuscript.

Comment 2.9 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.

Response: As mentioned in the comment above (comment 2.8), we agree with the reviewer. Figure 2 is indeed not necessary and has been removed from the revised version of the manuscript.

Comment 2.10 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.

Response: We thank the reviewer for raising this concern. To clarify the experimental set-up, we have added a new Figure 2 (see lines 160-161) describing both experimental set-ups (i.e., tank and lab).

Comment 2.11 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.

Response: We thank the reviewer for this comment, which we fully understand. A comparison of this dataset to the work referenced in the introduction has been added to the revised version of the manuscript as Table 1. In addition, as a visual representation of how the spectral reflectance of artificially biofouled and weathered plastics look like in comparison with the same pristine polymer would indeed be beneficial to the paper, we have added two graphs in the supplementary material.

Comment 2.12 Line 218 – Figure 3 – The plots after the correction has been applied (right) show negative reflectance for the plastic in the $< 700\text{nm}$ 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.

Response: We understand the concern raised by the reviewer and, as we agree, the plot with the splice correction is removed from the revised version of the manuscript. We have left the suggestion to the reader of using a splice correction.

Comment 2.13 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.

Response: We agree with the reviewer's suggestion, we have added two graphs (Fig 1S& Fig 2S) on the contribution of examples of spectral reflectance of UV and biofouled samples. As the description of the outcomes that can be generated by the described dataset is outside of the scope of this data journal, we have purposely not added interpretations or discussion.

Comment 2.14 Line 59 – Data collection – Grammar, “Data collection consisted in measuring....”-> “Data collection consisted of measuring....”

Response: We thank the reviewer for bringing this issue to our attention. We have changed this in the revised version of the manuscript.

Comment 2.15 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.

Response: We agree with the reviewer; the way the measurements initially written were clear. Therefore, we have changed this in the revised version of the manuscript.

Comment 2.16 Line 209 – Data description – Typo, ensures -> ensure.

Response: We thank the reviewer and corrected the typo.

Editor:

Comment 1.1 Reviewers will undoubtedly ask about differences or advances in this data from those already presented by some co-authors (Knaeps et al, <https://doi.org/10.5194/essd-13-713-2021>). If reviewers fail to ask, I will ask. Think of users! What do they learn from this data set not available from prior work? Biofouling? What else. You talk about sample numbering consistency, but what should a user find where? More clarity about advantages, knowledge gained, how users should select or react?

Response: The comment posed by the Editor raises important questions. In fact, similar points of concern were raised by the reviewers. To compare our dataset with the previously published work we have added, in the revised version of the manuscript, Table 1 (see line 91). This Table clarifies what readers can learn from previous work and what is novel in the presented dataset. In the revised version of the manuscript, we have now written ‘In addition, from the data presented it is possible to investigate the effects that biofouling and weathering have on the detection of different polymers. Lastly, the conditions in which a plastic item is (i.e., dry, wet or submerged with different turbidity) are also described and assessed in the presented dataset.’

Notification to the authors:

Comment 1.1 For the next revision, please note that each DOI, no matter where, must be accompanied by a citation. Thereby, add a citation to a DOI in section "Introduction" etc.

Response: We thank the editorial staff for bringing this to our attention. We have added a citation to each DOI.