

Reply to reviewer

Manuscript Title : Hyperspectral ultraviolet to shortwave infrared characteristics of marine-harvested washed ashore and virgin plastics
Authors : Garaba S.P. and Dierssen H. M.
Journal : Earth System Science Data (ESSD)

Anonymous Referee #2

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Referee comment - 1

This paper presents reflectance spectra for various types of plastics in the marine environment (dry vs wet, macro and micro, washed ashore and marine collected) plus virgin plastic pellets. While spectral reflectance at an arbitrary viewing geometry and illumination environment is not a sufficient input for formal radiative transfer simulations as the authors suggest, these spectra do have value in that they can be used to identify spectral absorption features of potential value for remote sensing.

Author response - 1

Thank you for taking the time to review and provide constructive feedback on our manuscript. We agree that investigations on the anisotropic distribution of the spectral reflectance of marine-harvested plastics is needed for more accurate simulations and hope future works will consider this (*See section 4 Discussion of the revised manuscript*).

We follow the review guidelines for the ESSD journal, indicated in italics.

Read the manuscript: Are the data and methods presented new? Is there any potential of the data being useful in the future? Are methods and materials described in sufficient detail? Are any references/citations to other data sets or articles missing or inappropriate?

Referee comment - 2

Overall, the data and methods are new, useful, and presented in sufficient detail. A few terms could use a bit more explanation to make this paper useful as a stand alone product. For example:

1. the Spectral Shape Similarity is described in Garaba and Dierssen 2018, but I think this would be much more powerful if equation 1 from that paper was also included here.

Author response - 2

Thank you for pointing this out. We have appended the methods section by explaining the data processing steps used and appended Equation 1 on spectral shape similarity (*See section 2.4 Data processing of the revised manuscript*).

Referee comment - 3

2. I feel that the sphericity and roundness scale from Powers 1953 is outdated and inappropriate for use if the goal is radiative transfer simulation a simple aspect ratio would suffice.

Table 1 has this, great, but was that table in the data files? Perhaps I missed it.

Author response - 3

Yes, Table 1 was provided in the manuscript and as supplementary material

Referee comment - 4

3. Derivative analysis needs to be defined. Again, this is in the Garaba and Dierssen 2018 paper, but definition is needed here. I find the description of what exactly constitutes a spectral ‘feature’ lacking (both here and the 2018 paper), and the listing of these features inconsistent in this paper. For example, the abstract lists four, apparently strong features. Section 3.1 shows eight. Qualitatively, I also question a few of the features – 2046 seems inconsistent, and 2313 seems too close to the edge of the spectral range to be valid. 1417 seems too close to other (water?) absorption features to be useful.

Author response - 4

-We have included information about derivative analysis and provide a definition of a spectral feature and expand on the methodology used to objectively identify the spectral features reported (*See section 2.5.1 Spectra absorption feature of the revised manuscript*).

-A new figure to summarize the spectral data analyses has been included (*See Figure 2 of the revised manuscript*).

-We have revised the text to clarify the mismatch in the number of absorption features in the abstract and in the results. In the abstract we have added the term ‘diagnostic’ which means an absorption feature is unique to a particular material in shape and is located around a limited wavelength range (*See Line 27 of the revised manuscript abstract, sections 2.5.1 Spectra absorption feature and 4 Discussion of the revised manuscript*).

-Yes, the 1417 nm feature is affected by atmospheric gases. The other features (centred around 2046, 2313 nm) have also been report in other studies. We have added text to point out the useful wavebands and studies that have already utilized several of the wavebands reported here (*See section 4 Discussion of the revised manuscript*).

Is the article itself appropriate to support the publication of a data set?

Referee comment - 5

Yes, with the modifications noted above.

Author response -5

Thank you and we have carefully made revisions to improve clarity of the text.

Check the data quality: Is the data set accessible via the given identifier? Is the data set complete? Are error estimates and sources of errors given (and discussed in the article)? Are the accuracy, calibration, processing, etc. state of the art? Are common standards used for comparison?

Referee comment 6

The data do appear available as noted, although the link for the “dry washed ashore macroplastics” appears broken in the abstract (but not the link in section 4).

Author response -6

The links have been checked and updated.

Referee comment - 7

As far as I can tell, no uncertainty metrics were provided for the ASD observations, a key missing component. If this exists, it should be included.

Author response - 7

We agree a comprehensive uncertainty budget is missing and is needed. However, the datasets are provided with the descriptive statistics mean, median and standard deviation. Each measurement was an average of 20 scans.

Referee comment - 8

Although the paper notes differences in viewing geometry, foreoptic aperture and spectralon plaque reflectance for both the macro and micro plastics, no explanation for these different choices was given. This should be rectified.

Author response - 8

We assume by doing a white reference with the Spectralon plaque after white referencing we obtained a Lambertian Equivalent Reflectance suggesting minimal effect by geometry. We have added text to clarify this (*See section 2.2 Spectral reflectance measurements of the revised manuscript*).

Is the data set significant – unique, useful, and complete?

Referee comment - 9

Yes

Consider article and data set: Are there any inconsistencies within these, implausible assertions or data, or noticeable problems which would suggest the data are erroneous (or worse). If possible, apply tests (e.g. statistics). Unusual formats or other circumstances which impede such tests in your discipline may raise suspicion.

Referee comment - 10

The data set, to the best of my ability to confirm, looks good.

Is the data set itself of high quality?

Referee comment - 11

Yes

Check the presentation quality: Is the data set usable in its current format and size? Are the formal metadata appropriate? Check the publication: Is the length of the article appropriate? Is the overall structure of the article well structured and clear? Is the language consistent and precise? Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Are figures and tables correct and of high quality?

Referee comment - 12

Yes to all of these

Is the data set publication, as submitted, of high quality?

Referee comment - 13

Yes

Finally: By reading the article and downloading the data set, would you be able to understand and (re-)use the data set in the future?

Referee comment -14

Yes, if the above issues are resolved. This could be used to help identify spectral absorption features for qualitative remote sensing algorithms, but not for input to radiative transfer simulations as the authors suggest. The latter requires spectrally resolved complex refractive indices, measurements of size distribution and sphericity. Hopefully these data will be measured in the future.

Author response -14

Thank you and yes further measurements are warranted to support detailed radiative transfer models and suggest future works should consider such investigations *See section 4 Discussion of the revised manuscript*).