

Earth Syst. Sci. Data Discuss., referee comment RC1
<https://doi.org/10.5194/essd-2022-140-RC1>, 2022
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Comment on **essd-2022-140**

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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-RC1>, 2022

This is a great effort toward remote sensing of marine plastics. The remote sensing capability heavily relies on our understanding of the spectral characteristics of various forms of plastics, and this dataset should be useful for algorithm development.

However, I feel that both the experimental settings and end results are poorly described, and I ended up with more questions than answers after I read through the descriptions. I understand it's impossible to present all measured spectra, but to a minimum, some representative spectra of plastic specimen A, B, C... in their dry, weathered, and submerged conditions should be presented and discussed. In particular, after several recent publications reporting similar datasets of macroplastics, how do these new results compare with those existing? What new information do we gain? Without the knowledge of why they agree or disagree on the same type of plastics, I sense that all we can get are some additional data, but our understanding of plastics reflectance may get worse.

Line 43 – 48: "To date, only a limited number of high-quality datasets consisting of hyperspectral measurements of wet and submerged plastic litter, have been published in open-access repositories (e.g., Garaba and Dierssen, 2019, Garaba and Dierssen, 2020; Knaeps et al., 2021). The dataset described in the current paper aims at complementing the existing datasets by adding new information about the hyperspectral reflectance of pristine plastic items, harvested plastic litter, and artificially weathered and biofouled plastic samples". This is certainly a good motivation. However, how do these additional data compare, contrast, and complement the existing data? Does this paper measure the same plastic materials (e.g., A, B, C) but measured under different dry/wet or marine conditions? Or does this paper measure different plastic materials (e.g., D, E, F instead of

the existing A, B, C) under the same conditions as in the current literature? How do the new spectra compare with the existing spectra? If there is difference, what's the reason?

Line 53 – 54. Not really, unless ALL possible scenarios in natural conditions are considered and measured here. Presenting certain examples of reflectance under different depths or under different algae or sediment concentration doesn't mean much, because this is already known based on radiative transfer principles. What is more useful is to perform a numerical simulation to see whether the measured reflectance can be reproduced. If the answer is yes, then reflectance under different measurement scenarios can simply be generated using simulations without involving more experimental settings.

Line 54 – 56. This is great – at least the community can use this data for a variety of purposes.

Section 2.1. How do these 6 types of polymers compare with those of Garaba, Knaeps, and their coworkers?

Table 1. It's good to include photos, but all photos have poor quality. The first 5 photos actually show nothing except some blurred features. The rest of the photos are also very vague. They all need to be improved in quality, and a length scale bar is needed for every photo. For a bright target, a dark background is required to show the appearance of the target.

Some of the targets in Table 1 appear spatially heterogenous. With 1-degree or 8-degree FOV, the ASD fiber probe may only see a small facet of the target, and reflectance can be strongly dependent on the location of the facet. For example, for "Bag dog food",

completely different spectra may result from the blue and yellow parts of the target. Then how are these spectra used as “endmembers” for remote sensing purpose where the footprint of a remote sensing pixel is way larger than the target itself?

Table 2. It’s better to add a photo showing the experimental setting. Also, it’s better to show the before/after comparison of the same samples. Finally, can these UV exposure really simulate the weathering process in nature, where plastic materials are in marine water under different chemical, physical, and biological conditions?

Figure 1. Please annotate each part of the photo – which is what. Also, it’s better to show a before/after photo comparison of the same specimen.

Figure 2. See comment above about spatial heterogeneity.

Section 3. Where is the experimental setting (i.e., how is the sample illuminated, how far is the fiber optic probe, does the lamp produce collimated beam, etc)? What’s the footprint size of the fiber optic probe under the experimental setting, and does the footprint fall on different colors of the same plastic target? A photo or at least an illustration chart is required, including the illumination, ASD probe, water tank, placement of the plastic target, and placement of the 99% reference.

Figure 3. Does the splice correction simply lower the reflectance < 1000 nm to remove the spike? Then it doesn’t appear correct because after the correction reflectance between 600 and 700 nm is 0 or even negative. How come plastic materials have near-0 reflectance?

Figure 3. What type of polypropylene is this? Please insert a photo. In Table 1, there are several "PP" photos with yellowish or whitish colors. Then why does this reflectance show a spike around 540 nm (greenish)?

Figure 4. What field sample? Those in Figure 2? There is no way all these replicates show the same spike around 540 nm from those plastic materials of Figure 2.