Re. GonzaleZ -Pleiter et al. A pilot study about microplastics and mesoplastics in an Antarctic glacier: the role of atmospheric dry deposition

This MS has already been thoroughly and ably reviewed by Dr. Berghmann and Dr. Obbard and I agree with their appraisals. Given the length of time this MS has already been in review, I don't want to delay decisions so I will give a brief review.

I am convinced the authors found plastic on the glacier, which is very interesting and could encourage meaningful change in Antarctic operations handling of plastic. For that I think the MS has merit.

I have significant misgivings about the title as I feel it is misleading.

The term "Atmospheric Dry Deposition" entails that the material was atmospherically entrained (the definition is >10 m AGL). I do not see any evidence of that. I think that the material merely underwent saltation transport from the beach. I.e. it's more likely it bounced along the ground up from the beach or from the Artigas base (a lot of red/white buildings). Evidencing the base as a source would have made a better focus. Aeolian transport is a more accurate description as it covers all manner of wind transport. I think all instances of "atmospheric dry deposition" should be removed before publication. This is not an atmospheric transport study and should not claim to be.

Thank you very much for your comment. According your request, we have written: "*A pilot study about microplastics and mesoplastics in an Antarctic glacier: the role of aeolian transport*"

Elevation and slope information is missing. The distance from the shoreline has not been made clear. One can infer from the maps, but distances and topography information should be clearly described. These are important to the understanding of possible transport vectors. A 3D elevation map can be made in GIS software.

Following your request, we have written in section *2.1 Study area* "*The distance from the shoreline to Ionosferico lake is ~694 m.* […] *The distance from the shoreline to Uruguay lake is ~366 m.*". Regarding topography information, we have not found elevation maps of the area, except for the map already included in Figure 1B, 1C and 1D.

Methodology: The 12hr testing is not useful as the material could have been blown in from just outside the squares or melting of the surface exposed new plastics (temperatures provided are from >300km away). It is disappointing that local meteo wind data from Artigas base was not included in the reporting. Average historical wind roses and wind reports from 322km away do not add to the evidence and I am sure the Artigas research station keeps daily records which would have been helpful. I also see no proof of the absence

of rainfall/snowfall as I assume the authors did not camp on the glacier. I doubt that it would have any bearing on your results but again, being 322km away from a meteo monitoring station is not proof it did not rain/snow overnight on the glacier. I also note no mention of fragments being partially frozen into the ice which is hard to believe did not occur.

Thank you very much for your comment. Meteorological data are not available from Artigas research station. However, we consider that local meteorological data from Villa Las Estrellas, which is located ~3.22 km (3220 meters) from Artigas base and keeps daily records, provides relevant evidence of wind direction and speed and absence of rain/snow during the study

period. We realized the distance is not clearly visible in Figure S1B, and we have now modified it.

A 60% FT-IR match with the library with such massive pieces is at the extreme low end with the given settings. I would expect >80% (which is normally the lower limit) to be easily achievable. The Omnic software should have been able to tell you the composition of the other fragments too which would have been interesting and useful for locating sources. I suggest that there is something either wrong with the machines or the methods.

Thank you very much for your comment. Recently, several studies used a 60% FT-IR match to identify airborne microplastics (doi.org/10.1016/j.scitotenv.2019.04.110, doi.org/10.1016/j.envint.2019.105127, doi.org/10.1016/j.jhazmat.2020.123223 or doi.org/10.1021/acs.est.9b03427). In our study, 75% of the pieces had percentages of FT-IR match with the library higher than 80%, and only two plastics a match < 70% (specifically 67% and 68 %). All the plastic spectra with matches between 67 - 79% FT-IR displayed significant peaks typical of plastics. Furthermore, the color and morphology of these plastics looked similar to the type of plastic they were ultimately classified into by the FT-IR analysis. Their low values in the matches could be consequence of several factors such as aging, dirt (see Figure S2) or humidity (e.g. some peak can variable from sample to sample as it depends on the amount of adsorbed water).

I realise these are quite large fragments making contamination less likely, but “blanks” are an integral part of any microplastic study and the lack of even a lab blank is very disappointing. It should be mentioned what material the 100 mL ISO reagent bottles are made of (we can’t assume the reader will know). I understand this MS started as a short piece with limited space but now it’s an article it would also be useful to have the photos of the fragments in the supplementary. I note some grammatical errors throughout the MS and spelling mistakes which I assume will be addressed in final editorial (fig 2 D,F,H, *wavelength).

Thank you very much for your comment. We have written wavenumber instead of wavelength in Figure 2 and have mentioned the material of the ISO reagent bottles. Furthermore, we have included representative photos of the plastics found (Figure S2).