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Discussions

Interactive comment on "Physical transport properties of marine microplastic pollution" *by* A. Ballent et al.

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Thank you for your review of the Biogeosciences paper Physical transport properties of marine microplastic pollution. We appreciate the time you spent on this paper, and consider your concerns well founded and suggestions to be most useful. We have made considerable revision to the manuscript in light of these, and would like to address your comments below:

1. The paper investigates three aspects of microplastic transport but does not bring the three areas together in a convincing manner. The section on river plastic transport is rather arbitrary, and though novel, the section on plastics under turbulence is not sufficiently developed.

We agree with these opinions, the manuscript as submitted did miss a clear focus. In the revised version of the paper, we now focus only on subsurface microplastic transport. The section dealing with coastal/strandline plastic collection has been removed, as suggested. The third section of the manuscript initially submitted, detailing the experimental turbulence and pressure investigations, is included in the revised version as the work provides a valuable insight into the transport and fate of neustonic plastics which are submerged below the surface via wind turbulence, fouling, degradation etc. However, the section has been rewritten so that it now augments the microplastic transport section and does not stand apart from it – the section now highlights the fact that not all plastics will behave like the microplastics modeled.

2. The description of the model used in the transport study is cursory, and episodic events are not addressed by it.

In the revised paper, a more complete description of the model is given, along with some further recent references. In this study, the laboratory experiments were interpolated and complemented with the application of the MOHID model. The hydrodynamic model was necessary to reproduce the canyon dynamics and the lagrangian transport model to evaluate the transport patterns during 66 days during the spring of 2009. This spring period was chosen as accurate environmental data was available to drive the model. Though this spring period is of interest ecologically as it coincided with high primary productivity in surface waters, there is the drawback that there was an absence of sediment gravity flow events during the modeled period. Though the MOHID model can incorporate river flux into transport modeling, the modelled period was not marked by high river discharges so this potential input was not included in the model runs. Our simulations describe the lateral advection of the microplastics for this particular spring period only, during which the net downslope transport was small – we do however in the revised manuscript clearly outline how this transport may be increased during other periods of the year, as highlighted in the reviewers comments, with reference to the appropriate literature. We introduce the Nazare canyon more completely in the revised

text, and position our modeled work in stronger context with previously published work carried out at the canyon.

The revised manuscript we believe is a much tighter study of the likely transport of microplastics in the Nazare Canyon during spring months. We highlight the strengths, weaknesses and temporal considerations of the modeling approach, and indicate where further experimental and investigative work is needed to further increase the accuracy of subsurface transport predictions of sinking plastic material.

Interactive comment on Biogeosciences Discuss., 9, 18755, 2012.