

Interactive comment on “Basin-scale sources and pathways of microplastic that ends up in the Galápagos Archipelago” by Erik van Sebille et al.

Anonymous Referee #2

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Major comments:

The paper address the transport of plastics at basin-wide scales from land-based origins to the Galapagos Islands, considering high resolution simulations that also include Stokes' Drift wave contributions to particle advection. The paper illustrates global environmental analysis needed for conservation efforts at the Galapagos. The paper is well written, but could benefit from some additional scientific detail and discussion.

Discussion of Stokes' Drift contribution, and its affect on Lagrangian particles, could be more developed as part of the literature review. Given the prominent role of Stokes' Drift on the results, it would benefit from greater up front introduction and discussion. Overall the paper addresses a novel use of Lagrangian particles needed for environmental protection, although use of forward and backward trajectories is less clear unless the

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backward in time, forward in time process is non-hysteretic within some error tolerance. Discussion of such the error tolerance would help provide additional confidence in the results.

Note, this is a nice example of how science can clear up a mystery related to plastics arriving at the Galapagos- could consider playing this up a little more to make the paper even more interesting than it already is given the need for ecological preservation in key sites like the Galapagos.

Below are some specific recommendations on ways this nice paper can be improved.

Pg 3, line 10 Please comment on why (or why not) 5-day temporal resolution is sufficient

Pg 3, line 115 - Please detail how currents+waves are used to advect particles. This isn't clear

Pg 3, line 19-20- How do you know you have enough particles to make the inference? Would you get the same answer with twice as many or few particles?

Png 4, line 10-12. Why do waves contain particles close to their release location? This is stated but it isn't clear why this may be the case. Line 17- which ones are better?

Pg 4, line 23- how consistent are the forward / backward runs? If you do a backward run to get a particle initial position and then do a forward run, does the particle return to its initial position? Is a discussion of backward / forward time particle hysteresis warranted? If not, why not?

Pg 4, line 28- do particles decay also? If so, this may be a good place to highlight or discuss this potential issue too.

Minor comments:

Pg 2, Line 8: "natural values in 1978" to "natural value in 1978"

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Pg 3, line 30 - "currents+waves" would be better described as "combined waves and current flow"

Pg 4, line 3 - nice reference and connection to broader work

Figures:

Figures are of good quality although text labels in Figure 4 could be rotated vertically for clarity.

Figure 5 implies that mixing changes as a function of Stokes' Drift contribution to particle advection. These plots could be used to derive advective and dispersive timescales for the transport, which would be a good way to more quantitatively make result comparisons.

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2019-37>, 2019.