

## ***Interactive comment on “Beaching patterns of plastic debris along the Indian Ocean rim” by Mirjam van der Mheen et al.***

**Anonymous Referee #2**

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The manuscript presents an interesting analysis of the transport and distribution of marine plastic debris from rivers into the northern Indian Ocean. The objective of the work is clear and the manuscript is well addressed and discussed. An interesting analysis is carried out to show how the results depend on the beaching methodology. The authors acknowledge that beaching of plastics is highly complex and that dynamics due to wind and waves are not considered in the simulations. These questions and their implications are identified and discussed in the manuscript. The manuscript represents a substantial contribution to scientific progress within the scope of Ocean Science and presents a high scientific and presentation quality.

However, I have some comments that I would like to be discussed in more detail:  
1- As the authors mention, they only consider the effect of surface currents on the

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transport of plastics in this study. This is correct, but this means that the results are representative of the marine plastic debris transported by surface currents. Buoyant items can be highly affected by wind, especially in coastal areas, where the wind can play an important role in the transport and beaching of marine debris. The authors would have to clarify the type of buoyant marine plastic debris under consideration and/or discuss in more detail how the results might change if the windage is included in the numerical simulations.

2- One of the main objectives of the study is to determine which countries and islands are most heavily affected by beaching plastics. However, beaching results are highly dependent on the beaching probability. On one hand, the beaching period varies from 3 years (with high probability) to 10 years (low probability). On the other hand, connectivity matrices show that beached particles mainly originate from the same country (for high probability) and from multiple different countries (for low probability). I find this analysis very interesting, especially to show our current limitations to properly simulate with numerical models the complex process of the beaching. I think that it is important to highlight the uncertainty in the beached patterns obtained and the relevance of improving the simulation of beaching in numerical models to obtain more robust results.

### **SPECIFIC COMMENTS:**

\* In section 2.2.1 (Long-term simulations) the authors explain that they include the monthly variation of plastic waste input from rivers by releasing particles on the first day of every month. However, it is not clear the number of particles used in the simulation and the release location:

- Please specify if the points displayed in Figure 2a are the numerical release points. If that is the case, please include this information in the label of Figure 2.

- Please specify the number of particles release the first day of every month, the total number of particles and the initial spatial distribution of the particles. Is it the same for section 2.2.2?

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\* Regarding the beaching probability ( $p$ ), section 2.3 indicates that the beaching probability can vary between 0 and 1 and section 2.3.1 indicates that only 3 values of  $p$  are used. Please, clarify it.

\* L175 and Figure 3. Why the results shown in Figure 3 are without beaching?. I wonder if it would be more appropriate to show the results with beaching. Without beaching the transport between the different regions and the 'escape' mechanism may be overestimated. Please, provide more details about it.

\* As previously mentioned, I suggest to highlight (in the discussion and conclusions) the uncertainty in the beached patterns obtained related to the uncertainty in the beaching methodology.

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