ANSWER TO REFEREE 1

We want to thank this referee for his/her very useful comments that have been addressed as follows:

1. Although in page 1205 a comment on the inertial effects is done, I think this aspect requires a larger explanation. All the air flight debris didnt have the same size and their motion is nearly sure that it was affected by waves and inertial effects. Both effects should have modified their Lagrangian motion and probably the sinking of the heaviest, above all after the time periods used in this paper. I do not agree with the authors that considering the inertial motion is speculative, but for larger debris it could be of importance.

Regarding this comment we want to say that we never meant that inertial effects are speculative. To avoid this interpretation we have rewritten Section 3 discussing more extensively wind an inertial effects. In particular for the inertial effects we say now:

Similarly to wind effects, inertial effects depend on the shape of the debris objects, which we do not know in this case, except for the flaperon piece. Although beyond the scope of this work, a thorough study of inertial effects for the flaperon would be of much interest, as it would help to track back, with a larger degree of accuracy, a possible impact point. The lack of knowledge on the distribution of shapes, densities and sizes of the floating debris, requires of too many assumptions which would prevent from a reliable conclusion on the inertial effects. We thus simplify our approach to that of purely advected particles. In the end, the agreement found between the GDP drifters tracks and the mesoscale features that our tools highlight supports this decision.

The sinking of the heaviest objects and the presence of floating objects is discussed both in the Introduction and at the beginning of Section 3.

2. The analysis performed at 2000 m depth is surprising. Why this depth, and not a different one? Of course, currents at these depths are calmer than at the surface, and consequently the Lagrangian dispersion will be smaller. The reason to include these results should be justified or in the worst case, deleted. It will be more interesting to show the 3D dispersion considering the full HYCOM model as this will show the final position of the debris.

We have removed that analysis in the current version.

3. And finally, the recent discoveries of some debris in the Reunion Island show that some of them could have been displaced from the accident area by the currents. I do not know if a comment could be added in view of this new information.

We have included some comments in the Introduction and in Section 3 regarding this finding. Some parts of the text have been reworded and the title changed as now debris is not absent.

ANSWER TO REFEREE 2

We want to thank this referee for his/her very useful comments that have been addressed as follows:

1. More questionable is the accuracy of the results of the paper to the real fate of the debris from the crashed plane MH370: different parts of the plane would have follow different fates, most of them sinking immediately

The sinking of the heaviest objects and the presence of floating objects is discussed both in the Introduction and at the beginning of section 3.

2. For the floating debris, I expect a strong influence of waves and wind, not included in the authors modelling. It is difficult to think on the nature of floating debris ... not surpassing the water line and thus no subjected to wind sailing effects (section 3) . Anyway the authors clearly state that they restrict to the consideration of such objects, which are assumed to follow the currents as passive fluid elements.

We have conjectured the type of object that could follow our modelling in the Introduction:

Large heavy pieces of the plane would have sank immediately, but small floating pieces are also expected. For instance, fuselage pieces similar to those recovered from the Air France Flight 447 flight, (see http://www.aviationlawmonitor.com/tags/air-france-flight-447/) which consisted of thin, flat, half submerged structures, or personal flotation devices, which potentially would have been driven mainly by ocean currents.

And also at the beginning of Section 3 we discuss on the distribution of shapes after the impact and wind effects:

The debris produced after a plane accident is due to the breakup of the plane and it depends on how it enters the water. Large heavy and unbroken pieces of fuselage would sink rapidly, however there exist reports of plane accidents (Chen at al 2015) which produced debris spread over a wide area, with light pieces that might have floated for a long time. The finding of a right wing flaperon from the plane on a beach of Réunion Island the 29th July 2015 confirms this point.

...

It is clear that wind action is not negligible when considering the leeway of different kinds of objects. Works devoted to exploring this contribution are for instance Breivik and Allen (2008); Breivik et al. (2011). As remarked there, wind action is strongly dependent on the shape and size of the object and on how it surpasses the waterline. Thus, an accurate study requires previous knowledge of the objects themselves, which are not known in this case (except for the flaperon). In this respect, our study addresses the scattering of flat and thin objects below the waterline which could have only been driven by ocean currents.

Our study clearly addresses the kind of debris that could share the properties of drifters, which as stated now in the Data section, are designed to avoid direct wind forcing and to represent motions under currents at a nominal depth of 15m. As we remark now also at the

Introduction, drifters are the only floating objects in the area, at the time of the impact, for which we have full knowledge of their time evolution. No comparison is possible with the real debris (except for the flaperon in the sense we mention in Section 3).

3. There is something however that should be thoroughly revised: The paper was probably written earlier, but after the discovery of some plane parts in Reunion Island last July, the text should be carefully checked. Statements such as ... not a single piece of debris from the aircraft has been found (3rd line of the abstract) are now simply false. I recommend the authors to reword some of the sentences to make clear that their scope is the dynamics on the few-months time scale. Afterwards (for example the time scales relevant to the newly found objects), some statistical approach would be more appropriate because of the large accumulated errors in long-time particle integration.

We have reworded the text in many places to make clear that our work addresses the search strategy at early stages after the accident. Consistently with the findings of Réunion Island we have reworded the text and suggested ways of addressing this finding.