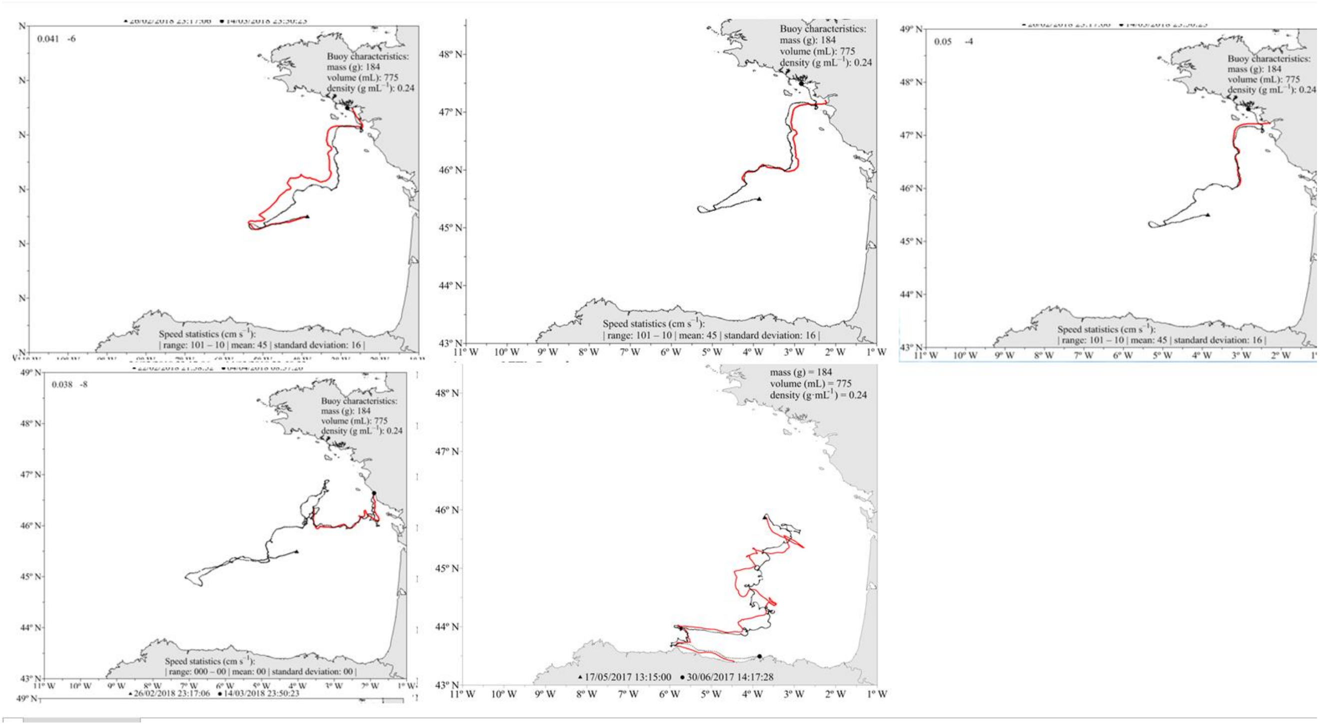
This article proposes a more complex mathematical model than previous models published in the literature to analyse the possible drift of Bluebottles due to the combination of wind and surface ocean currents. After reading the article, here are some general considerations to take into account in a discussion on this specific topic. In general, the size of the float of the Portuguese man-of-war that we find on the beaches is usually less than 15 cm, their tentacles do not usually exceed 3 metres in length and their wet weight can average 25-30 grams. In other words, we are talking about an extremely light organism, whose float is able to rotate very easily even in low winds. For example, in some parts of this video we can see a Portuguese man-of-war and how easily its float moves even in calm waters:

https://www.eitb.eus/es/eltiempo/videos/detalle/1382860/video-prediccion-llegada-medusas--azti/

Because this organism lives in the atmosphere-sea interface and we can say that the wind is the most important mechanism of its drift, since the surface ocean currents at the top level of the water column and the local waves are generated by the wind. That is, it is expected that the wind variable from prediction meteorological models (used in simple or complex drift models), by itself, will provide very adequate and useful information to model the drift of these organisms in a fairly efficient way. We are corroborating this fact in experiments with the launching of very light (<200 grams of weight) and cylindrical surface drifting buoys of approximately 10 cm x 10 cm (height x width). The trajectories of these symmetrical buoys or parts of these trajectories are adjusted in a very acceptable way with a simple drift model based only on wind (in black the real data and in red the simulated results in the figures below show some adjustment examples). Now we are analysing the drift of non-symmetrical buoys in order to simulate the dimorphism in the Portuguese man-of-war.



What we observe is that the greater the change in the characteristics of the real wind over time, the worse the prediction of this wind and the simulated trajectory of the buoys, since the meteorological model that predicts the wind offers worse results. Obviously, in areas where the current due to the tide is important or there are significant river discharges or the general circulation not induced by the local wind is intense or the swell is important, adding these components to the direct and indirect effect of the wind would be interesting. However, it would be necessary to predict these components with great precision and spatiotemporal resolution in order to obtain an optimal drift model. Currently, the coefficients of determination (r^2) of the wind in comparative meteorological model-real data are around a value of 0.7 in open waters and are below 0.5 in very coastal areas. If we take into account that the models of surface ocean currents (in the first centimetres of the water column) and the wave models depend on this wind prediction, we find that the r^2 of these models (currents and waves) decrease significantly, especially in direction. In other words, the fact of adding these components in a complex drift model does not seem a priori to offer a better solution than a simple drift model based only on wind. In addition, the velocities of these components should be also calibrated with coefficients for the specific organism or object being analysed. In fact, comparisons that we have carried out incorporating these components from different numerical current prediction models (HYCOM, NEMO, etc.) do not improve the predictions of the trajectories of the buoys based on a simple drift model that uses only the variable wind from meteorological models. Some recent works with heavier surface drifting buoys (for example, van Sebille et al. (2021), Dispersion of Surface Drifters in the Tropical Atlantic) is showing the need to greatly improve the outputs of leading hydrodynamic models that assimilate real data in order to reproduce the surface drift of objects. However, although it is possible to reasonably model a very specific object, we must be aware that accurately modelling the drift of an organism such as the Portuguese man-of-war from its initial stage to its adult stage or when it ends up on a beach is a task almost impossible. Furthermore, the complexity of a drift model that uses data from various prediction models (atmosphere, ocean and waves) does not guarantee a better solution to the problem. Additionally, complex models are associated with a considerable number of strong assumptions and coefficients or parameters to be determined for each specific organism. That is, they are very specific models for an organism with certain characteristics and cannot be considered as generalized models to solve a problem.

In the complex physical and mathematical approach presented in this article (I assume it is only applicable to an adult organism), the first thing that should be analysed is where the centre of gravity of the organism possibly is in order to correctly draw the diagram of forces. It is expected that the greatest weight of the organism is in the part of its tentacles (and more when the organism has trapped food), for which the centres of gravity of left-handed and right-handed individuals would have to be at different points. On the other hand, the Portuguese man-of-war is not symmetrical and assuming a perfect symmetry or that the submerged part where the tentacles are is a cylinder (and other assumptions discussed throughout the article) greatly conditions the results obtained. This is why the mathematical results obtained by the authors should be examined with great caution.

For example, in Figure 7, you write the following: “Figure 7. At an angle of attack of 90, the Bluebottle will sail downwind with sail perpendicular to the wind direction. This occurs at any camber. However, this Bluebottle orientation has not been observed”. If we take into account that the Portuguese man-of-war is asymmetric and its greatest weight is in the area of the tentacles, given the wind situation shown in figure 7, it would be reasonable to think that the front part of the organism would move faster than the part rear by rotating the organism clockwise to achieve a balanced position and changing the orientation of the float relative to the wind. The same happens in Figures 10 and 11 in which a current is introduced. Considering that the combined effect of wind and surface current will change the course of the organism, but it will not change the orientation of the float with respect to the wind seems to me a very strong assumption. I fully understand that trying to mathematically model the drift of this organism is extremely complicated and the authors have made a significant effort to do so. In my opinion, it would be interesting to analyse how the orientation of the float changes in conditions of wind and surface current, especially when the direction of the surface currents is far away from the direction of the wind or from the direction obtained assuming that Ekman's theory is valid and it is perfectly fulfilled (that is, surface current at 45 degrees with respect to the wind). Possibly this can only be done in controlled experiments in a wave-current tank.

Please, substitute along the paper the following reference “**Ferrer and Pastor-Rollan (2017)**” by “**Ferrer and Pastor (2017)**”.