This paper assess the drift of fishing FADs in the tropical Pacific using a numerical model and a Lagrangian simulator for FAD particle trajectories. It is argued that the results of this study can help with sustainable management of FAD resources and FAD pollution. I found the paper difficult to understand because of the exceptionally poor quality of the presentation. I wrestled between rejection and major revision, eventually settling on rejection since I can't offer constructive comments on how to salvage such a poorly conceived and executed study. My comments follow.

Below, we detail how we address the comments.

1. The Mercator model product used for estimating ocean velocities is presented as a black box. There is no attempt to illustrate the ocean circulation in the model, including mean, seasonal cycle, and ENSO time scale variations. How does the model represent eddy variability, where is it highest and how does it change with ENSO cycle variations?

Also, there no attempt at model validation or even a summary of what others have to done to validate the model. There is no comparison of the surface flows with flows averaged over the upper 50 m, even though this is a major theme of the analysis. Instead, we are treated to a child-like drawing of the Pacific Ocean circulation in Figure A1.

The reviewer is right that there was little validation of the hydrodynamic data that underpins the particle advection. We have now added a short summary of the validation of the MOI_GLO12_WEEKLY_run_for_DAILY_FORECAST product in the revised manuscript (lines 98-104):

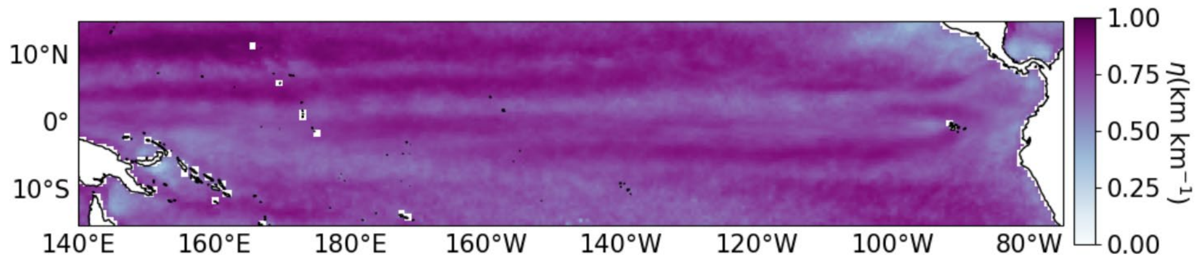
"*This product has been validated globally in Lellouche et al (2013), where it is found that the hydrodynamic data agrees well with independent observations. A very recent publication (Fritz et al 2023) also confirms that the product captures the circulation in the Indonesian Throughflow and western Tropical Pacific well. However, it is known that the tropical SEC is slightly too strong in the MOi data when compared to in-situ 15m drogued drifters (Lellouche et al 2021), which may result in a slight overestimation of virtual dFAD displacement and loopiness for virtual particles released in the SEC. There is no dedicated validation of the full Tropical Pacific circulation, but our analysis shows that the Nino3.4 index in the hydrodynamic data agrees well with sea surface temperature observations (see below).*"

As this manuscript is a process study, we feel that this is sufficient validation of the hydrodynamic data.

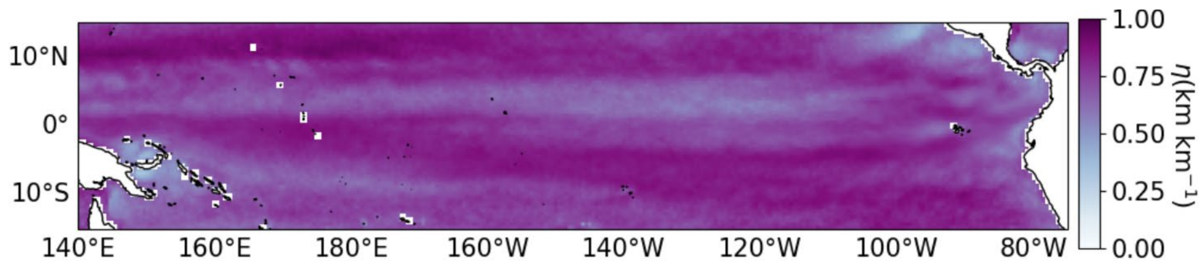
2. The definition of ENSO (Lines 141-144) is not conventional. Why do the authors use this instead or more conventional definitions? The higher threshold eliminates the 2006-07 El Nino which, though weak, is still considered an El Nino.

Our initial line of thought was that isolating the strongest ENSO events would lead to features which are representative of the grown stages of an ENSO. We now agree with the reviewer that the threshold was poorly chosen and as such did the analysis again with a more conventional deviation threshold of at least 5 consecutives months, where the ONI index (3 month running mean of Niño3.4 temperature deviations) exceeds 0.5 ^{o}C. The 2006-2007 el Niño is still not a part in the current dataset, because it is not fully captured within the timeframe of the used dataset, but the 2018-2019 el Niño is.

Though this particular analysis is no longer used (explained in the response to point 3), this approach resulted in the figures below, Fig. 1 of our comments. These respectively show the updated version of Fig. 2b and 2c of the original manuscript, that showcase the average distance ratio over all el Niño and la Niña events.



a)



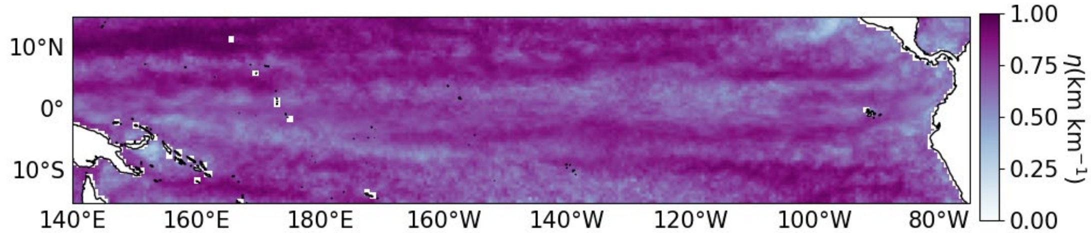
b)

*Fig. 1 Revised composite figures showing the average distance ratio of virtual dFADs after one month of travel during **(a)** all el Niño events and **(b)** all la Niña events. Values closer to 1 (in dark purple) indicate nearly straight trajectories, whereas values closer to 0 (in white) indicate stronger circulation. These figures are not used in the revised manuscript.*

3. The average of two El Ninos, 2009-10 and 2015-16, as somehow representative of El Nino is not convincing or useful. The two events are very different in spatial structure, amplitude, and temporal evolution. The analysis is further flawed by not taking into account the time evolution of these events (lines 260-61), somehow assuming fixed circulation for only one point in time.

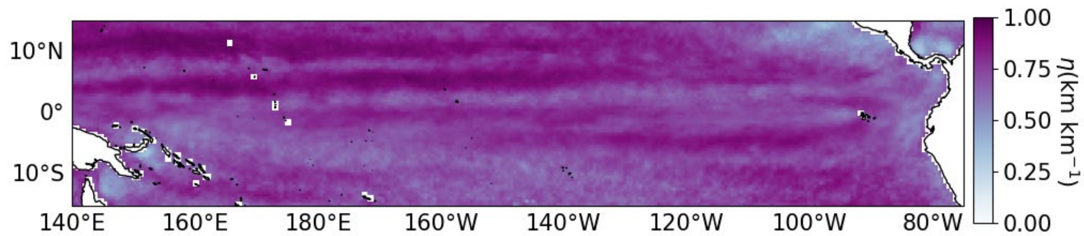
We partially disagree on the point that averaging the el Niño events is not useful, as we found that (with the new threshold values) the composite images of the 2009-2010, 2015-2016 and 2018-19 el Niño events are in general quite similar in their spatial structure of the calculated average distance ratio. These composite images are shown below in Fig. 2, but will not be a part of the revised manuscript. We agree that this method lacks the nuance of the temporal evolution of the individual events and as such chose to revisit this analysis altogether.

2009-2010



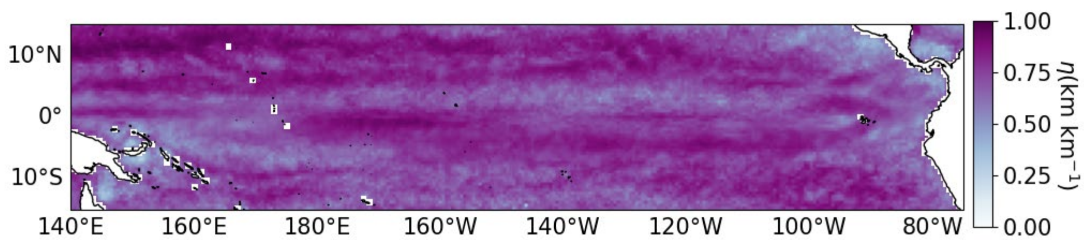
a)

2015-2016



b)

2018-2019

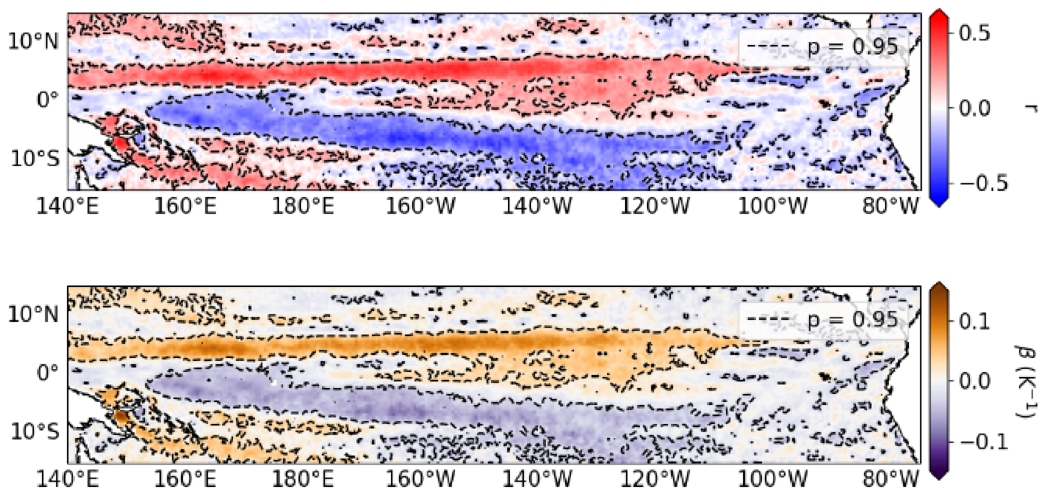


c)

*Fig. 2 Composite figures showing the average distance ratio of virtual dFADs after one month of travel during three separate el Niño events: **(a)** 2009-2010; **(b)** 2015-2016; **(c)** 2018-2019.*

Values closer to 1 (in dark purple) indicate nearly straight trajectories, whereas values closer to 0 (in white) indicate stronger circulation. These figures are not used in the revised manuscript.

To address the issues mentioned above, the same correlation analysis for this metric as was done for the other metrics is performed, which we agree gives a better representation of the ENSO variability. The (a) correlation and (b) linear regression coefficient of the distance ratio of the depth-integrated virtual particles with the Niño3.4 index is shown below, in Fig. 3. These two figures will be included in the new version and will replace Fig. 2b and 2c of the original manuscript.



(a)

(b)

*Fig 3. **(a)** Correlation between virtual dFAD distance ratio after 1 month and the monthly Niño3.4 index. Positive correlations are shown in red, whereas blue colours show a negative correlation. The dotted black lines mark regions where correlations are significant (probability values larger than 95%). **(b)** Linear regression coefficient between virtual dFAD distance ratio after 1 month and the monthly Niño3.4 index. Units are in K^{-1}.*

4. The written descriptions of displacement distance, travel distance, distance ratio, and “loopiness” are insufficient. These concepts should be illustrated with concrete graphic examples to make them understandable.

This is a good suggestion by the reviewer. We now include a graphic to illustrate the metrics better, shown in Fig. 4, as well as corresponding mathematical expressions in the textual description.

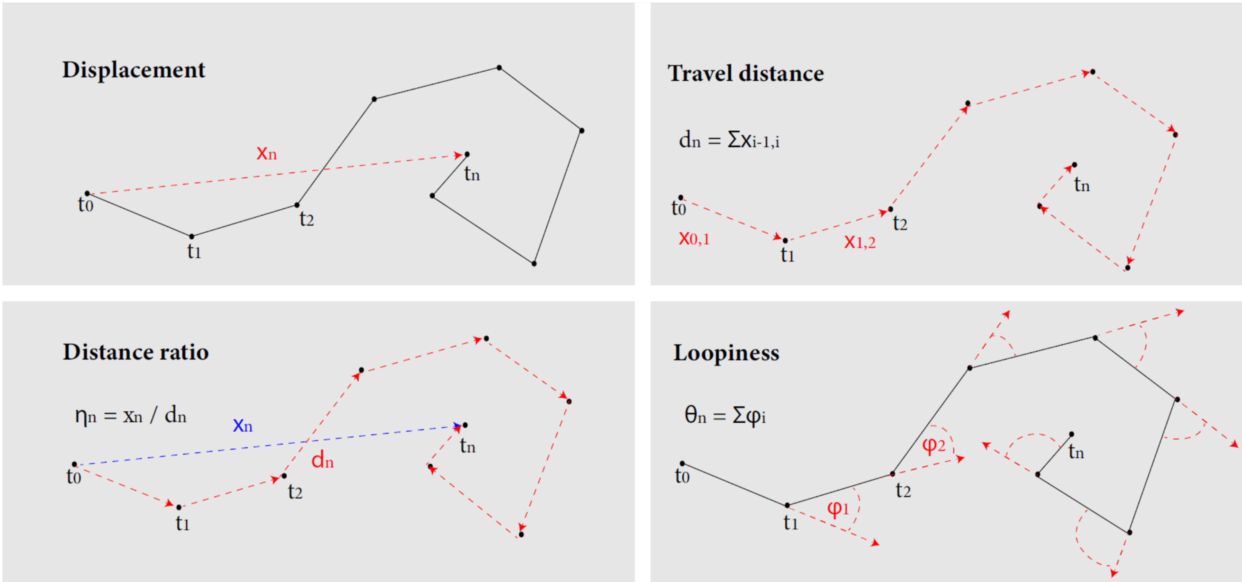


Fig. 4 Conceptual visualisation of the metrics used in this study: displacement (top left), travel distance (top right), distance ratio (bottom left) and loopiness (bottom right)

Lines 43-45. The description of the currents is incorrect. The flows are not in the directions indicated but in the opposite directions.

We have corrected this.

Lines 76-77. 35 to 65,000 or 35,000 to 65,000?

We have corrected this to 35,000.

Lines 95-96. Why did you use this period of time?

This was the time window for which MOi velocity-field data were available when we were running the particle simulations for this research.