We thank reviewer #2 for raising an important concern regarding the use of MODIS-Terra data into a multi-satellite merged product. We added a statement justifying this choice based on correlations with in situ data. Reviewer's comments are copied below and have been italicized, our responses are normal black font, citation from the manuscript are in blue font, ~~strikethrough~~ text was deleted, and new sentences that were added in the revised version, in response to reviewer comments, are shown in red font text.

This contribution investigates the Island Mass Effect (IME) in the Pacific Ocean, highlighting its potential significant impact on biogeochemical processes in oligotrophic waters surrounding remote islands and atolls. The study expands on the limitations of traditional remote sensing approaches that rely on L3 data with maximum resolution above 4km, which often fail to capture the full extent of sub-mesoscale and short-term temporal variations. It proposes an alternative enhanced approach that merges multi-sensor satellite data at a higher spatial resolution and integrates modelled surface currents to dynamically track chlorophyll enhancements associated with IME. The methodology is applied to four South Pacific island groups, suggesting that the ecological influence of IME may be larger than previously recognized, with important implications for broader ocean ecological studies.

Strengths of the Contribution

1. ***Innovative Methodology:*** *The research introduces a layered and carefully crafted methodology, combining ocean color data processing with modeled dynamic tracking of chlorophyll patches and filaments, as well as in situ calibration and validation measurements. This custom approach, it is proposed, addresses the limitations of legacy IME detection algorithms and significantly improves the spatial resolution of feature retrieval.*
2. ***Broader Implications:*** *By showcasing the potential broader ecological influence of IME, the study advances our understanding of global oceanic biogeochemistry. It provides a valuable foundation for investigating these processes in strongly stratified systems, such as the tropical western Pacific, where islands and submerged topography, as defined here, may cause significant perturbations that lead to enhanced productivity. This is particularly well articulated in L377, where the authors underscore the importance of IME. These regional results should be further evaluated in the context of global biogeochemical cycles, as well as in other island systems where background ocean biogeochemistry creates more eutrophic conditions (e.g., Galapagos, Ascension, Azores, etc.).*

Areas for Improvement

While the paper is a worthy contribution, some areas could benefit from refinement:

1. ***General study design (sensor choice justification):*** *The study effectively combines data from multiple sensors, including MODIS Terra, to detect changes in chlorophyll associated with the Island Mass Effect. While this approach is justified given the study's focus on detecting relative changes rather than establishing absolute chlorophyll*

concentrations, the authors should include a brief discussion of the known issues with MODIS Terra. Specifically, acknowledging its calibration challenges, and potential limitations for climate-quality data would enhance the transparency and robustness of the methodology. This acknowledgment would reassure readers that these factors have been considered and appropriately addressed in the study's design.

We would like to thank the reviewer for raising this concern regarding calibration challenges of MODIS-Terra. We added a short statement at the end of section "2.1.3 In situ and satellite match-ups":

Despite the well-documented degradation of the MODIS sensor onboard the Terra satellite and its potential impact on climate studies (Lyapustin et al., 2014; Xiong et al., 2019; Xiong and Butler, 2020), our analysis found no significant indication of reduced data quality in [Chla] estimates derived from MODIS-Terra Rrs. Correlations between in situ [Chla] and MODIS-Terra-derived [Chla] showed performance metrics (R^2, nRMSE, slope, and intercept) comparable to those of other satellite sensors included in this study (Table B1 and Fig. B2 b, c, and d). These findings suggest that the extensive correction and calibration efforts applied to MODIS-Terra data effectively mitigate the impacts of solar diffuser degradation, changes in scan mirror reflectance, and increased polarization sensitivity (Lyapustin et al., 2014). As a result, MODIS-Terra data can be reliably incorporated into the multi-satellite merged product used in this study.

The references Lyapustin et al., 2014; Xiong et al., 2019; Xiong and Butler, 2020 have been added to the reference list.

2. ***Section 3 (Assessment):*** *The results section contains substantial material (e.g., L315-320) that is methodological in nature. For clarity and better flow, this information should be moved to the methods section. This reorganization will help strengthen the distinction between methodology and results.*

The sentence starting line 307 belongs in the Methods, we moved it to section 2.1.4 and adjusted the previous two sentences accordingly:
"Time-series of 8-day ~~medians~~ periods were the smallest temporal binning we could achieve to recover nearly full satellite images in all the studied regions for six-month long time-series. Before computing the ~~medians~~ merged products of a given 8-day period and a given region, we grouped all re-projected level-2 images and removed outliers (see appendix C). To minimize the weight of outliers on the end level-3 products, the binning was performed with medians instead of averages."

We acknowledge the "Assessment" section still contains some methodological details including merging, binning, and the chl iteration step size however all these details are first presented in the method section. In the "Assessment" section, we assess our new approach, including the impact of merging, binning, and changing the iteration step size to demonstrate how these changes enhance IME detection using the algorithm developed in this study.

We have modified the sentence introducing the changes applied to the method from Messié et al. (2022) in the method section (line 206) to clarify that all the following statements describe the method updates developed in this study:

"We therefore extended the method proposed by Messié et al. (2022) by adding another set of detection protocols, here called step 2 and step 3."