

Interactive comment on “Divergence of seafloor elevation and sea level rise in coral reef regions” by Kimberly K. Yates et al.

Anonymous Referee #4

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The paper by Yates et al. analyses bathymetric data to quantify seafloor elevation changes in coral reef regions. As highlighted by reviewers 1 and 3, the dataset presented in the manuscript is especially impressive (number of sites considered, extent of the area considered). The results will be useful for coastal geomorphologists and managers concerned with the sustainability of coral reefs environments and the related ecosystem services. Despite the recommendation of reviewer 2, I think that the paper should be published after major revisions, to ensure that the amount of data analyzed in this work receives the attention it deserves.

Three previous reviews have extensively discussed the paper: overall, reviewers (1) have concerns regarding the ability of the method to retrieve seafloor elevation changes at the required accuracy; (2) made comments on the form of the paper; (3) and the interpretation of the results. The authors have already provided responses to several

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comments of the reviewers, and intend to implement corrections to their paper, which I think are reasonable. I would suggest that these major revisions are implemented, considering the following points:

- All reviewers agree that the paper should separate more clearly what is the overall approach (comparing bathymetric data) from the technical details of the GIS procedure used to produce this data. The authors have prepared a figure as part of their response to reviewer 1 to address this comment. However, I think that the figure remains too technical (e.g., use of the TIN surface wording), and I would support producing the detailed GIS procedure in an annex to the paper. Overall, I agree with previous reviews, who suggested that the authors should consider that their results may have a large impact beyond specialists of coastal bathymetric surveys, so that ideally, they should try to separate the main messages from the technical implementation details.

- While the comparison of historical bathymetric sounding with contemporary LiDAR is quite widespread in coastal geomorphology (as reminded by the authors, see AC2 – pages C6-C7), there is always the suspicion that the two techniques induce errors, as highlighted by reviewers 1 and 2. Such errors can arise because the techniques have not the same purpose and therefore don't necessarily capture the same proxies (e.g., highest seafloor elevation features for navigation applications vs average seafloor elevation feature for bathymetry data in support to coastal hydrographic modelling). The techniques also have different accuracy/precision (as discussed already), or because of time-sampling issues (as commented by reviewer 2). Overall, I think that the authors make a fair assessment of these errors: in the response of the authors to this comment of reviewer 2 (AC2 pages C8), information regarding the vertical resolution of the techniques is provided, while the precision issues are given in Table 4 in the original manuscript. To complete this assessment, I would suggest to provide more information on the planimetric resolution, and the vertical accuracy of the techniques in the core of the article. This includes details regarding the definition of a common reference, which incorporates sea-level rise constructions in a way, which is not completely clear to me

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based on the original manuscript, page 4 lines 10 and following. Nevertheless, I am confident this does not affect the results of the authors, as the RMSE in vertical datum adjustment is probably much larger than the RMSE due to uncertainties in relative sea-level changes for the sites of interest (table 4).

- Regarding the interpretation of the results: besides the aspects discussed with reviewer 1 and 2, I think that reviewer 3 provides a very clear line for improving the discussion section, and I hope that the authors will build on it in a future version of the article.

- Finally, I think that a “conclusion” section is needed.

I hope these comments are useful.

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