EGUsphere, referee comment RC1
https://doi.org/10.5194/egusphere-2022-514-RC1, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on egusphere-2022-514

Christopher Watson (Referee)

Referee comment on "Noumea: A new multi-mission Cal/Val site for past and future altimetry missions?" by Clémence Chupin et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-514-RC1, 2022

Title: Noumea: A new multi-mission Cal/Val site for past and future altimetry missions.
Authors: Chupin et al.

Comments:
This paper presents an analysis of various types of in situ data from the Noumea lagoon in New-Caledonia in order to assess the utility of the site for ongoing altimetry validation purposes. The work replicates a method whereby a suite of in situ measurements are used involving a bottom pressure gauge, surface GNSS buoy and coastal tide gauge. In addition, a novel towed sea carpet is used to assess local geoid slope. The work is generally presented to a high standard, making a strong case for the suitability of the site for this purpose. A number of areas within the manuscript would benefit from some revision and clarification - I therefore consider that the manuscript warrants publication following consideration of the following comments. I have summarised my more substantive comments below and have attached an annotated PDF which contains many more minor comments/suggestions throughout the manuscript.

1) One of the characteristics of existing validation facilities is a robust understanding of vertical land motion. In this paper, I felt that review of the land based GNSS sites and existing VLM time series was lacking - VLM was mentioned at various stages in the manuscript (including divergent estimates from ALT-TG records) but I felt this needed greater context and quantitative information presented to the reader. I was left feeling uncertain regarding the geophsyical context (e.g. proximity to co-/post-seismic signals), and wanted more of a sense of what the current GNSS record shows in terms of linearity/noise etc. Some additional review of previous work, plus perhaps some plots of GNSS time series in the appendices/supp material would be of benefit.

2) The hydrodynamical characteristics of the lagoon were of interest to me given these would often generate a gradient in sea level observed at the coast, at the location of a bottom pressure gauge and then further ofshore at an altimeter measurement location. Given the agreement between the tidally corrected tide gauge and BPR locations, this

doesn't appear to be a major issue for this site. I feel more could be made of this point - further, more detail could be provided regarding the quality of the tide gauge record (e.g. RSL trend(s), description of dominant non-tidal variability etc).

3) Several aspects of the GNSS buoy solution appeared to lack explanation. Variability in the GNSS solution is perhaps higher than I expected - I also expected to see greater comparison of the buoy v tide gauge when deployed in the harbour. The buoy data appears to be 1 sample per 10 seconds (I initially thought 10 Hz but statements in the appendix confirm 2 epochs = 20 seconds). Given this is slower than the wave period, there is significant scope for aliasing here - this choice needs to be defended, or the liklihood of aliasing further explored. There are also some furhter clarifications required on the GNSS processing settings used (eg Kalman filter configuration, mapping function selection etc) - see the annotated PDF for further details.

4) The magnitude and subsequent removal of trends in BiasAlt time series (Figure 9) requires further explanation and defence. The trend for Jason-1 is ~-4 mm/yr which is noticably different to Jason-2 and Jason-3. Is there an explanation for this? and coming back to point #1, could VLM be involved? Also relating to Figure 9, there appeared a number of outliers in the bias time series that warrant further investigation and possible discussion - e.g. three records for Jason-2 undoubtedly bias the standard deviation of this record and could be removed with justification. Are these symptomatic of erroneous altimeter data or do they provide insight to the lagoon dynamics? Comment on this would be insightful given the focus of the paper.

5) The absolute bias series presented are ~46 mm higher than other validation facilities. I wonder if the permanent component of the solid Earth tide has been appropriately considered in the analysis? This amounts to be ~34 mm at this latitude. The sign of this term would reduce the difference (assuming it has not already been applied). Without correcting for this bias, some of the statements made in the conclusions are not quite appropraitely defended and require revision (see annotated copy). Regardless of the permanent component of the solid Earth tide, the conclusion needs to make it quite clear that the absolute datum for this work is obtained from just a single buoy deployment - some mention of the likely uncertainty associated with the aboslute datum is therefore required.

6) I feel the abstract lacks quantitative statements to best represent its claims - I at least expected statements around the level of variability observed in the absolute bias time series and stability of the vertical datum in order to make the case for the location. Uncertainty also requires some mention in the abstract (e.g. the buoy issue raised in the previous point). I also note that the final comment in the short summary about sea level evolution in the lagoon is not covered in the abstract - these should be revised to be more consistent.

7) The paper could be strengthened by further elucidating the case for why further cal/val sites would be of benefit to the altimetry community. The rationale for altimetry validation is important - it is a fundamental component of mission design and takes many forms. I

would like to see the authors address this point which would assist to build the justification behind the publication.

Please see attached PDF for further comments/suggestions. Well done, nice work.

Please also note the supplement to this comment:
https://egusphere.copernicus.org/preprints/2022/egusphere-2022-514/egusphere-2022-514-RC1-supplement.pdf