ALTICAP: A new global satellite altimetry product for coastal applications

Answers to reviewers

RC1: 'Comment on essd-2025-560', Giuseppe M.R. Manzella, 16 Nov 2025 reply

Comments on

ALTICAP: A New Global Satellite Altimetry Product for Coastal Applications

by Cancet et al.

ESSD-2025-560

The article describes a product derived from altimetry data. Since I'm interested in the coastal zone, its processes, and their diversity from place to place, the title caught my attention. I found the article well-written, but, based on my needs for assessing coastal processes, it was very technical and less oceanographic: the data (and the products derived from it) are used to understand/evaluate the processes.

Based on this topic, I have only one general and one specific comment.

General Comment

The process adopted by the authors is highly professional and correct in all its components. As the authors wrote, it is important to have solutions that represent a compromise between the ability to obtain the best results while also ensuring continuity into the future. This is an interesting and ambitious goal, perhaps too optimistic since the product must be evaluated by intermediate/end users in their own applications.

ALTICAP's application area is the "coastal" zone between 0 and 200 km from the coast. An introduction that addressed not only the technical aspects but also the more oceanographic ones would have been useful. The "coastal zone" considered includes areas with different seabed types and dynamics: from the continental shelf of variable width (possibly less than 1 km) to the open sea with dominant geostrophic phenomena. Therefore, the very concept of "coastal application" should be better specified. ALTICAP's ability to capture sea level variability with a correlation and root-mean-square deviation of 0.74 and 9 cm is certainly better in some areas and less satisfactory in others.

Specific comment

The choice of tide gauges is based on criteria related to satellite operability and data quality requirements. It would have been interesting to discuss the results based on the different sea types to which ALTICAP is applied (enclosed, semi-enclosed, and open seas).

Conclusion

Overall, the article deserves publication, and the authors could add useful information for potential users by highlighting some use cases.

Thank you for your review and comments. Our main goal with the distribution of the ALTICAP product, and this associated data paper, is to provide the scientific community with a new global coastal altimetry dataset that can be easily accessed and handled for a large variety of studies, but which also allows, in a second step, the development of derived products to suit a wider variety of users. Even if it may sound too optimistic, our experience with other products developed and distributed by our group (e.g., the X-TRACK coastal altimetry product) shows that the priority is to make coastal altimetry data accessible and useful to users, as operational products are limited to that extent. Note that the product is distributed with reading codes and examples of use that we intend to enrich in the future, based on users' feedback. We added reference to this training material (Jupyter notebooks) in the text, as it provides examples of local applications. Users can then take advantage of such a new product and associated codes and develop their own use cases and applications. Based on their feedback, results and publications, we intend to further adapt the product if necessary (hence the planned extension to other missions such as Jason-2 and Sentinel-6 to have a longer time series).

We agree that more information about the coastal applications that can be addressed with such an altimetry product as ALTICAP was needed in the introduction. We have also added more details and a few sentences in sections 3.4 and 5 (conclusions). A Figure (new Figure 11) has also been added and illustrates the three geophysical variables (SLA, SWH and wind speed) collocated in space and time within the same product for easy and direct analyses.

As you mention, the ability of the ALTICAP product to accurately capture the variations in the sea level highly depends on the regions and coastal configurations. To highlight this aspect, we have added in Appendix B maps of the comparison at each tide gauge station, showing the diversity of situations we have considered in our validation with in situ observations. Note that the comparison to in situ tide gauge data is also part of the Jupyter notebooks distributed with the dataset.

Finally, we would like to point that, although the round-robin exercise that enables to build the product was performed on the coastal strip between 0 and 200 km from the coast, the ALTICAP product itself covers the coastal strip up to 500 km from the coast, which considerably widens the variety of coastal processes (including interactions with the open ocean) that can be studied with this product. To make it clearer to the reader, we have added the information about the product geographical coverage in different parts of the text, where we thought it would be relevant.

RC2: 'Comment on essd-2025-560', Anonymous Referee #2, 14 Dec 2025 reply

[General Comments]

The oceanographic community welcomes new datasets. Although the ALTICAP itself does not provide "new algorithms," this manuscript includes

1. selection of the best combination of algorithms through the round-robin tests (Appendix A)
2. importance of the validation flags (Section 3.3)
3. comparisons with the X-TRACK dataset (Section 3.4).

I believe these findings are useful to the community, so this manuscript should be eventually accepted.

However, I could not determine whether similar validation flags were applied in the round-robin tests. If the validation filters were not applied to the tests, it should be examined whether they affect the test results, because Section 3.3 shows they significantly control the quality of the data. For example, the "edited ALES" could be better than the "edited Adaptive," although the "raw Adaptive" was superior to the "raw ALES." Meanwhile, if similar flags have already been applied to the tests, Section 3.3 should come earlier in the manuscript.

In Figure 5, the authors explain that the RMS difference of the edited ALTICAP is higher than the X-TRACK due to the 20-Hz sampling. If the authors wish to emphasize the better quality of the ALTICAP dataset, this speculation should be examined by comparing the 20-point averaged ALTICAP data along the track to the X-TRACK data. Otherwise, readers would think that the X-TRACK is better, except for some narrow channels.

[Minor Comment]

The quality of coastal retracking algorithms strongly depends on the complexity of the coastlines, so the authors should better explain how and why only 14 tide gauges were selected. Can the authors show some specific tide gauges with straight or complex coastlines?

Thank you for your review and comments.

Regarding the validation flags presented in section 3.2, they were defined based on the final ALTICAP product and thus applied only to this dataset. For the algorithm selection process, a minimal editing was applied to the SLAs as described in section 3.1 (“SLA values outside the window [-3 m; 3 m] were systematically discarded everywhere. In the Mediterranean Sea, associated with generally lower SLA variations, a narrower window of [-1 m; 1 m] was applied. For each SLA point time series, values outside a 4 sigma window have also been removed from the computations, sigma being the standard deviation of the SLA time series.”). The validation flags discard data mainly in the last 20 km from the coast, and have very little impact offshore. In the example of the ALES versus Adaptive comparison, one of the reasons why the ALES algorithm was not selected is that its noise level is higher than that of the Adaptive algorithm in the offshore region, which would hence not be reduced with the validation flag.

Regarding Figure 5, this is a very good point, thank you for noting it. We have added the plots for the 20-point averaged ALTICAP data, and we show that the noise level is similar to X-TRACK in that case. It should be noted that the numbers for the distance to the coast at which 80% of the data are available have slightly changed compared to the first version of the manuscript, because we found a small issue in our estimation method. However, the new results are very close to the previous ones and the conclusions hold. Figure 2, which shows similar diagnostics for ALTICAP raw versus ALTICAP edited has also been updated accordingly, as well as the accompanying text in section 3.3.

Regarding the selection of tide gauges, we wanted to have a homogeneous repartition of stations worldwide. The main other constraints for the selection were the location less than 50 km from altimetry points, and the availability and quality of the tide gauge data over the ALTICAP product period. To highlight the large variety of configurations encountered with these tide gauges, we have added maps in Appendix B for each station. In general, it is very difficult to draw generic conclusions based on the configuration of the coastline and the relative positions of the tide gauge station and the altimetry track, as the coherency between the observations strongly depends on the spatial scales of

the local main ocean dynamics processes, which can largely vary from one coastal region to another. It can also depend on the quality of the altimetric corrections applied, which also varies from one region to another (for example: the importance of having accurate tidal corrections will not be the same in a microtidal and macrotidal region).

CC1: 'Comment on essd-2025-560', Marcello Passaro, 05 Nov 2025 reply

The abstract and the text should be correct. It is a false statement that ALTICAP is the "first global high resolution altimetry sea level product optimized for coastal applications". The "first global high resolution altimetry sea level product optimized for coastal applications" is the ALES dataset available through OpenADB https://openadb.dgfi.tum.de/en/products/adaptive-leading-edge-subwaveform-retracker/ since several years. This product is available at 1-Hz for direct download and 20-Hz data on request, and it is available globally.

Thank you for your comment, we have reformulated. We did not know that ALES was also available at 20 Hz. The OpenADB webpage you cite only mentions the availability of data at 1 Hz.