

Dear Referee #2,

Thank you for your review and for the constructive feedback on our manuscript. All comments have been taken into account and a list of responses and actions is given below.

Best wishes,

Erik Loebel and all co-authors

General Comments:

This work consists of a automatically generated glacial termini data product for 19 key outlet glaciers along the Antarctica Peninsula, and includes 2064 calving front locations from 2013 to 2023 at sub-seasonal temporal resolutions.

The manuscript covers the current state of the art in the field of machine learning/deep learning based cryosphere data extraction methods, as well as the need for such methods to be applied towards glacial data extraction. It describes the importance of calving front data for understanding dynamic glacier changes of marine terminating glaciers, and improving ice modeling. To address the labor-intensive obstacles required by manual delineation, an automatic deep learning-based processing system is developed to extract glacier fronts from satellite imagery. By leveraging the generalization capability of machine learning techniques to provide new observational constraints, this study contributes to groundwork that will enhance the cryosphere community's understanding of glacial dynamics and ice-ocean interactions.

The method uses the deep neural network trained on existing datasets to process Landsat 8 & 9 multiband imagery at spatial resolutions of 30m, and output Shapefile polylines at a spatial accuracy of 59.3 ± 5.9 m (average distance between the measured and predicted fronts). This which falls within human levels of accuracy (<107 m, Goliber et al. 2022).

The dataset itself is composed of zip files of the 19 basins, which are further organized into folders for each observed date, which then contain 2 set of Shapefiles (1 for the coastline, and 1 for the extracted glacial front). Metadata provides the name and date of the processed front. While the scope is small, the dataset still provides valuable new observational constraints.

We are thankful for your comments and remarks. In terms of the scope of our work, we'd like to inform you of planned changes to this data product (see RC1, Pages 1-3), in particular the increase in the number of glaciers covered from 19 to 41.

The publication is well done, and is largely free of grammatical errors and typographical issues. There are minor remarks to be addressed by the authors, after which I can recommend acceptance at the editor's discretion.

Specific Comments:

Dataset Coastline Quality

While the majority of the dataset is well curated, there are some coastlines in the dataset (i.e., drygalski_20210301_coastline, murphy_wilkinson_20191114_coastline, cayley_20141015_coastline,

cayley_20200227_coastline) that seem to have erroneous delineations, particularly along the domain boundaries. More validation or pruning of these data is needed, i.e. by manual pruning through visual GIS software, or some automated pruning by checking inter-annual differences between fronts to detect outliers.

The entire dataset will be reprocessed (see RC1, Pages 3-4) using the new width-dependent filtering. We will also manually check the data, especially the example you mentioned.

Dataset Coastlines Polygons

In conjunction with the above comment, it would be useful to have the glacial termini data in the form of land/ocean polygonal masks in addition to just a polyline, though this may be outside the scope of this work. This would also resolve the errors along the domain boundaries. Alternatively, provision of the domain boundaries would be helpful, as this would make it easier for modelers/community members to judge where errors are, and/or where the coastlines can be stitched to existing land/ocean masks.

Thank you for this suggestion. This was also raised by Referee #1. We are happy to include polygonal masks.

Dataset format

The organization of the dataset could be streamlined, such that the user can load an entire time series of a single domain without having to enter/navigate individual folders for each date, and/or make it more manageable for GIS software on less capable machines to load in all at once. Alternatively, such shapefiles could be consolidated, and the ability of Shapefiles to hold multiple features/delineations within a single file would be of use. Provision of monthly, quarterly, annual, or full time series files (similar to IceLines, Baumhoer et al., 2023) should be within scope.

The revised version will include a consolidated file for each glacier with all calving front traces. We will also include monthly and annual files for each glacier. Thanks for these suggestions.

Full time series results (area changes) are already available (<http://dx.doi.org/10.25532/OPARA-277>). These will be updated to include the new glaciers.

Accuracy Comparison w.r.t. Other Datasets

The mean/median distance and binary classification metrics are established accuracy measures in the calving front delineation field, and this study performs well on the evaluated test set. Considering L113P6: (“Although completely different test data sets are involved...Loebel et al. (2023c).”), it may be within scope to see a comparison with existing test sets/studies, to ensure the chosen test set is not biased, and the accuracy metrics are comparable. That being said, the generalization of the network is recognizable, so this can be done at the author’s discretion.

As our model uses multi-spectral inputs, there are currently no test or benchmark datasets other than the one we have processed. We can not test the model applied for this study with our TUD test set of *Loebel et al. 2023* as these test images are now included in the training data. However we can apply our model to the CALFIN and ESA-CCI test sets used in *Loebel et al. 2023*. The two test datasets

contain an additional 100 and 110 test images of Greenland outlet glaciers. Results will be reported in the revised version together with an extended accuracy assessment table in the supplement.

In conjunction with these additions, we'd like to let you know about planned changes to our accuracy assessment (see RC1, Pages 6-8).

Minor comments:

- It would be helpful to provide the spatial accuracy of the data to readers in the abstract.

Spatial accuracy will be included in the abstract.