College of Global Change and Earth System Science
Beijing Normal University
No. 19, Xinjiekouwai Street, HaiDian District
Beijing 100875, China
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Dear Editors,

Revision of ESSD manuscript 2020-340:

A 15-yr Circum-Antarctic Iceberg Calving Dataset Derived from Continuous Satellite Observations

It was a pleasure for us to read the encouraging comments and important suggestions provided by the reviewers. They were of great assistance in improving the quality of the manuscript. All of the comments and suggestions were considered during the revision process. Moreover, we have provided a new version of the manuscript along with a point-by-point response to all of the reviewers' comments.

The following pages provide the point-by-point responses to the suggestions made by the editor and reviewers and a detailed description of the changes made.

Yours sincerely,

The authors

Minor comments:

1. **In response 2, my understanding is that except for the actual coastline in 2005, 2010, and 2015 which were extracted from images (checked and manually corrected), the actual coastline in given year was modified from the simulated coastline by comparing with the images in that year. Considering that only the calved area was modified, so the cumulative error of the non-calved area will be larger after several years and a new benchmark (years of 2005, 2010 and 2015) is needed. I would like to know if there is any basis for dividing 15 consecutive years into three intervals, such as how much error is there before a new benchmark is needed.**

Response 1:

In order to reduce the error caused by the ice velocity during the iterative calculation of the coastline, we divided 14 consecutive years into three intervals. We used coastlines of 2005, 2010, and 2015 (checked and manually corrected) as the benchmark to control the error of coastline simulation within five years.

We have evaluated the positional accuracy of the simulated coastline in one-year interval (see Qi et al., 2020). The samples from the ice shelves' frontal edges only advanced, but those without calving events were chosen to assess the accuracy of the simulated coastline (as shown in the Figure 1). The specific method used is as follows. First, calculate the distance from the moved feature points on the simulated coastlines to the automatically extracted, and manually corrected, pixel boundaries of the ice shelves and the sea in the images. Then, determine the directions. If the feature points fall within the sea, the positional error is the distance value above. If the feature points fall on the ice shelf, the positional error is the negative value of the distance.

We measured the positional errors of all of the feature points (752 in total) in 30 samples. The errors generally exhibit a normal distribution with a standard deviation of 74.6 m and a mean value of 27.9 m. To some extent, there is a systematic error. This is because we regarded the distance from the feature points to the edge of the raster as the positional error, when in fact, the edge pixels are usually mixed pixels of ice and water. To further improve the accuracy, we choose the three benchmark coastlines (years of 2005, 2010 and 2015) as input, this is a choice that balances both the positional accuracy and the workload.

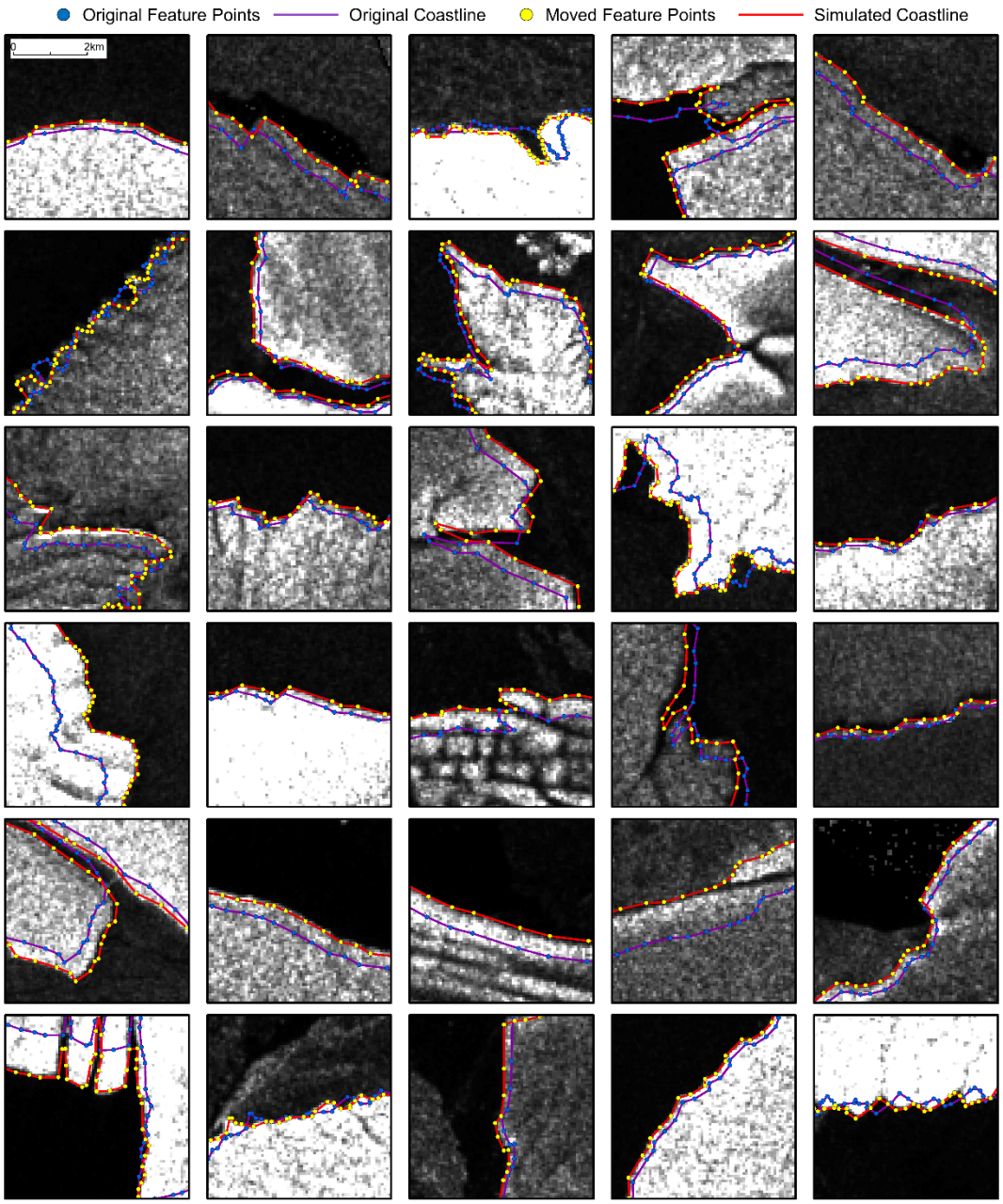

Figure 1. Samples used to validate the positional accuracy of the simulated coastline. The purple lines are the benchmark coastlines of the ice shelf's frontal edge in 2015. The blue points and yellow points are feature points before and after moving based on the ice velocity, respectively. The red lines are the simulated coastlines in 2016 generated by sequentially connecting the yellow points.

(Qi, M., Liu, Y., Lin, Y., Hui, F., Li, T., and Cheng, X.: Efficient Location and Extraction of the Iceberg Calved Areas of the Antarctic Ice Shelves, Remote Sens., 12, 10.3390/rs12162658, 2020.)

2. **Line 319, please add the unit "Gt" into calved mass.**
   Response 2: Corrected.