Summary: The authors compiled all publicly-available Greenland marine-terminating outlet glacier positions from a wide variety of authors and performed a rigorous standardization procedure with the aim of creating a terminus trace database that could train machine learning algorithms. A description of qualitative and quantitative differences between the sources is provided, as well as a cursory review of the terminus position data coverage and estimated retreat rates relative to single datasets. The discussion focuses on recommendations for use of these data in machine learning algorithms as well as generation of additional manual terminus trace data using the updated GEEDiT tool (called GEEDiT-TermPicks).

The manuscript is easy to read and documents much-needed work. Although I hope the standardized datasets and the "ideal" approach and output format for the terminus data will advance our field, I am a bit disappointed that this manuscript did not describe any novel insights gained from the combined dataset. I assume that is the topic of another manuscript, but it would have been nice to have this manuscript go a bit beyond a dataset description.

We appreciate the constrictive feedback and positive comments on the manuscript. Based on Reviewer #3's comments, we expanded on the usefulness of the dataset for both scientific and machine learning purposes in the text, primarily by improving figure 8. While we appreciate the desire for additional analysis, the manuscript itself is meant to present a new dataset that will be widely used by the glaciology community to produce new science with estimates of errors and temporal and spatial biases present in terminus traces. Additionally, many results regarding retreat have been published by the original data providers. As we addressed comments, the original line/section numbers of the text may have changed in the final manuscript. The changed text has been noted in the responses to individual comments. Our responses are in blue below each comment.

Major Points:

1. I'm not a huge fan of the title. A think there are lots of other applications for this dataset and I think it does the dataset a disservice for the title to suggest it can only be beneficial to machine learning applications. Also, there is no demonstration how the dataset improves machine learning applications (although the authors site machine learning manuscripts focused on glacier change). Instead, I recommend something broader, like "A standardized dataset and workflow for Greenland glacier terminus positions".
    - Title changed to "TermPicks: A century of Greenland glacier terminus data for use in scientific and machine learning applications." While we do not claim that we will improve machine learning itself, the addition of the new

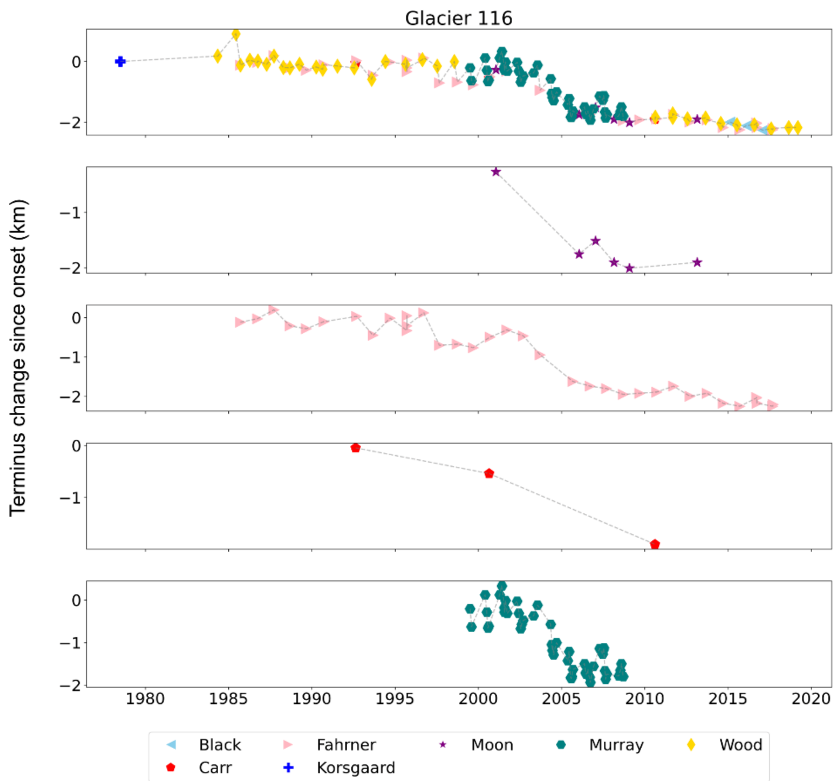
training data that includes image IDs will aid in improving the ability of machine learning to identify fronts in times of obstruction due to environmental factors and poor image quality (ice mélange, image saturation in early Landsat, etc.). This was an identified need to improve machine learning application by our co-authors who work on these issues. We agree with the reviewer that this data set will not only be useful for machine learning scientists. In section 2.4, we added the sentence "Including scene IDs is also useful in cases where scientists want to explore other features in the scene at the time of a terminus trace (e.g. iceberg distribution, sediment plume occurrence)" to make this more clear.

2. I appreciate that the results focus on errors and biases for individual traces, but I would also like more information on what the dataset can tell us about changes over time. This does not have to be a Greenland-wide description, but it is important to demonstrate how the combined dataset is much improved over individual datasets. There is one example figure (Figure 8) that is briefly mentioned in the discussion section as an example of the more "complete view of the change" for a glacier. It would be helpful if more examples were given, say as a series of subplots, and that some patterns in retreat rate, magnitude, or timing of changes in those metrics were presented for the broader dataset. Figure 6 gets close to doing this sort of broad overview to demonstrate merit, but doesn't adequately emphasize the value added by combining the datasets. If these sorts of metrics were presented for some of the contributing datasets as well, I think that information would really emphasize the need for coordination of efforts so that records are detailed in time but also extensive in both space and time. Right now there isn't anything that demonstrates the broad importance of the dataset you worked hard to create.

    - The authors plan on publishing subsequent papers on the application of the dataset, however the goal of the manuscript is to present a combined dataset with the addition of standardized metadata and image IDs for scientists to easily use these data. One of the largest indicators of the need for coordination is not only the usefulness, but the time it takes to create these datasets. In line 50, we estimate that it took approximately 48 hours per glacier to pick all available images in the Catania and others (2018) paper. Duplication of efforts precludes scientists from working on new questions and the goal of this paper is to reduce that.
    - To showcase the datasets merit further, we included subplots of individual author data in addition to the overall TermPicks dataset in figure 8 and compare the magnitude and retreat rate for a subset of authors (Moon, Fahrner, Carr, Murray) in 2000-2010. The retreat

magnitude and rates are comparable, the seasonality is only apparent when you include more data points. While the Fahrner data provides a single trace per year and the Carr and Moon data provide <1 trace per year on average to get the long-term magnitude of retreat, the lack of additional traces per year precludes the calculation of seasonality. While the record covers a shorter time, with an average of 6 traces per year for this glacier the Murray data provides enough traces per year to calculate a seasonal signal. The addition of the other authors (Korsgaard, Black, Wood) allows longer term retreat study and analysis of seasonality over the entire record.

- Updates Figure 8:



Author	Start	End	Retreat magnitude (km)	Retreat rate (m/yr)	Seasonality (m)
TermPicks	5/29/2000	9/21/2010	-2.01	-194.8	106
Moon	1/22/2001	1/28/2009	-1.74	-216.9	N/A
Carr	8/24/2000	8/13/2010	-1.365	-136.8	N/A
Fahrner	9/18/2000	9/11/2009	-1.425	-158.6	N/A
Murray	5/29/2000	9/15/2008	-1.92	-231.2	157

3. I'm not sure if this should be swapped in as a main figure or added as a supplemental figure, but I'd like to see heat maps or actual maps of the average temporal resolution and coverage for each glacier. You could potentially use

different symbol sizes and colors on an actual map to display those data. Right now the focus is on the number of traces for each glacier, which is important for machine learning, but the temporal resolution and coverage is much more important for someone who would want to analyze these data.

- Figures A9-11 in the Appendix demonstrate the number of traces per year for each glacier in our dataset. This shows how the temporal distribution of picks varies over each glacier. Additionally, we provide a Google Earth .kmz file in our data submission available on Zenodo that includes a Landsat coverage figure (examples shown in Figure 5) for each glacier so users can see the temporal coverage over the year for each glacier. While this only includes the Landsat data, as 70% of the dataset is Landsat, it provides a good overview of the temporal resolution and coverage for glaciers of interest.

4. In my opinion, the data formatting section should be below the metadata creation section. You mention scene IDs in the metadata creation but that comes after you already describe how you assigned IDs for datasets that did not contain that bit of metadata.

    - The name of the section was changed to “Landsat image scene identifiers” and moved below “Metadata Creation” section for clarity.

Minor Comments:

- Why is the ID flag 005 but all the other flags begin with X?
    - The flag of 05 referenced in section 2.5 Landsat image scene identifiers (formally “data formatting) refers to assigning Landsat IDs to only manually-delineated traces, therefore the prefix (X) of the quality flag will be 0. If it were referring to automatic traces, it would be 1.
- Section 3.3: There needs to be more quantitative substance here. You briefly state that you observe changes in retreat rates. What are the retreat rates? See my major comment about including more of a comparison with the contributing datasets to demonstrate difference.
    - The goal of this paper is to present a dataset that can be used widely by the scientific community. Many previous studies have already published retreat (Murray et al., 2015a; Cowton et al., 2018; Wood et al., 2021) and retreat rates (Box et al., 2017; King et al., 2020) and controls on retreat (Murray et al., 2015b; Catania et al., 2018; Fried et al., 2018; Slater et al., 2019). The purpose of the retreat section is to provide a check that our

dataset does not differ greatly from any of these previous studies. We plan to publish more detailed results with our terminus dataset in upcoming publications.

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