



Supplement of

Calving front positions for 42 key glaciers of the Antarctic Peninsula Ice Sheet: a sub-seasonal record from 2013 to 2023 based on deep-learning application to Landsat multi-spectral imagery

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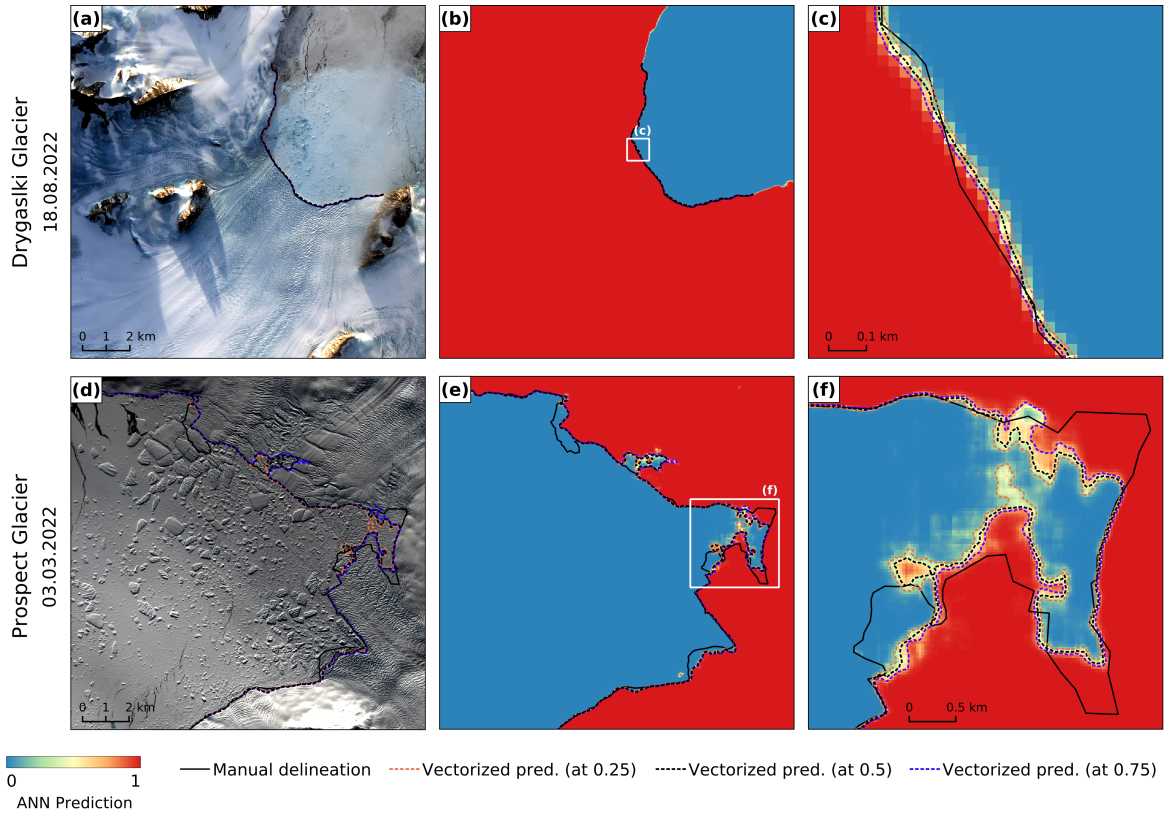


Figure S2. The effect of different vectorisation thresholds within our processing for two example images. Shown are the satellite image (a,d), the corresponding floating-point number prediction mask (b,c) as well as an enlarged spot at the front (c,f). A threshold of 0.5 corresponds to the predicted boundary between the glacier/land and ocean classes, i.e. the predicted calving front by our ANN. Landsat imagery courtesy of the U.S. Geological Survey.

Table S3. Average minimal distance and Hausdorff distance for the test data set generated in this study, the ESA-CCI test set and the CALFIN test set. For both estimates we give the mean and the median. The standard deviations result from the 5 different models.

Test dataset	Average minimal distance		Hausdorff distance	
	Mean (m)	Median (m)	Mean (m)	Median (m)
This study	59.3 ± 5.9	33.9 ± 1.5	405.1 ± 20.7	257.0 ± 14.7
ESA-CCI	79.1 ± 5.3	44.7 ± 0.5	364.0 ± 17.5	209.3 ± 13.0
CALFIN	78.7 ± 3.8	46.4 ± 1.8	242.7 ± 6.7	159.2 ± 4.5

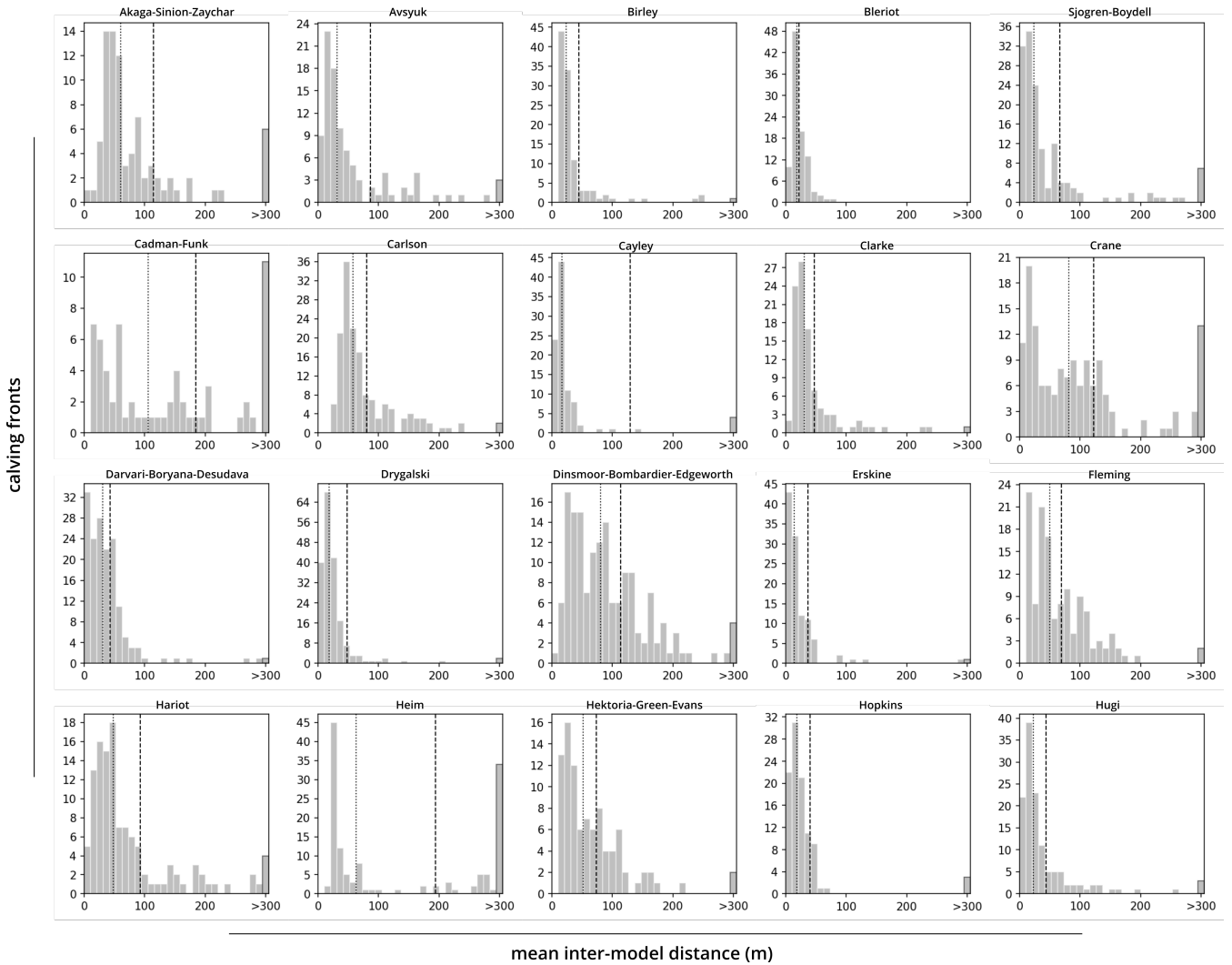


Figure S3. Histograms of the mean inter-model distance for all calving front entries of a glacier in our data product. The overall median is shown as a dotted line and the overall mean as a dashed line.

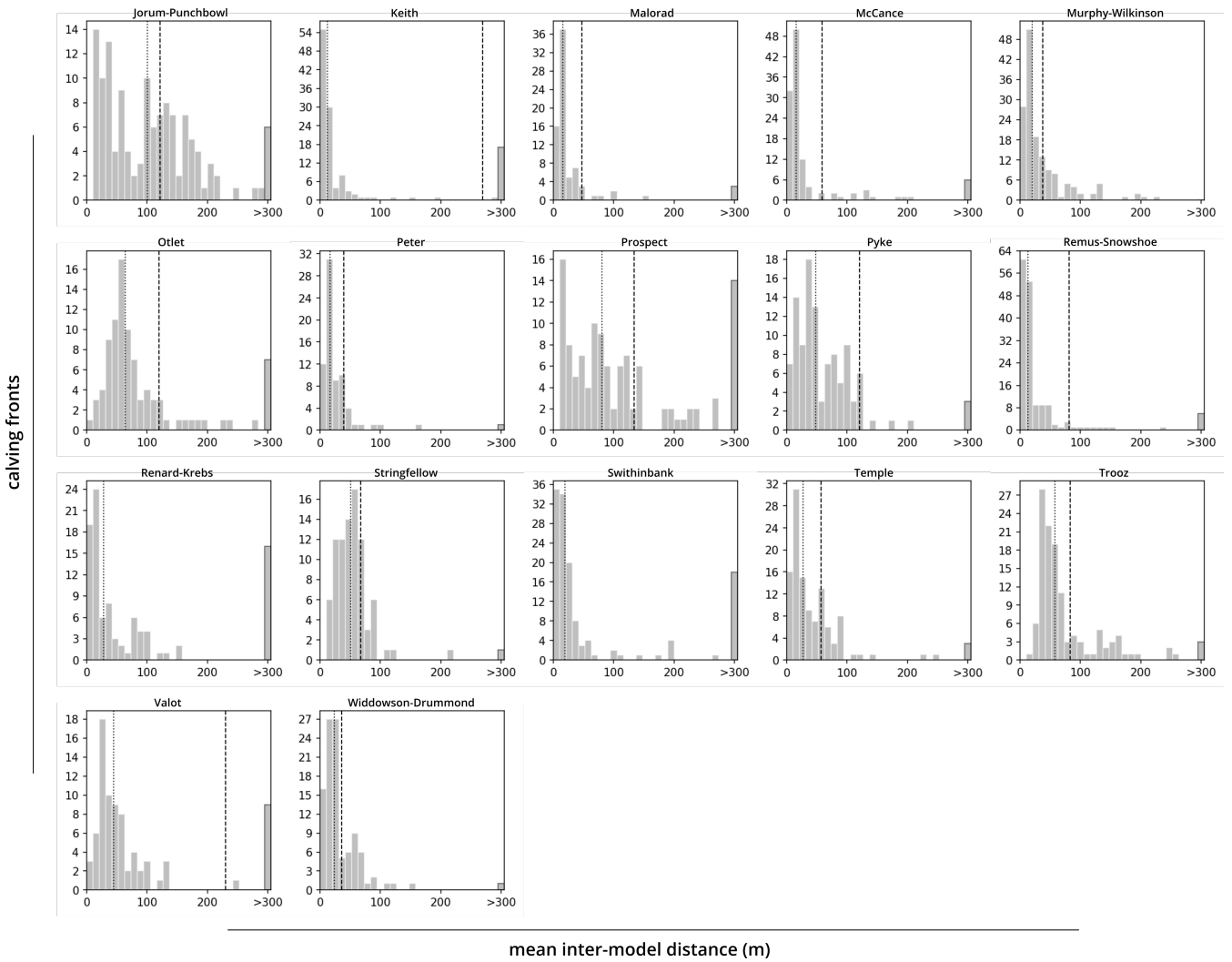


Figure S4. Histograms of the mean inter-model distance for all calving front entries of a glacier in our data product. The overall median is shown as a dotted line and the overall mean as a dashed line.

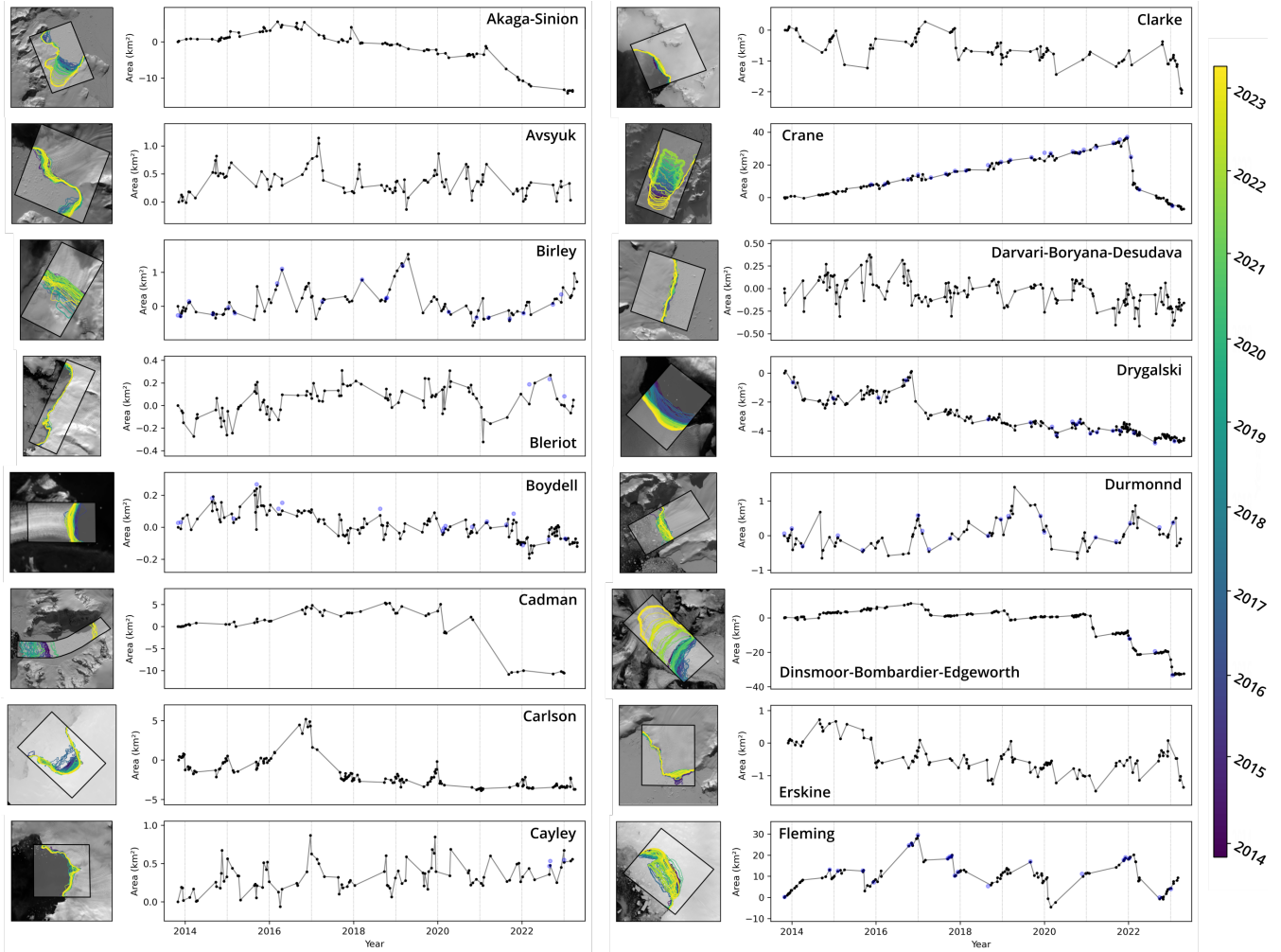


Figure S5. Time series generated by our ANN algorithm for 10 of the 19 glaciers provided in our data product. For each glacier, a satellite image, containing the color-coded calving front trajectories, and the corresponding time series is shown. Black dots connected by solid lines mark the automatically delineated calving front positions. The blue dots are additional validation marks that indicate the frontal positions of the manually delimited reference data set. The ANN model was trained using reference data from 2013 to 2021 and tested using data from 2022 and 2023. Note that the ordinate axis is scaled differently for each glacier. Landsat imagery courtesy of the U.S. Geological Survey.

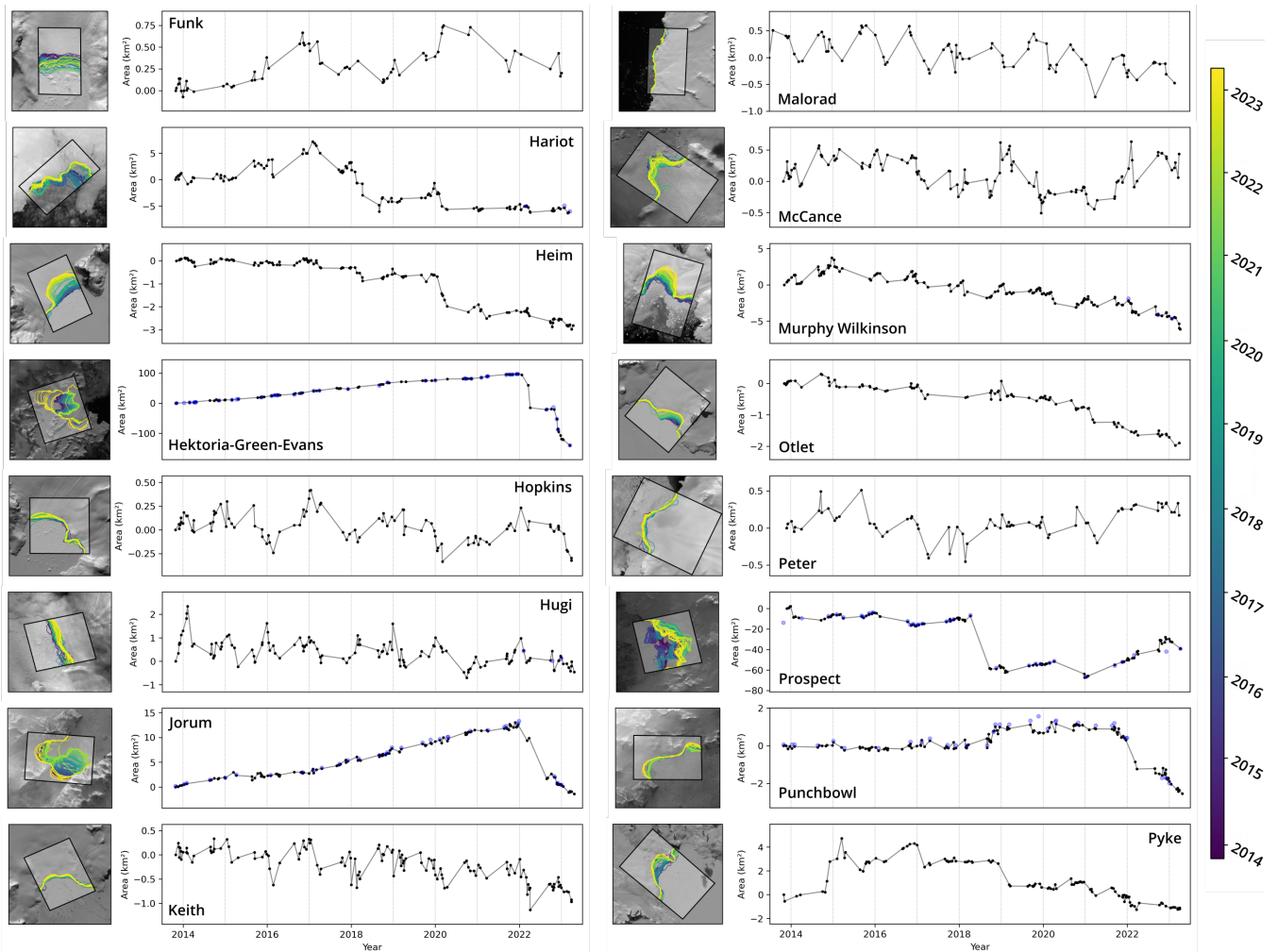


Figure S6. Time series generated by our ANN algorithm for 9 of the 19 glaciers provided in our data product. For each glacier, a satellite image, containing the color-coded calving front trajectories, and the corresponding time series is shown. Black dots connected by solid lines mark the automatically delineated calving front positions. The blue dots are additional validation marks that indicate the frontal positions of the manually delimited reference data set. The ANN model was trained using reference data from 2013 to 2021 and tested using data from 2022 and 2023. Note that the ordinate axis is scaled differently for each glacier. Landsat imagery courtesy of the U.S. Geological Survey.

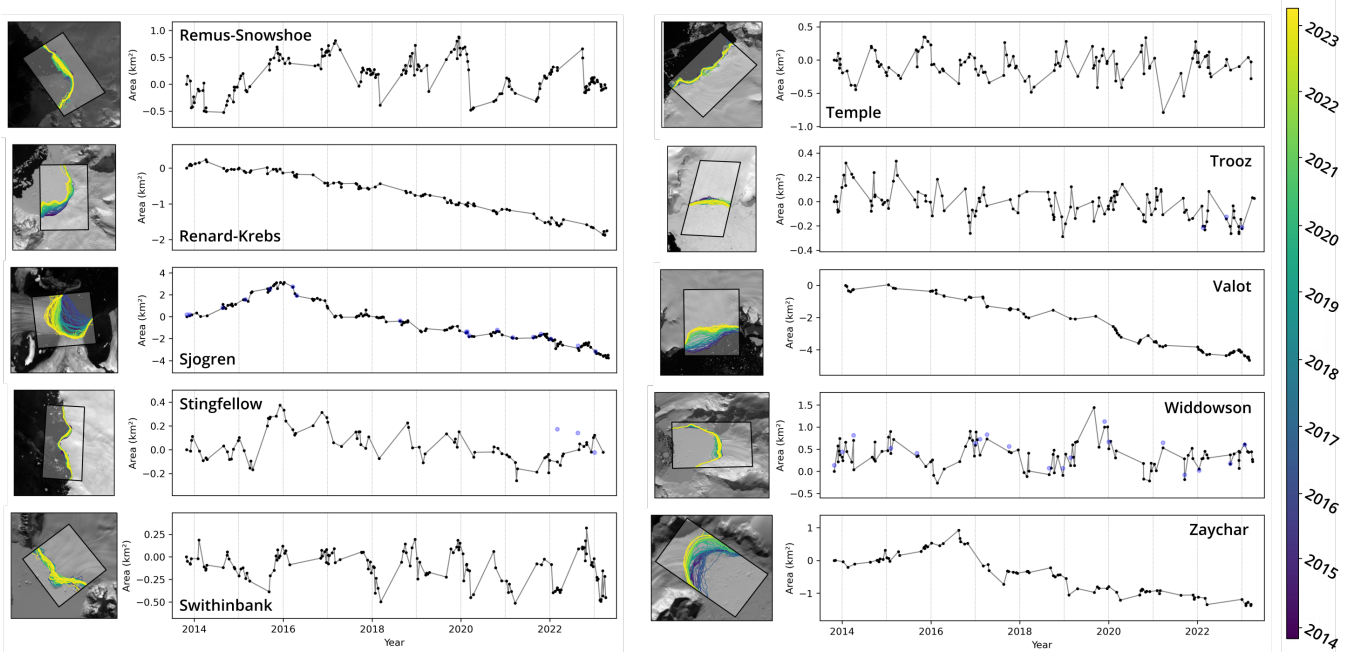


Figure S7. Time series generated by our ANN algorithm for 9 of the 19 glaciers provided in our data product. For each glacier, a satellite image, containing the color-coded calving front trajectories, and the corresponding time series is shown. Black dots connected by solid lines mark the automatically delineated calving front positions. The blue dots are additional validation marks that indicate the frontal positions of the manually delimited reference data set. The ANN model was trained using reference data from 2013 to 2021 and tested using data from 2022 and 2023. Note that the ordinate axis is scaled differently for each glacier. Landsat imagery courtesy of the U.S. Geological Survey.