

Supplementary Material

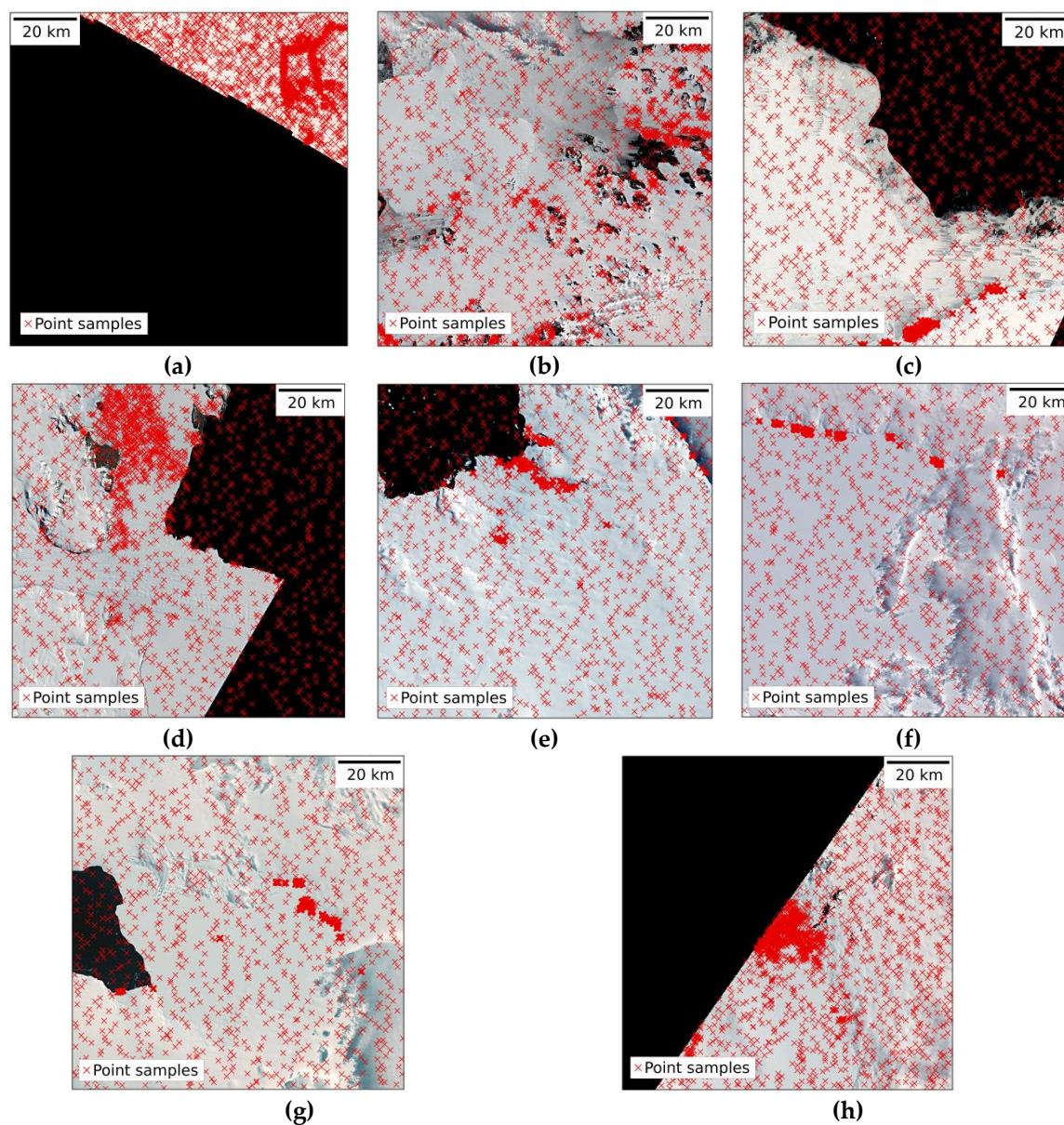


Figure. S1. Distribution of sampling points within the test scenes of (a) Nivlisen Ice Shelf, (b) Amundsen Bay, (c) Wilhelm II Coast, (d) Drygalski Ice Tongue, (e) Hull Glacier, (f) Abbott Ice Shelf (g) Cosgrove Ice Shelf and (h) George VI Ice Shelf.

Table S1. Sentinel-2 test data covering the 2017, 2018, 2019 and 2020 melt seasons over Amery Ice Shelf.

Number	Date	Relative Orbit
Melt Season 2017		
1	08 January 2017	75
2	08 January 2017	75
3	08 January 2017	75
4	27 January 2017	61
5	27 January 2017	61
6	27 January 2017	61
7	27 January 2017	61
8	27 January 2017	61
9	27 January 2017	61
10	27 January 2017	61
11	27 January 2017	61
12	27 January 2017	61
13	28 January 2017	75
14	28 January 2017	75
15	28 January 2017	75
16	28 January 2017	75
Melt Season 2018		
1	13 January 2018	75
2	13 January 2018	75
3	13 January 2018	75
4	13 January 2018	75
5	13 January 2018	75
6	13 January 2018	75
7	13 January 2018	75
8	22 January 2018	61
9	22 January 2018	61
10	22 January 2018	61
11	23 January 2018	75
12	23 January 2018	75
13	11 February 2018	61
Melt Season 2019		
1	02 January 2019	61
2	02 January 2019	61
3	02 January 2019	61
4	02 January 2019	61
5	02 January 2019	61
6	03 January 2019	75
7	03 January 2019	75
8	03 January 2019	75
9	12 January 2019	61
10	12 January 2019	61
11	12 January 2019	61
12	12 January 2019	61
13	12 January 2019	61
14	12 January 2019	61
15	13 January 2019	75
16	13 January 2019	75
17	13 January 2019	75

18	13 January 2019	75
19	13 January 2019	75
20	13 January 2019	75
21	13 January 2019	75
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Melt Season 2020		
<hr/>		
1	07 January 2020	61
2	07 January 2020	61
3	07 January 2020	61
4	07 January 2020	61
5	07 January 2020	61
6	07 January 2020	61
7	07 January 2020	61
8	07 January 2020	61
9	07 January 2020	61
10	07 January 2020	61
11	07 January 2020	61
12	07 January 2020	61
13	08 January 2020	75
14	08 January 2020	75
15	08 January 2020	75
16	18 January 2020	75
17	18 January 2020	75
18	18 January 2020	75
19	18 January 2020	75
20	18 January 2020	75
21	18 January 2020	75
22	18 January 2020	75
23	18 January 2020	75
24	18 January 2020	75
25	18 January 2020	75
26	18 January 2020	75
27	18 January 2020	75
28	18 January 2020	75
29	18 January 2020	75
30	18 January 2020	75
31	18 January 2020	75
32	18 January 2020	75
33	18 January 2020	75
34	27 January 2020	61
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Table S2. List of acronyms introduced throughout the paper.

Acronyms	
ADD	Antarctic Digital Database
AIS	Antarctic Ice Sheet
API	Antarctic Peninsula
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AWEI	Automated Water Extraction Index
BOA	Bottom-Of-Atmosphere
DEM	Digital Elevation Model
EA	Expected Accuracy
EAIS	East Antarctic Ice Sheet
EC	Errors of Commission
EO	EO
ESA	European Space Agency
F ₁	F-measure
FN	False Negatives
FNR	False Negative Rate
FP	False Positives
FPR	False Positive Rate
GrIS	Greenland Ice Sheet
ICESat	Ice, Cloud and Land Elevation Satellite
K	Kappa
MEaSUREs	Making Earth System Data Records for Use in Research Environments
ML	Machine Learning
MOA	Mosaic of Antarctica
MODIS	Moderate Resolution Imaging Spectroradiometer
MSI	MultiSpectral Instrument
NASA	National Aeronautics and Space Administration
NDGI	Normalized Difference Glacier Index
NDI	Normalized Difference Index
NDSI	Normalized Difference Snow Index
NDWI	Normalized Difference Water Index
NIR	Near-Infrared
NWI	New Water Index
OA	Overall Accuracy
OOB	Out-Of-Bag
P	Precision
R	Recall
REMA	Reference Elevation Model of Antarctica
RF	Random Forest
ROI	Region of Interest
S2A	Sentinel-2A
S2B	Sentinel-2B
SAR	Synthetic Aperture Radar
SAVI	Soil-Adjusted Vegetation Index
SCL	Scene Classification Layer
SI	Shadow Index
SMB	Surface Mass Balance
SWI	Soil/Water Index
SWIR	Shortwave Infrared
TC	Tasseled Cap
TN	True Negatives
TOA	Top-Of-Atmosphere
TP	True Positives
TS	Total Samples
WAIS	West Antarctic Ice Sheet