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Using deep learning and multi-source remote sensing images to map landlocked lakes in Antarctica

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Table S1. The normalized backscatters in SAR images. We sampled the land ice and sea ice with obviously lower backscatters, rather than sampling randomly. The backscatter averages of sampled land ice during September to December are similar to those of sampled LLOW during January.

Image	Land cover	Sample size	Min	Mean
VHs_2019_10_02	Land ice	146059	-1.83	-1.41
	Sea water	392647	-1.87	-1.55
	Sea ice	585496	-1.88	-1.60
VHs_2017_11_06	Land ice	32353	-1.76	-1.34
	Sea water	1225456	-1.75	-0.95
	Sea ice	448936	-1.79	-1.19
LHs_2019_11_28	Land ice	2444	-1.70	-0.95
	Sea water	110285	-1.86	-1.63
	Sea ice	248556	-1.85	-1.48
LHs_2018_01_25	LLOW	1435	-1.69	-1.31
LHs_2017_01_22	LLOW	3302	-1.75	-1.37

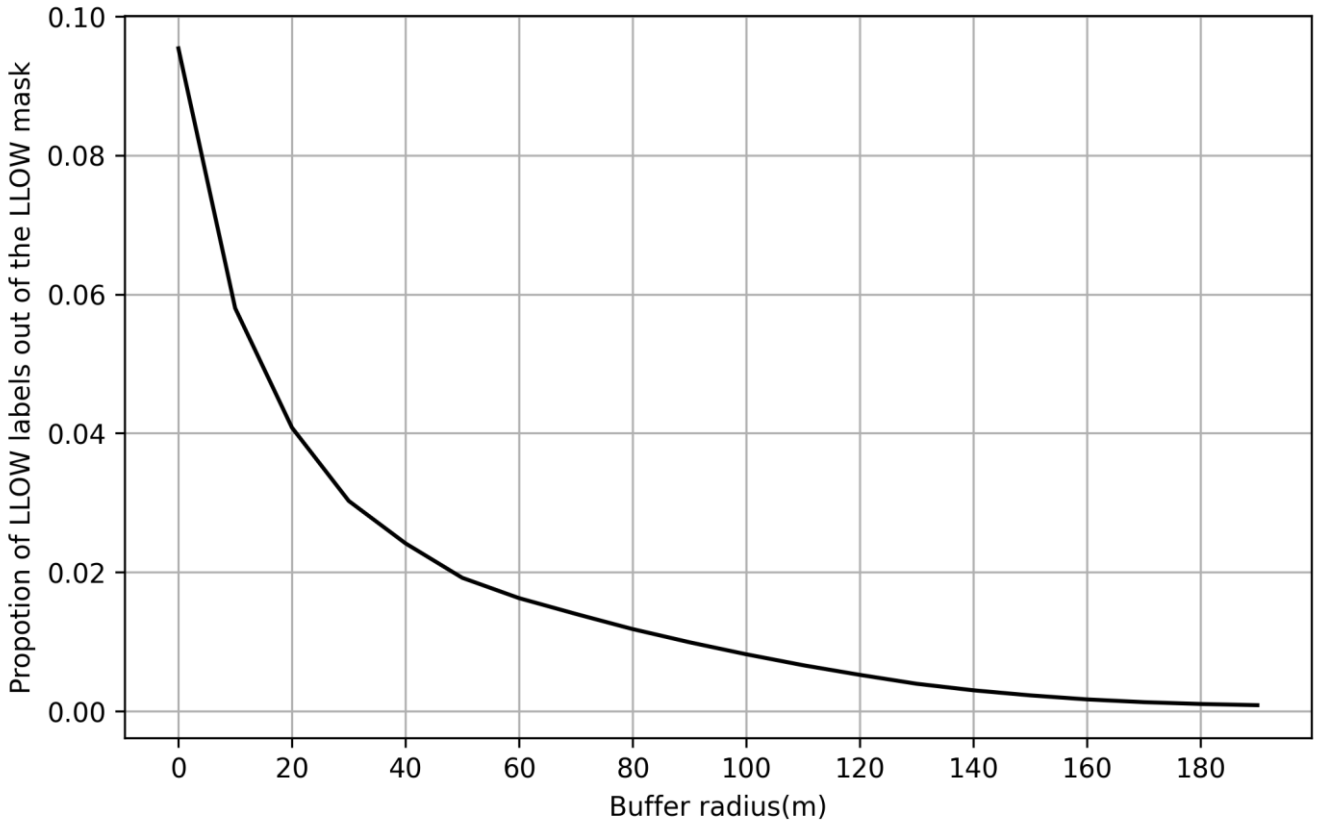

Figure S1. The relationship between the buffer radius and proportion of LLOW out of the potential LLOW areas. As the buffer radius increases, the rate at which the proportion of LLOW out of the mask decreases slows down significantly.

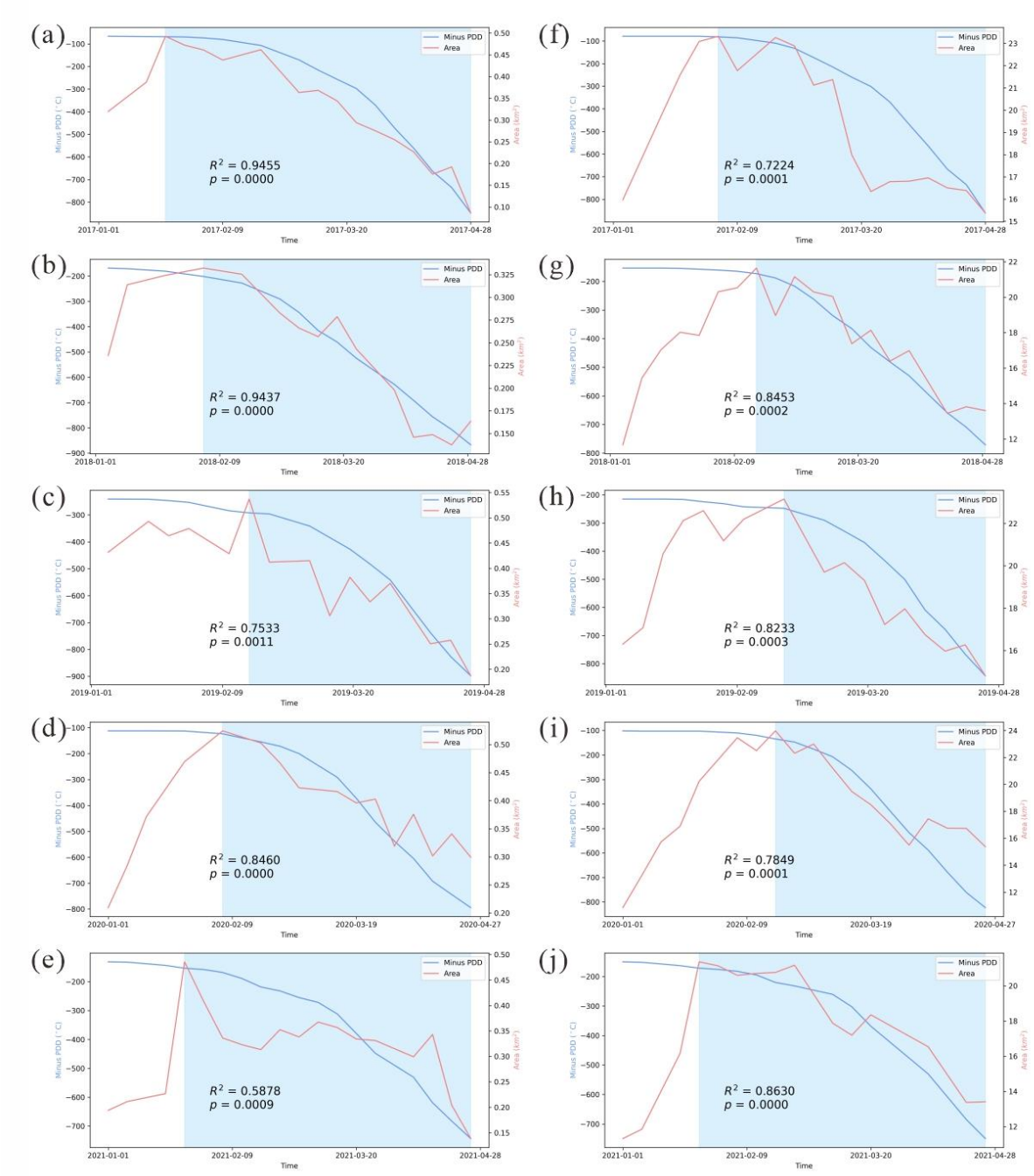

Figure S2. The negative degree-day sums (NDD) and landlocked lakes' open water (LLOW) area change during the 2017 (a), 2018 (b), 2019 (c), 2020 (d), and 2021 (e) melt seasons in Larsemann Hills (LHs) and during the 2017 (f), 2018 (g), 2019 (h), 2020 (i) and 2021 (j) in Vestfold Hills (VHs). In the figure, the blue interval represents the decline phase of LLOW area. The R^2 value in the figure is calculated from a linear fit of NDD and LLOW area during the decline phase.

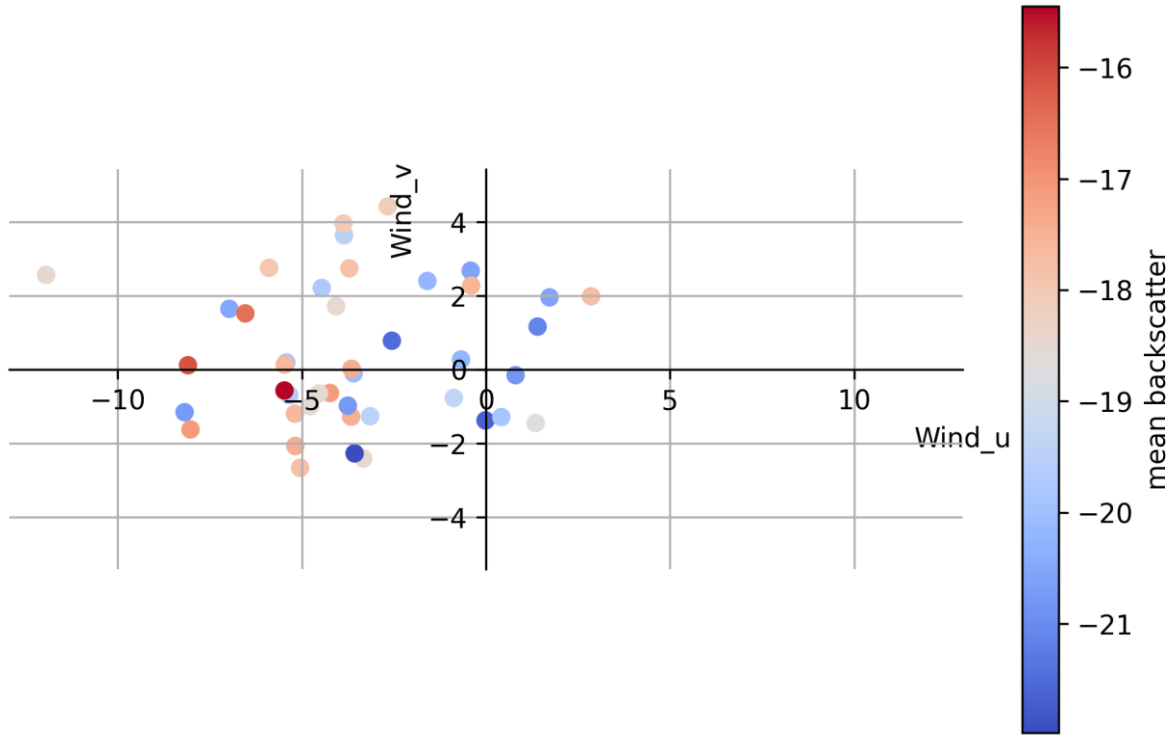

Figure S3. The relationship between mean backscatter of LLOW and wind features. LLOW samples came from the 46 annotated sample patches. The wind_u and wind_v were derived from ERA5 dataset, representing the wind velocity in the east and north direction respectively. There is no significant correlation between mean backscatter and wind speed or direction.

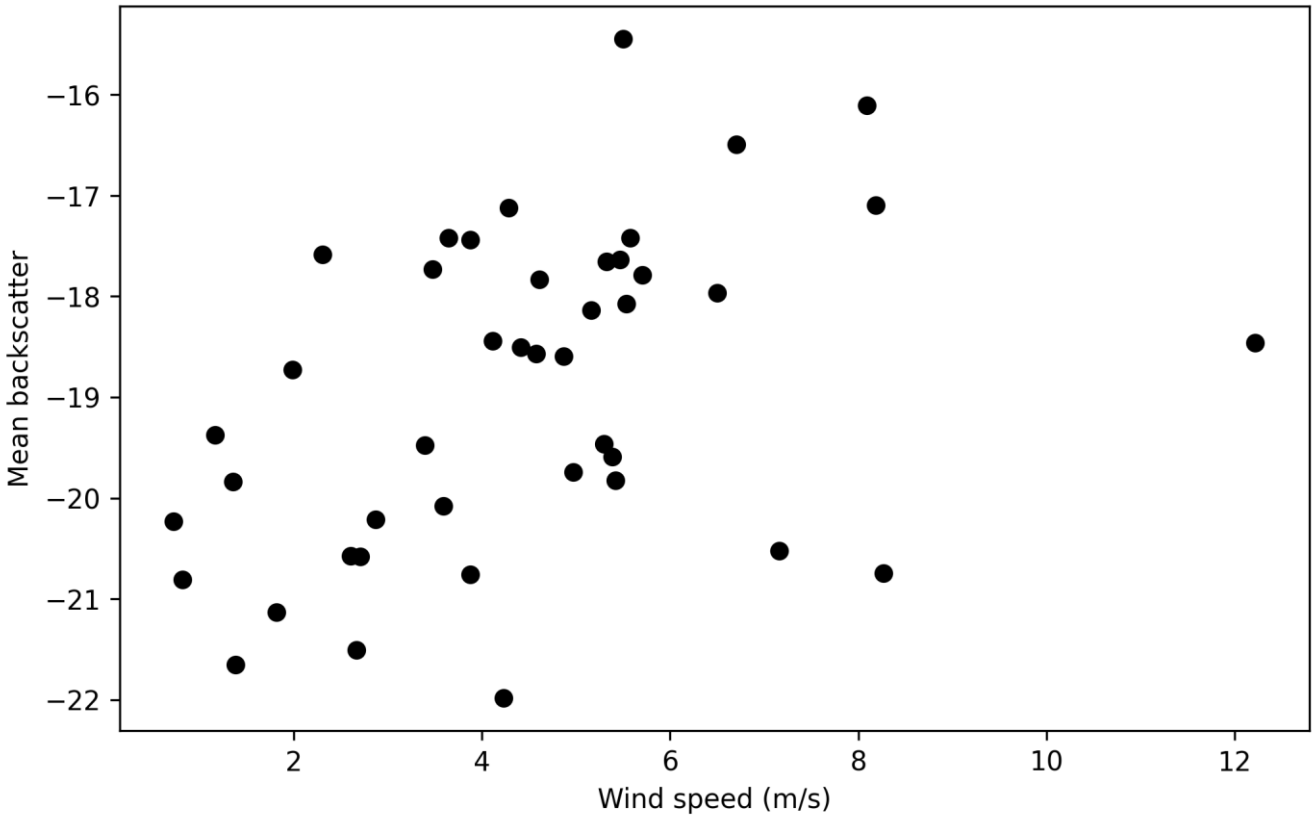

Figure S4. The relationship between mean backscatter of LLOW and wind speed. LLOW samples came from the 46 annotated sample patches. The wind speed was calculated from wind_u and wind_v. There is no significant correlation between mean backscatter and wind speed.

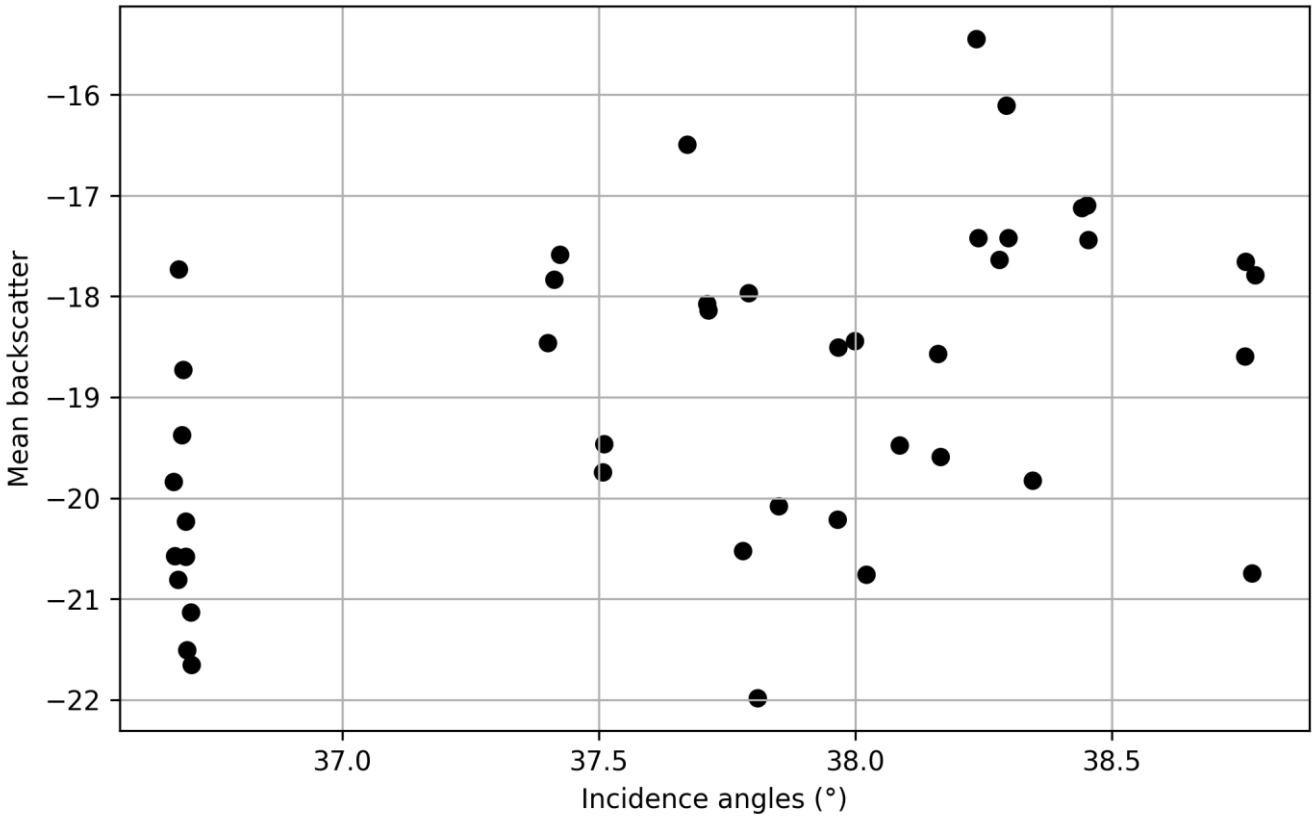

Figure S5. The relationship between mean backscatter of LLOW and incidence angles. LLOW and incidence angles samples came from the 46 annotated sample patches. There is no significant correlation between mean backscatter and incidence angles.

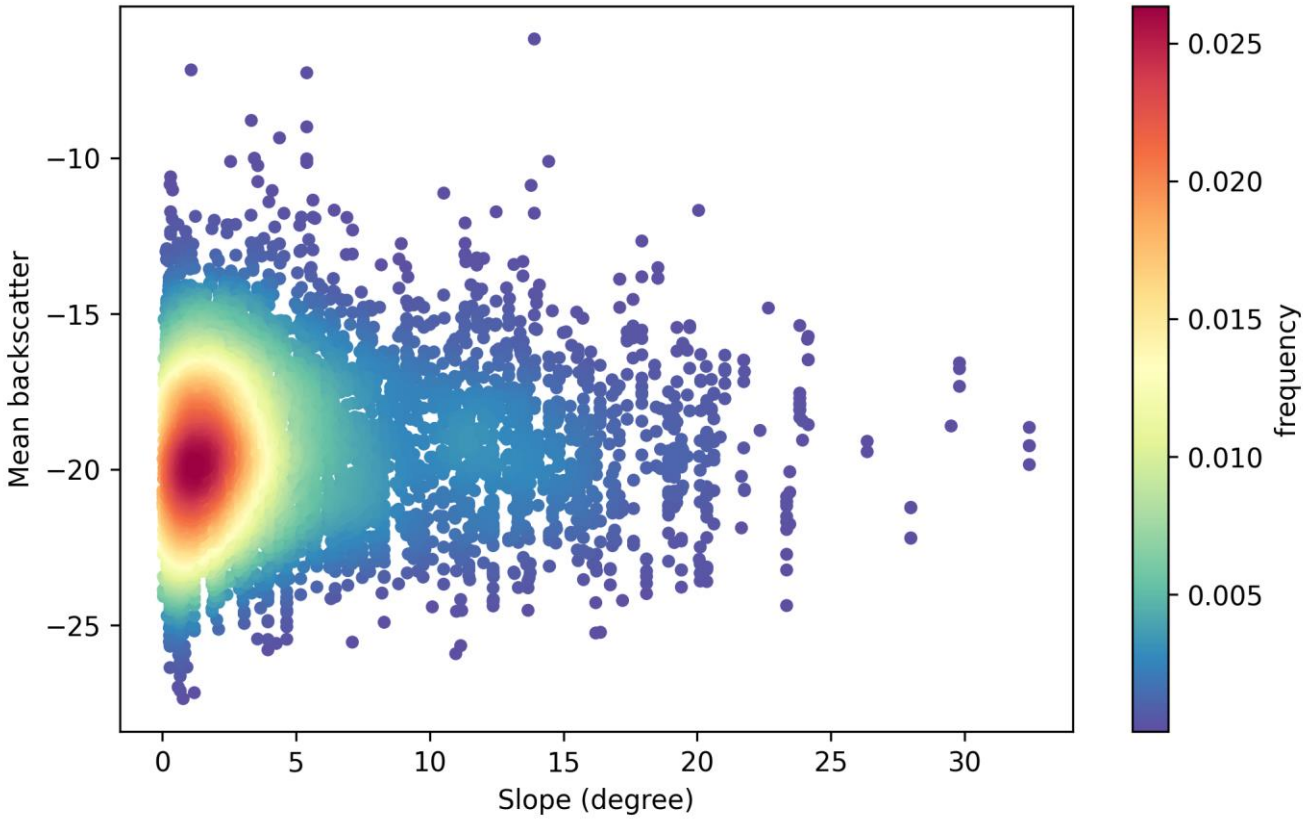

Figure S6. The relationship between mean backscatter of LLOW and slopes. LLOW and slope samples came from the 46 annotated sample patches. There is no significant correlation between mean backscatter and slopes.