



Supplement of

The role of föhn winds in eastern Antarctic Peninsula rapid ice shelf collapse

Matthew K. Laffin et al.

Correspondence to: Matthew K. Laffin (mlaffin@uci.edu)

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Supplement

Table S1. Föhn classification sensitivity study statistics

Study	AWS 18				AWS 17				AWS 15				AWS 14			
	Föhn Occurrence	True Positive	False Positive	False Negative	Föhn Occurrence	True Positive	False Positive	False Negative	Föhn Occurrence	True Positive	False Positive	False Negative	Föhn Occurrence	True Positive	False Positive	False Negative
This Study	771	771	0	0	190	190	0	0	162.5	162.5	0	0	163	163	0	0
	742	739	3	29	193	187	6	3	159.2	152.2	7	3.2	150	142	8	13
Cape et al., 2015	(96.2 %)	(95.8 %)	(0.4 %)	(3.8 %)	(101.6 %)	(98.4 %)	(3.2 %)	(1.6 %)	(98.0 %)	(93.7 %)	(4.3 %)	(2.0 %)	(92.0 %)	(87.1 %)	(4.9 %)	(8.0 %)
	757	753	4	14	180	174	6	10	160.5	154.5	6	2	159.2	149	10.2	3.7
Datta et al., 2018	(98.2 %)	(97.7 %)	(0.5 %)	(1.8 %)	(94.7 %)	(91.6 %)	(3.2 %)	(5.3 %)	(98.8 %)	(95.1 %)	(3.7 %)	(1.2 %)	(97.7 %)	(91.4 %)	(6.3 %)	(2.3 %)

Note: Each value is the average number of classified föhn melt event hours per year. Each of the classification methods are compared to AWS identification and this study. True positive represents the methods ability to correctly classify föhn hours defined by AWS/this study. False positive represents the methods classification of a föhn event when AWS/our model does not classify an event. False negative represents the method did not classify a föhn event when aws/our model did.

Table S2. Ice shelf intercomparison to the LBIS. T-statistic was calculated using a two-tailed t-test.

Bold values represent ice shelves that are significantly different from the LBIS at the 95% confidence interval.

Surface Melt Production

	Total		Non-föhn		Föhn	
	t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
Larsen A	0.04	0.969	-0.39	0.695	0.54	0.591
SCAR inlet	2.01	0.050	1.23	0.225	2.75	0.009
Larsen C (north)	2.44	0.019	1.60	0.117	3.18	0.003
Larsen C	4.57	0.000	3.99	0.000	4.73	0.000

Air Temperature

	Total		Non-föhn		Föhn	
	t-statistic	p-value	t-statistic	p-value	t-statistic	p-value
Larsen A	-5.01	0.000	-6.19	0.000	-7.24	0.000
SCAR inlet	2.90	0.006	2.13	0.039	2.20	0.033
Larsen C (north)	2.29	0.027	1.78	0.082	4.23	0.000
Larsen C	6.55	0.000	6.27	0.000	8.80	0.000

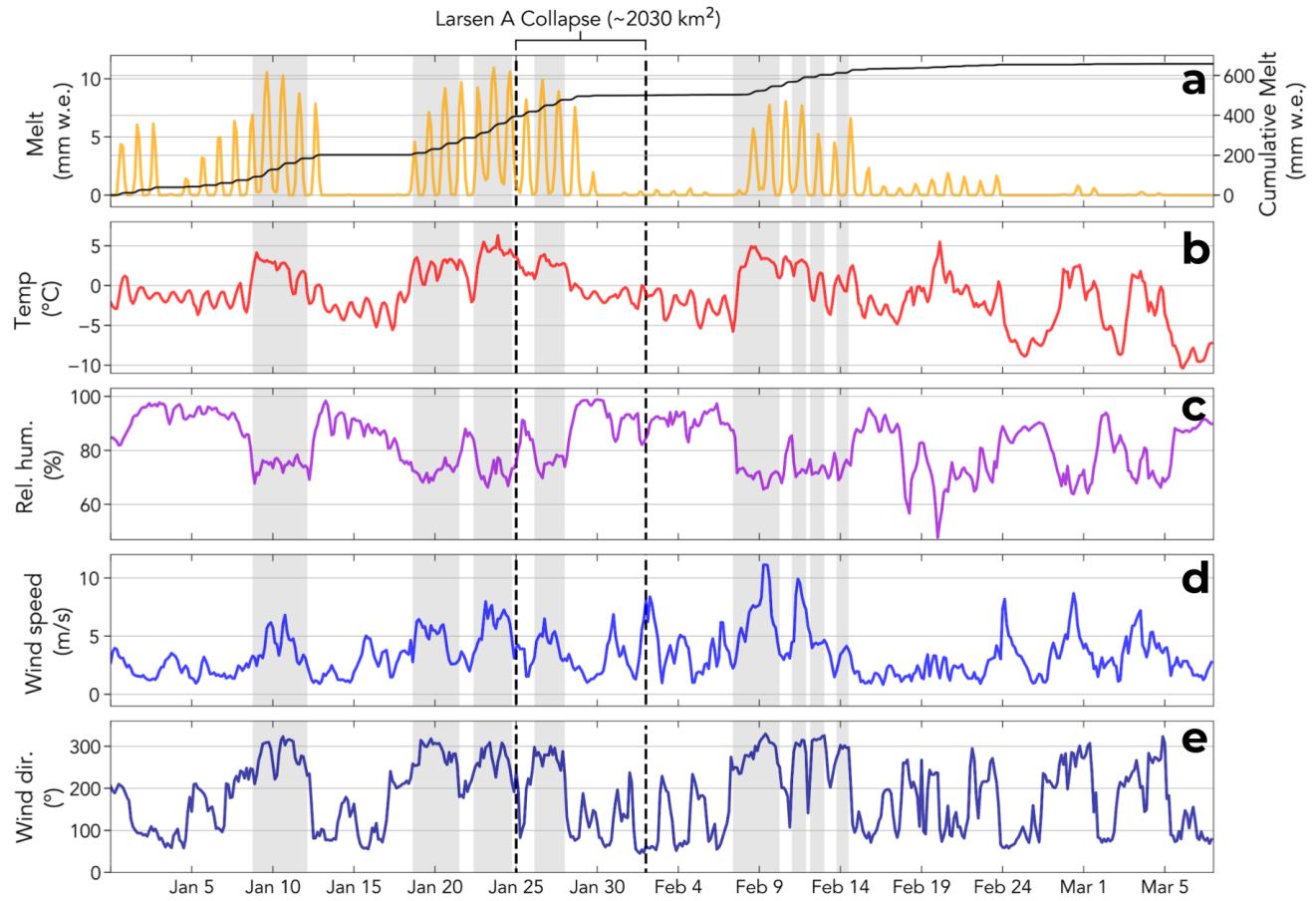


Figure S1. Time series during the 94/95 melt season averaged over the LAIS. Grey shading indicates the presence of föhn winds. (a) Surface melt production and Cumulative melt (b) Air temperature, (c) Relative Humidity, (d) 10 m Wind Speed, (e) Wind direction. *Note:* Values that occur after the collapse event indicated by the dashed lines are estimates if the ice shelf did not collapse.

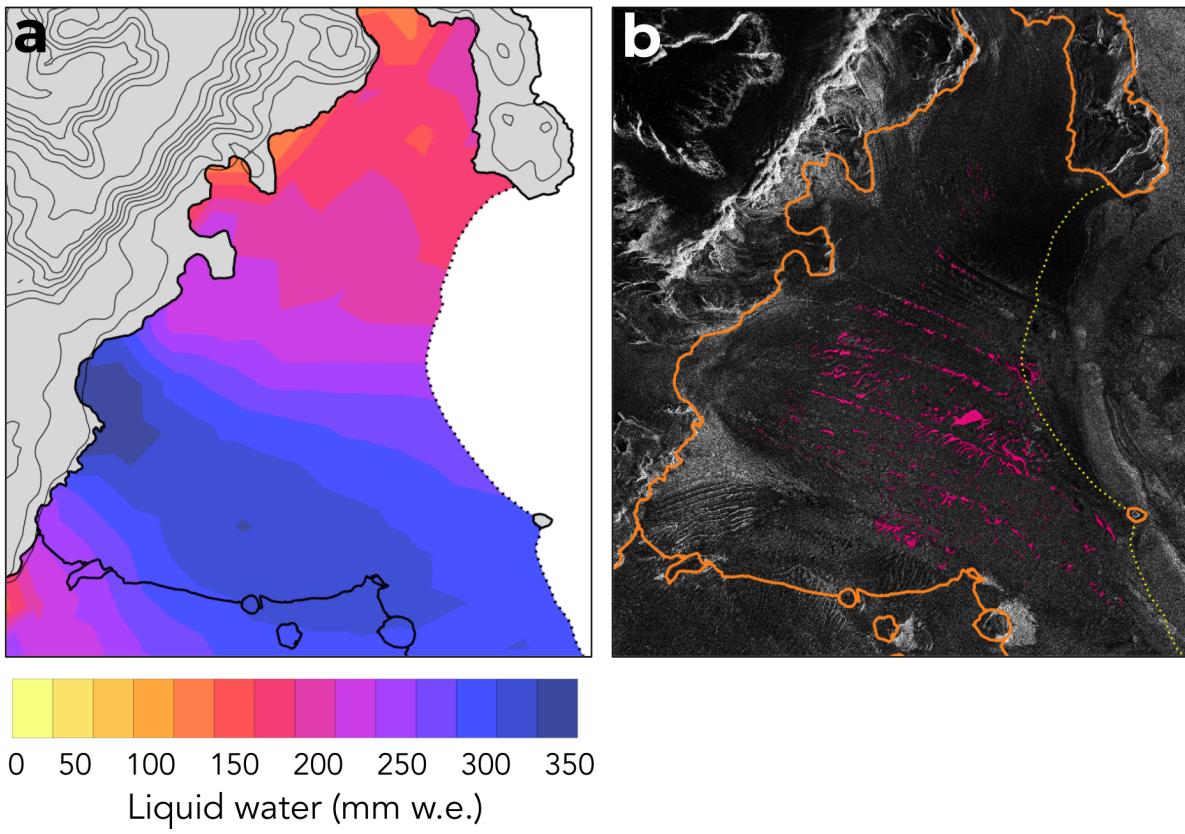


Figure S2. (a) Cumulative surface melt production on the LAIS during the nine-day föhn wind event period, January 18 - 27, 1995 (b) Advanced Very High-Resolution Radiometer (AVHRR) image of the LAIS on December 8, 1992, with surface melt lakes identified with pink shading. The solid orange line denotes the grounding line and the dashed yellow line denotes the location of the calving front prior to collapse in January 1995.

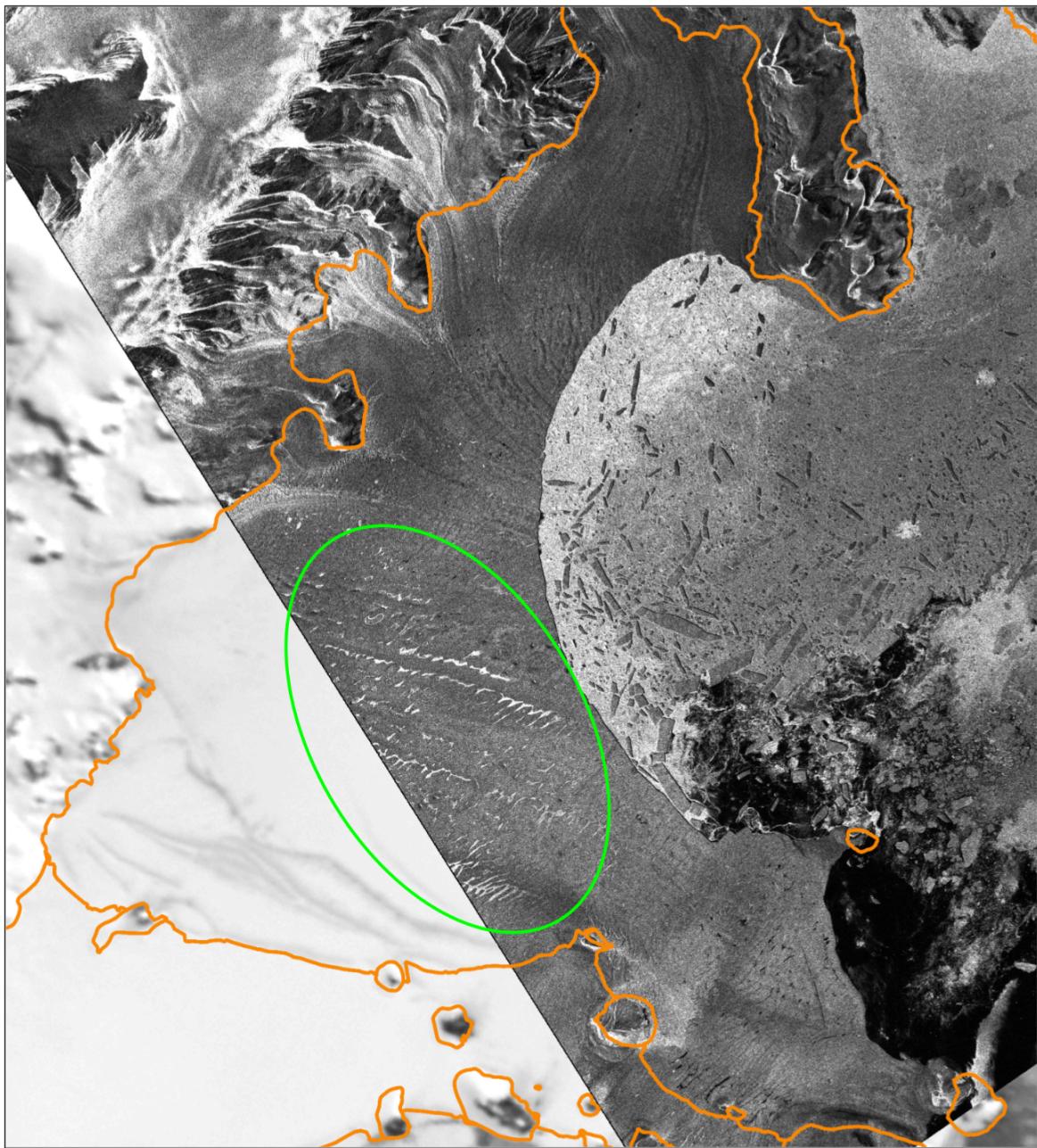


Figure S3. Advanced Very High-Resolution Radiometer (AVHRR) image of the LAIS on January 28, 1995, with surface melt lakes identified with the green oval.. The solid orange line denotes the grounding line at the time of collapse.