

Supplement for

Calving response to lake thermal regime at an ice sheet margin in west Greenland

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Table S1. Comparison of alternative formulations of lake surface temperature and thermal stratification as predictors of daily calving frequency. Each candidate predictor was fitted separately in a single-predictor Poisson GAM using the same 70 daily observations. Alternative formulations comprised same-day absolute conditions, day-to-day change, discrete 1- and 2-day lags, and 48- and 72-h rolling means. Δ AIC was calculated relative to the lowest-AIC model across all candidate formulations (Model 2: day-to-day change in surface temperature). Lower AIC indicates greater relative model support; pseudo- R^2 represents explained deviance.

Model	Lake variable	Formulation	Temporal representation	n	AIC	Δ AIC	Pseudo- R^2
1	Surface temperature	Absolute	Same-day daily mean	70	242.75	3.03	0.064
2	Surface temperature	Daily change	Current day - previous day	70	239.71	0.00	0.095
3	Surface temperature	Discrete lag	1-day lag	70	243.90	4.18	0.052
4	Surface temperature	Discrete lag	2-day lag	70	244.91	5.20	0.040
5	Surface temperature	Rolling mean	48 h	70	243.49	3.78	0.057
6	Surface temperature	Rolling mean	72 h	70	244.40	4.68	0.046
7	Stratification	Absolute	Same-day daily mean	70	246.03	6.32	0.025
8	Stratification	Daily change	Current day - previous day	70	243.89	4.17	0.049
9	Stratification	Discrete lag	1-day lag	70	246.33	6.62	0.023
10	Stratification	Discrete lag	2-day lag	70	245.43	5.72	0.033
11	Stratification	Rolling mean	48 h	70	246.14	6.42	0.023
12	Stratification	Rolling mean	72 h	70	246.71	6.99	0.018

Table S2. Summary of GAM performance and predictor significance for calving rates during summer 2024 and each of the three lake regime phases. Model fit is reported as pseudo- R^2 and AIC, while p values reflect the significance of each predictor variable.

Model	Period	Pseudo- R^2	AIC	Predictor	p
B1	11/07/24 – 20/09/24	0.095	239.714	Daily change in lake surface temperature	0.000000 000004989
B2	11/07/24 – 20/09/24	0.100	243.178	Daily change in lake surface temperature	0.000000 0004529
				Lake thermal regime phase	0.729
B3	11/07/24 – 20/09/24	0.101	242.485	Daily change in lake surface temperature	0.020
				Daily average lake stratification (48h lag)	0.814
B4	11/07/24 – 20/09/24	0.109	245.536	Daily change in lake surface temperature	0.016
				Daily average lake stratification (48h lag)	0.747
				Lake thermal regime phase	0.739
B5	11/07/24 – 20/09/24	0.112	246.405	Daily change in lake surface temperature (Phase 1)	0.025
				Daily change in lake surface temperature (Phase 2)	0.065
				Daily change in lake surface temperature (Phase 3)	0.465
				Lake thermal regime phase	0.582
B6	11/07/24 – 20/09/24	0.142	250.194	Daily change in lake surface temperature (Phase 1)	0.322
				Daily change in lake surface temperature (Phase 2)	0.245
				Daily change in lake surface temperature (Phase 3)	0.461
				Daily average lake stratification, 48h lag (Phase 1)	0.020
				Daily average lake stratification, 48h lag (Phase 2)	0.781
				Daily average lake stratification, 48h lag (Phase 3)	0.522
				Lake thermal regime phase	0.863
B7	11/07/24 – 14/08/24	0.305	113.574	Daily change in lake surface temperature	0.169
				Daily average lake stratification (48h lag)	0.867
				Daily average air temperature	0.854
				Daily average surface melt rate	0.298
B8	11/07/24 – 14/08/24	0.305	115.395	Daily change in lake surface temperature	0.152
				Daily average lake stratification (48h lag)	0.883
				Daily average air temperature	0.828
				Daily average surface melt rate	0.314
				Lake thermal regime phase	0.825

Table S3. Comparison of nested GAMs using ANOVA. Models were compared sequentially to determine whether the addition of lagged stratification or lake thermal-regime phase significantly improved model fit.

Comparison	Question	Deviance difference	df difference	F	<i>p</i>
A1→A2	Does adding lake thermal-regime phase improve the surface-temperature model?	2.192	1.865	1.176	0.381
A1→A3	Does adding 48-h lagged stratification improve the surface-temperature model?	3.935	1.655	2.377	0.173
A3→A4	Does adding lake thermal-regime phase improve the temperature + stratification model?	1.520	1.791	0.849	0.460