

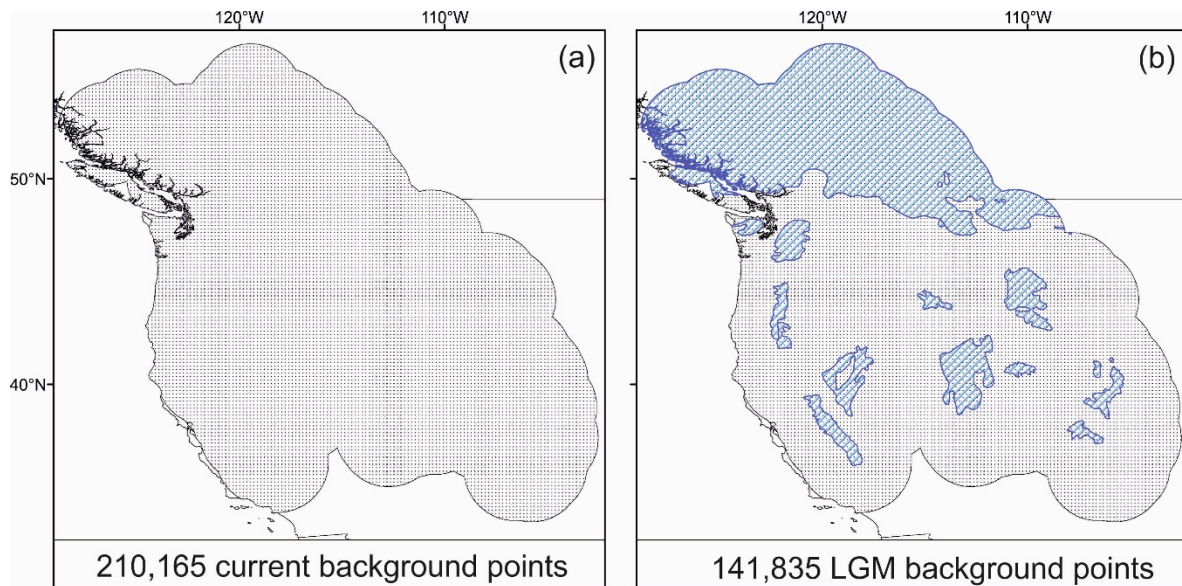
Ecography

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**Supplementary material**

## Appendix 1. The challenge of estimating realistic LGM potential distributions



**Figure A1.** Sampling of environmental background for calibrating the niche models of the American pika (*Ochotona princeps*) according to two experiments (see E1 and E2 in main text). (a) E1 uses environmental background in the context of only present-day climate conditions, assuming that the full training region is accessible for the species in the present (the most common practice in niche model calibration); (b) E2 uses combined environmental background in the context of both present-day and LGM conditions, assuming that the full training region is accessible for the species in the present but that areas covered by ice during the LGM (blue shadow) were inaccessible at that time.

**Table A1.** Evaluation metrics of ecological niche models generated for the American pika, *Ochotona princeps*, in North America. Results are presented for the three filtered datasets (10 km, 20 km, and 30 km).

10 km	Settings	AUCtest	AUCdiff	OR10	delta.AICc	nparam
	LQ_2	0.8947118	0.03506942	0.13741135	0	10
	LQ_1	0.8949515	0.0353405	0.13741135	2.106075	11
	LQH_1	0.896987	0.03841937	0.15347961	6.286533	30
	H_2	0.8972443	0.03402795	0.10571809	6.984621	23
	LQ_3	0.8899208	0.03895308	0.14804965	11.312151	10
	LQH_2	0.8904097	0.04366772	0.15336879	11.693326	25
	H_3	0.8984415	0.02970121	0.09507979	13.87452	18
	H_1	0.8969172	0.037562	0.12167553	19.392159	34
	LQH_3	0.8916028	0.04136664	0.14816046	22.659587	23
	L_1	0.8639974	0.04141663	0.14860372	141.196683	5
	L_2	0.8642478	0.04115741	0.15392287	141.217973	5
	L_3	0.8655322	0.03979684	0.14860372	144.772662	6
20 km	LQ_1	0.8815295	0.03089865	0.122807	0	9
	LQ_2	0.8797156	0.0321457	0.1292173	1.949913	9
	LQ_3	0.8741713	0.03746111	0.1420378	8.558199	9
	LQH_2	0.8774712	0.03678191	0.1165655	9.020456	16
	LQH_3	0.8766966	0.03480093	0.122807	11.606421	14
	H_2	0.8819954	0.03122376	0.1295547	17.137821	19

	H_3	0.8780486	0.03189146	0.1035762	28.060582	16
	LQH_1	0.8818457	0.03436417	0.1297233	37.709314	32
	H_1	0.8829677	0.03421953	0.1361336	47.670961	35
	L_1	0.853494	0.03444361	0.1486167	100.553911	5
	L_2	0.8539106	0.03451775	0.1614372	100.735994	5
	L_3	0.8552536	0.03391372	0.1614372	101.877051	5
30 km	LQ_1	0.8695596	0.03911705	0.2029857	0	10
	LQH_3	0.8625561	0.04459898	0.2181373	1.49118	12
	LQ_2	0.8667423	0.04083137	0.2027629	2.272139	10
	LQ_3	0.8602455	0.04700633	0.2254902	6.373902	10
	H_2	0.8723103	0.03905078	0.1426025	10.613767	20
	LQH_2	0.8597897	0.04973793	0.2259358	12.341036	20
	H_3	0.8717375	0.03449175	0.1272282	18.9957	17
	LQH_1	0.8633646	0.05085106	0.2562389	22.865079	30
	H_1	0.8686535	0.04590582	0.2564617	26.918613	31
	L_1	0.8425756	0.03841028	0.1813725	84.036438	5
	L_3	0.8442492	0.03757074	0.1813725	85.264103	5
	L_2	0.8433279	0.03816268	0.1813725	86.55614	6

**Table A2.** Niche overlaps of the American pika (*Ochotona princeps*) in geographic space computed with Schoener's D in ENMTools (Warren et al. 2010). All models were calibrated using present-day conditions (Experiment 1, see text) and projected onto current conditions. The comparisons are among resulting models using three filtered datasets (thinning at 10, 20, and 30 km) and two extrapolations methods available in MAXENT (Clamp = clamping; Uncons = unconstrained). Schoener's D ranges from 0 (no overlap) to 1 (full overlap).

	10kmClamp	10kmUncons	20kmClamp	20kmUncons	30kmClamp	30kmUncons
10kmClamp	1.0	1.0	0.956	0.956	0.936	0.936
10kmUncons		1.0	0.956	0.956	0.936	0.936
20kmClamp			1.0	1.0	0.960	0.960
20kmUncons				1.0	0.960	0.960
30kmClamp					1.0	1.0
30kmUncons						1.0

**Table A3.** Niche overlaps of the American pika (*Ochotona princeps*) in geographic space computed with Schoener's D. All models were calibrated using both present-day and LGM conditions (Experiment 2, see text) and projected onto current conditions. The comparisons are among resulting models using three filtered datasets (thinning at 10, 20, and 30 km) and two extrapolations methods available in MAXENT (Clamp = clamping; Uncons = unconstrained). Schoener's D ranges from 0 (no overlap) to 1 (full overlap).

	10kmClamp	10kmUncons	20kmClamp	20kmUncons	30kmClamp	30kmUncons
10kmClamp	1.0	1.0	0.956	0.956	0.926	0.926
10kmUncons		1.0	0.956	0.956	0.926	0.926
20kmClamp			1.0	1.0	0.962	0.962
20kmUncons				1.0	0.962	0.962
30kmClamp					1.0	1.0
30kmUncons						1.0

**Table A4.** Niche overlaps of the American pika (*Ochotona princeps*) in geographic space computed with Schoener's D in ENMTools (Warren et al. 2010). All models were calibrated using present-day conditions (Experiment 1, see text) and projected onto glacial conditions according to the Community Climate System Model (CCSM3; Collins et al. 2006) . The comparisons are among resulting models using three filtered datasets (thinning at 10, 20, and 30 km) and two extrapolations methods available in MAXENT (Clamp = clamping; Uncons = unconstrained). Schoener's D ranges from 0 (no overlap) to 1 (full overlap).

	10kmClamp	10kmUncons	20kmClamp	20kmUncons	30kmClamp	30kmUncons
10kmClamp	1.0	0.661	0.943	0.666	0.941	0.681
10kmUncons		1.0	0.685	0.956	0.641	0.938
20kmClamp			1.0	0.694	0.927	0.705
20kmUncons				1.0	0.647	0.953
30kmClamp					1.0	0.663
30kmUncons						1.0

**Table A5.** Niche overlaps of the American pika (*Ochotona princeps*) in geographic space computed with Schoener's D in ENMTools (Warren et al. 2010). All models were calibrated using both present-day and LGM conditions (Experiment 2, see text) and projected onto glacial conditions according to the Community Climate System Model (CCSM3; Collins et al. 2006) . The comparisons are among resulting models using three filtered datasets (thinning at 10, 20, and 30 km) and two extrapolations methods available in MAXENT (Clamp = clamping; Uncons = unconstrained). Schoener's D ranges from 0 (no overlap) to 1 (full overlap).

	10kmCla mp	10kmUnco ns	20kmCla mp	20kmUnco ns	30kmCla mp	30kmUnco ns
10kmClam p	1.0	0.999	0.957	0.957	0.934	0.934
10kmUnco ns		1.0	0.957	0.957	0.934	0.934
20kmClam p			1.0	0.999	0.963	0.963
20kmUnco ns				1.0	0.963	0.963
30kmClam p					1.0	0.999
30kmUnco ns						1.0



## References

- Warren, D. L., Glor, R. E., and Turelli, M. 2010. ENMTools: a toolbox for comparative studies of environmental niche models. *Ecography* 33: 607-611.
- Collins, W. D., Bitz, C. M., Blackmon, M. L., Bonan, G. B., Bretherton, C. S., Carton, J. A., ... Smith, R. D. 2006. The community climate system model version 3 (CCSM3). *J. Clim.*, 19: 2122-2143.