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Projecting the response of Greenland's peripheral glaciers to future climate change: glacier losses, sea level impact, freshwater contributions, and peak water timing

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Supplementary Information

Sect. S1. Validation of ERA5 Scaled Precipitation Against WRF High-Resolution Data

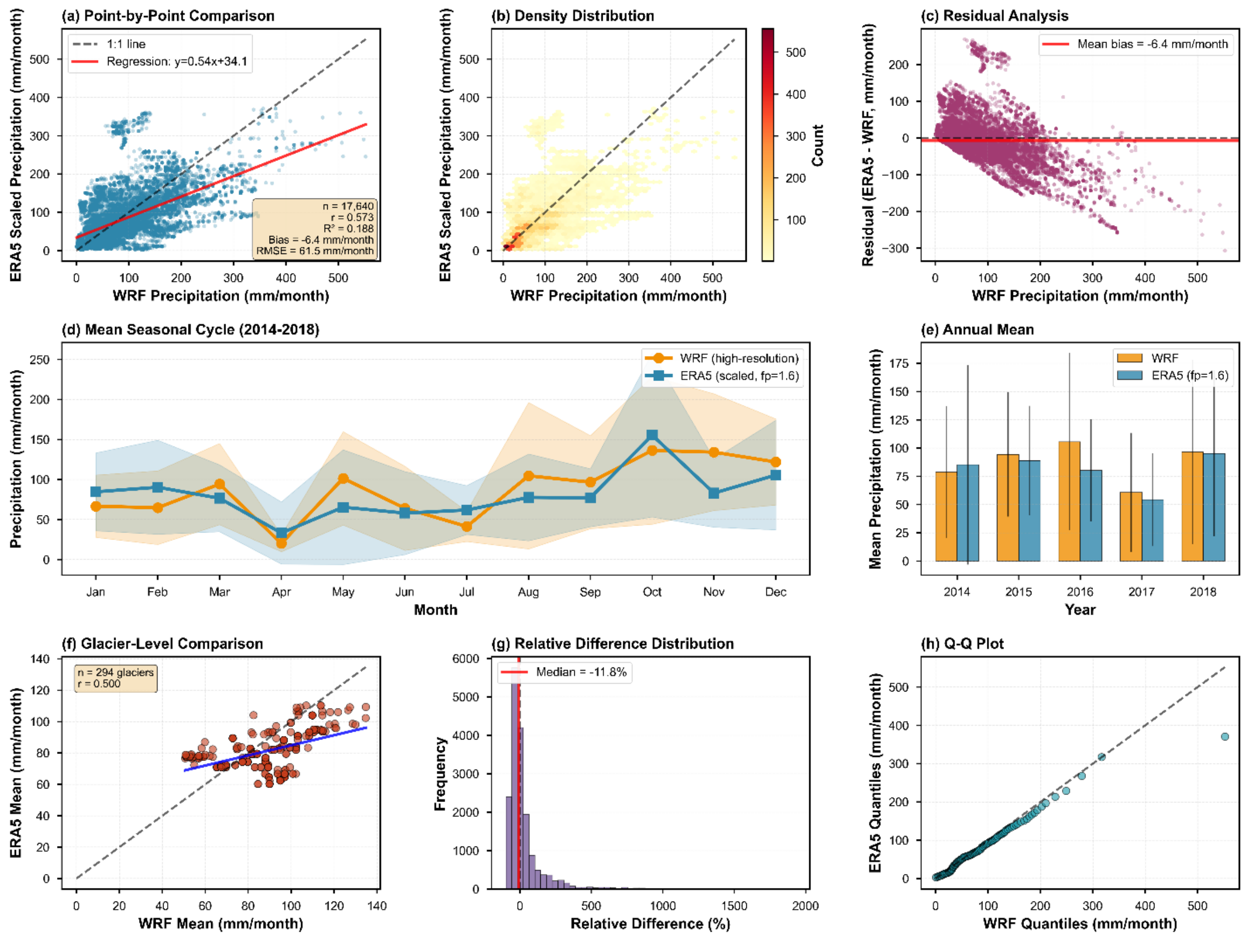


Figure S1: Validation of precipitation scaling factor (fp = 1.6) against WRF high-resolution data for regional application. (a) Point-by-point comparison showing moderate correlation (r = 0.57) and small systematic underestimation. The regression line (y = 0.54x + 34.1) indicates reasonable linear relationship with slight bias. (b) Density distribution revealing concentration of data points near 1:1 line at lower precipitation rates. (c) Residual analysis demonstrates small mean bias (6.4 mm per month) with no systematic pattern versus precipitation magnitude. (d) Mean seasonal cycle (2014-2018) showing ERA5 (fp = 1.6) captures seasonal pattern but systematically underestimates peak months. Shaded areas represent ±1 standard deviation. (e) Annual means demonstrating similar interannual variability between datasets. Error bars show ±1 standard deviation. (f) Glacier-level comparison (n = 294) revealing consistent underestimation across spatial domain (r = 0.50). (g) Relative difference distribution showing median underestimation of 11.8%. (h) Quantile-quantile plot demonstrates reasonable agreement across precipitation distribution with slight bias toward underestimation at higher values.

Sect. S2. OGGM Parameters

Table S1. OGGM Parameters for Greenland Peripheral Glaciers.

Category	Parameter	Symbol	Value / Range	Type	Calibration Method	Source / Reference
Mass Balance Parameters	Precipitation factor	f_p	1.6	Fixed	Global calibration against WGMS reference glaciers	Maussion et al. (2019)
	Temperature sensitivity	μ	Glacier-specific (median: 5.0 mm w.e. /K month^{-1}, range: 0–200)	Calibrated	Individual calibration using geodetic mass balance and frontal ablation observations	This study, following Malles et al. (2023)
	Melt temperature threshold	T_{melt}	-1 °C	Fixed	Standard OGGM default	Maussion et al. (2019)
	Temperature lapse rate	γ	−6.5 K km^{-1}	Fixed	Regional calibration for Arctic applications	OGGM default
	Solid precipitation threshold	T_{solid}	0 °C	Fixed	Standard OGGM default	Maussion et al. (2019)
	Liquid precipitation threshold	T_{liquid}	2 °C	Fixed	Standard OGGM default	Maussion et al. (2019)
Ice Dynamics Parameters	Glen's flow law exponent	n	3	Fixed	Standard ice rheology	Glen (1955)
	Ice density	ρ_{ice}	900 kg m^{-3}	Fixed	Standard value	Cuffey and Paterson (2010)
	Glen's creep parameter	A	2.4 × 10^{-24} Pa^{-3} s^{-1}	Fixed	Standard for temperate ice	Cuffey and Paterson (2010)
	Sliding parameter	f_s	10^{-20} m^2 Pa^{-3} s^{-1}	Fixed	Maintain numerical stabilities	Malles et al. (2023)

Frontal Ablation Parameters	Water-depth sensitivity	k	Glacier-specific (median: 0.65 yr/, range: 0-3.0)	Calibrated	Iterative calibration to match observed frontal ablation	This study, following Malles et al. (2023)
	Ocean water density	ρ_{oCean}	1028 kg m⁻³	Fixed	Standard ocean water density	—
	Fraction below waterline	f_{bwl}	0.75	Fixed	Assumption for volume retreat below waterline	Malles et al. (2023)
Numerical Parameters	Grid resolution	Δx	$14\sqrt{S}$ + 10 m (bound: 10-200 m)	Dynamic	Automatic based on glacier area S (km²)	Maussion et al. (2019)
	Time step	Δt	0.02 years	Fixed	Numerical stability requirement	OGGM default

Sect. S3. Glacier Count & Area vs Elevation

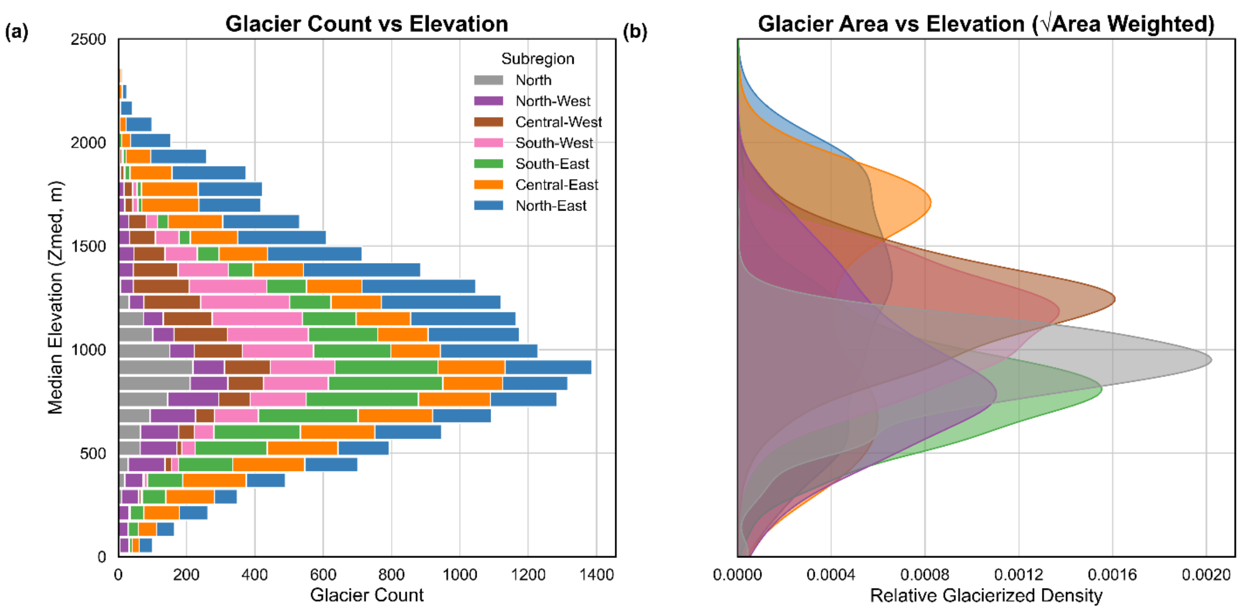
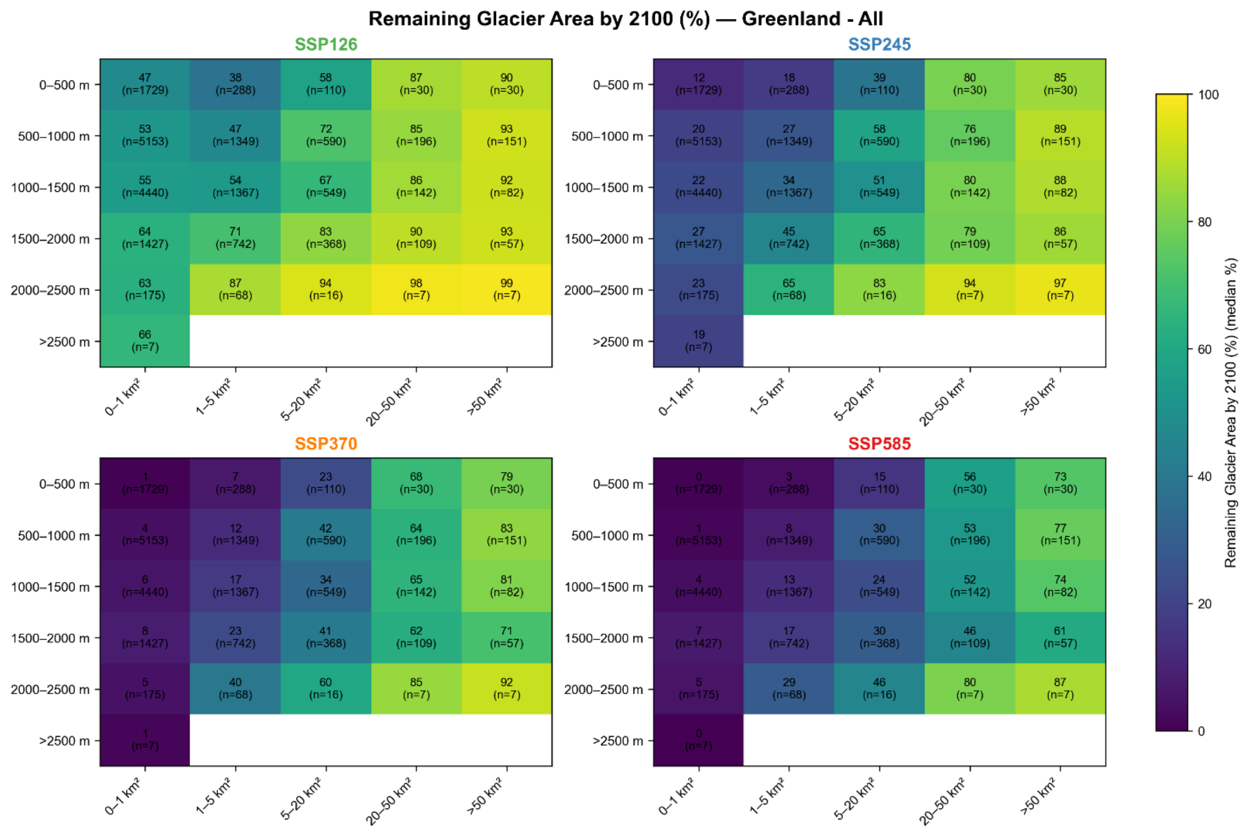


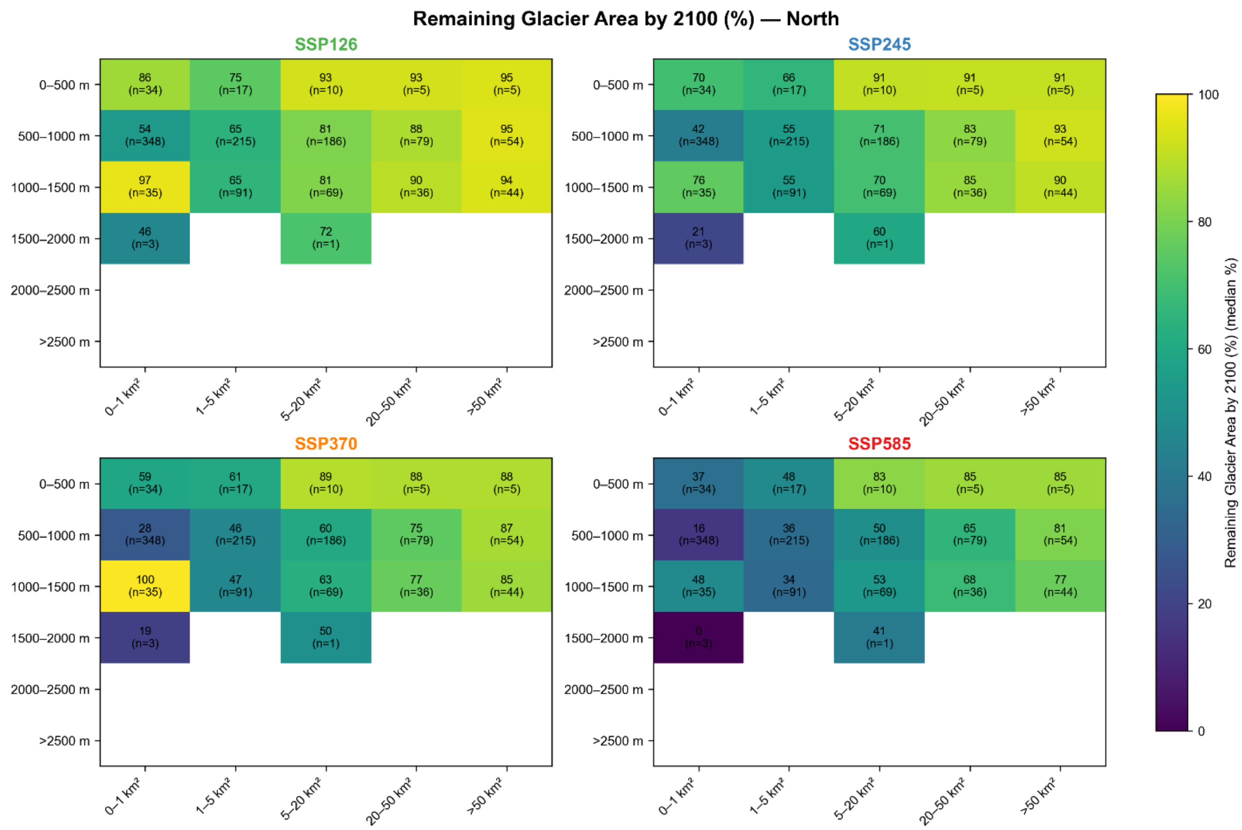
Figure S2. Elevation distribution of Greenland's peripheral glaciers by subregion. (a) Glacier count as a function of median glacier elevation (Z_{me}d, m) for each subregion. (b) Glacier area distribution with elevation, expressed as the square-root area-weighted relative glacierized density for each subregion.

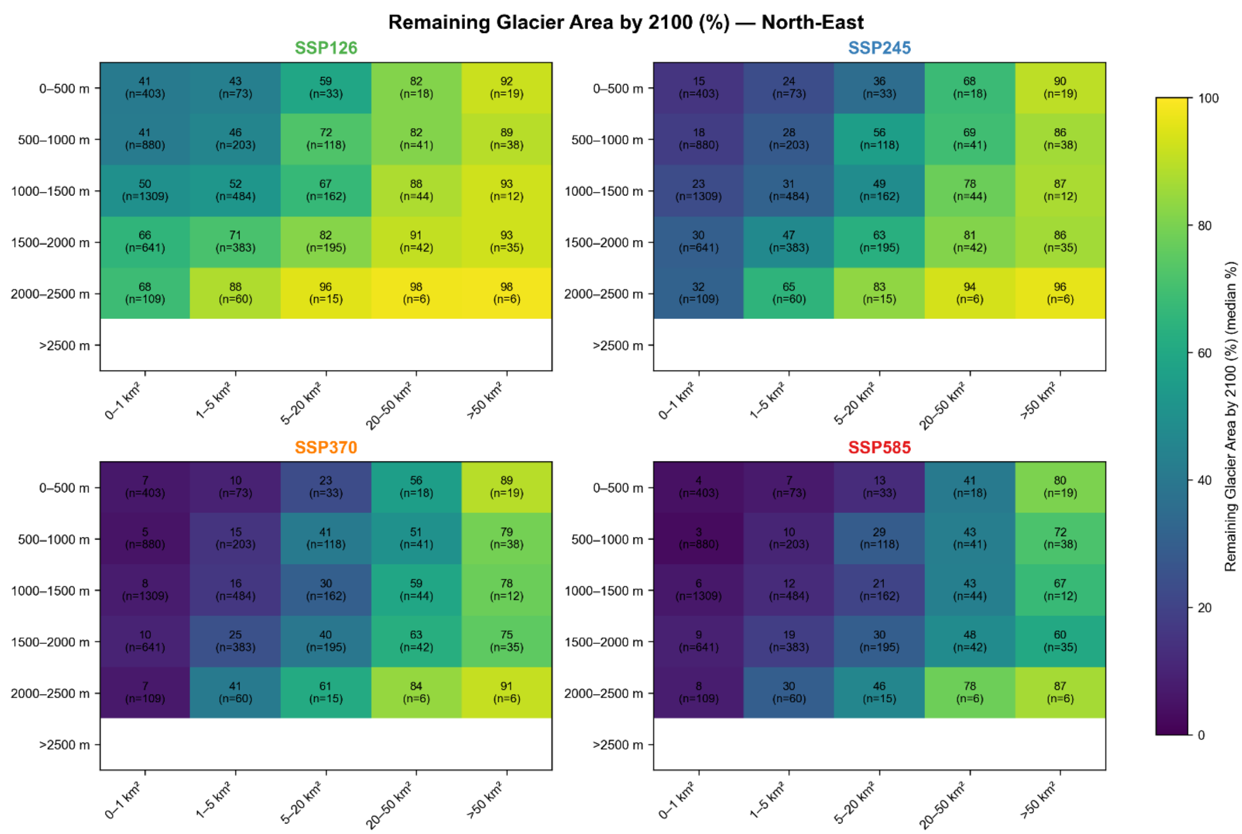
Sect. S4. Initial Glacier Area & Elevation vs. Glacier Losses

Sect. S4.1. Remaining Glacier Area

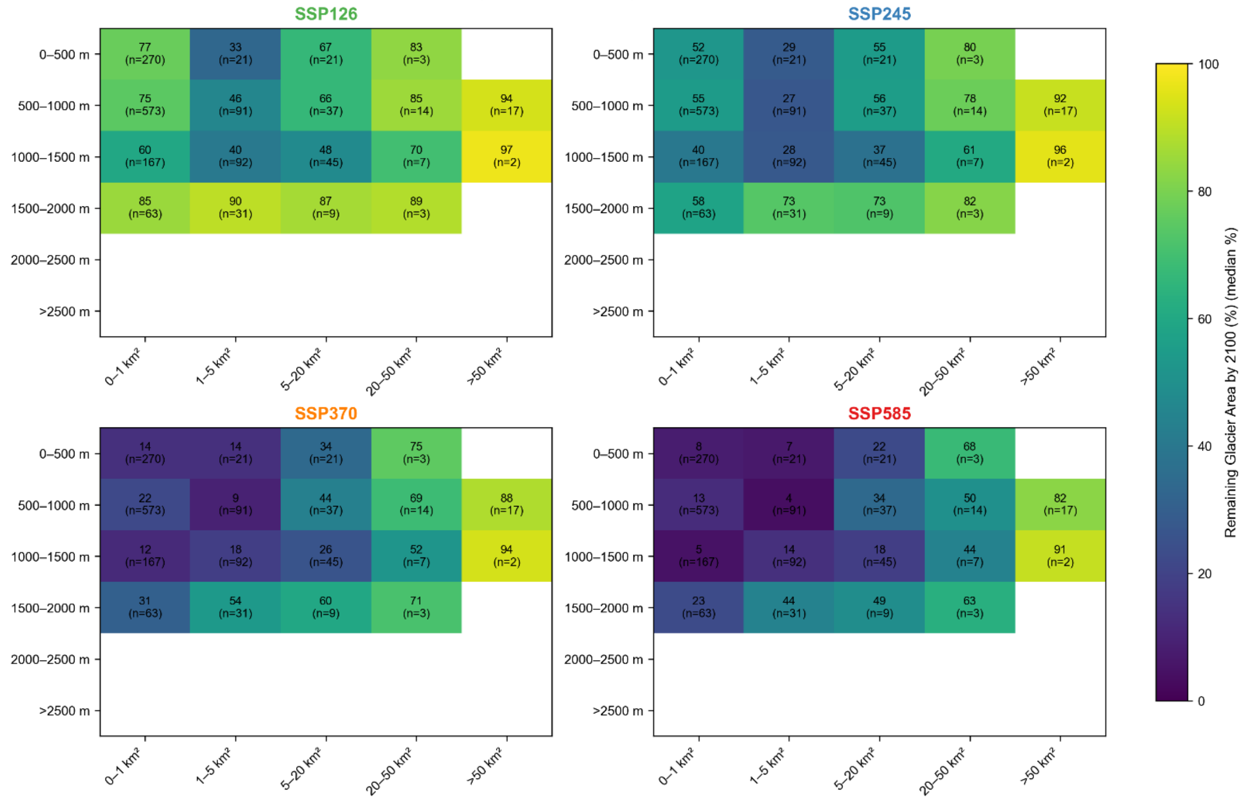
Figure S3-S10. Remaining Glacier Area by 2100 (%) across subregions and emission scenarios. Each panel shows the projected remaining glacier area by 2100 relative to 2020 under four SSP scenarios (SSP126, SSP245, SSP370, SSP585). The results are presented for (S3) Greenland-All, (S4) North, (S5) North-East, (S6) North-West, (S7) Central-East, (S8) Central-West, (S9) South-East, and (S10) South-West subregions. Glaciers are grouped by their initial area based on RIG v6.0 (x-axis) and median elevation (y-axis). Values within each grid cell denote the median percentage of remaining glacier area by 2100, with the number of glaciers in parentheses.



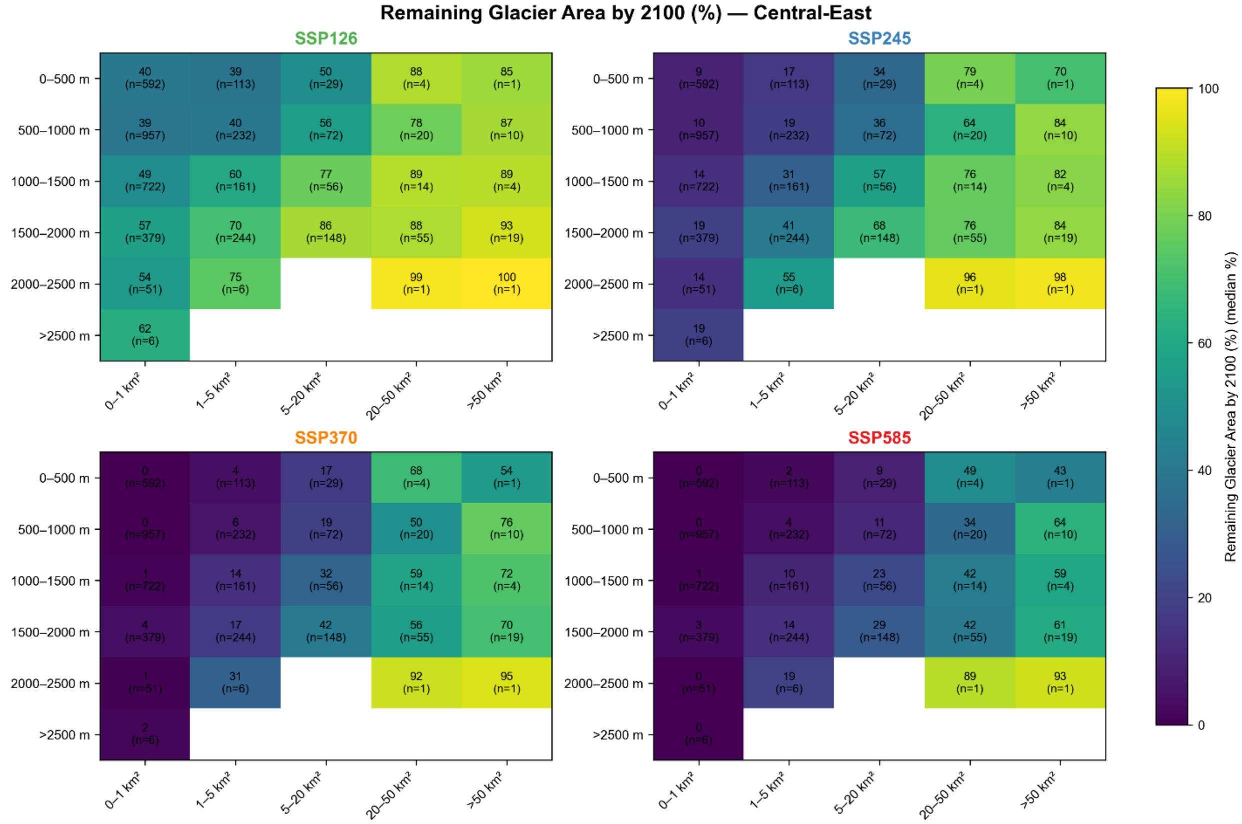

Remaining Glacier Area by 2100 (%) — North
SSP126
0–500 m: 86 (n=34) 75 (n=17) 93 (n=10) 93 (n=5) 95 (n=5)
500–1000 m: 54 (n=348) 65 (n=215) 81 (n=186) 88 (n=79) 95 (n=54)
1000–1500 m: 97 (n=35) 65 (n=91) 81 (n=69) 90 (n=36) 94 (n=44)
1500–2000 m: 46 (n=3) 72 (n=1)
2000–2500 m
>2500 m
SSP245
0–500 m: 70 (n=34) 66 (n=17) 91 (n=10) 91 (n=5) 91 (n=5)
500–1000 m: 42 (n=348) 55 (n=215) 71 (n=186) 83 (n=79) 93 (n=54)
1000–1500 m: 76 (n=35) 55 (n=91) 70 (n=69) 85 (n=36) 90 (n=44)
1500–2000 m: 21 (n=3) 60 (n=1)
2000–2500 m
>2500 m
SSP370
0–500 m: 59 (n=34) 61 (n=17) 89 (n=10) 88 (n=5) 88 (n=5)
500–1000 m: 28 (n=348) 46 (n=215) 60 (n=186) 75 (n=79) 87 (n=54)
1000–1500 m: 100 (n=35) 47 (n=91) 63 (n=69) 77 (n=36) 85 (n=44)
1500–2000 m: 19 (n=3) 50 (n=1)
2000–2500 m
>2500 m
SSP585
0–500 m: 37 (n=34) 48 (n=17) 83 (n=10) 85 (n=5) 85 (n=5)
500–1000 m: 16 (n=348) 36 (n=215) 50 (n=186) 65 (n=79) 81 (n=54)
1000–1500 m: 48 (n=35) 34 (n=91) 53 (n=69) 68 (n=36) 77 (n=44)
1500–2000 m: 0 (n=3) 41 (n=1)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Area by 2100 (%) (median %)
0 20 40 60 80 100

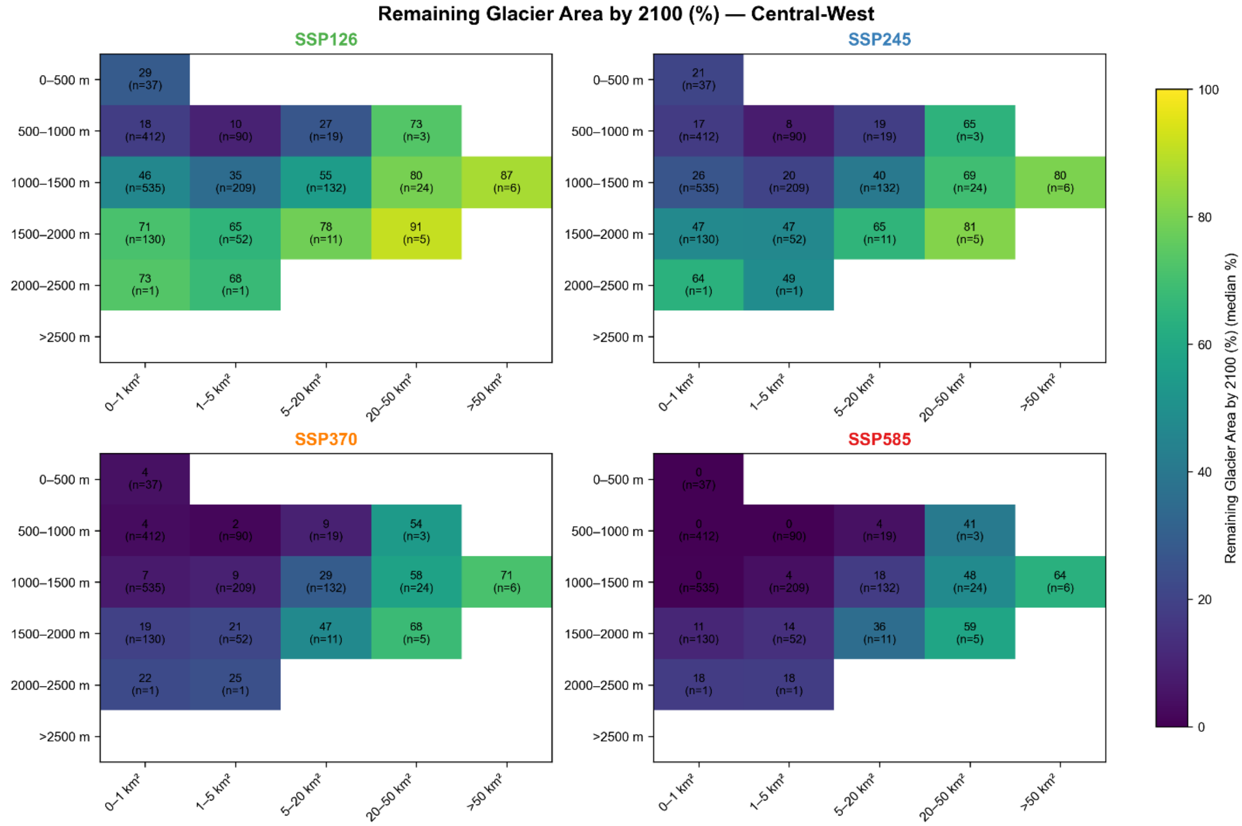

Remaining Glacier Area by 2100 (%) — North-East
SSP126
0–500 m: 41 (n=403) 43 (n=73) 59 (n=33) 82 (n=18) 92 (n=19)
500–1000 m: 41 (n=880) 46 (n=203) 72 (n=118) 82 (n=41) 89 (n=38)
1000–1500 m: 50 (n=1309) 52 (n=484) 67 (n=162) 88 (n=44) 93 (n=12)
1500–2000 m: 66 (n=641) 71 (n=383) 82 (n=195) 91 (n=42) 93 (n=35)
2000–2500 m: 68 (n=109) 88 (n=60) 96 (n=15) 98 (n=6) 98 (n=6)
>2500 m
SSP245
0–500 m: 15 (n=403) 24 (n=73) 36 (n=33) 68 (n=18) 90 (n=19)
500–1000 m: 18 (n=880) 28 (n=203) 56 (n=118) 69 (n=41) 86 (n=38)
1000–1500 m: 23 (n=1309) 31 (n=484) 49 (n=162) 78 (n=44) 87 (n=12)
1500–2000 m: 30 (n=641) 47 (n=383) 63 (n=195) 81 (n=42) 86 (n=35)
2000–2500 m: 32 (n=109) 65 (n=60) 83 (n=15) 94 (n=6) 96 (n=6)
>2500 m
SSP370
0–500 m: 7 (n=403) 10 (n=73) 23 (n=33) 56 (n=18) 89 (n=19)
500–1000 m: 5 (n=880) 15 (n=203) 41 (n=118) 51 (n=41) 79 (n=38)
1000–1500 m: 8 (n=1309) 16 (n=484) 30 (n=162) 59 (n=44) 78 (n=12)
1500–2000 m: 10 (n=641) 25 (n=383) 40 (n=195) 63 (n=42) 75 (n=35)
2000–2500 m: 7 (n=109) 41 (n=60) 61 (n=15) 84 (n=6) 91 (n=6)
>2500 m
SSP585
0–500 m: 4 (n=403) 7 (n=73) 13 (n=33) 41 (n=18) 80 (n=19)
500–1000 m: 3 (n=880) 10 (n=203) 29 (n=118) 43 (n=41) 72 (n=38)
1000–1500 m: 6 (n=1309) 12 (n=484) 21 (n=162) 43 (n=44) 67 (n=12)
1500–2000 m: 9 (n=641) 19 (n=383) 30 (n=195) 48 (n=42) 60 (n=35)
2000–2500 m: 8 (n=109) 30 (n=60) 46 (n=15) 78 (n=6) 87 (n=6)
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Area by 2100 (%) (median %)
0 20 40 60 80 100

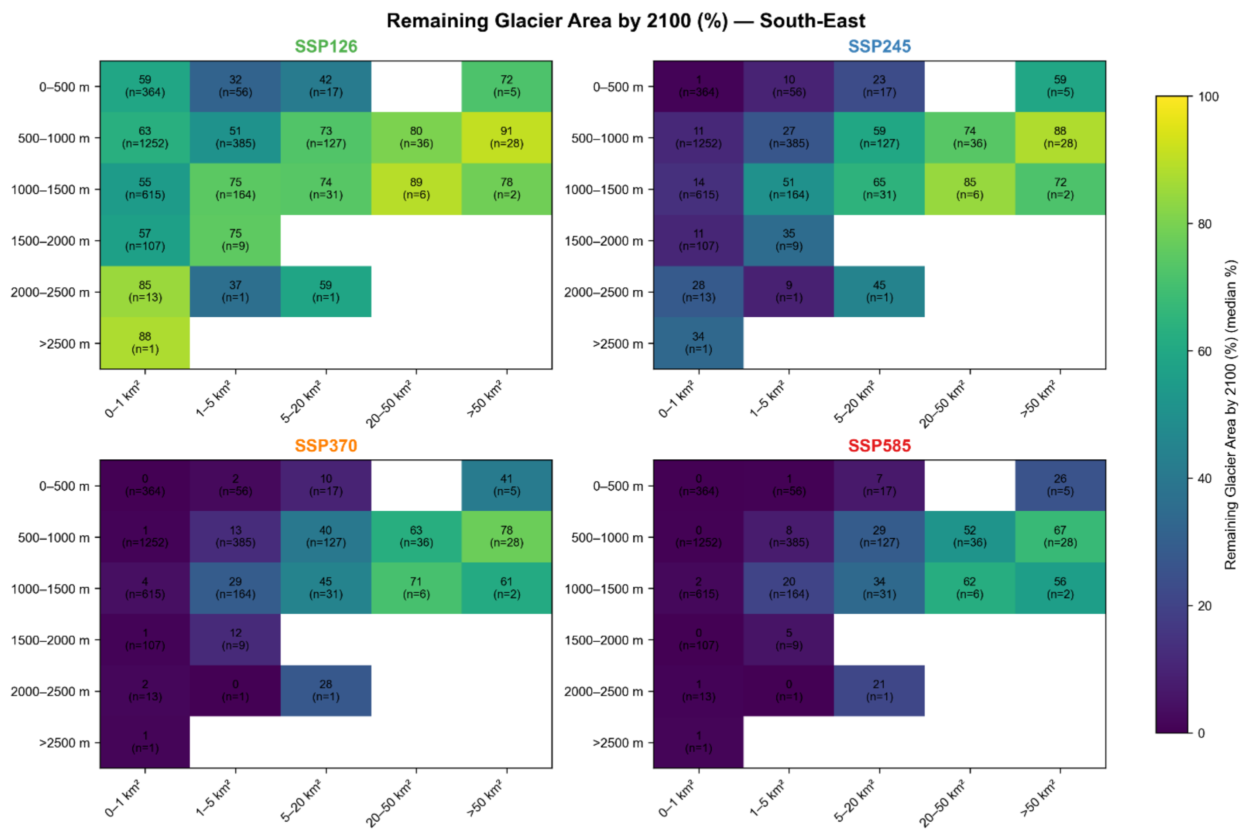
Remaining Glacier Area by 2100 (%) — North-West

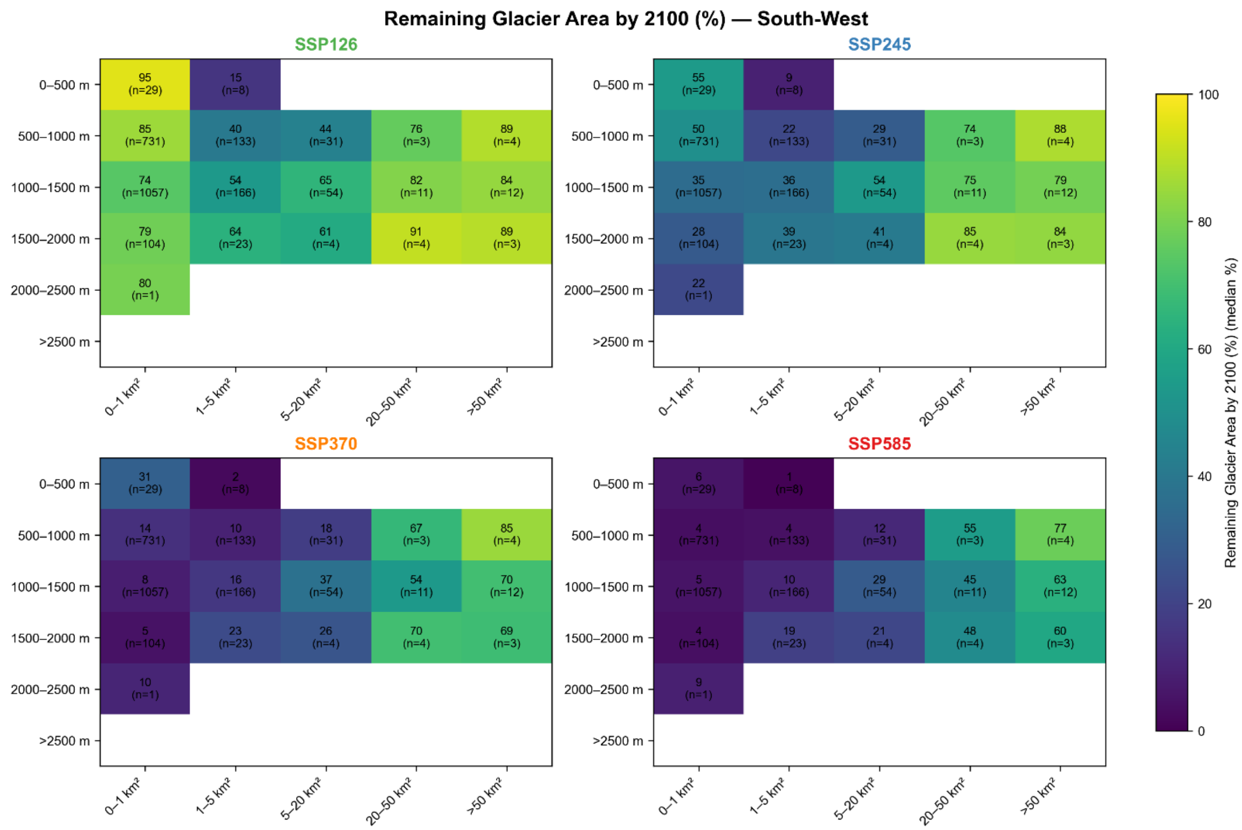


Remaining Glacier Area by 2100 (%) — Central-East



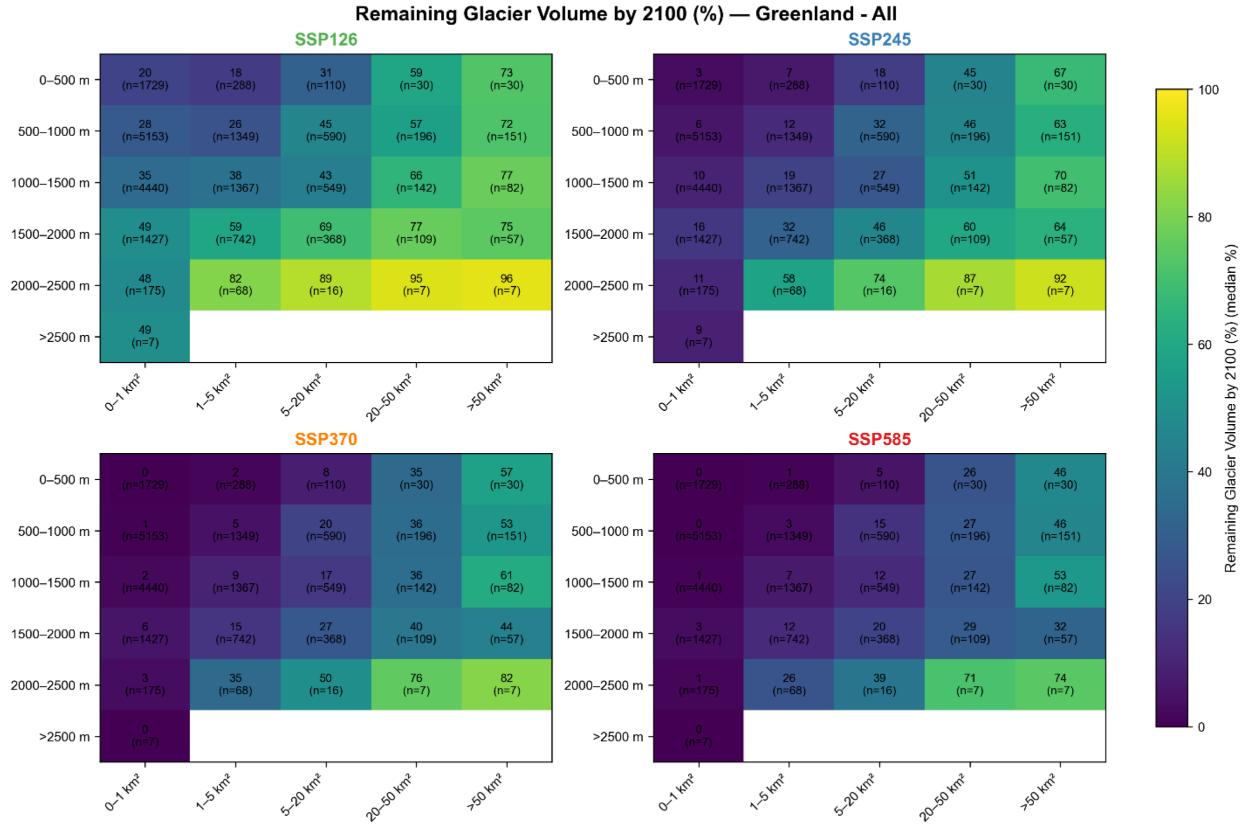

Remaining Glacier Area by 2100 (%) — Central-West
SSP126
0–500 m: 29 (n=37)
500–1000 m: 18 (n=412), 10 (n=90), 27 (n=19), 73 (n=3)
1000–1500 m: 46 (n=535), 35 (n=209), 55 (n=132), 80 (n=24), 87 (n=6)
1500–2000 m: 71 (n=130), 65 (n=52), 78 (n=11), 91 (n=5)
2000–2500 m: 73 (n=1), 68 (n=1)
>2500 m
SSP245
0–500 m: 21 (n=37)
500–1000 m: 17 (n=412), 8 (n=90), 19 (n=19), 65 (n=3)
1000–1500 m: 26 (n=535), 20 (n=209), 40 (n=132), 69 (n=24), 80 (n=6)
1500–2000 m: 47 (n=130), 47 (n=52), 65 (n=11), 81 (n=5)
2000–2500 m: 64 (n=1), 49 (n=1)
>2500 m
SSP370
0–500 m: 4 (n=37)
500–1000 m: 4 (n=412), 2 (n=90), 9 (n=19), 54 (n=3)
1000–1500 m: 7 (n=535), 9 (n=209), 29 (n=132), 58 (n=24), 71 (n=6)
1500–2000 m: 19 (n=130), 21 (n=52), 47 (n=11), 68 (n=5)
2000–2500 m: 22 (n=1), 25 (n=1)
>2500 m
SSP585
0–500 m: 0 (n=37)
500–1000 m: 0 (n=412), 0 (n=90), 4 (n=19), 41 (n=3)
1000–1500 m: 0 (n=535), 4 (n=209), 18 (n=132), 48 (n=24), 64 (n=6)
1500–2000 m: 11 (n=130), 14 (n=52), 36 (n=11), 59 (n=5)
2000–2500 m: 18 (n=1), 18 (n=1)
>2500 m
0–1 km², 1–5 km², 5–20 km², 20–50 km², >50 km²
Remaining Glacier Area by 2100 (%) (median %)
0, 20, 40, 60, 80, 100

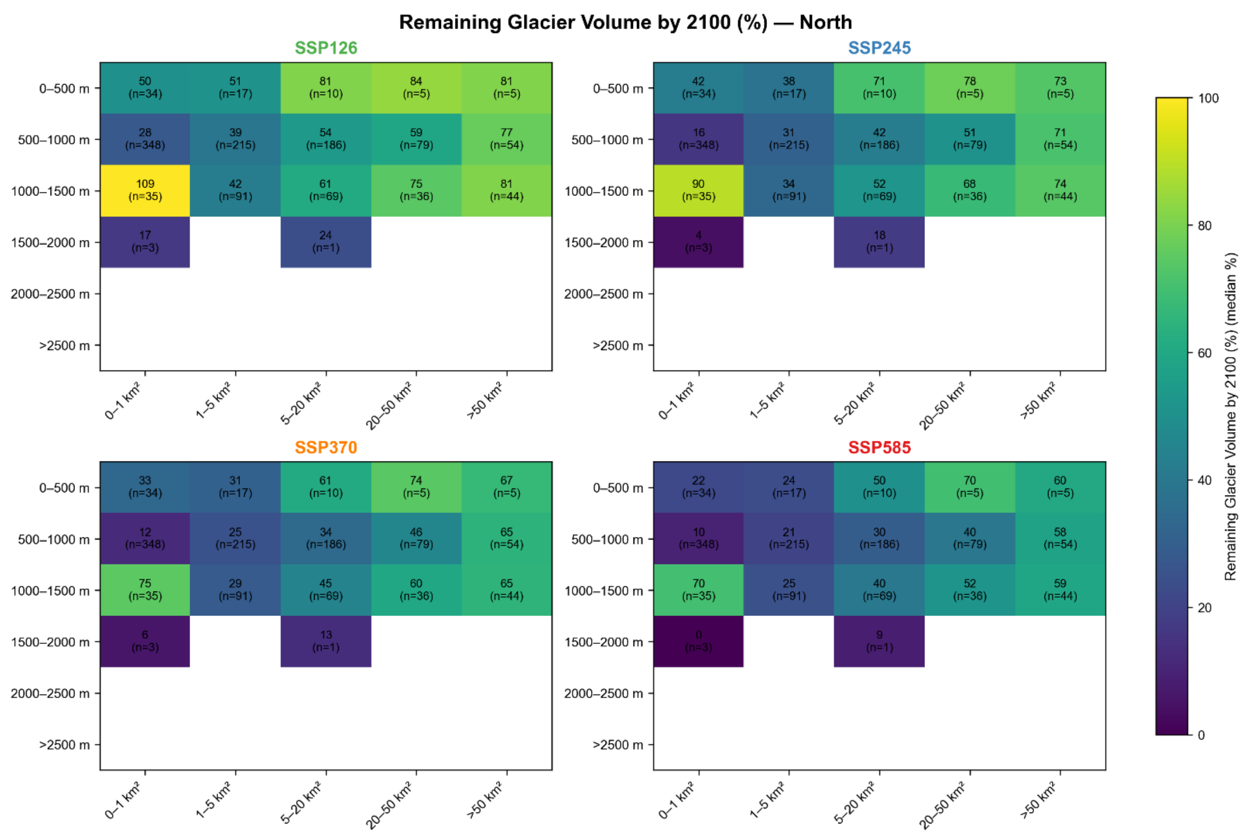

Remaining Glacier Area by 2100 (%) — South-East
SSP126
0–500 m: 59 (n=364), 32 (n=56), 42 (n=17), 72 (n=5)
500–1000 m: 63 (n=1252), 51 (n=385), 73 (n=127), 80 (n=36), 91 (n=28)
1000–1500 m: 55 (n=615), 75 (n=164), 74 (n=31), 89 (n=6), 78 (n=2)
1500–2000 m: 57 (n=107), 75 (n=9)
2000–2500 m: 85 (n=13), 37 (n=1), 59 (n=1)
>2500 m: 88 (n=1)
SSP245
0–500 m: 1 (n=364), 10 (n=56), 23 (n=17), 59 (n=5)
500–1000 m: 11 (n=1252), 27 (n=385), 59 (n=127), 74 (n=36), 88 (n=28)
1000–1500 m: 14 (n=615), 51 (n=164), 65 (n=31), 85 (n=6), 72 (n=2)
1500–2000 m: 11 (n=107), 35 (n=9)
2000–2500 m: 28 (n=13), 9 (n=1), 45 (n=1)
>2500 m: 34 (n=1)
SSP370
0–500 m: 0 (n=364), 2 (n=56), 10 (n=17), 41 (n=5)
500–1000 m: 1 (n=1252), 13 (n=385), 40 (n=127), 63 (n=36), 78 (n=28)
1000–1500 m: 4 (n=615), 29 (n=164), 45 (n=31), 71 (n=6), 61 (n=2)
1500–2000 m: 1 (n=107), 12 (n=9)
2000–2500 m: 2 (n=13), 0 (n=1), 28 (n=1)
>2500 m: 1 (n=1)
SSP585
0–500 m: 0 (n=364), 1 (n=56), 7 (n=17), 26 (n=5)
500–1000 m: 0 (n=1252), 8 (n=385), 29 (n=127), 52 (n=36), 67 (n=28)
1000–1500 m: 2 (n=615), 20 (n=164), 34 (n=31), 62 (n=6), 56 (n=2)
1500–2000 m: 0 (n=107), 5 (n=9)
2000–2500 m: 1 (n=13), 0 (n=1), 21 (n=1)
>2500 m: 1 (n=1)
0–1 km², 1–5 km², 5–20 km², 20–50 km², >50 km²
Remaining Glacier Area by 2100 (%) (median %)
0, 20, 40, 60, 80, 100

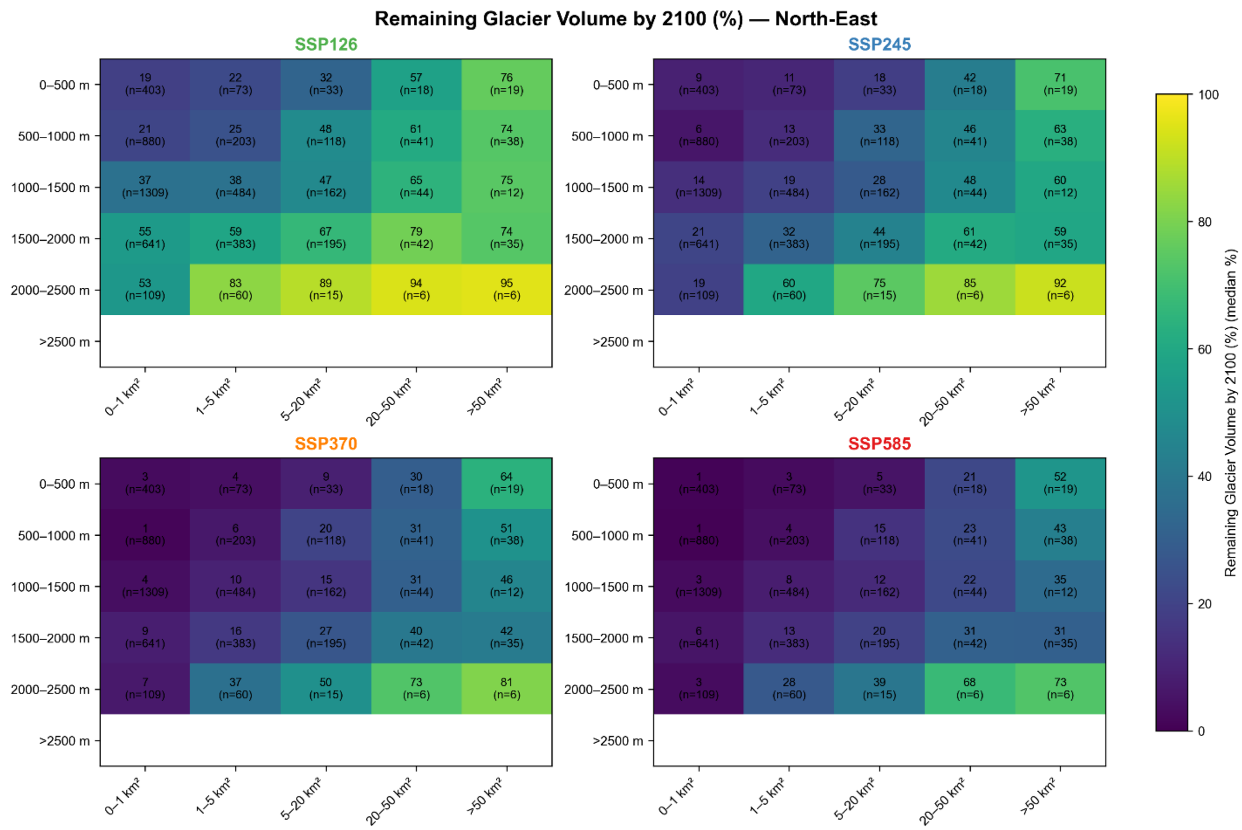


Sect. S4.2. Remaining Glacier Volume

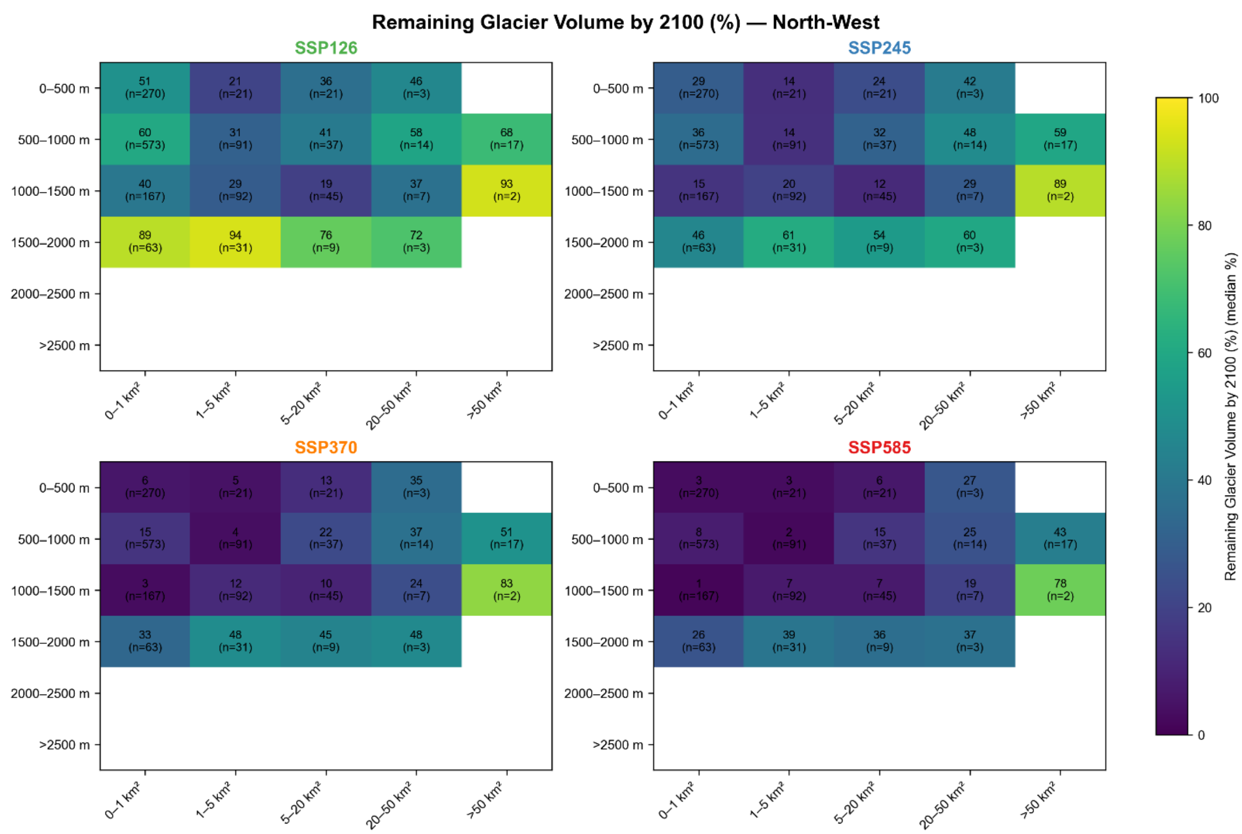
Figure S11-S18. Remaining Glacier Volume by 2100 (%) across subregions and emission scenarios. Same as Figures S3–S10, but showing the projected remaining glacier volume by 2100 relative to 2020 for each subregion under four SSP scenarios. Glaciers are binned by initial area (x-axis) and median elevation (y-axis). Values inside the grid cells indicate the median percentage of remaining glacier volume by 2100, with the number of glaciers in parentheses.


Remaining Glacier Volume by 2100 (%) — Greenland - All
SSP126
0–500 m: 20 (n=1729) 18 (n=288) 31 (n=110) 59 (n=30) 73 (n=30)
500–1000 m: 28 (n=5153) 26 (n=1349) 45 (n=590) 57 (n=196) 72 (n=151)
1000–1500 m: 35 (n=4440) 38 (n=1367) 43 (n=549) 66 (n=142) 77 (n=82)
1500–2000 m: 49 (n=1427) 59 (n=742) 69 (n=368) 77 (n=109) 75 (n=57)
2000–2500 m: 48 (n=175) 82 (n=68) 89 (n=16) 95 (n=7) 96 (n=7)
>2500 m: 49 (n=7)
SSP245
0–500 m: 3 (n=1729) 7 (n=288) 18 (n=110) 45 (n=30) 67 (n=30)
500–1000 m: 6 (n=5153) 12 (n=1349) 32 (n=590) 46 (n=196) 63 (n=151)
1000–1500 m: 10 (n=4440) 19 (n=1367) 27 (n=549) 51 (n=142) 70 (n=82)
1500–2000 m: 16 (n=1427) 32 (n=742) 46 (n=368) 60 (n=109) 64 (n=57)
2000–2500 m: 11 (n=175) 58 (n=68) 74 (n=16) 87 (n=7) 92 (n=7)
>2500 m: 9 (n=7)
SSP370
0–500 m: 0 (n=1729) 2 (n=288) 8 (n=110) 35 (n=30) 57 (n=30)
500–1000 m: 1 (n=5153) 5 (n=1349) 20 (n=590) 36 (n=196) 53 (n=151)
1000–1500 m: 2 (n=4440) 9 (n=1367) 17 (n=549) 36 (n=142) 61 (n=82)
1500–2000 m: 6 (n=1427) 15 (n=742) 27 (n=368) 40 (n=109) 44 (n=57)
2000–2500 m: 3 (n=175) 35 (n=68) 50 (n=16) 76 (n=7) 82 (n=7)
>2500 m: 0 (n=7)
SSP585
0–500 m: 0 (n=1729) 1 (n=288) 5 (n=110) 26 (n=30) 46 (n=30)
500–1000 m: 0 (n=5153) 3 (n=1349) 15 (n=590) 27 (n=196) 46 (n=151)
1000–1500 m: 1 (n=4440) 7 (n=1367) 12 (n=549) 27 (n=142) 53 (n=82)
1500–2000 m: 3 (n=1427) 12 (n=742) 20 (n=368) 29 (n=109) 32 (n=57)
2000–2500 m: 1 (n=175) 26 (n=68) 39 (n=16) 71 (n=7) 74 (n=7)
>2500 m: 0 (n=7)
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0 20 40 60 80 100

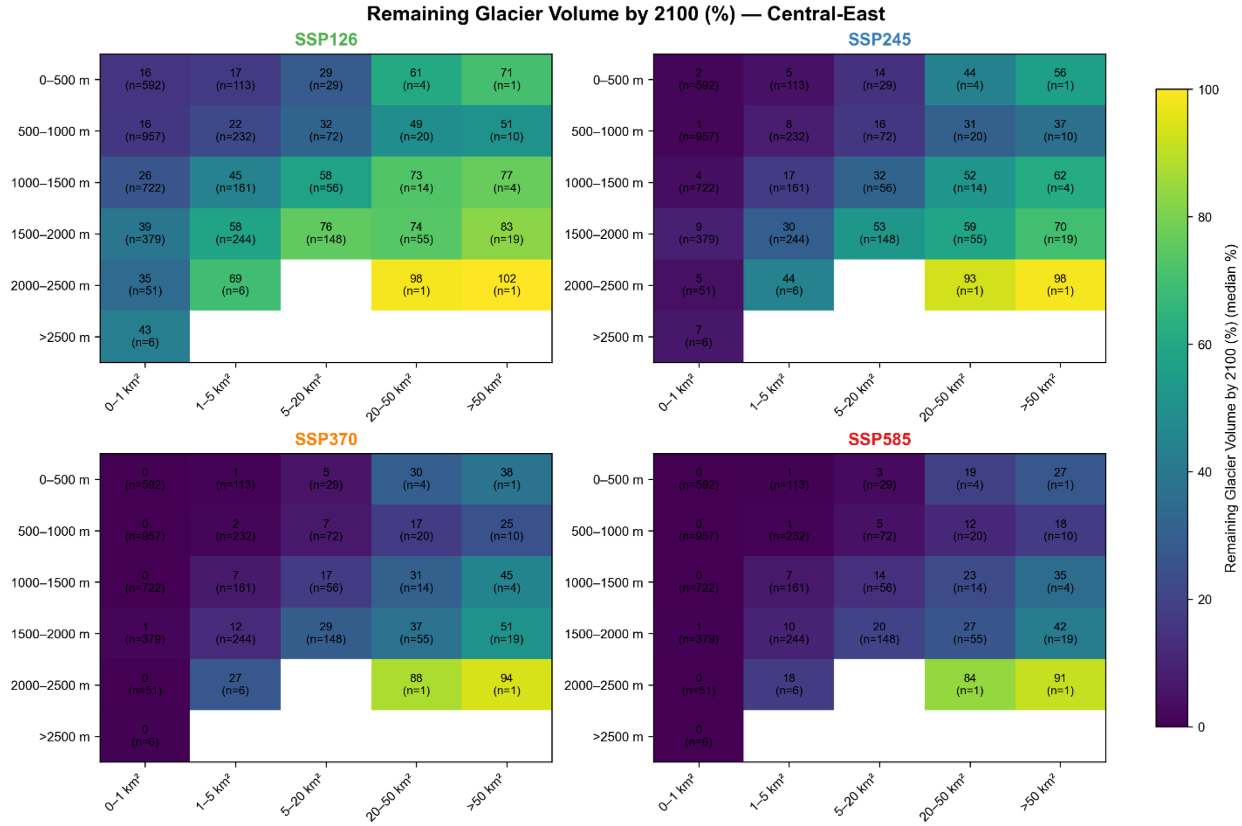

Remaining Glacier Volume by 2100 (%) — North
SSP126
0–500 m: 50 (n=34) 51 (n=17) 81 (n=10) 84 (n=5) 81 (n=5)
500–1000 m: 28 (n=348) 39 (n=215) 54 (n=186) 59 (n=79) 77 (n=54)
1000–1500 m: 109 (n=35) 42 (n=91) 61 (n=69) 75 (n=36) 81 (n=44)
1500–2000 m: 17 (n=3) 24 (n=1)
SSP245
0–500 m: 42 (n=34) 38 (n=17) 71 (n=10) 78 (n=5) 73 (n=5)
500–1000 m: 16 (n=348) 31 (n=215) 42 (n=186) 51 (n=79) 71 (n=54)
1000–1500 m: 90 (n=35) 34 (n=91) 52 (n=69) 68 (n=36) 74 (n=44)
1500–2000 m: 4 (n=3) 18 (n=1)
SSP370
0–500 m: 33 (n=34) 31 (n=17) 61 (n=10) 74 (n=5) 67 (n=5)
500–1000 m: 12 (n=348) 25 (n=215) 34 (n=186) 46 (n=79) 65 (n=54)
1000–1500 m: 75 (n=35) 29 (n=91) 45 (n=69) 60 (n=36) 65 (n=44)
1500–2000 m: 6 (n=3) 13 (n=1)
SSP585
0–500 m: 22 (n=34) 24 (n=17) 50 (n=10) 70 (n=5) 60 (n=5)
500–1000 m: 10 (n=348) 21 (n=215) 30 (n=186) 40 (n=79) 58 (n=54)
1000–1500 m: 70 (n=35) 25 (n=91) 40 (n=69) 52 (n=36) 59 (n=44)
1500–2000 m: 0 (n=3) 9 (n=1)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0 20 40 60 80 100

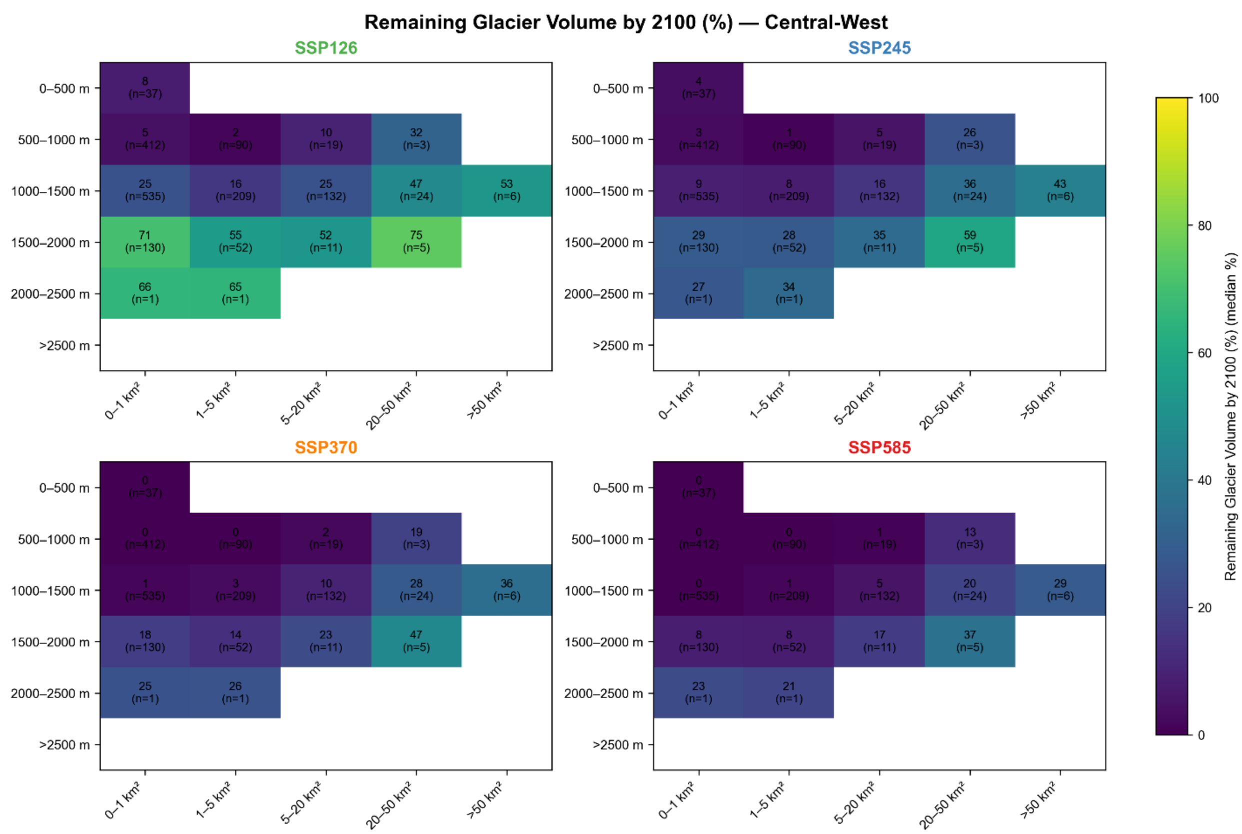


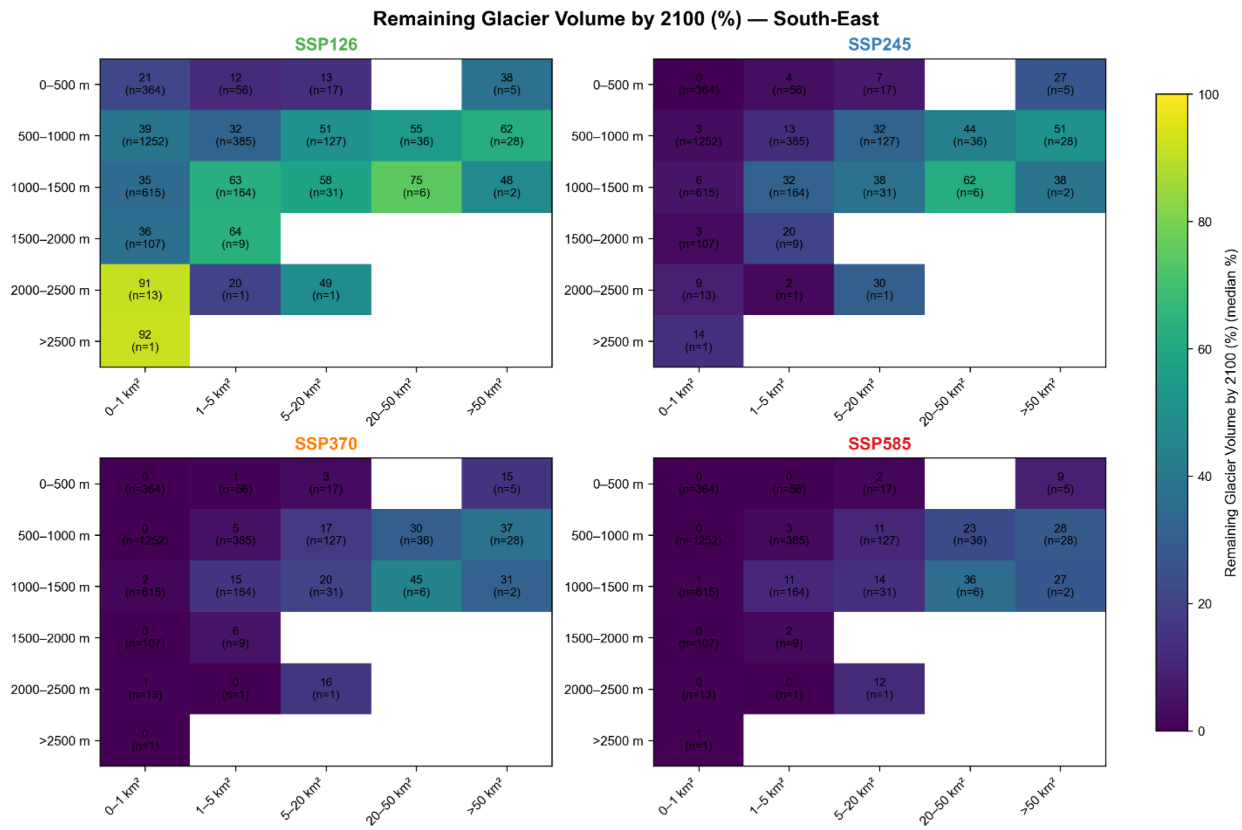
Remaining Glacier Volume by 2100 (%) — North-East
SSP126
0–500 m: 19 (n=403) 22 (n=73) 32 (n=33) 57 (n=18) 76 (n=19)
500–1000 m: 21 (n=880) 25 (n=203) 48 (n=118) 61 (n=41) 74 (n=38)
1000–1500 m: 37 (n=1309) 38 (n=484) 47 (n=162) 65 (n=44) 75 (n=12)
1500–2000 m: 55 (n=641) 59 (n=383) 67 (n=195) 79 (n=42) 74 (n=35)
2000–2500 m: 53 (n=109) 83 (n=60) 89 (n=15) 94 (n=6) 95 (n=6)
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP245
0–500 m: 9 (n=403) 11 (n=73) 18 (n=33) 42 (n=18) 71 (n=19)
500–1000 m: 6 (n=880) 13 (n=203) 33 (n=118) 46 (n=41) 63 (n=38)
1000–1500 m: 14 (n=1309) 19 (n=484) 28 (n=162) 48 (n=44) 60 (n=12)
1500–2000 m: 21 (n=641) 32 (n=383) 44 (n=195) 61 (n=42) 59 (n=35)
2000–2500 m: 19 (n=109) 60 (n=60) 75 (n=15) 85 (n=6) 92 (n=6)
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP370
0–500 m: 3 (n=403) 4 (n=73) 9 (n=33) 30 (n=18) 64 (n=19)
500–1000 m: 1 (n=880) 6 (n=203) 20 (n=118) 31 (n=41) 51 (n=38)
1000–1500 m: 4 (n=1309) 10 (n=484) 15 (n=162) 31 (n=44) 46 (n=12)
1500–2000 m: 9 (n=641) 16 (n=383) 27 (n=195) 40 (n=42) 42 (n=35)
2000–2500 m: 7 (n=109) 37 (n=60) 50 (n=15) 73 (n=6) 81 (n=6)
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP585
0–500 m: 1 (n=403) 3 (n=73) 5 (n=33) 21 (n=18) 52 (n=19)
500–1000 m: 1 (n=880) 4 (n=203) 15 (n=118) 23 (n=41) 43 (n=38)
1000–1500 m: 3 (n=1309) 8 (n=484) 12 (n=162) 22 (n=44) 35 (n=12)
1500–2000 m: 6 (n=641) 13 (n=383) 20 (n=195) 31 (n=42) 31 (n=35)
2000–2500 m: 3 (n=109) 28 (n=60) 39 (n=15) 68 (n=6) 73 (n=6)
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0 20 40 60 80 100



Remaining Glacier Volume by 2100 (%) — North-West
SSP126
0–500 m: 51 (n=270) 21 (n=21) 36 (n=21) 46 (n=3)
500–1000 m: 60 (n=573) 31 (n=91) 41 (n=37) 58 (n=14) 68 (n=17)
1000–1500 m: 40 (n=167) 29 (n=92) 19 (n=45) 37 (n=7) 93 (n=2)
1500–2000 m: 89 (n=63) 94 (n=31) 76 (n=9) 72 (n=3)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP245
0–500 m: 29 (n=270) 14 (n=21) 24 (n=21) 42 (n=3)
500–1000 m: 36 (n=573) 14 (n=91) 32 (n=37) 48 (n=14) 59 (n=17)
1000–1500 m: 15 (n=167) 20 (n=92) 12 (n=45) 29 (n=7) 89 (n=2)
1500–2000 m: 46 (n=63) 61 (n=31) 54 (n=9) 60 (n=3)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP370
0–500 m: 6 (n=270) 5 (n=21) 13 (n=21) 35 (n=3)
500–1000 m: 15 (n=573) 4 (n=91) 22 (n=37) 37 (n=14) 51 (n=17)
1000–1500 m: 3 (n=167) 12 (n=92) 10 (n=45) 24 (n=7) 83 (n=2)
1500–2000 m: 33 (n=63) 48 (n=31) 45 (n=9) 48 (n=3)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
SSP585
0–500 m: 3 (n=270) 3 (n=21) 6 (n=21) 27 (n=3)
500–1000 m: 8 (n=573) 2 (n=91) 15 (n=37) 25 (n=14) 43 (n=17)
1000–1500 m: 1 (n=167) 7 (n=92) 7 (n=45) 19 (n=7) 78 (n=2)
1500–2000 m: 26 (n=63) 39 (n=31) 36 (n=9) 37 (n=3)
2000–2500 m
>2500 m
0–1 km² 1–5 km² 5–20 km² 20–50 km² >50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0 20 40 60 80 100


Remaining Glacier Volume by 2100 (%) — Central-East
SSP126
SSP245
SSP370
SSP585
0–500 m
500–1000 m
1000–1500 m
1500–2000 m
2000–2500 m
>2500 m
0–1 km²
1–5 km²
5–20 km²
20–50 km²
>50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0
20
40
60
80
100


Remaining Glacier Volume by 2100 (%) — Central-West
SSP126
SSP245
SSP370
SSP585
0–500 m
500–1000 m
1000–1500 m
1500–2000 m
2000–2500 m
>2500 m
0–1 km²
1–5 km²
5–20 km²
20–50 km²
>50 km²
Remaining Glacier Volume by 2100 (%) (median %)
0
20
40
60
80
100



Remaining Glacier Volume by 2100 (%) — South-East
SSP126
SSP245
SSP370
SSP585
0–500 m
500–1000 m
1000–1500 m
1500–2000 m
2000–2500 m
>2500 m
0–1 km²
1–5 km²
5–20 km²
20–50 km²
>50 km²
Remaining Glacier Volume by 2100 (%) (median %)

Sect. S5. Comparisons with other studies

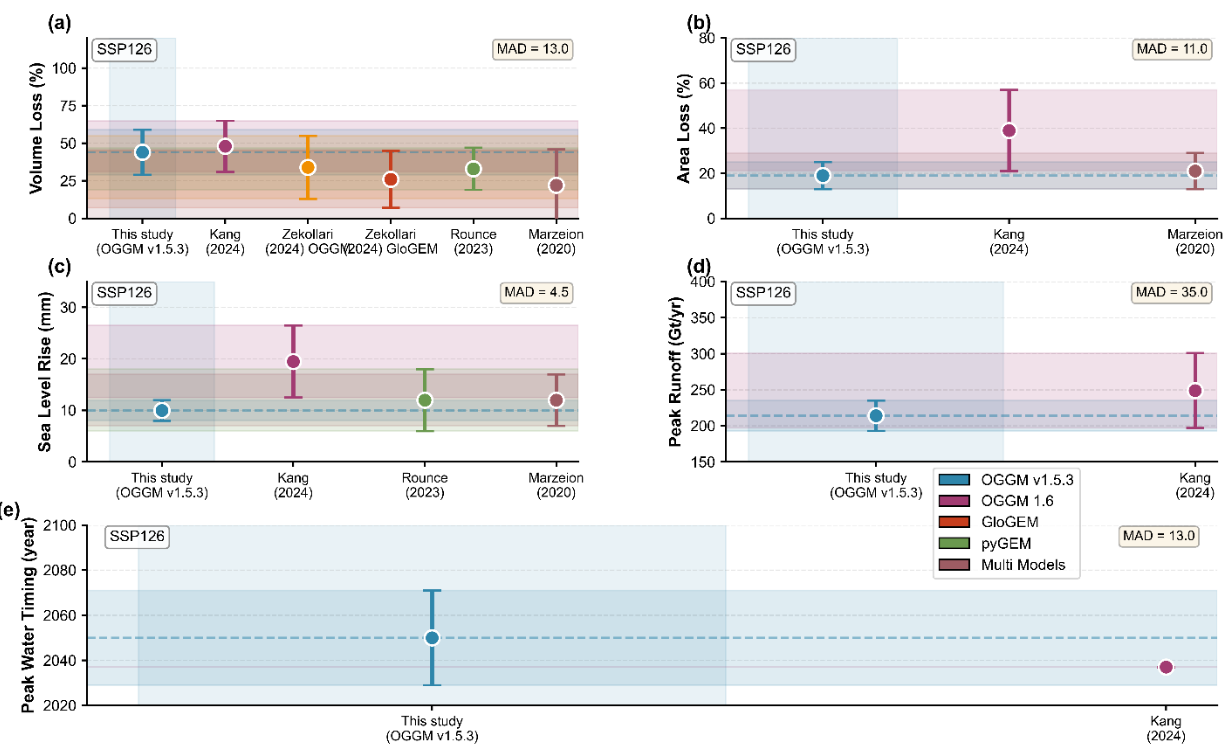


Figure S19. Multi-model comparison of projected changes for Greenlands peripheral glaciers under SSP126 scenario.

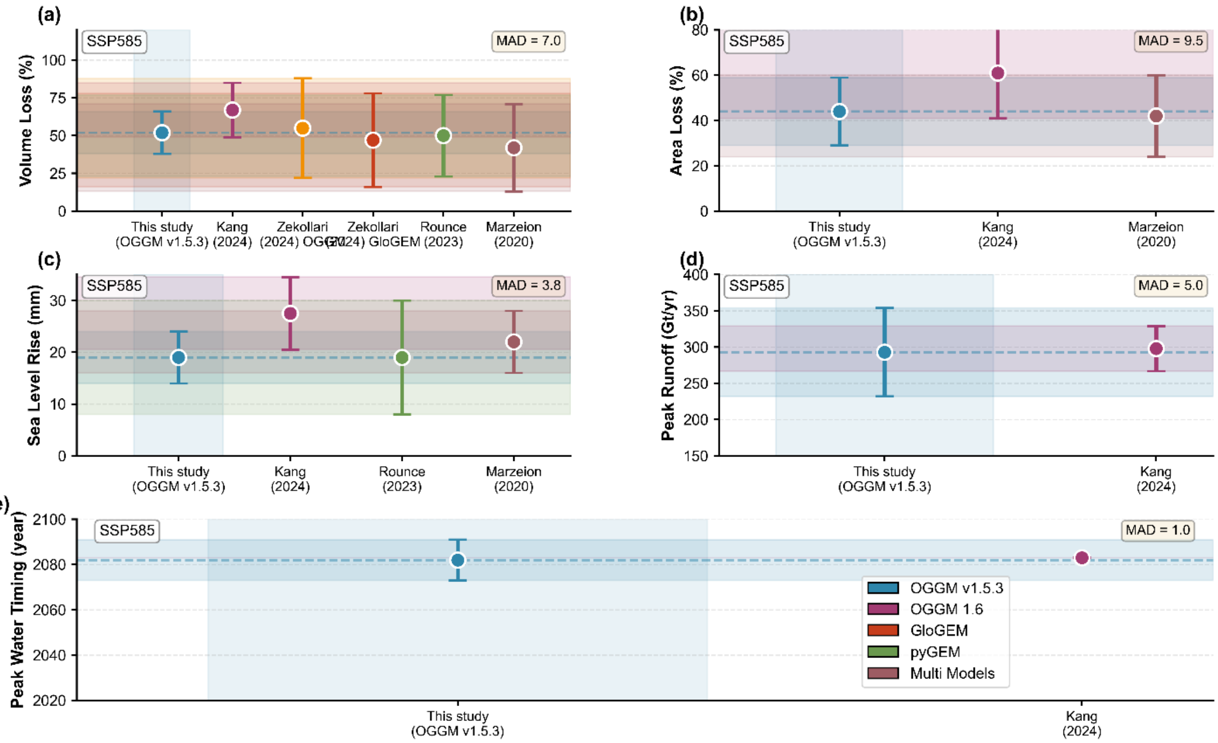


Figure S20. Multi-model comparison of projected changes for Greenlands peripheral glaciers under SSP585 scenario. Studies included: Marzeion et al. (2020); Rounce et al. (2023); Zekollari et al. (2024); Kang et al. (2024)

Table S2. Statistical metrics comparing projections across glacier models. MAD = Mean Absolute Difference, CV = Coefficient of Variation (OGGM-based studies only), Overlap Range = minimum to maximum confidence interval overlap with individual studies.

Metric	Scenario	MAD (All Studies)	MAD (OGGM Only)	CV (OGGM)	Overlap Range (%)
Volume Loss (%)	SSP126	13.0	7.0	0.140	28-78
	SSP585	7.0	9.0	0.112	36-52
Area Loss (%)	SSP126	11.0	20.0	0.345	9-75
	SSP585	9.5	17.0	0.162	35-83
SLR (mm)	SSP126	4.5	9.5	0.322	33-40
	SSP585	3.8	8.5	0.183	17-57
Peak Runoff (Gt/yr)	SSP126	35.0	-	-	-
	SSP585	5.0	-	-	-
Peakwater Timing (year)	SSP126	13.0	-	-	-
	SSP585	1.0	-	-	-

References

Cuffey, K. M. and Paterson, W. S. B.: The Physics of Glaciers, Academic Press, 2010.

Glen, J. W.: The creep of polycrystalline ice, Proceedings of the Royal Society of London. Series A. Mathematical and Physical Sciences 1175, London, https://doi.org/10.1098/rspa.1955.0066, 1955.

Kang, L., Ding, M., Wang, Y., Sun, W., Wang, L., An, H., Zhang, Q., Che, J., and Huai, B.: Projected changes of Greenland's periphery glaciers and ice caps, Environmental Research Letters, 19, 10.1088/1748-9326/ad8b5f, 2024.

Malles, J.-H., Maussion, F., Ultee, L., Kochtitzky, W., Copland, L., and Marzeion, B.: Exploring the impact of a frontal ablation parameterization on projected 21st-century mass change for Northern Hemisphere glaciers, Journal of Glaciology, 1-16, 10.1017/jog.2023.19, 2023.

Marzeion, B., Hock, R., Anderson, B., Bliss, A., Champollion, N., Fujita, K., Huss, M., Immerzeel, W. W., Kraaijenbrink, P., Malles, J. H., Maussion, F., Radić, V., Rounce, D. R., Sakai, A., Shannon, S., van de Wal, R., and Zekollari, H.: Partitioning the Uncertainty of Ensemble Projections of Global Glacier Mass Change, Earths Future, 8, 10.1029/2019ef001470, 2020.

Maussion, F., Butenko, A., Champollion, N., Dusch, M., Eis, J., Fourteau, K., Gregor, P., Jarosch, A. H., Landmann, J., Oesterle, F., Recinos, B., Rothenpieler, T., Vlug, A., Wild, C. T., and Marzeion, B.: The Open Global Glacier Model (OGGM) v1.1, Geoscientific Model Development, 12, 909-931, 10.5194/gmd-12-909-2019, 2019.

Rounce, D. R., Hock, R., Maussion, F., Hugonnet, R., Kochtitzky, W., Huss, M., Berthier, E., Brinkerhoff, D., Compagno, L., Copland, L., Farinotti, D., Menounos, B., and McNabb, R. W.: Global glacier change in the 21st century: Every increase in temperature matters, Science, 379, 78-83, 10.1126/science.abo1324, 2023.

Zekollari, H., Huss, M., Schuster, L., Maussion, F., Rounce, D. R., Aguayo, R., Champollion, N., Compagno, L., Hugonnet, R., Marzeion, B., Mojtabavi, S., and Farinotti, D.: Twenty-first century global glacier evolution under CMIP6 scenarios and the role of glacier-specific observations, The Cryosphere, 18, 5045-5066, 10.5194/tc-18-5045-2024, 2024.