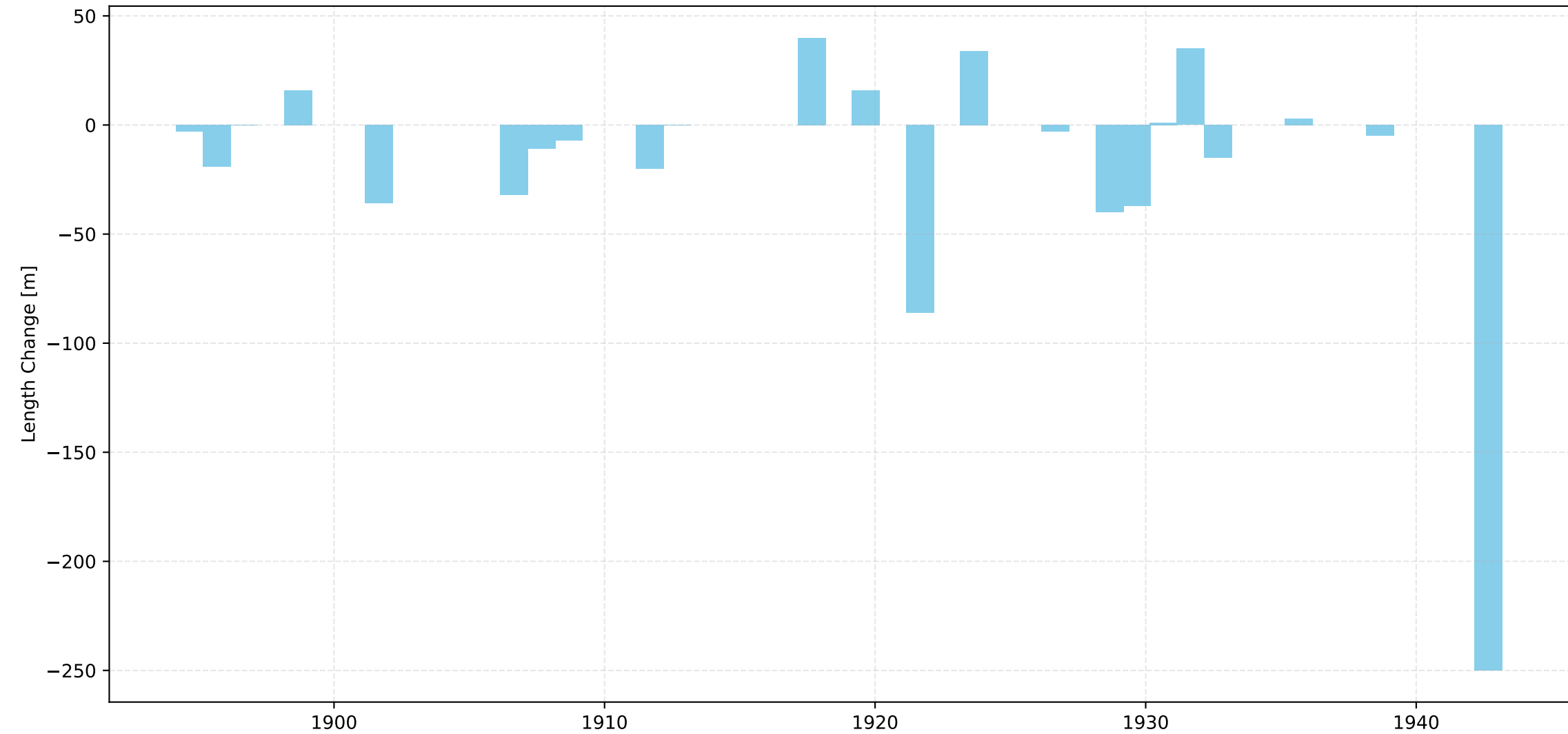
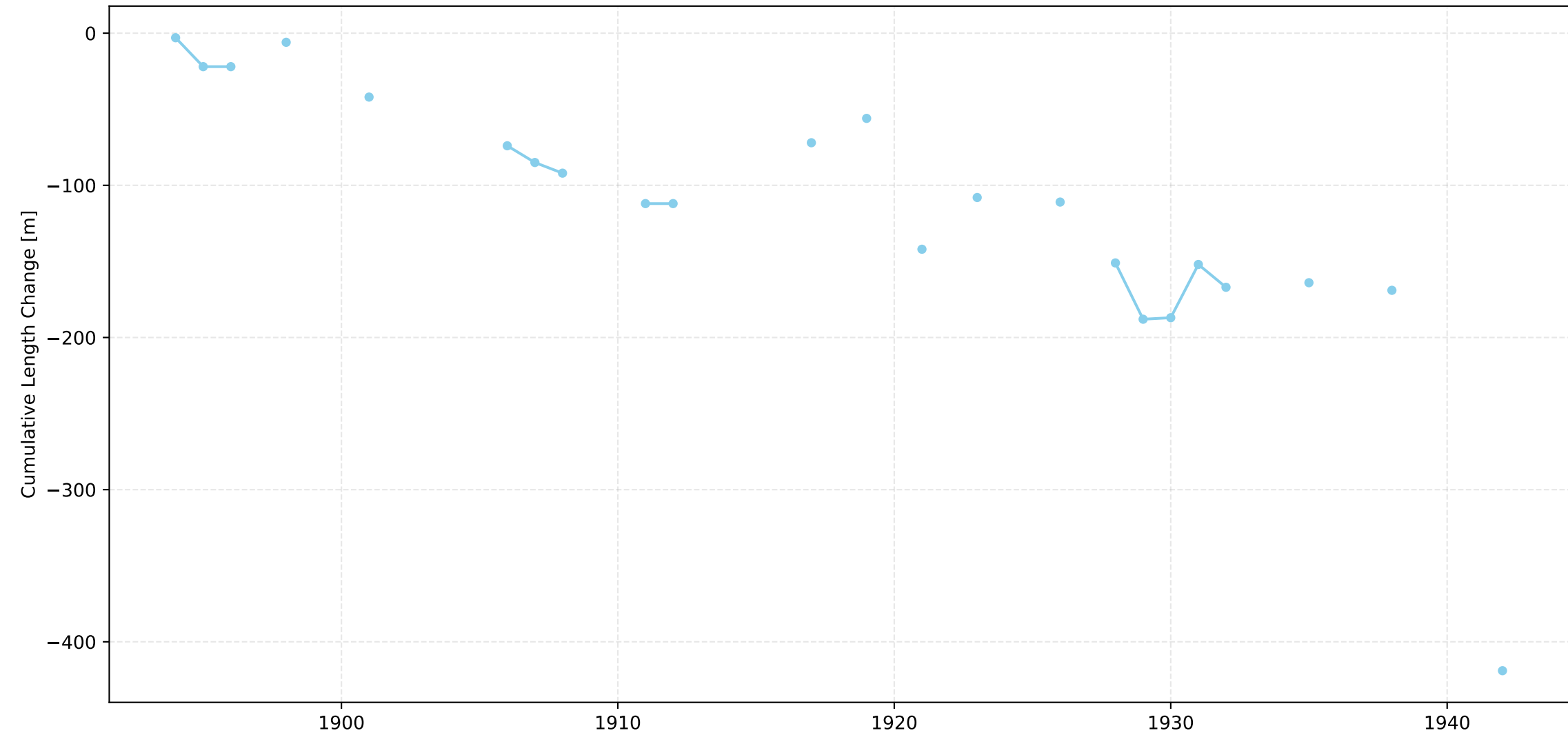


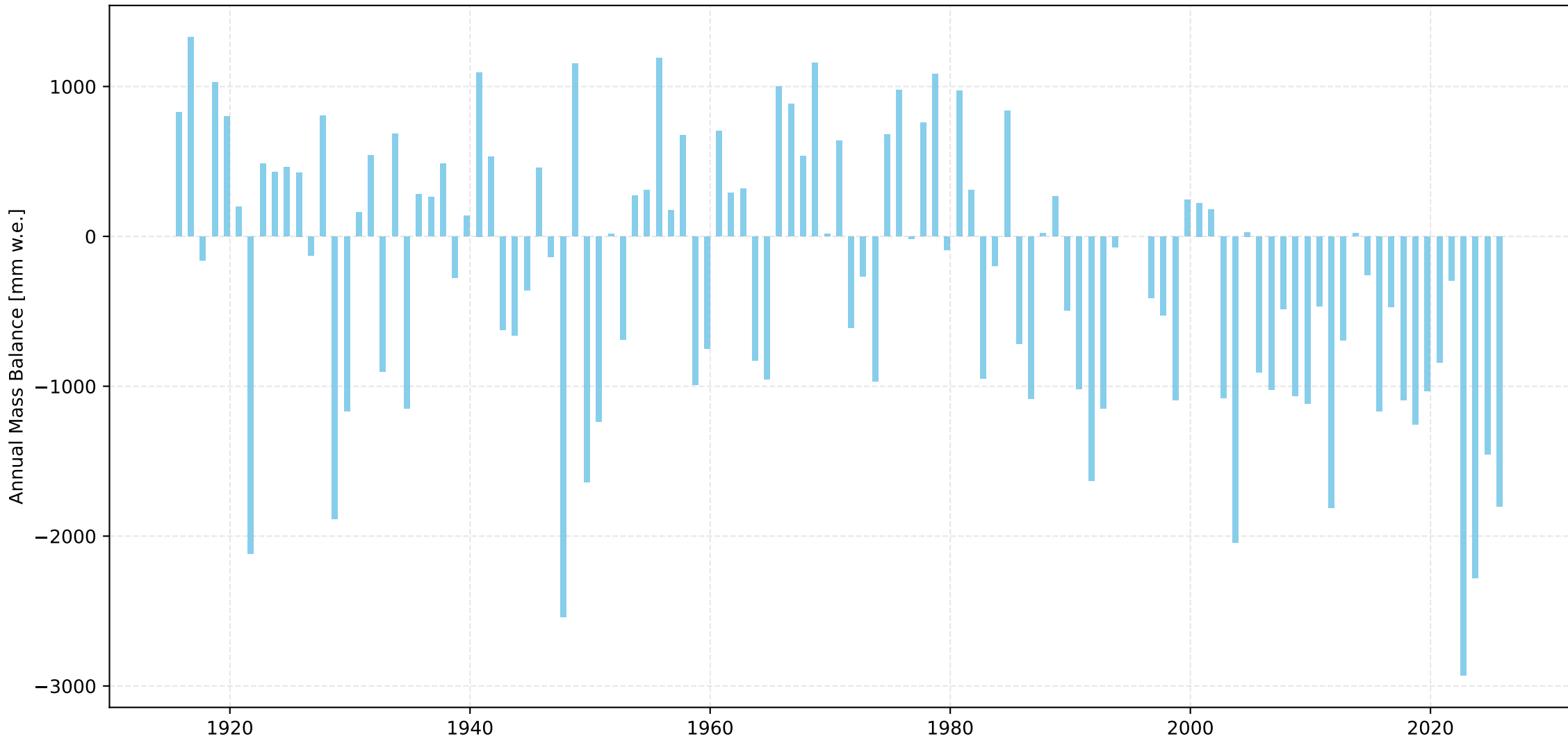
Claridenfirn Length Change Over Time



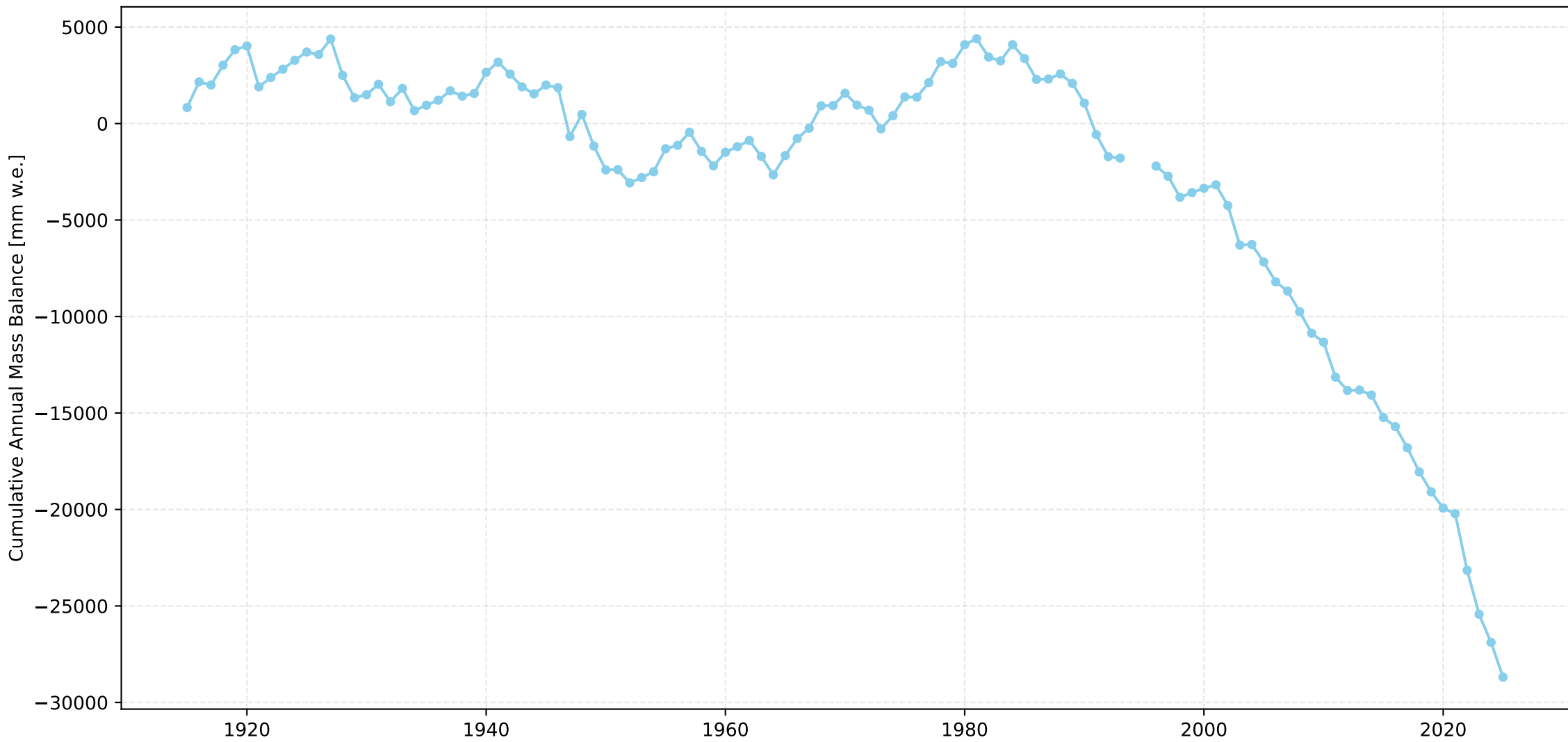
Claridenfirn Cumulative Length Change Over Time



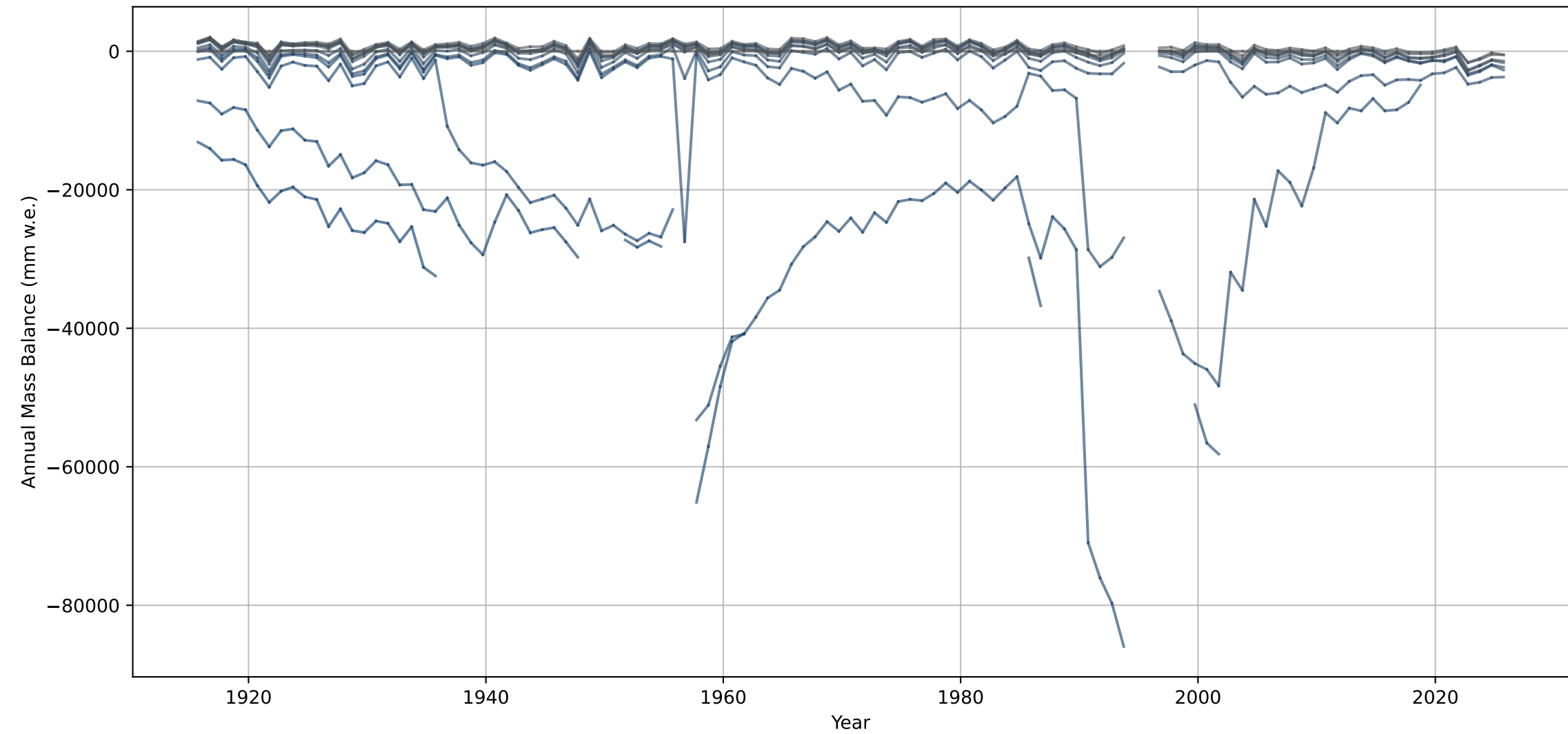
Claridenfirn Annual Mass Balance Over Time



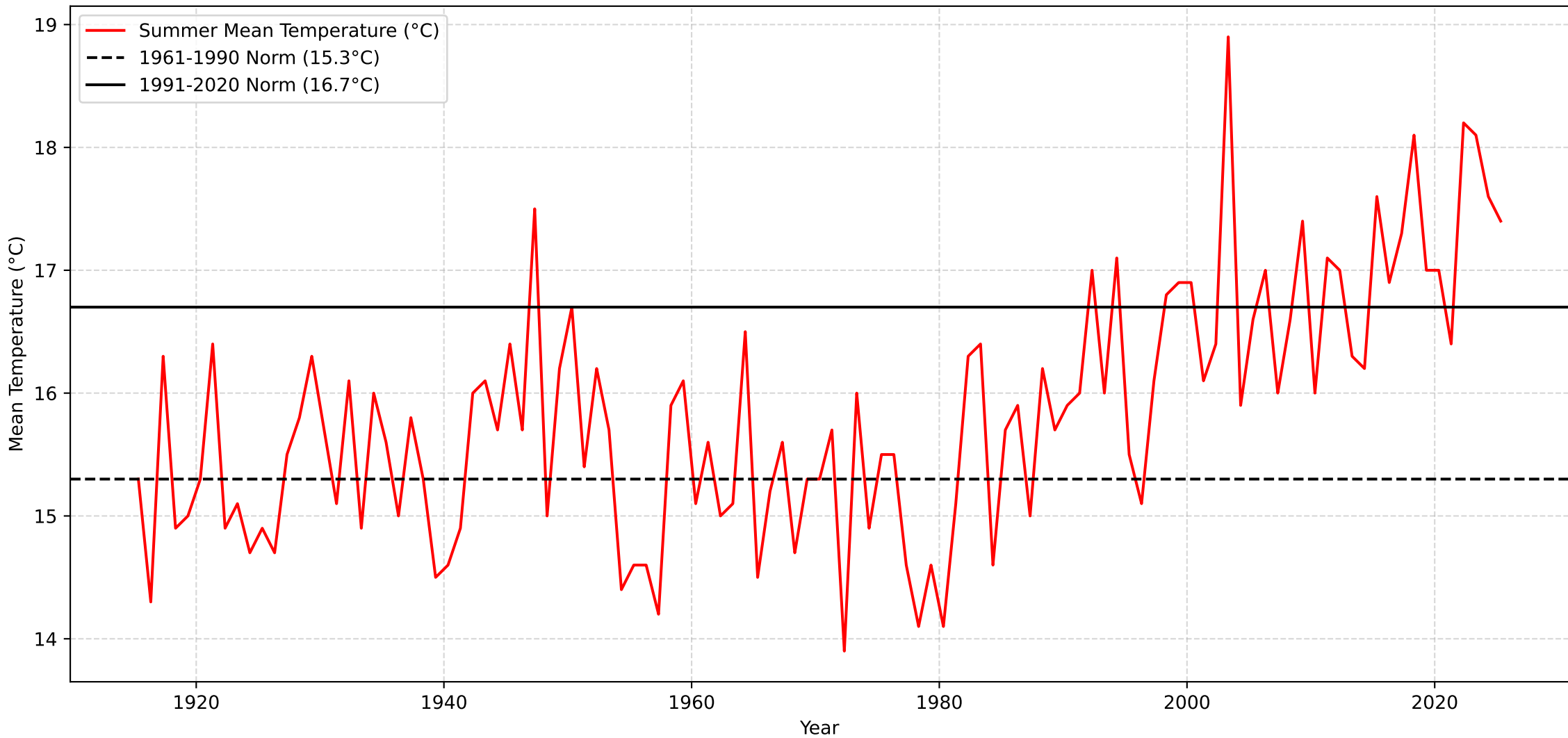
Claridenfirn Cumulative Annual Mass Balance Over Time



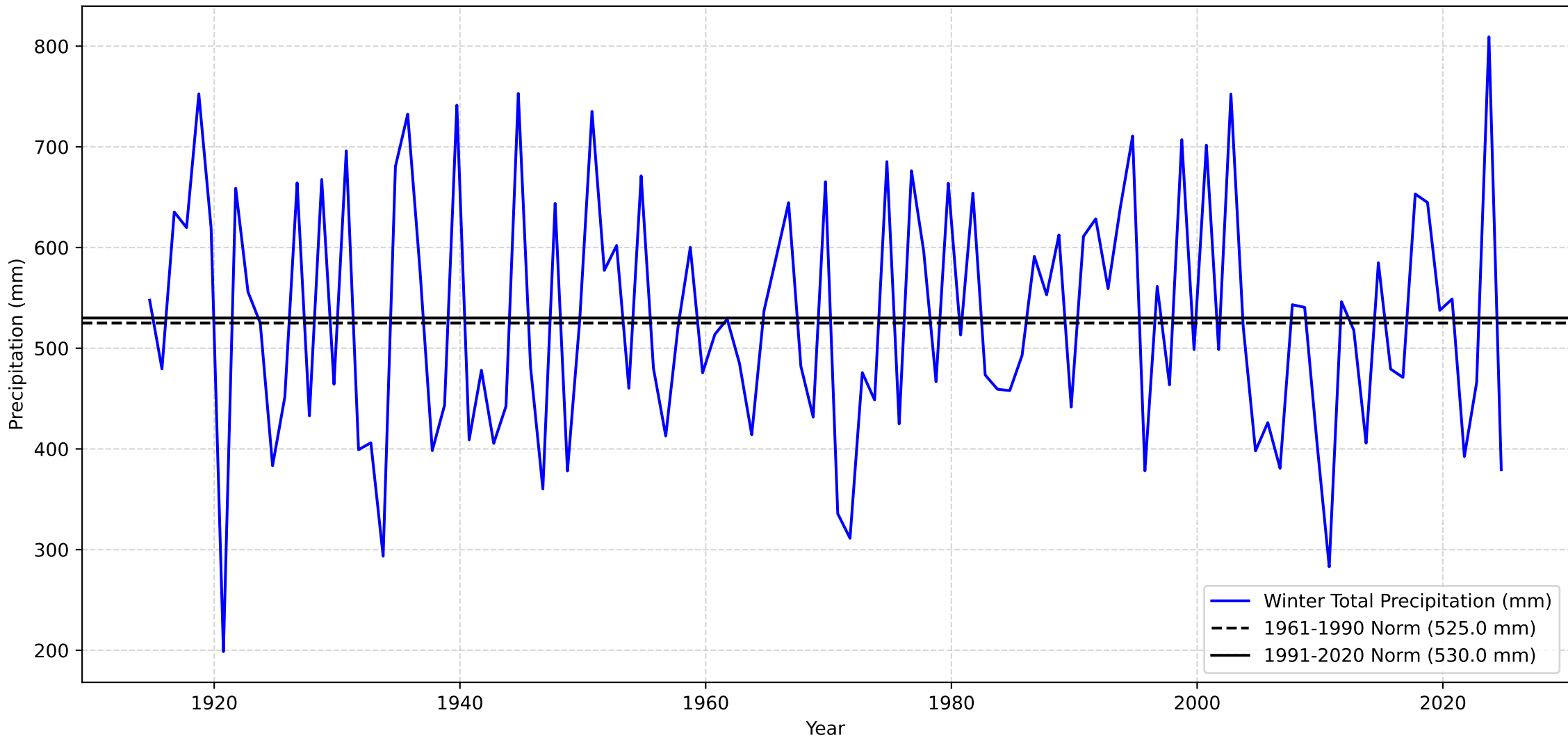
Annual Mass Balance for each Elevation Bin over Time - Claridenfirn



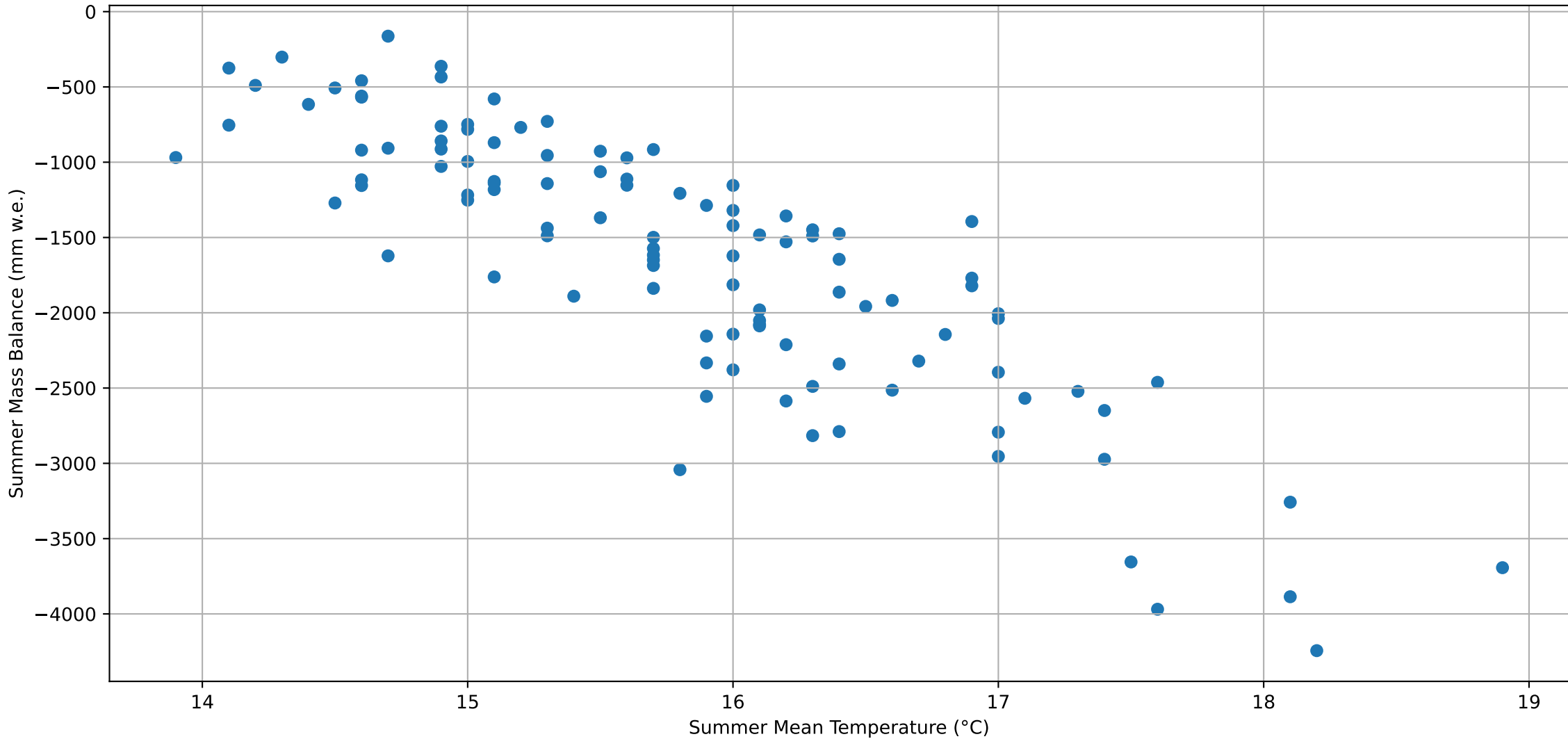
Altdorf Summer Mean Temperature



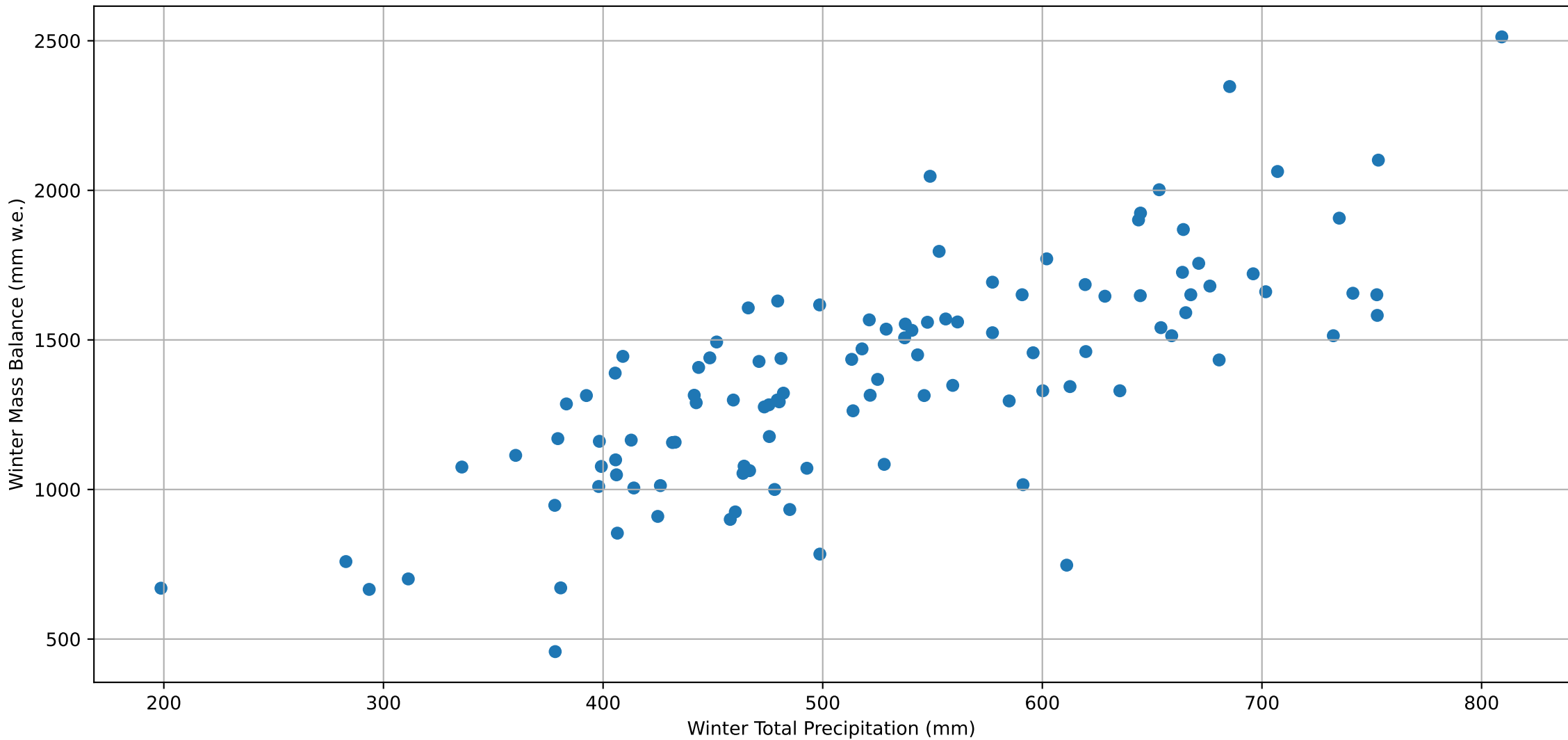
Altdorf Winter Total Precipitation



Claridenfirn Summer Mass Balance with relation to Temperature



Claridenfirn Winter Mass Balance with relation to Precipitation



Regression: Monthly 1961-1990

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MONTHLY DEVIATIONS for Claridenfirn using 1961-1990 climate norms
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correlation Analysis with Significance Testing:
Skipping constant column: const

	Variable	Correlation	Coefficient	P-value	Significant (p < 0.05)
2	july_td	-0.642742	4.899987e-14		True
3	august_td	-0.603902	3.614537e-12		True
1	june_td	-0.470638	2.414525e-07		True
4	september_td	-0.440927	1.597990e-06		True
0	may_td	-0.327747	5.033976e-04		True
9	february_pd	0.272898	4.091815e-03		True
5	october_pd	0.155127	1.072529e-01		False
8	january_pd	0.149151	1.216468e-01		False
7	december_pd	0.094737	3.271420e-01		False
10	march_pd	0.082160	3.957002e-01		False
11	april_pd	0.081340	4.004488e-01		False
6	november_pd	0.071166	4.621182e-01		False

Number of observations: 109

Regression Summary:

OLS Regression Results						
Dep. Variable:	annual mass balance (mm w.e.)			R-squared:	0.768	
Model:	OLS			Adj. R-squared:	0.739	
Method:	Least Squares			F-statistic:	26.54	
Date:	Wed, 17 Dec 2025			Prob (F-statistic):	2.55e-25	
Time:	21:49:27			Log-Likelihood:	-818.07	
No. Observations:	109			AIC:	1662.	
Df Residuals:	96			BIC:	1697.	
Df Model:	12					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	59.2099	53.628	1.104	0.272	-47.241	165.661
may_td	-78.5856	30.615	-2.567	0.012	-139.356	-17.815
june_td	-98.5647	30.860	-3.194	0.002	-159.821	-37.309
july_td	-192.9518	34.689	-5.562	0.000	-261.808	-124.095
august_td	-189.5345	36.611	-5.177	0.000	-262.207	-116.862
september_td	-137.7202	34.027	-4.047	0.000	-205.263	-70.178
october_pd	3.7112	0.949	3.911	0.000	1.827	5.595
november_pd	2.0676	0.824	2.509	0.014	0.432	3.703
december_pd	2.2300	0.913	2.443	0.016	0.418	4.042
january_pd	3.4498	1.133	3.046	0.003	1.202	5.698
february_pd	4.5414	1.066	4.258	0.000	2.424	6.658
march_pd	2.7083	1.152	2.350	0.021	0.421	4.996
april_pd	-0.5163	1.286	-0.402	0.689	-3.069	2.036
Omnibus:	1.448	Durbin-Watson:	1.667			
Prob(Omnibus):	0.485	Jarque-Bera (JB):	1.207			
Skew:	-0.039	Prob(JB):	0.547			
Kurtosis:	2.491	Cond. No.	72.2			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression: Optimal 1961-1990

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OPTIMAL SEASONAL DEVIATIONS for Claridenfirn using 1961-1990 climate norms

=====

Correlation Analysis with Significance Testing:

Skipping constant column: const

	Variable	Correlation	Coefficient	P-value	Significant (p < 0.05)
0	opt_season_td	-0.729232	2.449264e-19		True
1	opt_season_pd	0.333928	3.873699e-04		True

Number of observations: 109

Regression Summary:

OLS Regression Results						
=====						
Dep. Variable:	annual mass balance (mm w.e.)			R-squared:	0.640	
Model:	OLS			Adj. R-squared:	0.633	
Method:	Least Squares			F-statistic:	94.27	
Date:	Wed, 17 Dec 2025			Prob (F-statistic):	3.00e-24	
Time:	21:49:28			Log-Likelihood:	-842.09	
No. Observations:	109			AIC:	1690.	
Df Residuals:	106			BIC:	1698.	
Df Model:	2					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	83.3856	60.955	1.368	0.174	-37.464	204.236
opt_season_td	-604.5066	48.447	-12.478	0.000	-700.557	-508.456
opt_season_pd	2.8935	0.512	5.649	0.000	1.878	3.909
=====						
Omnibus:	1.729		Durbin-Watson:		1.776	
Prob(Omnibus):	0.421		Jarque-Bera (JB):		1.287	
Skew:	-0.250		Prob(JB):		0.526	
Kurtosis:	3.180		Cond. No.		133.	
=====						

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression: Seasonal 1961-1990

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SUMMER/WINTER SEASONAL DEVIATIONS for Claridenfirn using 1961-1990 climate norms
=====

Correlation Analysis with Significance Testing:
Skipping constant column: const
Variable Correlation Coefficient P-value Significant (p < 0.05)
0 summer_td -0.772507 7.814267e-23 True
1 winter_pd 0.344108 2.485777e-04 True

Number of observations: 109

Regression Summary:

OLS Regression Results
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.717
Model: OLS Adj. R-squared: 0.712
Method: Least Squares F-statistic: 134.6
Date: Wed, 17 Dec 2025 Prob (F-statistic): 8.03e-30
Time: 21:49:28 Log-Likelihood: -828.90
No. Observations: 109 AIC: 1664.
Df Residuals: 106 BIC: 1672.
Df Model: 2
Covariance Type: nonrobust
coef std err t P>|t| [0.025 0.975]
const 113.6658 53.563 2.122 0.036 7.471 219.860
summer_td -708.5002 47.257 -14.993 0.000 -802.191 -614.809
winter_pd 2.6683 0.396 6.730 0.000 1.882 3.454
Omnibus: 3.151 Durbin-Watson: 1.635
Prob(Omnibus): 0.207 Jarque-Bera (JB): 2.632
Skew: -0.367 Prob(JB): 0.268
Kurtosis: 3.201 Cond. No. 155.

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression: Monthly 1991-2020

=====
MONTHLY DEVIATIONS for Claridenfirn using 1991-2020 climate norms
=====

correlation Analysis with Significance Testing:
Skipping constant column: const

	Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
2	july_td	-0.642742	4.899987e-14	True
3	august_td	-0.603902	3.614537e-12	True
1	june_td	-0.470638	2.414525e-07	True
4	september_td	-0.440927	1.597990e-06	True
0	may_td	-0.327747	5.033976e-04	True
9	february_pd	0.272898	4.091815e-03	True
5	october_pd	0.155127	1.072529e-01	False
8	january_pd	0.149151	1.216468e-01	False
7	december_pd	0.094737	3.271420e-01	False
10	march_pd	0.082160	3.957002e-01	False
11	april_pd	0.081340	4.004488e-01	False
6	november_pd	0.071166	4.621182e-01	False

Number of observations: 109

Regression Summary:

OLS Regression Results						
Dep. Variable:	annual mass balance (mm w.e.)			R-squared:	0.768	
Model:	OLS			Adj. R-squared:	0.739	
Method:	Least Squares			F-statistic:	26.54	
Date:	Wed, 17 Dec 2025			Prob (F-statistic):	2.55e-25	
Time:	21:49:28			Log-Likelihood:	-818.07	
No. Observations:	109			AIC:	1662.	
Df Residuals:	96			BIC:	1697.	
Df Model:	12					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	-885.9051	61.387	-14.432	0.000	-1007.757	-764.054
may_td	-78.5856	30.615	-2.567	0.012	-139.356	-17.815
june_td	-98.5647	30.860	-3.194	0.002	-159.821	-37.309
july_td	-192.9518	34.689	-5.562	0.000	-261.808	-124.095
august_td	-189.5345	36.611	-5.177	0.000	-262.207	-116.862
september_td	-137.7202	34.027	-4.047	0.000	-205.263	-70.178
october_pd	3.7112	0.949	3.911	0.000	1.827	5.595
november_pd	2.0676	0.824	2.509	0.014	0.432	3.703
december_pd	2.2300	0.913	2.443	0.016	0.418	4.042
january_pd	3.4498	1.133	3.046	0.003	1.202	5.698
february_pd	4.5414	1.066	4.258	0.000	2.424	6.658
march_pd	2.7083	1.152	2.350	0.021	0.421	4.996
april_pd	-0.5163	1.286	-0.402	0.689	-3.069	2.036
Omnibus:	1.448	Durbin-Watson:	1.667			
Prob(Omnibus):	0.485	Jarque-Bera (JB):	1.207			
Skew:	-0.039	Prob(JB):	0.547			
Kurtosis:	2.491	Cond. No.	83.1			

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression: Optimal 1991-2020

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OPTIMAL SEASONAL DEVIATIONS for Claridenfirn using 1991-2020 climate norms

=====

Correlation Analysis with Significance Testing:

Skipping constant column: const

	Variable	Correlation	Coefficient	P-value	Significant (p < 0.05)
0	opt_season_td	-0.731612	1.638598e-19		True
1	opt_season_pd	0.333928	3.873699e-04		True

Number of observations: 109

Regression Summary:

OLS Regression Results						
=====						
Dep. Variable:	annual mass balance (mm w.e.)			R-squared:	0.642	
Model:	OLS			Adj. R-squared:	0.635	
Method:	Least Squares			F-statistic:	94.89	
Date:	Wed, 17 Dec 2025			Prob (F-statistic):	2.40e-24	
Time:	21:49:28			Log-Likelihood:	-841.86	
No. Observations:	109			AIC:	1690.	
Df Residuals:	106			BIC:	1698.	
Df Model:	2					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	-844.3329	70.849	-11.917	0.000	-984.798	-703.868
opt_season_td	-610.0771	48.721	-12.522	0.000	-706.672	-513.482
opt_season_pd	2.8672	0.511	5.609	0.000	1.854	3.881
=====						
Omnibus:	2.136		Durbin-Watson:	1.779		
Prob(Omnibus):	0.344		Jarque-Bera (JB):	1.580		
Skew:	-0.252		Prob(JB):	0.454		
Kurtosis:	3.307		Cond. No.	156.		
=====						

Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Regression: Seasonal 1991-2020

=====
SUMMER/WINTER SEASONAL DEVIATIONS for Claridenfirn using 1991-2020 climate norms
=====

Correlation Analysis with Significance Testing:
Skipping constant column: const
Variable Correlation Coefficient P-value Significant (p < 0.05)
0 summer_td -0.772507 7.814267e-23 True
1 winter_pd 0.344108 2.485777e-04 True

Number of observations: 109

Regression Summary:

OLS Regression Results
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.717
Model: OLS Adj. R-squared: 0.712
Method: Least Squares F-statistic: 134.6
Date: Wed, 17 Dec 2025 Prob (F-statistic): 8.03e-30
Time: 21:49:28 Log-Likelihood: -828.90
No. Observations: 109 AIC: 1664.
Df Residuals: 106 BIC: 1672.
Df Model: 2
Covariance Type: nonrobust
coef std err t P>|t| [0.025 0.975]
const -864.8931 62.383 -13.864 0.000 -988.574 -741.212
summer_td -708.5002 47.257 -14.993 0.000 -802.191 -614.809
winter_pd 2.6683 0.396 6.730 0.000 1.882 3.454
Omnibus: 3.151 Durbin-Watson: 1.635
Prob(Omnibus): 0.207 Jarque-Bera (JB): 2.632
Skew: -0.367 Prob(JB): 0.268
Kurtosis: 3.201 Cond. No. 181.

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.