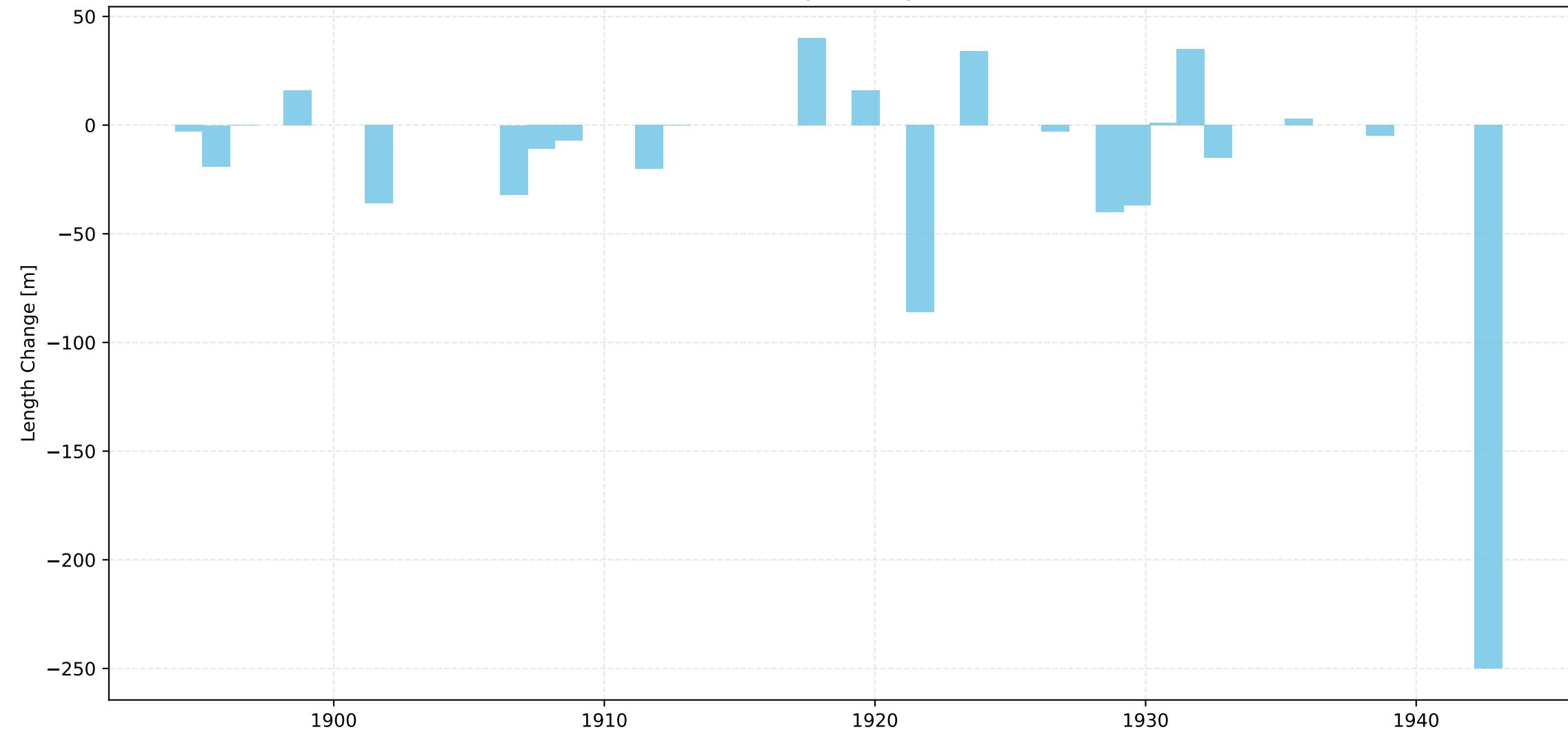
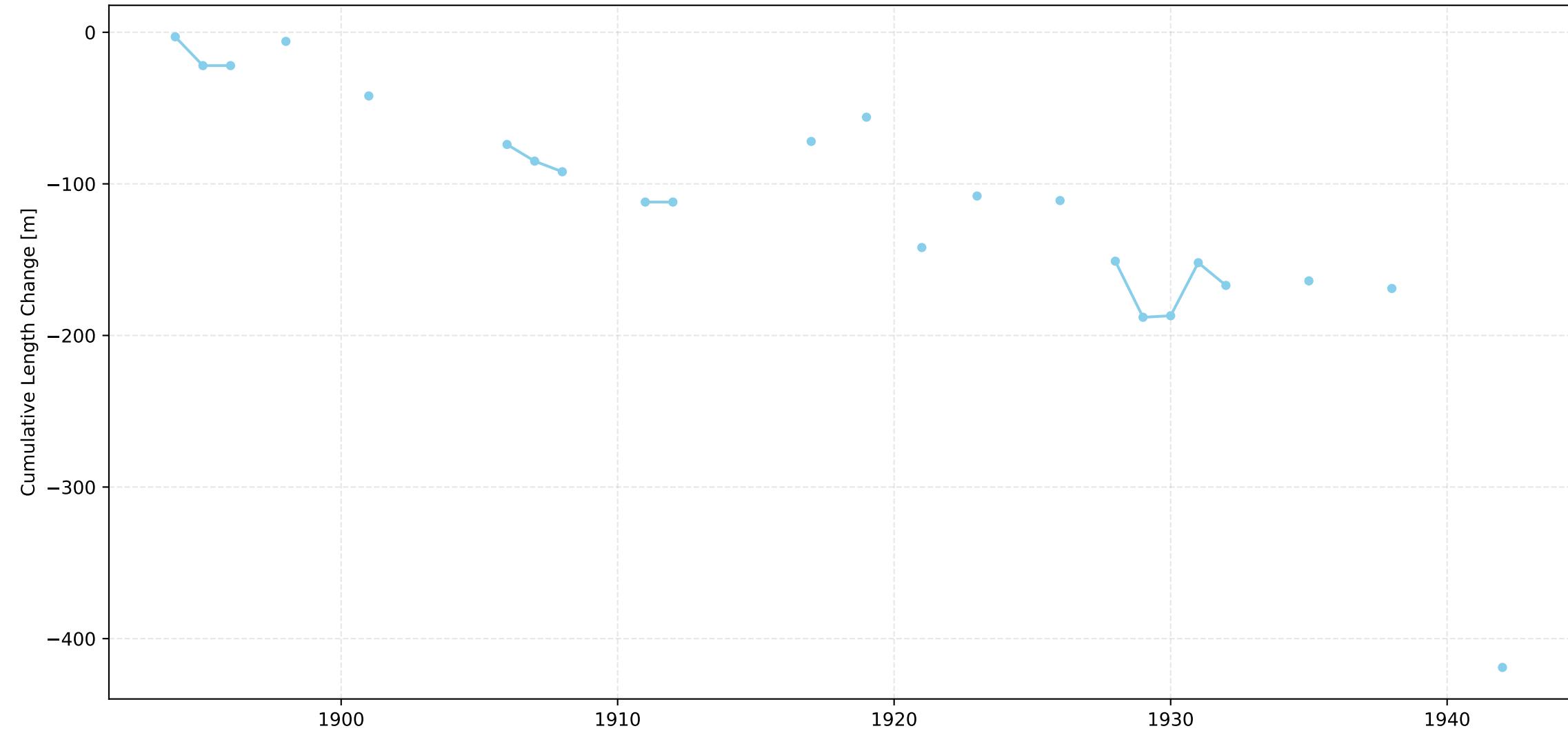


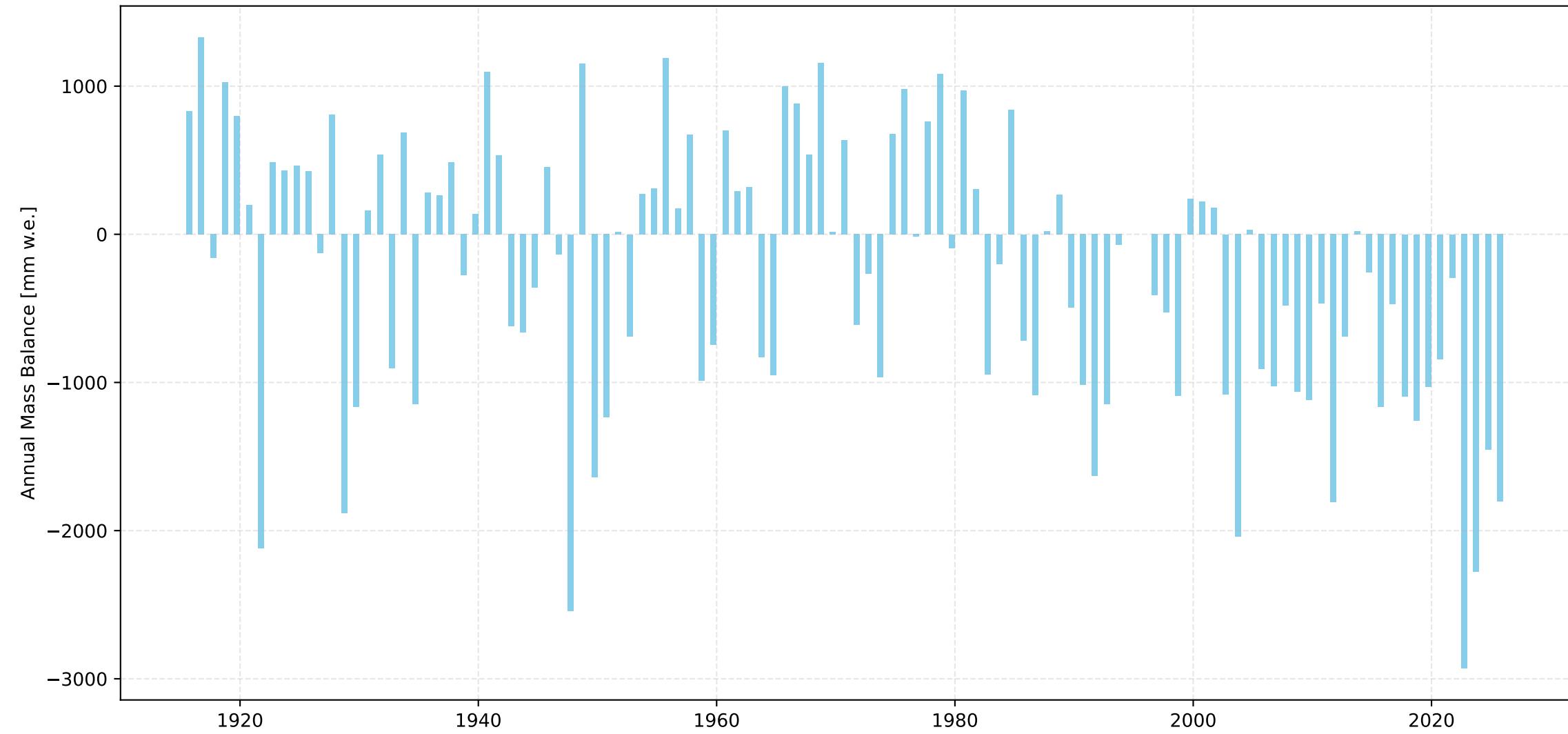
Claridenfирn Length Change Over Time



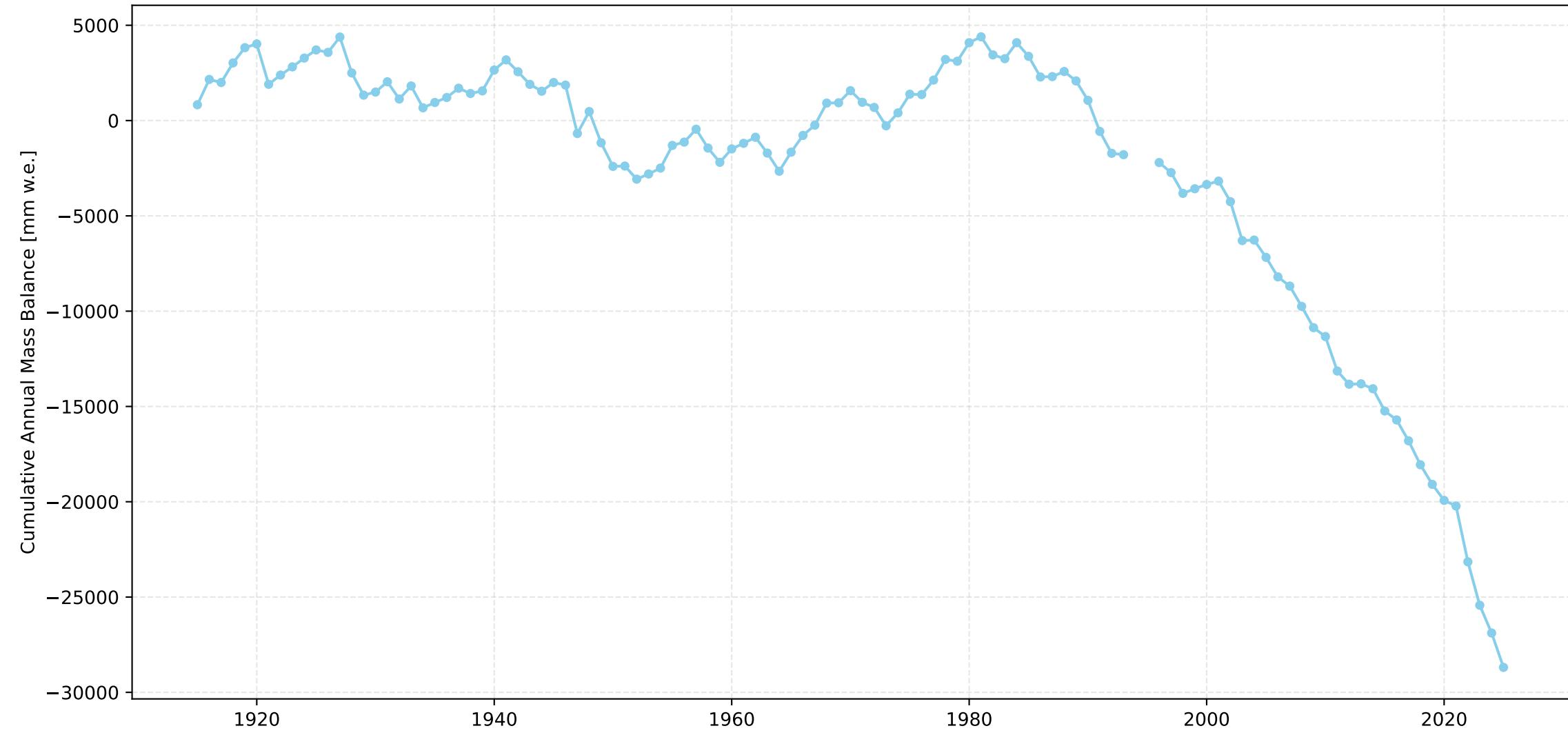
Claridenfirn Cumulative Length Change Over Time



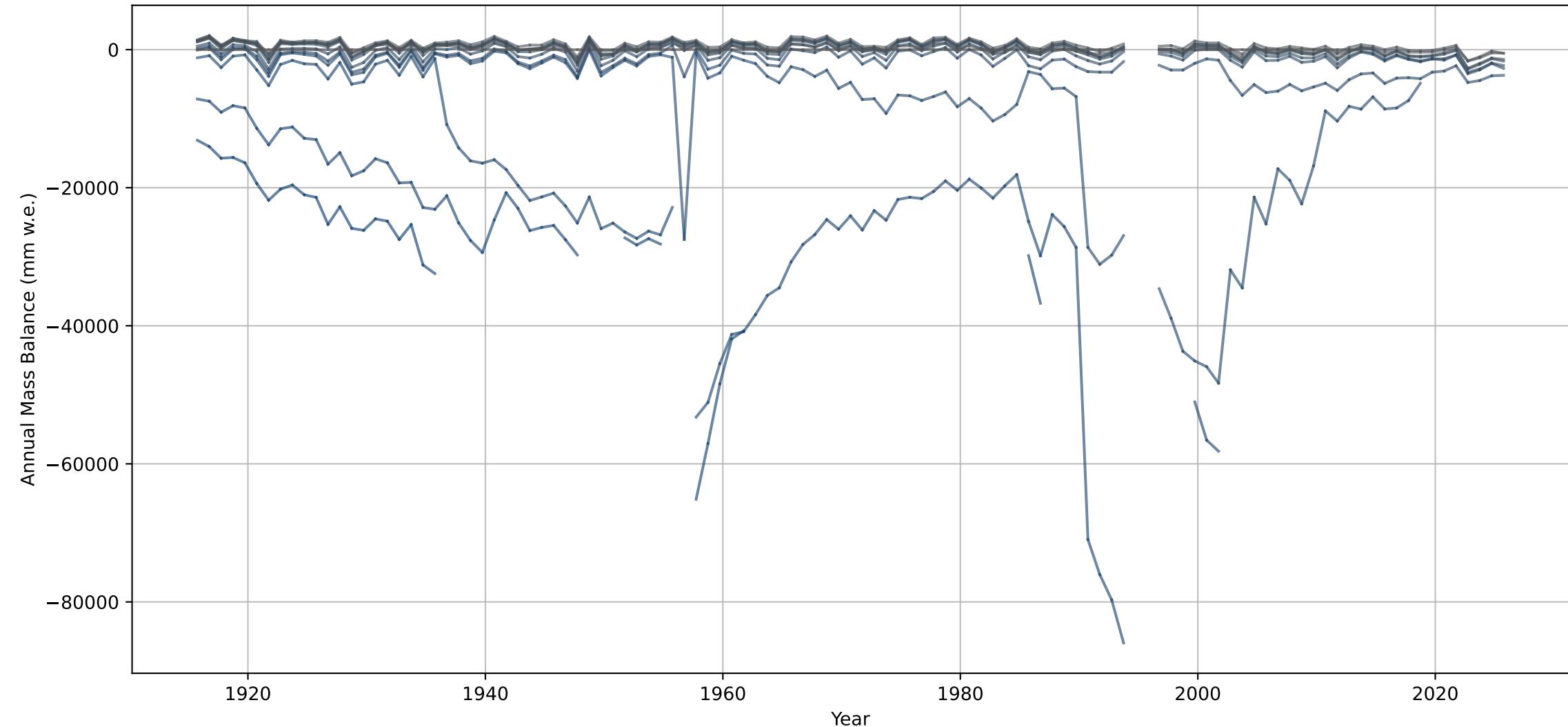
Claridenfirn Annual Mass Balance Over Time



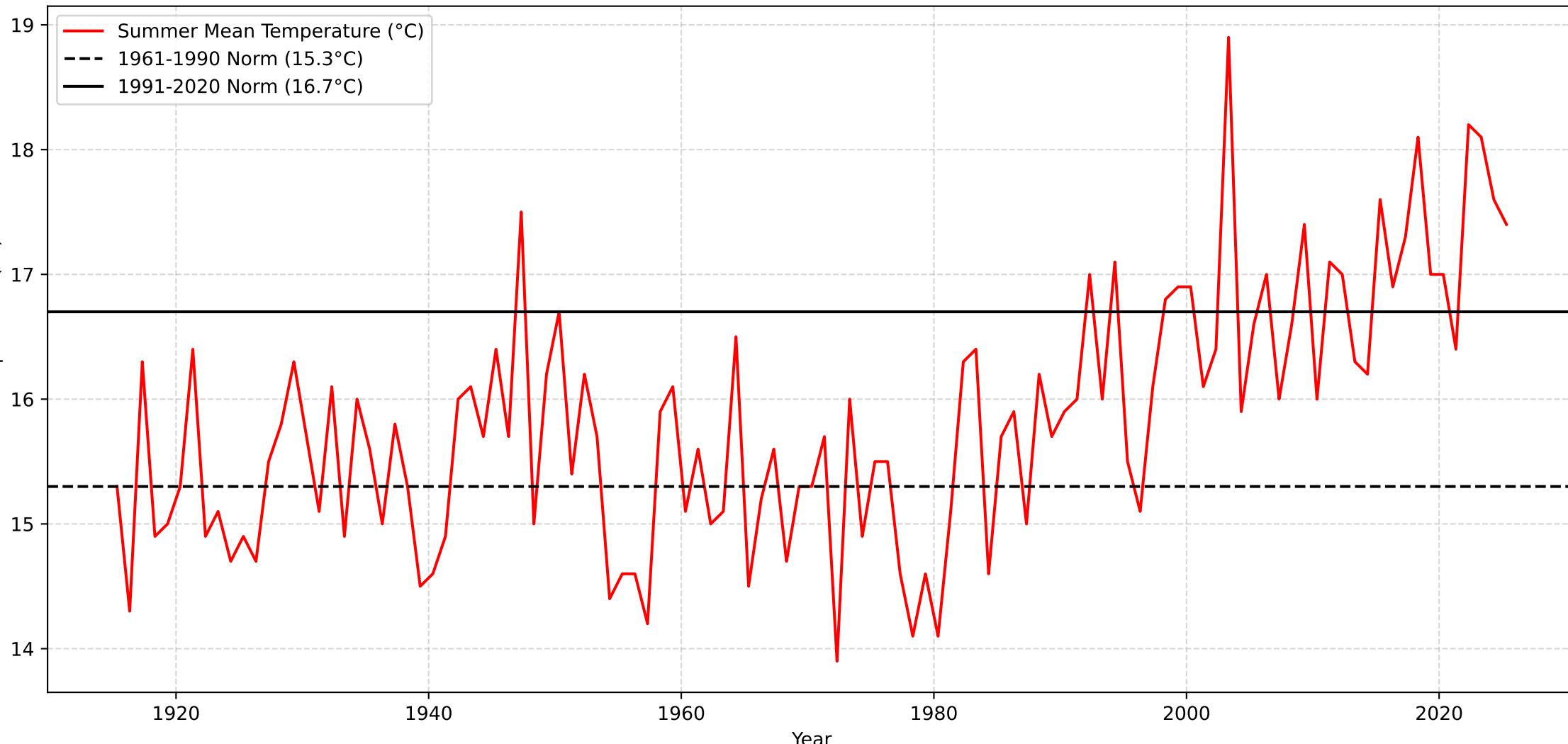
Claridenfirn Cumulative Annual Mass Balance Over Time



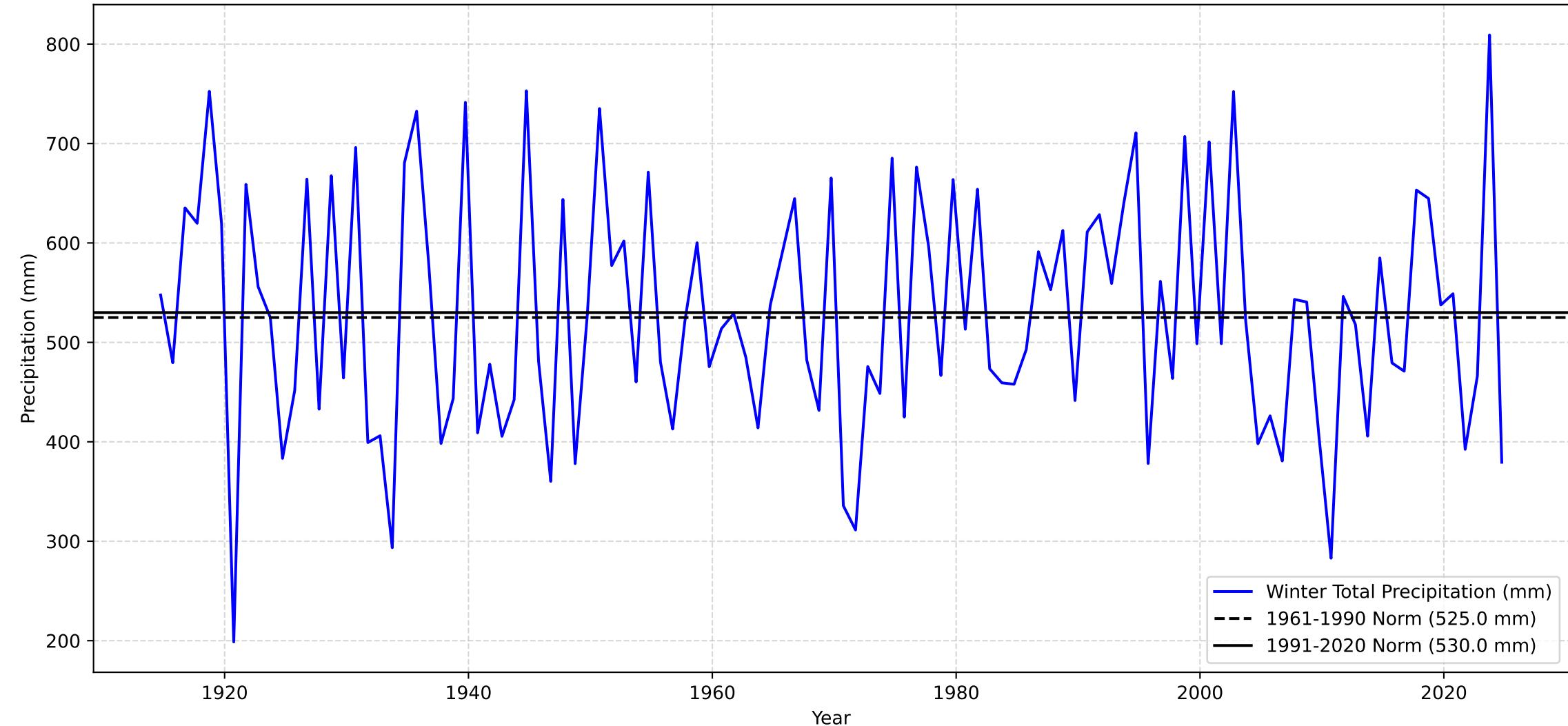
Annual Mass Balance for each Elevation Bin over Time - Claridenfirn



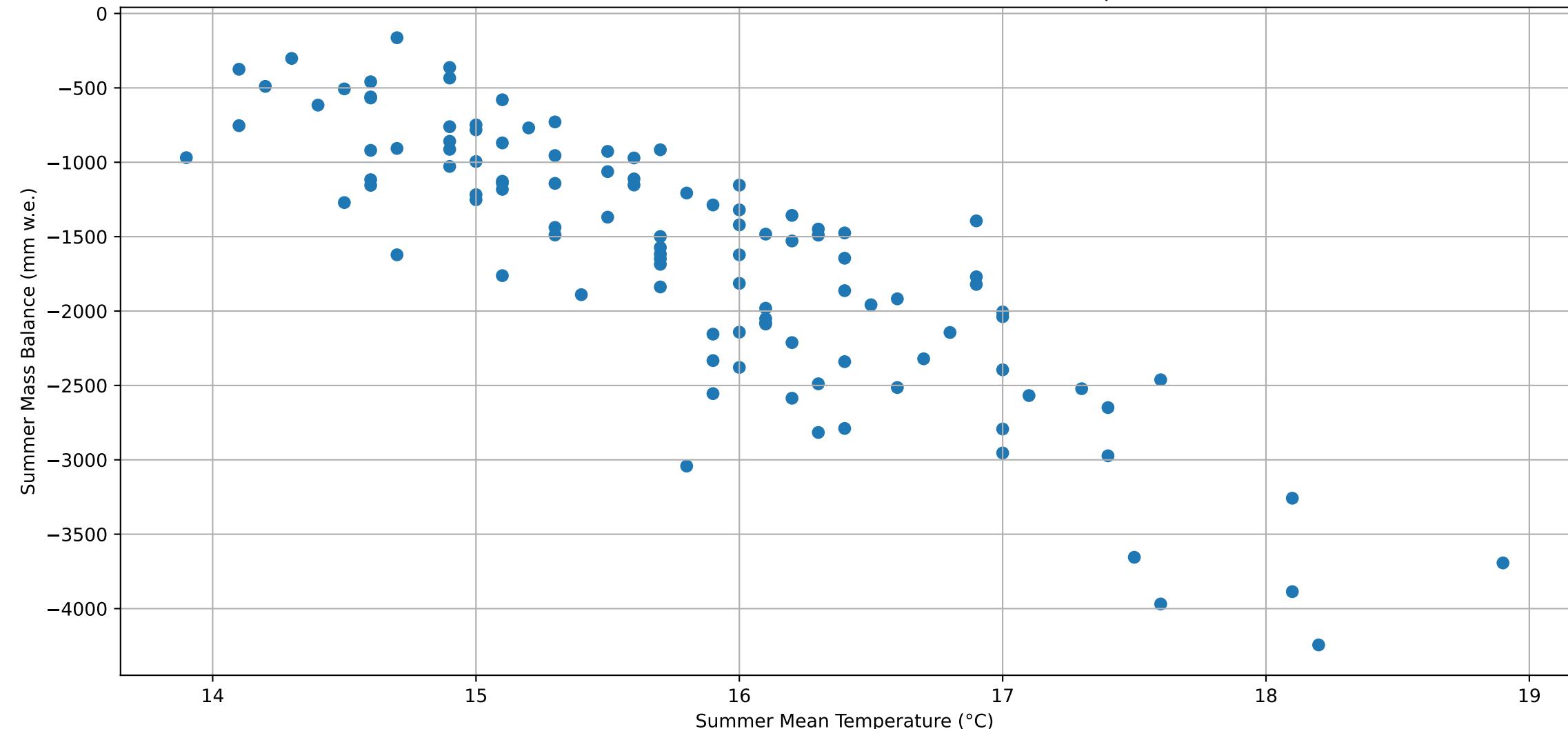
Altdorf Summer Mean Temperature



Altdorf Winter Total Precipitation



Claridenfirn Summer Mass Balance with relation to Temperature



Regression: Monthly 1961-1990

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 MONTHLY DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
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 MONTHLY DEVIATIONS for Claridenfirn (1961-1990 norms)
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Correlation Analysis with Significance Testing:

	Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
10	february_pd	0.272898	4.091815e-03	True
6	october_pd	0.155127	1.072529e-01	False
9	january_pd	0.149151	1.216468e-01	False
8	december_pd	0.094737	3.271420e-01	False
11	march_pd	0.082160	3.957002e-01	False
12	april_pd	0.081340	4.004488e-01	False
7	november_pd	0.071166	4.621182e-01	False
1	may_td	-0.327747	5.033976e-04	True
5	september_td	-0.440927	1.597990e-06	True
2	june_td	-0.470638	2.414525e-07	True
4	august_td	-0.603902	3.614537e-12	True
3	july_td	-0.642742	4.899987e-14	True
0	const	NaN	NaN	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:	Mon, 08 Dec 2025	Prob (F-statistic):	2.55e-25
Time:	12:08:28	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	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

Regression: Optimal 1961-1990

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OPTIMAL SEASONAL DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
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OPTIMAL SEASONAL DEVIATIONS for Claridenfirn (1961-1990 norms)
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Correlation Analysis with Significance Testing:

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

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:	Mon, 08 Dec 2025	Prob (F-statistic):	3.00e-24
Time:	12:08:28	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.

Coefficient Interpretation:

Intercept (normal mass balance): 83.39 (p=0.1742)
opt_season_td: -604.51 (p=0.0000)
opt_season_pd: 2.89 (p=0.0000)

Variance Inflation Factors (VIF):

	Variable	VIF
0	const	1.310518
1	opt_season_td	1.000043
2	opt_season_pd	1.000043

R-squared: 0.6401

Adjusted R-squared: 0.6333

Regression: Seasonal 1961-1990

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SUMMER/WINTER SEASONAL DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
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SUMMER/WINTER SEASONAL DEVIATIONS for Claridenfirn (1961-1990 norms)
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Correlation Analysis with Significance Testing:

Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
2 winter_pd	0.344108	2.485777e-04	True
1 summer_td	-0.772507	7.814267e-23	True
0 const	NaN	NaN	False

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:	Mon, 08 Dec 2025	Prob (F-statistic):	8.03e-30
Time:	12:08:28	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.

Coefficient Interpretation:

Intercept (normal mass balance): 113.67 (p=0.0362)
summer_td: -708.50 (p=0.0000)
winter_pd: 2.67 (p=0.0000)

Variance Inflation Factors (VIF):

Variable	VIF
0 const	1.289085
1 summer_td	1.000019
2 winter_pd	1.000019

R-squared: 0.7175

Adjusted R-squared: 0.7122

Regression: Monthly 1991-2020

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MONTHLY DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS

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MONTHLY DEVIATIONS for Claridenfirn (1991-2020 norms)

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Correlation Analysis with Significance Testing:

	Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
10	february_pd	0.272898	4.091815e-03	True
6	october_pd	0.155127	1.072529e-01	False
9	january_pd	0.149151	1.216468e-01	False
8	december_pd	0.094737	3.271420e-01	False
11	march_pd	0.082160	3.957002e-01	False
12	april_pd	0.081340	4.004488e-01	False
7	november_pd	0.071166	4.621182e-01	False
1	may_td	-0.327747	5.033976e-04	True
5	september_td	-0.440927	1.597990e-06	True
2	june_td	-0.470638	2.414525e-07	True
4	august_td	-0.603902	3.614537e-12	True
3	july_td	-0.642742	4.899987e-14	True
0	const	NaN	NaN	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:	Mon, 08 Dec 2025	Prob (F-statistic):	2.55e-25
Time:	12:08:28	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

Regression: Optimal 1991-2020

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OPTIMAL SEASONAL DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS
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OPTIMAL SEASONAL DEVIATIONS for Claridenfirn (1991-2020 norms)
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Correlation Analysis with Significance Testing:

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

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:	Mon, 08 Dec 2025	Prob (F-statistic):	2.40e-24
Time:	12:08:28	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.

Coefficient Interpretation:

Intercept (normal mass balance): -844.33 (p=0.0000)
opt_season_td: -610.08 (p=0.0000)
opt_season_pd: 2.87 (p=0.0000)

Variance Inflation Factors (VIF):

	Variable	VIF
0	const	1.777901
1	opt_season_td	1.000114
2	opt_season_pd	1.000114

R-squared: 0.6416

Adjusted R-squared: 0.6349

Regression: Seasonal 1991-2020

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SUMMER/WINTER SEASONAL DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS
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SUMMER/WINTER SEASONAL DEVIATIONS for Claridenfirn (1991-2020 norms)
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Correlation Analysis with Significance Testing:

Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
2 winter_pd	0.344108	2.485777e-04	True
1 summer_td	-0.772507	7.814267e-23	True
0 const	NaN	NaN	False

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:	Mon, 08 Dec 2025	Prob (F-statistic):	8.03e-30
Time:	12:08:28	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.

Coefficient Interpretation:

Intercept (normal mass balance): -864.89 (p=0.0000)

summer_td: -708.50 (p=0.0000)

winter_pd: 2.67 (p=0.0000)

Variance Inflation Factors (VIF):

Variable	VIF
0 const	1.748573
1 summer_td	1.000019
2 winter_pd	1.000019

R-squared: 0.7175

Adjusted R-squared: 0.7122