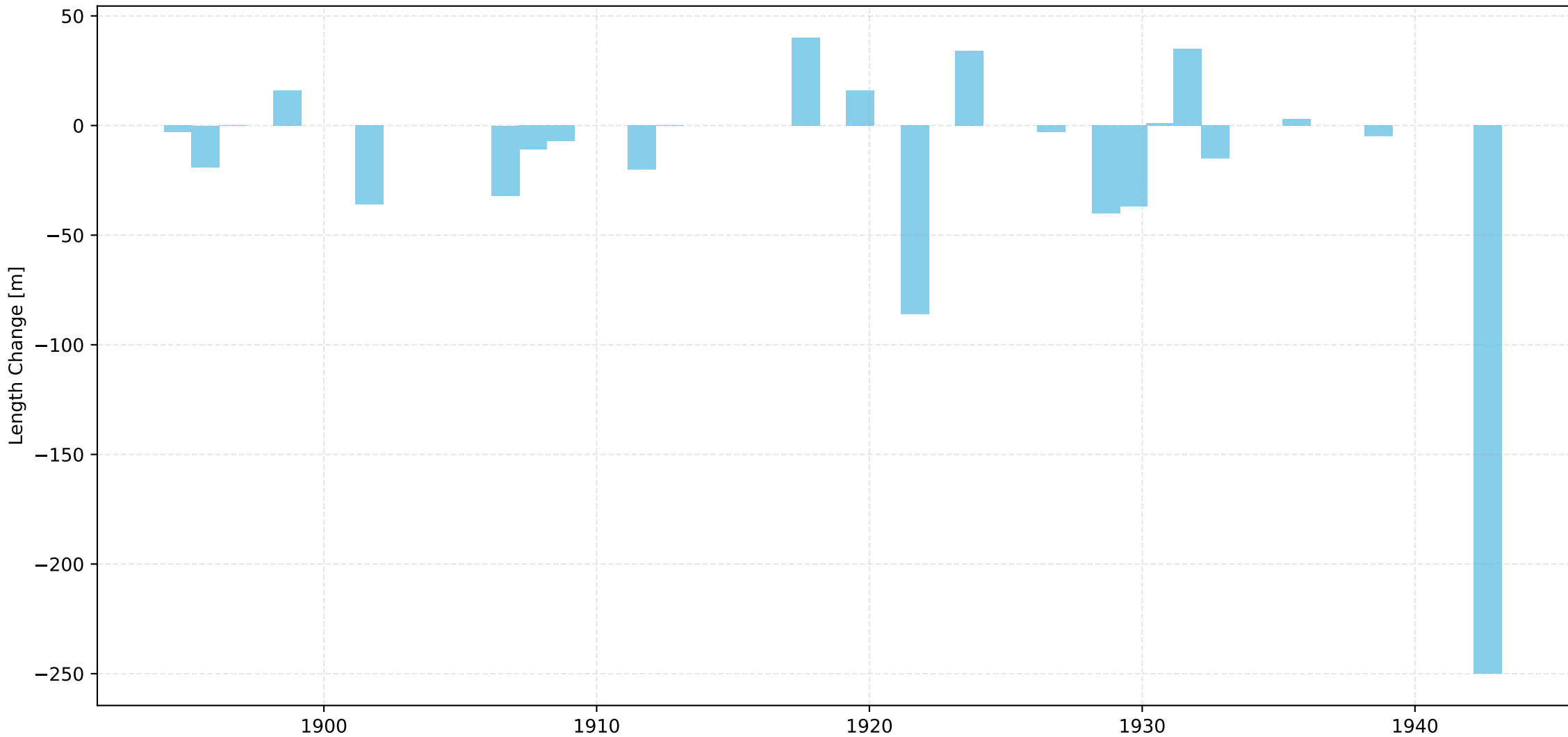
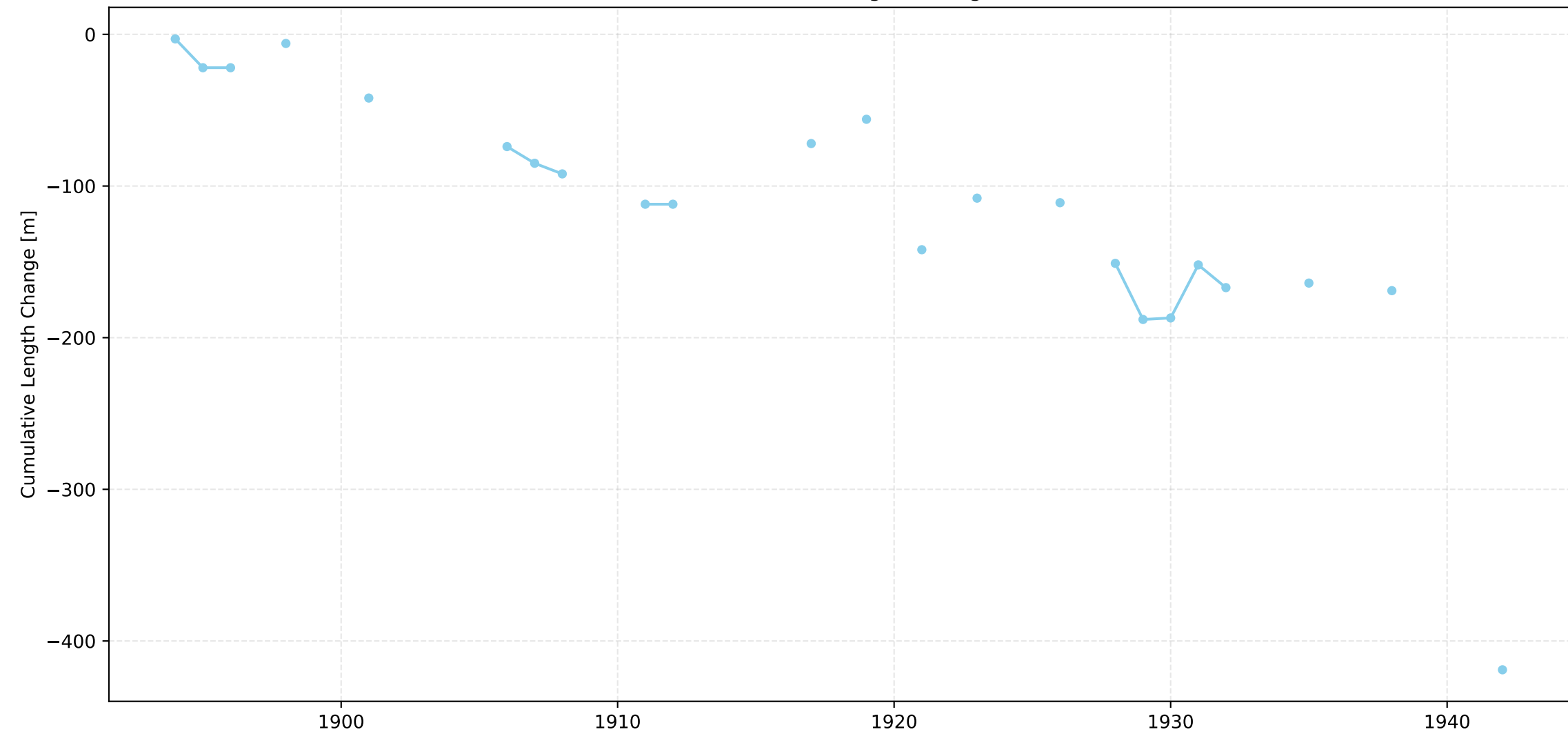


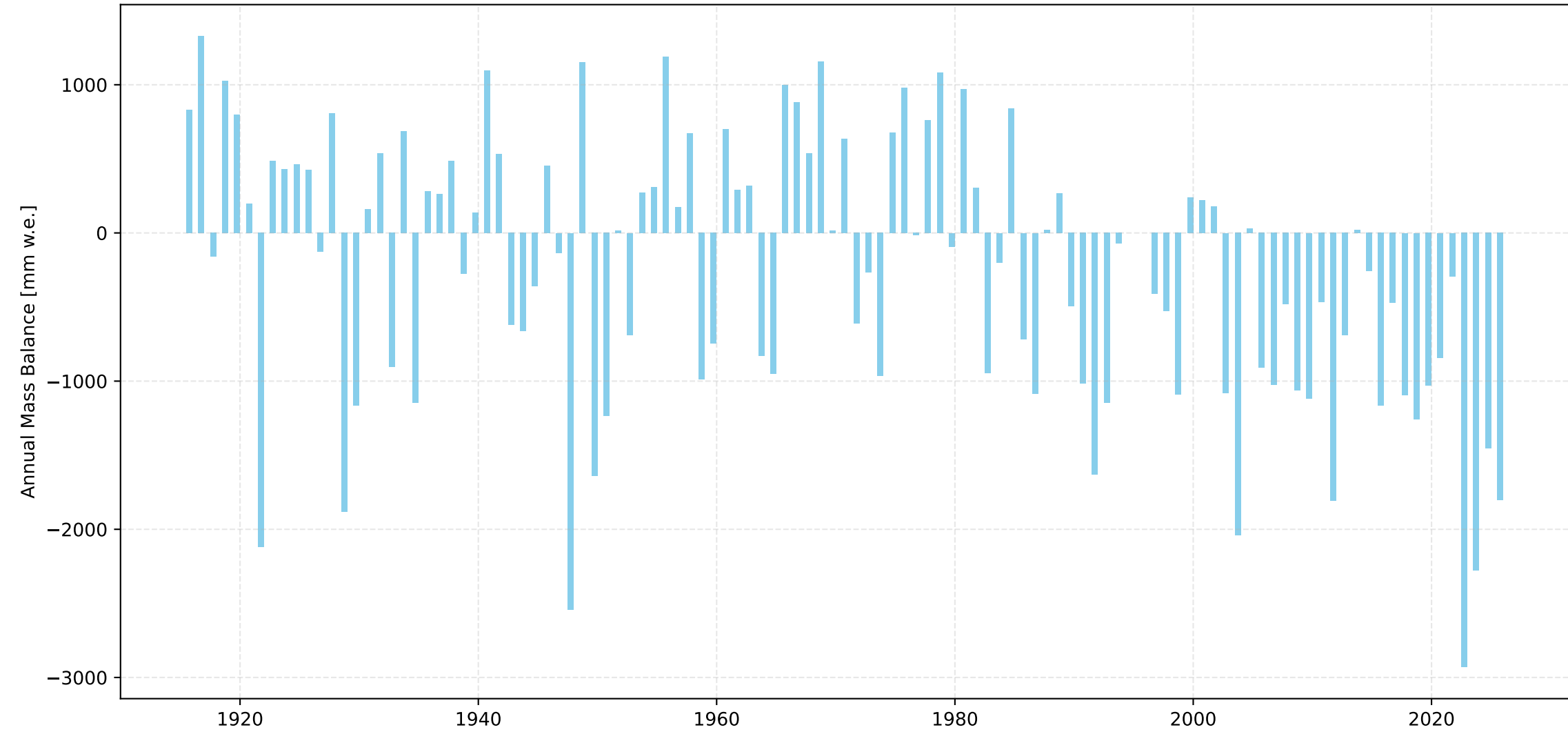
Claridenfirn Length Change Over Time



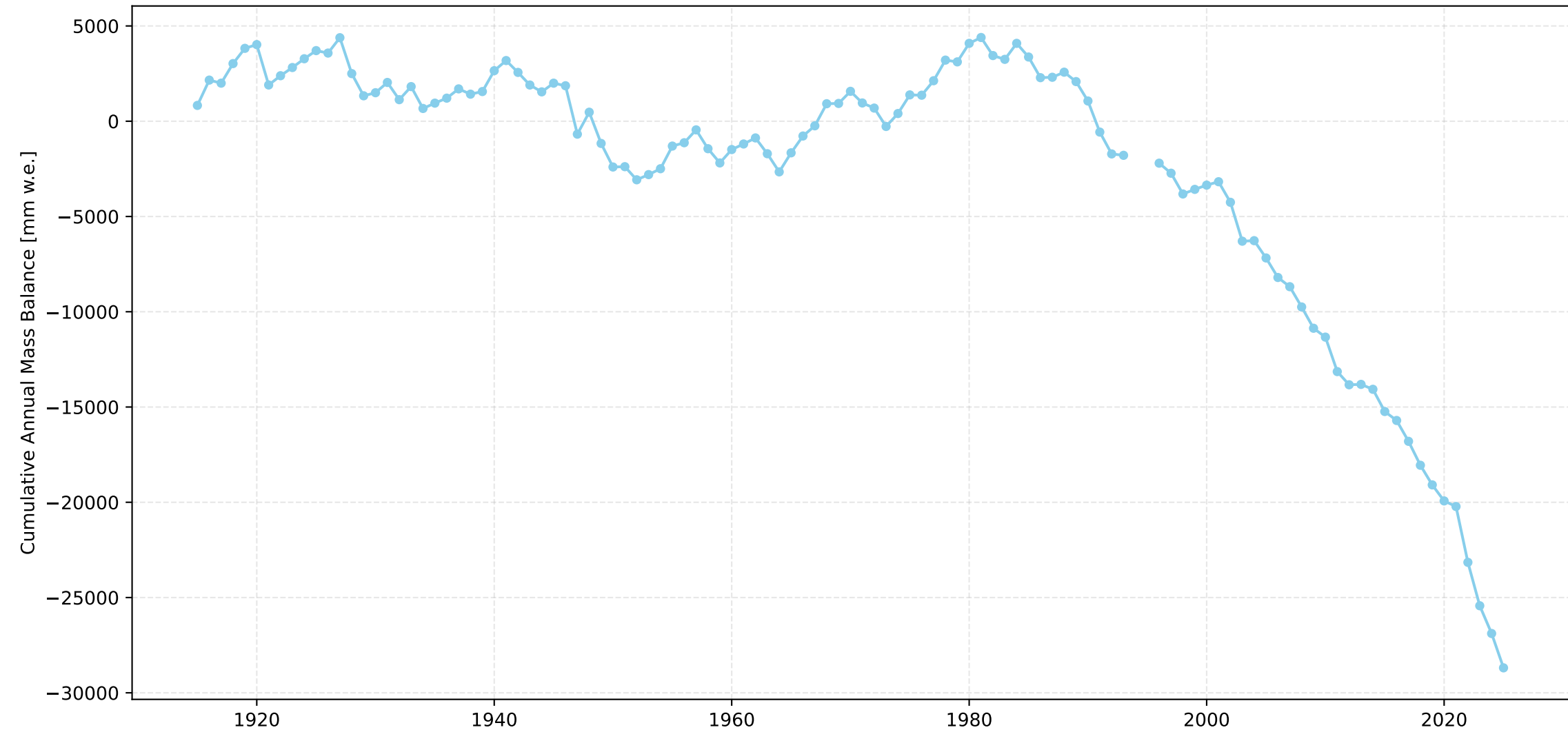
Claridenfirn Cumulative Length Change Over Time



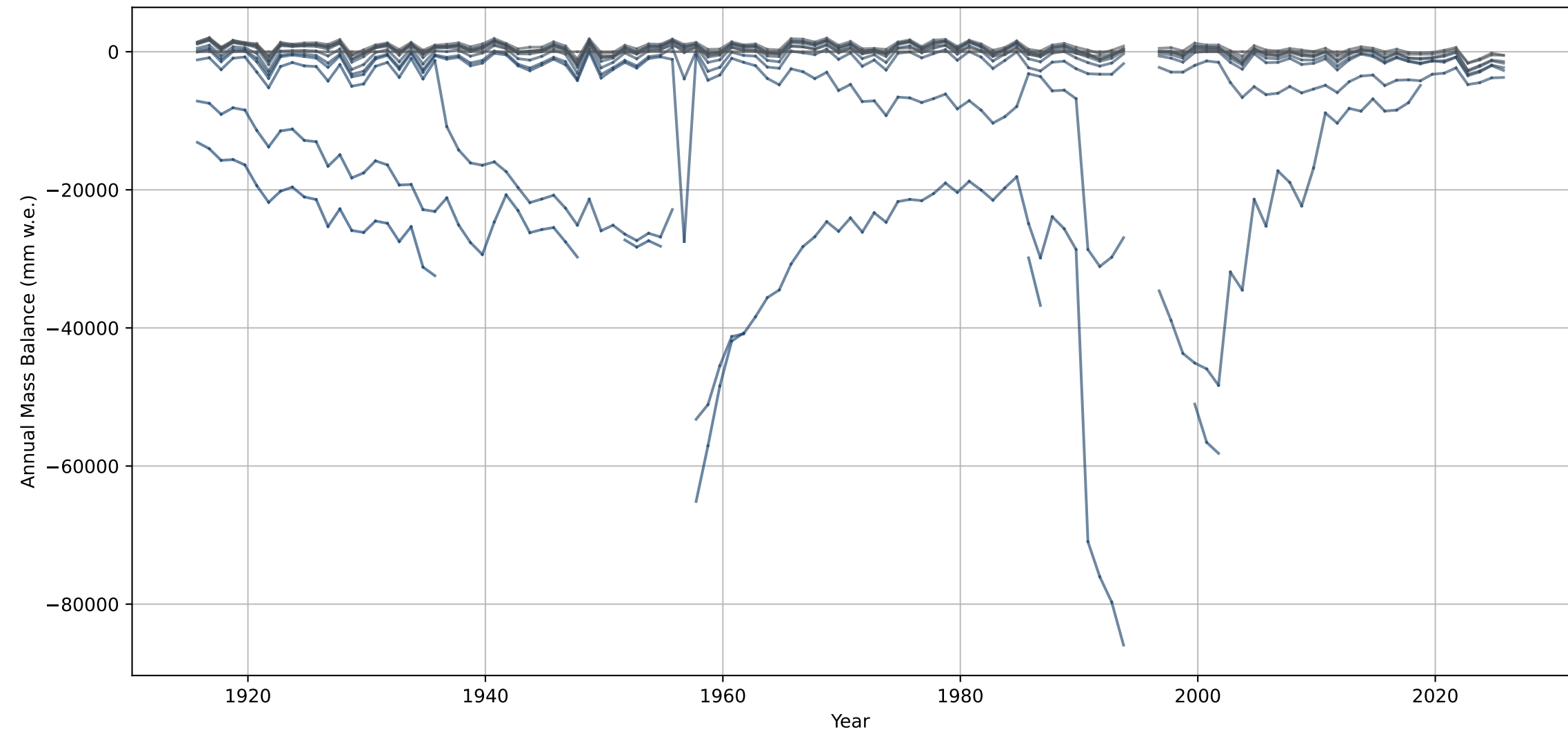
Claridenfirn Annual Mass Balance Over Time



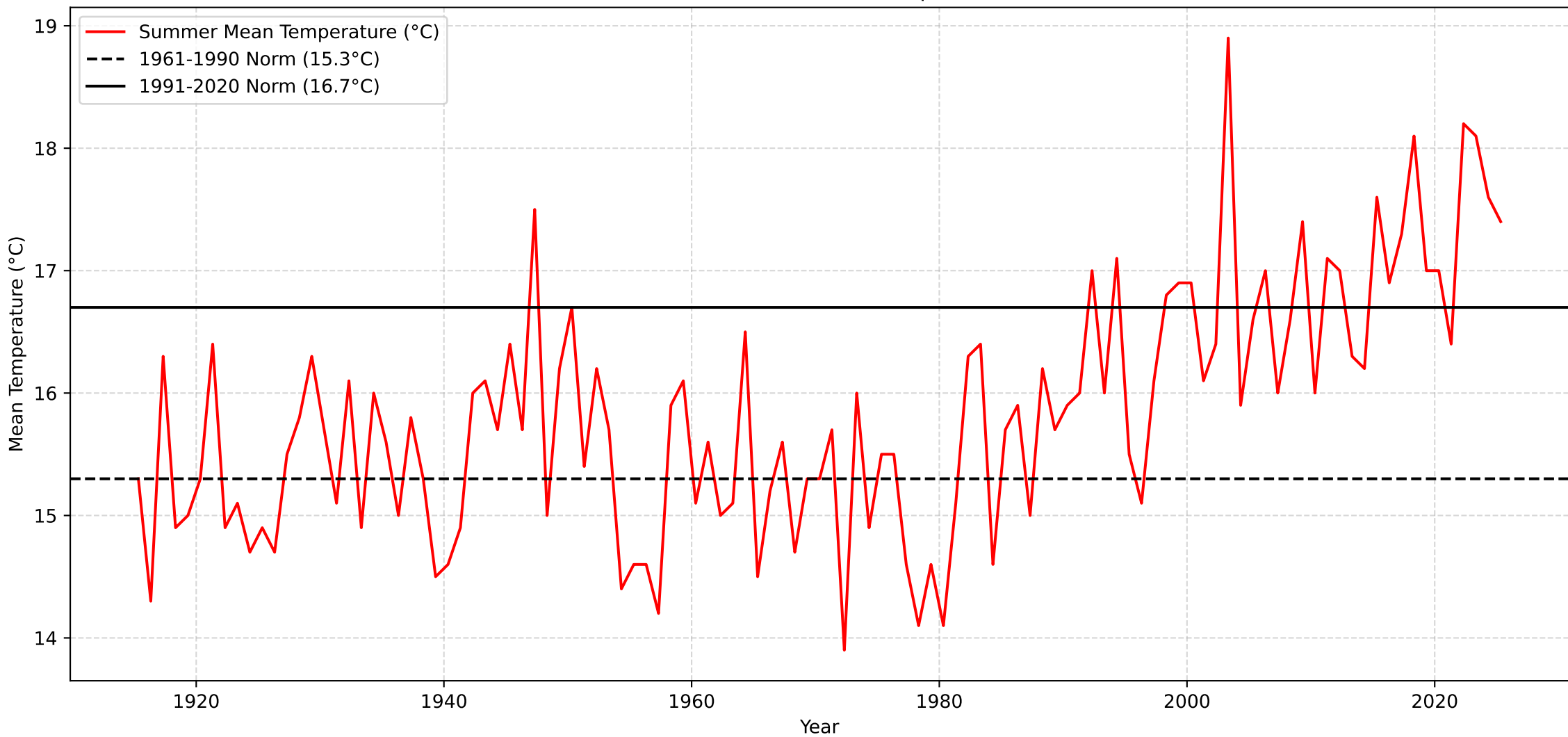
Claridenfirn Cumulative Annual Mass Balance Over Time



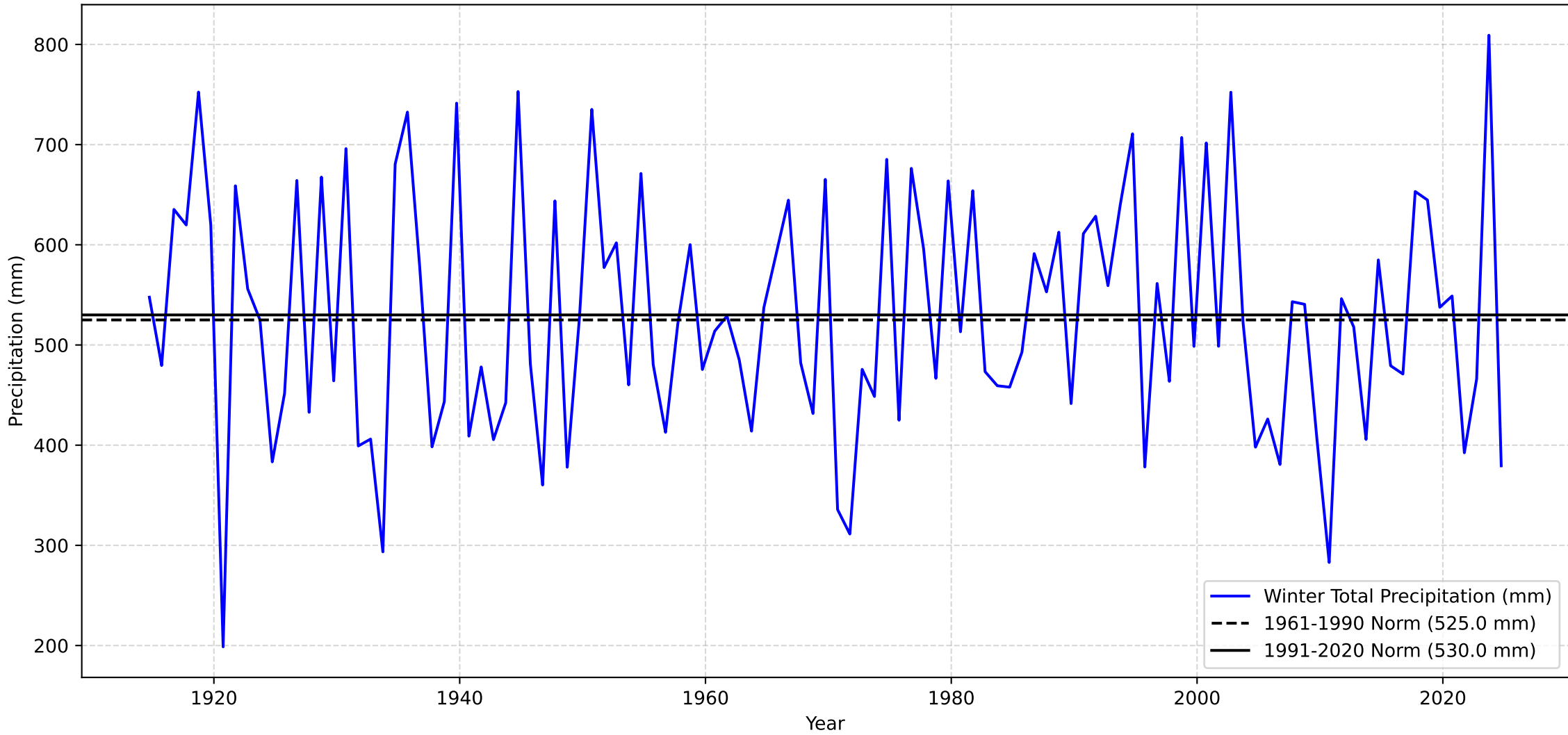
Annual Mass Balance for each Elevation Bin over Time - Claridenfirn



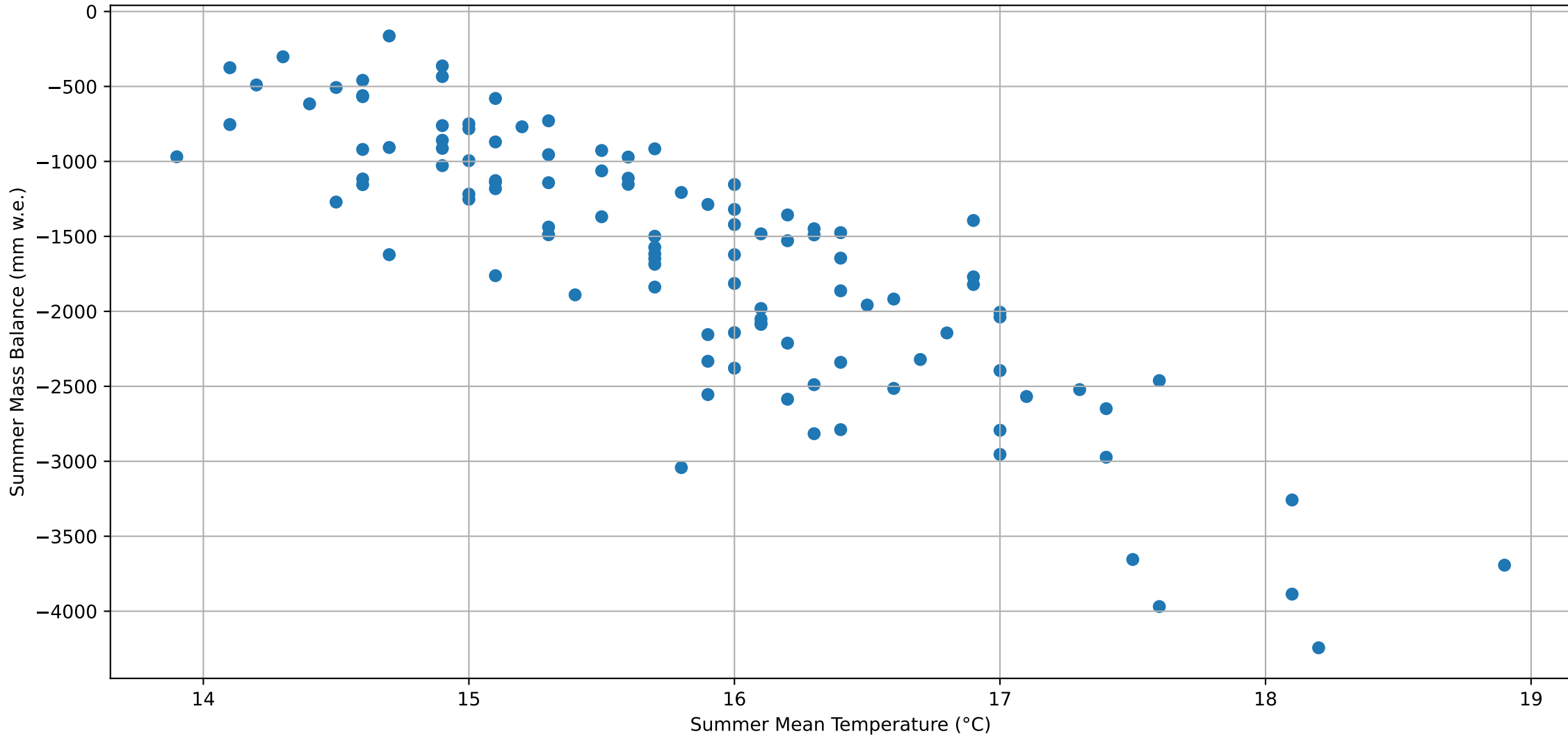
Altdorf Summer Mean Temperature



Aldorf Winter Total Precipitation



Claridenfirn Summer Mass Balance with relation to Temperature



Regression: Monthly 1961-1990

MONTHLY DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS

MONTHLY DEVIATIONS for Claridenfirn (1961-1990 norms)

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)

=====

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)
=====

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

## MONTHLY DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS

### MONTHLY DEVIATIONS for Claridenfirn (1991-2020 norms)

#### 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)
=====
```

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)
=====

Correlation Analysis with Significance Testing:
Table with 5 columns: Variable, Correlation Coefficient, P-value, Significant (p < 0.05)
Rows: 2 winter\_pd, 1 summer\_td, 0 const

Number of observations: 109

Regression Summary:

OLS Regression Results
Table with 7 columns: Dep. Variable, Model, Method, Date, Time, No. Observations, Df Residuals, Df Model, Covariance Type, R-squared, Adj. R-squared, F-statistic, Prob (F-statistic), Log-Likelihood, AIC, BIC
Rows: Regression statistics, Coefficients table, Diagnostic statistics

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):
Table with 2 columns: Variable, VIF
Rows: 0 const, 1 summer\_td, 2 winter\_pd

R-squared: 0.7175
Adjusted R-squared: 0.7122