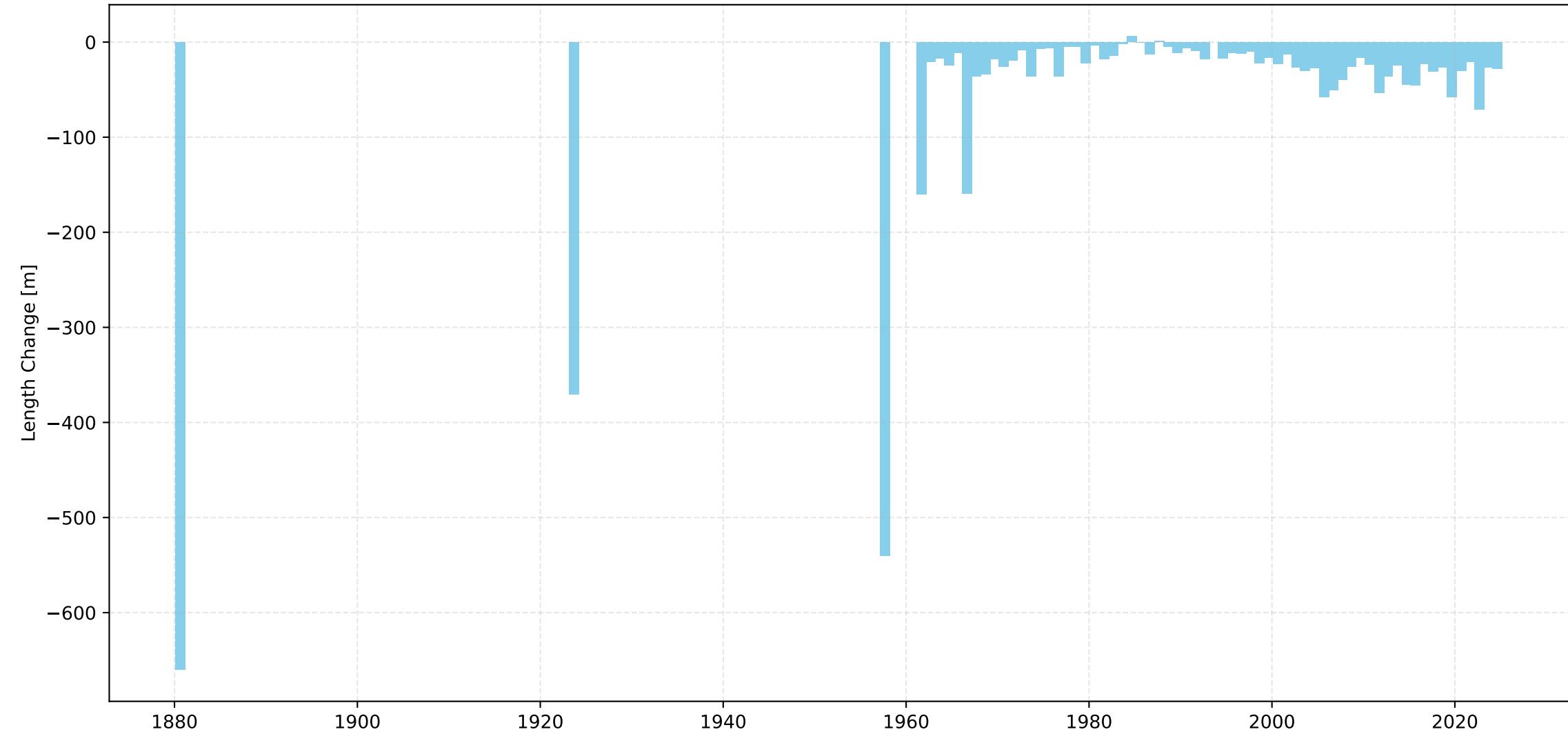
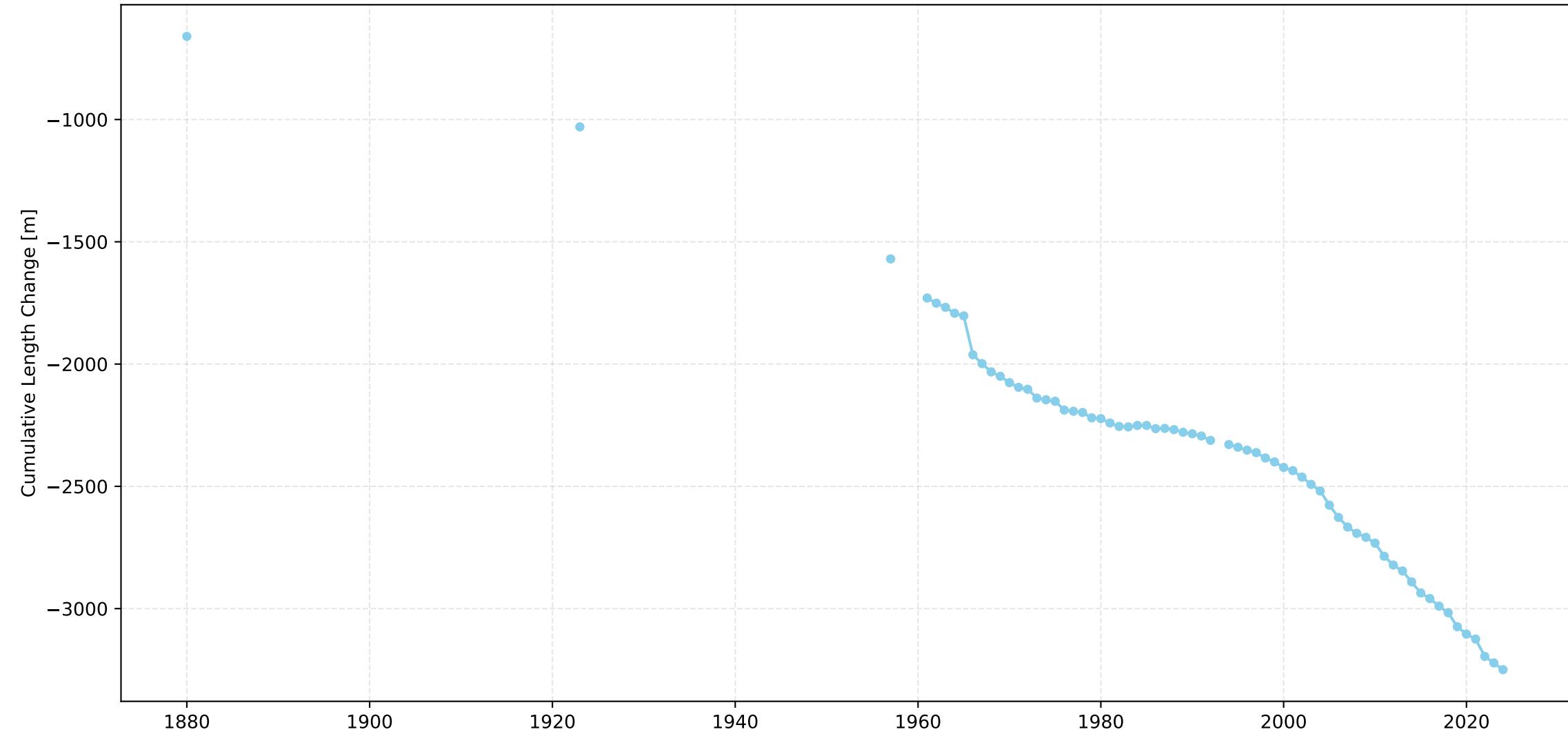


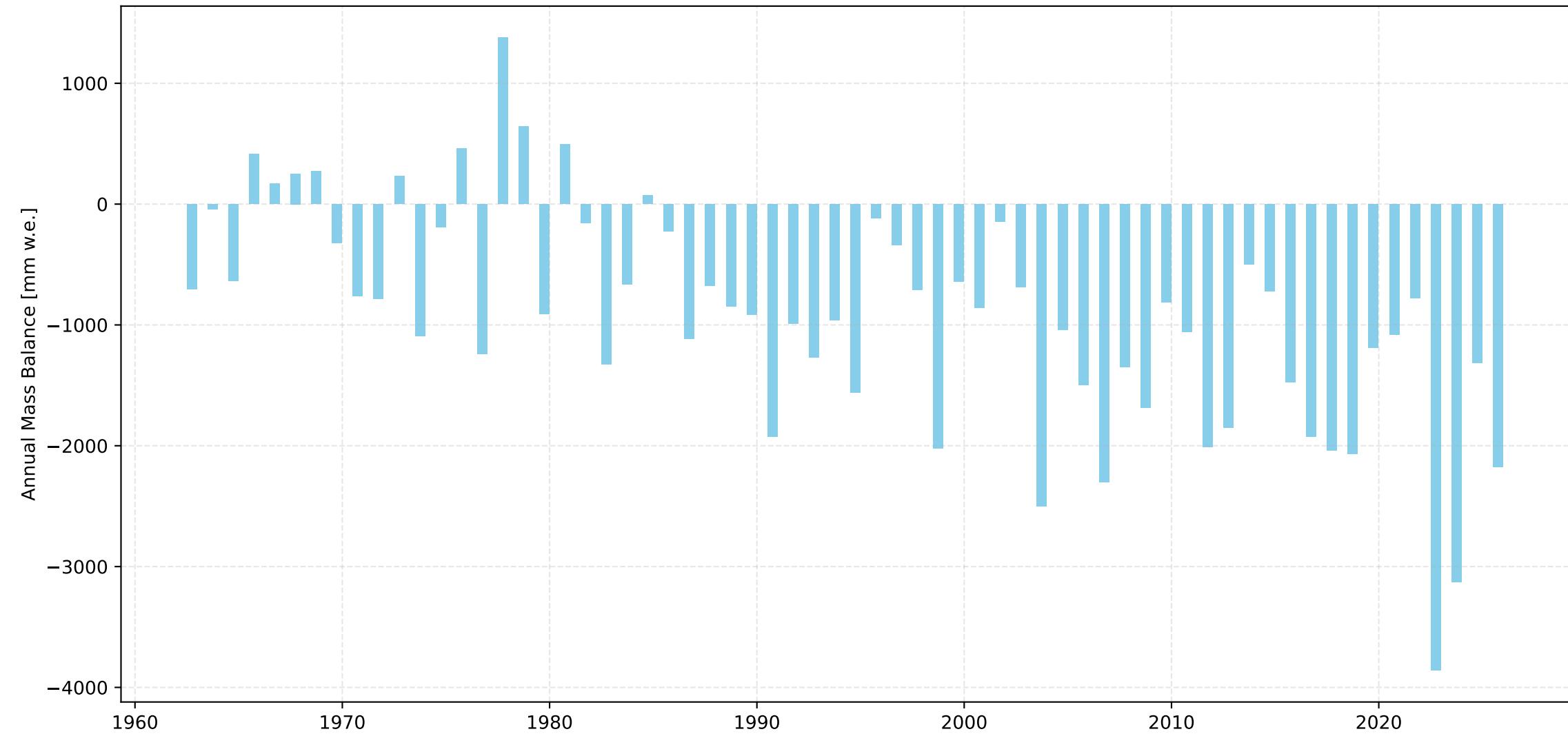
Griesgletscher Length Change Over Time



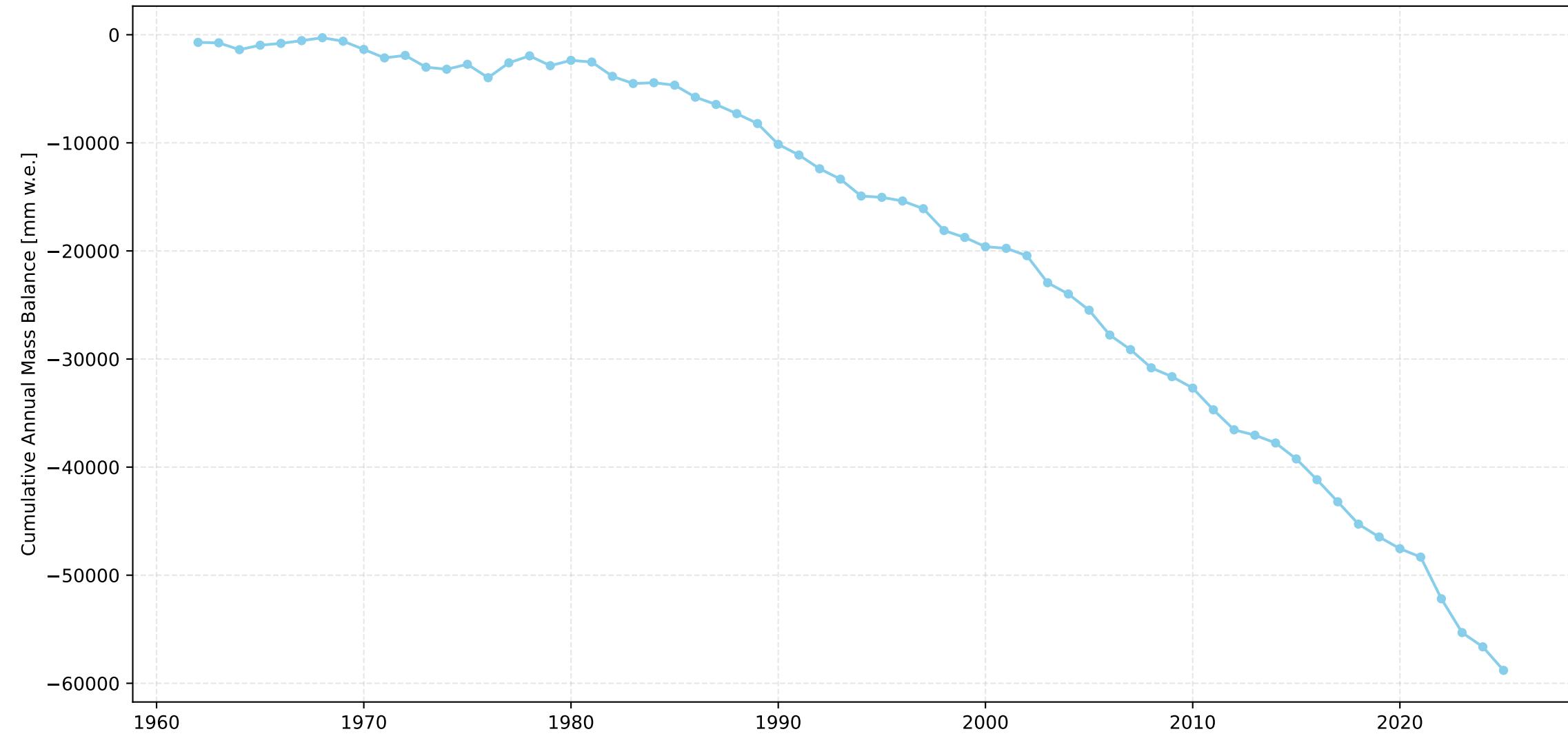
Griesgletscher Cumulative Length Change Over Time



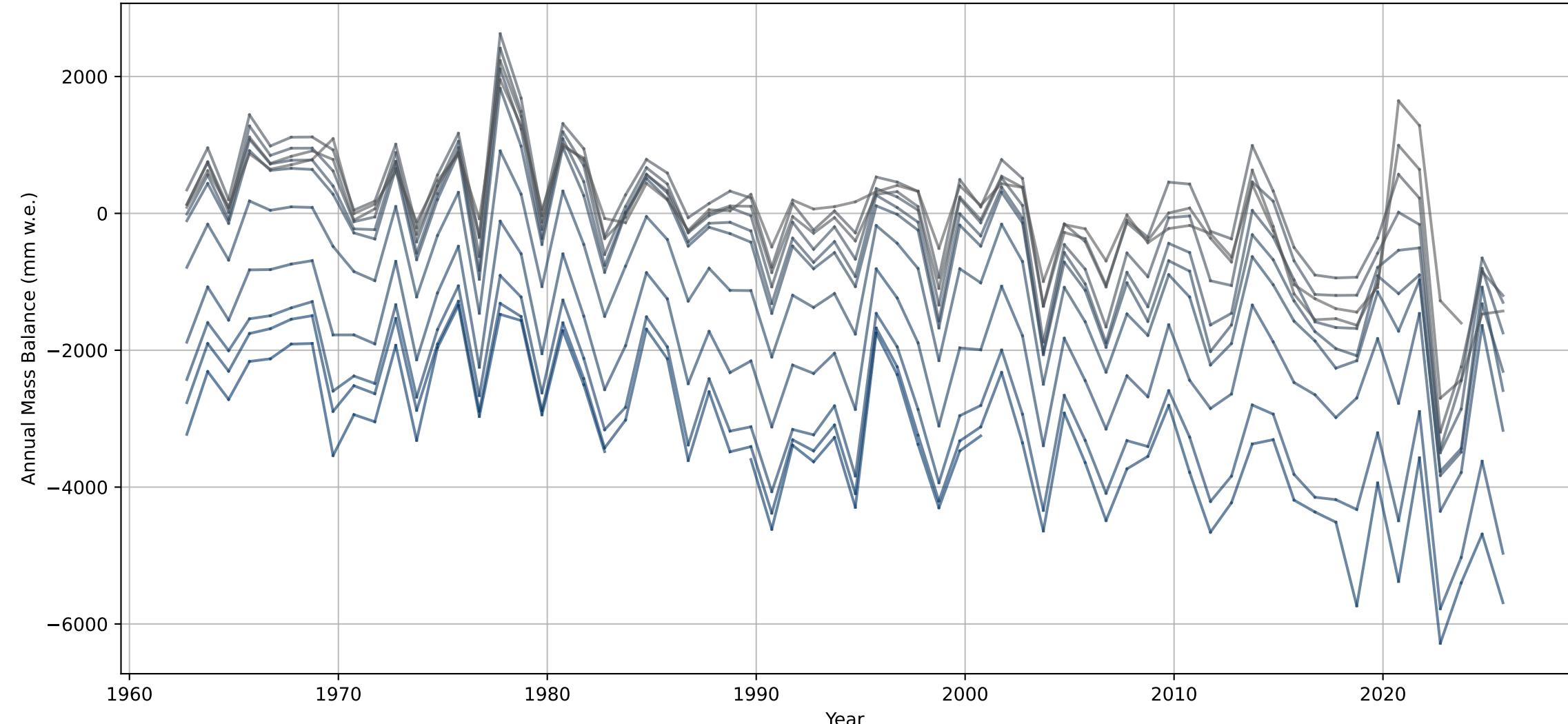
Griesgletscher Annual Mass Balance Over Time



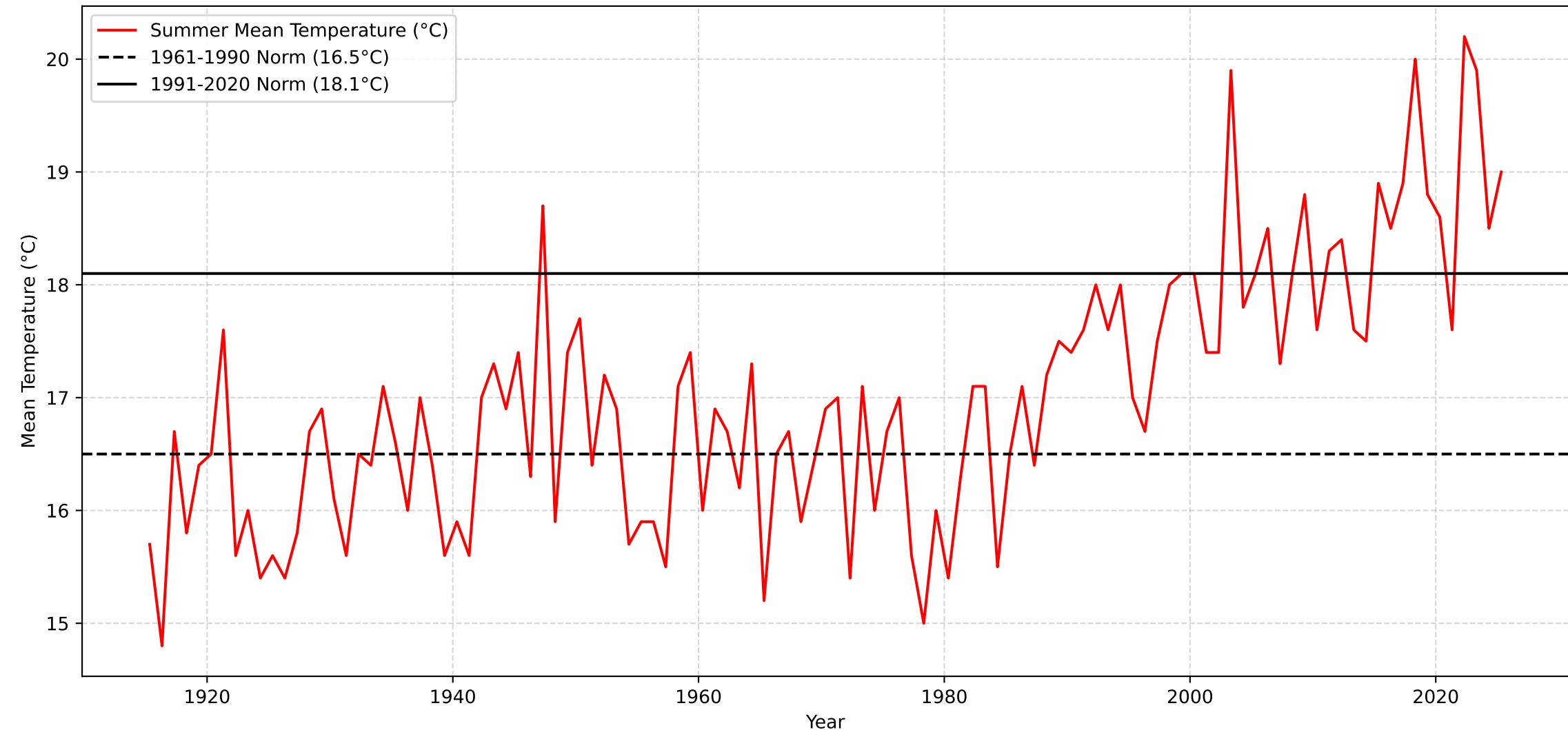
Griesgletscher Cumulative Annual Mass Balance Over Time



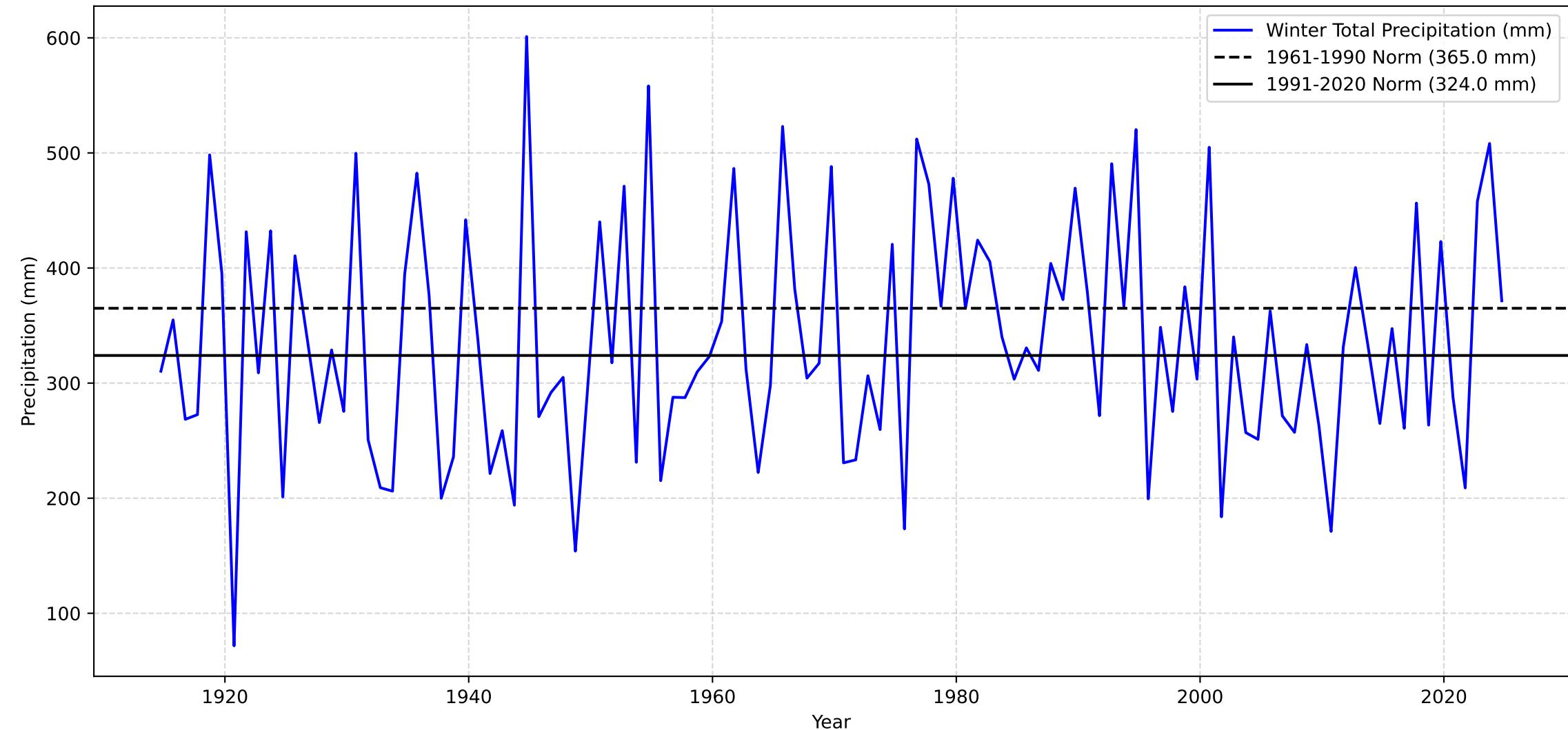
Annual Mass Balance for each Elevation Bin over Time - Griesgletscher



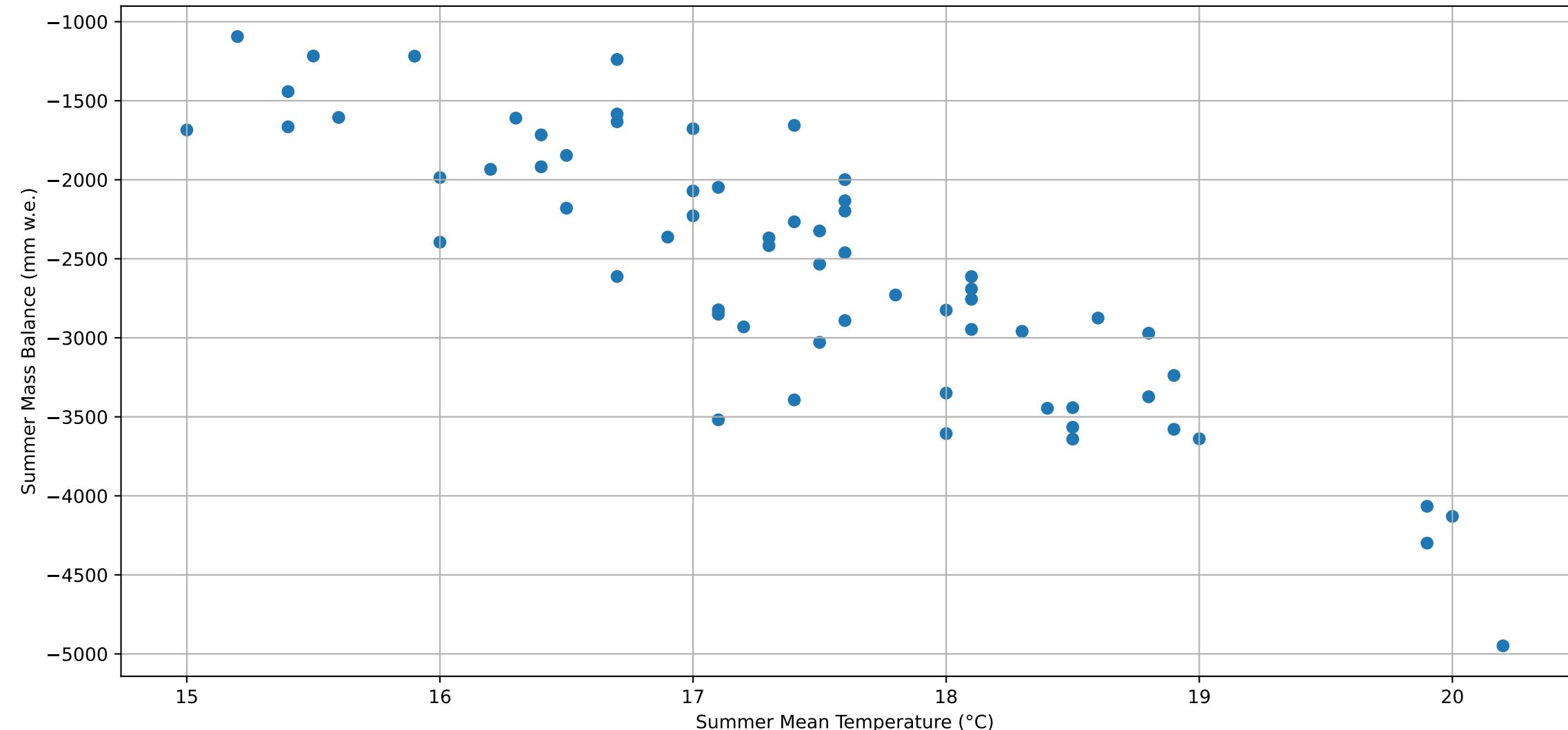
Sion Summer Mean Temperature



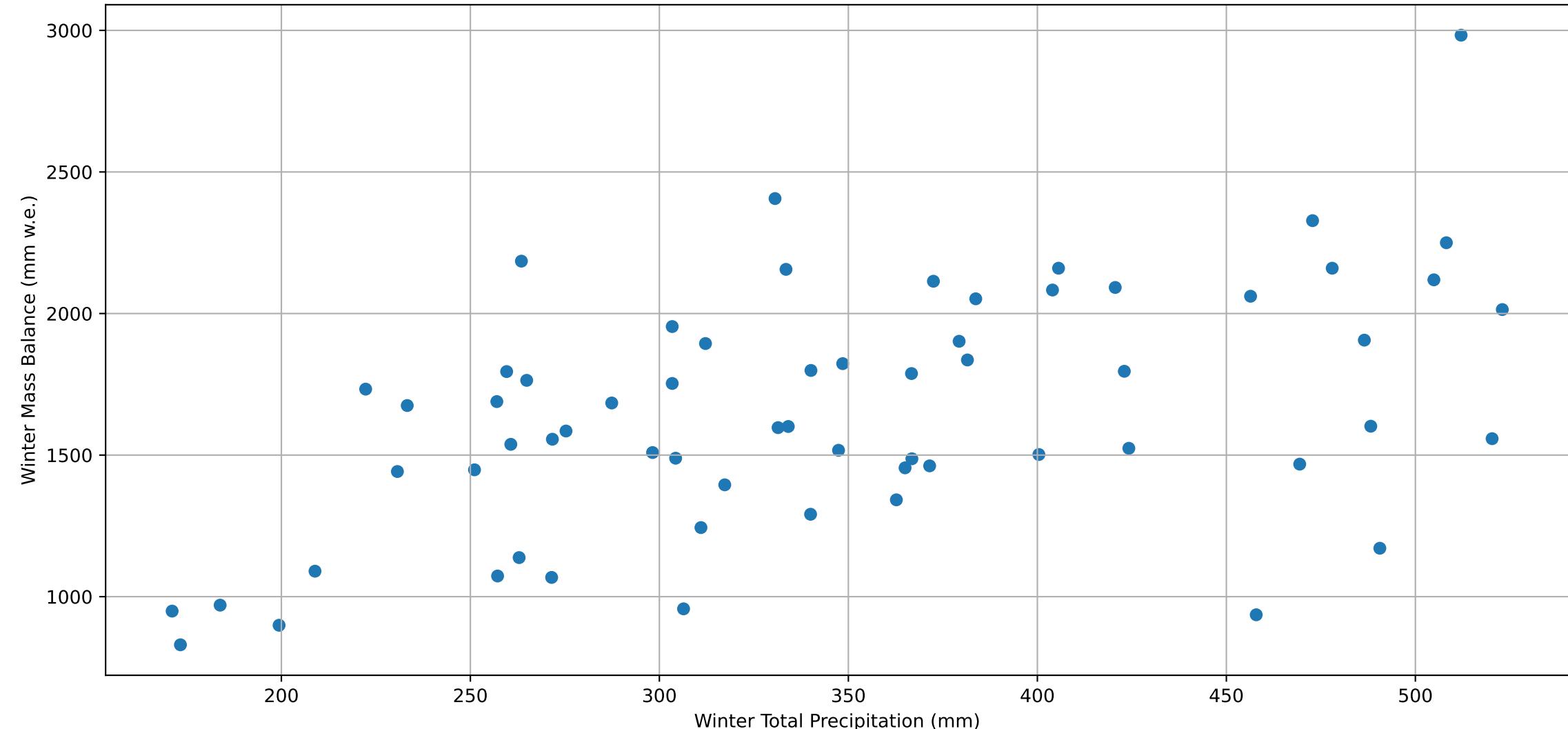
Sion Winter Total Precipitation



Griesgletscher Summer Mass Balance with relation to Temperature



Griesgletscher Winter Mass Balance with relation to Precipitation



Regression: Monthly 1961-1990

=====

MONTHLY DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS

=====

=====

MONTHLY DEVIATIONS for Griesgletscher (1961-1990 norms)

=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.773
Model:	OLS	Adj. R-squared:	0.719
Method:	Least Squares	F-statistic:	14.46
Date:	Fri, 05 Dec 2025	Prob (F-statistic):	1.74e-12
Time:	00:05:24	Log-Likelihood:	-480.43
No. Observations:	64	AIC:	986.9
Df Residuals:	51	BIC:	1015.
Df Model:	12		
Covariance Type:	nonrobust		

=====

	coef	std err	t	P> t	[0.025	0.975]
const	-253.5128	80.999	-3.130	0.003	-416.125	-90.901
may_td	-152.9150	51.327	-2.979	0.004	-255.957	-49.873
june_td	-142.2344	47.185	-3.014	0.004	-236.963	-47.506
july_td	-106.0656	49.078	-2.161	0.035	-204.593	-7.538
august_td	-148.2455	58.751	-2.523	0.015	-266.194	-30.297
september_td	-119.6194	47.846	-2.500	0.016	-215.674	-23.565
october_pd	2.3939	2.245	1.066	0.291	-2.113	6.900
november_pd	3.3629	1.687	1.994	0.052	-0.023	6.749
december_pd	1.1490	1.424	0.807	0.424	-1.710	4.008
january_pd	2.1679	1.700	1.275	0.208	-1.245	5.581
february_pd	0.2412	1.452	0.166	0.869	-2.673	3.156
march_pd	-0.1632	1.979	-0.082	0.935	-4.137	3.811
april_pd	0.8314	3.074	0.270	0.788	-5.341	7.004

=====

Omnibus:	0.563	Durbin-Watson:	1.566
Prob(Omnibus):	0.755	Jarque-Bera (JB):	0.705
Skew:	0.160	Prob(JB):	0.703
Kurtosis:	2.597	Cond. No.	65.0

=====

Notes:

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

Coefficient Interpretation:

Intercept (normal mass balance): -253.51 (p=0.0029)

may_td: -152.91 (p=0.0044)

june_td: -142.23 (p=0.0040)

july_td: -106.07 (p=0.0354)

august_td: -148.25 (p=0.0148)

september_td: -119.62 (p=0.0157)

october_pd: 2.39 (p=0.2912)

november_pd: 3.36 (p=0.0515)

december_pd: 1.15 (p=0.4235)

january_pd: 2.17 (p=0.2080)

february_pd: 0.24 (p=0.8697)

Regression: Optimal 1961-1990

=====
OPTIMAL SEASONAL DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
=====

=====
OPTIMAL SEASONAL DEVIATIONS for Griesgletscher (1961-1990 norms)
=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.728
Model: OLS Adj. R-squared: 0.719
Method: Least Squares F-statistic: 81.59
Date: Fri, 05 Dec 2025 Prob (F-statistic): 5.75e-18
Time: 00:05:24 Log-Likelihood: -486.22
No. Observations: 64 AIC: 978.4
Df Residuals: 61 BIC: 984.9
Df Model: 2
Covariance Type: nonrobust
=====

	coef	std err	t	P> t	[0.025	0.975]
const	-272.3690	79.983	-3.405	0.001	-432.304	-112.434
opt_season_td	-605.6955	49.367	-12.269	0.000	-704.410	-506.981
opt_season_pd	1.4027	0.744	1.885	0.064	-0.085	2.890

=====

Omnibus: 0.407 Durbin-Watson: 1.612
Prob(Omnibus): 0.816 Jarque-Bera (JB): 0.487
Skew: -0.178 Prob(JB): 0.784
Kurtosis: 2.763 Cond. No. 119.
=====

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

Coefficient Interpretation:

Intercept (normal mass balance): -272.37 (p=0.0012)
opt_season_td: -605.70 (p=0.0000)
opt_season_pd: 1.40 (p=0.0641)

Variance Inflation Factors (VIF):

	Variable	VIF
0	const	1.678831
1	opt_season_td	1.018134
2	opt_season_pd	1.018134

R-squared: 0.7279

Adjusted R-squared: 0.7190

Regression: Seasonal 1961-1990

=====
SUMMER/WINTER SEASONAL DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
=====

=====
SUMMER/WINTER SEASONAL DEVIATIONS for Griesgletscher (1961-1990 norms)
=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.756
Model: OLS Adj. R-squared: 0.748
Method: Least Squares F-statistic: 94.57
Date: Fri, 05 Dec 2025 Prob (F-statistic): 2.03e-19
Time: 00:05:24 Log-Likelihood: -482.71
No. Observations: 64 AIC: 971.4
Df Residuals: 61 BIC: 977.9
Df Model: 2
Covariance Type: nonrobust
=====

	coef	std err	t	P> t	[0.025	0.975]
const	-259.5597	75.603	-3.433	0.001	-410.737	-108.383
summer_td	-662.5783	50.131	-13.217	0.000	-762.821	-562.336
winter_pd	1.4118	0.623	2.265	0.027	0.166	2.658

=====

Omnibus:	0.743	Durbin-Watson:	1.710
Prob(Omnibus):	0.690	Jarque-Bera (JB):	0.545
Skew:	-0.226	Prob(JB):	0.761
Kurtosis:	2.968	Cond. No.	137.

=====

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

Coefficient Interpretation:

Intercept (normal mass balance): -259.56 (p=0.0011)
summer_td: -662.58 (p=0.0000)
winter_pd: 1.41 (p=0.0271)

Variance Inflation Factors (VIF):

Variable	VIF
0 const	1.673765
1 summer_td	1.013245
2 winter_pd	1.013245

R-squared: 0.7561

Adjusted R-squared: 0.7481

Regression: Monthly 1991-2020

=====
MONTHLY DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS
=====

=====
MONTHLY DEVIATIONS for Griesgletscher (1991-2020 norms)
=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.773
Model:	OLS	Adj. R-squared:	0.719
Method:	Least Squares	F-statistic:	14.46
Date:	Fri, 05 Dec 2025	Prob (F-statistic):	1.74e-12
Time:	00:05:24	Log-Likelihood:	-480.43
No. Observations:	64	AIC:	986.9
Df Residuals:	51	BIC:	1015.
Df Model:	12		
Covariance Type:	nonrobust		

=====

	coef	std err	t	P> t	[0.025	0.975]
const	-1418.2957	73.361	-19.333	0.000	-1565.574	-1271.017
may_td	-152.9150	51.327	-2.979	0.004	-255.957	-49.873
june_td	-142.2344	47.185	-3.014	0.004	-236.963	-47.506
july_td	-106.0656	49.078	-2.161	0.035	-204.593	-7.538
august_td	-148.2455	58.751	-2.523	0.015	-266.194	-30.297
september_td	-119.6194	47.846	-2.500	0.016	-215.674	-23.565
october_pd	2.3939	2.245	1.066	0.291	-2.113	6.900
november_pd	3.3629	1.687	1.994	0.052	-0.023	6.749
december_pd	1.1490	1.424	0.807	0.424	-1.710	4.008
january_pd	2.1679	1.700	1.275	0.208	-1.245	5.581
february_pd	0.2412	1.452	0.166	0.869	-2.673	3.156
march_pd	-0.1632	1.979	-0.082	0.935	-4.137	3.811
april_pd	0.8314	3.074	0.270	0.788	-5.341	7.004

=====

Omnibus:	0.563	Durbin-Watson:	1.566
Prob(Omnibus):	0.755	Jarque-Bera (JB):	0.705
Skew:	0.160	Prob(JB):	0.703
Kurtosis:	2.597	Cond. No.	57.9

=====

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

Coefficient Interpretation:

Intercept (normal mass balance): -1418.30 (p=0.0000)

may_td: -152.91 (p=0.0044)

june_td: -142.23 (p=0.0040)

july_td: -106.07 (p=0.0354)

august_td: -148.25 (p=0.0148)

september_td: -119.62 (p=0.0157)

october_pd: 2.39 (p=0.2912)

november_pd: 3.36 (p=0.0515)

december_pd: 1.15 (p=0.4235)

january_pd: 2.17 (p=0.2080)

february_pd: 0.24 (p=0.8697)

Regression: Optimal 1991-2020

=====
OPTIMAL SEASONAL DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS
=====

=====
OPTIMAL SEASONAL DEVIATIONS for Griesgletscher (1991-2020 norms)
=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.728
Model: OLS Adj. R-squared: 0.719
Method: Least Squares F-statistic: 81.59
Date: Fri, 05 Dec 2025 Prob (F-statistic): 5.75e-18
Time: 00:05:24 Log-Likelihood: -486.22
No. Observations: 64 AIC: 978.4
Df Residuals: 61 BIC: 984.9
Df Model: 2
Covariance Type: nonrobust
=====

	coef	std err	t	P> t	[0.025	0.975]
const	-1385.6474	71.749	-19.313	0.000	-1529.117	-1242.177
opt_season_td	-605.6955	49.367	-12.269	0.000	-704.410	-506.981
opt_season_pd	1.4027	0.744	1.885	0.064	-0.085	2.890

=====

Omnibus: 0.407 Durbin-Watson: 1.612
Prob(Omnibus): 0.816 Jarque-Bera (JB): 0.487
Skew: -0.178 Prob(JB): 0.784
Kurtosis: 2.763 Cond. No. 107.
=====

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

Coefficient Interpretation:

Intercept (normal mass balance): -1385.65 (p=0.0000)
opt_season_td: -605.70 (p=0.0000)
opt_season_pd: 1.40 (p=0.0641)

Variance Inflation Factors (VIF):

	Variable	VIF
0	const	1.350956
1	opt_season_td	1.018134
2	opt_season_pd	1.018134

R-squared: 0.7279

Adjusted R-squared: 0.7190

Regression: Seasonal 1991-2020

=====
SUMMER/WINTER SEASONAL DEVIATIONS ANALYSIS USING 1991-2020 CLIMATE NORMS
=====

=====
SUMMER/WINTER SEASONAL DEVIATIONS for Griesgletscher (1991-2020 norms)
=====

Number of observations: 64

Regression Summary:

OLS Regression Results

=====
Dep. Variable: annual mass balance (mm w.e.) R-squared: 0.756
Model: OLS Adj. R-squared: 0.748
Method: Least Squares F-statistic: 94.57
Date: Fri, 05 Dec 2025 Prob (F-statistic): 2.03e-19
Time: 00:05:24 Log-Likelihood: -482.71
No. Observations: 64 AIC: 971.4
Df Residuals: 61 BIC: 977.9
Df Model: 2
Covariance Type: nonrobust
=====

	coef	std err	t	P> t	[0.025	0.975]
const	-1404.8496	68.422	-20.532	0.000	-1541.668	-1268.032
summer_td	-662.5783	50.131	-13.217	0.000	-762.821	-562.336
winter_pd	1.4118	0.623	2.265	0.027	0.166	2.658

=====

Omnibus: 0.743 Durbin-Watson: 1.710
Prob(Omnibus): 0.690 Jarque-Bera (JB): 0.545
Skew: -0.226 Prob(JB): 0.761
Kurtosis: 2.968 Cond. No. 124.
=====

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

Coefficient Interpretation:

Intercept (normal mass balance): -1404.85 (p=0.0000)
summer_td: -662.58 (p=0.0000)
winter_pd: 1.41 (p=0.0271)

Variance Inflation Factors (VIF):

Variable	VIF
0 const	1.370909
1 summer_td	1.013245
2 winter_pd	1.013245

R-squared: 0.7561

Adjusted R-squared: 0.7481