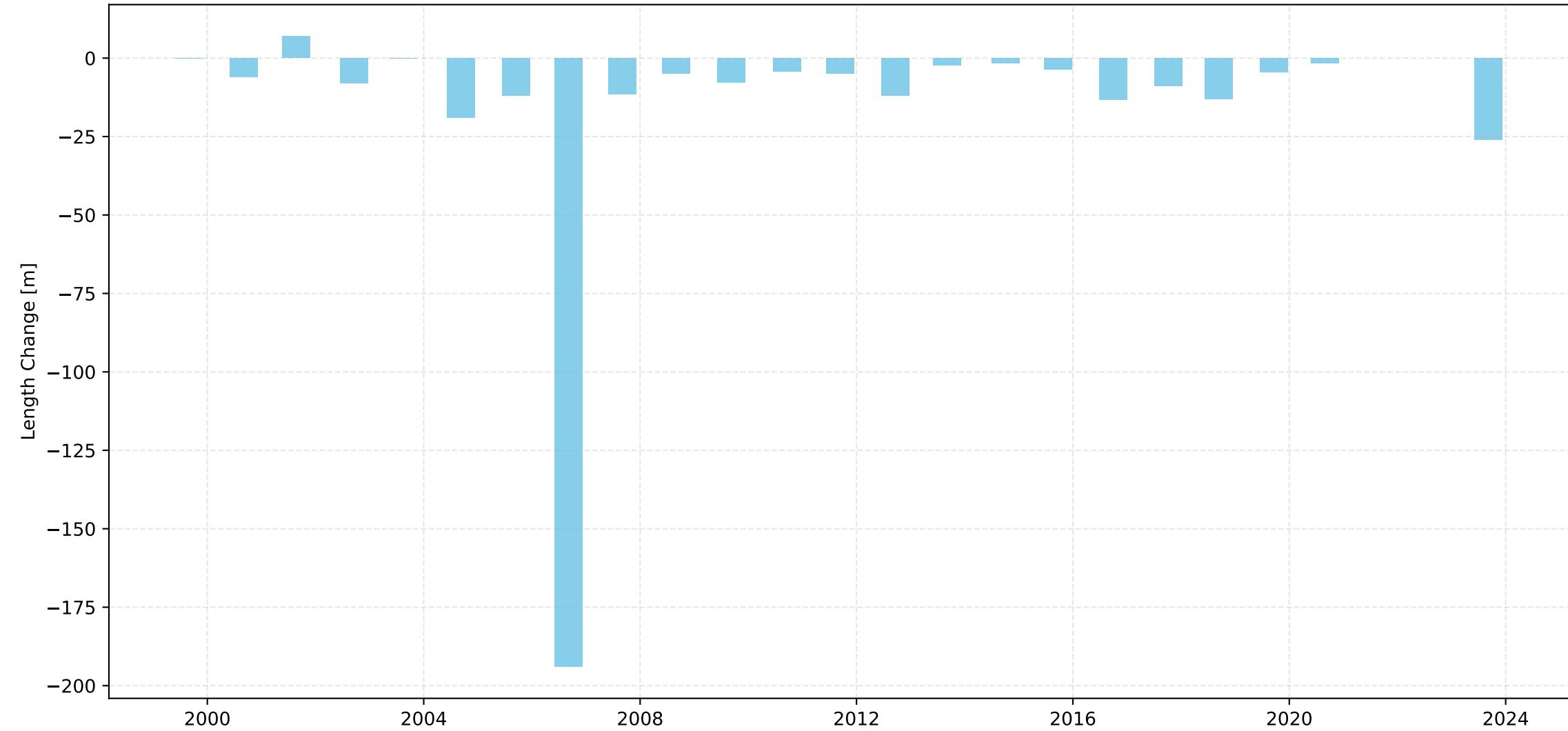
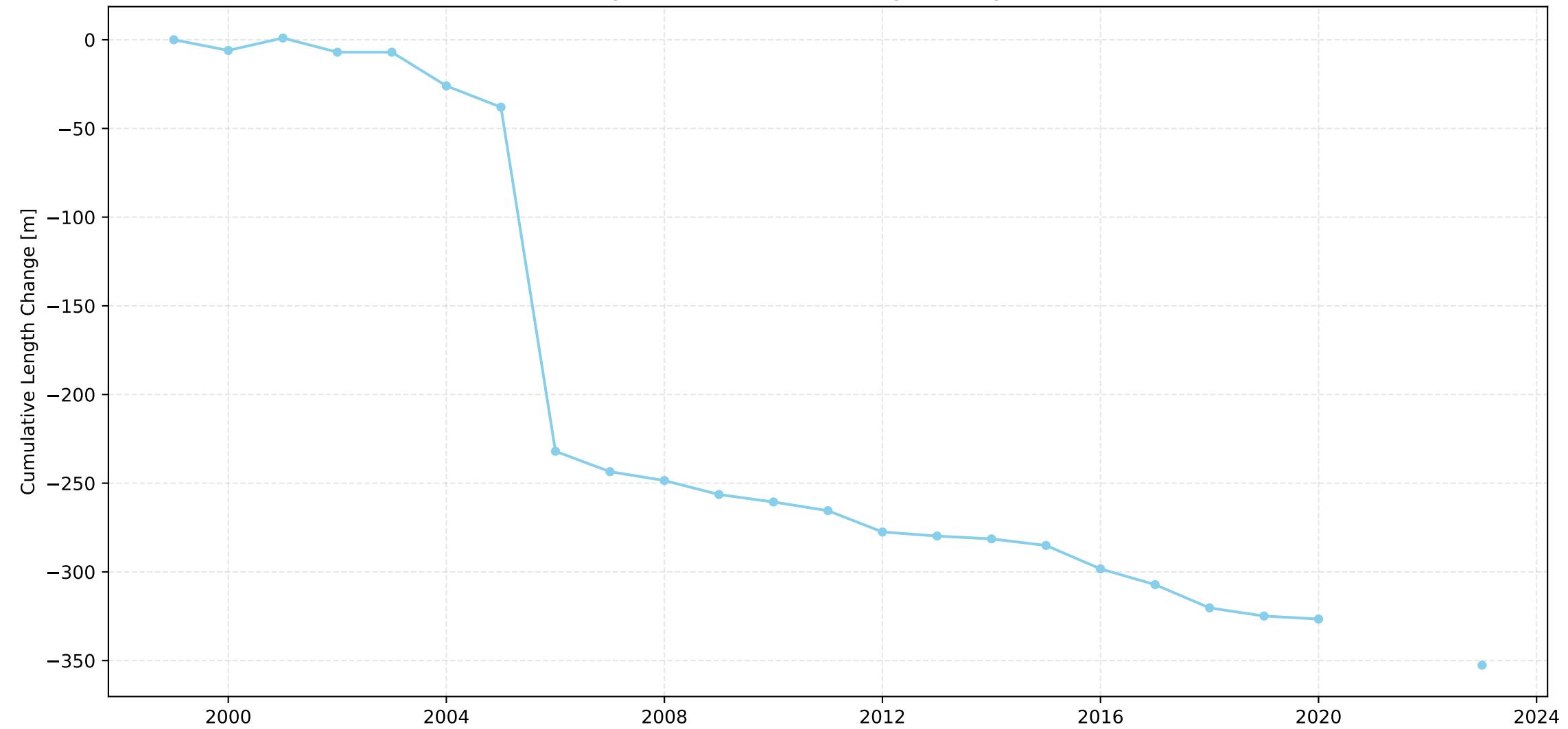


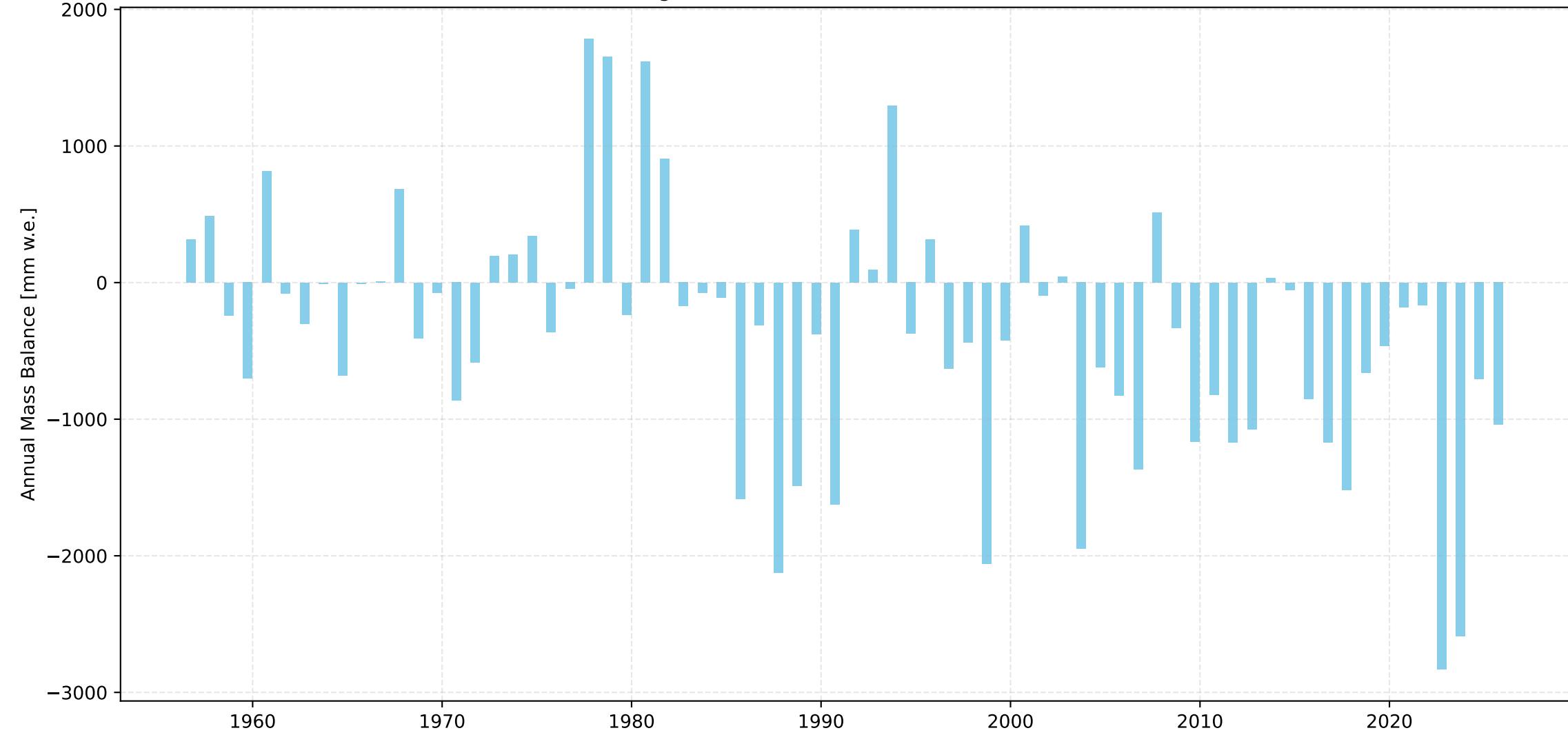
## Hohlaubgletscher Length Change Over Time



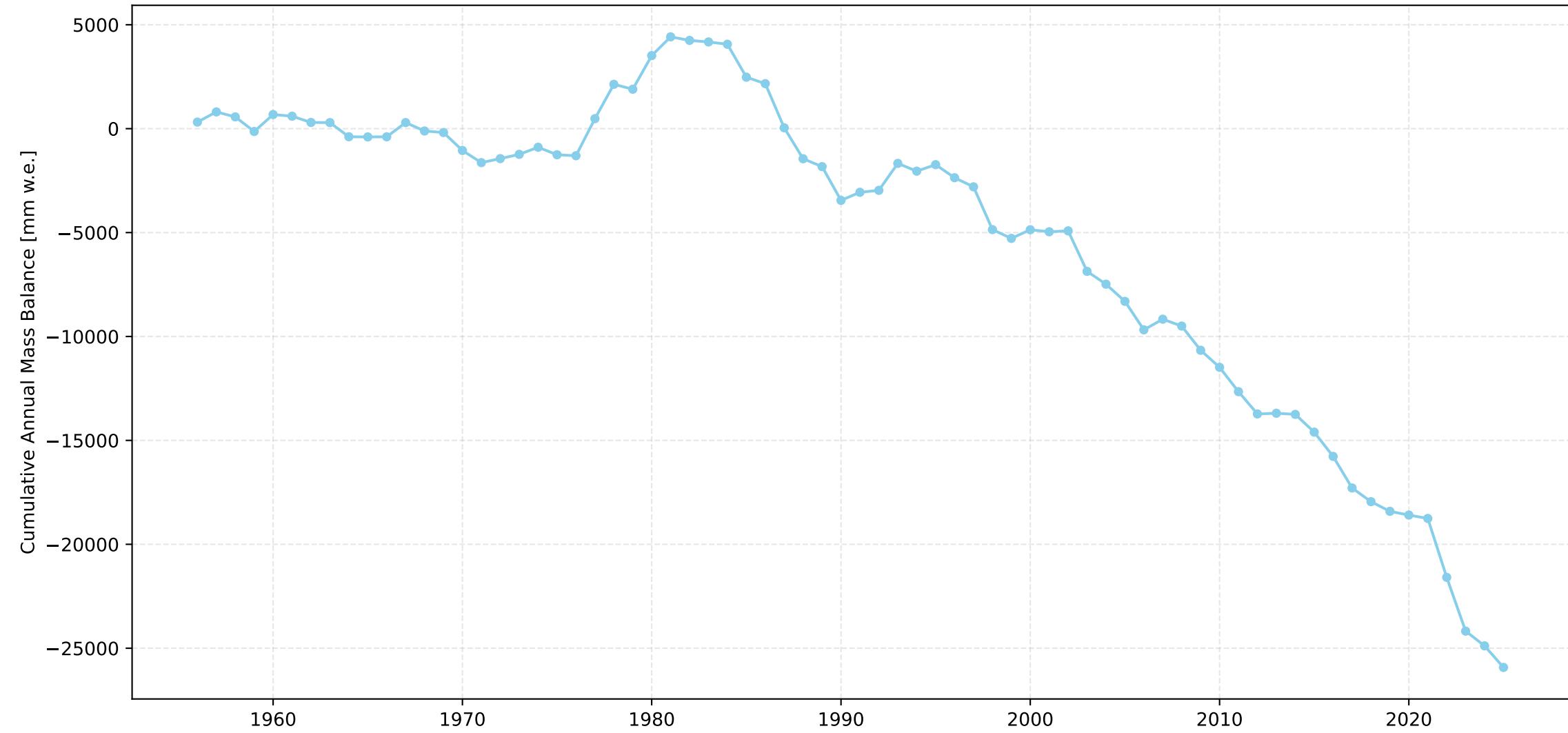
## Hohlaubgletscher Cumulative Length Change Over Time



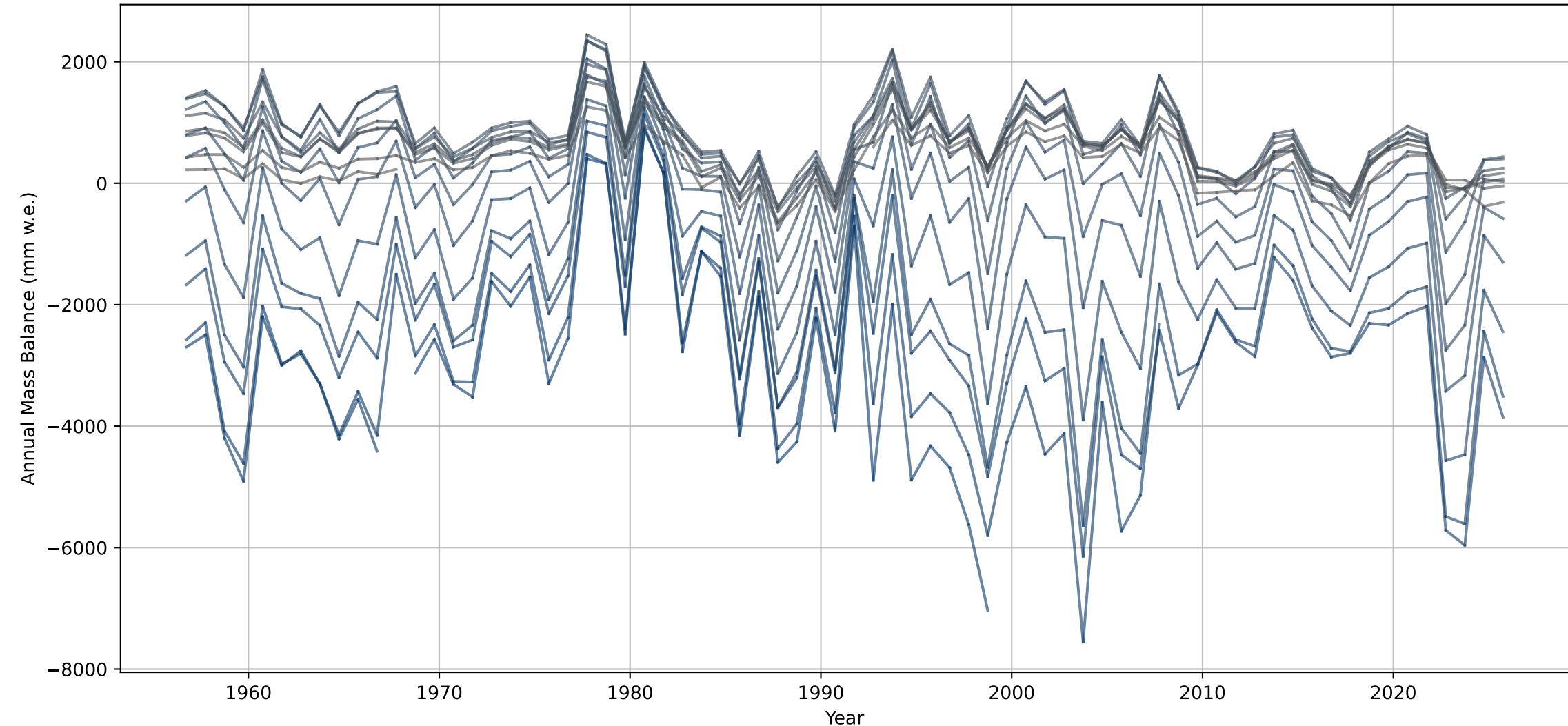
## Hohlaubgletscher Annual Mass Balance Over Time



## Hohlaubgletscher Cumulative Annual Mass Balance Over Time



# Annual Mass Balance for each Elevation Bin over Time - Hohlaubgletscher



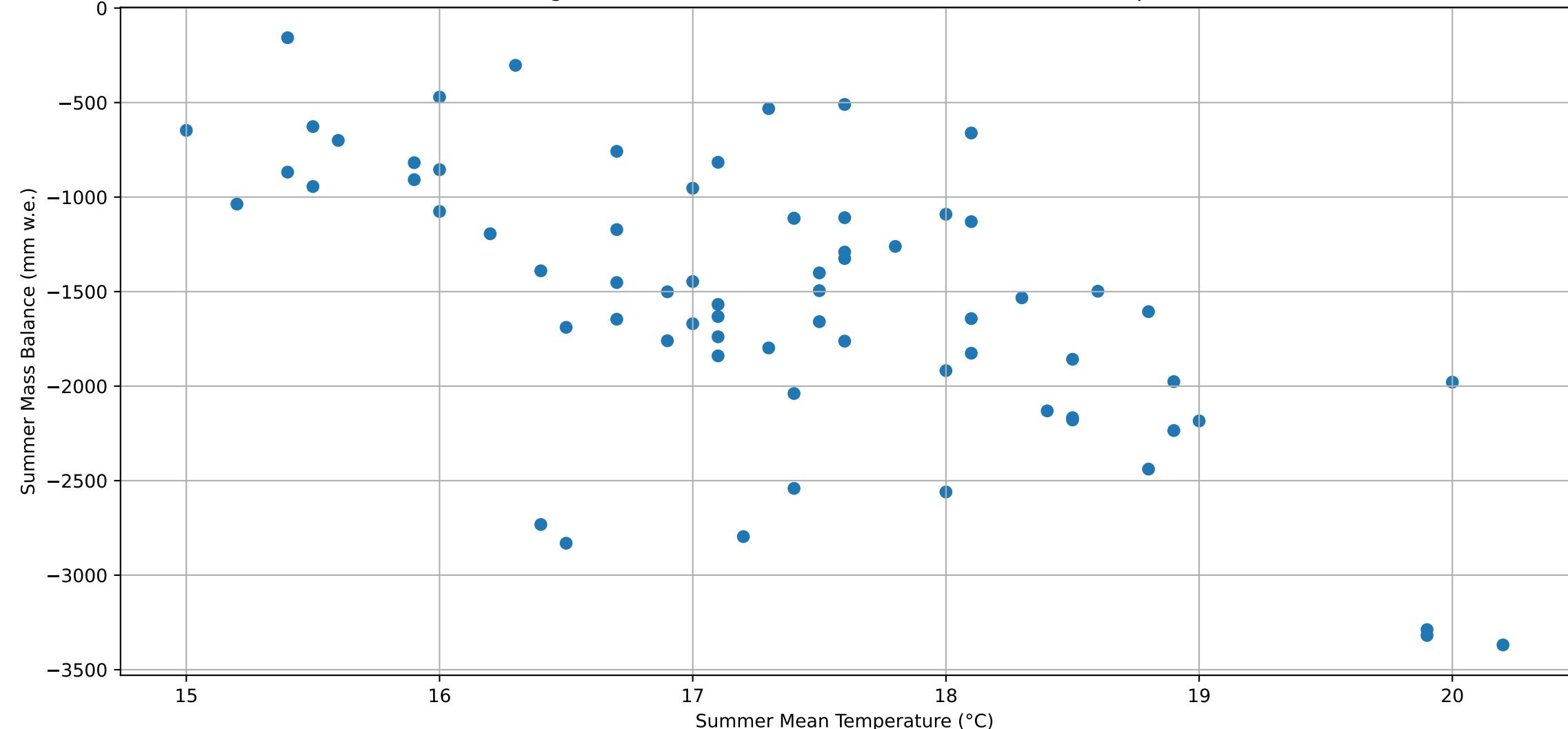
## Sion Summer Mean Temperature



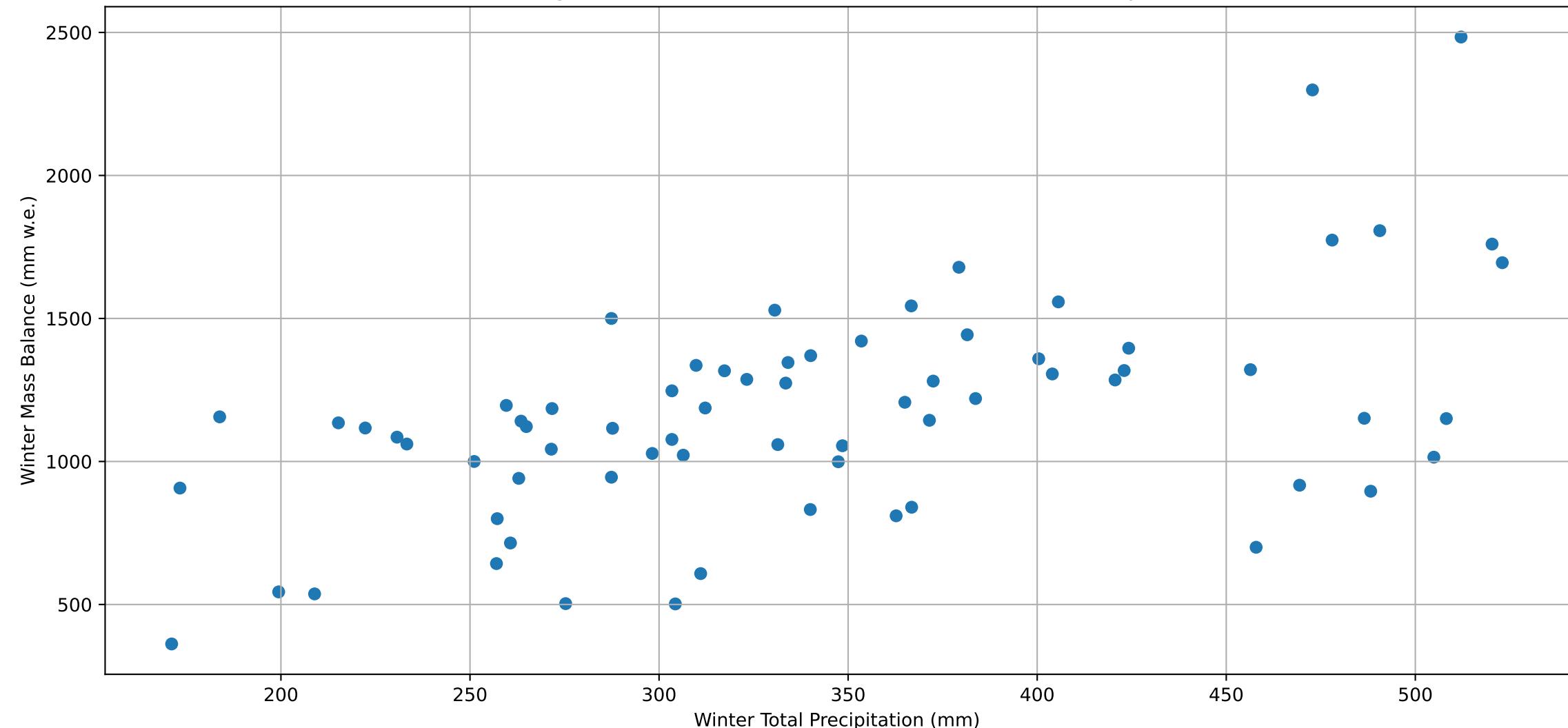
## Sion Winter Total Precipitation



### Hohlaubgletscher Summer Mass Balance with relation to Temperature



### Hohlaubgletscher Winter Mass Balance with relation to Precipitation



# Regression: Monthly 1961-1990

=====  
MONTHLY DEVIATIONS for Hohlaubgletscher using 1961-1990 climate norms  
=====

Correlation Analysis with Significance Testing:

Skipping constant column: const

	Variable	Correlation Coefficient	P-value	Significant (p < 0.05)
2	july_td	-0.551877	7.340182e-07	True
3	august_td	-0.467402	4.515425e-05	True
1	june_td	-0.444657	1.150260e-04	True
4	september_td	-0.414801	3.566138e-04	True
0	may_td	-0.388732	8.821633e-04	True
5	october_pd	0.192638	1.101076e-01	False
9	february_pd	0.154829	2.006150e-01	False
11	april_pd	-0.141633	2.421798e-01	False
6	november_pd	0.101388	4.036308e-01	False
7	december_pd	0.082763	4.957804e-01	False
10	march_pd	0.064021	5.985187e-01	False
8	january_pd	0.014279	9.066076e-01	False

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.518
Model:	OLS	Adj. R-squared:	0.417
Method:	Least Squares	F-statistic:	5.105
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	1.05e-05
Time:	10:30:33	Log-Likelihood:	-549.81
No. Observations:	70	AIC:	1126.
Df Residuals:	57	BIC:	1155.
Df Model:	12		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	49.3592	107.418	0.460	0.648	-165.741	264.459
may_td	-51.7296	66.025	-0.783	0.437	-183.942	80.483
june_td	-16.4373	62.241	-0.264	0.793	-141.073	108.198
july_td	-161.9487	66.779	-2.425	0.018	-295.671	-28.226
august_td	-132.5787	78.796	-1.683	0.098	-290.364	25.207
september_td	-121.8690	62.697	-1.944	0.057	-247.418	3.680
october_pd	7.0823	3.071	2.306	0.025	0.932	13.232
november_pd	2.8305	2.282	1.240	0.220	-1.739	7.400
december_pd	4.4549	1.907	2.336	0.023	0.636	8.274
january_pd	0.6375	2.321	0.275	0.785	-4.010	5.285
february_pd	1.2869	1.802	0.714	0.478	-2.322	4.896
march_pd	-0.7323	2.653	-0.276	0.784	-6.045	4.581
april_pd	-4.2385	4.053	-1.046	0.300	-12.354	3.877

Omnibus:	3.799	Durbin-Watson:	1.573
Prob(Omnibus):	0.150	Jarque-Bera (JB):	3.408
Skew:	-0.540	Prob(JB):	0.182
Kurtosis:	3.006	Cond. No.	68.7

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

# Regression: Optimal 1961-1990

=====  
OPTIMAL SEASONAL DEVIATIONS for Hohlaubgletscher 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	-0.602347	3.457786e-08	True
1	opt_season_pd	0.272364	2.254596e-02	True

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.407
Model:	OLS	Adj. R-squared:	0.390
Method:	Least Squares	F-statistic:	23.04
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	2.43e-08
Time:	10:30:33	Log-Likelihood:	-557.04
No. Observations:	70	AIC:	1120.
Df Residuals:	67	BIC:	1127.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	47.5984	105.330	0.452	0.653	-162.641	257.838
opt_season_td	-410.3203	66.837	-6.139	0.000	-543.727	-276.913
opt_season_pd	2.3534	1.047	2.247	0.028	0.263	4.444

Omnibus:	8.352	Durbin-Watson:	1.542
Prob(Omnibus):	0.015	Jarque-Bera (JB):	8.071
Skew:	-0.661	Prob(JB):	0.0177
Kurtosis:	4.009	Cond. No.	111.

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 Hohlaubgletscher 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	-0.630517	4.928413e-09	True
1 winter_pd	0.227639	5.806108e-02	False

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.434
Model:	OLS	Adj. R-squared:	0.417
Method:	Least Squares	F-statistic:	25.65
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	5.35e-09
Time:	10:30:33	Log-Likelihood:	-555.45
No. Observations:	70	AIC:	1117.
Df Residuals:	67	BIC:	1124.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	87.4437	104.438	0.837	0.405	-121.015	295.902
summer_td	-474.8311	70.647	-6.721	0.000	-615.844	-333.818
winter_pd	1.8549	0.897	2.067	0.043	0.064	3.646

Omnibus:	6.635	Durbin-Watson:	1.541
Prob(Omnibus):	0.036	Jarque-Bera (JB):	5.868
Skew:	-0.605	Prob(JB):	0.0532
Kurtosis:	3.740	Cond. No.	132.

Notes:

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

# Regression: Monthly 1991-2020

=====  
MONTHLY DEVIATIONS for Hohlaubgletscher 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	-0.551877	7.340182e-07	True
3	august_td	-0.467402	4.515425e-05	True
1	june_td	-0.444657	1.150260e-04	True
4	september_td	-0.414801	3.566138e-04	True
0	may_td	-0.388732	8.821633e-04	True
5	october_pd	0.192638	1.101076e-01	False
9	february_pd	0.154829	2.006150e-01	False
11	april_pd	-0.141633	2.421798e-01	False
6	november_pd	0.101388	4.036308e-01	False
7	december_pd	0.082763	4.957804e-01	False
10	march_pd	0.064021	5.985187e-01	False
8	january_pd	0.014279	9.066076e-01	False

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.518
Model:	OLS	Adj. R-squared:	0.417
Method:	Least Squares	F-statistic:	5.105
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	1.05e-05
Time:	10:30:33	Log-Likelihood:	-549.81
No. Observations:	70	AIC:	1126.
Df Residuals:	57	BIC:	1155.
Df Model:	12		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	-761.0987	100.998	-7.536	0.000	-963.343	-558.854
may_td	-51.7296	66.025	-0.783	0.437	-183.942	80.483
june_td	-16.4373	62.241	-0.264	0.793	-141.073	108.198
july_td	-161.9487	66.779	-2.425	0.018	-295.671	-28.226
august_td	-132.5787	78.796	-1.683	0.098	-290.364	25.207
september_td	-121.8690	62.697	-1.944	0.057	-247.418	3.680
october_pd	7.0823	3.071	2.306	0.025	0.932	13.232
november_pd	2.8305	2.282	1.240	0.220	-1.739	7.400
december_pd	4.4549	1.907	2.336	0.023	0.636	8.274
january_pd	0.6375	2.321	0.275	0.785	-4.010	5.285
february_pd	1.2869	1.802	0.714	0.478	-2.322	4.896
march_pd	-0.7323	2.653	-0.276	0.784	-6.045	4.581
april_pd	-4.2385	4.053	-1.046	0.300	-12.354	3.877

Omnibus:	3.799	Durbin-Watson:	1.573
Prob(Omnibus):	0.150	Jarque-Bera (JB):	3.408
Skew:	-0.540	Prob(JB):	0.182
Kurtosis:	3.006	Cond. No.	65.8

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

# Regression: Optimal 1991-2020

```
=====
OPTIMAL SEASONAL DEVIATIONS for Hohlaubgletscher 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	-0.605611	2.786038e-08	True
1	opt_season_pd	0.272364	2.254596e-02	True

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.409
Model:	OLS	Adj. R-squared:	0.392
Method:	Least Squares	F-statistic:	23.21
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	2.19e-08
Time:	10:30:33	Log-Likelihood:	-556.93
No. Observations:	70	AIC:	1120.
Df Residuals:	67	BIC:	1127.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	-749.6822	101.557	-7.382	0.000	-952.390	-546.974
opt_season_td	-414.5566	67.243	-6.165	0.000	-548.774	-280.339
opt_season_pd	2.2984	1.047	2.196	0.032	0.209	4.387

Omnibus:	7.664	Durbin-Watson:	1.534
Prob(Omnibus):	0.022	Jarque-Bera (JB):	7.203
Skew:	-0.628	Prob(JB):	0.0273
Kurtosis:	3.944	Cond. No.	107.

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

# Regression: Seasonal 1991-2020

```
=====
SUMMER/WINTER SEASONAL DEVIATIONS for Hohlaubgletscher 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	-0.628791	5.584849e-09	True
1 winter_pd	0.227639	5.806108e-02	False

Number of observations: 70

Regression Summary:

## OLS Regression Results

Dep. Variable:	annual mass balance (mm w.e.)	R-squared:	0.431
Model:	OLS	Adj. R-squared:	0.414
Method:	Least Squares	F-statistic:	25.33
Date:	Mon, 15 Dec 2025	Prob (F-statistic):	6.41e-09
Time:	10:30:33	Log-Likelihood:	-555.64
No. Observations:	70	AIC:	1117.
Df Residuals:	67	BIC:	1124.
Df Model:	2		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	-763.8050	99.610	-7.668	0.000	-962.627	-564.983
summer_td	-472.5222	70.779	-6.676	0.000	-613.797	-331.247
winter_pd	1.8323	0.900	2.036	0.046	0.036	3.629

Omnibus:	6.431	Durbin-Watson:	1.533
Prob(Omnibus):	0.040	Jarque-Bera (JB):	5.631
Skew:	-0.599	Prob(JB):	0.0599
Kurtosis:	3.704	Cond. No.	124.

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