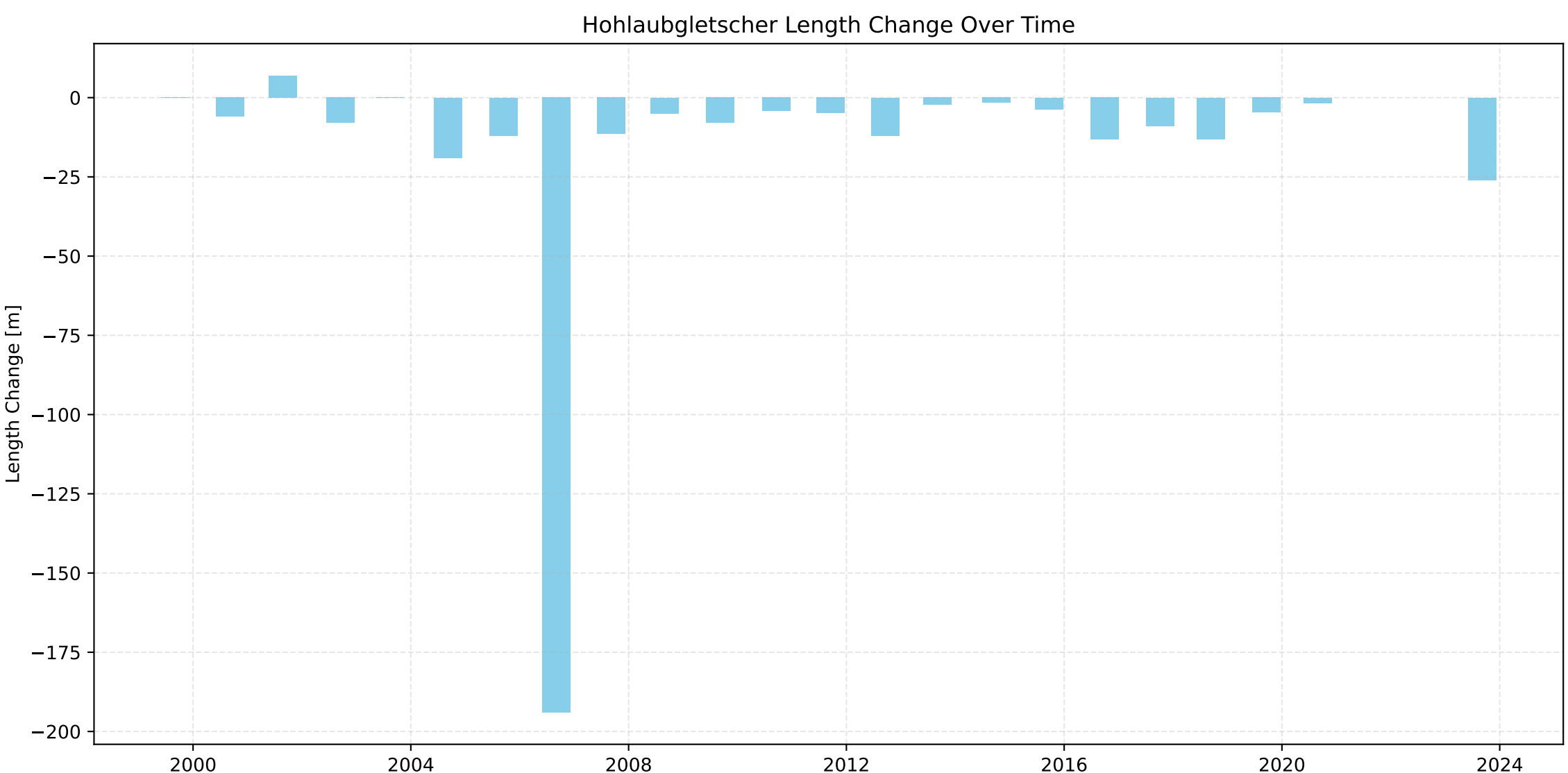
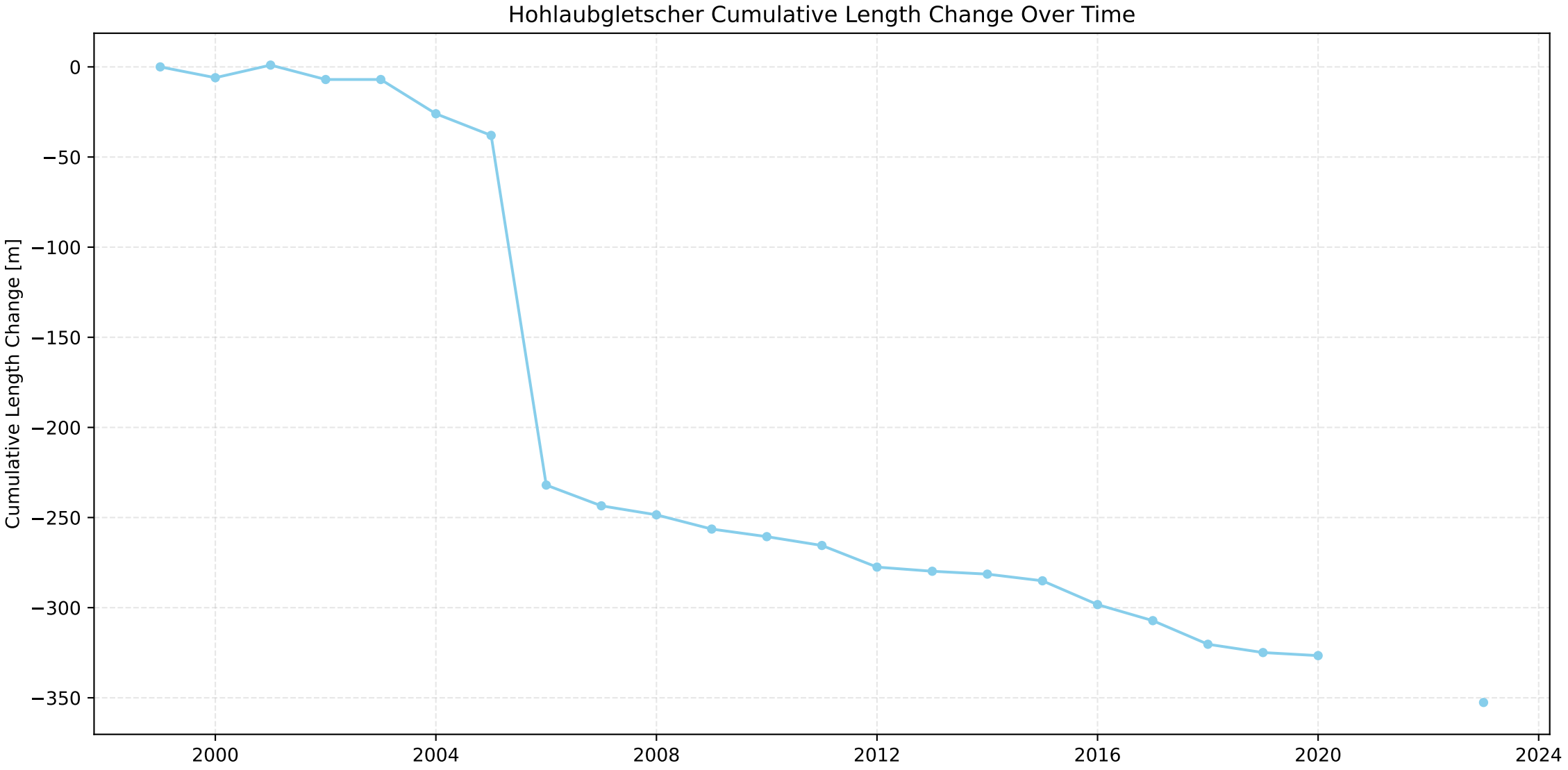
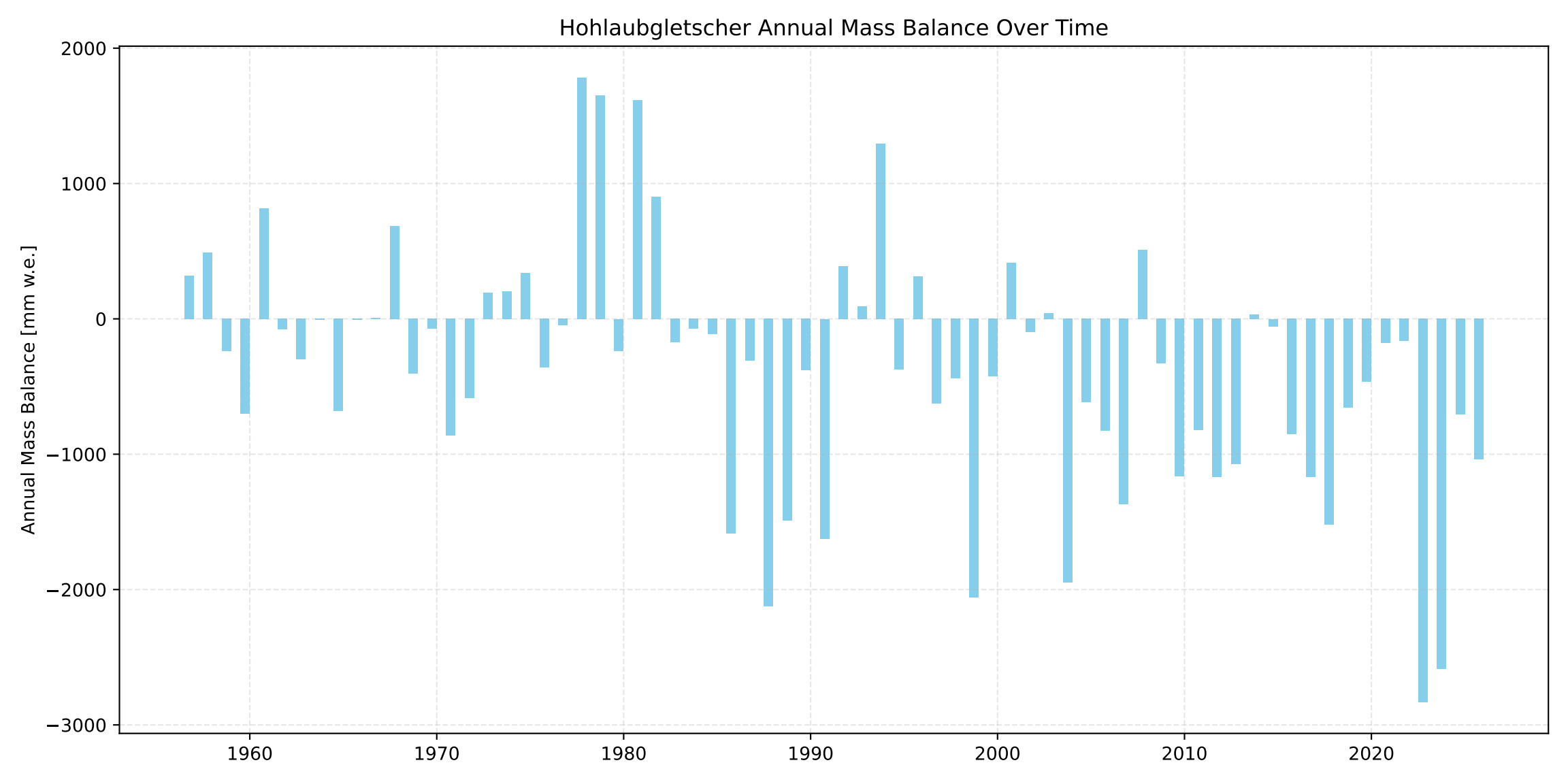
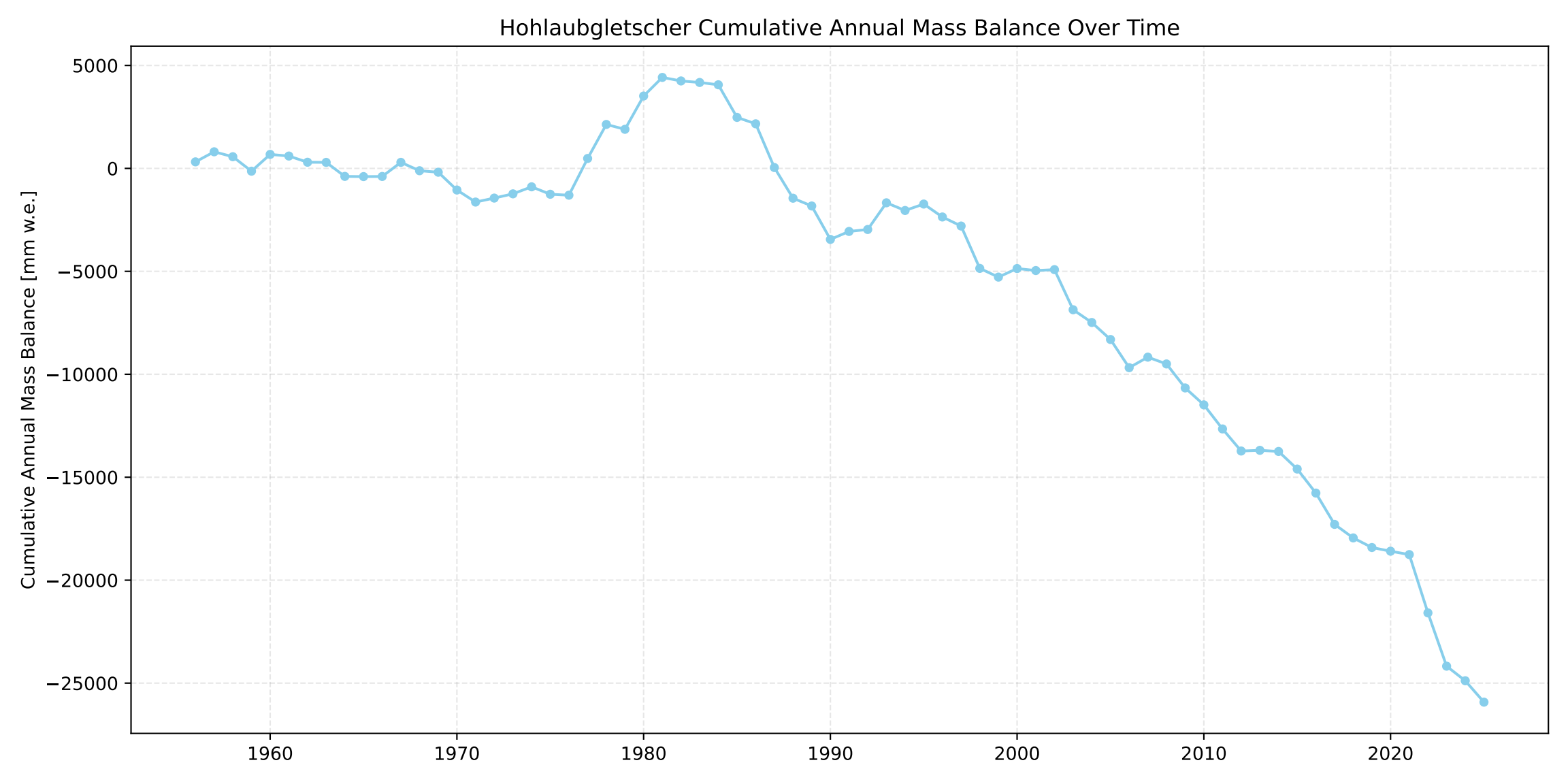
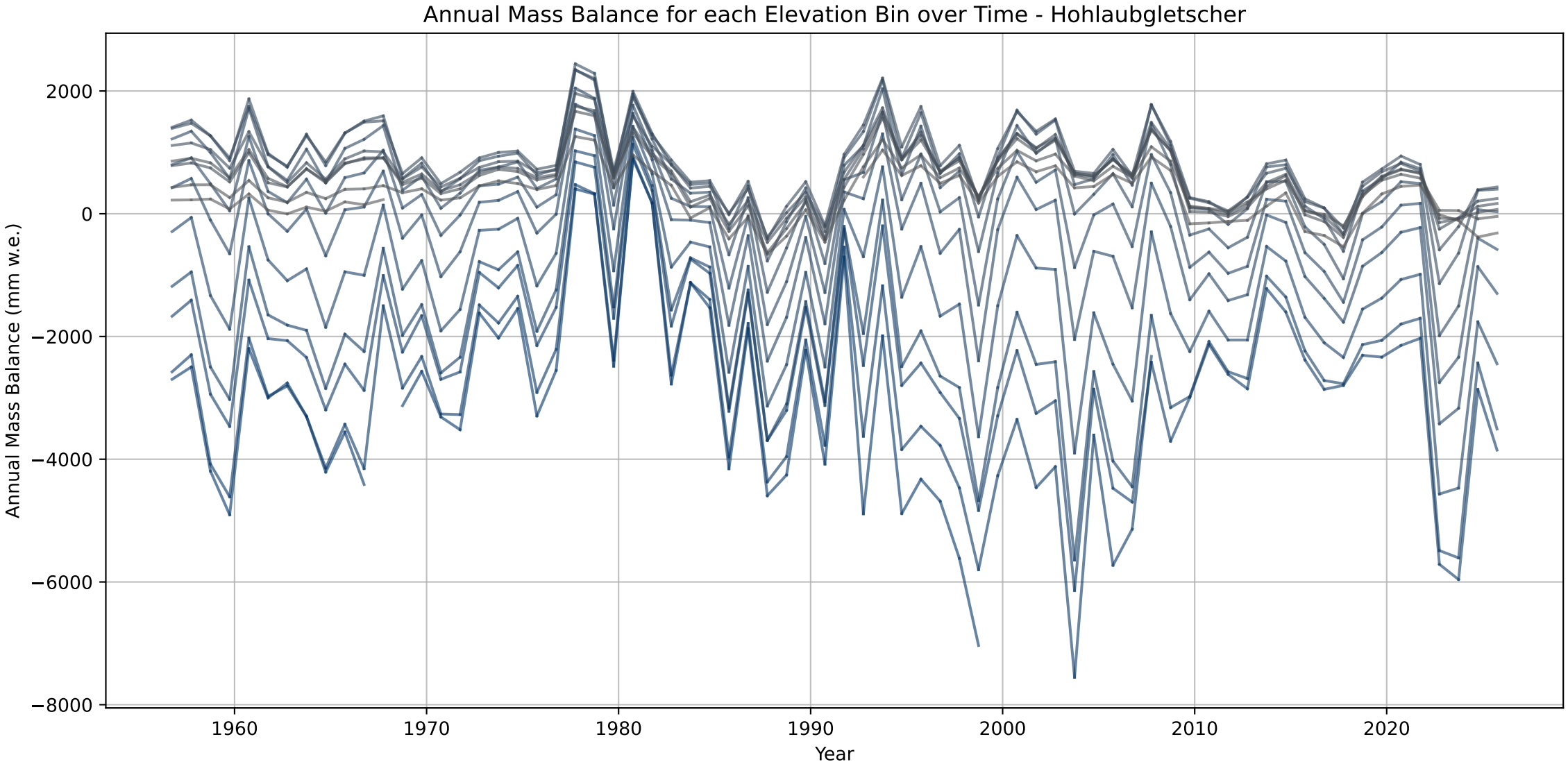
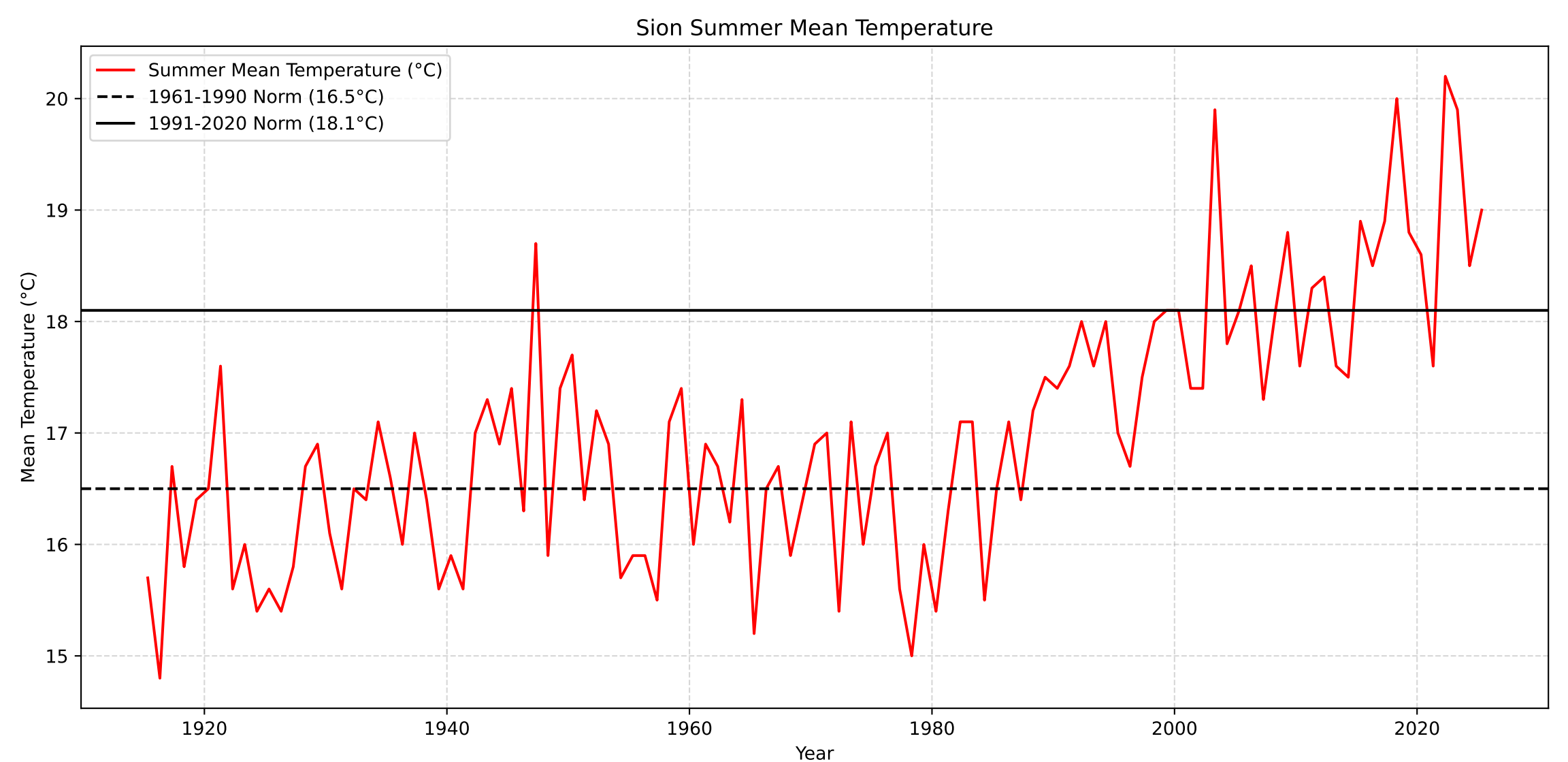

Hohlaubgletscher Length Change Over Time
Length Change [m]
0
−25
−50
−75
−100
−125
−150
−175
−200
2000
2004
2008
2012
2016
2020
2024

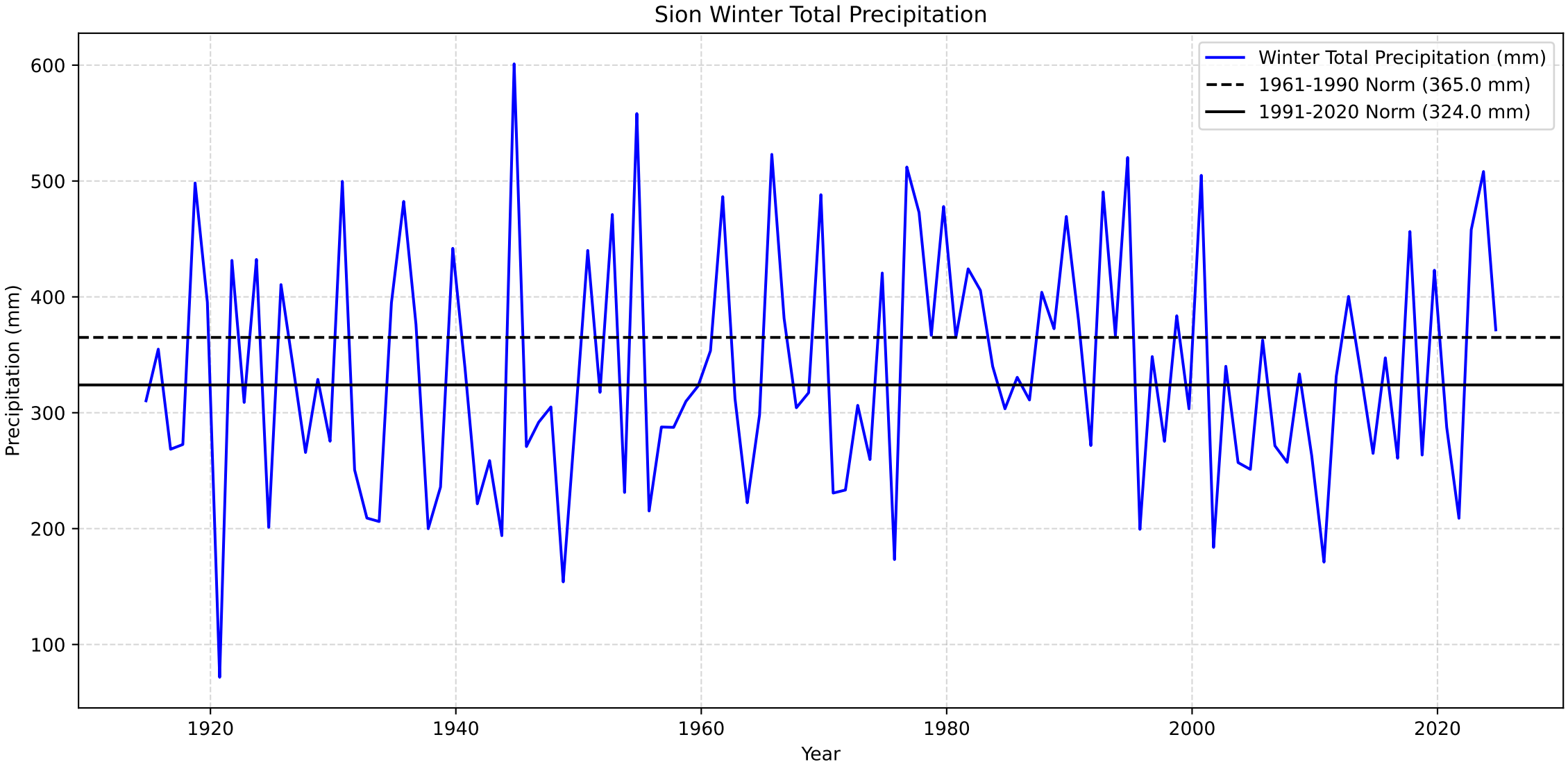

Hohlaubgletscher Cumulative Length Change Over Time
Cumulative Length Change [m]
0
−50
−100
−150
−200
−250
−300
−350
2000
2004
2008
2012
2016
2020
2024

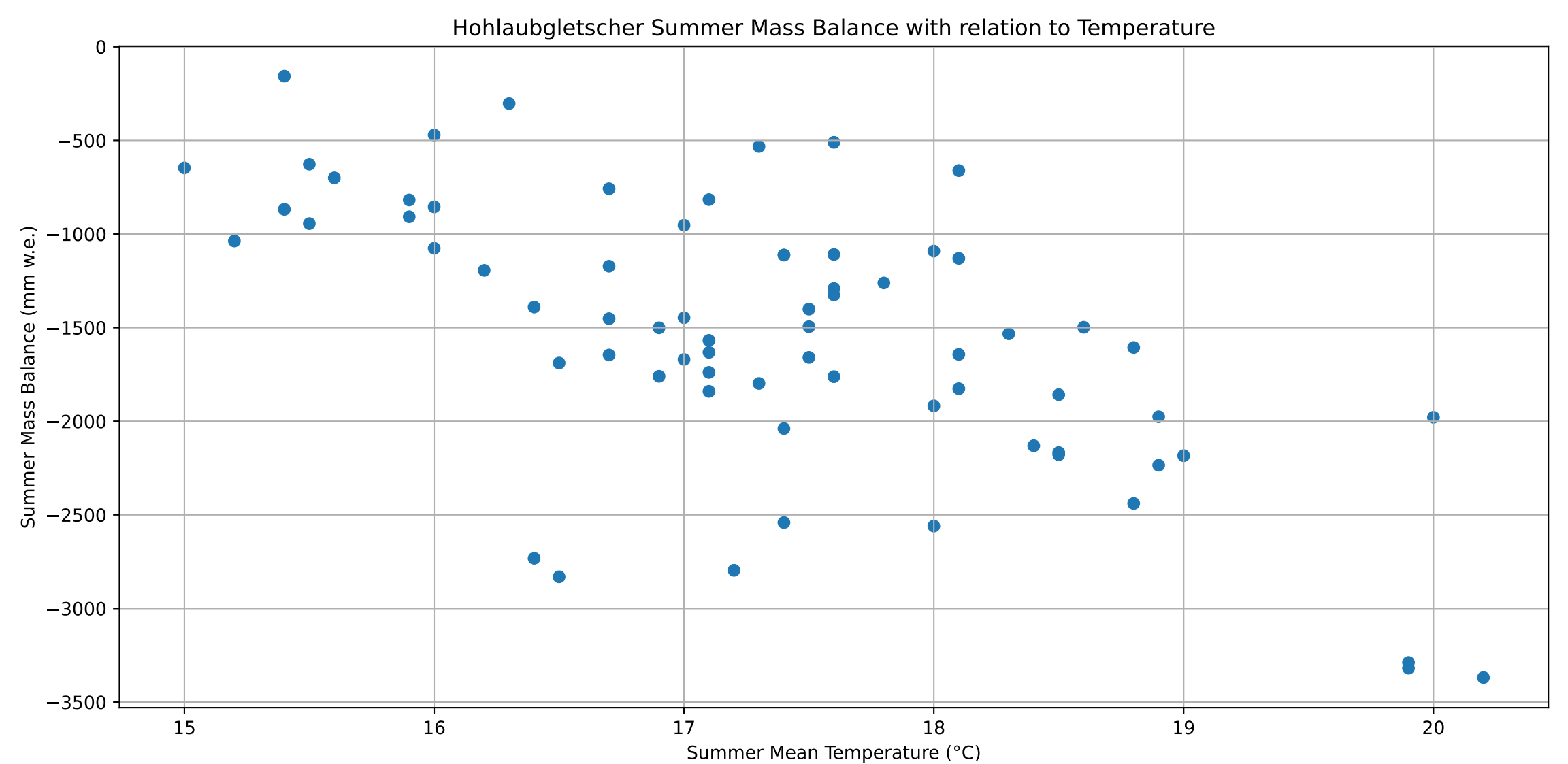

Hohlaubgletscher Annual Mass Balance Over Time
Annual Mass Balance [mm w.e.]
2000
1000
0
−1000
−2000
−3000
1960
1970
1980
1990
2000
2010
2020

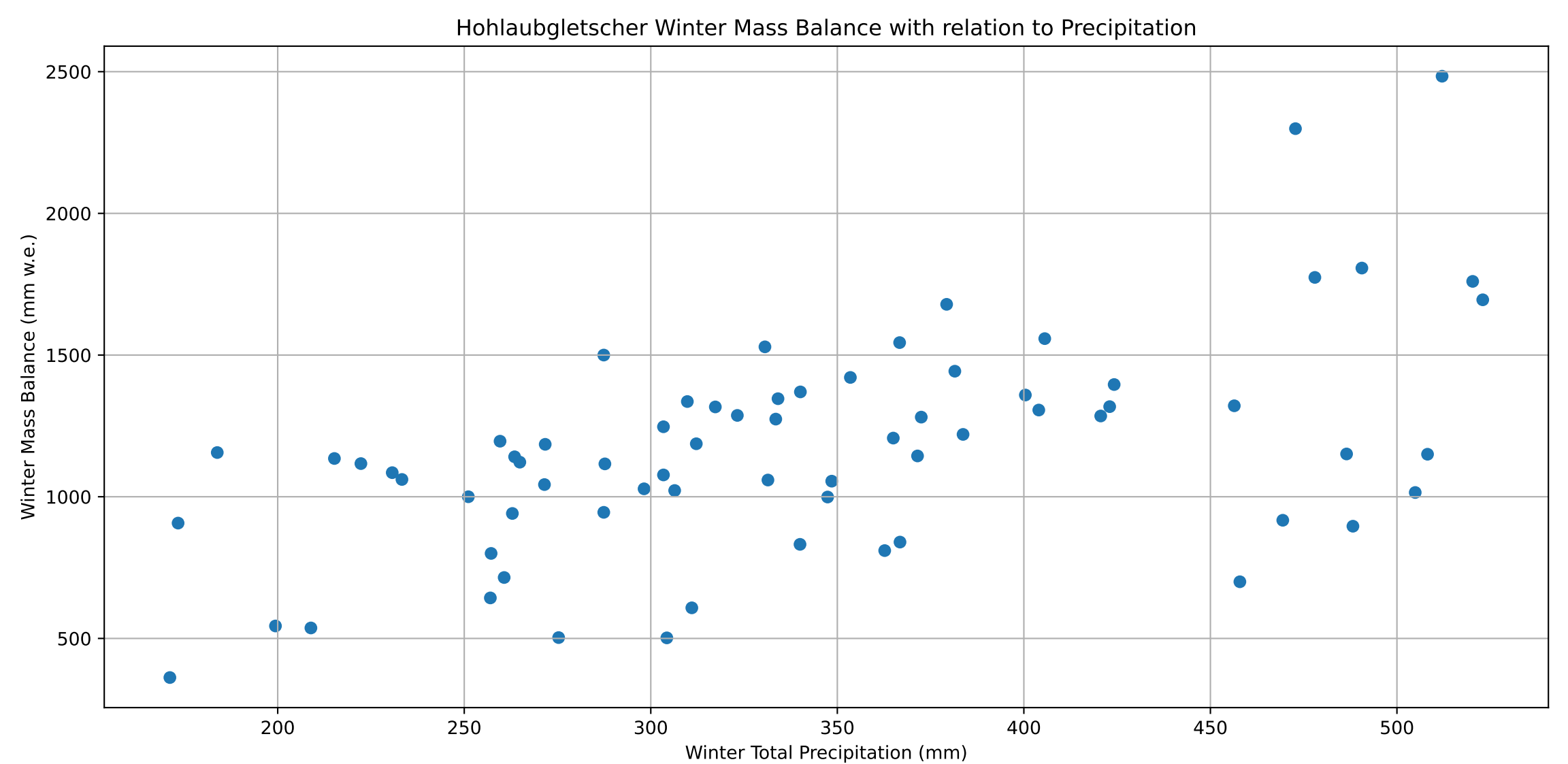

Hohlaubgletscher Cumulative Annual Mass Balance Over Time
Cumulative Annual Mass Balance [mm w.e.]
5000
0
−5000
−10000
−15000
−20000
−25000
1960
1970
1980
1990
2000
2010
2020


Annual Mass Balance for each Elevation Bin over Time - Hohlaubgletscher
Annual Mass Balance (mm w.e.)
2000
0
−2000
−4000
−6000
−8000
1960
1970
1980
1990
2000
2010
2020
Year


Sion Summer Mean Temperature
Summer Mean Temperature (°C)
1961-1990 Norm (16.5°C)
1991-2020 Norm (18.1°C)
Mean Temperature (°C)
Year
15
16
17
18
19
20
1920
1940
1960
1980
2000
2020


Sion Winter Total Precipitation
Winter Total Precipitation (mm)
1961-1990 Norm (365.0 mm)
1991-2020 Norm (324.0 mm)
Precipitation (mm)
600
500
400
300
200
100
1920
1940
1960
1980
2000
2020
Year


Hohlaubgletscher Summer Mass Balance with relation to Temperature
Summer Mass Balance (mm w.e.)
0
−500
−1000
−1500
−2000
−2500
−3000
−3500
15
16
17
18
19
20
Summer Mean Temperature (°C)


Hohlaubgletscher Winter Mass Balance with relation to Precipitation
Winter Mass Balance (mm w.e.)
2500
2000
1500
1000
500
200
250
300
350
400
450
500
Winter Total Precipitation (mm)

Regression: Monthly 1961-1990

```
================================================================================
MONTHLY DEVIATIONS ANALYSIS USING 1961-1990 CLIMATE NORMS
================================================================================

================================================================================
MONTHLY DEVIATIONS for Hohlaubgletscher (1961-1990 norms)
================================================================================

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:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.05e-05
Time:                                   00:05:35   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.

Coefficient Interpretation:
Intercept (normal mass balance): 49.36 (p=0.6476)
may_td: -51.73 (p=0.4366)
june_td: -16.44 (p=0.7927)
july_td: -161.95 (p=0.0185)
august_td: -132.58 (p=0.0979)
september_td: -121.87 (p=0.0569)
october_pd: 7.08 (p=0.0248)
november_pd: 2.83 (p=0.2199)
december_pd: 4.45 (p=0.0230)
january_pd: 0.64 (p=0.7846)
```

Regression: Optimal 1961-1990

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

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

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:                     23.20
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           2.21e-08
Time:                                   00:05:35   Log-Likelihood:                -556.94
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            48.8278    105.207      0.464      0.644    -161.166     258.821
opt_season_td  -412.9136     66.995     -6.163      0.000    -546.635    -279.192
opt_season_pd     2.3355      1.046      2.233      0.029       0.248       4.423
==============================================================================
Omnibus:                        8.158   Durbin-Watson:                   1.534
Prob(Omnibus):                  0.017   Jarque-Bera (JB):                7.823
Skew:                          -0.652   Prob(JB):                       0.0200
Kurtosis:                       3.991   Cond. No.                         111.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): 48.83 (p=0.6441)
opt_season_td: -412.91 (p=0.0000)
opt_season_pd: 2.34 (p=0.0289)

Variance Inflation Factors (VIF):
        Variable       VIF
0          const  1.555743
1  opt_season_td  1.011296
2  opt_season_pd  1.011296

R-squared: 0.4092
Adjusted R-squared: 0.3915
```

Regression: Seasonal 1961-1990

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

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

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:                     25.72
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           5.13e-09
Time:                                   00:05:35   Log-Likelihood:                -555.41
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         87.7680    104.370      0.841      0.403    -120.556     296.092
summer_td   -475.5301     70.645     -6.731      0.000    -616.537    -334.523
winter_pd      1.8374      0.897      2.048      0.044       0.047       3.628
==============================================================================
Omnibus:                        6.535   Durbin-Watson:                   1.538
Prob(Omnibus):                  0.038   Jarque-Bera (JB):                5.748
Skew:                          -0.603   Prob(JB):                       0.0565
Kurtosis:                       3.718   Cond. No.                         132.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): 87.77 (p=0.4034)
summer_td: -475.53 (p=0.0000)
winter_pd: 1.84 (p=0.0444)

Variance Inflation Factors (VIF):
    Variable       VIF
0      const  1.599275
1  summer_td  1.003988
2  winter_pd  1.003988

R-squared: 0.4344
Adjusted R-squared: 0.4175
```

Regression: Monthly 1991-2020

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

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

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:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.05e-05
Time:                                   00:05:35   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.

Coefficient Interpretation:
Intercept (normal mass balance): -761.10 (p=0.0000)
may_td: -51.73 (p=0.4366)
june_td: -16.44 (p=0.7927)
july_td: -161.95 (p=0.0185)
august_td: -132.58 (p=0.0979)
september_td: -121.87 (p=0.0569)
october_pd: 7.08 (p=0.0248)
november_pd: 2.83 (p=0.2199)
december_pd: 4.45 (p=0.0230)
january_pd: 0.64 (p=0.7846)
```

Regression: Optimal 1991-2020

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

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

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:                     23.20
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           2.21e-08
Time:                                   00:05:35   Log-Likelihood:                -556.94
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          -748.7328    101.489     -7.377      0.000    -951.305    -546.160
opt_season_td  -412.9136     66.995     -6.163      0.000    -546.635    -279.192
opt_season_pd     2.3355      1.046      2.233      0.029       0.248       4.423
==============================================================================
Omnibus:                        8.158   Durbin-Watson:                   1.534
Prob(Omnibus):                  0.017   Jarque-Bera (JB):                7.823
Skew:                          -0.652   Prob(JB):                       0.0200
Kurtosis:                       3.991   Cond. No.                         107.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): -748.73 (p=0.0000)
opt_season_td: -412.91 (p=0.0000)
opt_season_pd: 2.34 (p=0.0289)

Variance Inflation Factors (VIF):
        Variable       VIF
0          const  1.447730
1  opt_season_td  1.011296
2  opt_season_pd  1.011296

R-squared: 0.4092
Adjusted R-squared: 0.3915
```

Regression: Seasonal 1991-2020

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

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

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:                     25.72
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           5.13e-09
Time:                                   00:05:35   Log-Likelihood:                -555.41
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       -767.9948     99.474     -7.721      0.000    -966.546    -569.444
summer_td   -475.5301     70.645     -6.731      0.000    -616.537    -334.523
winter_pd      1.8374      0.897      2.048      0.044       0.047       3.628
==============================================================================
Omnibus:                        6.535   Durbin-Watson:                   1.538
Prob(Omnibus):                  0.038   Jarque-Bera (JB):                5.748
Skew:                          -0.603   Prob(JB):                       0.0565
Kurtosis:                       3.718   Cond. No.                         124.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): -767.99 (p=0.0000)
summer_td: -475.53 (p=0.0000)
winter_pd: 1.84 (p=0.0444)

Variance Inflation Factors (VIF):
    Variable       VIF
0      const  1.452737
1  summer_td  1.003988
2  winter_pd  1.003988

R-squared: 0.4344
Adjusted R-squared: 0.4175
```