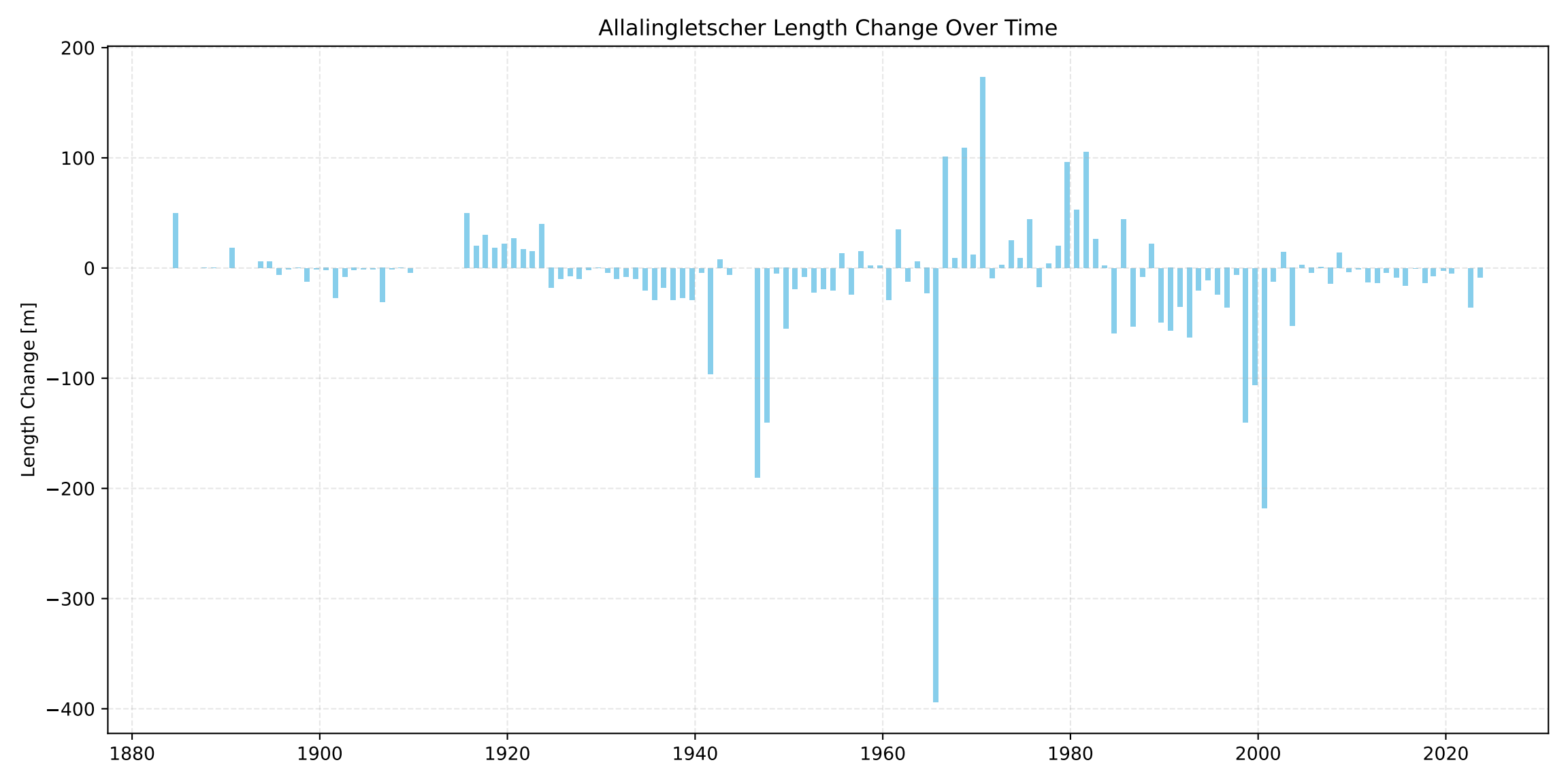
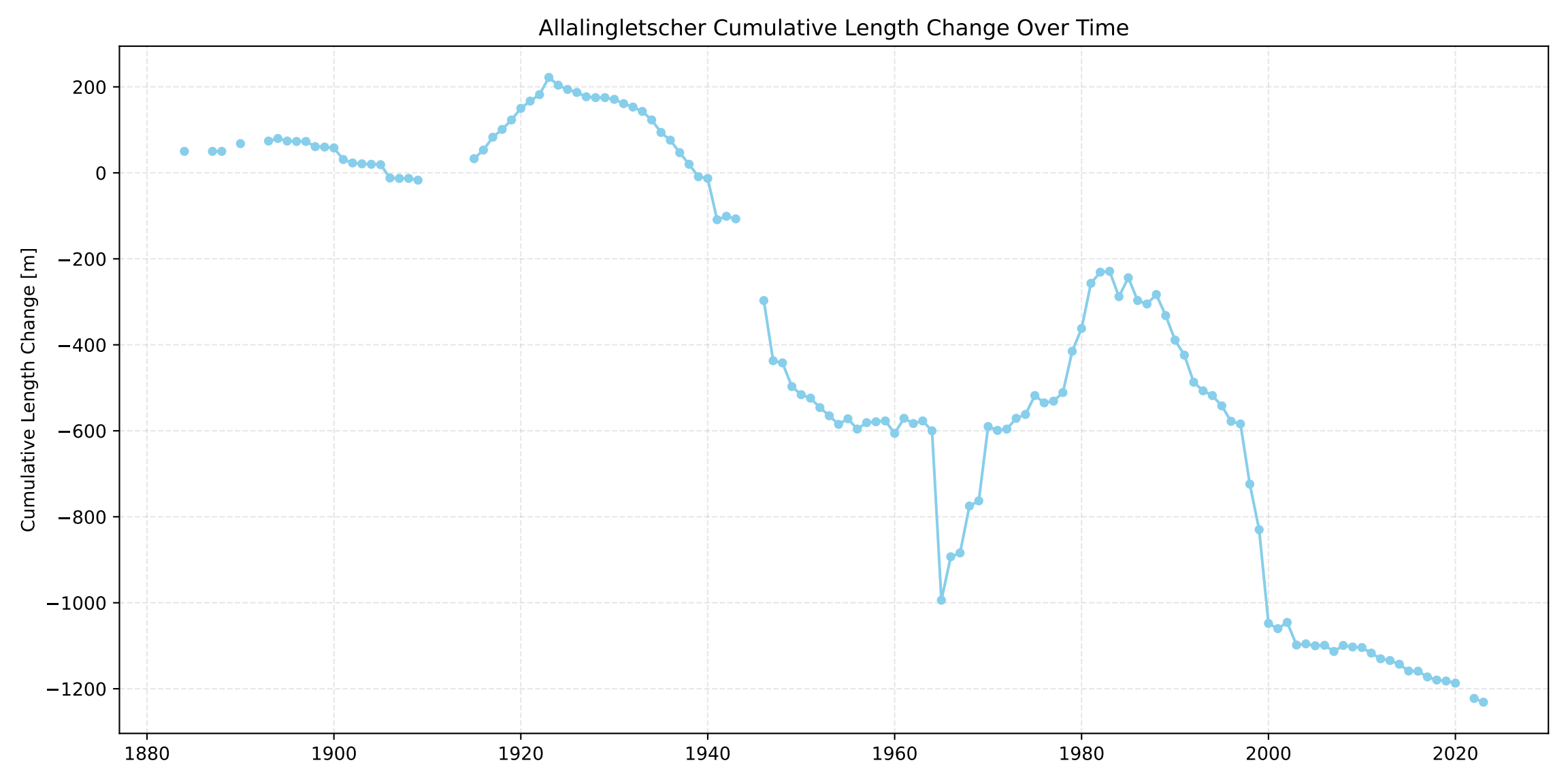
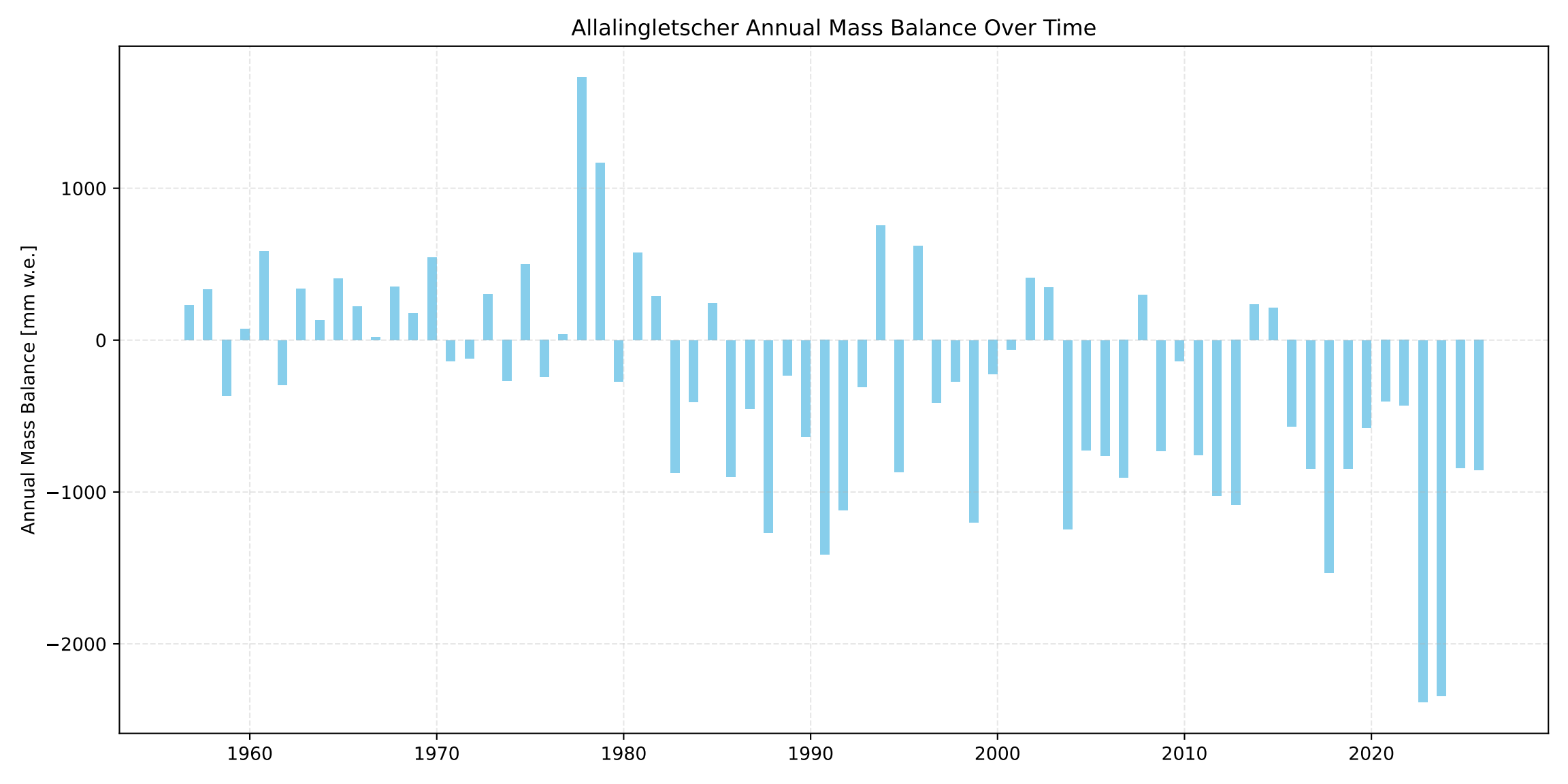
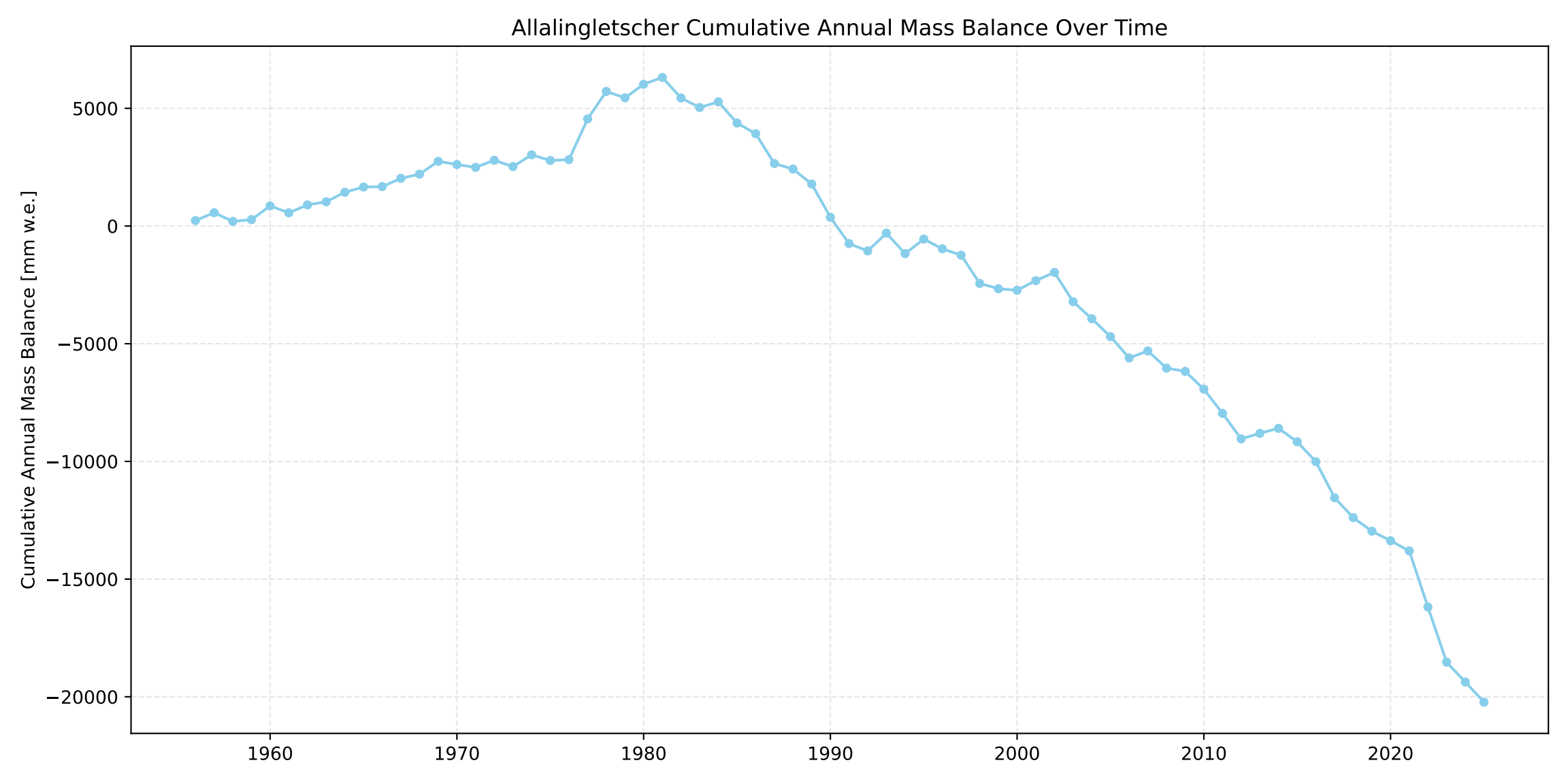
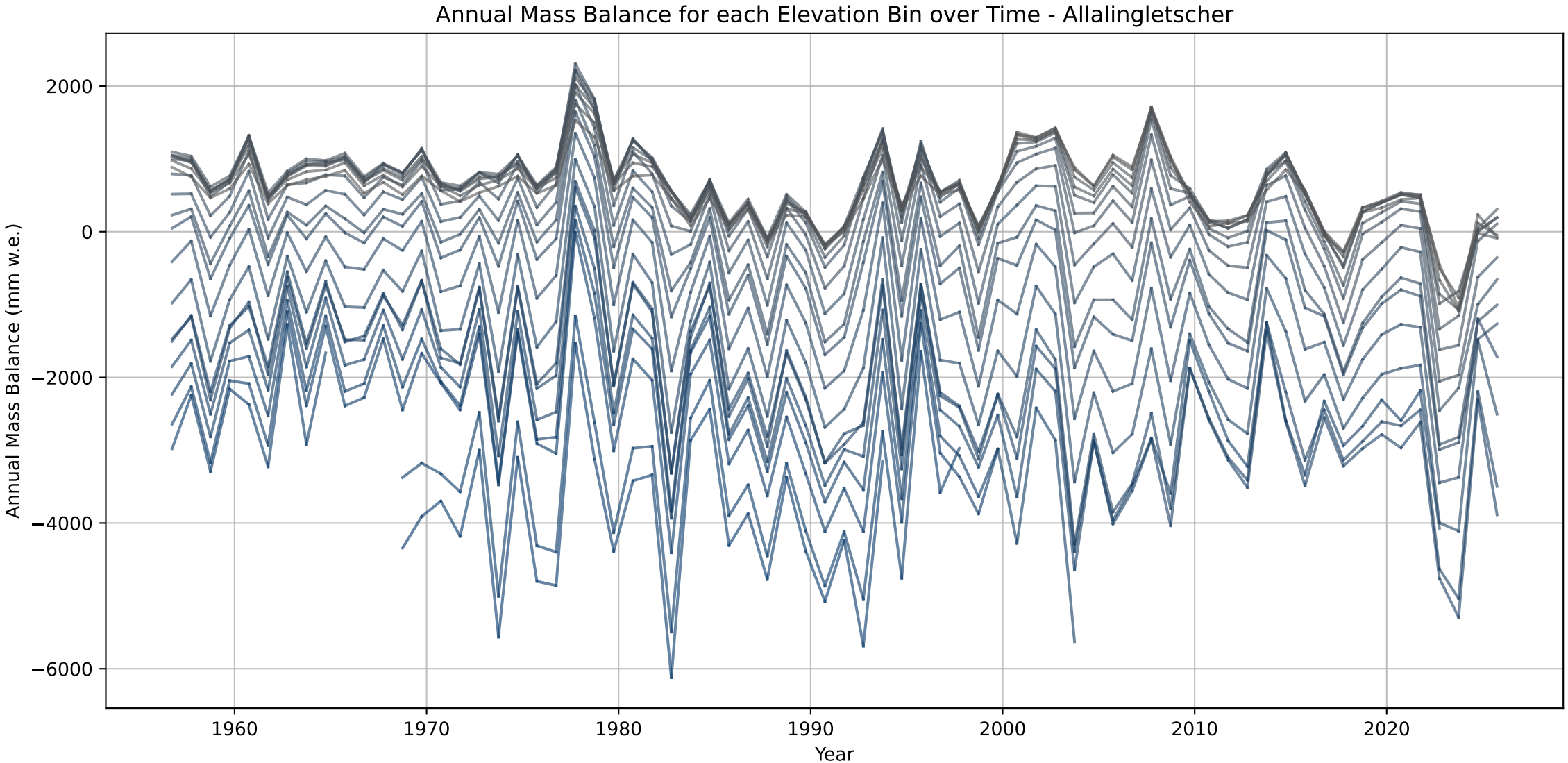
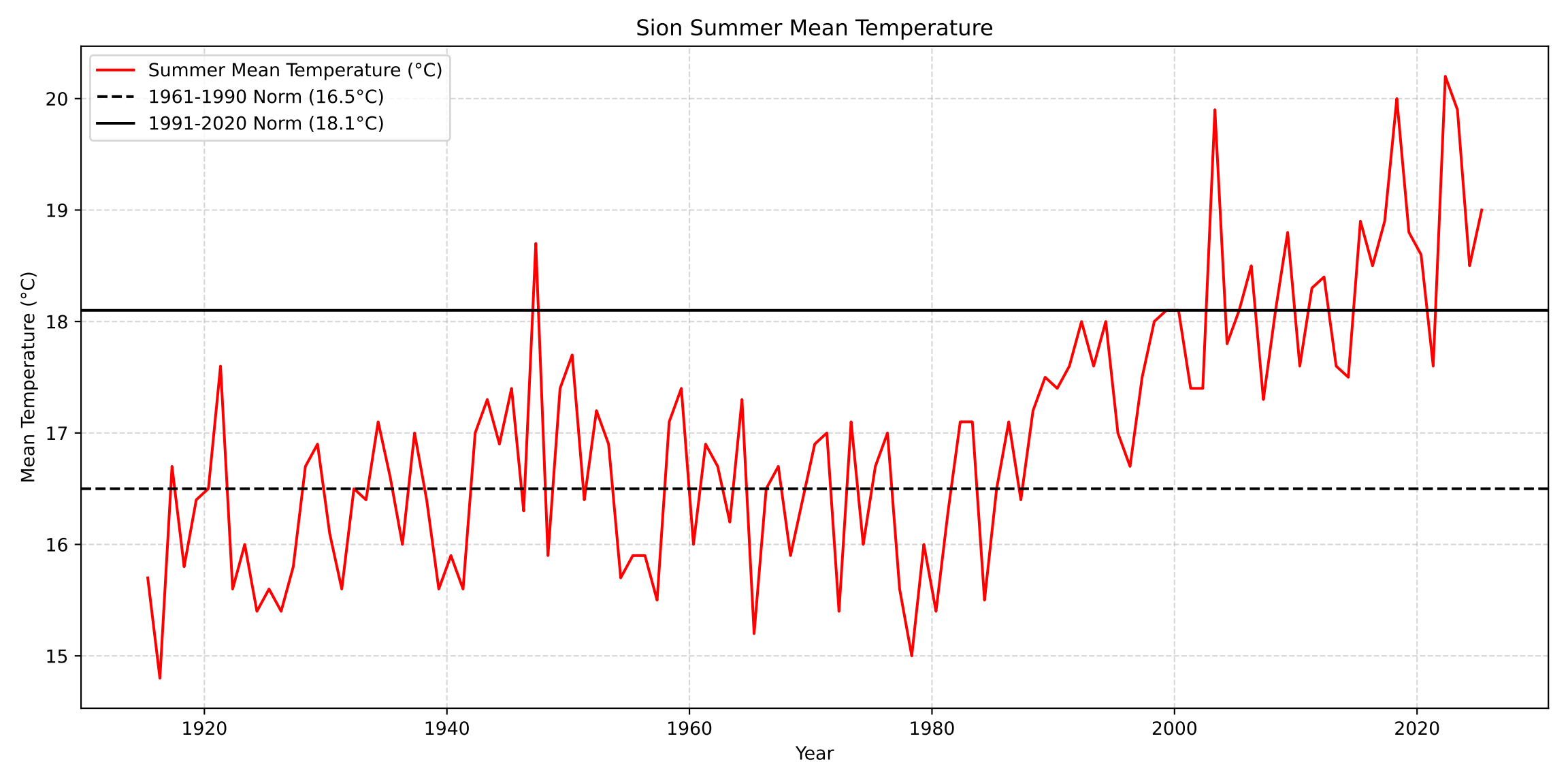

Allalingletscher Length Change Over Time
Length Change [m]
200
100
0
−100
−200
−300
−400
1880
1900
1920
1940
1960
1980
2000
2020

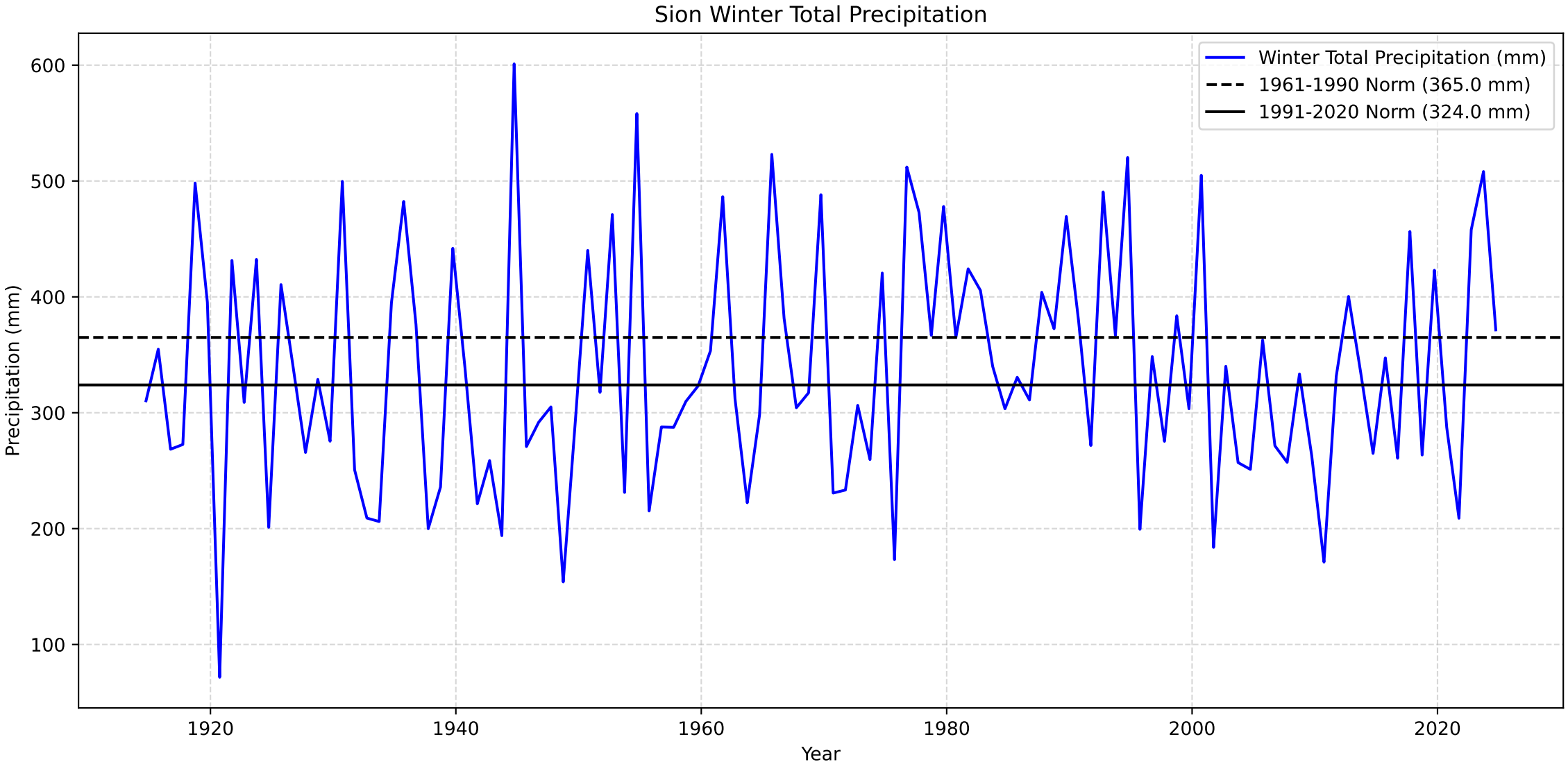

Allalingletscher Cumulative Length Change Over Time
Cumulative Length Change [m]
200
0
−200
−400
−600
−800
−1000
−1200
1880
1900
1920
1940
1960
1980
2000
2020

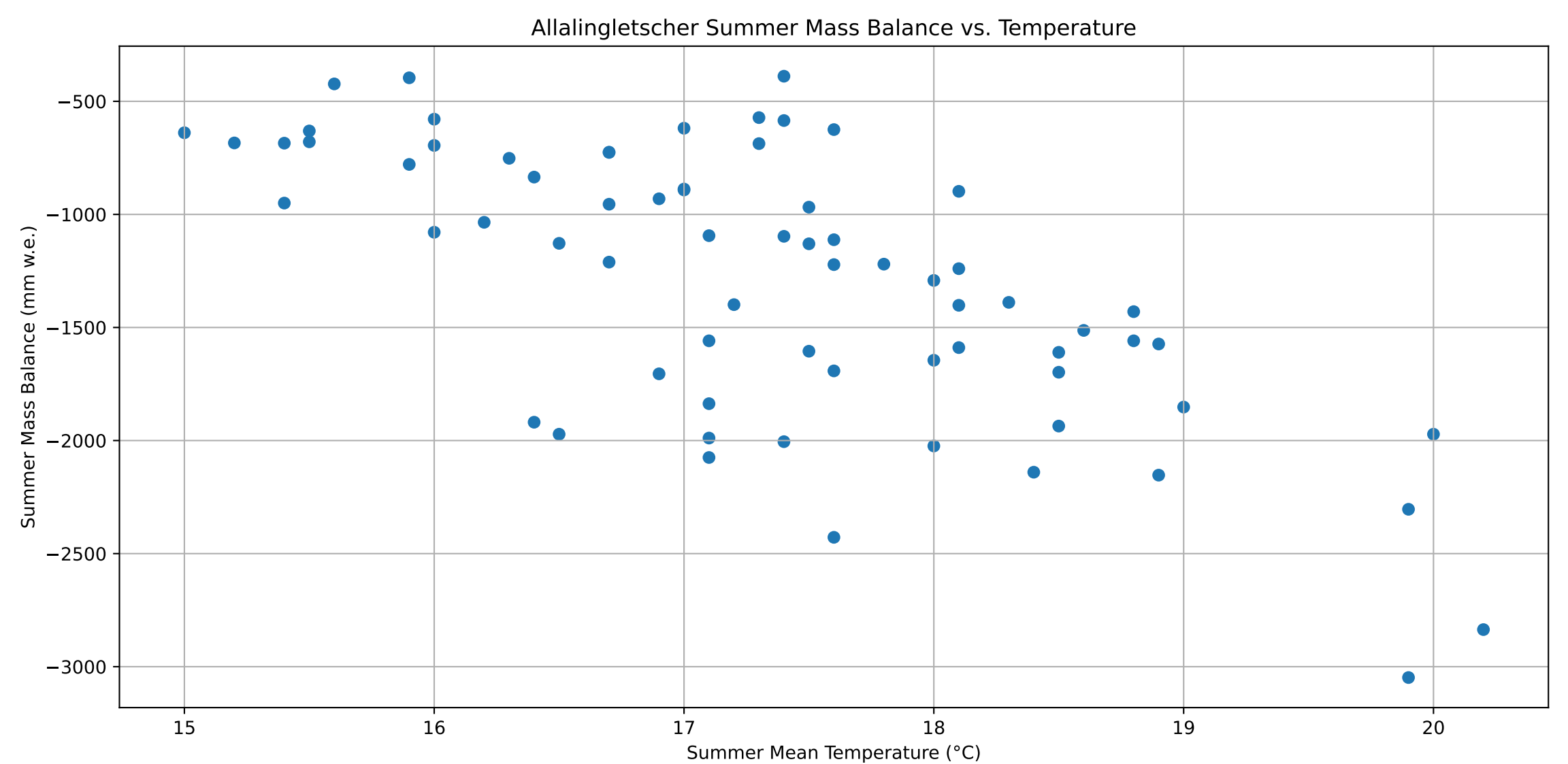

Allalingletscher Annual Mass Balance Over Time
Annual Mass Balance [mm w.e.]
1000
0
−1000
−2000
1960
1970
1980
1990
2000
2010
2020

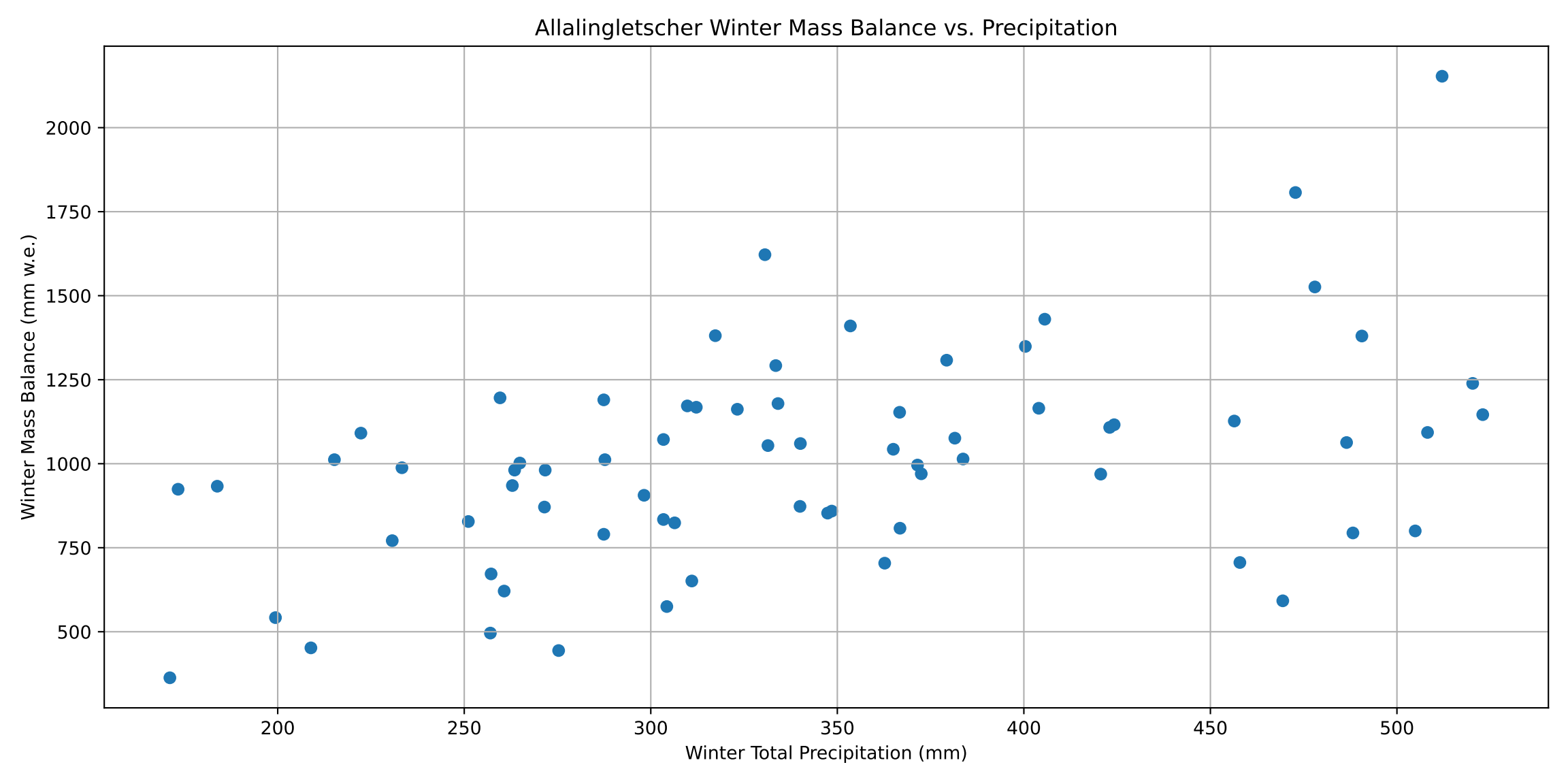

Allalingletscher Cumulative Annual Mass Balance Over Time
Cumulative Annual Mass Balance [mm w.e.]
5000
0
−5000
−10000
−15000
−20000
1960
1970
1980
1990
2000
2010
2020


Annual Mass Balance for each Elevation Bin over Time - Allalingletscher
Annual Mass Balance (mm w.e.)
2000
0
−2000
−4000
−6000
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


Allalingletscher Summer Mass Balance vs. Temperature
Summer Mass Balance (mm w.e.)
−500
−1000
−1500
−2000
−2500
−3000
15
16
17
18
19
20
Summer Mean Temperature (°C)


Allalingletscher Winter Mass Balance vs. Precipitation
Winter Mass Balance (mm w.e.)
2000
1750
1500
1250
1000
750
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 Allalingletscher (1961-1990 norms)
================================================================================

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.577
Model:                                       OLS   Adj. R-squared:                  0.488
Method:                            Least Squares   F-statistic:                     6.472
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           4.26e-07
Time:                                   00:01:02   Log-Likelihood:                -530.10
No. Observations:                             70   AIC:                             1086.
Df Residuals:                                 57   BIC:                             1115.
Df Model:                                     12
Covariance Type:                       nonrobust
==============================================================================
                   coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const          115.7522     81.059      1.428      0.159     -46.565     278.069
may_td         -35.6575     49.823     -0.716      0.477    -135.427      64.112
june_td        -43.8331     46.968     -0.933      0.355    -137.885      50.218
july_td       -107.0402     50.392     -2.124      0.038    -207.949      -6.132
august_td     -116.1017     59.460     -1.953      0.056    -235.168       2.965
september_td  -150.8187     47.312     -3.188      0.002    -245.560     -56.078
october_pd       1.3714      2.318      0.592      0.556      -3.269       6.012
november_pd      2.9680      1.722      1.723      0.090      -0.480       6.416
december_pd      1.1423      1.439      0.794      0.431      -1.740       4.024
january_pd       1.9309      1.751      1.102      0.275      -1.576       5.438
february_pd      0.8317      1.360      0.611      0.543      -1.892       3.555
march_pd         0.5088      2.002      0.254      0.800      -3.500       4.518
april_pd         2.4437      3.058      0.799      0.428      -3.680       8.568
==============================================================================
Omnibus:                        1.054   Durbin-Watson:                   1.687
Prob(Omnibus):                  0.590   Jarque-Bera (JB):                1.056
Skew:                          -0.164   Prob(JB):                        0.590
Kurtosis:                       2.496   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): 115.75 (p=0.1587)
may_td: -35.66 (p=0.4771)
june_td: -43.83 (p=0.3546)
july_td: -107.04 (p=0.0380)
august_td: -116.10 (p=0.0558)
september_td: -150.82 (p=0.0023)
october_pd: 1.37 (p=0.5564)
november_pd: 2.97 (p=0.0902)
december_pd: 1.14 (p=0.4307)
january_pd: 1.93 (p=0.2749)
```

Regression: Optimal 1961-1990

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

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

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.456
Model:                                       OLS   Adj. R-squared:                  0.440
Method:                            Least Squares   F-statistic:                     28.05
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.41e-09
Time:                                   00:01:02   Log-Likelihood:                -538.90
No. Observations:                             70   AIC:                             1084.
Df Residuals:                                 67   BIC:                             1091.
Df Model:                                      2
Covariance Type:                        nonrobust
================================================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------------------------
const            74.6384     81.307      0.918      0.362     -87.651     236.928
opt_season_td  -372.7968     51.776     -7.200      0.000    -476.141    -269.452
opt_season_pd     1.0445      0.808      1.292      0.201      -0.569       2.658
==============================================================================
Omnibus:                        2.411   Durbin-Watson:                   1.528
Prob(Omnibus):                  0.300   Jarque-Bera (JB):                1.652
Skew:                          -0.316   Prob(JB):                        0.438
Kurtosis:                       3.410   Cond. No.                         111.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): 74.64 (p=0.3619)
opt_season_td: -372.80 (p=0.0000)
opt_season_pd: 1.04 (p=0.2008)

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

R-squared: 0.4558
Adjusted R-squared: 0.4395
```

Regression: Seasonal 1961-1990

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

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

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.527
Model:                                       OLS   Adj. R-squared:                  0.513
Method:                            Least Squares   F-statistic:                     37.32
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.28e-11
Time:                                   00:01:02   Log-Likelihood:                -533.99
No. Observations:                             70   AIC:                             1074.
Df Residuals:                                 67   BIC:                             1081.
Df Model:                                      2
Covariance Type:                       nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const        116.4254     76.854      1.515      0.135     -36.976     269.827
summer_td   -434.7609     52.020     -8.358      0.000    -538.593    -330.929
winter_pd      1.0950      0.661      1.658      0.102      -0.223       2.413
==============================================================================
Omnibus:                        2.082   Durbin-Watson:                   1.554
Prob(Omnibus):                  0.353   Jarque-Bera (JB):                1.484
Skew:                          -0.341   Prob(JB):                        0.476
Kurtosis:                       3.211   Cond. No.                         132.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): 116.43 (p=0.1345)
summer_td: -434.76 (p=0.0000)
winter_pd: 1.10 (p=0.1020)

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

R-squared: 0.5270
Adjusted R-squared: 0.5129
```

Regression: Monthly 1991-2020

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

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

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.577
Model:                                       OLS   Adj. R-squared:                  0.488
Method:                            Least Squares   F-statistic:                     6.472
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           4.26e-07
Time:                                   00:01:02   Log-Likelihood:                -530.10
No. Observations:                             70   AIC:                             1086.
Df Residuals:                                 57   BIC:                             1115.
Df Model:                                     12
Covariance Type:                       nonrobust
================================================================================
                   coef    std err          t      P>|t|      [0.025      0.975]
--------------------------------------------------------------------------------
const         -645.4679     76.214     -8.469      0.000    -798.084    -492.852
may_td         -35.6575     49.823     -0.716      0.477    -135.427      64.112
june_td        -43.8331     46.968     -0.933      0.355    -137.885      50.218
july_td       -107.0402     50.392     -2.124      0.038    -207.949      -6.132
august_td     -116.1017     59.460     -1.953      0.056    -235.168       2.965
september_td  -150.8187     47.312     -3.188      0.002    -245.560     -56.078
october_pd       1.3714      2.318      0.592      0.556      -3.269       6.012
november_pd      2.9680      1.722      1.723      0.090      -0.480       6.416
december_pd      1.1423      1.439      0.794      0.431      -1.740       4.024
january_pd       1.9309      1.751      1.102      0.275      -1.576       5.438
february_pd      0.8317      1.360      0.611      0.543      -1.892       3.555
march_pd         0.5088      2.002      0.254      0.800      -3.500       4.518
april_pd         2.4437      3.058      0.799      0.428      -3.680       8.568
==============================================================================
Omnibus:                        1.054   Durbin-Watson:                   1.687
Prob(Omnibus):                  0.590   Jarque-Bera (JB):                1.056
Skew:                          -0.164   Prob(JB):                        0.590
Kurtosis:                       2.496   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): -645.47 (p=0.0000)
may_td: -35.66 (p=0.4771)
june_td: -43.83 (p=0.3546)
july_td: -107.04 (p=0.0380)
august_td: -116.10 (p=0.0558)
september_td: -150.82 (p=0.0023)
october_pd: 1.37 (p=0.5564)
november_pd: 2.97 (p=0.0902)
december_pd: 1.14 (p=0.4307)
january_pd: 1.93 (p=0.2749)
```

Regression: Optimal 1991-2020

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

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

Number of observations: 70

Regression Summary:
                            OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.456
Model:                                       OLS   Adj. R-squared:                  0.440
Method:                            Least Squares   F-statistic:                     28.05
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.41e-09
Time:                                   00:01:02   Log-Likelihood:                -538.90
No. Observations:                             70   AIC:                             1084.
Df Residuals:                                 67   BIC:                             1091.
Df Model:                                      2
Covariance Type:                        nonrobust
================================================================================================
                   coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------------------------
const          -615.6395     78.434     -7.849      0.000    -772.194    -459.085
opt_season_td  -372.7968     51.776     -7.200      0.000    -476.141    -269.452
opt_season_pd     1.0445      0.808      1.292      0.201      -0.569       2.658
==============================================================================
Omnibus:                        2.411   Durbin-Watson:                   1.528
Prob(Omnibus):                  0.300   Jarque-Bera (JB):                1.652
Skew:                          -0.316   Prob(JB):                        0.438
Kurtosis:                       3.410   Cond. No.                         107.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): -615.64 (p=0.0000)
opt_season_td: -372.80 (p=0.0000)
opt_season_pd: 1.04 (p=0.2008)

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

R-squared: 0.4558
Adjusted R-squared: 0.4395
```

Regression: Seasonal 1991-2020

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

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

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.527
Model:                                       OLS   Adj. R-squared:                  0.513
Method:                            Least Squares   F-statistic:                     37.32
Date:                           Fri, 05 Dec 2025   Prob (F-statistic):           1.28e-11
Time:                                   00:01:02   Log-Likelihood:                -533.99
No. Observations:                             70   AIC:                             1074.
Df Residuals:                                 67   BIC:                             1081.
Df Model:                                      2
Covariance Type:                       nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
const       -641.9908     73.248     -8.765      0.000    -788.195    -495.786
summer_td   -434.7609     52.020     -8.358      0.000    -538.593    -330.929
winter_pd      1.0950      0.661      1.658      0.102      -0.223       2.413
==============================================================================
Omnibus:                        2.082   Durbin-Watson:                   1.554
Prob(Omnibus):                  0.353   Jarque-Bera (JB):                1.484
Skew:                          -0.341   Prob(JB):                        0.476
Kurtosis:                       3.211   Cond. No.                         124.
==============================================================================

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

Coefficient Interpretation:
Intercept (normal mass balance): -641.99 (p=0.0000)
summer_td: -434.76 (p=0.0000)
winter_pd: 1.10 (p=0.1020)

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

R-squared: 0.5270
Adjusted R-squared: 0.5129
```