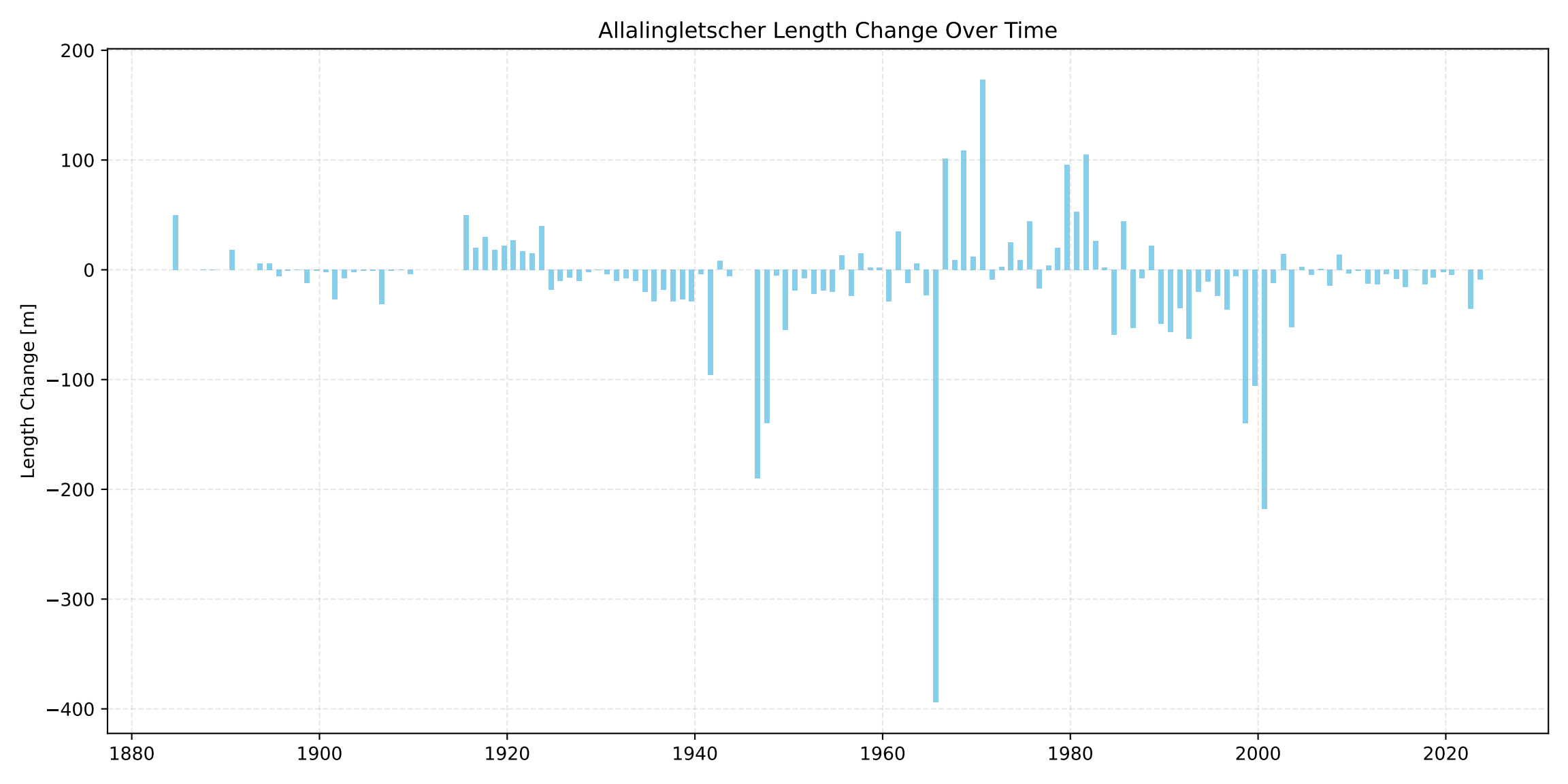
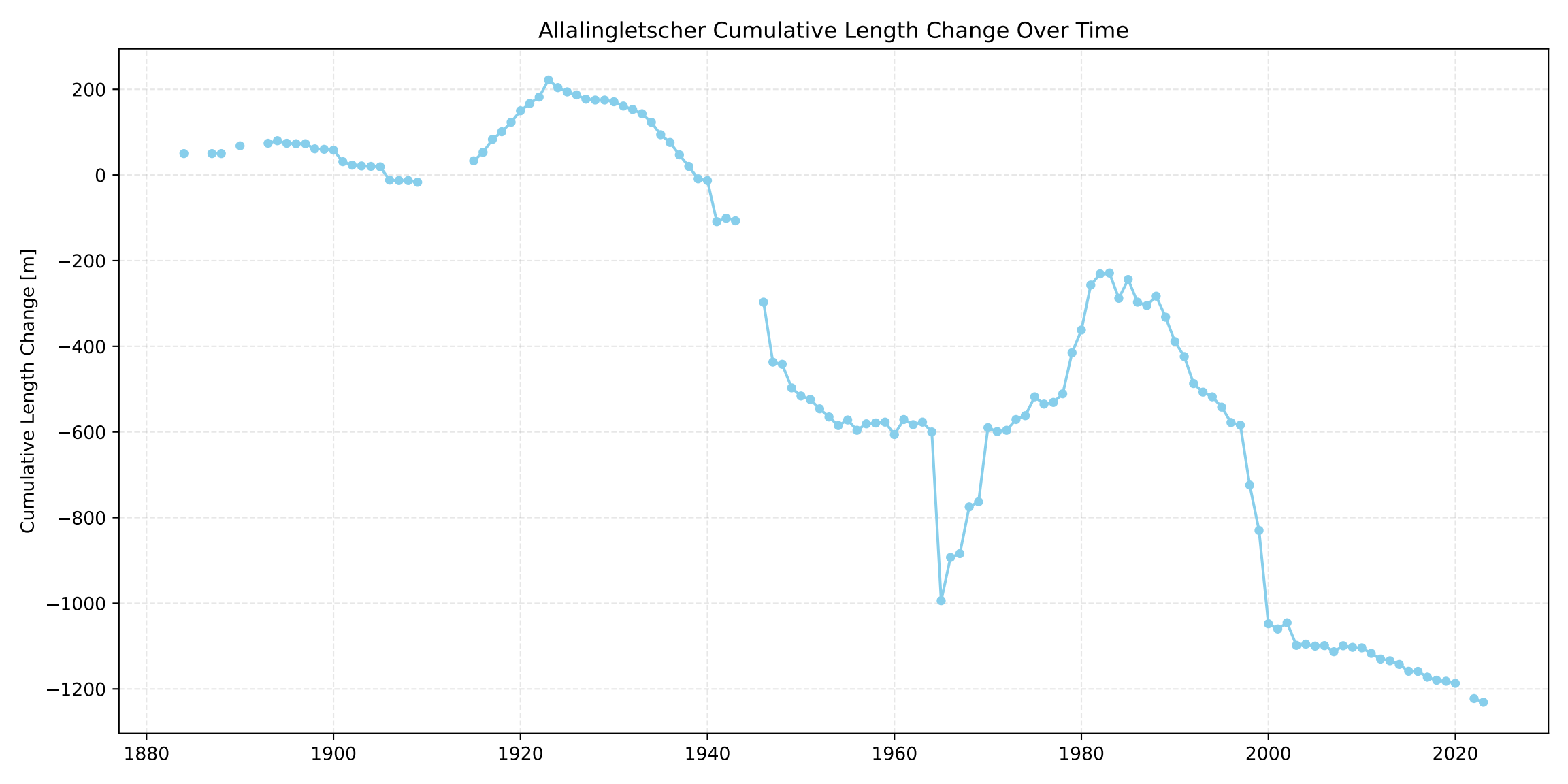
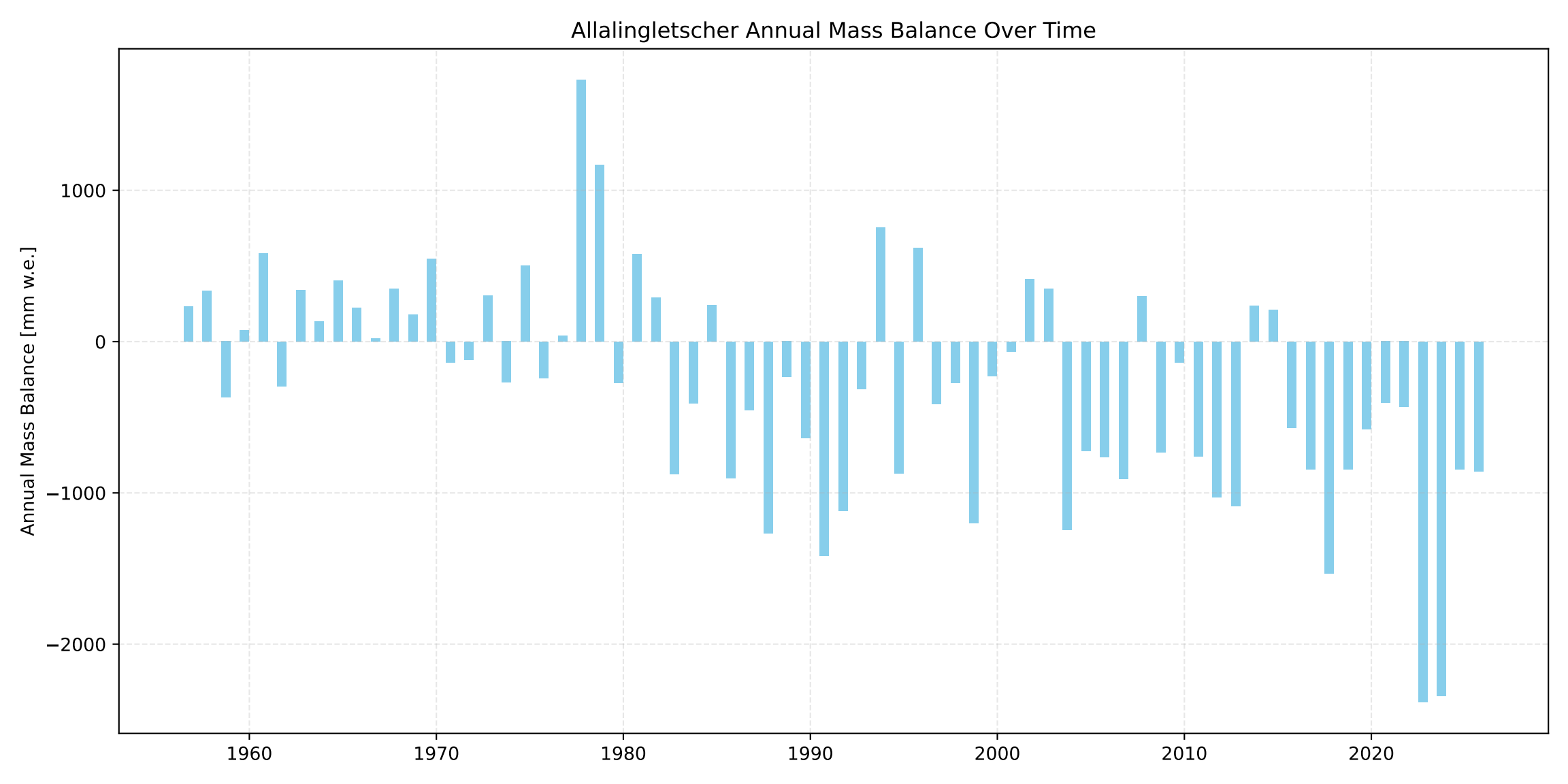
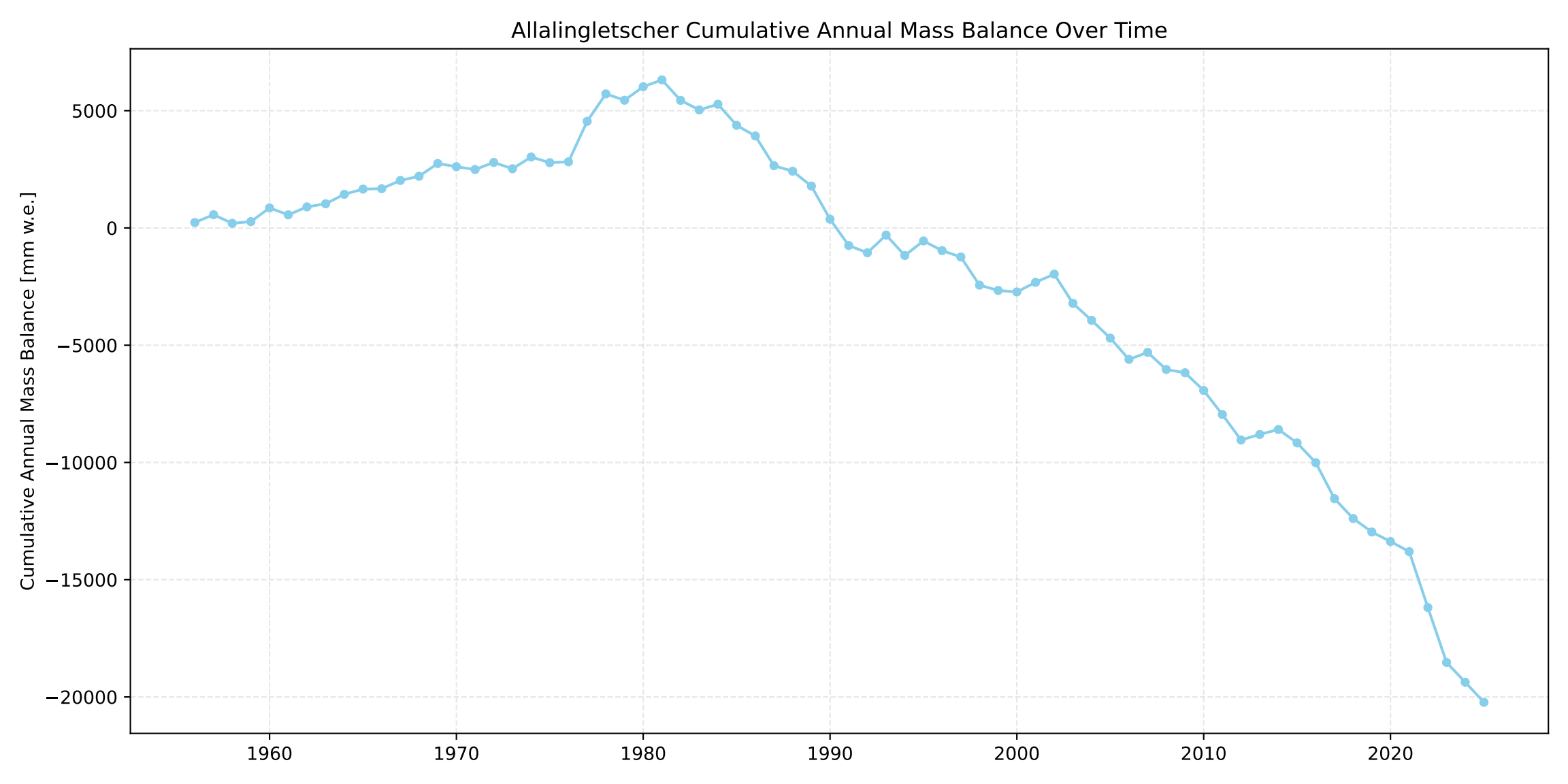
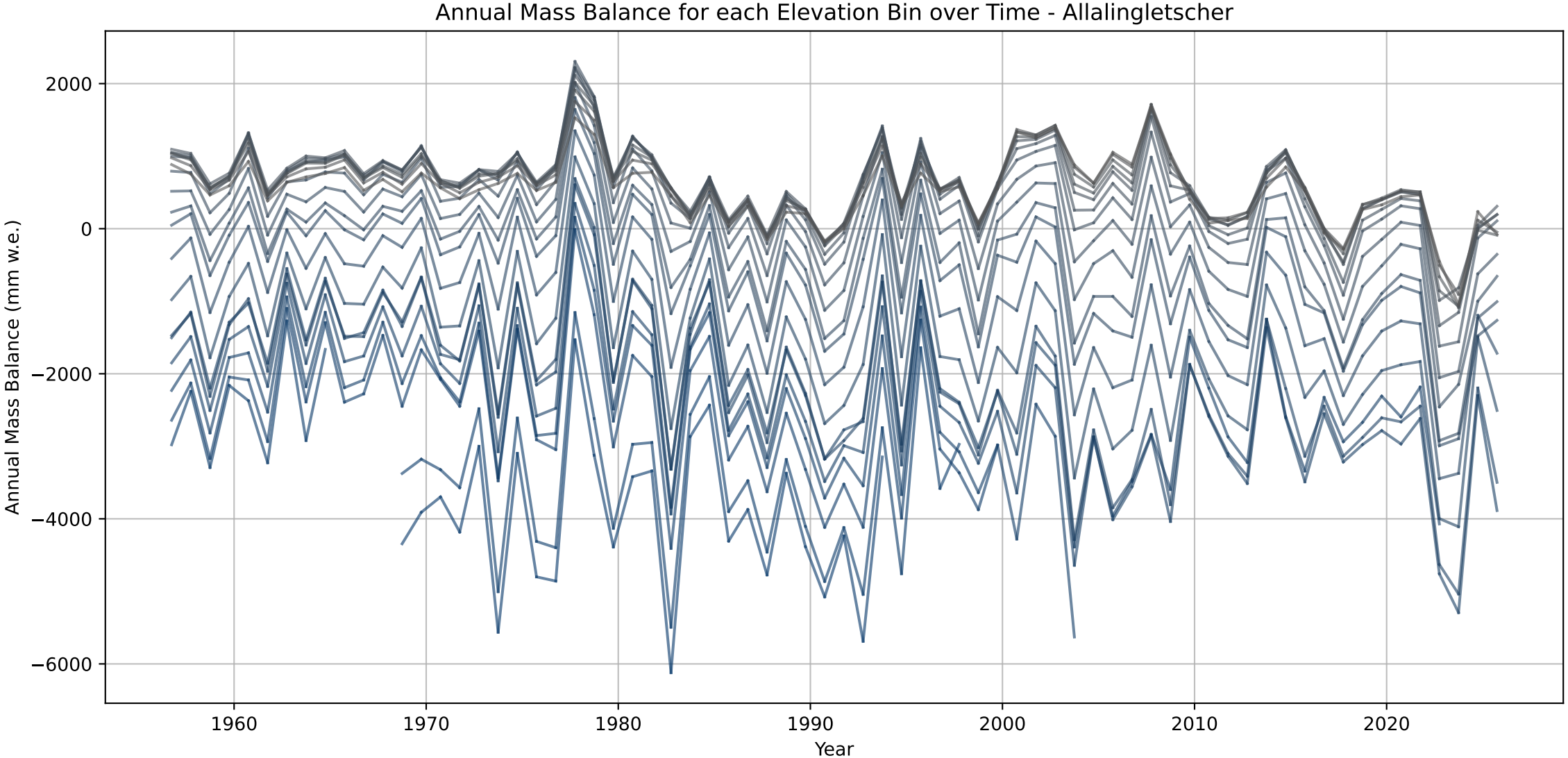
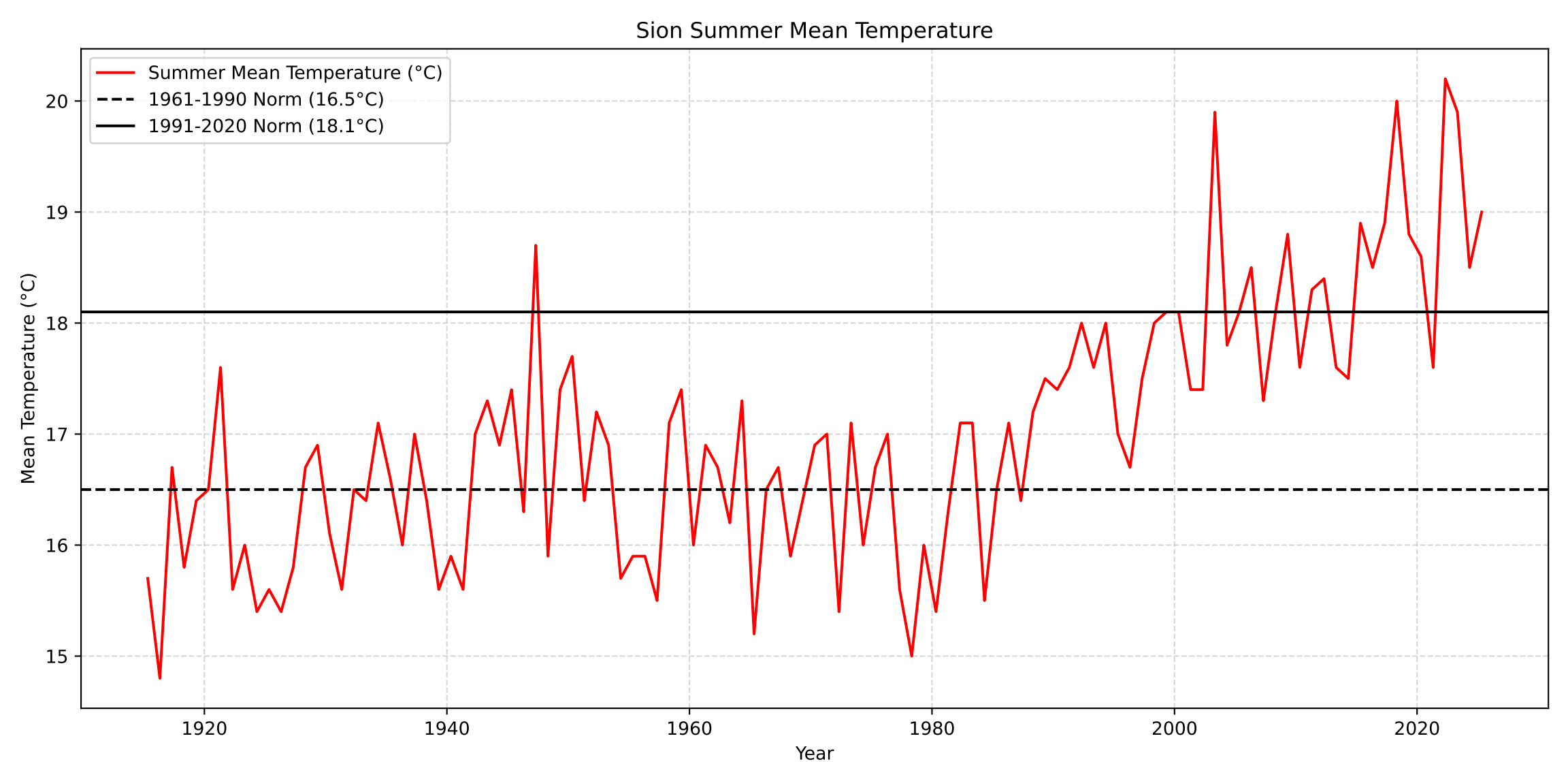

Allalingletscher Length Change Over Time
Length Change [m]
200
100
0
−100
−200
−300
−400
1880
1900
1920
1940
1960
1980
2000
2020

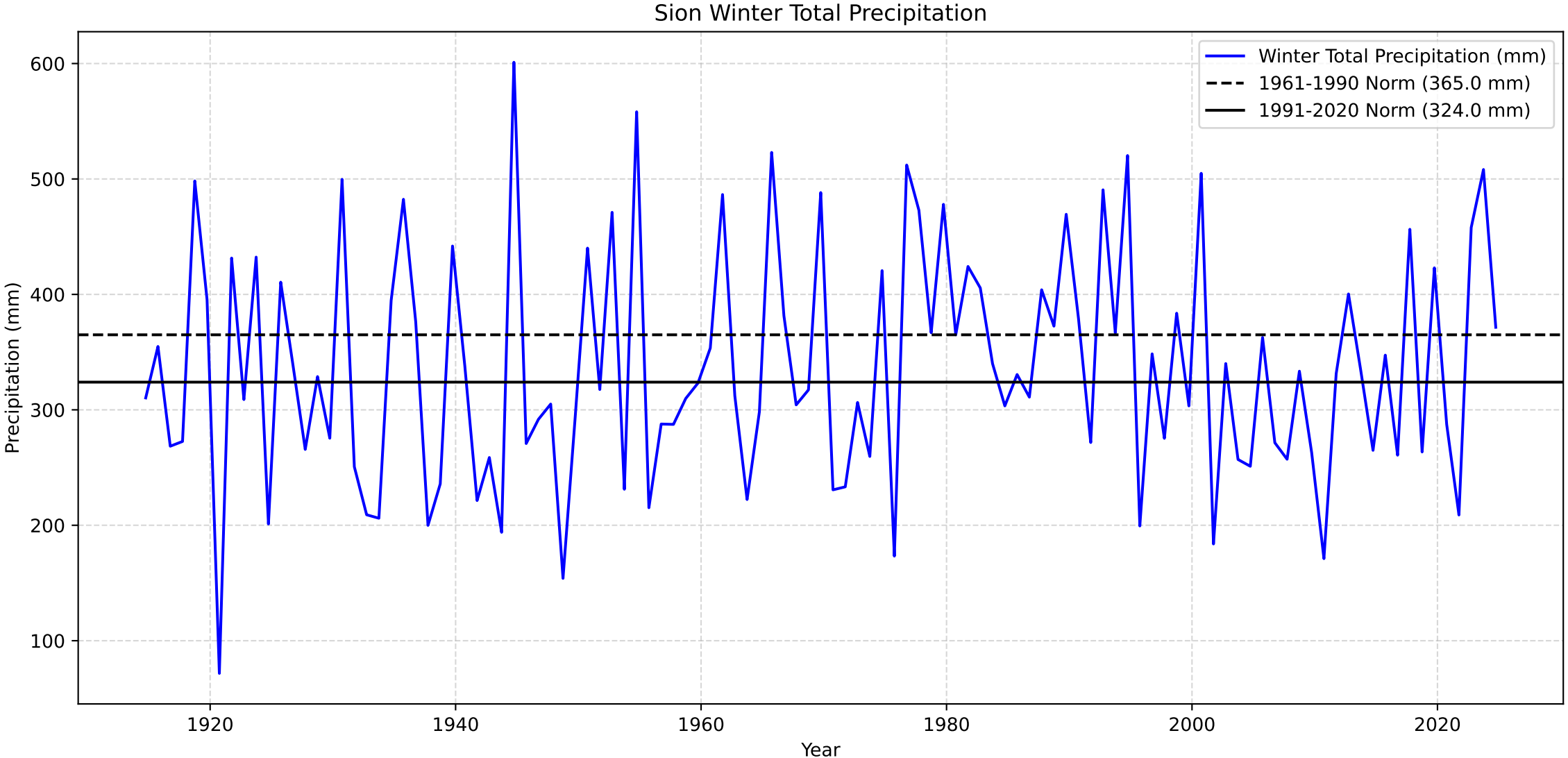

Allalingletscher Cumulative Length Change Over Time
Cumulative Length Change [m]
200
0
−200
−400
−600
−800
−1000
−1200
1880
1900
1920
1940
1960
1980
2000
2020

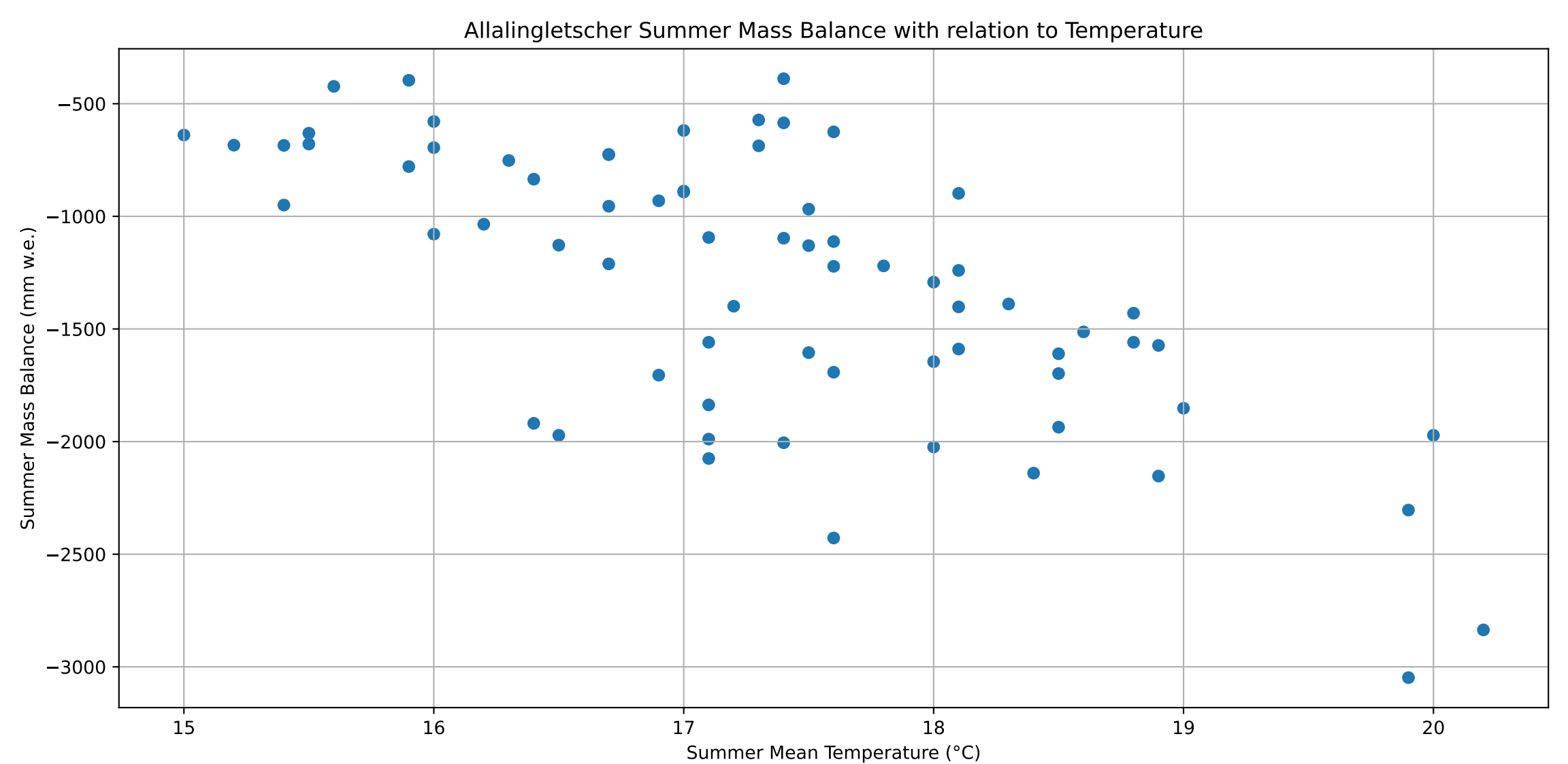

Allalingletscher Annual Mass Balance Over Time
Annual Mass Balance [mm w.e.]
1000
0
−1000
−2000
1960
1970
1980
1990
2000
2010
2020

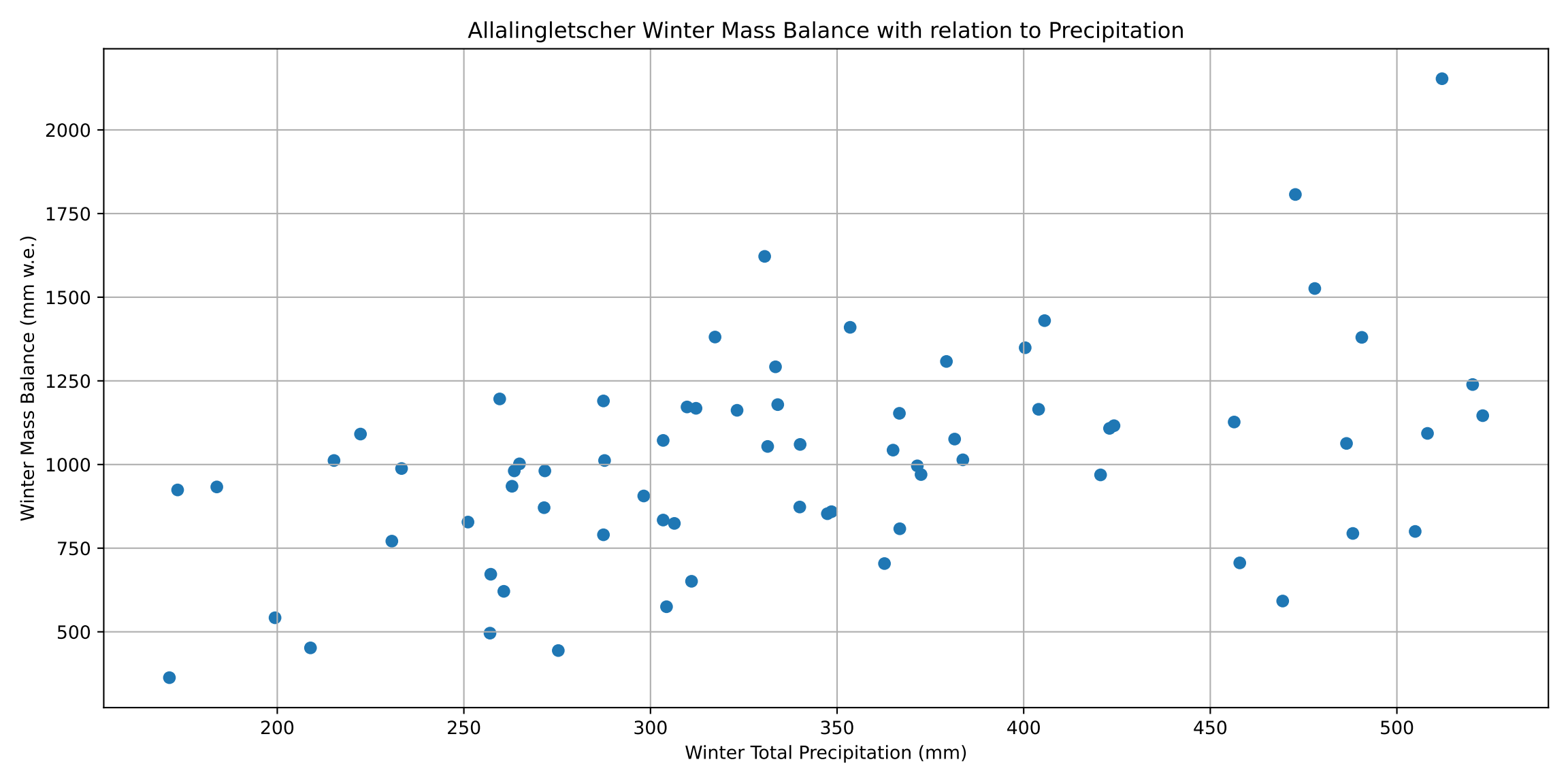

Allalingletscher Cumulative Annual Mass Balance Over Time
Cumulative Annual Mass Balance [mm w.e.]
5000
0
−5000
−10000
−15000
−20000
1960
1970
1980
1990
2000
2010
2020


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 with relation to 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 with relation to 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 for Allalingletscher using 1961-1990 climate norms
================================================================================

Correlation Analysis with Significance Testing:
Skipping constant column: const
        Variable  Correlation Coefficient       P-value  Significant (p < 0.05)
3      august_td                -0.575838  1.834509e-07                    True
2        july_td                -0.569002  2.755457e-07                    True
4   september_td                -0.524591  3.138374e-06                    True
1        june_td                -0.507660  7.269171e-06                    True
0         may_td                -0.383095  1.062868e-03                    True
9    february_pd                 0.191023  1.131806e-01                   False
6    november_pd                 0.139067  2.509042e-01                   False
10      march_pd                 0.078152  5.201751e-01                   False
7    december_pd                -0.056406  6.427920e-01                   False
5     october_pd                 0.049693  6.828859e-01                   False
11      april_pd                -0.033442  7.834401e-01                   False
8     january_pd                 0.026701  8.263267e-01                   False

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:                           Wed, 17 Dec 2025   Prob (F-statistic):           4.26e-07
Time:                                   14:27:30   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.
```

Regression: Optimal 1961-1990

```
================================================================================
OPTIMAL SEASONAL DEVIATIONS for Allalingletscher 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                -0.663145  3.977237e-10                    True
1  opt_season_pd                 0.186076  1.230024e-01                   False

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.454
Model:                                       OLS   Adj. R-squared:                  0.437
Method:                            Least Squares   F-statistic:                     27.83
Date:                           Wed, 17 Dec 2025   Prob (F-statistic):           1.59e-09
Time:                                   14:27:30   Log-Likelihood:                -539.03
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            73.5746     81.436      0.903      0.370     -88.972     236.122
opt_season_td  -370.5059     51.675     -7.170      0.000    -473.650    -267.362
opt_season_pd     1.0606      0.810      1.310      0.195      -0.556       2.677
==============================================================================
Omnibus:                        2.669   Durbin-Watson:                   1.541
Prob(Omnibus):                  0.263   Jarque-Bera (JB):                1.882
Skew:                          -0.338   Prob(JB):                        0.390
Kurtosis:                       3.433   Cond. No.                         111.
==============================================================================

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

Regression: Seasonal 1961-1990

```
================================================================================
SUMMER/WINTER SEASONAL DEVIATIONS for Allalingletscher 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                -0.712312  4.685311e-12                    True
1  winter_pd                 0.183920  1.274798e-01                   False

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:                     37.38
Date:                           Wed, 17 Dec 2025   Prob (F-statistic):           1.25e-11
Time:                                   14:27:30   Log-Likelihood:                -533.96
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        116.6081     76.826      1.518      0.134     -36.737     269.953
summer_td   -434.6813     51.969     -8.364      0.000    -538.412    -330.950
winter_pd      1.1106      0.660      1.682      0.097      -0.207       2.428
==============================================================================
Omnibus:                        2.272   Durbin-Watson:                   1.565
Prob(Omnibus):                  0.321   Jarque-Bera (JB):                1.650
Skew:                          -0.360   Prob(JB):                        0.438
Kurtosis:                       3.219   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 Allalingletscher using 1991-2020 climate norms
================================================================================

Correlation Analysis with Significance Testing:
Skipping constant column: const
        Variable  Correlation Coefficient       P-value  Significant (p < 0.05)
3      august_td                -0.575838  1.834509e-07                    True
2        july_td                -0.569002  2.755457e-07                    True
4   september_td                -0.524591  3.138374e-06                    True
1        june_td                -0.507660  7.269171e-06                    True
0         may_td                -0.383095  1.062868e-03                    True
9    february_pd                 0.191023  1.131806e-01                   False
6    november_pd                 0.139067  2.509042e-01                   False
10      march_pd                 0.078152  5.201751e-01                   False
7    december_pd                -0.056406  6.427920e-01                   False
5     october_pd                 0.049693  6.828859e-01                   False
11      april_pd                -0.033442  7.834401e-01                   False
8     january_pd                 0.026701  8.263267e-01                   False

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:                           Wed, 17 Dec 2025   Prob (F-statistic):           4.26e-07
Time:                                   14:27:30   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.
```

Regression: Optimal 1991-2020

```
================================================================================
OPTIMAL SEASONAL DEVIATIONS for Allalingletscher 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                -0.665403  3.303086e-10                    True
1  opt_season_pd                 0.186076  1.230024e-01                   False

Number of observations: 70

Regression Summary:
                                OLS Regression Results
==============================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.455
Model:                                       OLS   Adj. R-squared:                  0.439
Method:                            Least Squares   F-statistic:                     28.02
Date:                           Wed, 17 Dec 2025   Prob (F-statistic):           1.44e-09
Time:                                   14:27:30   Log-Likelihood:                -538.92
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          -616.3370     78.515     -7.850      0.000    -773.054    -459.620
opt_season_td  -374.0837     51.987     -7.196      0.000    -477.850    -270.318
opt_season_pd     1.0113      0.809      1.250      0.216      -0.604       2.626
==============================================================================
Omnibus:                        2.208   Durbin-Watson:                   1.529
Prob(Omnibus):                  0.332   Jarque-Bera (JB):                1.476
Skew:                          -0.299   Prob(JB):                        0.478
Kurtosis:                       3.386   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 Allalingletscher 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                -0.711854  4.903874e-12                    True
1  winter_pd                 0.183920  1.274798e-01                   False

Number of observations: 70

Regression Summary:
                                OLS Regression Results
================================================================================
Dep. Variable:     annual mass balance (mm w.e.)   R-squared:                       0.526
Model:                                       OLS   Adj. R-squared:                  0.512
Method:                            Least Squares   F-statistic:                     37.16
Date:                           Wed, 17 Dec 2025   Prob (F-statistic):           1.38e-11
Time:                                   14:27:30   Log-Likelihood:                -534.07
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       -639.4128     73.187     -8.737      0.000    -785.495    -493.330
summer_td   -433.6850     52.004     -8.339      0.000    -537.485    -329.885
winter_pd      1.0890      0.661      1.647      0.104      -0.231       2.409
==============================================================================
Omnibus:                        2.028   Durbin-Watson:                   1.553
Prob(Omnibus):                  0.363   Jarque-Bera (JB):                1.428
Skew:                          -0.333   Prob(JB):                        0.490
Kurtosis:                       3.217   Cond. No.                         124.
==============================================================================

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