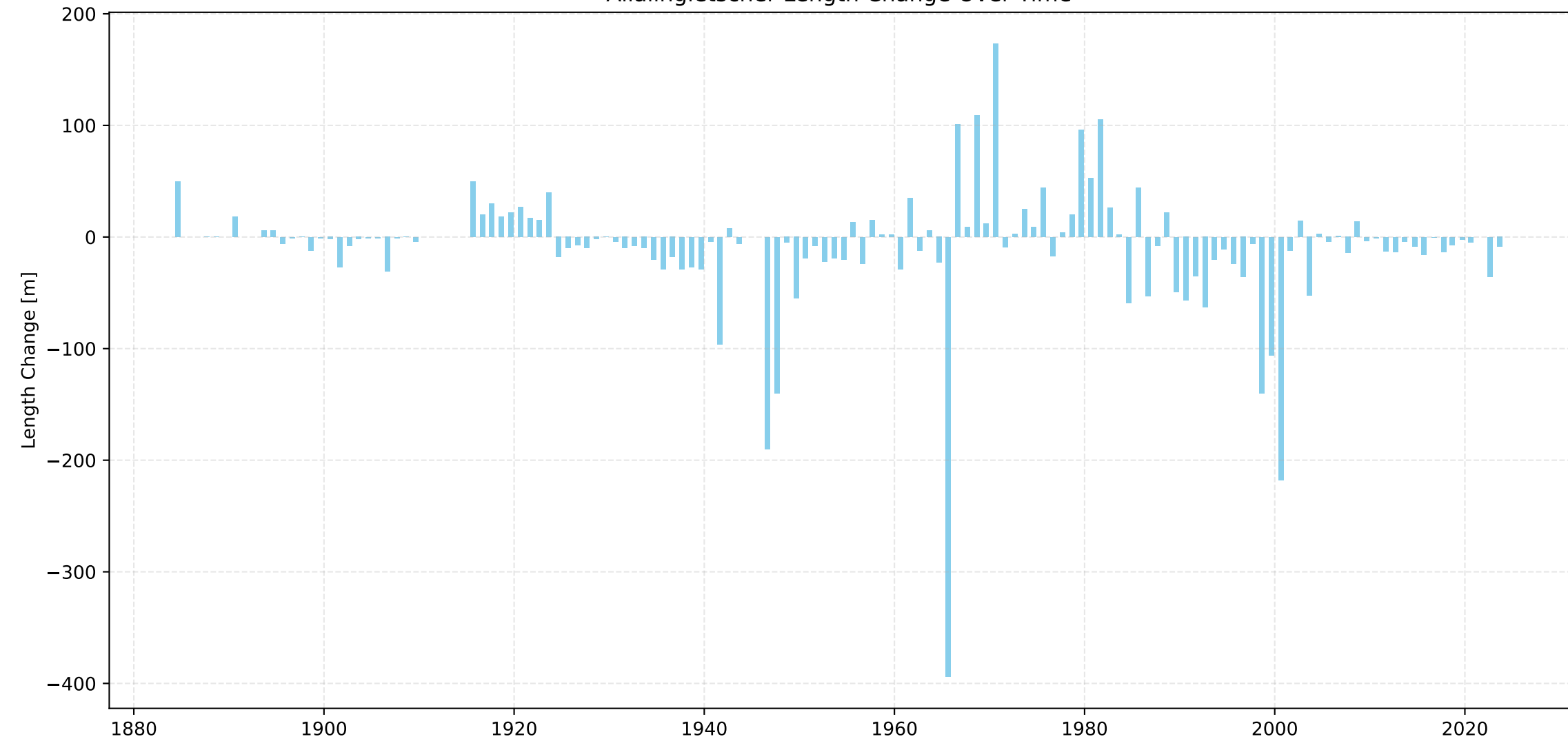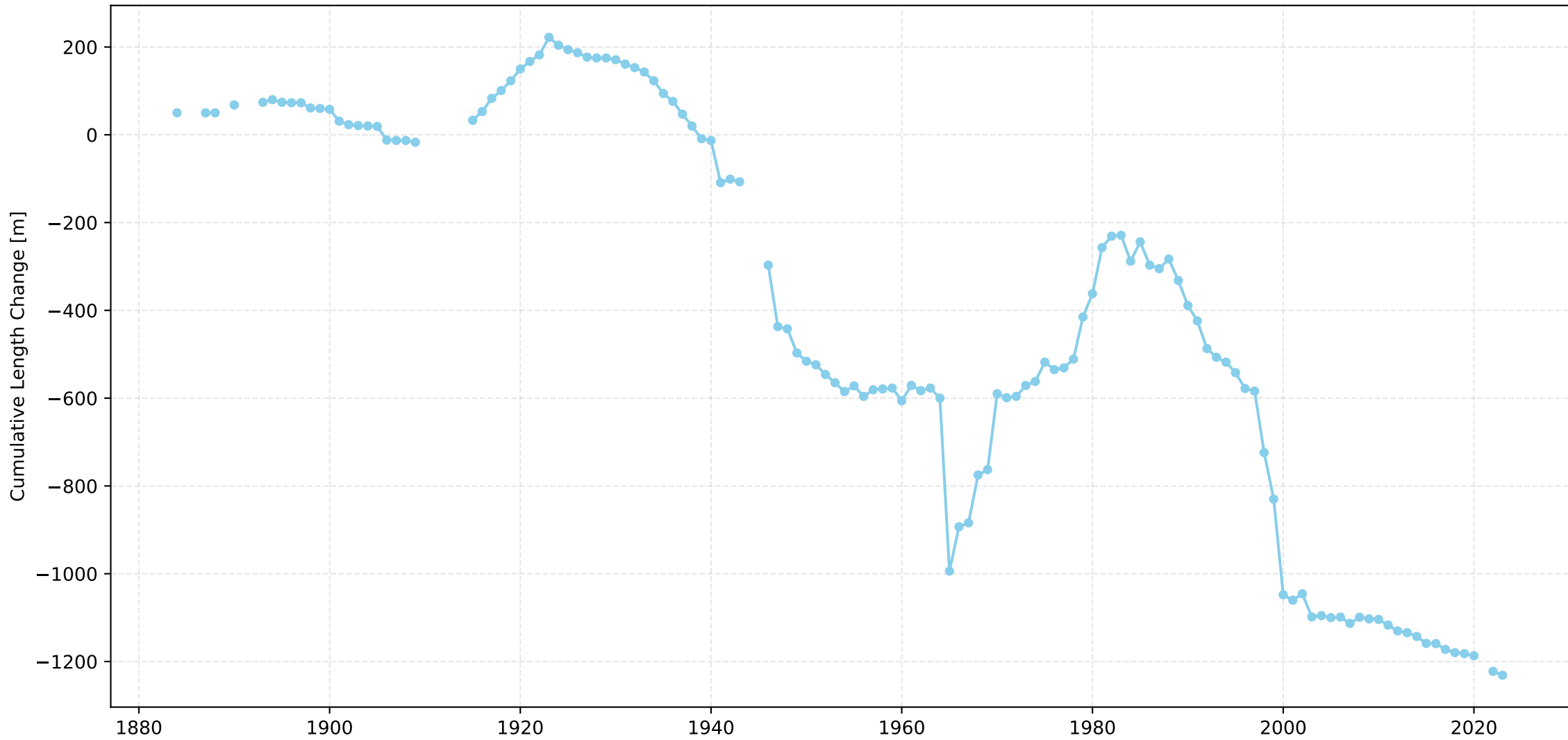Allalingletscher Length Change Over Time

Allalingletscher Cumulative Length Change Over Time
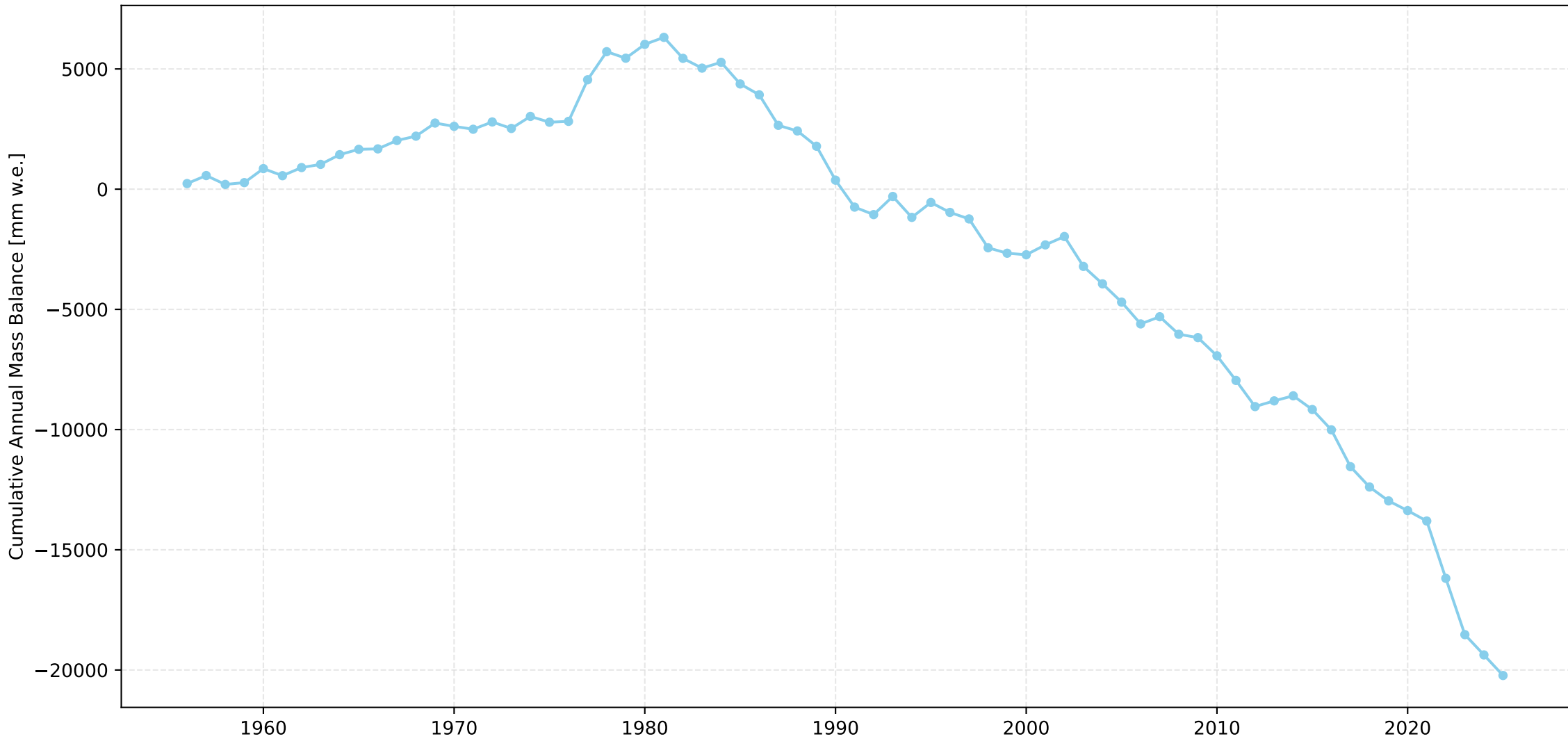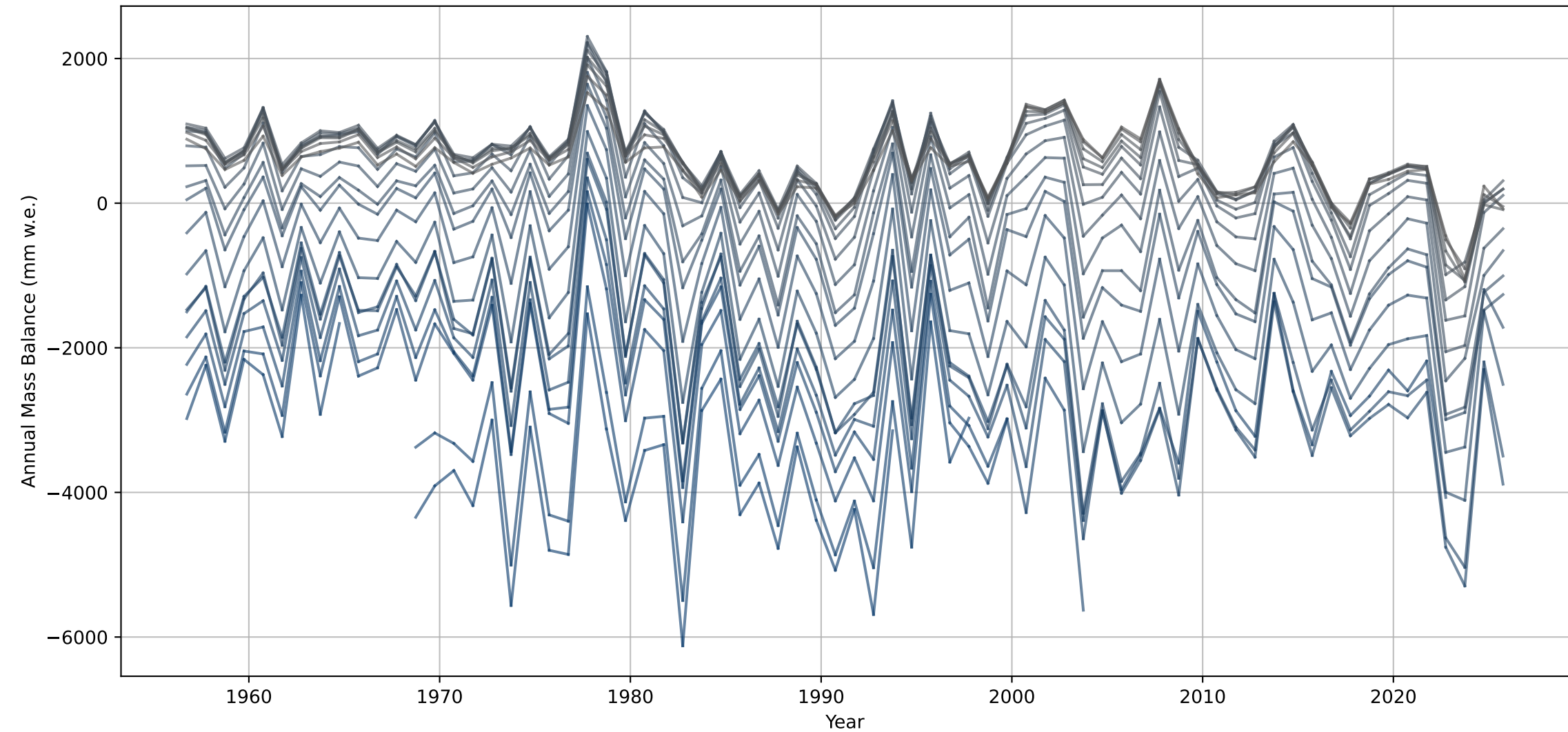
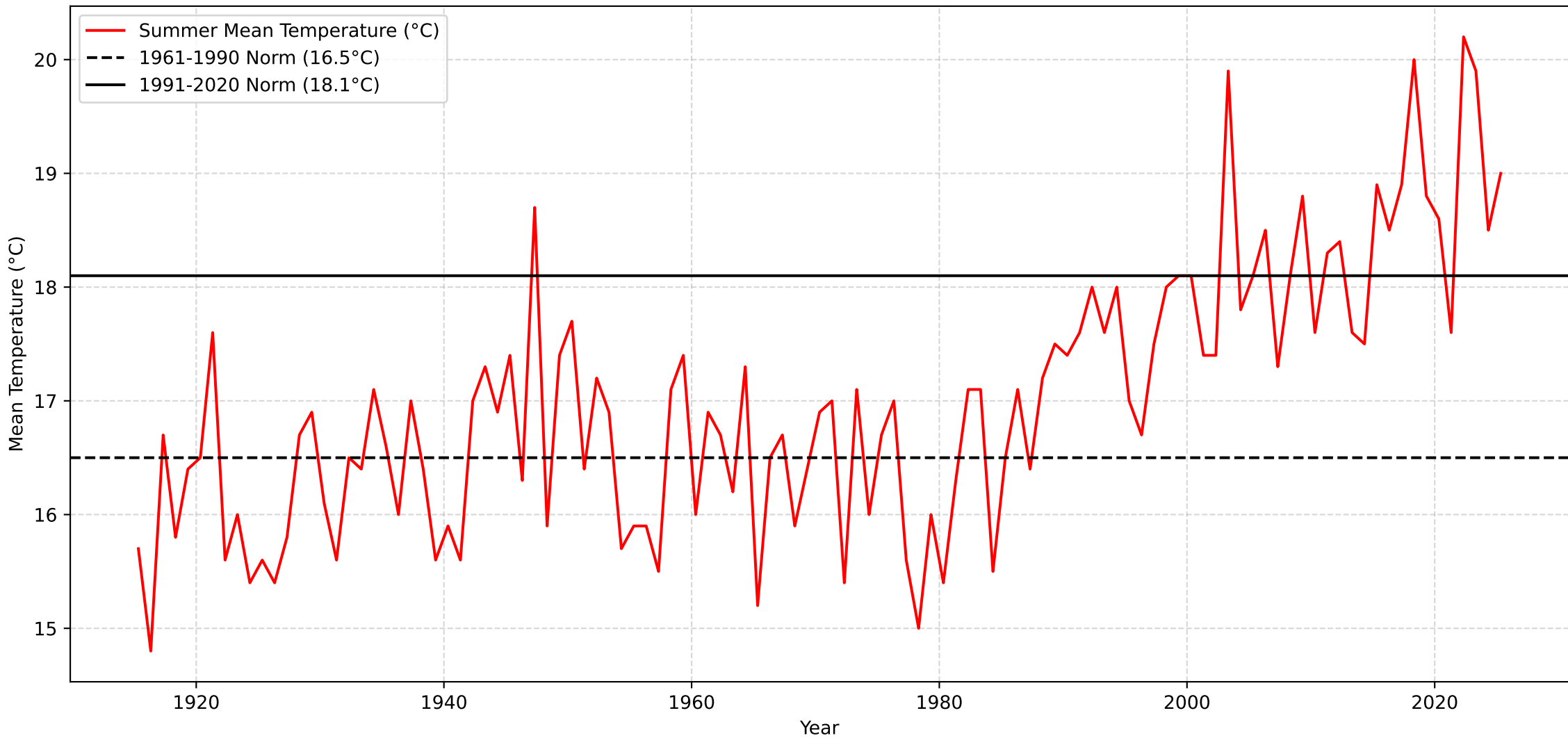Allalingletscher Annual Mass Balance Over Time

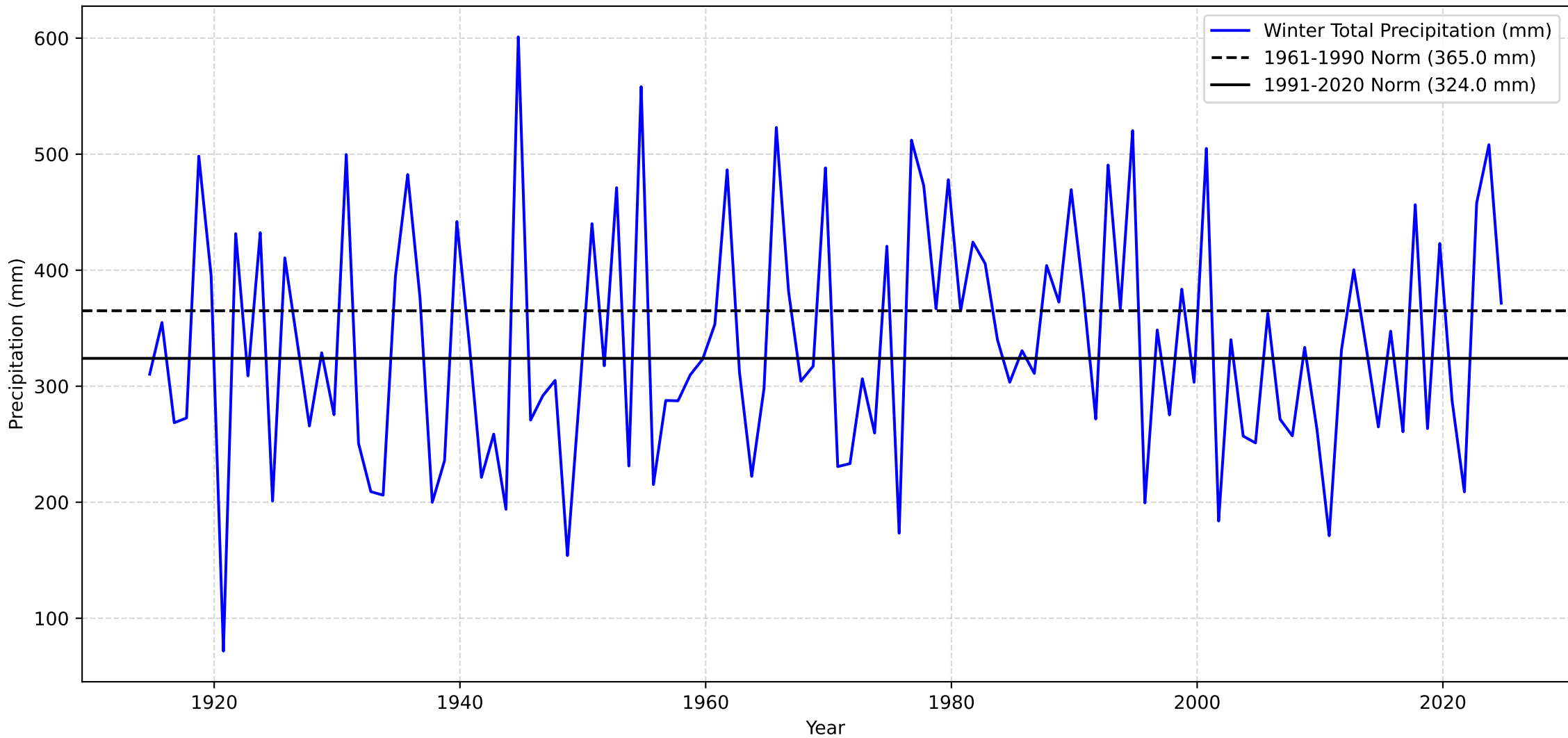Allalingletscher Cumulative Annual Mass Balance Over Time

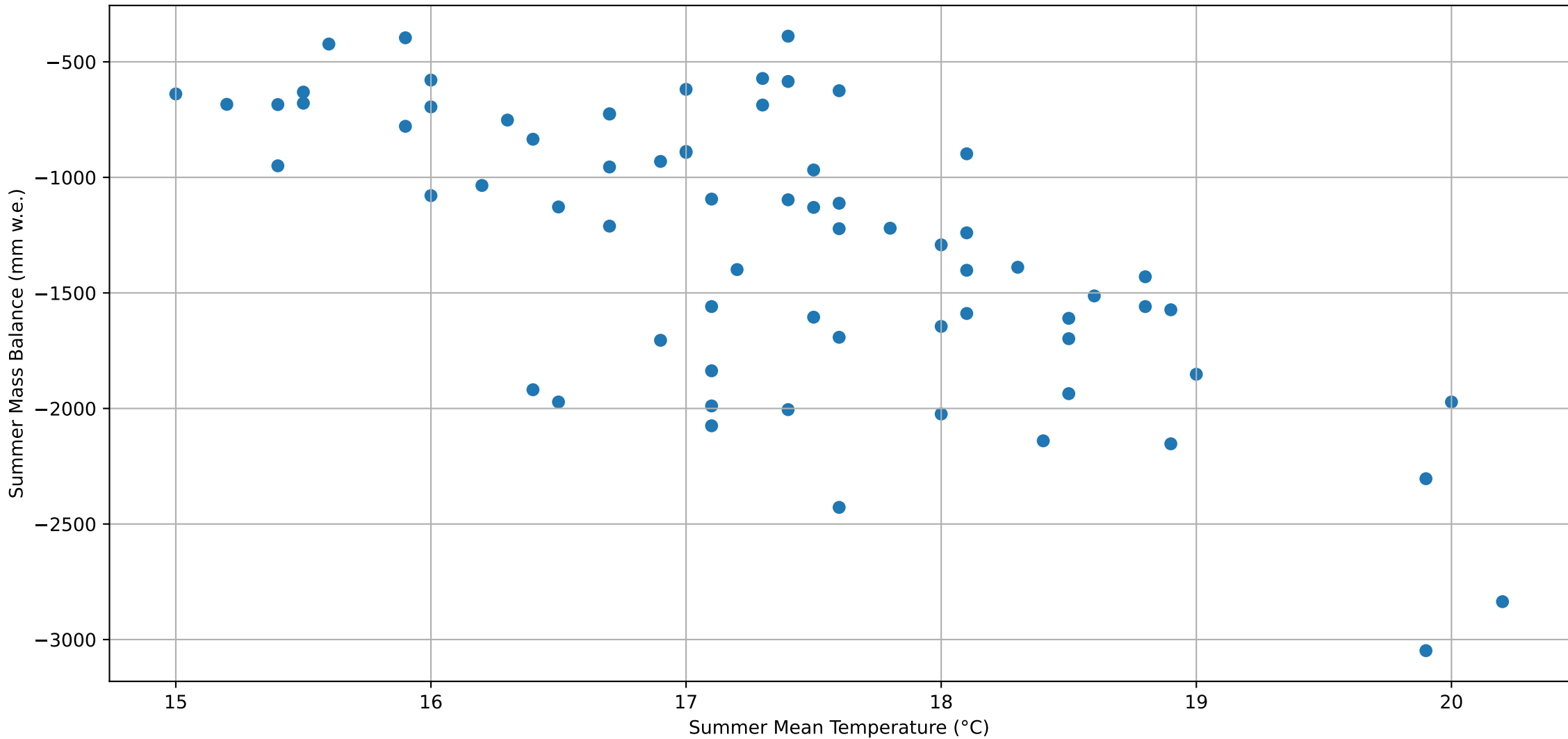Annual Mass Balance for each Elevation Bin over Time - Allalingletscher
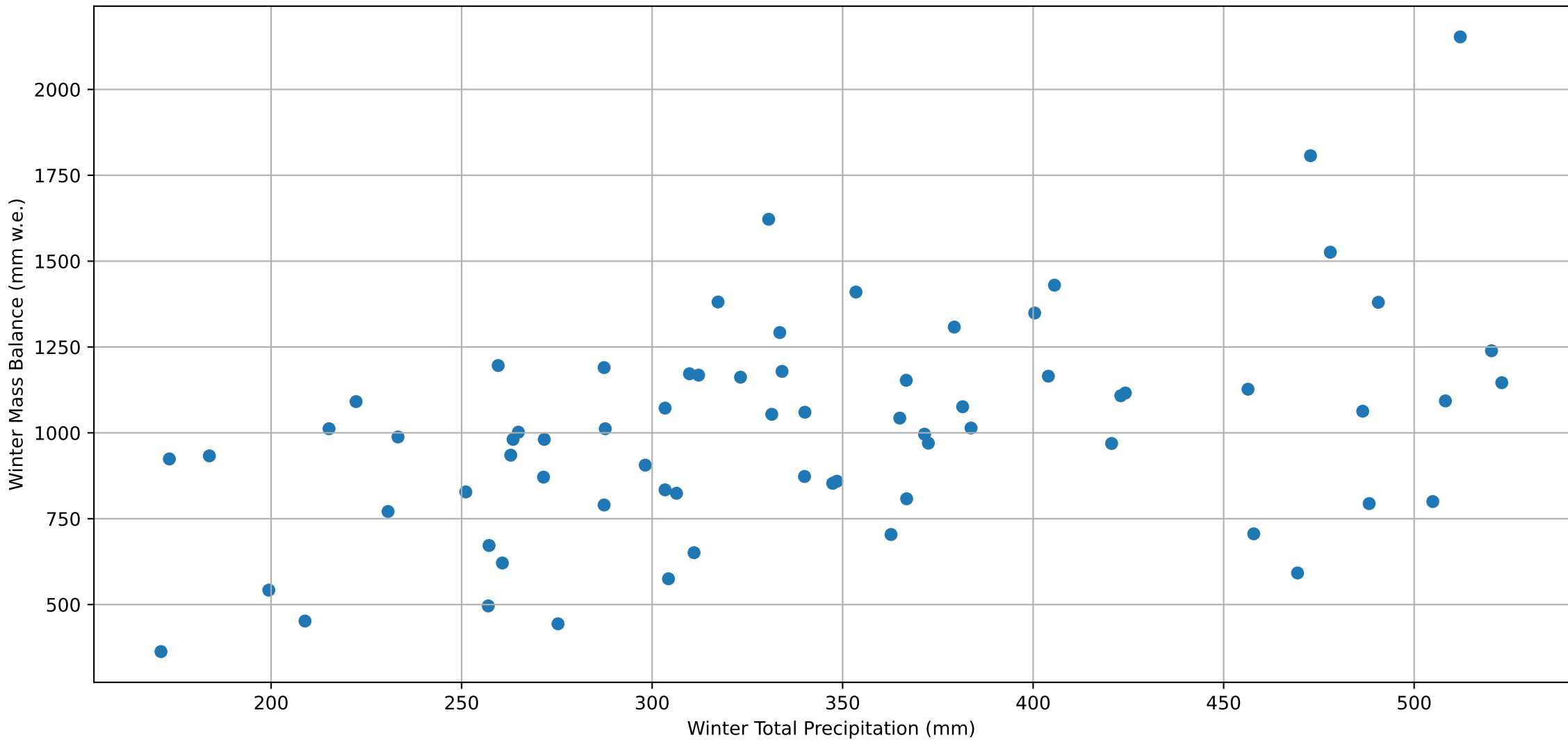
Sion Summer Mean Temperature

Sion Winter Total Precipitation

Allalingletscher Summer Mass Balance with relation to Temperature

Allalingletscher Winter Mass Balance with relation to Precipitation

```
================================================================================
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:                                 00:05:28    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)

```
================================================================================
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:                                  00:05:28   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
```

```
================================================================================
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:                                   00:05:28   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

```
================================================================
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:                                  00:05:28    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)
```

```
================================================================================
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:                                  00:05:28    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
```

```
================================================================================
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:                                    00:05:28   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
```