Climate data for the revegetation locations

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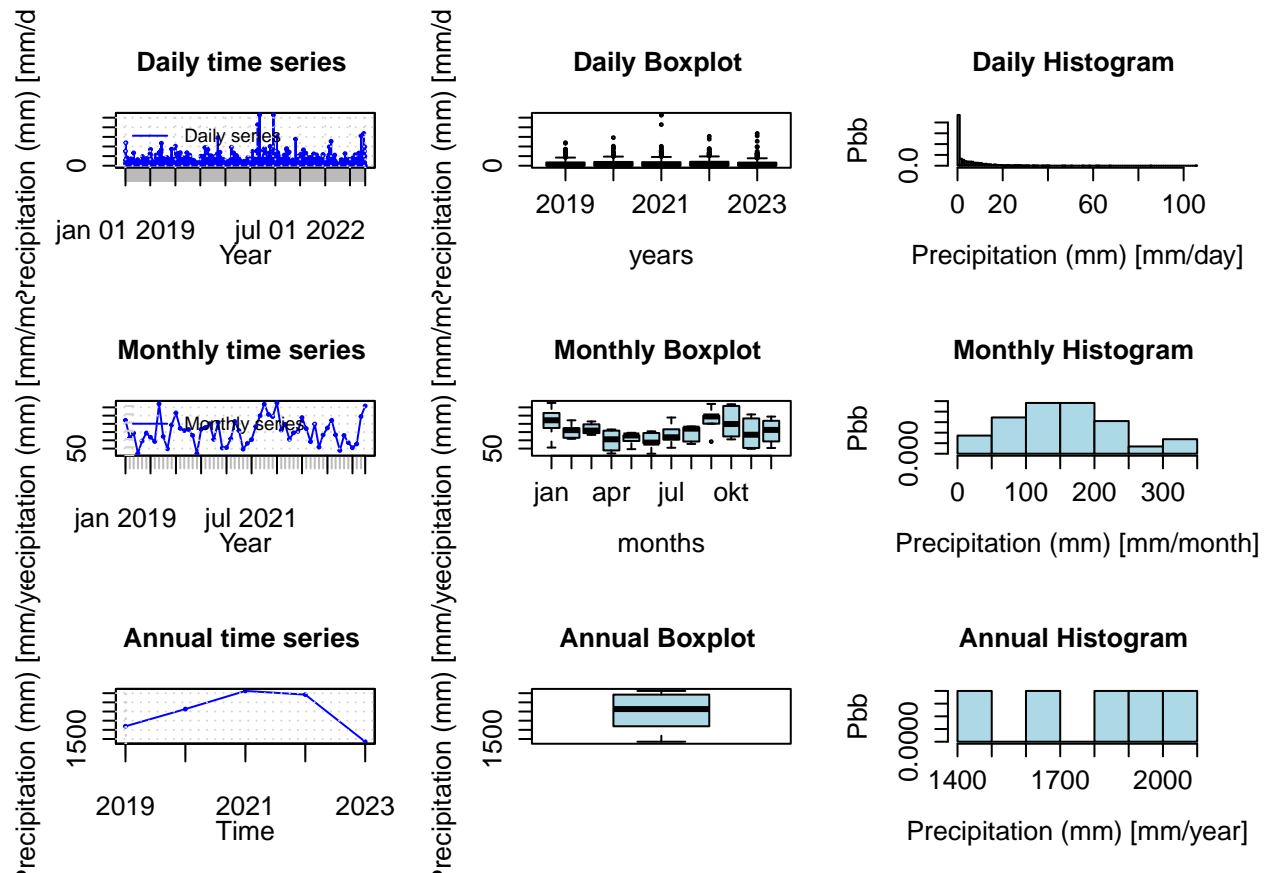
Visualize local weather data

Data retrieved from aklima.no from weather stations around Namsos and Åfjord (two near Namsos and 1 near Åfjord)
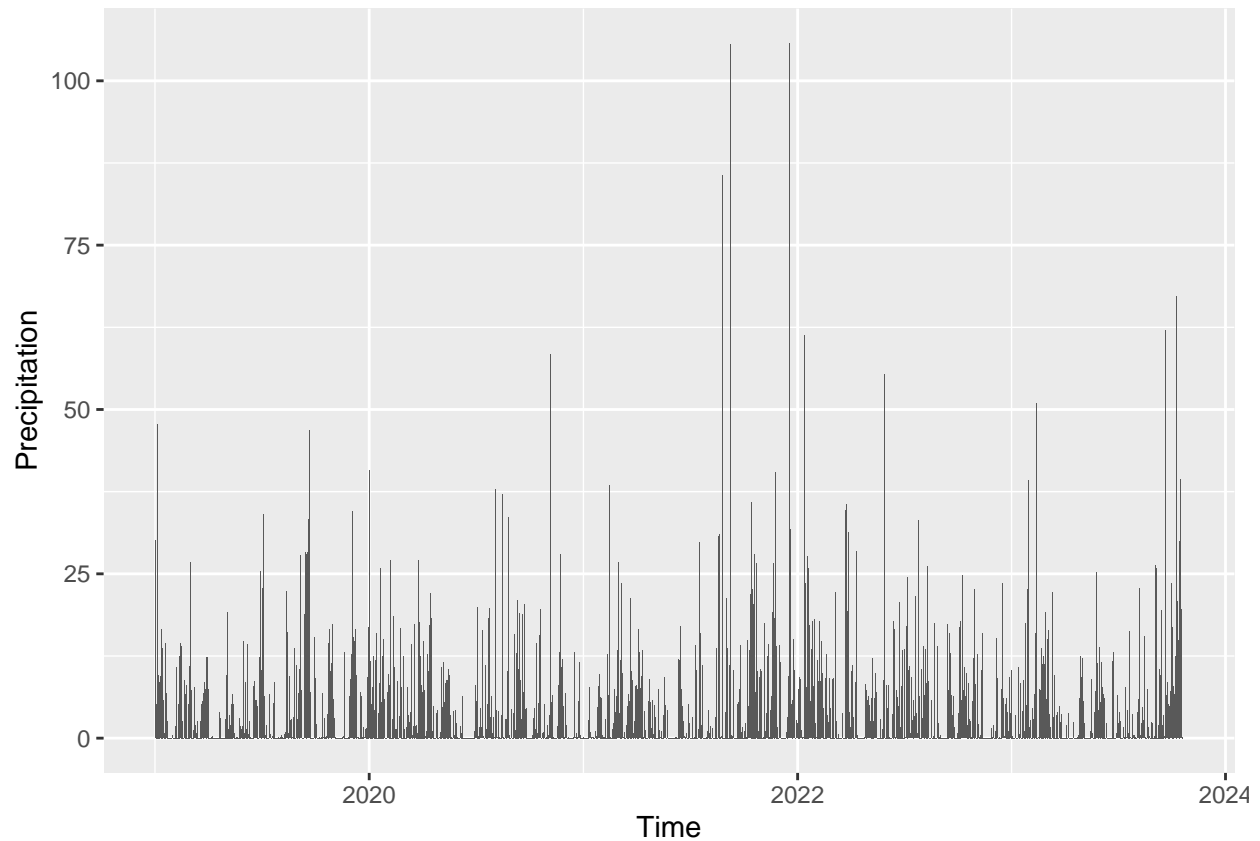
Precipitation Åfjord

```r
#Lage nye kolonner med kun måned og år
klima_afjord$Year <- floor_date(klima_afjord$Time, "year")
klima_afjord$Month <- floor_date(klima_afjord$Time, "month")
klima_afjord$month <- month(klima_afjord$Time)
klima_afjord$year <- year(klima_afjord$Time)

afjord.ts = zoo(klima_afjord$Precipitation, order.by= klima_afjord$Time)
hydroplot(afjord.ts, var.type="Precipitation", var.unit="mm", xlab="Year", ylab="Precipitation (mm)")
```

Daily time series
Daily Boxplot
Daily Histogram
Monthly time series
Monthly Boxplot
Monthly Histogram
Annual time series
Annual Boxplot
Annual Histogram

Daily precipitation

```
afjord <- ggplot(klima_afjord, aes(x = Time, y = Precipitation))
afjord + geom_col()
```

The daily mean is about 5mm with a few (3) extreme events of >50mm that will have been rain and not snow.

```
klima_afjord %>%
  summarise(mean= mean(Precipitation), max=max(Precipitation))
```

```
## # A tibble: 1 x 2
##    mean   max
##   <dbl> <dbl>
## 1  5.10  106.
```

Daily means grouped by month of the year

```
klima_afjord %>%
  group_by(month) %>%
  summarise_at(vars(Precipitation), list(mean = mean)) #gives only the daily mean per month
```

```
## # A tibble: 12 x 2
##    month  mean
##    <dbl> <dbl>
## 1      1  6.74
## 2      2  5.54
## 3      3  5.47
## 4      4  3.27
## 5      5  3.53
```

3

```
##  6       6   3.24
##  7       7   4.41
##  8       8   4.54
##  9       9   7.38
## 10      10   7.33
## 11      11   4.78
## 12      12   5.03
```

Yearly precipitation

```r
klima_afjord %>%
  filter(year != 2023 ) %>%
  group_by(year)%>%
  summarise(sum = sum(Precipitation))
```

```
## # A tibble: 4 x 2
##    year   sum
##   <dbl> <dbl>
## 1  2019 1639
## 2  2020 1827.
## 3  2021 2025.
## 4  2022 1984.
```

Mean annual precipitation

```r
prc_year <-  klima_afjord %>%
  filter(year != 2023 ) %>%
  group_by(year)%>%
  summarise(sum = sum(Precipitation))

mean(prc_year$sum)
```

```
## [1] 1868.625
```

Number of days with precipitation each year

```r
klima_afjord %>%
  group_by(year) %>%
  summarise (days_precipitation=sum(Precipitation>0))
```

```
## # A tibble: 5 x 2
##    year days_precipitation
##   <dbl>              <int>
## 1  2019                231
## 2  2020                260
## 3  2021                250
## 4  2022                253
## 5  2023                194
```

Monthly precipitation

```
afjord.monthly <- aggregate(afjord.ts, as.yearmon(index(afjord.ts)), sum)
df_afjord.monthly <-fortify.zoo(afjord.monthly, names=c("Month")) #How to convert a zoo file to a data
df_afjord.monthly <-rename(df_afjord.monthly, Precipitation=afjord.monthly)
plot_afjord.monthly <- ggplot(df_afjord.monthly, aes(x = Month, y = Precipitation))
plot_afjord.monthly + geom_col()
```
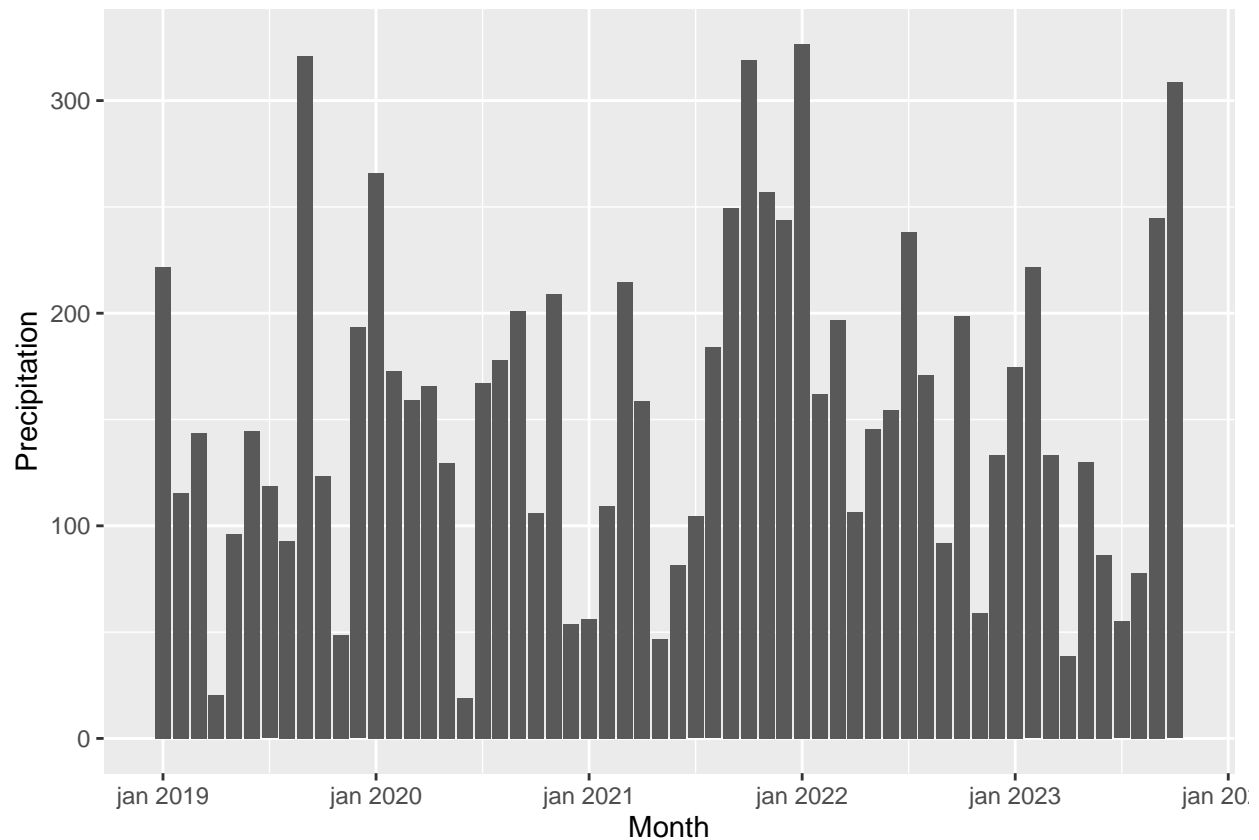


```
df_afjord.monthly$Year <-as.numeric(format(df_afjord.monthly$Month, "%Y"))
df_afjord.monthly$Month2 <-as.numeric(format(df_afjord.monthly$Month, "%m"))
df_afjord.monthly %>%
  group_by(Month2) %>%
summarise_at(vars(Precipitation), list(mean= mean))
```

```
## # A tibble: 12 x 2
##    Month2  mean
##     <dbl> <dbl>
## 1       1 209.
## 2       2 156.
## 3       3 170.
## 4       4  98.0
## 5       5 110.
## 6       6  97.1
## 7       7 137.
```

```
## 8       8 141.
## 9       9 222.
## 10     10 211.
## 11     11 143.
## 12     12 156.
```

The precipitation is usually less in the first half of the growing season, i.o. spring and early summer (April, May, June) with an average of 101.5 mm/month. The average precipitation in the second half of the growing season (July, August and September) is 169.5 mm/month. September is the wettest month of the year with an mean of 216.0 mm, while April and June are the driest (approx. 97.5mm)

```
klima_afjord %>%
  group_by(year, month) %>%
summarise_at(vars(Precipitation), list(sum = sum))
```

```
## # A tibble: 58 x 3
## # Groups:   year [5]
##     year month   sum
##    <dbl> <dbl> <dbl>
##  1  2019     1 222.
##  2  2019     2 115.
##  3  2019     3 144.
##  4  2019     4  20.3
##  5  2019     5  96
##  6  2019     6 144.
##  7  2019     7 118.
##  8  2019     8  92.8
##  9  2019     9 321.
## 10  2019    10 124.
## 11  2019    11  48.6
## 12  2019    12 193.
## 13  2020     1 266.
## 14  2020     2 173.
## 15  2020     3 159.
## 16  2020     4 166.
## 17  2020     5 130.
## 18  2020     6  18.9
## 19  2020     7 167
## 20  2020     8 178.
## 21  2020     9 201.
## 22  2020    10 106.
## 23  2020    11 209.
## 24  2020    12  53.7
## 25  2021     1  56.2
## 26  2021     2 109.
## 27  2021     3 214.
## 28  2021     4 159.
## 29  2021     5  46.6
## 30  2021     6  81.7
## 31  2021     7 104.
## 32  2021     8 184.
## 33  2021     9 249.
## 34  2021    10 319
```

```
## 35   2021      11 257
## 36   2021      12 244
## 37   2022       1 327.
## 38   2022       2 162.
## 39   2022       3 197
## 40   2022       4 106.
## 41   2022       5 146.
## 42   2022       6 154.
## 43   2022       7 238.
## 44   2022       8 171.
## 45   2022       9  92
## 46   2022      10 199.
## 47   2022      11  58.9
## 48   2022      12 133.
## 49   2023       1 175.
## 50   2023       2 222.
## 51   2023       3 133.
## 52   2023       4  38.7
## 53   2023       5 130.
## 54   2023       6  86.1
## 55   2023       7  55
## 56   2023       8  78
## 57   2023       9 245.
## 58   2023      10 308.
```

```r
df_afjord.monthly %>%
ggplot(aes(x = as.factor(Month2), y = Precipitation)) + geom_boxplot()
```
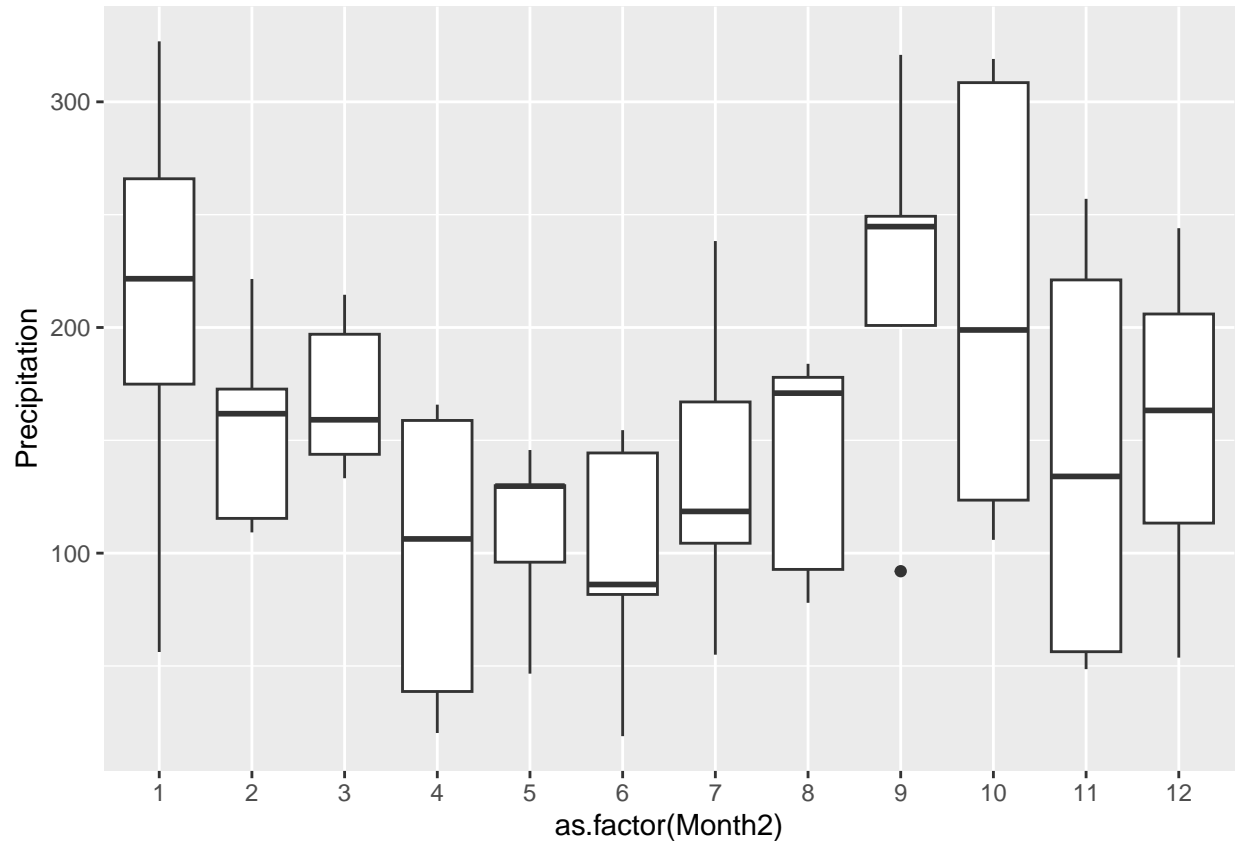
The precipitation in April 2019, before we started up the experiment was extremely low (only 20.3mm), while September 2019 was extremely wet (320.8mm).November 2019 was likewise dry (48.6mm). June 2020 was another low (18.9mm), but with wet July and August (167.0mm and 177.9mm). Both May and June 2021 was dry (46.6.mm and 81.7mm), especially May. October same year had very high precipitation (319mm), with both September and November also being wet. The whole summer of 2022 was wet (May 145.7mm, June 154.5mm, July 238.3mm, August 170.9mm), but more varied autumn with a somewhat drier September (92.0mm), while wet October (198.9mm), and dry November (58.9mm).

Temperatures, Åfjord

```
klima_afjord %>%
ggplot(aes(x = Time, y = Mean_temp)) + geom_col()
```

```
## Warning: Removed 8 rows containing missing values ('position_stack()').
```
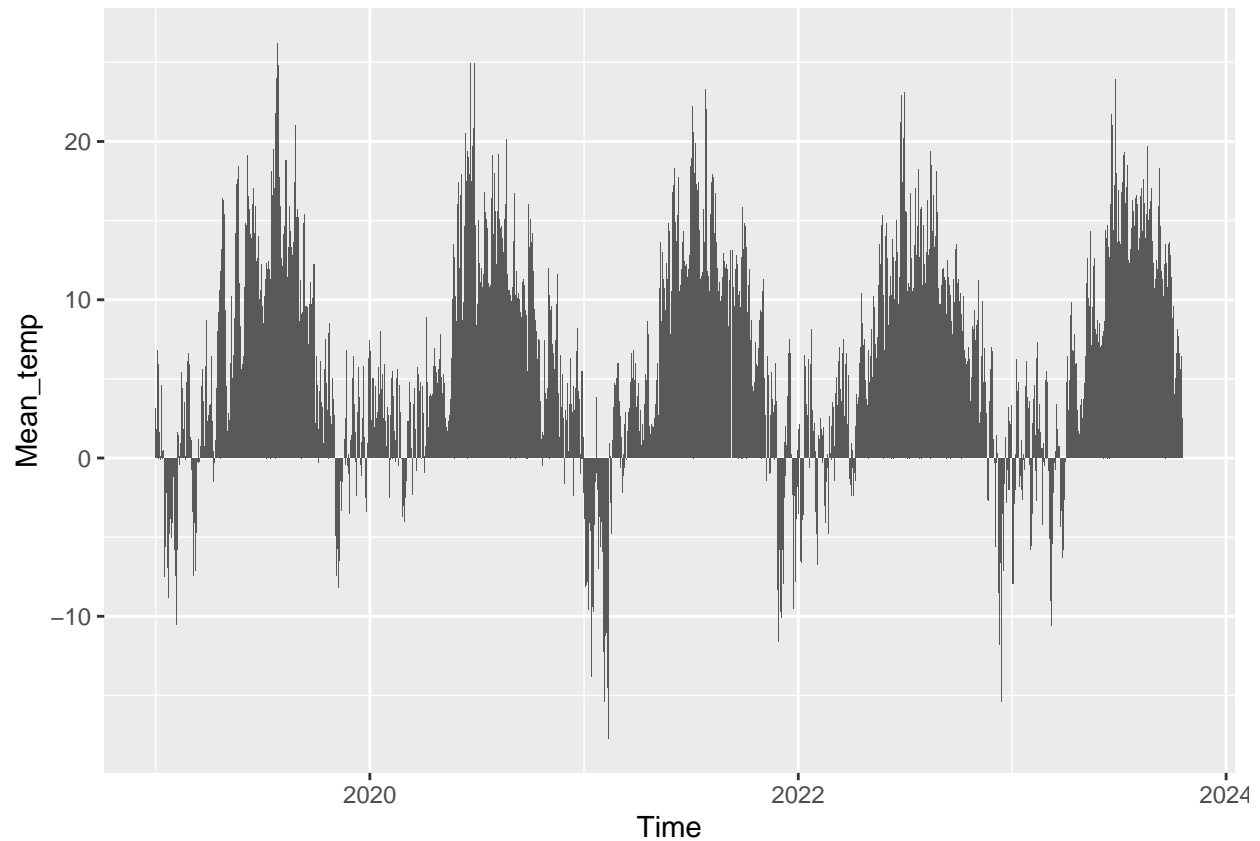
Averaged temperatures per month of the year

```r
klima_afjord %>%
  group_by(month) %>%
summarise_at(vars(Min_temp, Mean_temp, Max_temp), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 12 x 4
##    month Min_temp_mean Mean_temp_mean Max_temp_mean
##    <dbl>         <dbl>          <dbl>         <dbl>
## 1      1         -3.01          -0.26          2.52
## 2      2         -3.19         -0.174          2.79
## 3      3         -2.18           1.30          4.99
## 4      4       -0.0427           4.42          9.15
## 5      5          3.80           7.99         12.6
## 6      6          9.19          13.8          19.1
## 7      7         10.6           14.4          19.1
## 8      8         10.1           13.9          18.7
## 9      9          7.31          10.7          15.0
## 10    10          3.58           6.37          9.53
## 11    11       -0.0825           2.61          5.30
## 12    12         -2.76          0.125          2.88
```
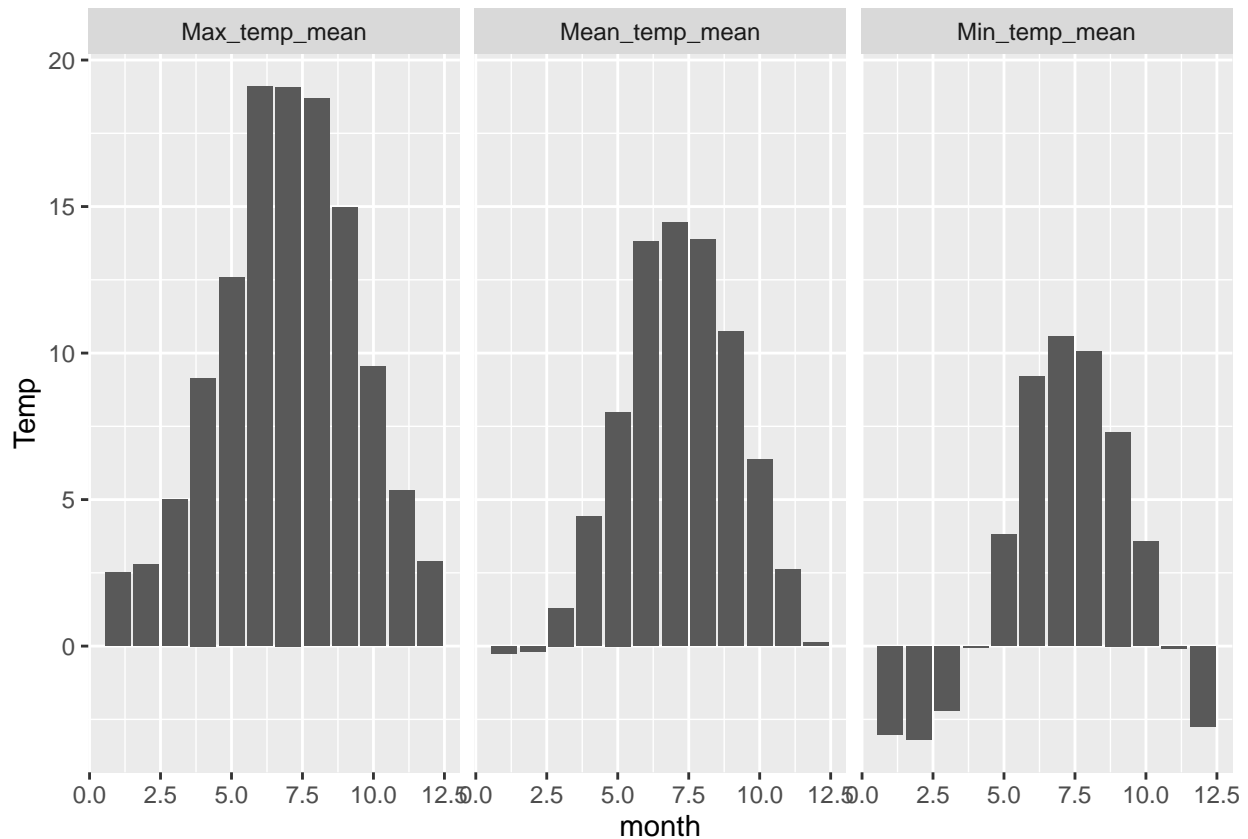
Plot average temperature through out the year

```
mean_temp_yearly <- klima_afjord %>%
  group_by(month) %>%
summarise_at(vars(Min_temp, Mean_temp, Max_temp), list(mean = mean), na.rm = TRUE)

mean_temp_yearly %>%
  pivot_longer(Min_temp_mean:Max_temp_mean, names_to = "Means", values_to = "Temp") %>%
  ggplot(aes(x = month, y = Temp)) +
  geom_col() +
  facet_wrap(vars(Means))
```
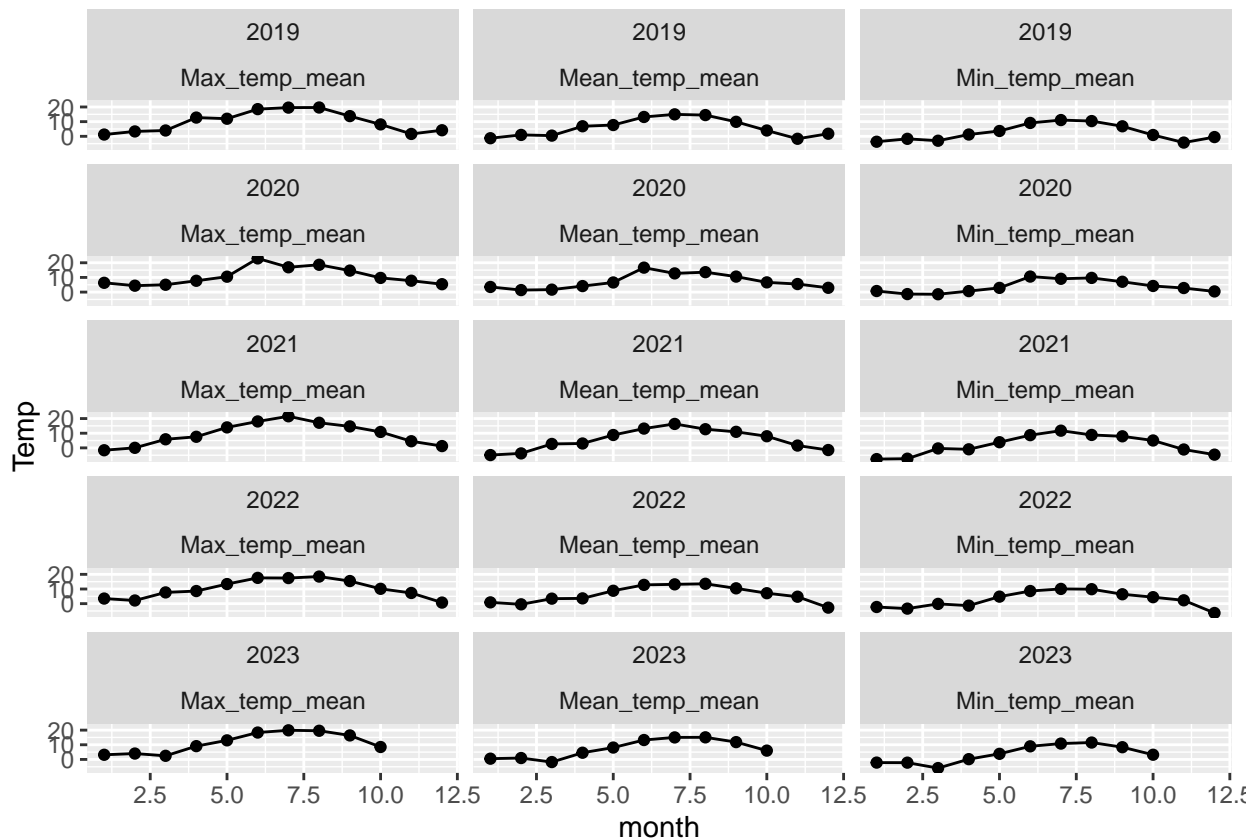

Average temperatures by specific months and years

```
klima_afjord %>%
  group_by(month, year) %>%
summarise_at(vars(Min_temp, Mean_temp, Max_temp), list(mean = mean), na.rm = TRUE) %>%
pivot_longer(Min_temp_mean:Max_temp_mean, names_to = "Means", values_to = "Temp") %>%
  ggplot(aes(x = month, y = Temp)) +
  geom_point() +
  geom_line() +
  facet_wrap(vars(year, Means), ncol=3)
```

Average temperatures through the growing season (May to October)

```
growing_season_afjord <- klima_afjord %>%
  filter(month >4 & month <11)

growing_season_afjord%>%
summarise_at(vars(Min_temp, Max_temp, Mean_temp), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 1 x 3
##   Min_temp_mean Max_temp_mean Mean_temp_mean
##           <dbl>         <dbl>          <dbl>
## 1          7.45          15.7           11.3
```

```
klima_afjord %>%
  filter(month >4 & month <10)%>%
  group_by(year) %>%
summarise_at(vars(Min_temp, Max_temp, Mean_temp), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 5 x 4
##    year Min_temp_mean Max_temp_mean Mean_temp_mean
##   <dbl>         <dbl>         <dbl>          <dbl>
## 1  2019          8.22          16.7           12.0
## 2  2020          7.84          16.7           12.0
## 3  2021          8.20          17.1           12.4
## 4  2022          7.96          16.5           11.8
## 5  2023          8.68          17.4           12.6
```

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Precipitation Bangdalen

Only precipitation data from Overhalla-Unnset (26mas), hopefully this is close enough to be similar to Bangdalen As the longterm annual data from Bangdalen 1930-2012 shows a trend of about 10% more precipitation, I adjust the data accordingly

```
#Lage nye kolonner med kun måned og år
klima_overhalla$Year <- floor_date(klima_overhalla$Time, "year")
klima_overhalla$Month <- floor_date(klima_overhalla$Time, "month")
klima_overhalla$month <- month(klima_overhalla$Time)
klima_overhalla$year <- year(klima_overhalla$Time)
klima_overhalla$Precipitation10 <- klima_overhalla$Precipitation *1.10
```

Daily precipitation

```
klima_overhalla%>%
ggplot(aes(x = Time, y = Precipitation10)) + geom_col()
```
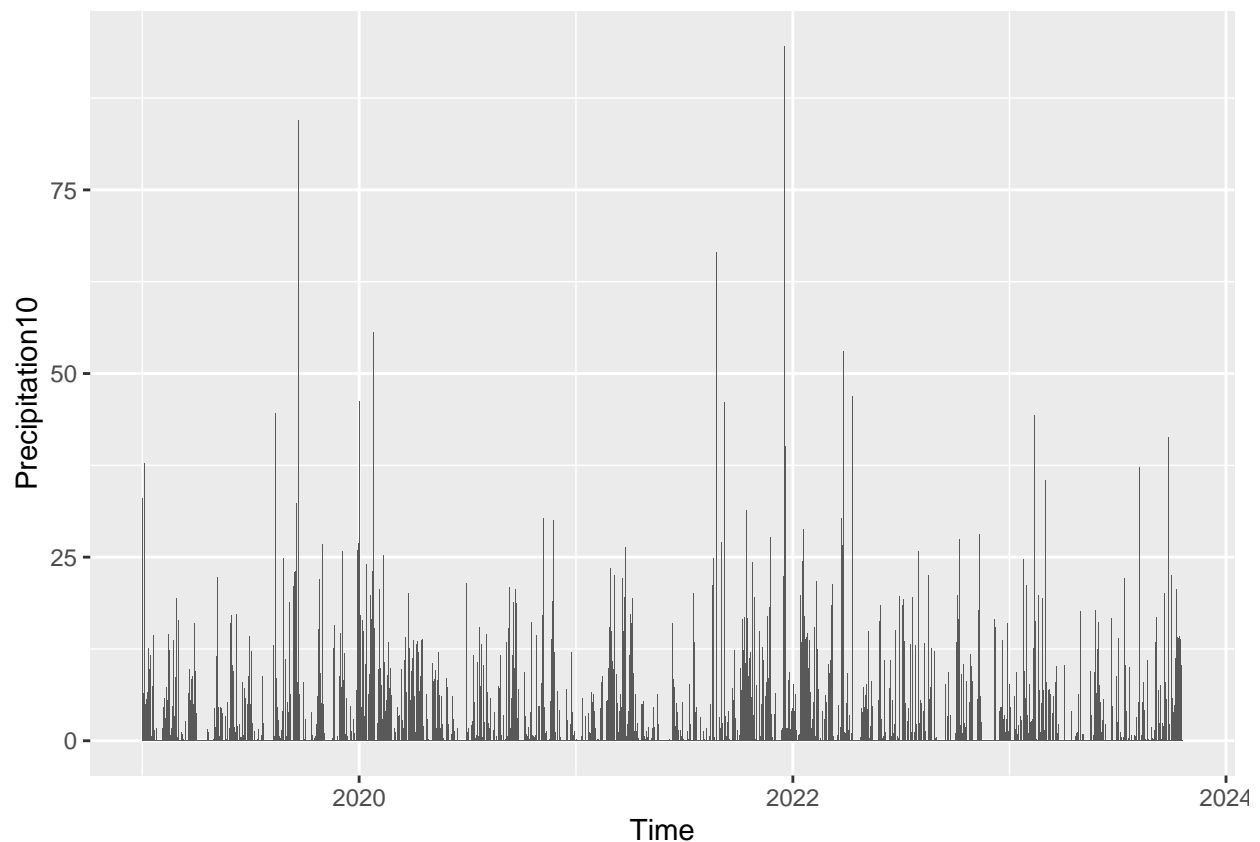

The daily mean is about 3.9mm with a few (4) extreme events of >50mm that will have been rain and not snow.

```
klima_overhalla %>%
  summarise_at(vars(Precipitation10), list(mean=mean, max=max), na.rm = TRUE)
```

```
## # A tibble: 1 x 2
##     mean    max
##    <dbl> <dbl>
## 1   4.26  94.6
```

Daily means grouped by month of the year

```r
klima_overhalla %>%
  group_by(month) %>%
  summarise_at(vars(Precipitation10), list(mean = mean)) #gives only the daily mean per month
```

```
## # A tibble: 12 x 2
##     month  mean
##     <dbl> <dbl>
## 1      1   6.57
## 2      2   4.91
## 3      3   5.15
## 4      4   2.87
## 5      5   3.03
## 6      6   2.44
## 7      7   2.97
## 8      8   3.59
## 9      9   5.34
## 10    10   5.79
## 11    11   4.03
## 12    12   4.50
```

Yearly precipitation

```r
klima_overhalla %>%
  filter(year !=2023) %>%
  group_by(year)%>%
  summarise(sum = sum(Precipitation10))
```

```
## # A tibble: 4 x 2
##     year    sum
##    <dbl> <dbl>
## 1   2019  1518
## 2   2020  1646.
## 3   2021  1606.
## 4   2022  1543.
```

Mean annual precipitation

```r
prc_year <-  klima_overhalla %>%
  filter(year != 2023 ) %>%
  group_by(year)%>%
  summarise(sum = sum(Precipitation10))

mean(prc_year$sum)
```

```
## [1] 1578.198
```

Number of days with precipitation each year

```r
klima_overhalla %>%
  group_by(year) %>%
  summarise (days_precipitation=sum(Precipitation10>0))
```

```
## # A tibble: 5 x 2
##    year days_precipitation
##   <dbl>              <int>
## 1  2019                227
## 2  2020                261
## 3  2021                239
## 4  2022                217
## 5  2023                165
```

Monthly precipitation

```r
mean_prc_month_overhalla <-  klima_overhalla%>%
  group_by(year, month) %>%
summarise(sum=sum(Precipitation10))
```

```
## 'summarise()' has grouped output by 'year'. You can override using the
## '.groups' argument.
```

```r
mean_prc_month_overhalla
```

```
## # A tibble: 58 x 3
## # Groups:   year [5]
##     year month   sum
##    <dbl> <dbl> <dbl>
##  1  2019     1 201.
##  2  2019     2 138.
##  3  2019     3 104.
##  4  2019     4  12.0
##  5  2019     5 115.
##  6  2019     6 117.
##  7  2019     7  57.6
##  8  2019     8 121.
##  9  2019     9 288.
## 10  2019    10 118.
## 11  2019    11  59.2
## 12  2019    12 186.
## 13  2020     1 394.
## 14  2020     2 157.
## 15  2020     3 131.
## 16  2020     4 152.
## 17  2020     5 115.
## 18  2020     6  34.2
```

```
## 19   2020     7 111.
## 20   2020     8  74.5
## 21   2020     9 186.
## 22   2020    10  74.8
## 23   2020    11 175.
## 24   2020    12  41.9
## 25   2021     1  35.5
## 26   2021     2 102.
## 27   2021     3 235.
## 28   2021     4 127.
## 29   2021     5  22.4
## 30   2021     6  74.1
## 31   2021     7  67.0
## 32   2021     8 135.
## 33   2021     9 154.
## 34   2021    10 243.
## 35   2021    11 185.
## 36   2021    12 226.
## 37   2022     1 241.
## 38   2022     2 113.
## 39   2022     3 217.
## 40   2022     4  95.6
## 41   2022     5 117.
## 42   2022     6  84.0
## 43   2022     7 141.
## 44   2022     8 140.
## 45   2022     9  25.3
## 46   2022    10 199.
## 47   2022    11  64.9
## 48   2022    12 104.
## 49   2023     1 147.
## 50   2023     2 183.
## 51   2023     3 110.
## 52   2023     4  44.1
## 53   2023     5 101.
## 54   2023     6  56.4
## 55   2023     7  83.2
## 56   2023     8  86.1
## 57   2023     9 148.
## 58   2023    10 192.
```

```
mean_prc_month_overhalla %>%
ggplot(aes(x = as.factor(month), y = sum)) + geom_boxplot()
```
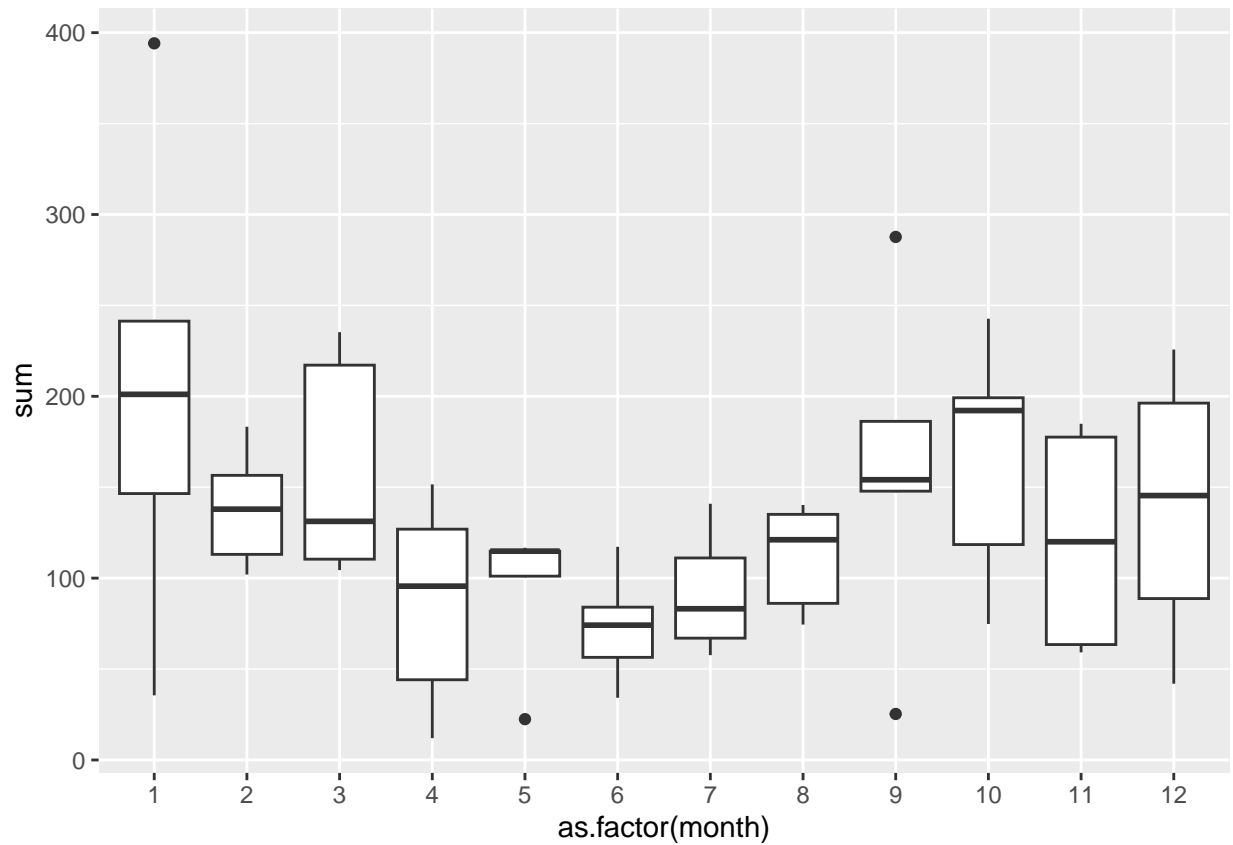
```
mean_prc_month_overhalla %>%
   group_by(month)%>%
  summarise(mean=mean(sum))
```
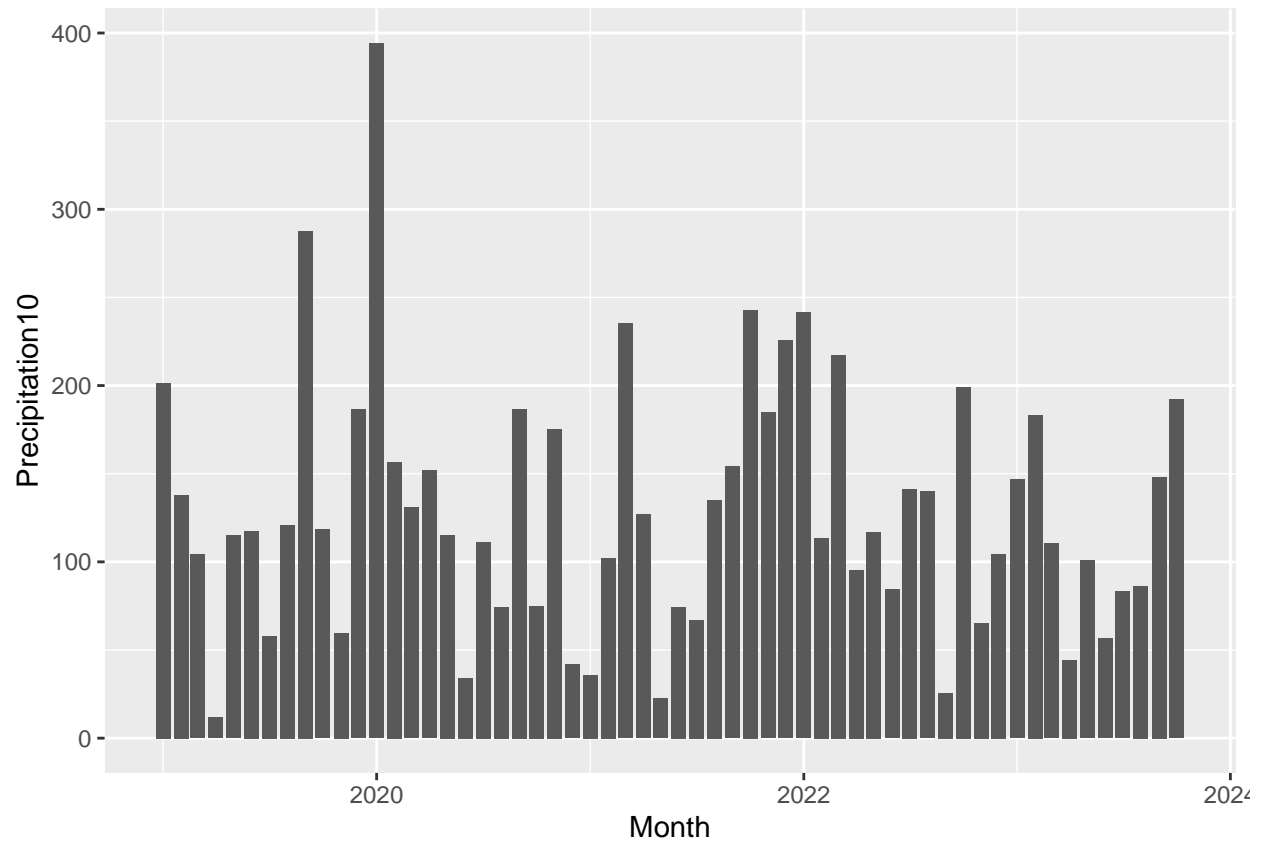
```
## # A tibble: 12 x 2
##    month  mean
##    <dbl> <dbl>
## 1     1 204.
## 2     2 139.
## 3     3 160.
## 4     4  86.0
## 5     5  94.0
## 6     6  73.2
## 7     7  92.0
## 8     8 111.
## 9     9 160.
## 10    10 165.
## 11    11 121.
## 12    12 140.
```

```
klima_overhalla %>%
ggplot(aes(x = Month, y = Precipitation10)) + geom_col()
```

```
klima_overhalla %>%
  group_by(year, month) %>%
summarise_at(vars(Precipitation10), list(sum = sum))
```

```
## # A tibble: 58 x 3
## # Groups:   year [5]
##     year month   sum
##    <dbl> <dbl> <dbl>
##  1  2019     1  201.
##  2  2019     2  138.
##  3  2019     3  104.
##  4  2019     4   12.0
##  5  2019     5  115.
##  6  2019     6  117.
##  7  2019     7   57.6
##  8  2019     8  121.
##  9  2019     9  288.
## 10  2019    10  118.
## 11  2019    11   59.2
## 12  2019    12  186.
## 13  2020     1  394.
## 14  2020     2  157.
## 15  2020     3  131.
## 16  2020     4  152.
## 17  2020     5  115.
```

```
## 18   2020      6   34.2
## 19   2020      7  111.
## 20   2020      8   74.5
## 21   2020      9  186.
## 22   2020     10   74.8
## 23   2020     11  175.
## 24   2020     12   41.9
## 25   2021      1   35.5
## 26   2021      2  102.
## 27   2021      3  235.
## 28   2021      4  127.
## 29   2021      5   22.4
## 30   2021      6   74.1
## 31   2021      7   67.0
## 32   2021      8  135.
## 33   2021      9  154.
## 34   2021     10  243.
## 35   2021     11  185.
## 36   2021     12  226.
## 37   2022      1  241.
## 38   2022      2  113.
## 39   2022      3  217.
## 40   2022      4   95.6
## 41   2022      5  117.
## 42   2022      6   84.0
## 43   2022      7  141.
## 44   2022      8  140.
## 45   2022      9   25.3
## 46   2022     10  199.
## 47   2022     11   64.9
## 48   2022     12  104.
## 49   2023      1  147.
## 50   2023      2  183.
## 51   2023      3  110.
## 52   2023      4   44.1
## 53   2023      5  101.
## 54   2023      6   56.4
## 55   2023      7   83.2
## 56   2023      8   86.1
## 57   2023      9  148.
## 58   2023     10  192.
```

*Mean precipitation within growing season

```
mean_prc_growth_overhalla <-  klima_overhalla%>%
  filter(month>4 & month <10) %>%
  group_by(year, month) %>%
summarise(sum=sum(Precipitation10))
```

```
## `summarise()` has grouped output by 'year'. You can override using the
## `.groups` argument.
```

```
mean_prc_growth_overhalla
```

```
## # A tibble: 25 x 3
## # Groups:   year [5]
##     year month   sum
##    <dbl> <dbl> <dbl>
##  1  2019     5 115.
##  2  2019     6 117.
##  3  2019     7  57.6
##  4  2019     8 121.
##  5  2019     9 288.
##  6  2020     5 115.
##  7  2020     6  34.2
##  8  2020     7 111.
##  9  2020     8  74.5
## 10  2020     9 186.
## 11  2021     5  22.4
## 12  2021     6  74.1
## 13  2021     7  67.0
## 14  2021     8 135.
## 15  2021     9 154.
## 16  2022     5 117.
## 17  2022     6  84.0
## 18  2022     7 141.
## 19  2022     8 140.
## 20  2022     9  25.3
## 21  2023     5 101.
## 22  2023     6  56.4
## 23  2023     7  83.2
## 24  2023     8  86.1
## 25  2023     9 148.
```

```
mean_prc_growth_overhalla %>%
   group_by(month)%>%
  summarise(mean=mean(sum))
```

```
## # A tibble: 5 x 2
##   month  mean
##   <dbl> <dbl>
## 1     5  94.0
## 2     6  73.2
## 3     7  92.0
## 4     8 111.
## 5     9 160.
```

```
mean_prc_growth_overhalla%>%
ggplot(aes(x = month, y = sum)) +
  geom_col() +
  facet_wrap(vars(year))
```
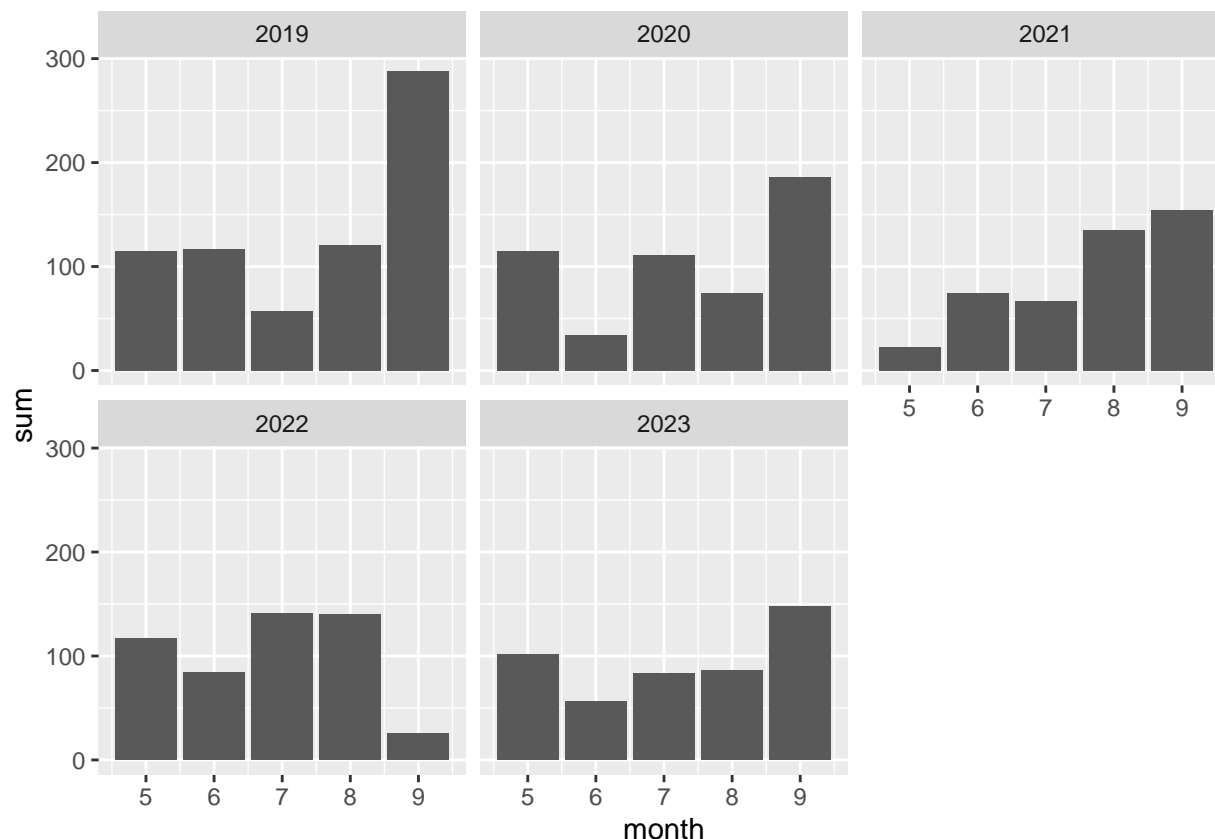
The mean precipitation is somewhat lower in the first half of the growing season (May, June, July) than in the late growing season (August, September), but the precipitation over the last 5 years has been very varied at Bangdalen (at least on the level of month, but quite similar on a seasonal and yearly scale).

The precipitation in April 2019, before we started up the experiment was extremely low (only 12mm), while September 2019 was extremely wet (287.6mm).November 2019 was likewise dry (59.2mm). June 2020 was another low (34.2mm), but with somewhat wetter July and August (111.0mm and 74mm). Both May, June and July 2021 was dry (22.4, 74.1, 67), especially May. October same year had very high precipitation (242.7), with both September and November also being wet. The whole summer of 2022 was wet, but more varied autumn with a very dry September (25.3), while wet October (199mm), and dry November (65). The whole of the summer 2023 has been medium to dry with a wet september and october.

Bangdalen (Overhalla) has in general somewhat less rain than Åfjord, with an annual mean of 1578mm over the time period.

Temperatures, Bangdalen

Temperatures from Namsos stasjon. It lies only 20mas and close to the fjord, which means the temperatures at Vestersetermyra (120mas) should be adjusted slightly. Bragazza 2008 uses -0.6oC per 100m change in altitude, which seems to be more or less the norm. I'll adjust similarily.

```
klima_namsosstasjon$Max_tempA <- klima_namsosstasjon$Max_temp -0.6
klima_namsosstasjon$Min_tempA <- klima_namsosstasjon$Min_temp -0.6
klima_namsosstasjon$Mean_tempA <- klima_namsosstasjon$Mean_temp -0.6

klima_namsosstasjon$Year <- floor_date(klima_namsosstasjon$Time, "year")
```

```
klima_namsosstasjon$Month <- floor_date(klima_namsosstasjon$Time, "month")
klima_namsosstasjon$month <- month(klima_namsosstasjon$Time)
klima_namsosstasjon$year <- year(klima_namsosstasjon$Time)
```
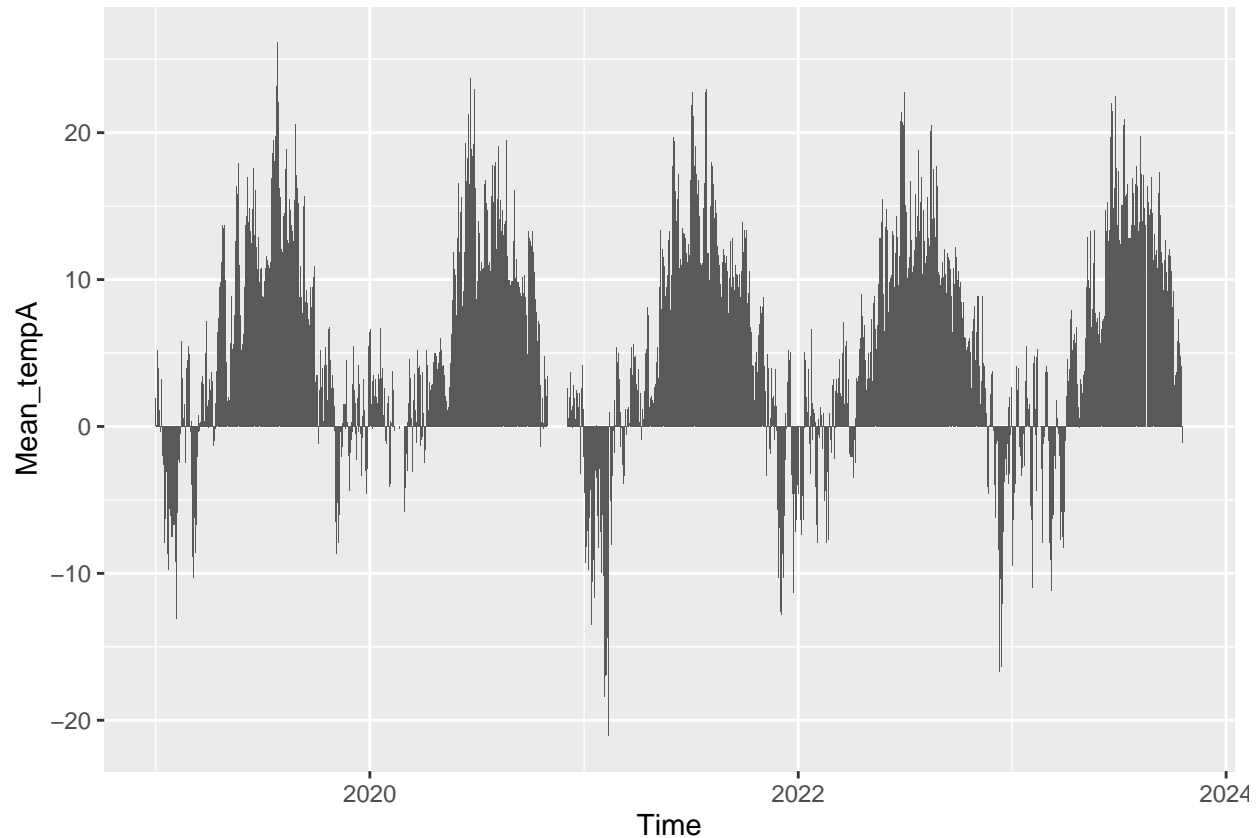
```
klima_namsosstasjon %>%
ggplot(aes(x = Time, y = Mean_tempA)) + geom_col()
```

Warning: Removed 18 rows containing missing values (`position_stack()`).

Averaged temperatures per month of the year

```
klima_namsosstasjon %>%
  group_by(month) %>%
summarise_at(vars(Min_tempA, Mean_tempA, Max_tempA), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 13 x 4
##     month Min_tempA_mean Mean_tempA_mean Max_tempA_mean
##     <dbl>          <dbl>           <dbl>          <dbl>
## 1       1          -4.14           -1.62          1.08
## 2       2          -4.86           -2.04          0.895
## 3       3          -3.09            0.00968       3.35
## 4       4          -0.337           3.56          7.95
## 5       5           3.39            7.25         11.6
## 6       6           9.01           13.6          18.9
```

```
## 7     7     10.7     14.3     18.8
## 8     8     9.94     13.6     18.4
## 9     9     7.08     10.1     14.0
## 10    10    2.95     5.35     7.97
## 11    11    -1.64    0.561    3.10
## 12    12    -4.24    -1.55    1.14
## 13    NA    NaN      NaN      NaN
```
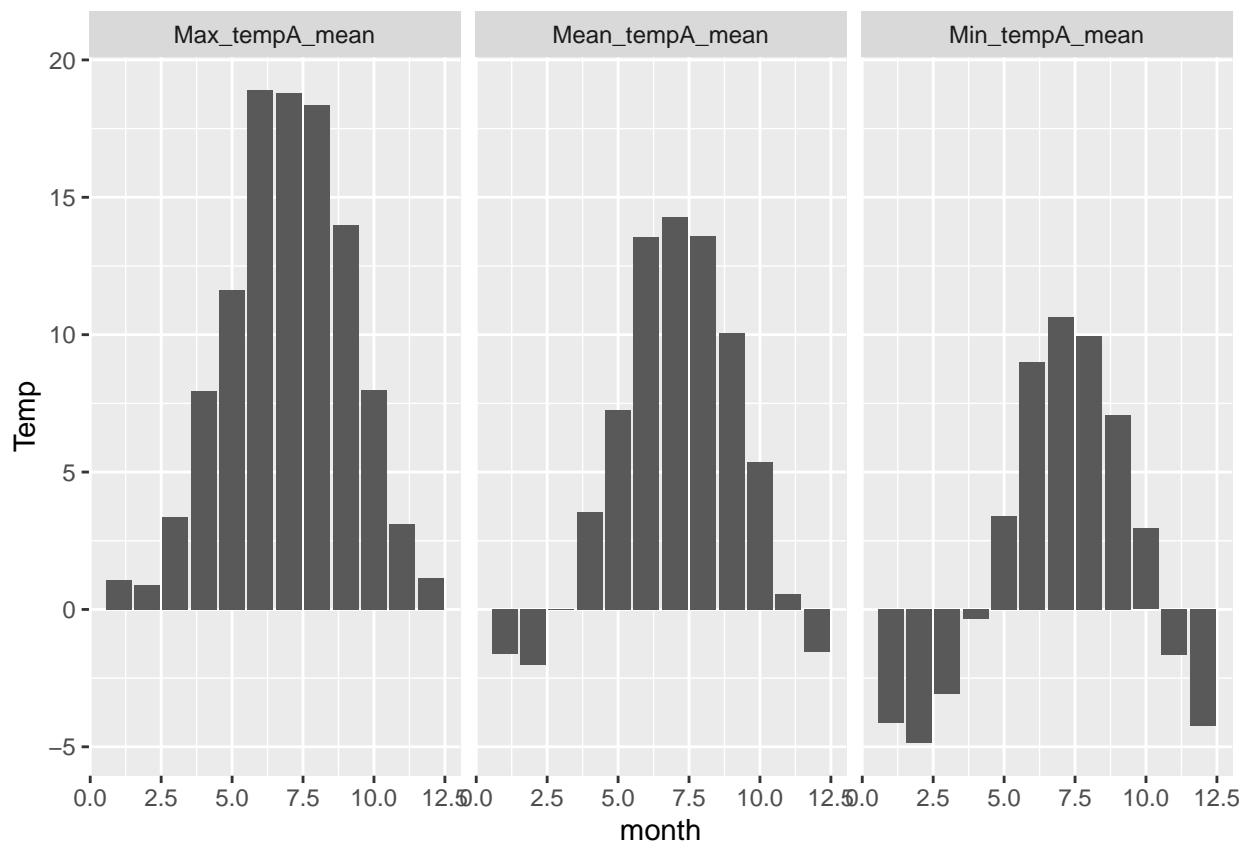
Plot average temperature through out the year

```
mean_temp_yearly <- klima_namsosstasjon %>%
  group_by(month) %>%
summarise_at(vars(Min_tempA, Mean_tempA, Max_tempA), list(mean = mean), na.rm = TRUE)

mean_temp_yearly %>%
  pivot_longer(Min_tempA_mean:Max_tempA_mean, names_to = "Means", values_to = "Temp") %>%
  ggplot(aes(x = month, y = Temp)) +
  geom_col() +
  facet_wrap(vars(Means))
```

```
## Warning: Removed 3 rows containing missing values (`position_stack()`).
```


Average temperatures by specific months and years

```
klima_namsosstasjon %>%
  group_by(year, month) %>%
summarise_at(vars(Min_tempA, Mean_tempA, Max_tempA), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 58 x 5
## # Groups:   year [6]
##     year month Min_tempA_mean Mean_tempA_mean Max_tempA_mean
##    <dbl> <dbl>          <dbl>           <dbl>          <dbl>
##  1  2019     1         -5.59           -2.92          -0.261
##  2  2019     2         -3.43           -0.636          1.67
##  3  2019     3         -4.23           -1.13           2.22
##  4  2019     4          0.827           5.87          11.8
##  5  2019     5          3.43            7.05          11.5
##  6  2019     6          8.76           12.5           17.4
##  7  2019     7         11.2            14.5           18.7
##  8  2019     8         10.4            14.3           19.0
##  9  2019     9          6.43            9.25          13.2
## 10  2019    10          0.542           3.00           6.11
## 11  2019    11         -4.06           -1.89           0.487
## 12  2019    12         -1.49            0.781          3.02
## 13  2020     1         -0.119           2.16           4.72
## 14  2020     2         -2.69           -0.1            3.24
## 15  2020     3         -1.94            0.803          3.65
## 16  2020     4         -0.0100          3.02           6.31
## 17  2020     5          2.63            5.70           9.14
## 18  2020     6          9.96           16.0           22.3
## 19  2020     7          9.11           12.6           16.7
## 20  2020     8          9.28           13.3           18.2
## 21  2020     9          6.95            9.92          13.8
## 22  2020    10          3.77            6.02           8.51
## 23  2020    12         -0.839           1.34           3.51
## 24  2021     1         -8.83           -6.36          -3.55
## 25  2021     2         -9.18           -5.63          -2.6
## 26  2021     3         -1.14            1.53           4.47
## 27  2021     4         -1.03            2.53           6.47
## 28  2021     5          3.49            8.08          12.7
## 29  2021     6          8.75           13.3           18.3
## 30  2021     7         12.1            16.5           21.6
## 31  2021     8          8.55           12.3           16.7
## 32  2021     9          6.97            9.89          13.3
## 33  2021    10          4.12            6.71           9.30
## 34  2021    11         -1.69            0.64           3.40
## 35  2021    12         -6.26           -3.35          -0.555
## 36  2022     1         -3.37           -0.613          2.35
## 37  2022     2         -4.95           -2.26           0.564
## 38  2022     3         -0.781           2.39           6.15
## 39  2022     4         -1.36            2.79           7.41
## 40  2022     5          3.99            7.94          12.3
## 41  2022     6          9.02           12.8           17.7
## 42  2022     7          9.91           13.1           17.4
## 43  2022     8          9.99           13.4           18.4
## 44  2022     9          6.72            9.93          14.2
## 45  2022    10          3.93            6.25           8.75
```

```
## 46   2022   11      0.827          2.94           5.41
## 47   2022   12     -8.38          -4.81          -1.41
## 48   2023    1     -2.81          -0.387          2.11
## 49   2023    2     -3.28          -0.485          2.33
## 50   2023    3     -7.34          -3.55           0.252
## 51   2023    4     -0.120          3.58           7.76
## 52   2023    5      3.38           7.54          12.6
## 53   2023    6      8.56          13.3           18.8
## 54   2023    7     10.9           14.7           19.5
## 55   2023    8     11.5           14.7           19.4
## 56   2023    9      8.35          11.3           15.4
## 57   2023   10      2.06           4.48           6.69
## 58     NA   NA      NaN            NaN            NaN
```

```r
klima_namsosstasjon %>%
  filter(!is.na(Time))%>%
  group_by(year, month) %>%
summarise_at(vars(Min_tempA, Mean_tempA, Max_tempA), list(mean = mean), na.rm = TRUE) %>%
pivot_longer(Min_tempA_mean:Max_tempA_mean, names_to = "Means", values_to = "Temp") %>%
  ggplot(aes(x = month, y = Temp), na.rm=TRUE) +
  geom_point() +
  geom_line() +
  facet_wrap(vars(year, Means), ncol=3)
```
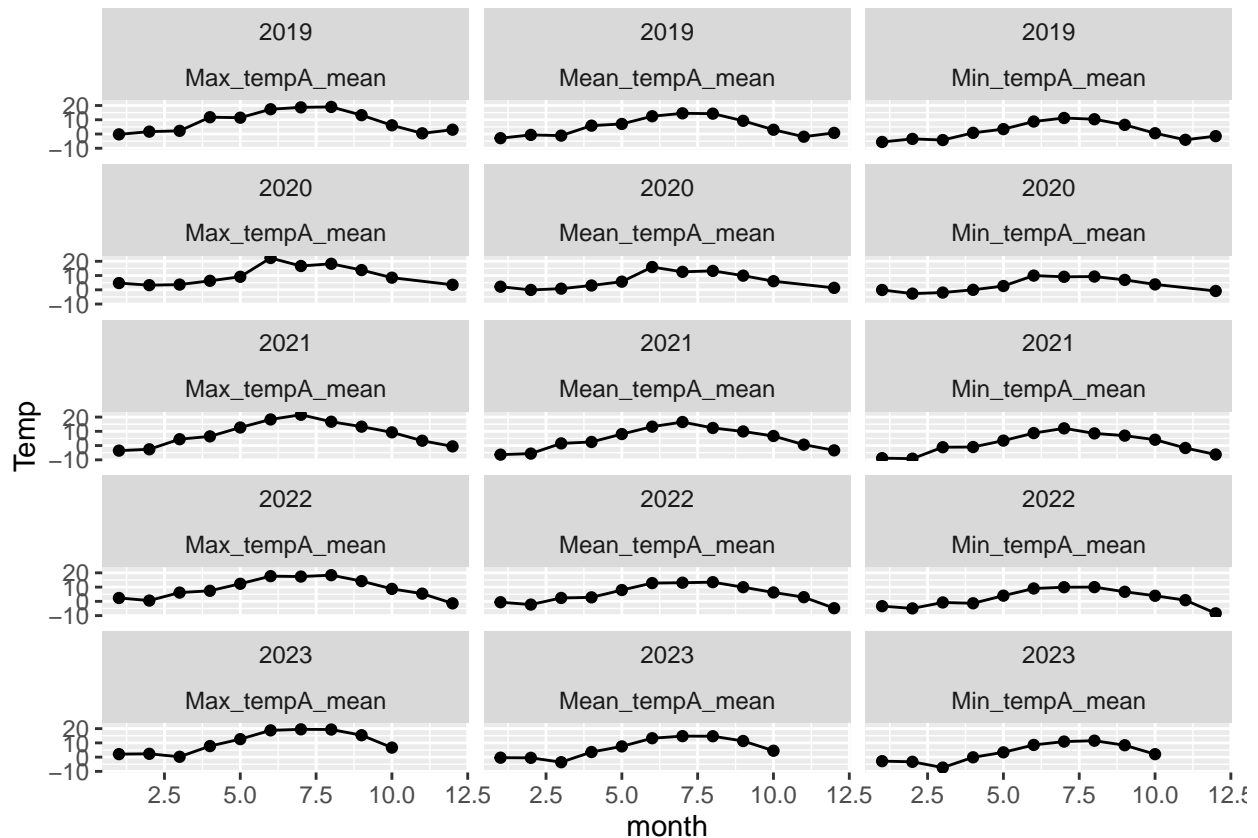

Average temperatures through the growing season (May to October)

```r
growing_season_namsos <- klima_namsosstasjon %>%
  filter(month >4 & month <11)
growing_season_namsos%>%
summarise_at(vars(Min_tempA, Max_tempA, Mean_tempA), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 1 x 3
##   Min_tempA_mean Max_tempA_mean Mean_tempA_mean
##            <dbl>          <dbl>           <dbl>
## 1           7.21           15.0            10.8
```

```r
klima_namsosstasjon %>%
  filter(month >4 & month <10)%>%
  group_by(year) %>%
summarise_at(vars(Min_tempA, Max_tempA, Mean_tempA), list(mean = mean), na.rm = TRUE)
```

```
## # A tibble: 5 x 4
##    year Min_tempA_mean Max_tempA_mean Mean_tempA_mean
##   <dbl>          <dbl>          <dbl>           <dbl>
## 1  2019           8.05           16.0            11.5
## 2  2020           7.58           16.0            11.5
## 3  2021           7.97           16.6            12.1
## 4  2022           7.93           16.0            11.4
## 5  2023           8.55           17.1            12.3
```