Lista 6 -Series

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Tente analisar separadamente as seguintes séries temporais mensais encontradas no arquivo "ALGONQUIN_PARK_Ontario_Canada.csv":

1. "Mean Max Temp (°C)",
2. "Mean Min Temp (°C)",
3. "Mean Temp (°C)",
4. "Extr Max Temp (°C)",
5. "Extr Min Temp (°C)",
6. "Total Rain (mm)",
7. "Total Snow (cm)",
8. "Total Precip (mm)".

```
# Leitura dos dados
data <- read_csv("ALGONQUIN_PARK_Ontario_Canada.csv")
```

```
## Rows: 528 Columns: 29
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## chr (12): Station Name, Date/Time, Month, Mean Max Temp Flag, Mean Min Temp ...
## dbl (13): Longitude (x), Latitude (y), Climate ID, Year, Mean Max Temp (°C),...
## lgl  (4): Dir of Max Gust (10's deg), Dir of Max Gust Flag, Spd of Max Gust ...
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

```
# Seleção das colunas de interesse
columns_of_interest <- c(
  "Mean Max Temp (°C)", "Mean Min Temp (°C)", "Mean Temp (°C)",
  "Extr Max Temp (°C)", "Extr Min Temp (°C)", "Total Rain (mm)",
  "Total Snow (cm)", "Total Precip (mm)"
)

# Contagem de valores nulos
null_counts <- sapply(data[columns_of_interest], function(x) sum(is.na(x)))
print(null_counts)
```

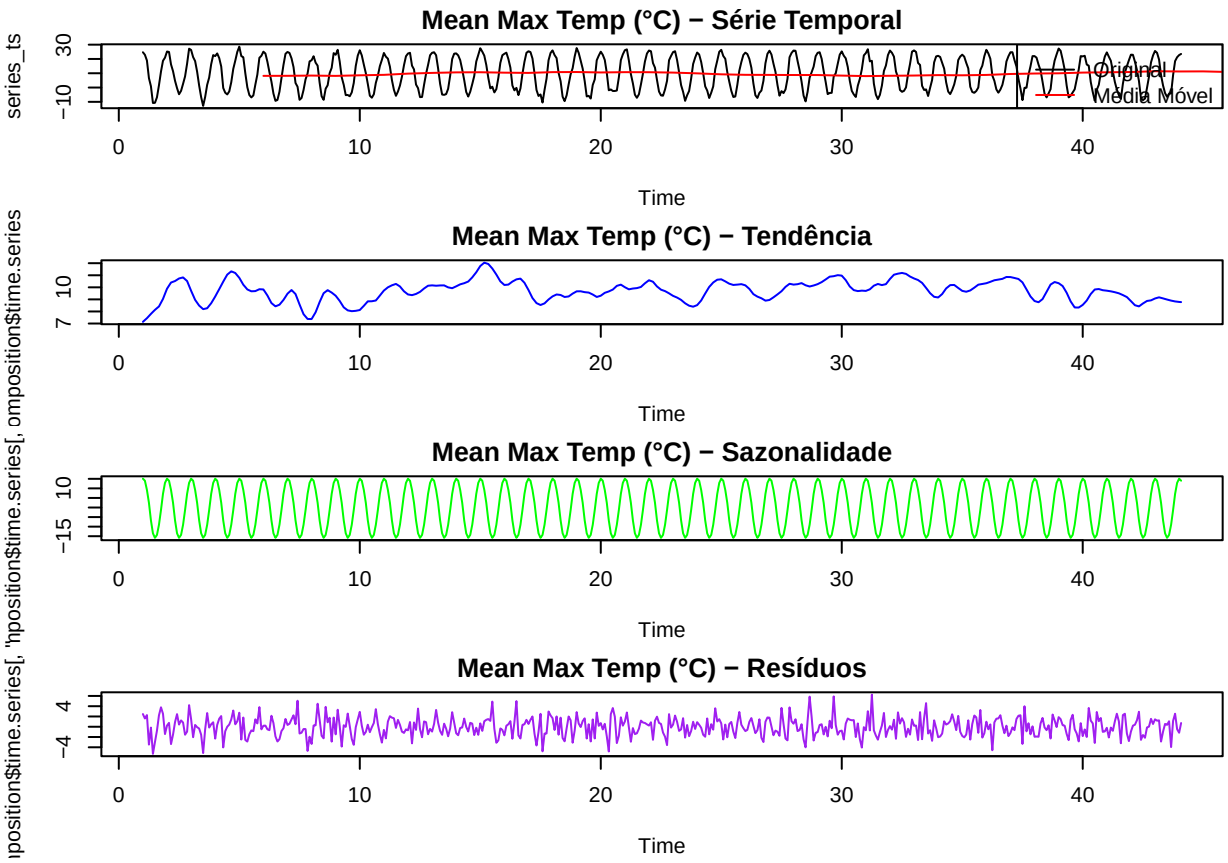
```
## Mean Max Temp (°C) Mean Min Temp (°C)     Mean Temp (°C) Extr Max Temp (°C)
##                 10                 10                 10                 14
## Extr Min Temp (°C)    Total Rain (mm)    Total Snow (cm)  Total Precip (mm)
##                 15                 15                 15                 15
```

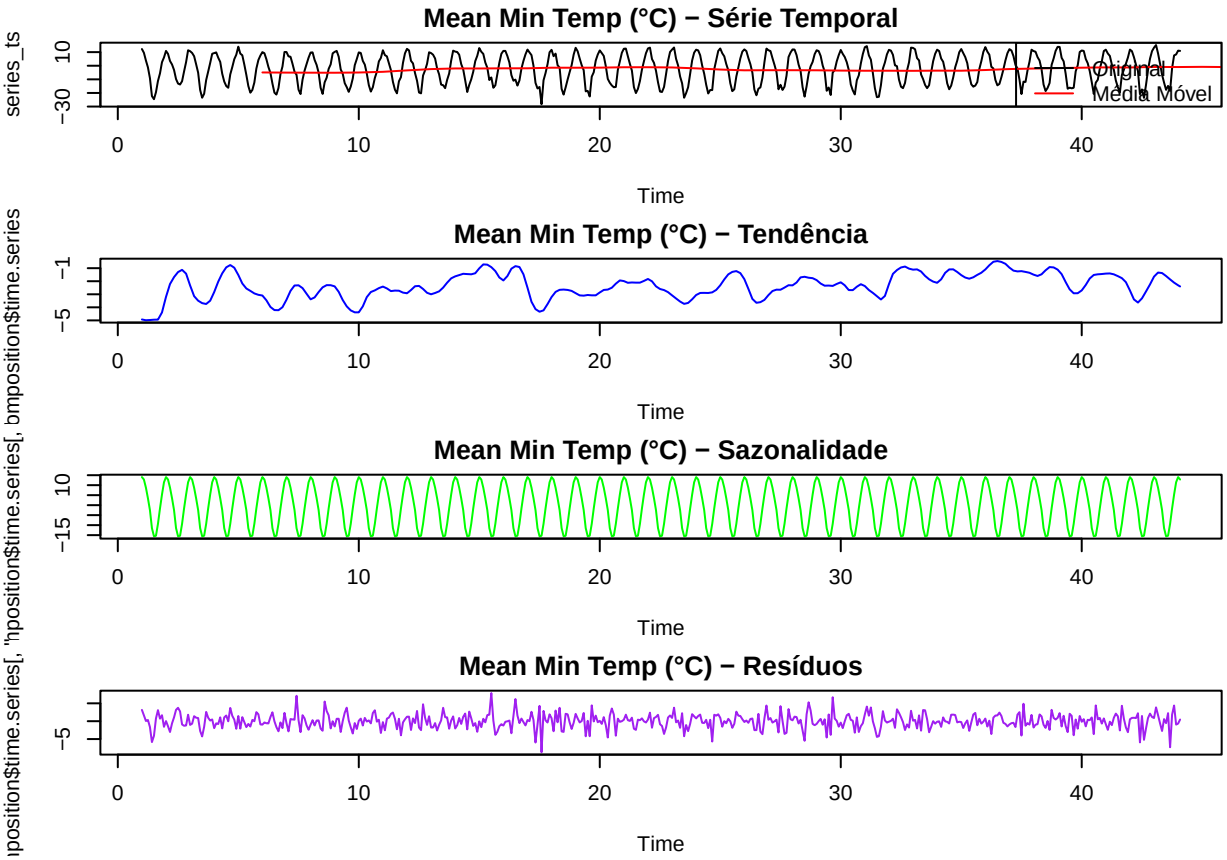
```r
# Estatísticas descritivas
descriptive_stats <- data[columns_of_interest] %>%
  summarise(across(everything(), list(
    count = ~sum(!is.na(.)),
    mean = ~mean(., na.rm = TRUE),
    std = ~sd(., na.rm = TRUE),
    min = ~min(., na.rm = TRUE),
    q25 = ~quantile(., 0.25, na.rm = TRUE),
    median = ~median(., na.rm = TRUE),
    q75 = ~quantile(., 0.75, na.rm = TRUE),
    max = ~max(., na.rm = TRUE)
  )))
print(descriptive_stats)
```

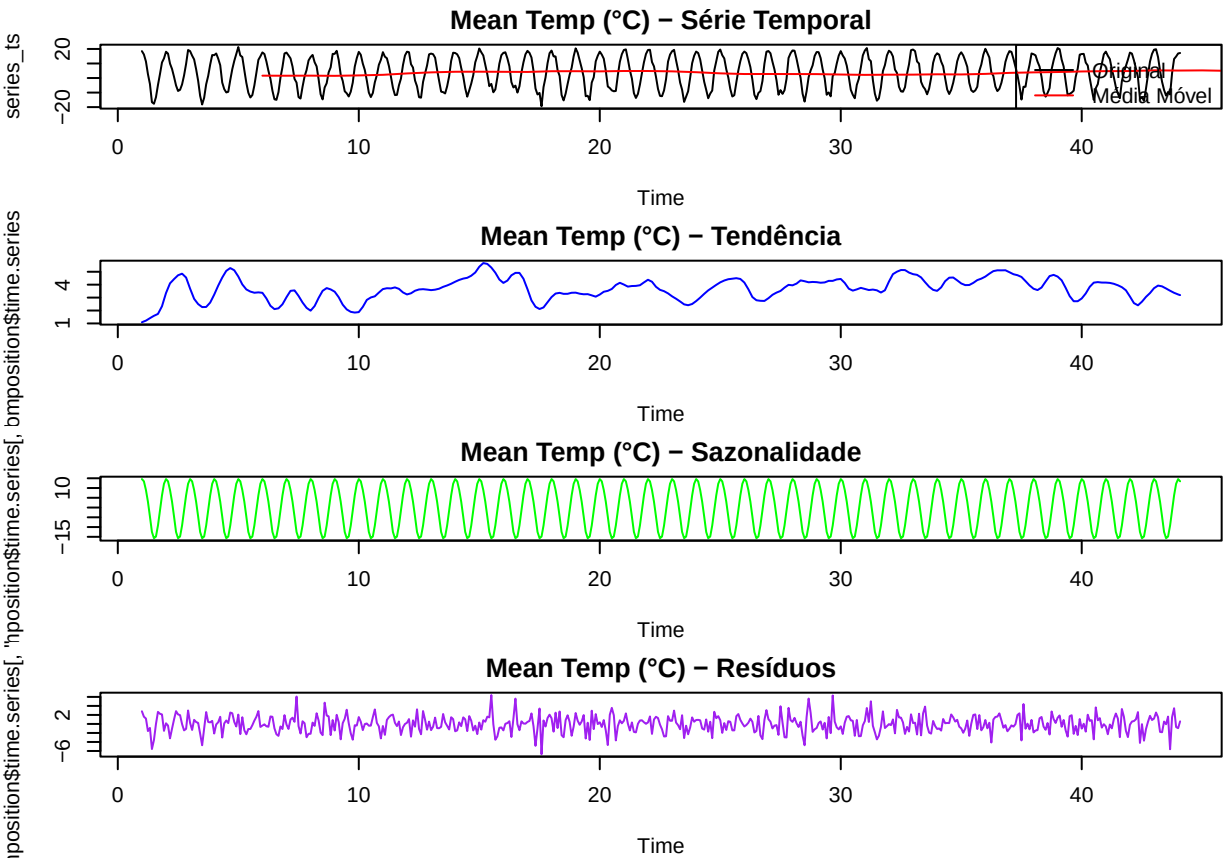
```
## # A tibble: 1 x 64
##   `Mean Max Temp (°C)_count` `Mean Max Temp (°C)_mean` `Mean Max Temp (°C)_std`
##                        <int>                     <dbl>                    <dbl>
## 1                        518                      9.76                     11.4
## # i 61 more variables: `Mean Max Temp (°C)_min` <dbl>,
## #   `Mean Max Temp (°C)_q25` <dbl>, `Mean Max Temp (°C)_median` <dbl>,
## #   `Mean Max Temp (°C)_q75` <dbl>, `Mean Max Temp (°C)_max` <dbl>,
## #   `Mean Min Temp (°C)_count` <int>, `Mean Min Temp (°C)_mean` <dbl>,
## #   `Mean Min Temp (°C)_std` <dbl>, `Mean Min Temp (°C)_min` <dbl>,
## #   `Mean Min Temp (°C)_q25` <dbl>, `Mean Min Temp (°C)_median` <dbl>,
## #   `Mean Min Temp (°C)_q75` <dbl>, `Mean Min Temp (°C)_max` <dbl>, ...
```

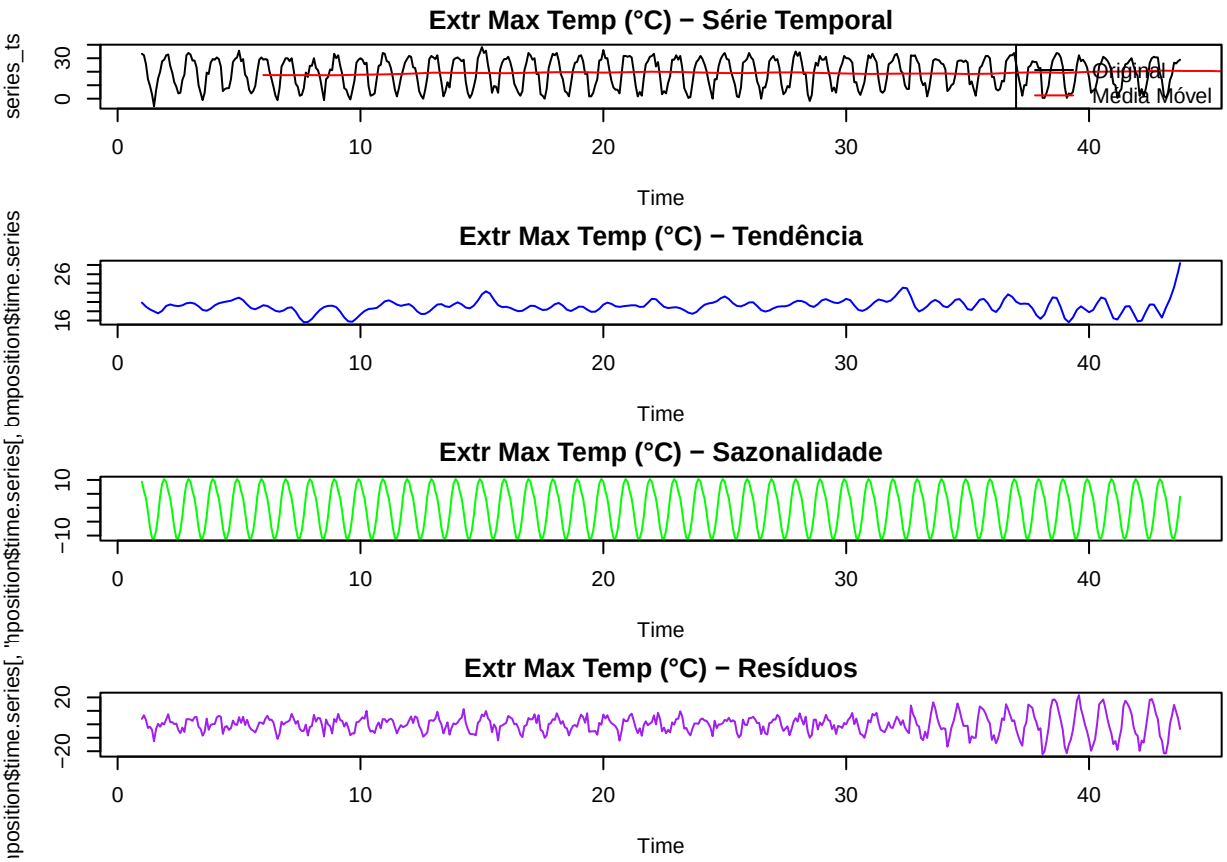
```r
# Função para decomposição sazonal e plotagem
plot_series_with_decomposition <- function(series, title, window=12) {
  series_ts <- ts(series, frequency=12)  # Converter série para objeto de série temporal
  series_rolling <- rollmean(series, k=window, fill=NA, align="center")  # Calcular média móvel
  decomposition <- stl(series_ts, s.window="periodic")  # Decompor série temporal

  par(mfrow=c(4, 1), mar=c(4, 4, 2, 1))  # Configurar layout do plot

  # Plotar série original e média móvel
  plot(series_ts, main=paste(title, "- Série Temporal"), col="black")
  lines(series_rolling, col="red")
  legend("topright", legend=c("Original", "Média Móvel"), col=c("black", "red"), lty=1)

  # Plotar tendência
  plot(decomposition$time.series[, "trend"], main=paste(title, "- Tendência"), col="blue")

  # Plotar sazonalidade
  plot(decomposition$time.series[, "seasonal"], main=paste(title, "- Sazonalidade"), col="green")

  # Plotar resíduos
  plot(decomposition$time.series[, "remainder"], main=paste(title, "- Resíduos"), col="purple")

  par(mfrow=c(1, 1))  # Resetar layout do plot
}

# Aplicar a função para cada coluna de interesse
for (column in columns_of_interest) {
```

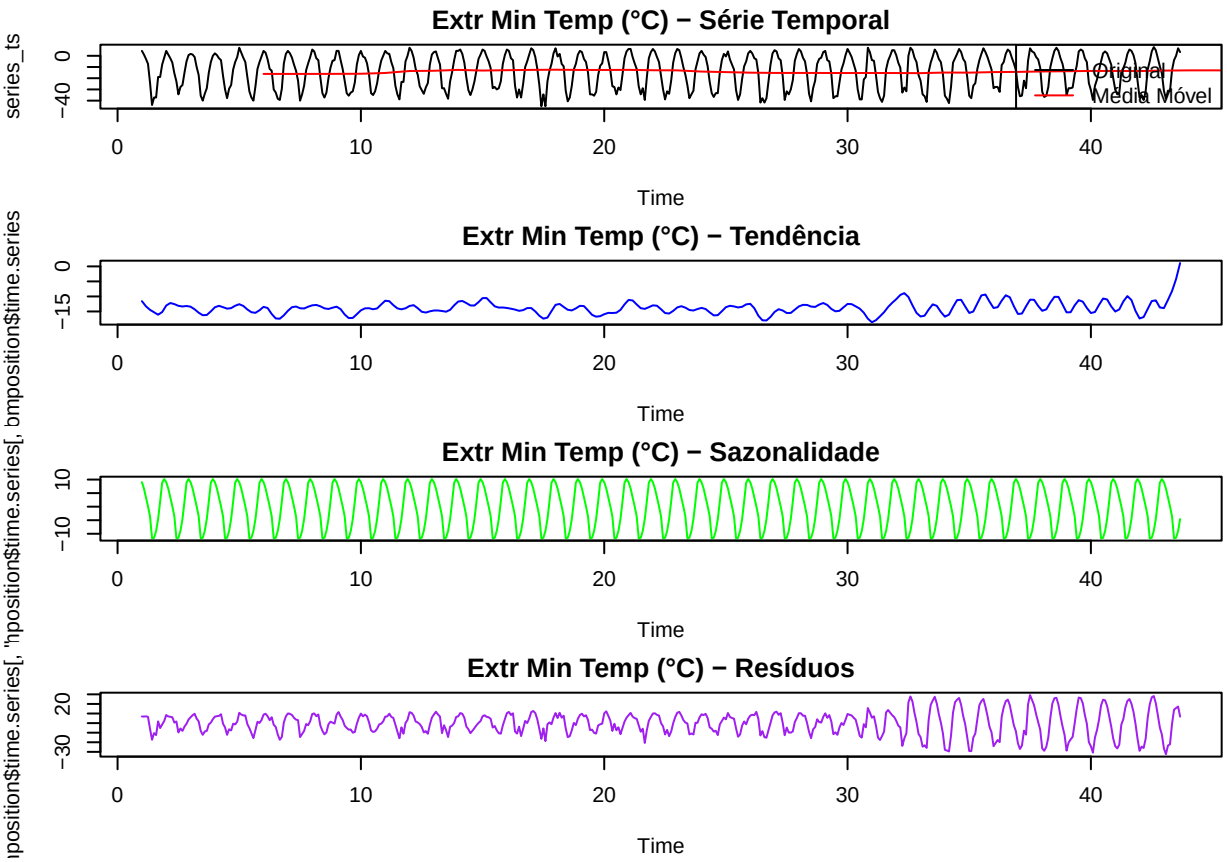
```r
  if (all(is.na(data[[column]]))) {
    next  # Pular colunas que estão completamente vazias
  }
  plot_series_with_decomposition(na.omit(data[[column]]), column)
}
```

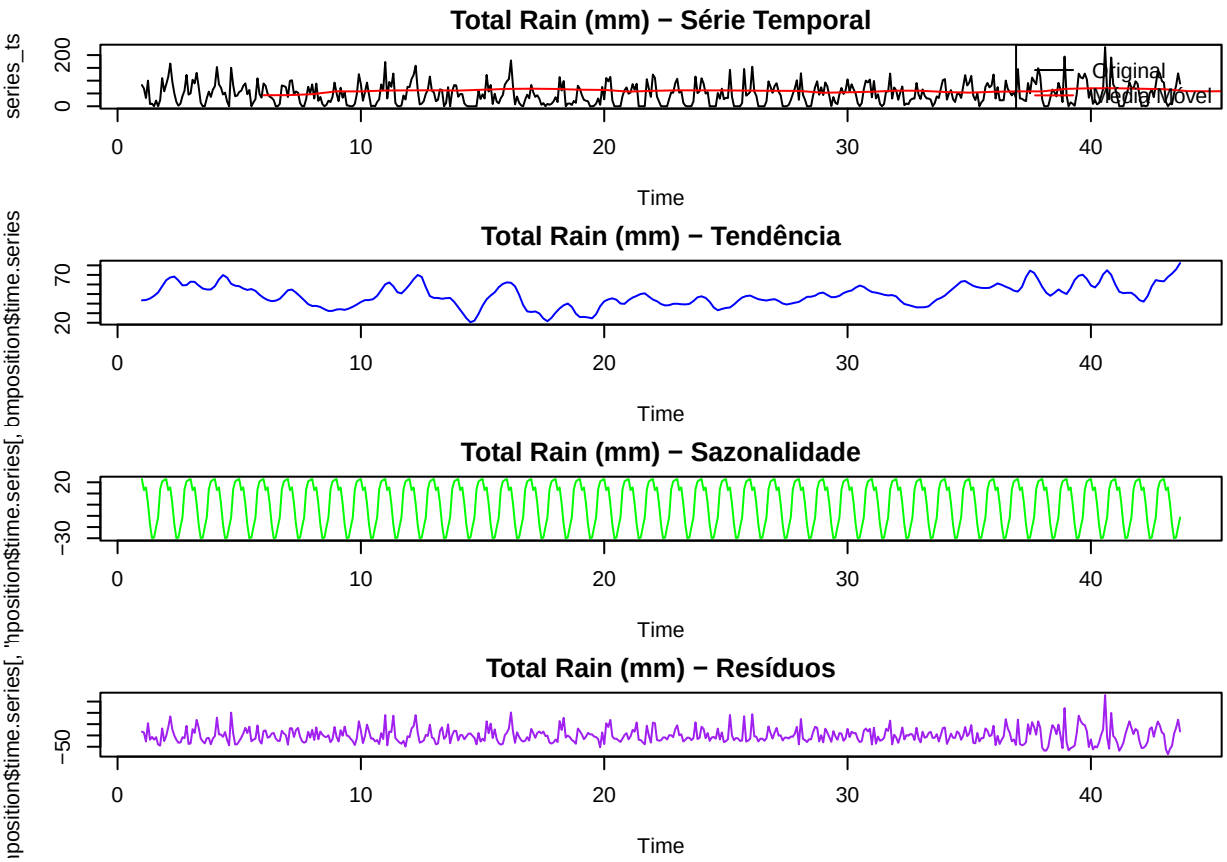


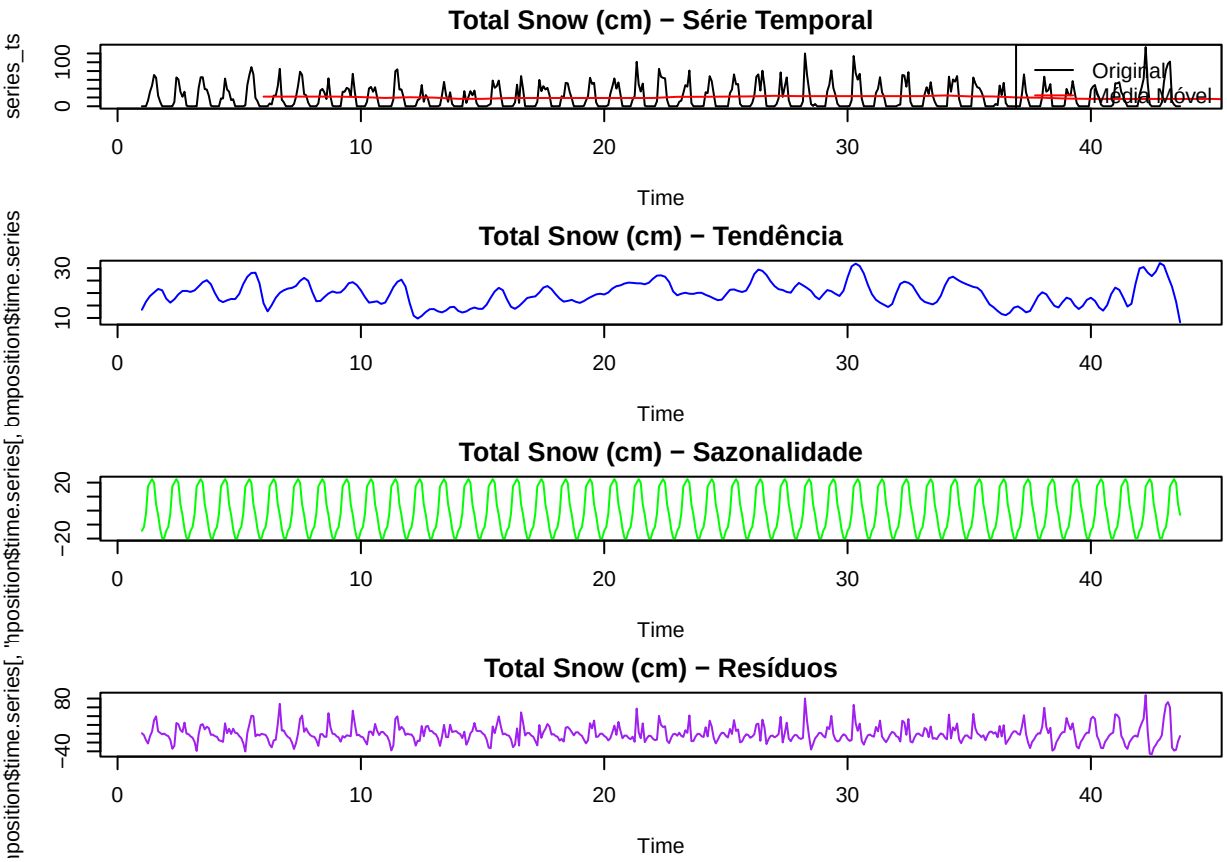

Mean Min Temp (°C) − Série Temporal
Original
Média Móvel
Time
Mean Min Temp (°C) − Tendência
Time
Mean Min Temp (°C) − Sazonalidade
Time
Mean Min Temp (°C) − Resíduos
Time

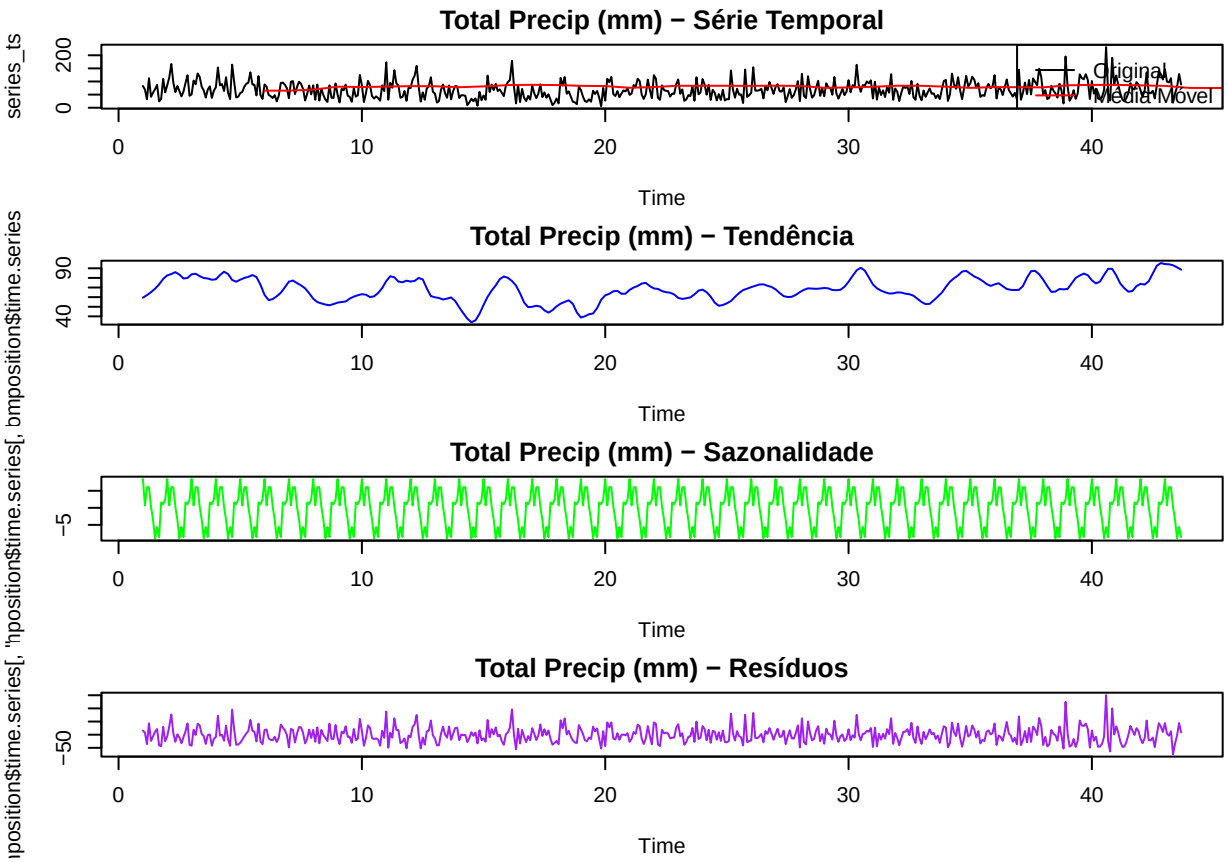

Mean Temp (°C) − Série Temporal
Original
Média Móvel
Time
Mean Temp (°C) − Tendência
Time
Mean Temp (°C) − Sazonalidade
Time
Mean Temp (°C) − Resíduos
Time


Extr Max Temp (°C) − Série Temporal
series_ts
Original
Média Móvel
Time
Extr Max Temp (°C) − Tendência
decomposition$time.series[, bmposition$time.series
Time
Extr Max Temp (°C) − Sazonalidade
decomposition$time.series[, "nposition$time.series
Time
Extr Max Temp (°C) − Resíduos
decomposition$time.series[, "nposition$time.series
Time


Extr Min Temp (°C) − Série Temporal
series_ts
Original
Média Móvel
Time
Extr Min Temp (°C) − Tendência
decomposition$time.series[, bmposition$time.series
Time
Extr Min Temp (°C) − Sazonalidade
decomposition$time.series[, "nposition$time.series
Time
Extr Min Temp (°C) − Resíduos
decomposition$time.series[, 2
Time


Total Rain (mm) − Série Temporal
Original
Média Móvel
series_ts
0
200
0
10
20
30
40
Time
Total Rain (mm) − Tendência
decomposition$time.series[, bmposition$time.series
20
70
0
10
20
30
40
Time
Total Rain (mm) − Sazonalidade
decomposition$time.series[, "nposition$time.series
−30
20
0
10
20
30
40
Time
Total Rain (mm) − Resíduos
nposition$time.series[, "
−50
0
10
20
30
40
Time


Total Snow (cm) − Série Temporal
series_ts
0
100
Original
Média Móvel
0
10
20
30
40
Time
Total Snow (cm) − Tendência
decomposition$time.series[, bmposition$time.series
10
30
0
10
20
30
40
Time
Total Snow (cm) − Sazonalidade
decomposition$time.series[, "nposition$time.series
−20
20
0
10
20
30
40
Time
Total Snow (cm) − Resíduos
decomposition$time.series[, "
−40
80
0
10
20
30
40
Time


Total Precip (mm) − Série Temporal
Original
Média Móvel
Total Precip (mm) − Tendência
Total Precip (mm) − Sazonalidade
Total Precip (mm) − Resíduos
Time