

Mappeinnlevering1

Eov016

26 1 2022

OPPGAVE 1

```
uahncdc_lt_6_0.txt <- fread("http://www.nsstc.uah.edu/data/msu/v6.0/tlt/uahncdc_lt_6.0.txt",
                           header = TRUE,
                           sep = "auto",
                           stringsAsFactors = FALSE,
                           fill = TRUE)
```

```
names(uahncdc_lt_6_0.txt) <- make.names(names(uahncdc_lt_6_0.txt), unique = TRUE)
#ville sjekke class
sapply(uahncdc_lt_6_0.txt, class)
```

```
##      Year      Mo      Globe      Land      Ocean      NH
## "character" "character" "character" "character" "character" "character"
##      Land.1      Ocean.1      SH      Land.2      Ocean.2      Trpcs
## "character" "character" "character" "character" "character" "character"
##      Land.3      Ocean.3      NoExt      Land.4      Ocean.4      SoExt
##      ....
```

```
#Ville se strukturen
```

```
str(uahncdc_lt_6_0.txt)
```

```
## Classes 'data.table' and 'data.frame':  529 obs. of  29 variables:
## $ Year   : chr  "1978" "1979" "1979" "1979" ...
## $ Mo     : chr  "12" "1" "2" "3" ...
## $ Globe  : chr  "-0.48" "-0.47" "-0.43" "-0.38" ...
## $ Land   : chr  "-0.51" "-0.64" "-0.56" "-0.51" ...
##      ....
```

```
#Her har jeg gjort om til en tibble etter at jeg valgte ønskede kolonner
#og fjernet rader. (Viste seg etterhvert at jeg ikke fikk bruk for "Year", "Mo")
lt_txt <- uahncdc_lt_6_0.txt %>%
  select(Year, Globe, Mo) %>%
  slice(-c(518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529))
head(lt_txt)
```

```
##      Year Globe Mo
## 1: 1978 -0.48 12
## 2: 1979 -0.47  1
## 3: 1979 -0.43  2
## 4: 1979 -0.38  3
## 5: 1979 -0.40  4
## 6: 1979 -0.40  5
```

```

str(lt_txt)

## Classes 'data.table' and 'data.frame':  517 obs. of  3 variables:
## $ Year : chr  "1978" "1979" "1979" "1979" ...
## $ Globe: chr  "-0.48" "-0.47" "-0.43" "-0.38" ...
## $ Mo   : chr  "12" "1" "2" "3" ...
## - attr(*, ".internal.selfref")=<externalptr>

#Konverterer til numeric før jeg bruker rollmean
convert_to_double <- c("Globe", "Year", "Mo")

lt_txt[, convert_to_double] <- lt_txt[, lapply(.SD, as.double), .SDcols = convert_to_double]

str(lt_txt)

## Classes 'data.table' and 'data.frame':  517 obs. of  3 variables:
## $ Year : num  1978 1979 1979 1979 1979 ...
## $ Globe: num  -0.48 -0.47 -0.43 -0.38 -0.4 -0.4 -0.39 -0.31 -0.4 -0.32 ...
## $ Mo   : num  12 1 2 3 4 5 6 7 8 9 ...
## - attr(*, ".internal.selfref")=<externalptr>

#Lager ny kolonne der jeg regner zoo::rollmean som jeg plasser først
#Jeg prøvde først align ="center", men den som var lik original_grafen var "right"
lt_plot<- lt_txt %>%
  mutate(thirteen_avg = rollmean(Globe, 13,
                                align="right",
                                fill=NA)) %>%

  relocate(thirteen_avg)
str(lt_plot)

## Classes 'data.table' and 'data.frame':  517 obs. of  4 variables:
## $ thirteen_avg: num  NA NA NA NA NA NA NA NA NA NA ...
## $ Year         : num  1978 1979 1979 1979 1979 ...
## $ Globe        : num  -0.48 -0.47 -0.43 -0.38 -0.4 -0.4 -0.39 -0.31 -0.4 -0.32 ...
## $ Mo          : num  12 1 2 3 4 5 6 7 8 9 ...
## - attr(*, ".internal.selfref")=<externalptr>

#Skrev årene inn til "labels" i scale_x_continuous
manual_years = c("1978", "1979", "1980", "1981", "1982", "1983", "1984", "1985",
                 "1986", "1987", "1988", "1989", "1990", "1991", "1992", "1993",
                 "1994", "1995", "1996", "1997", "1998", "1999", "2000", "2001",
                 "2002", "2003", "2004", "2005", "2006", "2007", "2008", "2009",
                 "2010", "2011", "2012", "2013", "2014", "2015", "2016", "2017",
                 "2018", "2019", "2020", "2021")

```

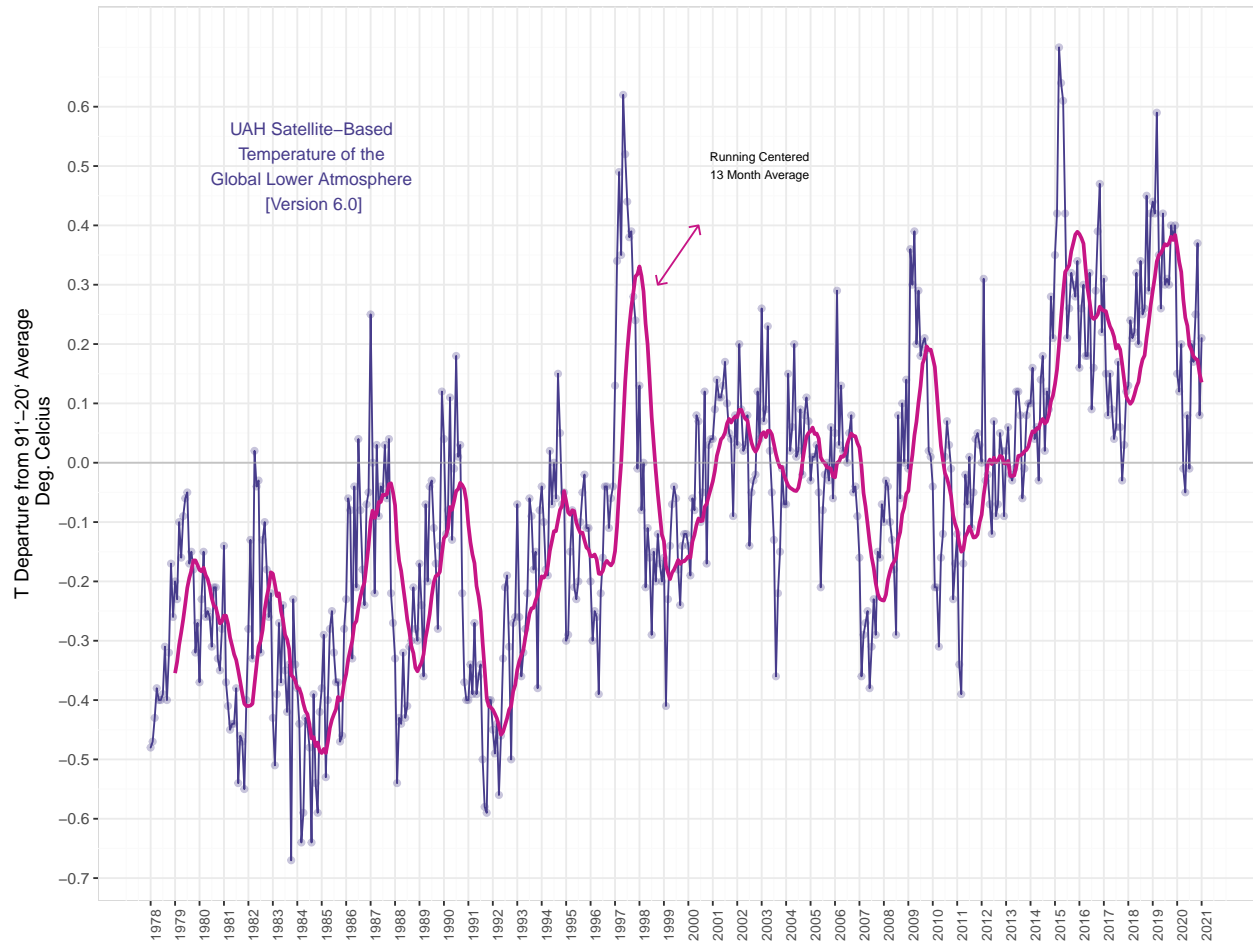
```

#Når jeg hadde "Year" på x akse ble grafen plottet uten mange ønskede
#datapunkter fordi den inneholdt så mange like årstall. Forsøkte unite()
#unite("navn", Year, Mo, sep "-"), men det ville seg ikke. Etter mye tenking
#endte jeg opp med "x = 1:517", da fikk jeg alle verdiene med og grafen ble mer
#flytende. Da måtte jeg gjøre litt ekstra manuelt i scale_x_continuous.
lt_plot %>%
  ggplot(aes(x = 1:517, group = 1))+
  geom_line(aes(y = Globe), linetype = 1, color = "slateblue4", lineend = "round")+
  geom_point(aes(y = Globe), alpha = 0.30, color = "slateblue4")+
  geom_line(aes(y = thirteen_avg), lwd = 1, lineend = "butt", color = "mediumvioletred") +
  scale_y_continuous(breaks = round(seq(min(lt_plot$Globe), max(lt_plot$Globe), by = 0.1),1))+
  scale_x_continuous(name = "", breaks=seq(1,517,12), labels = manual_years)+
  geom_hline(yintercept = 0, alpha = 0.60, color = "darkgray") +
  labs(x = "",
       y = "T Departure from 91`-20` Average\n Deg. Celcius",
       title = "Latest Global Average Trophospheric Temperatures", size = 8)+
  theme(axis.text.x = element_text(angle = 90, size = 8),
        panel.background = element_rect(fill = "white", colour = "grey85"),
        panel.grid.major = element_line(colour = "gray92"),
        panel.grid.minor = element_line(colour = "gray98"))+
  annotate(geom="text", x=300, y=0.5, label="Running Centered\n13 Month Average",
          color="Black", size = 2.5)+
  annotate(geom = "segment", x = 270, xend = 250, y = 0.4, yend = 0.3, color = "mediumvioletred",
          arrow = arrow(ends = "both", angle = 45, length = unit(.2,"cm")))+
  annotate(geom="text", x=80, y=0.5,
          label="UAH Satellite-Based\nTemperature of the\nGlobal Lower Atmosphere\n [Version 6.0]",
          color="slateblue4", size = 3.5)

```

```
## Warning: Removed 12 row(s) containing missing values (geom_path).
```

Latest Global Average Tropospheric Temperatures



OPPGAVE 2

```
#Lastet in datasettene en etter en.
uahncdc_lt_6_0.txt <- fread("http://www.nsstc.uah.edu/data/msu/v6.0/tlt/uahncdc_lt_6.0.txt",
                           header = TRUE,
                           sep = "auto",
                           stringsAsFactors = FALSE,
                           fill = TRUE)

names(uahncdc_lt_6_0.txt)<-make.names(names(uahncdc_lt_6_0.txt),unique = TRUE)

uahncdc_mt_6_0.txt <- fread("https://www.nsstc.uah.edu/data/msu/v6.0/tmt/uahncdc_mt_6.0.txt",
                           header = TRUE,
                           sep = "auto",
                           stringsAsFactors = FALSE,
                           fill = TRUE)

names(uahncdc_mt_6_0.txt)<-make.names(names(uahncdc_mt_6_0.txt),unique = TRUE)

uahncdc_tp_6_0.txt <- fread("https://www.nsstc.uah.edu/data/msu/v6.0/ttp/uahncdc_tp_6.0.txt",
                           header = TRUE,
                           sep = "auto",
                           stringsAsFactors = FALSE,
                           fill = TRUE)

names(uahncdc_tp_6_0.txt)<-make.names(names(uahncdc_tp_6_0.txt),unique = TRUE)

uahncdc_ls_6_0.txt <- fread("https://www.nsstc.uah.edu/data/msu/v6.0/tls/uahncdc_ls_6.0.txt",
                           header = TRUE,
                           sep = "auto",
                           stringsAsFactors = FALSE,
                           fill = TRUE)

names(uahncdc_ls_6_0.txt)<-make.names(names(uahncdc_ls_6_0.txt),unique = TRUE)

#kvitter meg med unødvendig kolonner og rader i alle datasettene
lt_raw <- select(uahncdc_lt_6_0.txt, -c(USA48, USA49, AUST))
str(lt_raw)

## Classes 'data.table' and 'data.frame':  529 obs. of  26 variables:
## $ Year   : chr  "1978" "1979" "1979" "1979" ...
## $ Mo     : chr  "12"  "1"  "2"  "3"  ...
## $ Globe  : chr  "-0.48" "-0.47" "-0.43" "-0.38" ...
## $ Land   : chr  "-0.51" "-0.64" "-0.56" "-0.51" ...
## ....
lt_raw1 <- lt_raw %>% slice(-c(518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529))

mt_raw <- select(uahncdc_mt_6_0.txt, -c(USA48, USA49, AUST))
str(mt_raw)

## Classes 'data.table' and 'data.frame':  529 obs. of  26 variables:
## $ Year   : chr  "1978" "1979" "1979" "1979" ...
## $ Mo     : chr  "12"  "1"  "2"  "3"  ...
## $ Globe  : chr  "-0.30" "-0.29" "-0.28" "-0.22" ...
## $ Land   : chr  "-0.35" "-0.41" "-0.30" "-0.22" ...
```

```

....
mt_raw1 <- mt_raw %>% slice(-c(518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529))

tp_raw <- select(uahncdc_tp_6_0.txt, -c(USA48, USA49, AUST))
str(tp_raw)

## Classes 'data.table' and 'data.frame': 529 obs. of 26 variables:
## $ Year : chr "1978" "1979" "1979" "1979" ...
## $ Mo : chr "12" "1" "2" "3" ...
## $ Globe : chr "0.05" "0.06" "0.03" "0.11" ...
## $ Land : chr "-0.05" "0.02" "0.20" "0.35" ...
....
tp_raw1 <- tp_raw %>% slice(-c(518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529))

ls_raw <- select(uahncdc_ls_6_0.txt, -c(USA48, USA49, AUST))
str(ls_raw)

## Classes 'data.table' and 'data.frame': 529 obs. of 26 variables:
## $ Year : chr "1978" "1979" "1979" "1979" ...
## $ Mo : chr "12" "1" "2" "3" ...
## $ Globe : chr "1.14" "1.14" "0.92" "0.99" ...
## $ Land : chr "0.55" "1.19" "1.03" "1.32" ...
....
ls_raw1 <- ls_raw %>% slice(-c(518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529))

#Velger ønskelige kolloner
lt_<-lt_raw1 %>%
  select(Year, Mo, NoPol)
mt_<-mt_raw1 %>%
  select(NoPol)
tp_<-tp_raw1 %>%
  select(NoPol)
ls_<-ls_raw1 %>%
  select(NoPol)

#Samlet datasettene til ett ved hjelp av cbind()
#Deretter gjorde jeg om på navnene på kolonnene.
all_<- cbind(lt_, mt_,tp_,ls_)

names(all_)<-make.names(names(all_),unique = TRUE)

all_1<- all_ %>%
  rename(NoPol_lt_ = NoPol,
         NoPol_mt_ = NoPol.1,
         NoPol_tp_ = NoPol.2,
         NoPol_ls_ = NoPol.3)

head(all_1)

## Year Mo NoPol_lt_ NoPol_mt_ NoPol_tp_ NoPol_ls_
## 1: 1978 12 -0.39 -0.48 -0.66 -1.13
## 2: 1979 1 -0.46 -0.76 -1.34 -1.95
## 3: 1979 2 -2.00 -1.16 0.48 4.01
## 4: 1979 3 -0.56 0.19 1.64 4.36

```

....

```
#Ville ha en tibble, deretter konverterte jeg de til numeric  
as_tibble(all_1)
```

```
## # A tibble: 517 x 6  
##   Year Mo   NoPol_lt_ NoPol_mt_ NoPol_tp_ NoPol_ls_  
##   <chr> <chr> <chr>      <chr>      <chr>      <chr>  
## 1 1978 12   -0.39    -0.48    -0.66    -1.13  
## 2 1979 1    -0.46    -0.76    -1.34    -1.95
```

....

```
convert_to_numeric <- c("NoPol_lt_", "NoPol_mt_", "NoPol_tp_", "NoPol_ls_")
```

```
all_1[, convert_to_numeric] <- all_1[, lapply(.SD, as.numeric), .SDcols = convert_to_numeric]
```

```
#Utførte rowmeans() av alle NoPol kolonnene. Resultatet til ny kolonne  
#kalt "Avg_NoPol".  
#Deretter kjørte jeg rollmean av Avg_NoPol som jeg kalte for "thirteen_avg_NoPol"  
all_2<-mutate(all_1, Avg_NoPol = rowMeans(select(all_1, ends_with("_")), na.rm = TRUE))
```

```
all_plot<- all_2 %>% mutate(thirteen_avg_NoPol = rollmean(Avg_NoPol, 13,  
                                                           align="right",  
                                                           fill=NA)) %>%  
  
  relocate(thirteen_avg_NoPol)  
str(all_plot)
```

```
## Classes 'data.table' and 'data.frame': 517 obs. of 8 variables:  
## $ thirteen_avg_NoPol: num NA NA NA NA NA NA NA NA NA NA ...  
## $ Year : chr "1978" "1979" "1979" "1979" ...  
## $ Mo : chr "12" "1" "2" "3" ...  
## $ NoPol_lt_ : num -0.39 -0.46 -2 -0.56 -0.84 -0.76 -0.76 -0.2 -0.26 -0.17 ...  
....
```

```
#Jeg forsøkte forskjellige plot for å se hva som så mest oversiktelig ut.  
#Endte opp med at geom_line() som for meg hvertfall var lettest å lese av.  
#Prøvde å holde meg på samme linje visuelt som i Oppg1.
```

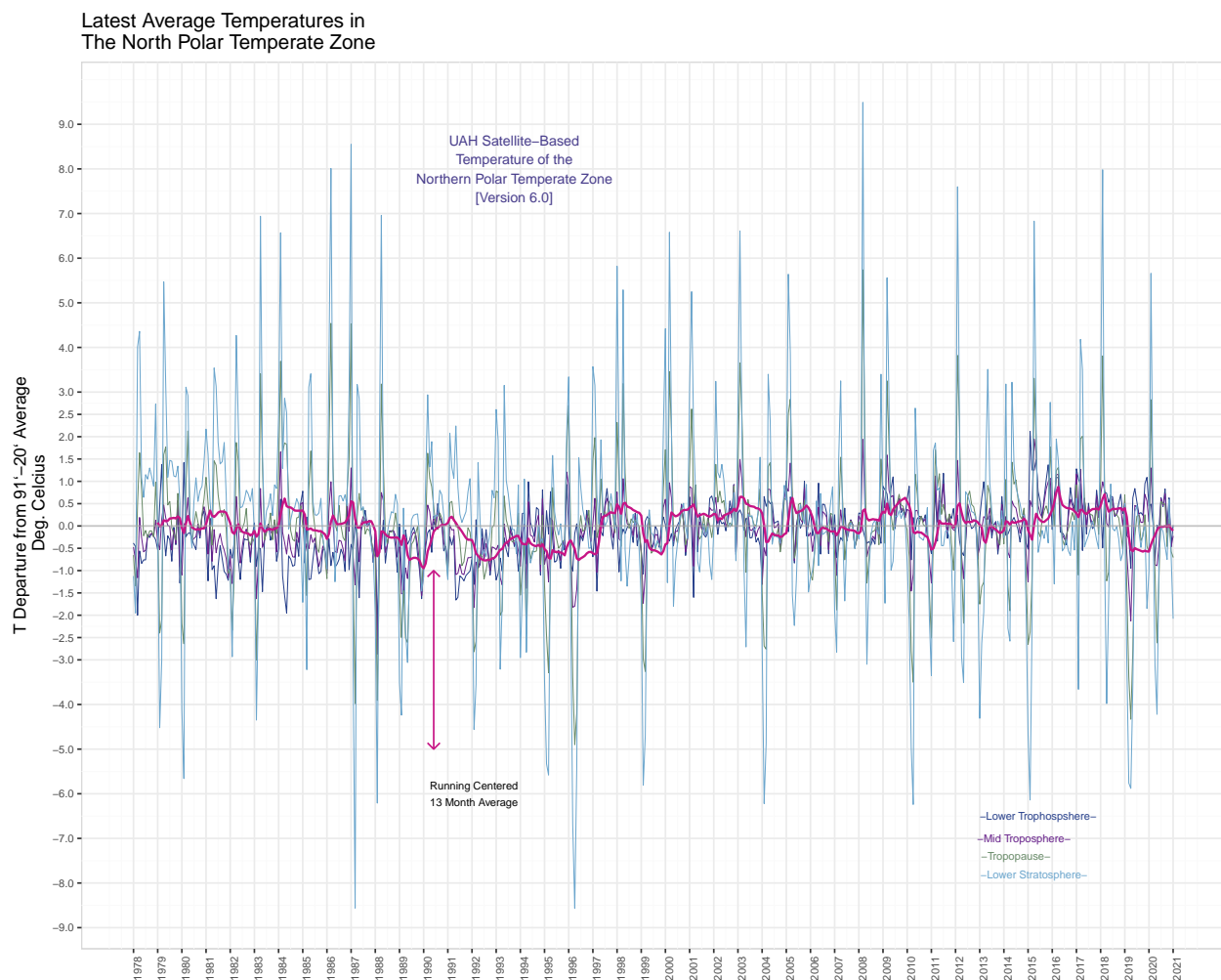
```
all_plot %>%  
  ggplot(aes(x = 1:517, group = 1))+  
  geom_line(aes(y = NoPol_lt_), linetype = 1, lwd = 0.3, color = "royalblue4", lineend = "round")+  
  geom_line(aes(y = NoPol_mt_), linetype = 1, lwd = 0.3, color = "darkorchid4", lineend = "round")+  
  geom_line(aes(y = NoPol_tp_), linetype = 1, lwd = 0.3, color = "darkseagreen4", lineend = "round")+  
  geom_line(aes(y = NoPol_ls_), linetype = 1, lwd = 0.3, color = "skyblue3", lineend = "round")+  
  geom_line(aes(y = thirteen_avg_NoPol), linetype = 1, lwd = 0.7, lineend = "butt", color = "mediumvioletred3")+  
  scale_y_continuous(breaks = c(-9,-8,-7,-6,-5,-4,-3,-2,-2.5,-1.5,-1.0,-0.5,0.0,  
                                0.5,1.0,1.5,2.0,2.5,3,4,5,6,7,8,9)) +  
  scale_x_continuous(name = "", breaks=seq(1,517,12), labels = manual_years)+  
  geom_hline(yintercept = 0, alpha = 0.60, color = "darkgray") +  
  labs(x = "",  
       y = "T Departure from 91`-20` Average\n Deg. Celcius",  
       title = "Latest Average Temperatures in\nThe North Polar Temperate Zone")+  
  theme(axis.text.x = element_text(angle = 90, size = 7),  
        axis.text.y = element_text(size = 7),  
        panel.background = element_rect(fill = "white", colour = "grey85"),  
        panel.grid.major = element_line(colour = "gray92"),  
        panel.grid.minor = element_line(colour = "gray98"))+
```

```

annotate(geom="text", x=170, y=-6.0, label="Running Centered\n13 Month Average",
        color="Black", size = 2.5)+
annotate(geom = "segment", x = 150, xend = 150, y = -5.0, yend = -1.0, color = "mediumvioletred",
        arrow = arrow(ends = "both", angle = 45, length = unit(.2,"cm")))+
annotate(geom="text", x=190, y=8.0,
        label="UAH Satellite-Based\nTemperature of the\nNorthern Polar Temperate Zone\n[Version 6.0]",
        color="slateblue4", size = 3.0)+
annotate(geom="text", x=450, y=-6.5,
        label="-Lower Trophosphere-",
        color="royalblue4", size = 2.5)+
annotate(geom="text", x=443, y=-7.0,
        label="-Mid Troposphere-",
        color="darkorchid4", size = 2.5)+
annotate(geom="text", x=439, y=-7.4,
        label="-Tropopause-",
        color="darkseagreen4", size = 2.5)+
annotate(geom="text", x=448, y=-7.8,
        label="-Lower Stratosphere-",
        color="skyblue3", size = 2.5)

```

Warning: Removed 12 row(s) containing missing values (geom_path).



R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

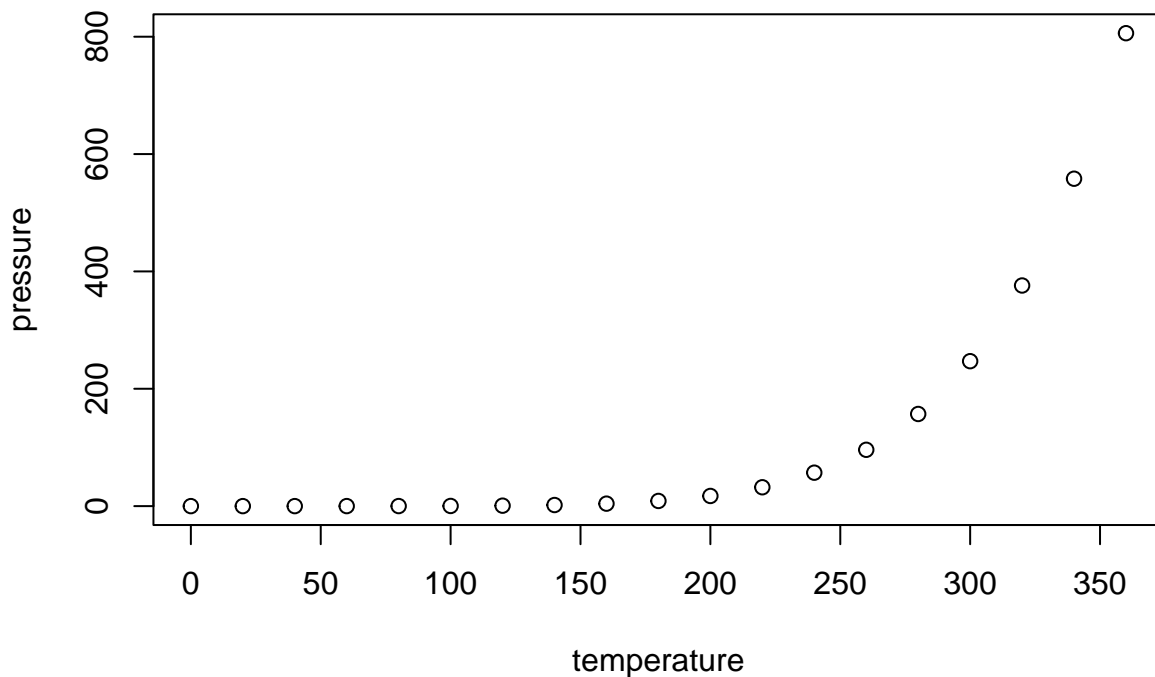
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed      dist
##  Min.   : 4.0    Min.   :  2.00
##  1st Qu.:12.0    1st Qu.: 26.00
##  Median :15.0    Median : 36.00
##  Mean   :15.4    Mean   : 42.98
##  3rd Qu.:19.0    3rd Qu.: 56.00
##  Max.   :25.0    Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.