Moritz-Ivo Will Plant Science Data

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Report for Greenhouse X1

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Jargon

- the X1 is greenhouse 1, (there are also larger datasets with X2) .
- The c, b and p behind X1 are the location of the sensors.
- PAR stands for photosynthetic active radiation (basically a measure of sunlight),
- T is temperature in degrees Celsius, and
- RH is relative humidity.

```
rm(list = ls())
plant_science <- read_csv("./file.csv") %>%
  janitor::clean_names()
```

```
## New names:
## * `` -> ...1
```

```
## Rows: 1000 Columns: 38
```

```
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## dbl (38): ...1, time, X1c.PAR1, X1c.PAR2, X1c.PAR3, X1c.PAR4, X1c.T1, X1c.T2...
```

```
##
## 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.
```

```
plant_science <- plant_science %>% janitor::remove_empty(which = c("rows","cols"))
```

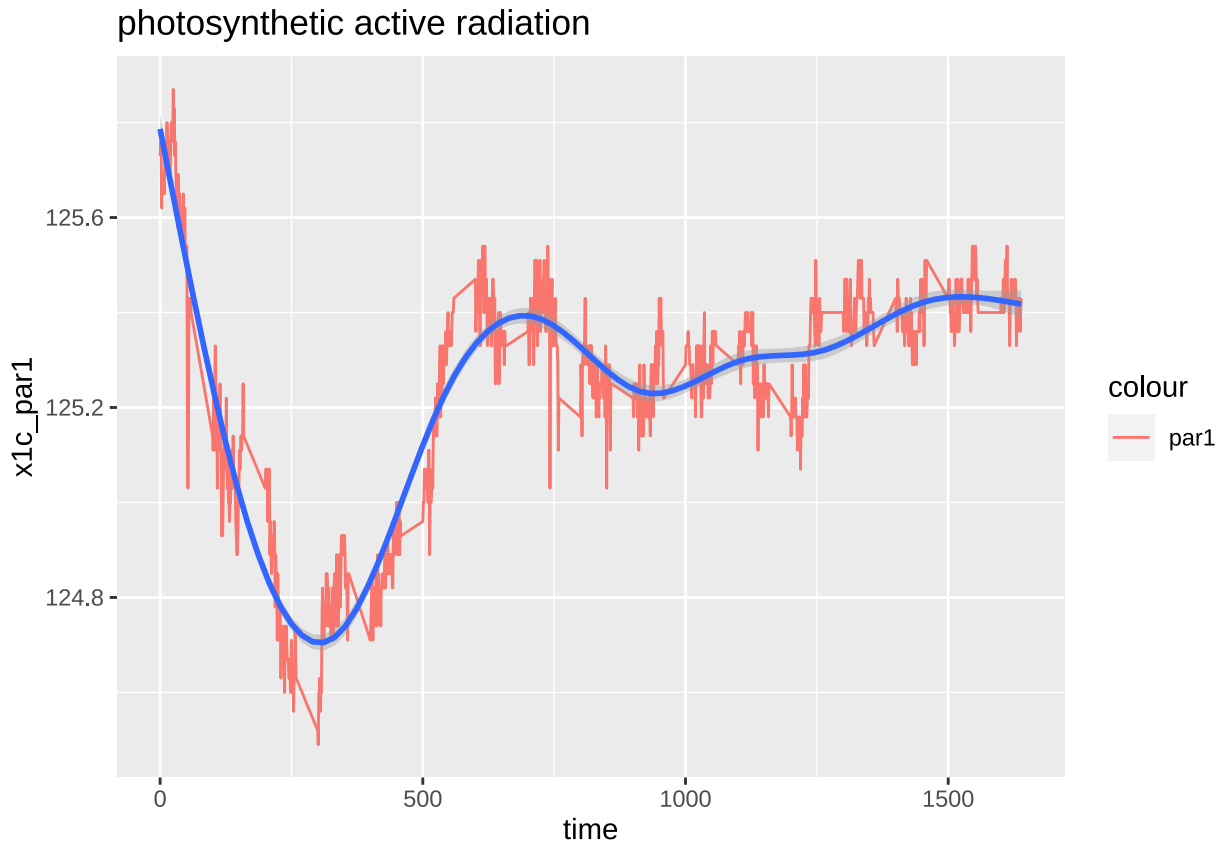
Sensor X1C

```
sensor_x1c <- plant_science %>% select(time:x1c_rh4)
sensor_x1c %>% dlookr::diagnose_numeric()
```

```
## # A tibble: 13 x 10
##    variables    min     Q1     mean median      Q3     max  zero minus outlier
##    <chr>      <dbl>  <dbl>    <dbl>  <dbl>   <dbl>   <dbl> <int> <int>   <int>
##  1 time         0    410.   813.     820.   1229.   1639        1     0       0
##  2 x1c_par1   124.   125.   125.     125.    125.    126.       0     0      47
##  3 x1c_par2    27.1   27.3   27.4     27.4    27.5    27.6      0     0       0
##  4 x1c_par3     9.88   9.95  10.0     10.0    10.1    10.3      0     0       1
##  5 x1c_par4     0.03   0.07   0.0698   0.07    0.07    0.07     0     0       4
##  6 x1c_t1      21.2   21.3   21.4     21.4    21.4    21.5      0     0       0
##  7 x1c_t2      20.1   20.3   20.3     20.3    20.3    20.4      0     0      76
##  8 x1c_t3      19.9   20.0   20.0     20.1    20.1    20.1      0     0       0
##  9 x1c_t4      20.4   20.5   20.5     20.5    20.6    20.6      0     0       0
## 10 x1c_rh1     72.4   74     75.0     74.8    75.8    79.0      0     0      14
## 11 x1c_rh2     81.6   84.4   85.3     85.4    86.5    88.4      0     0       0
## 12 x1c_rh3     82.4   83.0   83.8     83.4    84.4    87.7      0     0      34
## 13 x1c_rh4     76.2   77.2   77.7     77.5    78.2    80.2      0     0      31
```

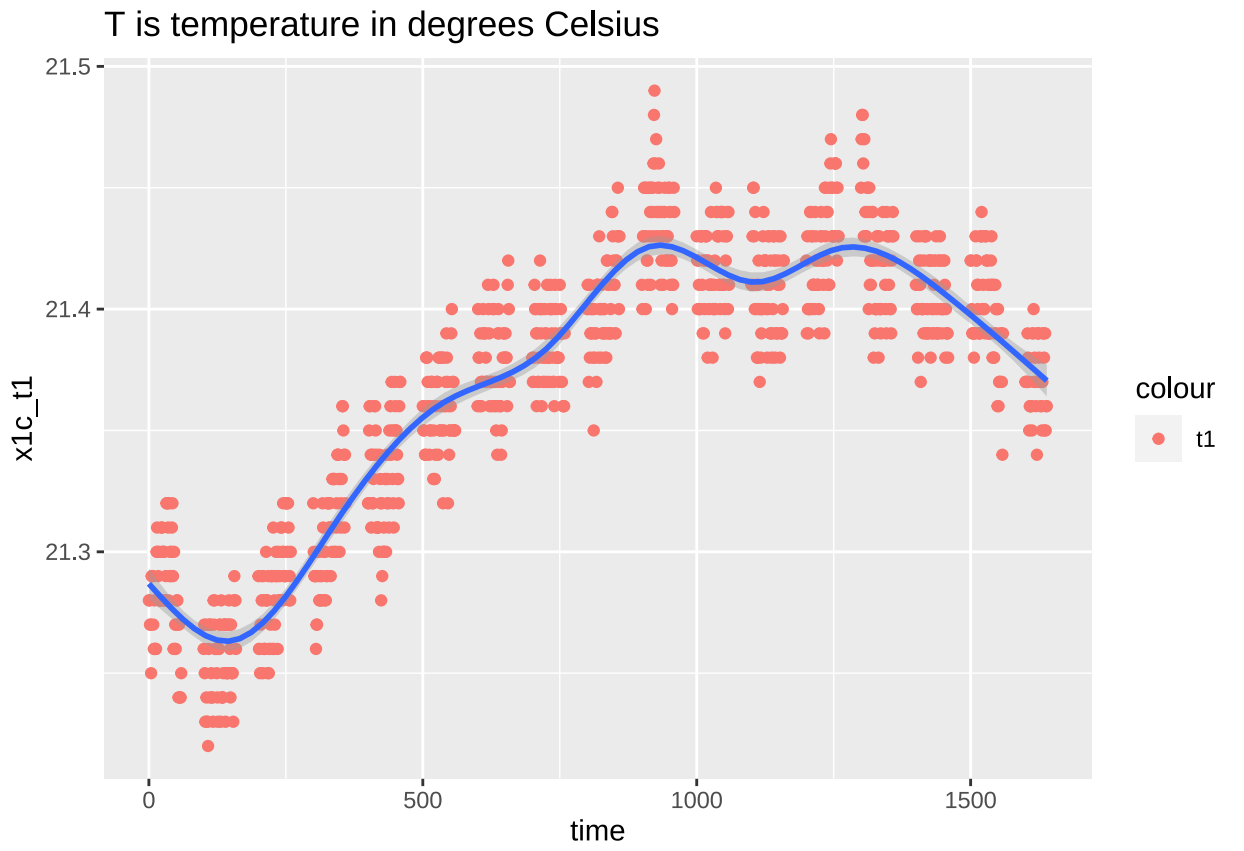
```
ggplot(sensor_x1c) + geom_line(aes(x=time,y=x1c_par1,col="par1")) +
  geom_smooth(aes(x=time,y=x1c_par1)) +
  labs(title = "photosynthetic active radiation")
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```



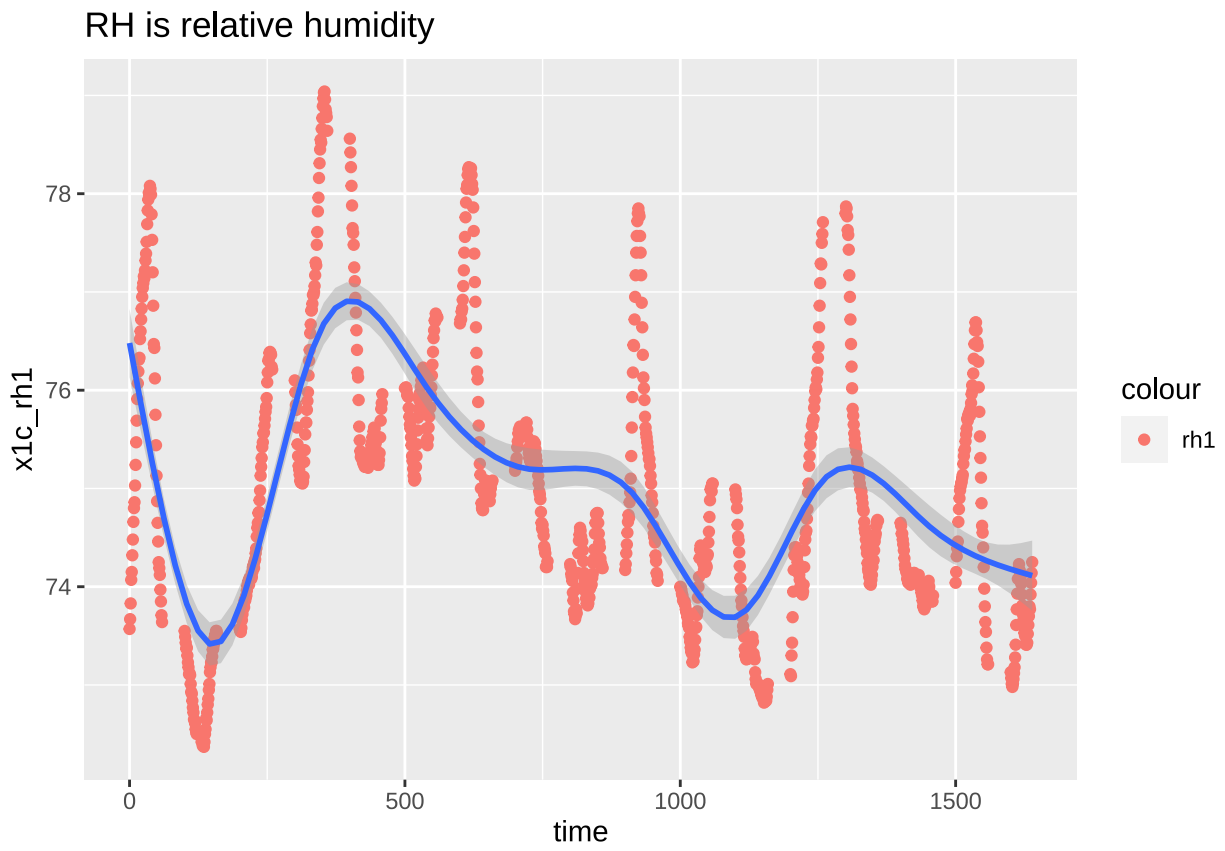
```
ggplot(sensor_x1c) + geom_point(aes(x=time,y=x1c_t1,col="t1")) +
  geom_smooth(aes(x=time,y=x1c_t1)) +
  labs(title ="T is temperature in degrees Celsius")
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```




```
ggplot(sensor_x1c) + geom_point(aes(x=time,y=x1c_rh1,col="rh1")) +
  geom_smooth(aes(x=time,y=x1c_rh1)) +
  labs(title ="RH is relative humidity")
```

```
## `geom_smooth()` using method = 'gam' and formula 'y ~ s(x, bs = "cs")'
```



Sensor X1C

```
sensor_x1b <- plant_science %>% select(time,starts_with("x1b_"))
sensor_x1b %>% dlookr::diagnose_numeric()
```

```
## # A tibble: 13 x 10
##    variables    min     Q1     mean median      Q3    max  zero minus outlier
##    <chr>      <dbl>  <dbl>    <dbl>  <dbl>   <dbl>  <dbl> <int> <int>   <int>
##  1 time         0    410.   813.     820.   1229.   1639       1     0       0
##  2 x1b_par1   108.   108.   108.     108.    109.    109       0     0      20
##  3 x1b_par2    61.1   61.5   61.5     61.5    61.6    61.9     0     0     142
##  4 x1b_par3    39.7   39.8   39.9     39.9    40.0    40.1     0     0       7
##  5 x1b_par4     0.06   0.06   0.0616   0.06    0.06    0.1     0     0      39
##  6 x1b_t1      20.4   20.6   20.6     20.6    20.7    20.8     0     0      14
##  7 x1b_t2      20.2   20.4   20.4     20.4    20.5    20.5     0     0       1
##  8 x1b_t3      20.6   20.7   20.7     20.8    20.8    20.9     0     0       2
##  9 x1b_t4      20.8   20.9   20.9     20.9    21.0    21.1     0     0       0
## 10 x1b_rh1     75.7   77.4   78.4     78.2    79.2    82.4     0     0      10
## 11 x1b_rh2     77.8   79.7   80.6     80.5    81.6    83.8     0     0       0
## 12 x1b_rh3     74.7   76.1   77.0     76.9    77.9    79.2     0     0       0
## 13 x1b_rh4     73.2   74.6   75.4     75.4    76.2    77.8     0     0       0
```

Sensor X1P

```
sensor_x1p <- plant_science %>% select(time,starts_with("x1p_"))
sensor_x1p %>% dlookr::diagnose_numeric()
```

```
## # A tibble: 13 x 10
##    variables    min     Q1   mean median      Q3     max  zero minus outlier
##    <chr>      <dbl>  <dbl>  <dbl>  <dbl>   <dbl>   <dbl> <int> <int>   <int>
##  1 time         0    410.   813.   820.   1229.   1639        1     0       0
##  2 x1p_par1   143.   144.   144.   144.    145.    145.       0     0      27
##  3 x1p_par2   116.   116.   116.   116.    117.    117.       0     0      28
##  4 x1p_par3    84.3   84.7   84.8   84.8    84.9    85.3      0     0     125
##  5 x1p_par4     2.66   2.69   2.71   2.69    2.73    2.73     0     0       0
##  6 x1p_t1      20.5   20.6   20.7   20.7    20.7    20.8      0     0       2
##  7 x1p_t2      20.6   20.7   20.7   20.7    20.8    20.8      0     0       0
##  8 x1p_t3      20.0   20.1   20.1   20.1    20.1    20.2      0     0       0
##  9 x1p_t4      20.1   20.2   20.3   20.2    20.3    20.4      0     0       0
## 10 x1p_rh1     75.2   76.9   77.9   78.0    78.9    80.1      0     0       0
## 11 x1p_rh2     75.4   77.3   78.1   78.2    78.8    79.8      0     0       0
## 12 x1p_rh3     79.0   82.1   82.7   82.8    83.5    84.7      0     0      41
## 13 x1p_rh4     75.1   78.5   80.0   80.5    81.7    82.9      0     0       0
```