Multivariate-Analysis-Sites

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Objective

Goal is to test microclimatic variation hypthesis in long-term forests. i.e. There is a significant microclimatic variations that can be found under forest canopies.

Study system

Mt Rainier is known to house vary distinctive microclimates, for our study we chose 5 sites along an elvational gradient on the southside of Mt Rainier.

Data Preparation

Find monthly minimum temperatures for all the 5 sites

```
#Site T004

T004 <- read_csv("./data/T004-S1.csv",skip = 1)

## Parsed with column specification:
## cols(
##   `#` = col_integer(),
##   `Date Time, GMT-07:00` = col_character(),
##   `Temp, °C (LGR S/N: 2401791, SEN S/N: 2401791, LBL: C)` = col_double(),
##   `Intensity, Lux (LGR S/N: 2401791, SEN S/N: 2401791, LBL: Lux)` = col_double(),
##   `Coupler Attached (LGR S/N: 2401791)` = col_character(),
##   `Host Connected (LGR S/N: 2401791)` = col_character(),
##   `Stopped (LGR S/N: 2401791)` = col_character(),
##   `End Of File (LGR S/N: 2401791)` = col_character()
## )

#rename columns
col_names <- c("index","Date_Time", "Temp", "Intensity", "Coupler" , "HostConnected","Stopped",  "EndOf
colnames(T004) <- col_names
# fix the date
T004$datetime <- as_datetime(T004$Date_Time,format='%m/%d/%y %r',tz="America/Los_Angeles")
#convery date from Posixlt to Posixct - Dplyr requirement
T004$datetime <- as.POSIXct(T004$datetime)
#create summary metrics by month
T004$hr <-strftime(T004$datetime,'%H')
T004$min <-strftime(T004$datetime,'%M')
T004$month <- strftime(T004$datetime,'%m')
T004$day <- strftime(T004$datetime,'%d')

df_T004 <- T004 %>% group_by(month,day) %>%
  mutate(min_daily= min(Temp),max_daily= max(Temp)) %>%
  group_by(month) %>%
```

```r
  mutate(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  filter(month %in% c("06","07","08")) %>%
  summarise(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  select(c("month","min_jja")) %>%
  spread(key = "month",value = "min_jja") %>%  mutate(site="TO04") %>%
  as.data.frame()

#Site AE10

AE10 <- read_csv("./data/AE10-S1.csv",skip = 1)
```

```
## Parsed with column specification:
## cols(
##   `#` = col_integer(),
##   `Date Time, GMT-07:00` = col_character(),
##   `Temp, °C (LGR S/N: 10163328, SEN S/N: 10163328, LBL: C)` = col_double(),
##   `Intensity, Lux (LGR S/N: 10163328, SEN S/N: 10163328, LBL: Lux)` = col_double(),
##   `Coupler Attached (LGR S/N: 10163328)` = col_character(),
##   `Coupler Detached (LGR S/N: 10163328)` = col_character(),
##   `Host Connected (LGR S/N: 10163328)` = col_character(),
##   `Stopped (LGR S/N: 10163328)` = col_character(),
##   `End Of File (LGR S/N: 10163328)` = col_character()
## )
```

```r
#rename columns
col_names <- c("index","Date_Time", "Temp", "Intensity", "Coupler" , "HostConnected","Stopped",  "EndOfF
colnames(AE10) <- col_names
AE10 <- AE10[,col_names]
# fix the date
AE10$datetime <- as_datetime(AE10$Date_Time,format='%m/%d/%y %r',tz="America/Los_Angeles")
#convery date from Posixlt to Posixct - Dplyr requirement
AE10$datetime <- as.POSIXct(AE10$datetime)
#create summary metrics by month
AE10$hr <-strftime(AE10$datetime,'%H')
AE10$min <-strftime(AE10$datetime,'%M')
AE10$month <- strftime(AE10$datetime,'%m')
AE10$day <- strftime(AE10$datetime,'%d')

#missing june
df_AE10 <- AE10 %>%
  group_by(month,day) %>%
  mutate(min_daily= min(Temp),max_daily= max(Temp)) %>%
  group_by(month) %>%
  mutate(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  filter(month %in% c("06","07","08")) %>%
  summarise(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  select(c("month","min_jja")) %>%
  spread(key = "month",value = "min_jja") %>%  mutate(site="AE10") %>%
  as.data.frame()

# add "NA" for june
df_AE10$"06" <- NA
#Site AG05
```

```
AG05 <- read_csv("./data/AG05-S1.csv",skip = 1)
```

```
## Parsed with column specification:
## cols(
##   `#` = col_integer(),
##   `Date Time, GMT-07:00` = col_character(),
##   `Temp, °C (LGR S/N: 10603887, SEN S/N: 10603887, LBL: C)` = col_double(),
##   `Intensity, Lux (LGR S/N: 10603887, SEN S/N: 10603887, LBL: Lux)` = col_double(),
##   `Coupler Attached (LGR S/N: 10603887)` = col_character(),
##   `Host Connected (LGR S/N: 10603887)` = col_character(),
##   `Stopped (LGR S/N: 10603887)` = col_character(),
##   `End Of File (LGR S/N: 10603887)` = col_character()
## )
```
```
#rename columns
col_names <- c("index","Date_Time", "Temp", "Intensity", "Coupler" , "HostConnected","Stopped",  "EndOf
colnames(AG05) <- col_names
AG05 <- AG05[,col_names]
# fix the date
AG05$datetime <- as_datetime(AG05$Date_Time,format='%m/%d/%y %r',tz="America/Los_Angeles")
#convery date from Posixlt to Posixct - Dplyr requirement
AG05$datetime <- as.POSIXct(AG05$datetime)
#create summary metrics by month
AG05$hr <-strftime(AG05$datetime,'%H')
AG05$min <-strftime(AG05$datetime,'%M')
AG05$month <- strftime(AG05$datetime,'%m')
AG05$day <- strftime(AG05$datetime,'%d')

#
df_AG05 <- AG05 %>%
  group_by(month,day) %>%
  mutate(min_daily= min(Temp),max_daily= max(Temp)) %>%
  group_by(month) %>%
  mutate(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  filter(month %in% c("06","07","08")) %>%
  summarise(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  select(c("month","min_jja")) %>%
  spread(key = "month",value = "min_jja") %>%  mutate(site="AG05") %>%
  as.data.frame()

#Site AM16

AM16 <- read_csv("./data/AM16-S1.csv",skip = 1)
```

```
## Parsed with column specification:
## cols(
##   `#` = col_integer(),
##   `Date Time, GMT-07:00` = col_character(),
##   `Temp, °C (LGR S/N: 10163323, SEN S/N: 10163323, LBL: C)` = col_double(),
##   `Intensity, Lux (LGR S/N: 10163323, SEN S/N: 10163323, LBL: Lux)` = col_double(),
##   `Coupler Attached (LGR S/N: 10163323)` = col_character(),
##   `Host Connected (LGR S/N: 10163323)` = col_character(),
##   `Stopped (LGR S/N: 10163323)` = col_character(),
##   `End Of File (LGR S/N: 10163323)` = col_character()
```

```r
## )
#rename columns
col_names <- c("index","Date_Time", "Temp", "Intensity", "Coupler" , "HostConnected","Stopped",  "EndOf
colnames(AM16) <- col_names
AM16 <- AM16[,col_names]
# fix the date
AM16$datetime <- as_datetime(AM16$Date_Time,format='%m/%d/%y %r',tz="America/Los_Angeles")
#convery date from Posixlt to Posixct - Dplyr requirement
AM16$datetime <- as.POSIXct(AM16$datetime)
#create summary metrics by month
AM16$hr <-strftime(AM16$datetime,'%H')
AM16$min <-strftime(AM16$datetime,'%M')
AM16$month <- strftime(AM16$datetime,'%m')
AM16$day <- strftime(AM16$datetime,'%d')

#
df_AM16 <- AM16 %>%
  group_by(month,day) %>%
  mutate(min_daily= min(Temp),max_daily= max(Temp)) %>%
  group_by(month) %>%
  mutate(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  filter(month %in% c("06","07","08")) %>%
  summarise(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  select(c("month","min_jja")) %>%
  spread(key = "month",value = "min_jja") %>%  mutate(site="AM16") %>%
  as.data.frame()

#Site AV06

AV06 <- read_csv("./data/AV06-S1.csv",skip = 1)

## Parsed with column specification:
## cols(
##   `#` = col_integer(),
##   `Date Time, GMT-07:00` = col_character(),
##   `Temp, °C (LGR S/N: 2409564, SEN S/N: 2409564, LBL: C)` = col_double(),
##   `Intensity, Lux (LGR S/N: 2409564, SEN S/N: 2409564, LBL: Lux)` = col_double(),
##   `Coupler Attached (LGR S/N: 2409564)` = col_character(),
##   `Host Connected (LGR S/N: 2409564)` = col_character(),
##   `Stopped (LGR S/N: 2409564)` = col_character(),
##   `End Of File (LGR S/N: 2409564)` = col_character()
## )
#rename columns
col_names <- c("index","Date_Time", "Temp", "Intensity", "Coupler" , "HostConnected","Stopped",  "EndOf
colnames(AV06) <- col_names
AV06 <- AV06[,col_names]
# fix the date
AV06$datetime <- as_datetime(AV06$Date_Time,format='%m/%d/%y %r',tz="America/Los_Angeles")
#convery date from Posixlt to Posixct - Dplyr requirement
AV06$datetime <- as.POSIXct(AV06$datetime)
#create summary metrics by month
AV06$hr <-strftime(AV06$datetime,'%H')
AV06$min <-strftime(AV06$datetime,'%M')
```

```
AV06$month <- strftime(AV06$datetime,'%m')
AV06$day <- strftime(AV06$datetime,'%d')

#
df_AV06 <- AV06 %>%
  group_by(month,day) %>%
  mutate(min_daily= min(Temp),max_daily= max(Temp)) %>%
  group_by(month) %>%
  mutate(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  filter(month %in% c("06","07","08")) %>%
  summarise(min_jja = mean(min_daily,na.rm = T),max_jja = max(max_daily,na.rm = T)) %>%
  select(c("month","min_jja")) %>%
  spread(key = "month",value = "min_jja") %>%  mutate(site="AV06") %>%
  as.data.frame()

#site characteristics
```

Combine into 1 dataframe

Add additional site characteristics

```
## Parsed with column specification:
## cols(
##   site = col_character(),
##   lat = col_double(),
##   long = col_double()
## )
```

Save the files

Exploratory Plots

You can also embed plots, for example: