Extracting Climate Data from Prism

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Here, I download climate data for each of the LTER sites from Prism and put it in a long format data frame.

First, load required packages

```
library(tidyverse)
library(stringr)
library(prism)
library(raster)
library(magrittr)
library(popler)
```

Fetch Data

Prism has daily, monthly, or annual climate data. Climate measures are tmin, tmax, tmean, and ppt. Here, I've extracted monthly tmean and ppt for from 2000-2005.

```
# First, set a file path where prism data will be stored
# I recommend deleting contents this folder before downloading each new batch of data
options(prism.path = 'C:\\Users\\Shannon\\Documents\\F18 Topics in Ecology\\prism.path_monthly')

# Now, select the type and date range
get_prism_monthlys(type = 'tmean', years = 2000:2005, mo = 1:12, keepZip = F)
get_prism_monthlys(type = 'ppt', years = 2000:2005, mo = 1:12, keepZip = F)
```

Process Data

First, stack raster data and extract coordinates

```
# Here, you'll need to specify which dataset to pull if you've downloaded multiple to the path.
mystack <- ls_prism_data() %>%
  prism_stack(.)

# Get project coordinates from raster stack
mycrs <- mystack@crs@projargs
```

Now, make a dataframe of coordinates for each LTER site, put them in the same coordinate reference system (CRS) as the Prism data, and match them

```
# First, pull all LTER sites
all_studies <- popler::pplr_browse()

# Select just the lat/long and site ID columns and make a df
lter_sites <- all_studies %>%
  dplyr::select(lng_lter,lat_lter, lterid)

lter_sites <- as.data.frame(lter_sites)
```

```r
# Convert these locations to format that can be matched to prism data
coordinates(lter_sites) <- c('lng_lter', 'lat_lter')
proj4string(lter_sites) <- CRS(mycrs)
```

Tidy Data

Wrangle data to long format with columns lat, long, site ID, time, and climate

```r
# Extract data from raster
data <- data.frame(coordinates(lter_sites), lter_sites$lterid, extract(mystack, lter_sites))

# Reshape data. Col 1:3 are lat, long, and site ID. Col 4:ncol are climate data
# Column headers include date and climate type info
data <- data %>%
  gather(date, value, 4:ncol(data))

# Remove the extra info from the column header
data$date <- gsub('PRISM_', '', data$date) %>%
  gsub('stable_4kmM3_', '', .) %>%
  gsub('stable_4kmM2_', '', .) %>%
  gsub('_bil', '', .)

# Split header into type, year, and month
data <- separate(data, 'date',
                 into = c('type', 'YearMonth'),
                 sep = '_')
data <- separate(data, 'YearMonth',
                 into = c('year', 'month'),
                 sep = 4)

# Reshape data
data <- unique(data)
data <- data %>%
  spread(type, value) %>%
  rename(lng = lng_lter, lat = lat_lter, lterid = lter_sites.lterid)

# Order data
data <- data[order(data$lterid),]
```

View Data

```r
head(data)
```

```
##          lng    lat lterid year month    ppt tmean
## 217 -122.26 44.21    AND 2000    01 474.28  1.64
## 218 -122.26 44.21    AND 2000    02 256.22  4.31
## 219 -122.26 44.21    AND 2000    03 171.27  5.44
## 220 -122.26 44.21    AND 2000    04 103.51 10.07
## 221 -122.26 44.21    AND 2000    05 142.10 11.27
## 222 -122.26 44.21    AND 2000    06  82.94 17.20
```

```
str(data)
```

```
## 'data.frame':    1800 obs. of  7 variables:
##  $ lng   : num  -122 -122 -122 -122 -122 ...
##  $ lat   : num  44.2 44.2 44.2 44.2 44.2 ...
##  $ lterid: Factor w/ 25 levels "AND","ARC","BNZ",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ year  : chr  "2000" "2000" "2000" "2000" ...
##  $ month : chr  "01" "02" "03" "04" ...
##  $ ppt   : num  474 256 171 104 142 ...
##  $ tmean : num  1.64 4.31 5.44 10.07 11.27 ...
```

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