intro

Learning Objectives

After completing this tutorial, you will be able to:

What you need

You will need a computer with internet access to complete this lesson and the data for week 6 of the course.

```
library(raster)
library(rgdal)
options(stringsAsFactors = F)
```

It's really useful to be able to grab a list of files

```
# get list of all tifs
list.files("data/week6/Landsat/LC80340322016205-SC20170127160728")
##  [1] "crop"
##  [2] "LC80340322016205LGN00_bqa.tif"
##  [3] "LC80340322016205LGN00_cfmask_conf.tif"
##  [4] "LC80340322016205LGN00_cfmask.tif"
##  [5] "LC80340322016205LGN00_MTL.txt"
##  [6] "LC80340322016205LGN00_sr_band1.tif"
##  [7] "LC80340322016205LGN00_sr_band2.tif"
##  [8] "LC80340322016205LGN00_sr_band3.tif"
##  [9] "LC80340322016205LGN00_sr_band4.tif"
## [10] "LC80340322016205LGN00_sr_band5.tif"
## [11] "LC80340322016205LGN00_sr_band6.tif"
## [12] "LC80340322016205LGN00_sr_band7.tif"
## [13] "LC80340322016205LGN00_sr_cloud.tif"
## [14] "LC80340322016205LGN00_sr_ipflag.tif"
## [15] "LC80340322016205LGN00.xml"

# but really we just want the tif files
all_landsat_bands <- list.files("data/week6/Landsat/LC80340322016205-SC20170127160728",
          pattern="band",  # grab file names that contain "band" in the name
          full.names = T,
            )

# but really we just want the tif files
list.files("data/week6/Landsat/LC80340322016205-SC20170127160728",
          pattern=".tif$") # use the dollar sign at the end to get all files that END WITH
##  [1] "LC80340322016205LGN00_bqa.tif"
##  [2] "LC80340322016205LGN00_cfmask_conf.tif"
##  [3] "LC80340322016205LGN00_cfmask.tif"
##  [4] "LC80340322016205LGN00_sr_band1.tif"
##  [5] "LC80340322016205LGN00_sr_band2.tif"
##  [6] "LC80340322016205LGN00_sr_band3.tif"
##  [7] "LC80340322016205LGN00_sr_band4.tif"
##  [8] "LC80340322016205LGN00_sr_band5.tif"
##  [9] "LC80340322016205LGN00_sr_band6.tif"
```

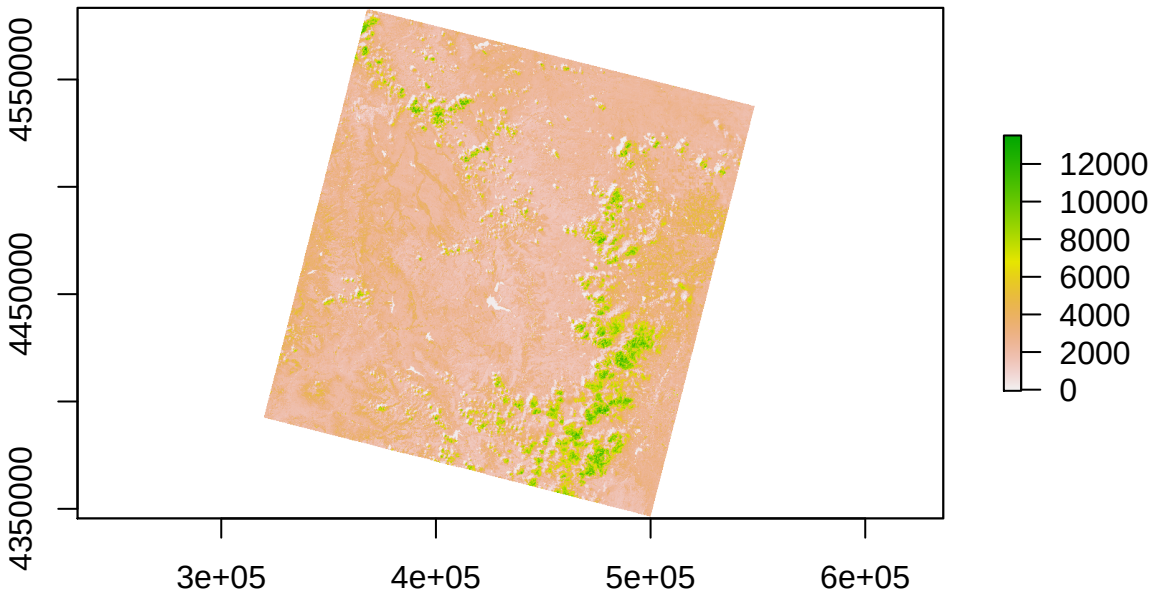

Figure 1:

```
## [10] "LC80340322016205LGN00_sr_band7.tif"
## [11] "LC80340322016205LGN00_sr_cloud.tif"
## [12] "LC80340322016205LGN00_sr_ipflag.tif"
```

We could open the files one by one... yawn

```
band_one <- raster("data/week6/Landsat/LC80340322016205-SC20170127160728/LC80340322016205LGN00_sr_band5

plot(band_one)
```

```
crs(band_one)
## CRS arguments:
##  +proj=utm +zone=13 +datum=WGS84 +units=m +no_defs +ellps=WGS84
## +towgs84=0,0,0

# or we could create a raster stack this way
all_bands <- stack(all_landsat_bands)
plot(all_bands$LC80340322016205LGN00_sr_band1)
```

let's crop all of the rasters

Reproject the extent to the landsat data

The landsat data are much larger than the scene that we downloaded. I think we should crop all the layers to the study area but show them we've done that.

Additional resources

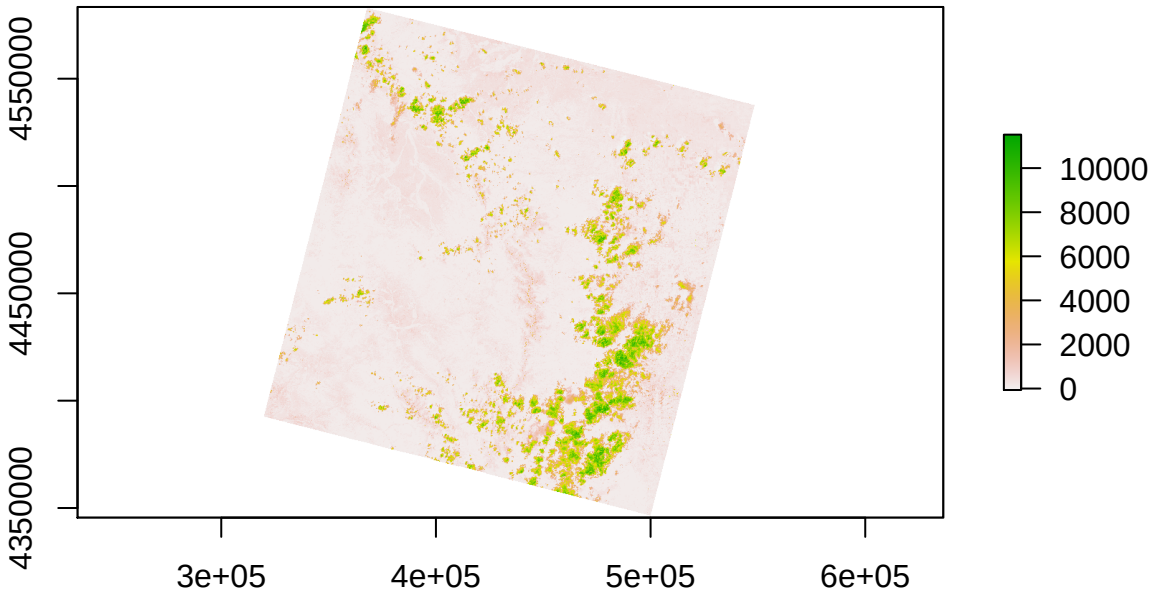
4550000
4450000
4350000
3e+05
4e+05
5e+05
6e+05
10000
8000
6000
4000
2000
0

Figure 2: