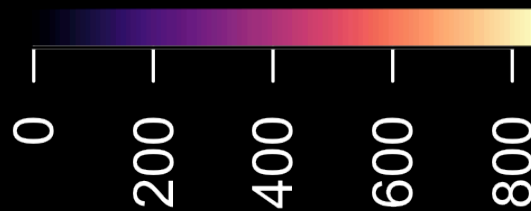


Geospatial Analysis with R

Class 1



```
library(raster)
library(viridis)
ghana_dem <- getData(name = "alt", country = "GHA")
png("inst/slides/figures/ghana-dem.png", bg = "transparent", height = 4,
    width = 3, res = 300, units = "in")
par(mar = c(3, 0, 0, 0))
plot(as(extent(ghana_dem), "SpatialPolygons"), lty = 0)
plot(ghana_dem, col = magma(100), add = TRUE, axes = FALSE, box = FALSE,
    legend = FALSE)
plot(ghana_dem, col = magma(100), legend.only = TRUE, horizontal = TRUE,
    axis.args = list(col.axis = "white", col = "white", las = 2),
    legend.args = list(text = "", col = "white"))
dev.off()
```

Class Overview

- By the end of this class, you should:
 - Be comfortable in working with R, including most common geospatial functions
 - Have a good sense of where R is headed as a language
 - Know where to look when don't know how to do something
 - Be using R as part of a *reproducible* workflow
- Course approach
 - (Largely) flipped model and emphasis on problem solving
 - Programming should be fun! (or at least intriguing)
 - Lab and office hours as help sessions

Reproducibility 1

The figure displays two side-by-side screenshots of a file explorer interface, illustrating the organization of research data and code into 'Not Reproducible' and 'Reproducible' categories.

Not Reproducible: This folder contains a variety of files, including documents (e.g., 'Latest_Biodi...avannas.docx', 'maizeNlivest...ovement.pptx', 'Mammalian...orld wide2.pdf'), data files (e.g., 'div.boxplots.nolab.tif', 'div.histographs.tif', 'wet.savannas1.R' through 'wet.savannas8.R'), and project files (e.g., '.DS_Store', '.Rhistory', '.Rproj.user', 'African food...20-2013.xlsx', 'analyses_15012014', 'Angola_mlo...okavango.png', 'Beringer_02052012.docx', 'Beringer_04102012', 'Beringer_11012012', 'clim.sensitivity_AnGS.png', 'clim.sensitivity.png', 'cpt_maps_140212.R', 'crop+live+veg_a.tif', 'crop+live+veg_norm_4c1.tif', 'crop+live+veg_norm2.tif', 'crop+live+veg_rev_4c1.png', 'crop+live+veg_rev_4c1.tif', 'crop+live+veg.tif', 'crop+live+veg2.tif', 'cropliveveg4c1.png', 'crops+live+soc.tif', 'crops+live+toc.tif').

Reproducible: This folder is highlighted in orange and contains a structured set of files. It includes a '.gitignore' file, a '.Rproj.user' folder, a 'changelog.txt' file, a 'data' folder, a 'DESCRIPTION' file, an 'external' folder, an 'inst' folder, a 'man' folder, a 'NAMESPACE' file, a 'paper' folder, an 'R' folder, a 'README.md' file, and a series of Rmd files (e.g., 'c1-landcov...ess-1.Rmd', 'c2-landcov...ess-2.Rmd', 'c2a-landco...figure.Rmd', 'c3-cropland-1.Rmd', 'c4-cropland-2.Rmd', 'c5-accurac...ensity.Rmd', 'c6-carbon.Rmd', 'c7-et.Rmd', 'c8-yield-pr...uction.Rmd', 'c9-agent-...-model.Rmd', 'c10-locali...impact.html', 'c10-locali...impact.Rmd', 'c99-misc.html', 'c99-misc.Rmd', 'code.pdf', 'code.Rmd', 'compile-book.html', 'compile-book.Rmd', 'old').

Reproducibility 2

```
79 ▾ ### Bring in landcover datasets
80 Let's start with the improved/fusion datasets, GLC share and geo-wiki's
81 ▾ ```{r, eval = FALSE}
82 ▾ if(!file.exists(fp(p_data, "glcsa_masked.tif"))) { # see if file exists,
83   # to avoid redoing step
84   path <- "/u/lestes/spatial_data/glc_share/"
85   url <- "http://www.fao.org/geonetwork/srv/en/resources.get?id=47948&fname=GlcShare_v10_02.zip&access=private"
86   download.file(url, method = "auto", destfile = "glc_share.zip")
87   unzip("glc_share.zip", exdir = "glc_share")
88   glc <- raster(fp(path, "glc_shv10_02.Tif"))
89   projection(glc) <- gcsstr
90   glcSA <- crop(glc, y=sa_buf_gcs, file = fp(path, "glcSA.tif"),
91     overwrite = TRUE) # crop to SA
92   gdalwarp(srcfile = glcSA@file$name,
93     dstfile = fp(path, "glcSA_alb.tif"), t_srs = prjstr,
94     tr = c(1000, 1000), r = "bilinear")
95   glcSA_alb <- raster(fp(path, "glcSA_alb.tif"))
96
97   # Warp to SA grid
98   glcsa <- resample(glcSA_alb, sa_r, method = "bilinear",
99     filename = fp(path, "glcSA_alb_rect.tif"))
100   glcsa_m <- mask(glcsa, sa_r, file = fp(p_data, "glcsa_masked.tif"),
101     overwrite = TRUE)
102 ▾ } else {
103   glcsa_m <- raster(fp(p_data, "glcsa_masked.tif"))
104 }
105
106 ▾ if(!file.exists(fp(p_data, "geowikisa_masked.tif"))) { # see if file exists,
  to avoid redoing step
107   # first downloaded manually from password protected geo-wiki site
108   path <- "/u/lestes/spatial_data/geowiki/"
109   unzip("cropland_hybrid_14052014v8.zip", exdir= "geowiki")
110   geowiki <- raster(fp(path, "Hybrid_14052014V8.img"))
111   projection(geowiki) <- gcsstr
112   geowikiSA <- crop(geowiki, y=sa_buf_gcs,
113     file = fp(path, "geowikiSA.tif")) # crop to SA
114   gdalwarp(srcfile = geowikiSA@file$name,
115     dstfile = fp(path, "geowikiSA_alb.tif"), t_srs = prjstr,
116     tr = c(1000, 1000), r = "bilinear")
117   geowikisa_alb <- raster(fp(path, "geowikiSA_alb.tif"))
118   geowikisa <- resample(geowikisa_alb, sa_r, method = "bilinear", # Warp to SA
119     filename = fp(path, "geowikisa_alb_rect.tif"))
120   geowikisa_m <- mask(glcsa, sa_r,
121     file = fp(p_data, "geowikisa_masked.tif"),
122     overwrite = TRUE)
123 ▾ } else {
124   geowikisa_m <- raster(fp(p_data, "geowikisa_masked.tif"))
125 }
126 ```
```

Course Requirements

- Let's have a look at the Syllabus

Changes

- `sf` replacing `sp`
- `raster` about to be replaced by `stars`
- R's syntax is evolving -> Rewriting the course

Getting Set Up

- Get yourself a GitHub account, if you haven't
- Send us your GitHub name
- Install `git` on your local computer(s)
- Set up your personal access token
- Install the `geospaar` library
- Learn how to create your own github repo under the `\@agroimpacts\geog246346` team