Case Study 6

Hang Tian
UB PERSON ID: 50413372

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1. Import packages and get data

```
library(raster)
```

```
## Loading required package: sp
```

```
library(sp)
library(spData)
```

```
## To access larger datasets in this package, install the spDataLarge
## package with: `install.packages('spDataLarge',
## repos='https://nowosad.github.io/drat/', type='source')`
```

```
library(tidyverse)
```

```
## -- Attaching packages --------------------------------------- tidyverse 1.3.2 --
```

```
## v ggplot2 3.3.6      v purrr   0.3.4
## v tibble  3.1.8      v dplyr   1.0.10
## v tidyr   1.2.1      v stringr 1.4.1
## v readr   2.1.2      v forcats 0.5.2
## -- Conflicts ------------------------------------------ tidyverse_conflicts() --
## x tidyr::extract() masks raster::extract()
## x dplyr::filter()  masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## x dplyr::select()  masks raster::select()
```

```
library(sf)
```

```
## Linking to GEOS 3.10.2, GDAL 3.4.2, PROJ 8.2.1; sf_use_s2() is TRUE
```

```
library(ncdf4)
library(geodata)
```

```
## Loading required package: terra
## terra 1.6.17
##
## Attaching package: 'terra'
##
## The following object is masked from 'package:tidyr':
##
##     extract
```

```
data(world)
download.file("https://crudata.uea.ac.uk/cru/data/temperature/absolute.nc","crudata.nc")
tmean=raster("crudata.nc")
```

2. Prepare country polygon data

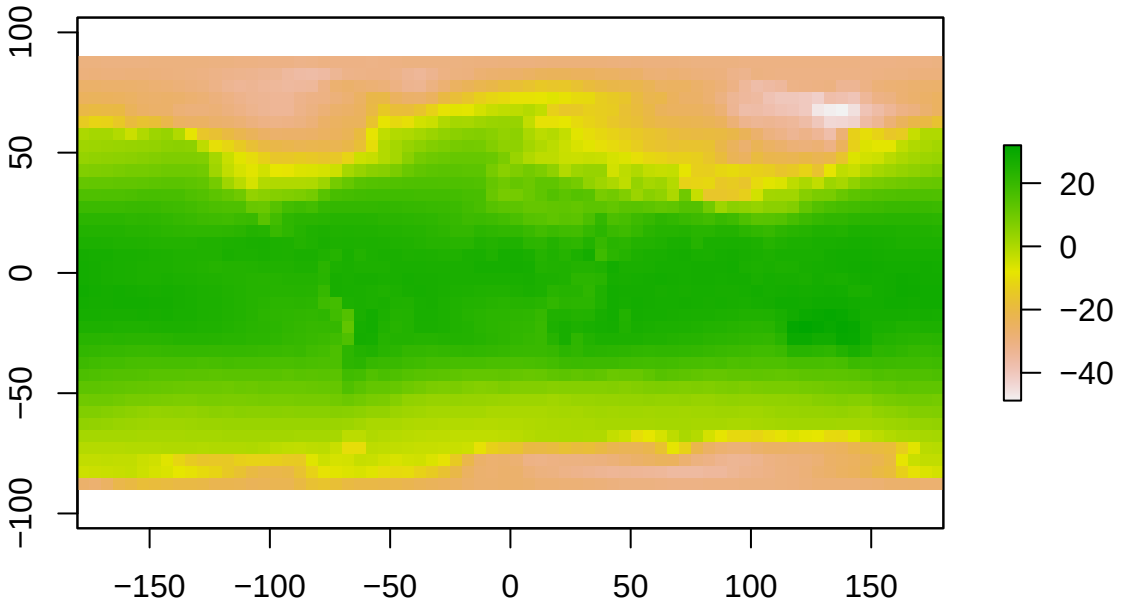
```
world=world%>%filter(name_long!='Antarctica')
world_sp=as(world,'Spatial')
```

#3. Prepare climate data

```
plot(tmean)
#There are 12 layers in this data indicating 12 months.
tmax_annual=max(tmean)
```

```
## Warning in max(): Nothing to summarize if you provide a single RasterLayer; see
## cellStats
```

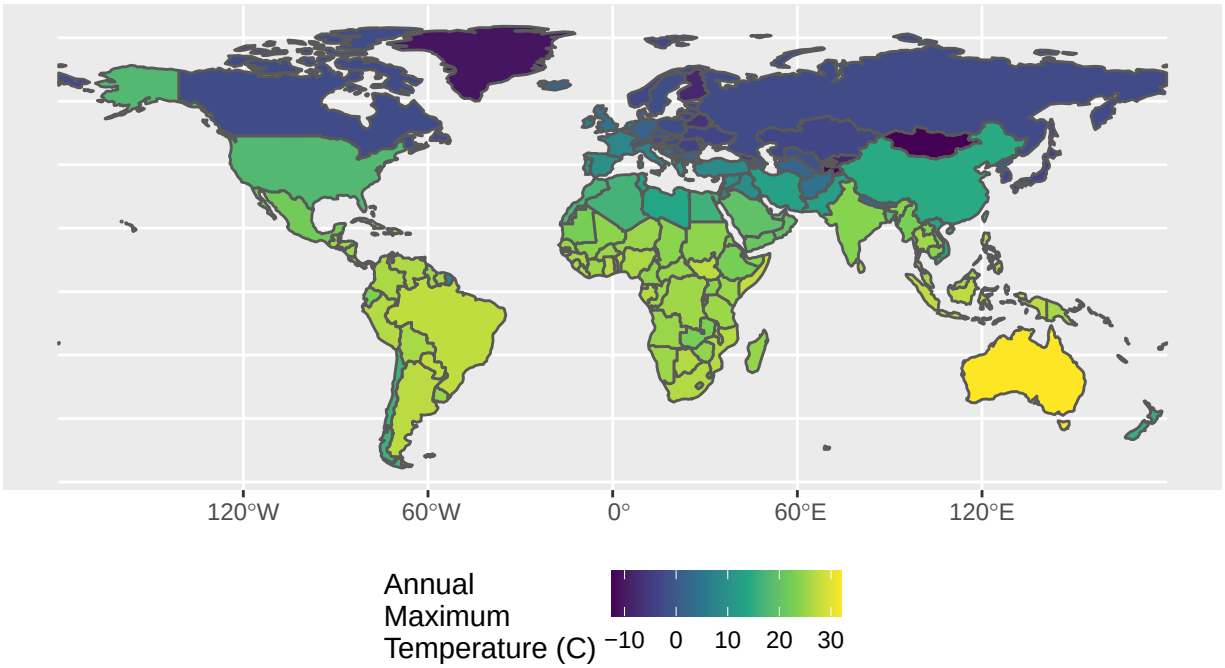
```
plot(tmax_annual)
```



```
names(tmax_annual)='tmax'
tmax_country=extract(tmax_annual,world,fun=max,na.rm=T,small=T,sp=T)%>%st_as_sf()
```

#4. GGplot

```
ggplot()+
  geom_sf(data=tmax_country,aes(fill=tmax))+
  scale_fill_viridis_c(name="Annual\nMaximum\nTemperature (C)")+
  theme(legend.position = 'bottom')
```




```
hottest_continents=tmax_country%>%
  select(c('name_long','continent','tmax'))%>%
  group_by(continent)%>%
  top_n(1,tmax)%>%
  arrange(desc(tmax))%>%
  st_set_geometry(NULL)
hottest_continents
```

```
## # A tibble: 7 x 3
## # Groups:   continent [7]
##   name_long                          continent                tmax
## * <chr>                              <chr>                   <dbl>
## 1 Australia                          Oceania                  32
## 2 Somalia                            Africa                   27.7
## 3 Paraguay                           South America            27.7
## 4 Timor-Leste                        Asia                     27.6
## 5 Costa Rica                         North America            26.1
## 6 Albania                            Europe                   12.5
## 7 French Southern and Antarctic Lands Seven seas (open ocean)  7.1
```