Assignment 05

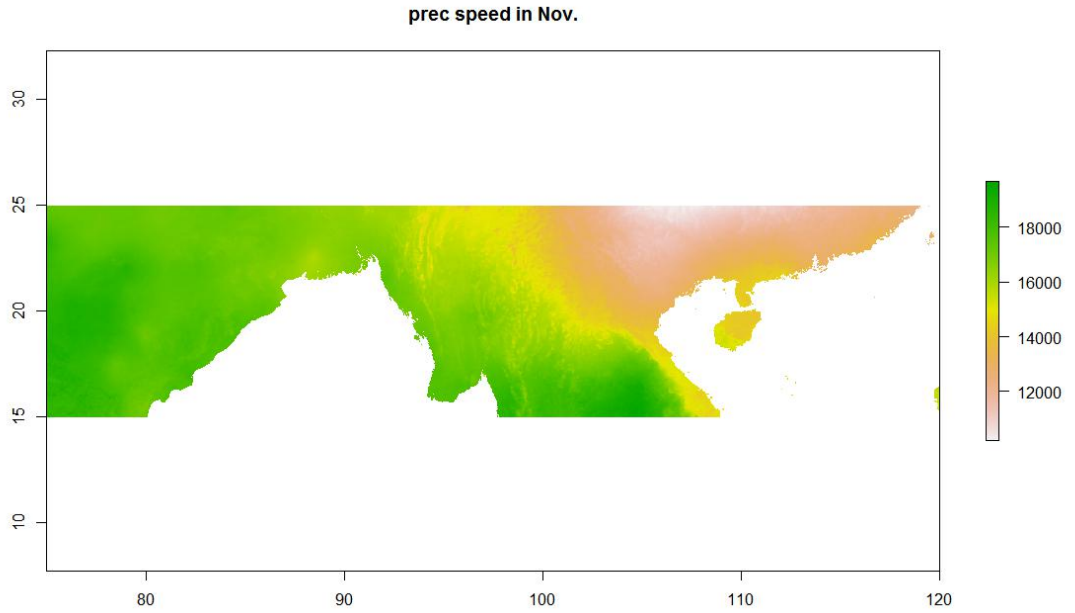
1. Potential Renewable Energy Spots in China

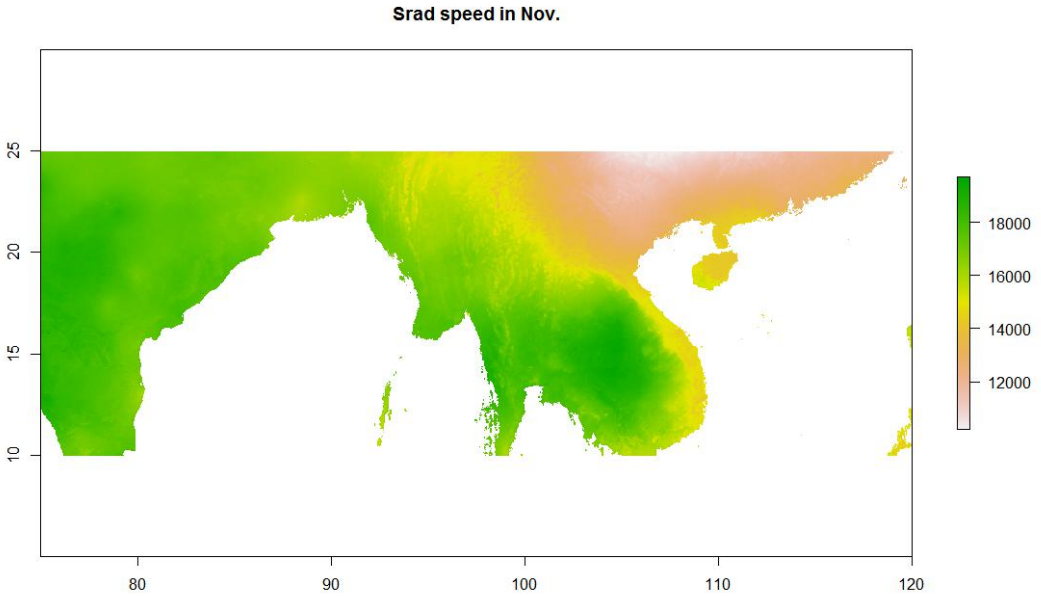
1.1 [5 points] Download the following data sets and load them in R:

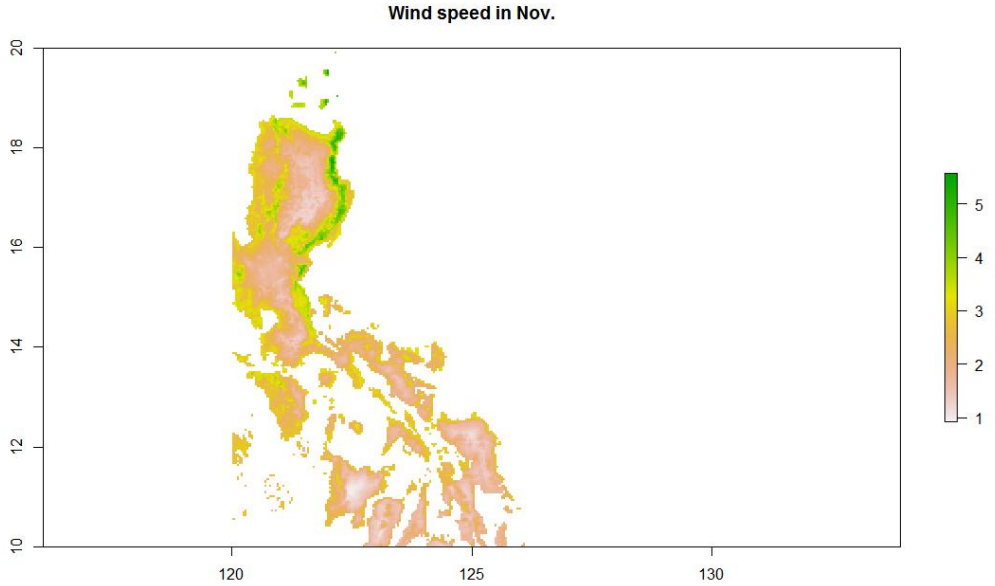
```
library("sp")
library("raster")
library("sf")
library("rgdal")


setwd("C:\\Users\\Len\\Desktop\\ESE")
#1. Potential Renewable Energy Spots in China
#-----------------------------------------------------#
# 1.1 Download the following data sets and load them in R:
#-----------------------------------------------------#
wc_wind_2.5m_11 <- raster("wc2.1_2.5m_wind/wc2.1_2.5m_wind_11.tif")
wc_srad_2.5m_11 <- raster("wc2.1_2.5m_srad/wc2.1_2.5m_srad_11.tif")
wc_prec_2.5m_11 <- raster("wc2.1_2.5m_prec/wc2.1_2.5m_prec_11.tif")
```

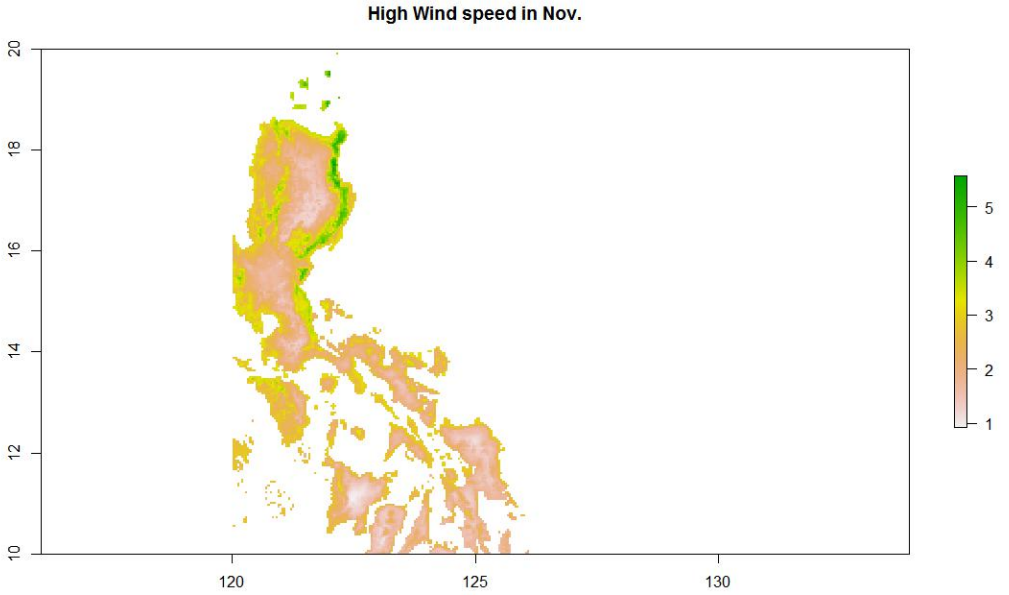
1.2 [10 points] Plot the above data sets over China. You should make three plots, each should contain its own legend.







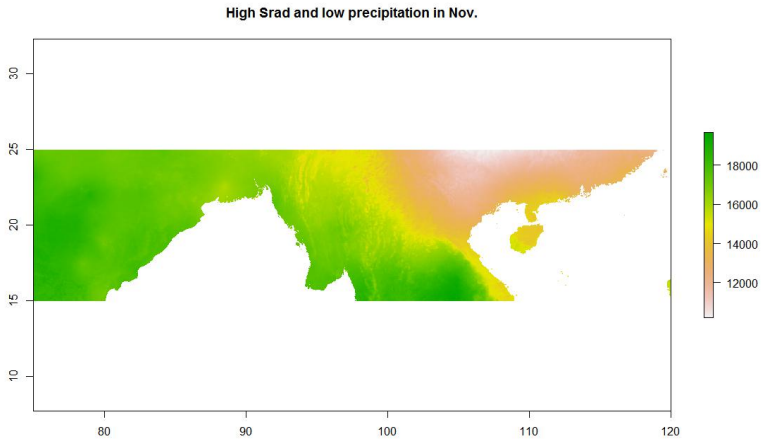
1.3 [5 points] First, let’s search for regions with relatively high wind speed to build wind farms. Define a reasonable wind speed as the threshold, and describe your favorite spots.



Spot info：

```
class      : RasterLayer
dimensions : 240, 240, 57600  (nrow, ncol, ncell)
resolution : 0.04166667, 0.04166667  (x, y)
extent     : 120, 130, 10, 20  (xmin, xmax, ymin, y
max)
crs        : +proj=longlat +datum=WGS84 +no_defs
source     : memory
names      : wc2.1_2.5m_wind_11
values     : 0.916, 5.58  (min, max)
```

1.4 [5 points] Second, let’ s search for regions with relatively high solar radiation and low precipitation as potential locations of photovoltaics (PV) farms. Describe your favorite spots of PV farms.



Spot info:

```
class      : RasterLayer
dimensions : 240, 1080, 259200  (nrow, ncol, ncel
l)
resolution : 0.04166667, 0.04166667  (x, y)
extent     : 75, 120, 15, 25  (xmin, xmax, ymin, ym
ax)
crs        : +proj=longlat +datum=WGS84 +no_defs
source     : memory
names      : wc2.1_2.5m_srad_11
values     : 10198, 19688  (min, max)
```

2. More Linux Commands

2.1 [2 points] Make a link called data_demo_link to data_demo folder using ln

```
[ese-liy@login01 ~]$ ln -s data_demo data_demo_link
[ese-liy@login01 ~]$ ls
billing_report  data_demo  data_demo_link  exam  test  test.txt
```

2.2 [2 points] Go to data_demo/data/, make an empty file planets.txt_1st with touch.

```
[ese-liy@login01 ~]$ cd data_demo/data/
[ese-liy@login01 data]$ touch planets.txt_1st
[ese-liy@login01 data]$ ls
amino-acids.txt  elements   planets.txt      sunspot.txt
animal-counts    morse.txt  planets.txt_1st
animals.txt      pdb        salmon.txt
[ese-liy@login01 data]$
```

2.3 [2 points] Print your home directory using echo.

```
[ese-liy@login01 data]$ echo ~
/work/ese-liy
[ese-liy@login01 data]$
```

2.4 [3 points] Find how many files in data_demo/data/pdb/ using find.

```
[ese-liy@login01 ~]$ find data_demo/data/pdb | wc -l
49
[ese-liy@login01 ~]$
```

2.5 [3 points] Count how many C character appears in data_demo/data/pdb/tnt.pdb with grep.

```
[ese-liy@login01 ~]$ grep -o "C" data_demo/data/pdb/tnt.
pdb | wc -l
10
[ese-liy@login01 ~]$
```

2.6 [2 points] Compare data_demo/data/pdb/ethane.pdb and data_demo/data/pdb/ethanol.pdb with diff

```
[ese-liy@login01 ~]$ diff data_demo/data/pdb/ethane.pdb data_demo/data/pdb/ethanol.pdb
1,11c1,12
< COMPND      ETHANE
< AUTHOR      DAVE WOODCOCK  95 12 18
< ATOM      1  C           1      -0.752   0.001  -0.141  1.00  0.00
< ATOM      2  C           1       0.752  -0.001   0.141  1.00  0.00
< ATOM      3  H           1      -1.158   0.991   0.070  1.00  0.00
< ATOM      4  H           1      -1.240  -0.737   0.496  1.00  0.00
< ATOM      5  H           1      -0.924  -0.249  -1.188  1.00  0.00
< ATOM      6  H           1       1.158  -0.991  -0.070  1.00  0.00
< ATOM      7  H           1       0.924   0.249   1.188  1.00  0.00
< ATOM      8  H           1       1.240   0.737  -0.496  1.00  0.00
< TER       9              1
---
> COMPND      ETHANOL
> AUTHOR      DAVE WOODCOCK  96 01 03
> ATOM      1  C           1      -0.426  -0.115  -0.147  1.00  0.00
> ATOM      2  O           1      -0.599   1.244  -0.481  1.00  0.00
> ATOM      3  H           1      -0.750  -0.738  -0.981  1.00  0.00
> ATOM      4  H           1      -1.022  -0.351   0.735  1.00  0.00
> ATOM      5  H           1      -1.642   1.434  -0.689  1.00  0.00
> ATOM      6  C           1       1.047  -0.383   0.147  1.00  0.00
> ATOM      7  H           1       1.370   0.240   0.981  1.00  0.00
> ATOM      8  H           1       1.642  -0.147  -0.735  1.00  0.00
> ATOM      9  H           1       1.180  -1.434   0.405  1.00  0.00
> TER      10              1
[ese-liy@login01 ~]$
```

2.7 [2 points] Check the total file size of the data_demo folder using df.

```
[ese-liy@login01 ~]$ df -h data_demo
文件系统        容量  已用  可用 已用% 挂载点
work            501T  167T  334T   34% /work
[ese-liy@login01 ~]$
```

2.8 [3 points] Copy the data_demo folder to data_demo_new, compress it using zip, and decompress the .zip file with unzip.

```
billing_report  data_demo  data_demo_link  exam  test  test.txt
[ese-liy@login01 ~]$ cp -r data_demo/ data_demo_new/
[ese-liy@login01 ~]$ ls
billing_report  data_demo  data_demo_link  data_demo_new  exam  test  test.txt
[ese-liy@login01 ~]$ zip -q -r data_demo_zip.zip data_demo_new/
[ese-liy@login01 ~]$ ls
billing_report  data_demo_link  data_demo_zip.zip  test
data_demo       data_demo_new   exam               test.txt
[ese-liy@login01 ~]$ unzip -q data_demo_zip.zip -d unzip_demo
[ese-liy@login01 ~]$ ls unzip_demo/data_demo_new/
creatures  molecules          notes.txt  solar.pdf  writing
data       north-pacific-gyre  pizza.cfg  thesis
[ese-liy@login01 ~]$
```

2.9 [3 points] Change the file permissions flags on data_demo_new to drwxr-x--- using chmod.

```
[ese-liy@login01 ~]$ chmod 750 data_demo_new
[ese-liy@login01 ~]$ ls -l
总用量 644
drwxr-xr-x 2 root    root        4096 9月  26 15:20 billing_report
drwxr-xr-x 8 ese-liy ese-ouycc   4096 11月 19 19:27 data_demo
lrwxrwxrwx 1 ese-liy ese-ouycc      9 11月 20 21:20 data_demo_link -> data_demo
drwxr-x--- 8 ese-liy ese-ouycc   4096 11月 23 15:57 data_demo_new
-rw-r--r-- 1 ese-liy ese-ouycc 584485 11月 23 15:57 data_demo_zip.zip
drwxr-xr-x 2 ese-liy ese-ouycc   4096 9月  12 11:00 exam
drwxr-xr-x 2 ese-liy ese-ouycc   4096 11月 19 19:11 test
-rw-r--r-- 1 ese-liy ese-ouycc      0 11月 19 19:11 test.txt
drwxr-xr-x 3 ese-liy ese-ouycc   4096 11月 23 15:58 unzip_demo
[ese-liy@login01 ~]$
```

2.10 [3 points] Print the last 10 commands you made using history.

```
[ese-liy@login01 ~]$ history | tail -n 10
  244  ls -l data_demo_new
  245  ls data_demo_new
  246  ls -l data_demo_new
  247  ls -l
  248  chmod "drwxr-x---" data_demo_new
  249  chmod --help
  250  chmode 750 data_demo_new
  251  chmod 750 data_demo_new
  252  ls -l
  253  history | tail -n 10
[ese-liy@login01 ~]$
```