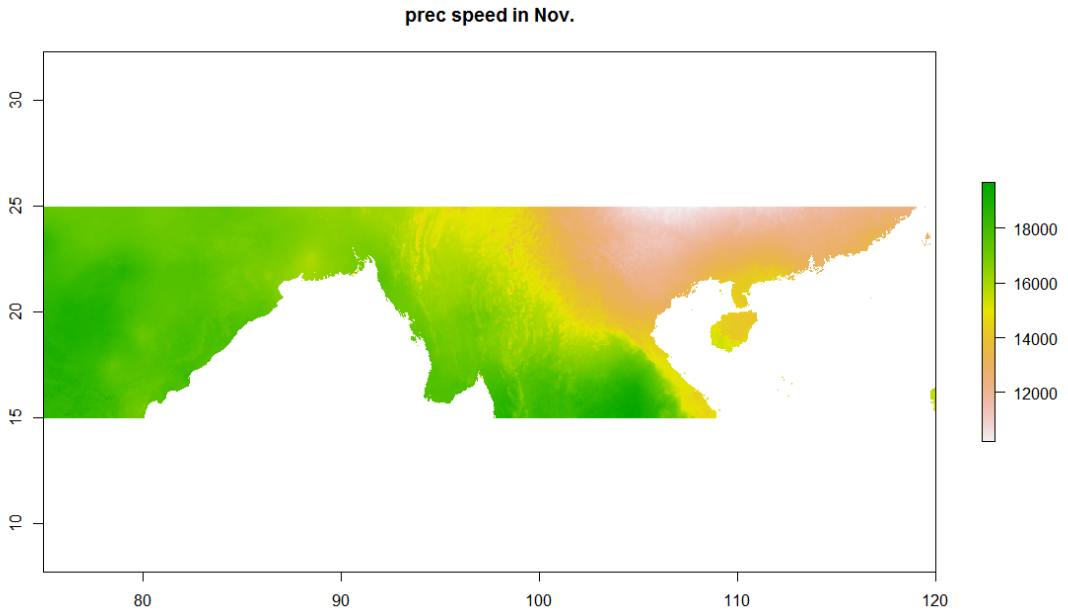
Assignment 05

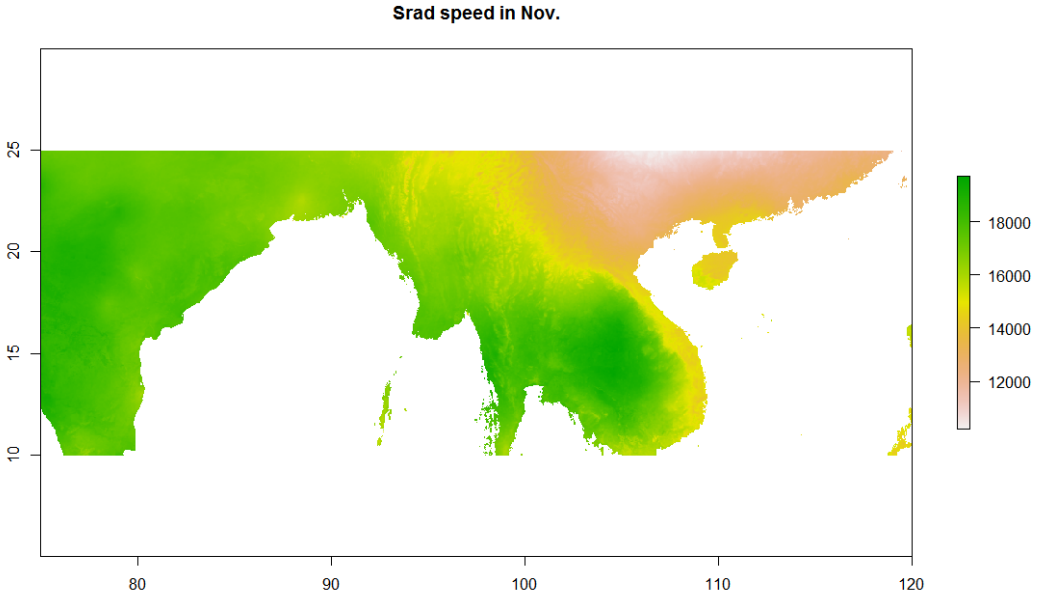
1. Potential Renewable Energy Spots in China

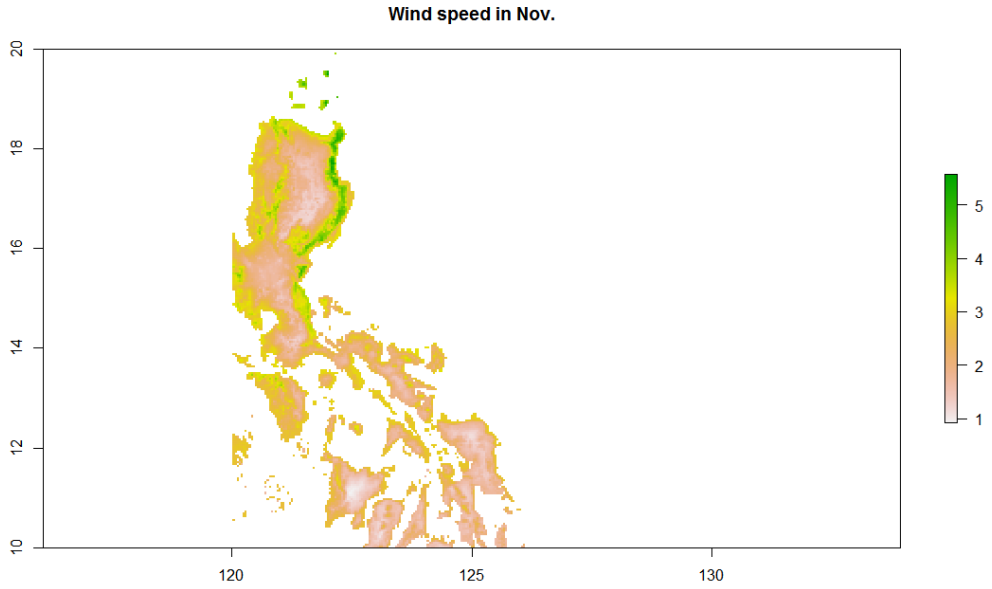
1.1 Download the following data sets and load them in R:

```
#Note
#I got inspired by Li Yuan and I reviewed the previous sections.
#I looked up some data formats on the website and searched for some methods to analyze them by using R.
#Li Yuan and I chose the same data to analyze it.
library("sp")
library("raster")
library("sf")
library("rgdal")

# 1.1
wind_2.5m_11 <- raster("wc2.1_2.5m_wind/wc2.1_2.5m_wind_11.tif")
srad_2.5m_11 <- raster("wc2.1_2.5m_srad/wc2.1_2.5m_srad_11.tif")
prec_2.5m_11 <- raster("wc2.1_2.5m_prec/wc2.1_2.5m_prec_11.tif")

China_map_crop <- readOGR("C:\\Users\\yw\\Documents\\ESE5023\\China_map", "bou2_4p")


# Crop the raster with china map
Wind_Nov_crop <- crop(wind_2.5m_11, China_map_crop)
Srad_Nov_crop <- crop(srad_2.5m_11, China_map_crop)
Prec_Nov_crop <- crop(prec_2.5m_11, China_map_crop)
```

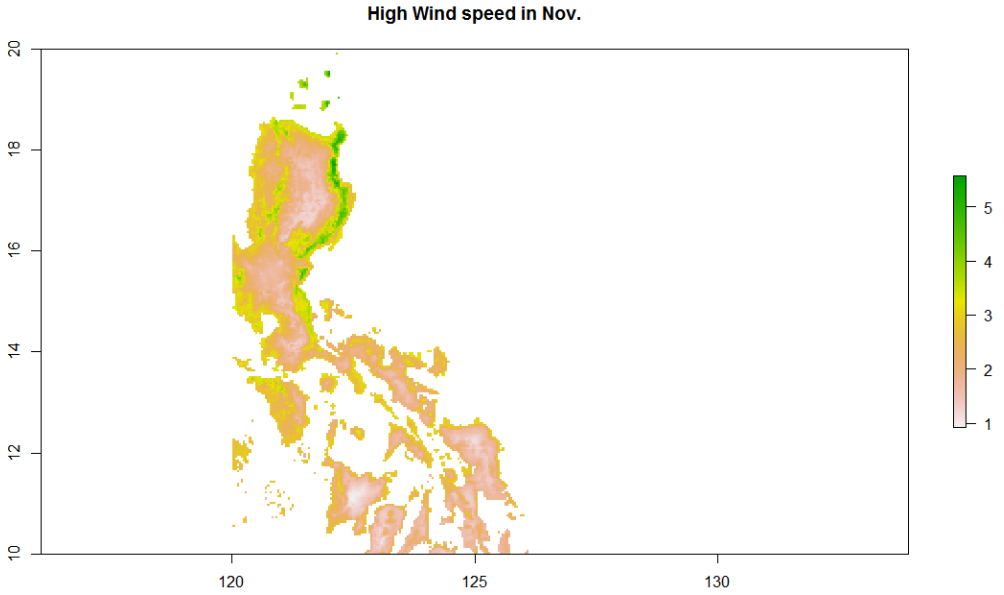
1.2 Plot the above data sets over China. You should make three plots, each should contain its own legend.



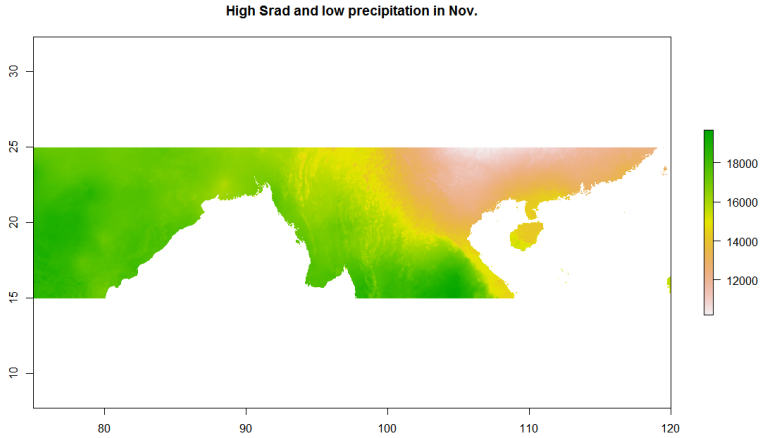




1.3 First, let’s search for regions with relatively high wind speed to build wind farms. Define a reasonable wind speed as the threshold, and describe your favorite spots.



1.4 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.



2. More Linux Commands

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

```
[ese-liuyw@login03 ~]$ ls
billing_report  data_demo  exam  test1.R
[ese-liuyw@login03 ~]$ ln -s data_demo data_demo_link
[ese-liuyw@login03 ~]$ ls
billing_report  data_demo  data_demo_link  exam  test1.R
[ese-liuyw@login03 ~]$
```

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

```
[ese-liuyw@login03 ~]$ cd data_demo/data/
[ese-liuyw@login03 data]$ touch plants.txt_1st
[ese-liuyw@login03 data]$ ls
amino-acids.txt  animals.txt  morse.txt  planets.txt     salmon.txt
animal-counts    elements     pdb        plants.txt_1st  sunspot.txt
[ese-liuyw@login03 data]$
```

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

```
[ese-liuyw@login03 data]$ echo ~
/work/ese-liuyw
[ese-liuyw@login03 data]$
```

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

```
[ese-liuyw@login03 ~]$ find data_demo/data/pdb | wc -l
50
[ese-liuyw@login03 ~]$
```

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

```
[ese-liuyw@login03 ~]$ grep -o "C" data_demo/data/pdb/tnt.pdb | wc -l
10
[ese-liuyw@login03 ~]$
```

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

```
[ese-liuyw@login03 ~]$ diff data_demo/data/pdb/ethane.pdb data_demo/data/
anol.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
```

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

ls

```
[ese-liuyw@login03 ~]$ df -h data_demo
Filesystem      Size  Used Avail Use% Mounted on
work            501T  167T  334T  34% /work
[ese-liuyw@login03 ~]$
```

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

```
[ese-liuyw@login03 ~]$ cp - r data_demo/ data_demo_new/
cp: target 'data_demo_new/' is not a directory
[ese-liuyw@login03 ~]$ cp -r data_demo/ data_demo_new/
[ese-liuyw@login03 ~]$ ls
billing_report  data_demo  data_demo_link  data_demo_new  exam  test1.R
[ese-liuyw@login03 ~]$ zip -1 -r data_demo_zip.zip data_demo_new/
```

```
[ese-liuyw@login03 ~]$ ls
billing_report  data_demo_link  data_demo_zip.zip  test1.R
data_demo       data_demo_new   exam
[ese-liuyw@login03 ~]$ unzip -q data_demo_zip.zip -d unzip_demo
[ese-liuyw@login03 ~]$ ls unzip_demo/data_demo_new/
creatures  molecules           notes.txt  solar.pdf
data       north-pacific-gyre  pizza.cfg  writing
[ese-liuyw@login03 ~]$
```

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

```
data       north-pacific-gyre  pizza.cfg  writing
[ese-liuyw@login03 ~]$ chmod 750 data_demo_new
[ese-liuyw@login03 ~]$ ls -l
total 899
drwxr-xr-x 2 root      root        4096 Sep 26 15:20 billing_report
drwxr-xr-x 7 ese-liuyw ese-ouycc   4096 Nov 26 19:14 data_demo
lrwxrwxrwx 1 ese-liuyw ese-ouycc      9 Dec  3 17:25 data_demo_link -> da
drwxr-x--- 7 ese-liuyw ese-ouycc   4096 Dec  3 17:33 data_demo_new
-rw-r--r-- 1 ese-liuyw ese-ouycc 665082 Dec  3 17:33 data_demo_zip.zip
drwxr-xr-x 2 ese-liuyw ese-ouycc   4096 Sep 12 10:57 exam
-rw-r--r-- 1 ese-liuyw ese-ouycc   8192 Nov 26 20:40 test1.R
drwxr-xr-x 3 ese-liuyw ese-ouycc   4096 Dec  3 17:34 unzip_demo
[ese-liuyw@login03 ~]$
```

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

```
[ese-liuyw@login03 ~]$ history | tail -n 10
  128  cp - r data_demo/ data_demo_new/
  129  cp -r data_demo/ data_demo_new/
  130  ls
  131  zip -1 -r data_demo_zip.zip data_demo_new/
  132  ls
  133  unzip -q data_demo_zip.zip -d unzip_demo
  134  ls unzip_demo/data_demo_new/
  135  chmod 750 data_demo_new
  136  ls -l
  137  history | tail -n 10
[ese-liuyw@login03 ~]$
```