Prepare Data in SNAP for PSI analysis

1-Preparing the SLC data Pack**age** **Tuturial videos for this document** (VIDEO 1, VIDEO 2)

NB: All the selected data should be either ascending or descending from the same track (in my case: ASC- **135**)

Two source for downloading the data. I prefer the second one as it has no limit for downloading

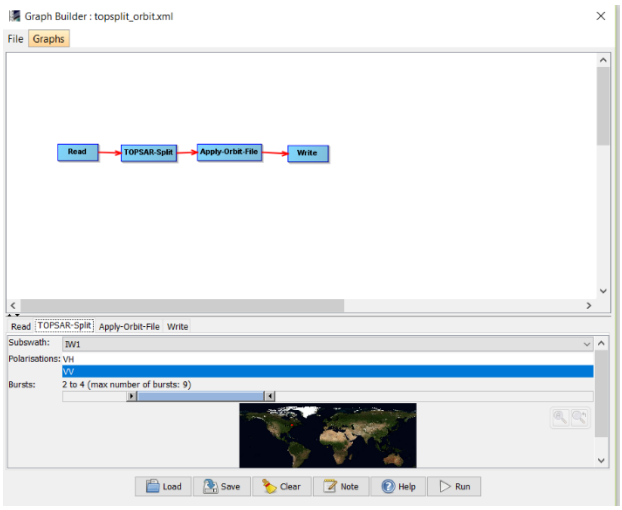
https://scihub.copernicus.eu/dhus/#/home

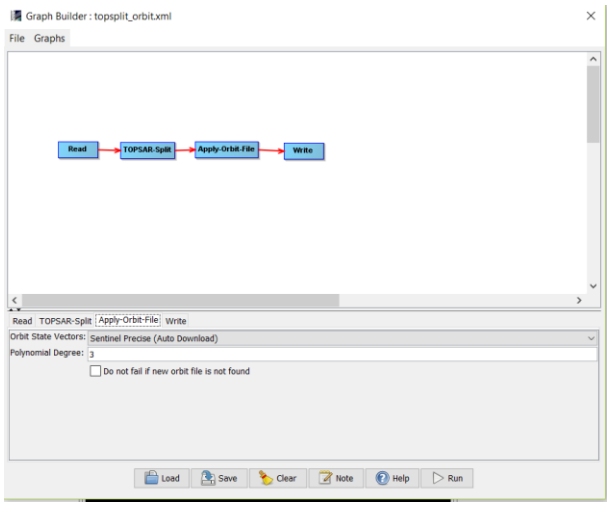
https://search.asf.alaska.edu/#/

The perfect size of the package should be something between 13-15. In case of having a bigger package, it should be processed in more than one package. Furthermore, if the desired zone of the process is located in more than one subswath. Each subswath should be processed separately.

1-1 Applying TOPSAR split and precise orbit on all the SLC data

It is easier to be done with a prepared graph.

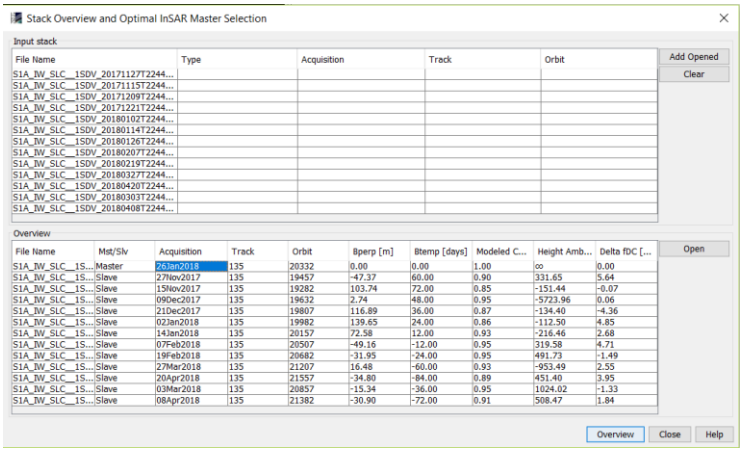




1-2 finding the master SLC (inputs: results of 1-1)

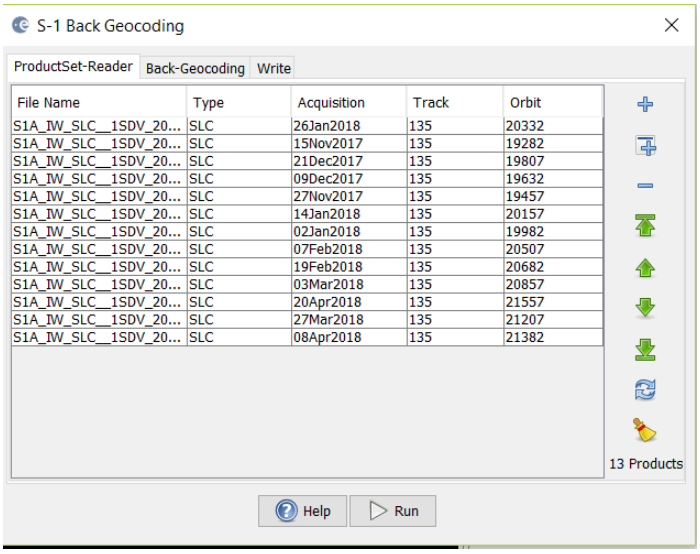
Radar > Interferometric > inSAR stack overview

Adding all the Data and then clicking overview



1-3 Making a Stack by back geocoding from the processed data while the master SLC is set at top of the table. (inputs: results of 1-2)

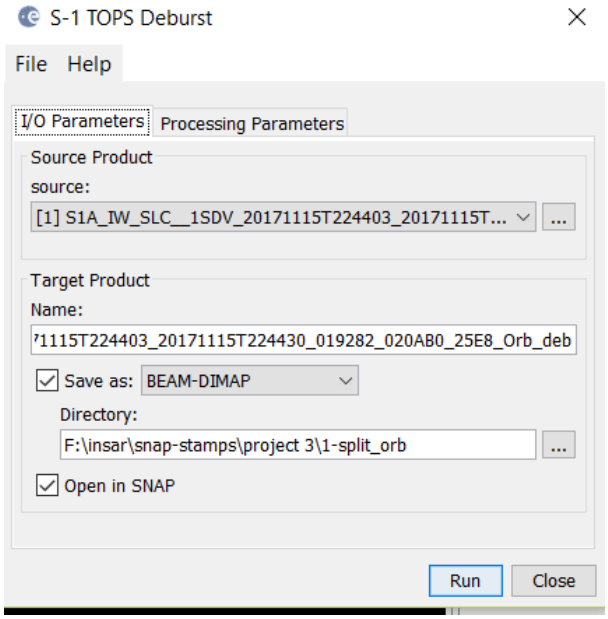
Radar>Coregistration >s1top Coregistration> s1 back geocoding



1-4 TopSAR deburst

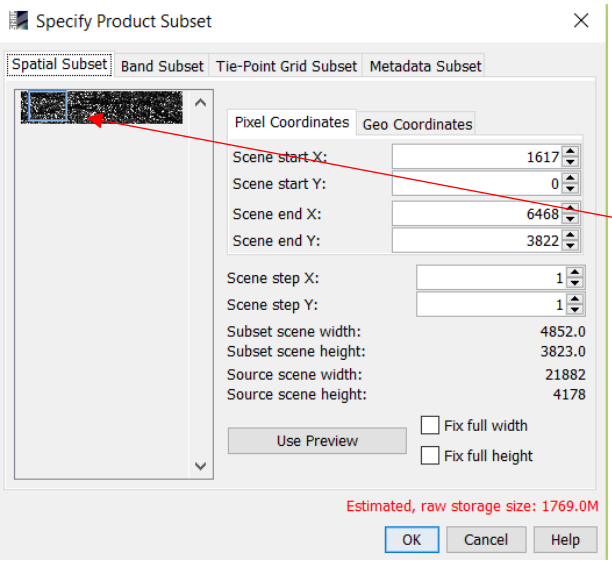
Radar > sentinel 1 top > S1 top deburst

(Input: result of 1-3)



1-5 making a subset (cutting down the SLC to the desired size)

Raster > subset (input: result of 1-4)



This box set the final size of the subset

After the time that the process is done, you should save the subset

1-6

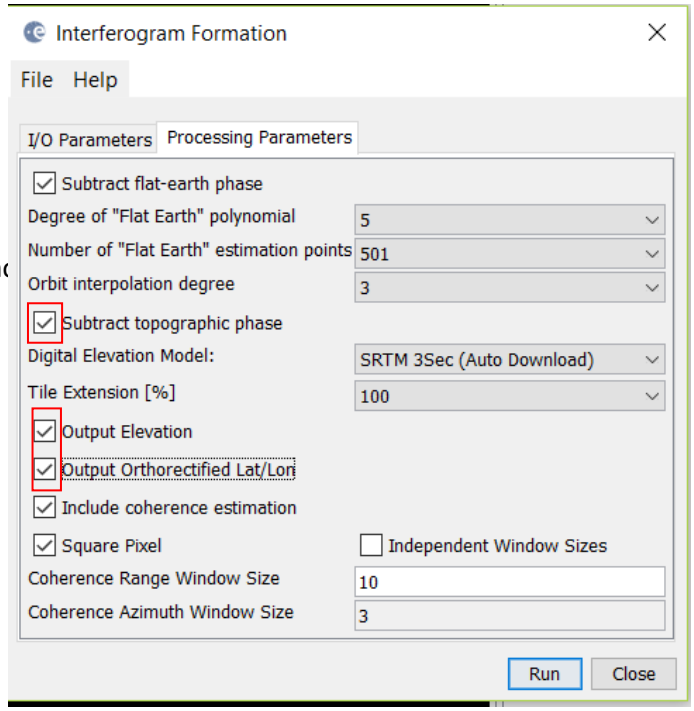
Making the interferogram

Radar > interferometric > (input: result of 1-5)

the topographic phase should be removed and

The elevation band and orthorectified Latitude, longitude sh

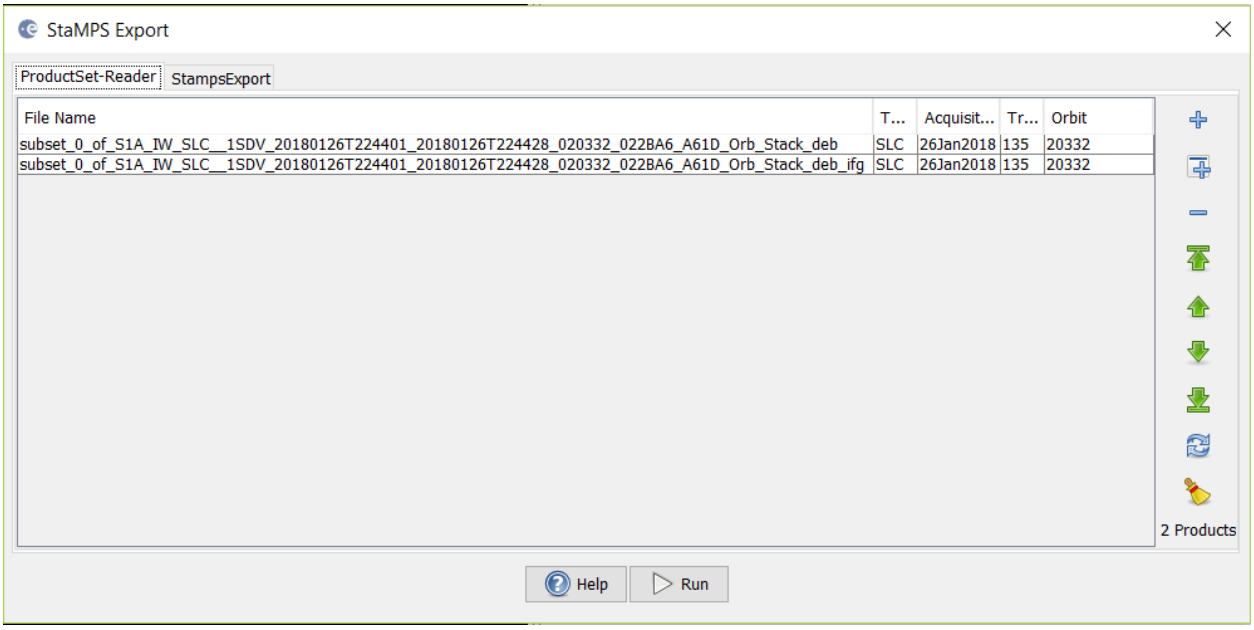
So, all the checkbox should be checked as the picture



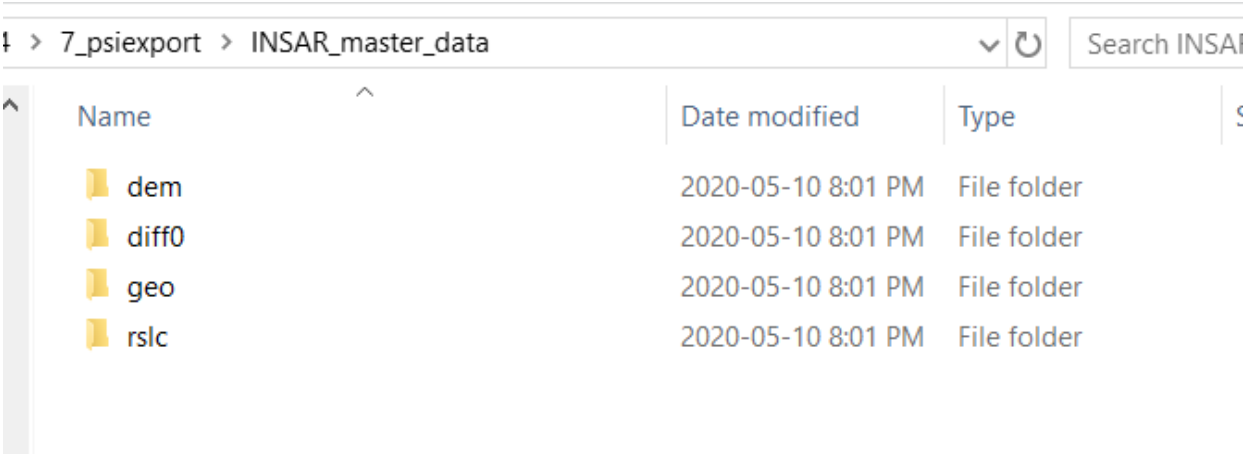
1-7 Export to PSI StaMPS format **(inputs: result of 1-5 + result of 1-6)**

Radar > Interferometric > PSI, SBAS > StaMPS export

In the final step, the subset of the stack and the result of the interferogram will be used in order to export the data



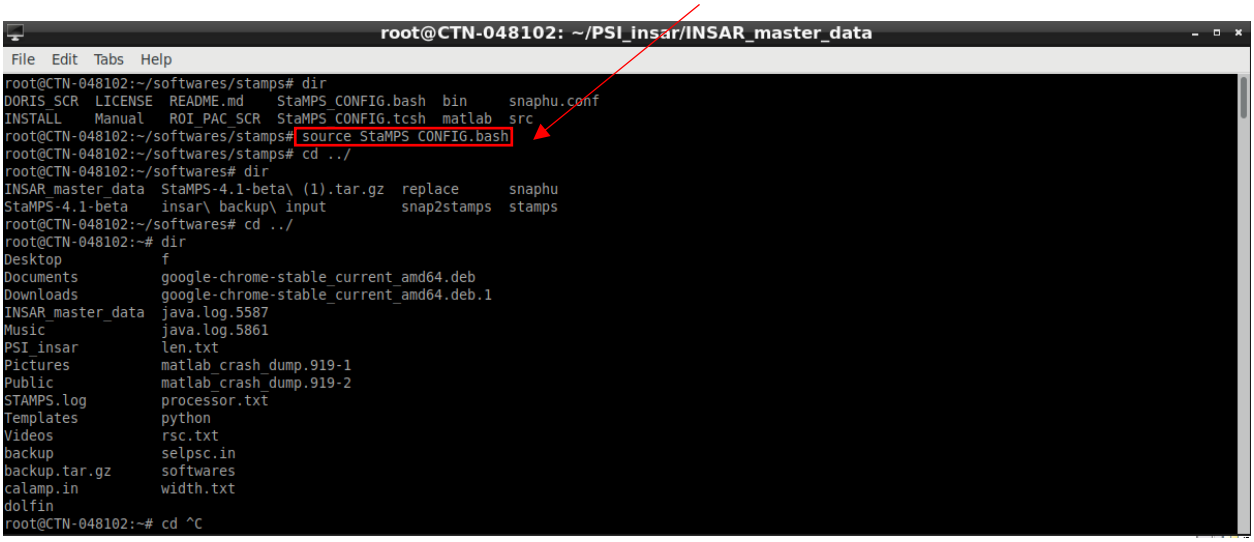
The final result package for stamps should be like this



The folder name that contains these folders should be renamed to **INSAR_master_data** in order to be ready for StaMPS process

2- PSI process in StaMPS

2-1 you should open the terminal in ubuntu and the first step is sourcing the bash file in Stamps folder



It is important that all the following steps in ubuntu be done in the same terminal. Otherwise, the stamps files would not be accessible for the process.

2-2

Changing the current path to INSAR_master_data destination

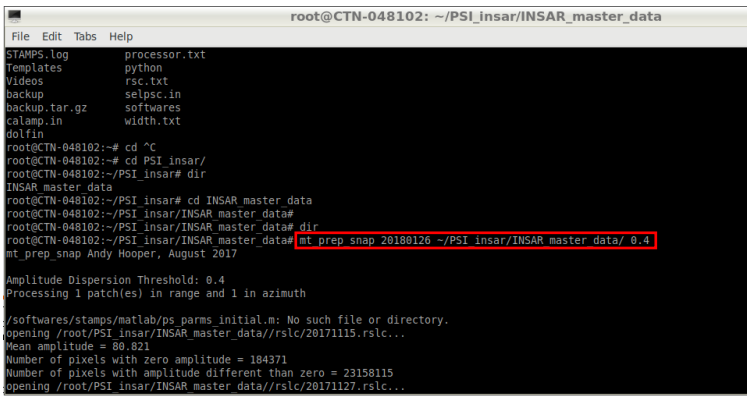
** In case of doing the process in windows subsystem for Linux (WSL), this folder should be in moved from windows to ubuntu

Running the preparation command

mt_prep_snap 20180126 ~/PSI_insar/INSAR_master_data/ 0.4

Main command | Master date | Data path | Threshold

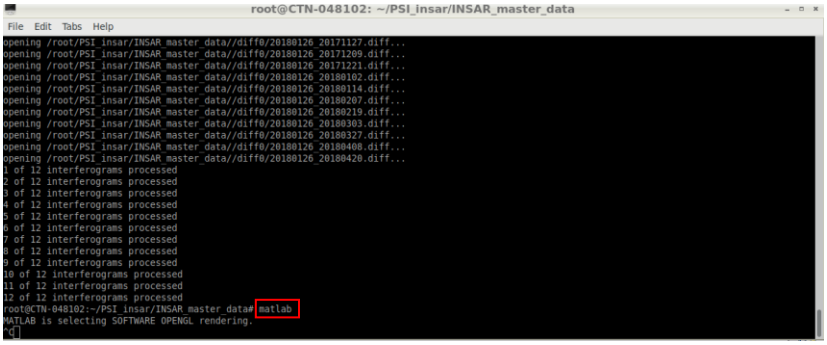
It is important



** This command is for snap **7** and stamps **4.1 b**. In older version the command was a bit different and it might change in newer version.

2-3 After the initial process, we should run the MATLAB in the same terminal and the rest of the process will be done there

Command: Matlab



3-PSI process (STaMPS-MATLAB)

Command: stamps (1,8)

This command run the process from step 1 to step 8 (more detail in stamps manual)

Then we should wait a plenty of time for finishing the all steps.

4-Exporting the final result for the visualization in R-Studio

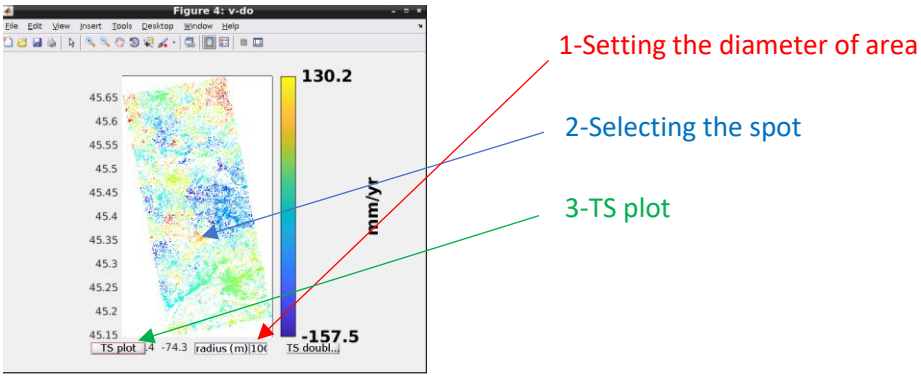
In matlab command window:

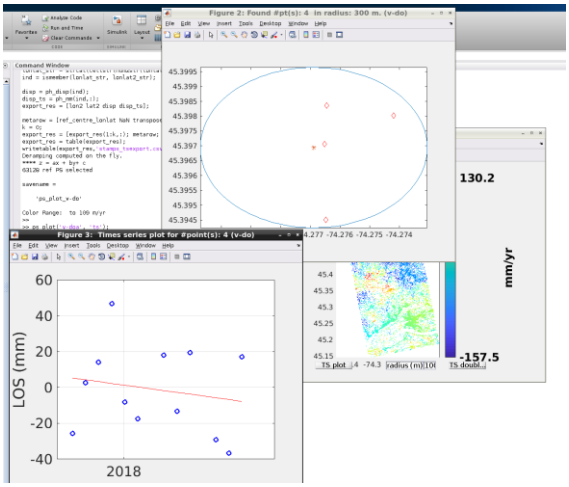
It can be different in different cases, more details in STaMPS manual.

ps_plot('v-do', 'ts');

```
PS_SCN_FILT: Finished
STAMPS: Finished
>> ps_plot('v-do', 'ts');
Deramping computed on the fly.
**** z = ax + by+ c
63128 ref PS selected
Warning: MATLAB has disabled some advanced graphics rendering features by switching to software OpenGL. For more information, click here.
Color Range: -157.509 to 130.177 mm/yr
Please select a point on the figure to plot time series (TS)
Selected point coordinates (lon,lat):-74.2769, 45.3969
```

Then we should select the PS point and the diameter of the area around it for the exported time series (TS)





The following codes can then just get copy pasted to command window. It is important that whatever we had in the first command v-d or v-do or v-doa should be followed in exact same way in the following codes

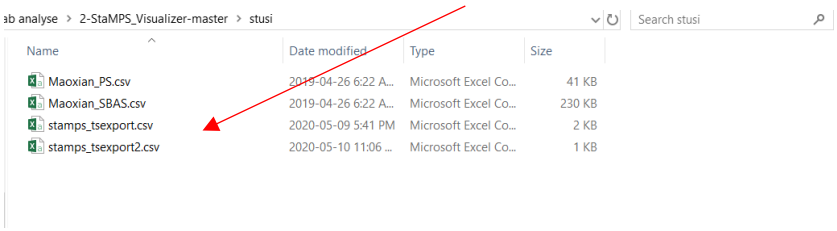
```
load parms.mat;
ps_plot('v-do', -1);
load ps_plot_v-do.mat;
lon2_str = cellstr(num2str(lon2));
lat2_str = cellstr(num2str(lat2));
lonlat2_str = strcat(lon2_str, lat2_str);
lonlat_str = strcat(cellstr(num2str(lonlat(:,1))), cellstr(num2str(lonlat(:,2))));
ind = ismember(lonlat_str, lonlat2_str);
disp = ph_disp(ind);
disp_ts = ph_mm(ind,:);
export_res = [lon2 lat2 disp disp_ts];
metarow = [ref_centre_lonlat NaN transpose(day)-1];
k = 0;
export_res = [export_res(1:k,:); metarow; export_res(k+1:end,:)];
export_res = table(export_res);
writetable(export_res,'stamps_tsexport.csv')
```

The name can be any thing

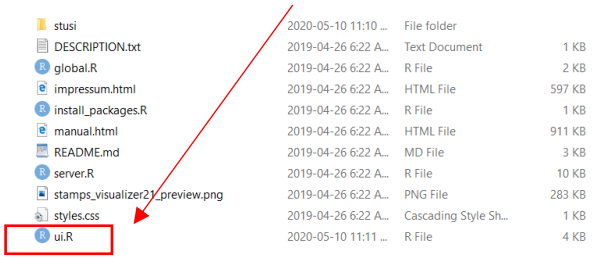
5- visualization in R-studio with Thorsten Höser codes

5-1 We should move the final product in the format of csv ….CSV to **stusi** subfolder of the visualization package

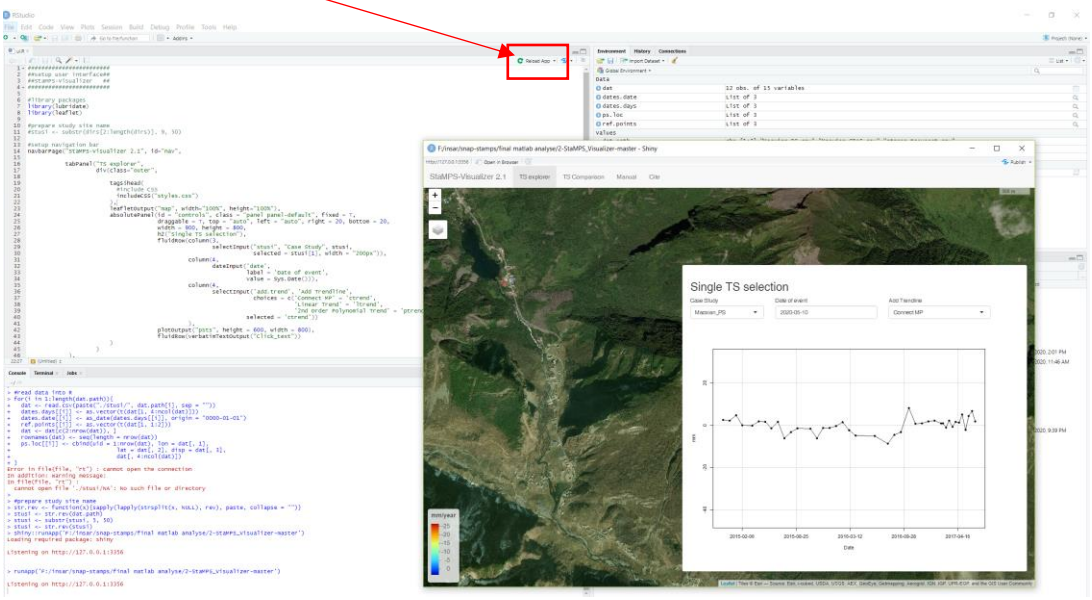
The RStudio package can be used either in windows or ubuntu platform



5-2 open ui.R file in Rstudio



5-3 Running the code



5- 4 the result will then be shown in explorer, and we can select the different scatter points to check the result.

(Written by Amirhossein Shafaei)