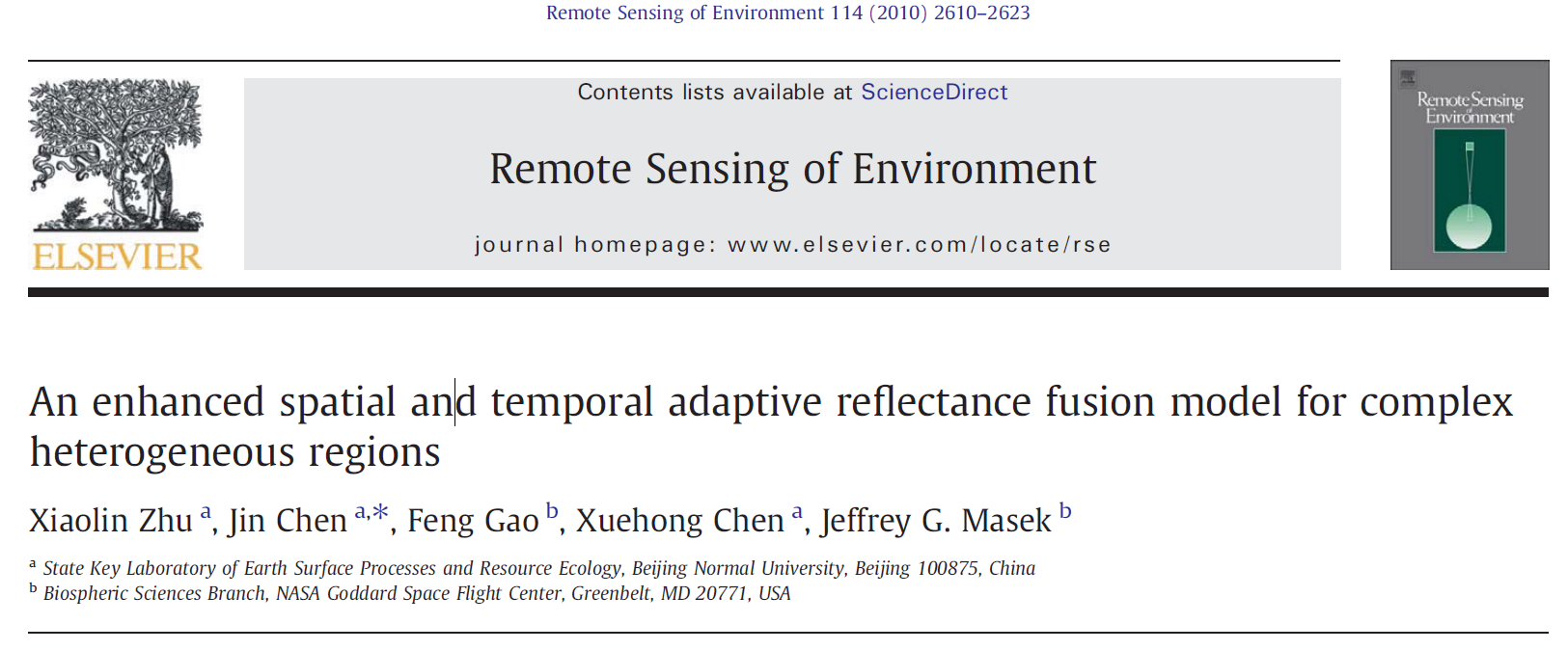
**Instruction of ESTARFM Program （Python Code）**

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**Reference**



**Download link:**

<https://www.sciencedirect.com/science/article/pii/S0034425710001884?casa_token=HRhadf9dK1cAAAAA:D3gITcfe35U5xXidlTIYELp1nj7SHfkju_JCmrN3TqxxcDDc4m2KfDo0d4l033OphxhJ8s6pPQ>

**Input data preparation**

1) 2 Landsat images;

2) 2 corresponding MODIS images at the same time as Landsat images;

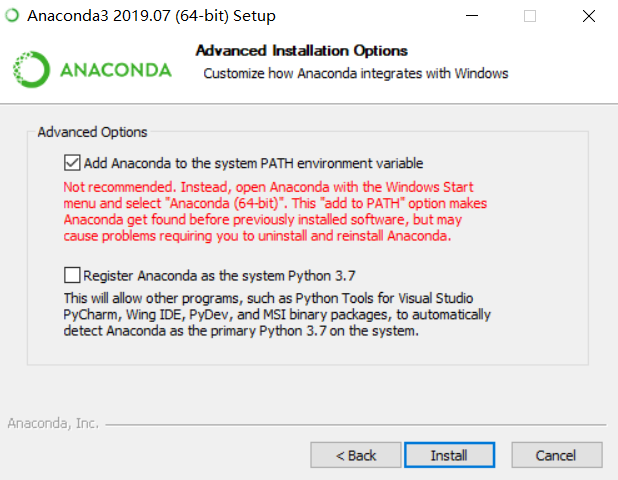
3) one MODIS image at the prediction time;

**Operation Steps of ESTARFM**

**Step1: Configure Anaconda and PyCharm**

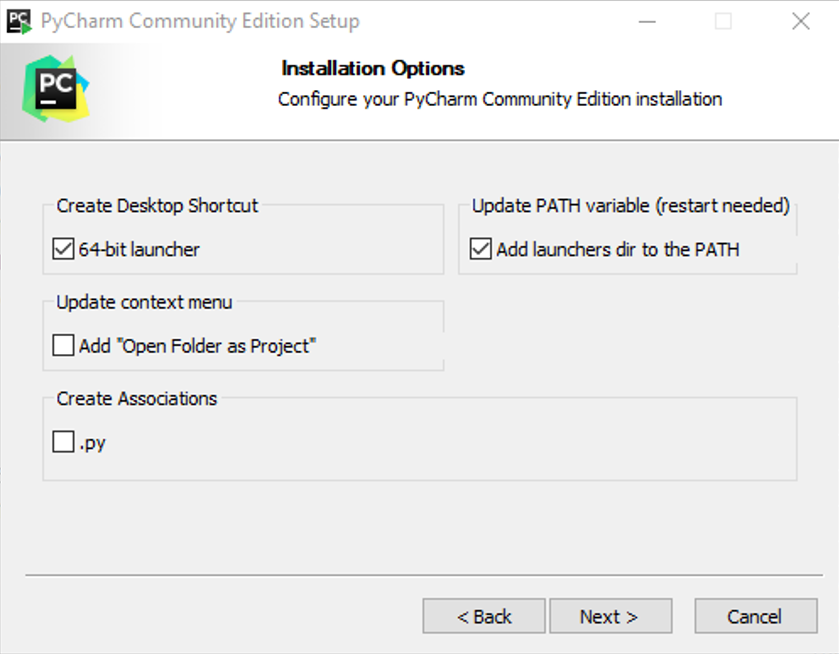
**Anaconda is selected as a virtual environment**

1. Download Anaconda from <https://www.anaconda.com/distribution/> for your operating system and install (Please check the box of “Add Anaconda to the system PATH environment variable”)



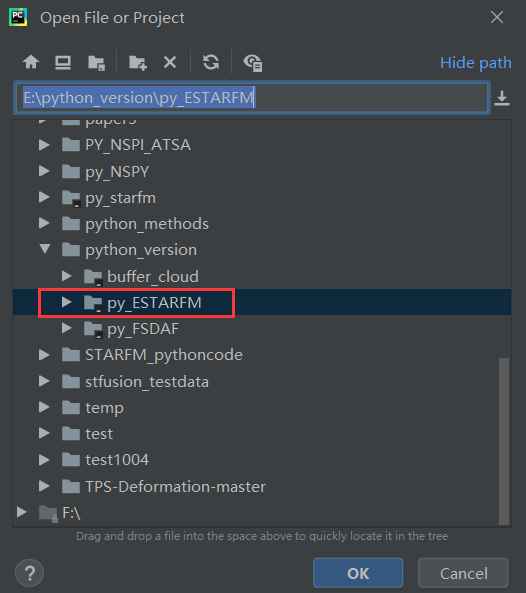
**PyCharm**

1. PyCharm Community Edition is used as an integrated development environment (IDE) for development and debugging. Download the latest version of PyCharm from <https://www.jetbrains.com/pycharm/download/#section=windows>. The free Community Edition is recommended.
2. Install PyCharm (Please check the box of “Add launchers dir to the PATH”)

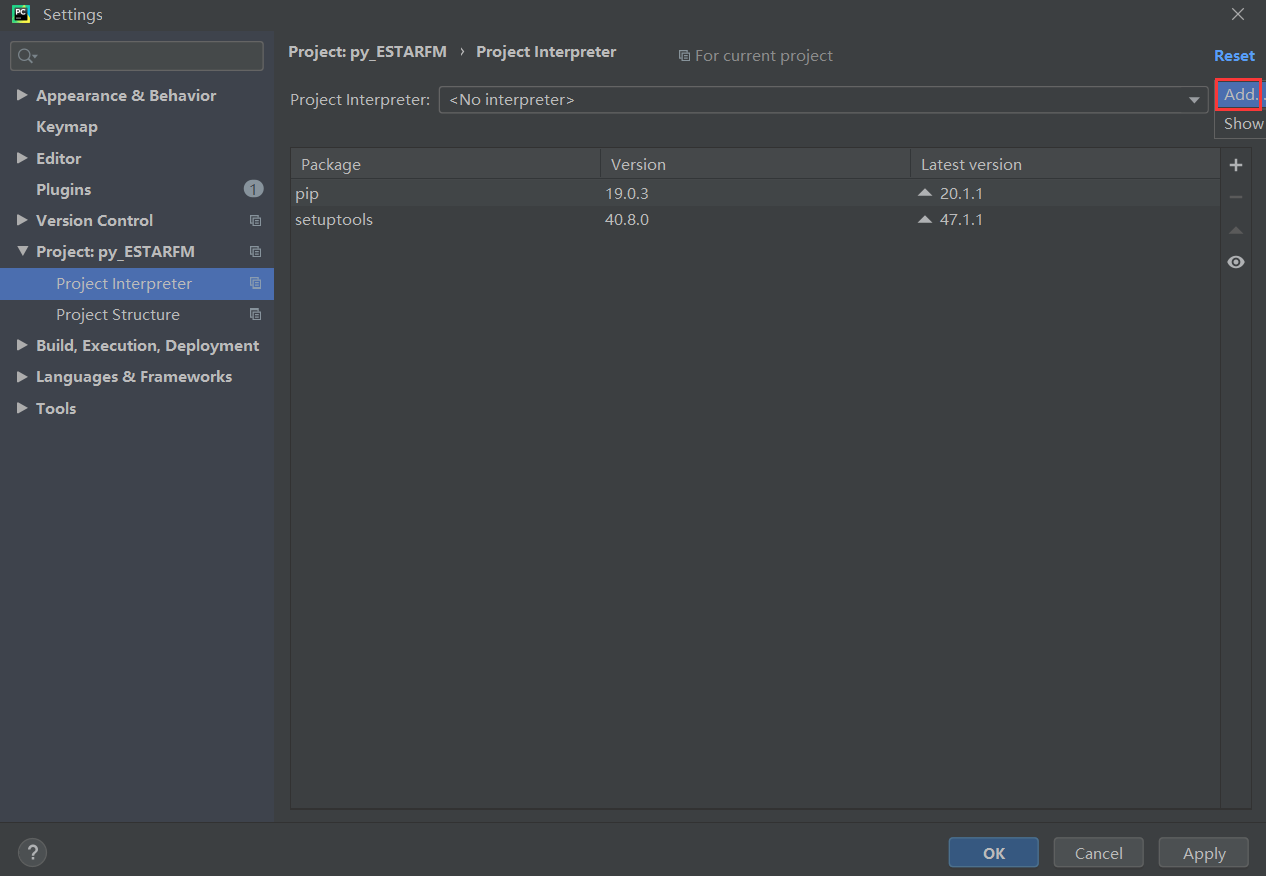


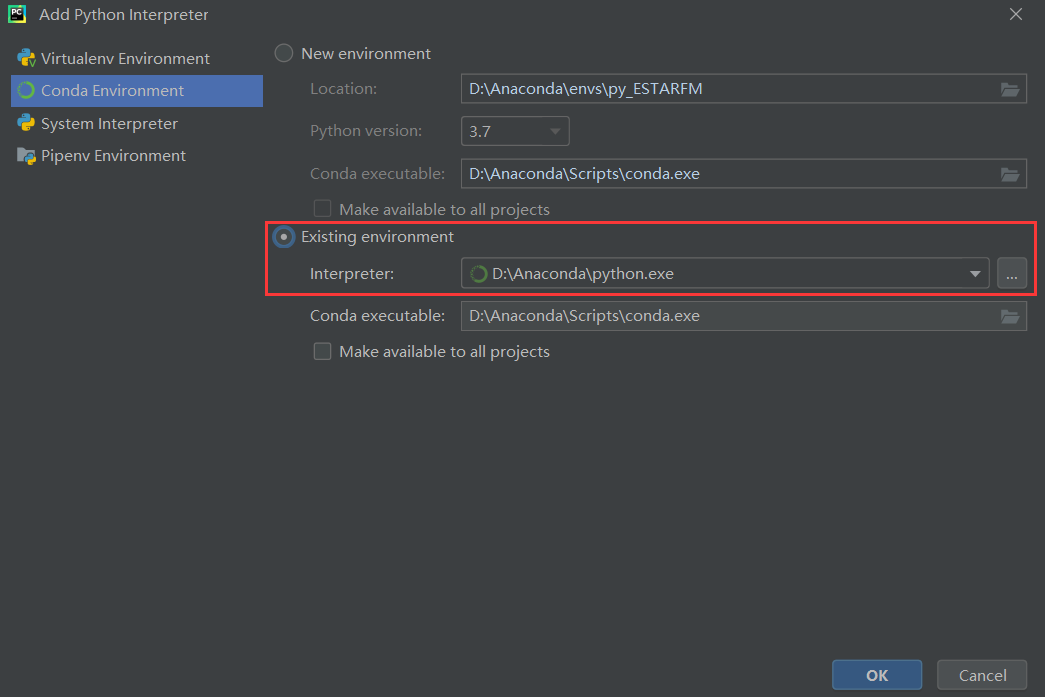
**Configure PyCharm with Anaconda**

1. Launch JetBrains PyCharm and click “File -> Open” to Open py\_ESTAFM project (i.e. select the folder “py\_ESTARFM” and then click “OK”)

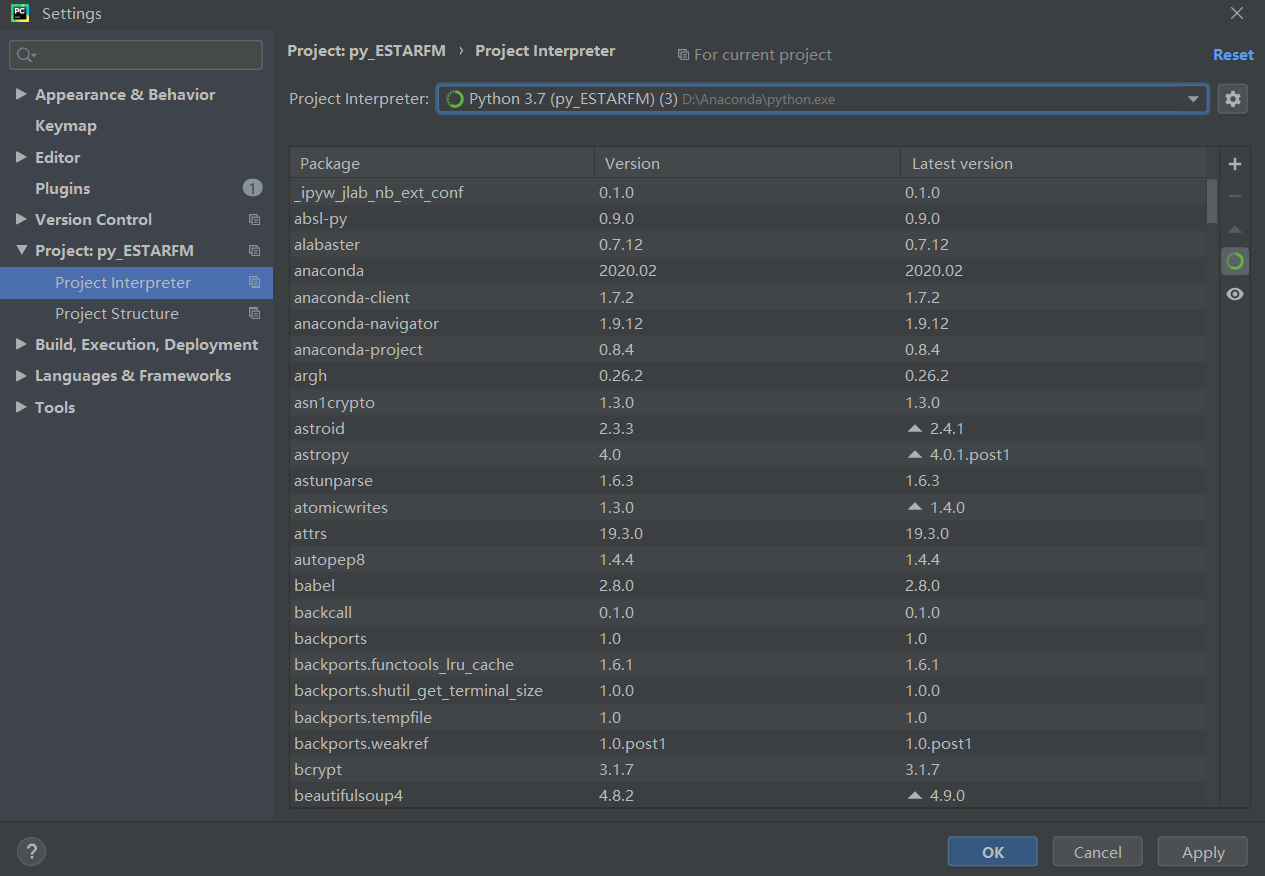


1. Select File -> Settings -> Project -> Project Interpreter
2. Click a settings button  for adding the python.exe interpreter that you just installed in Conda Environment to the “Existing environment”. In my case, the path is “D:\Anaconda\python.exe”, then click “OK”.



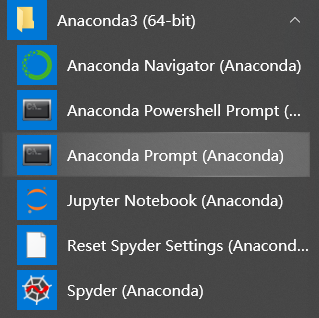


Then click “OK” in the following interface window:

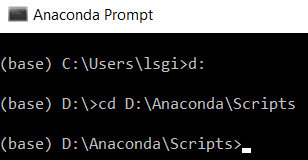


**Install the required packages**

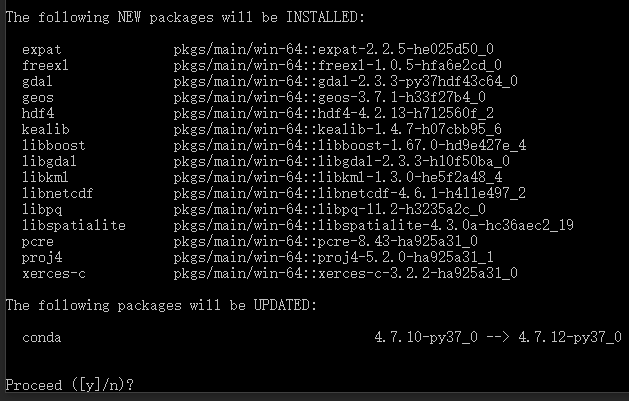
1. Open **Anaconda Prompt** in the window starter



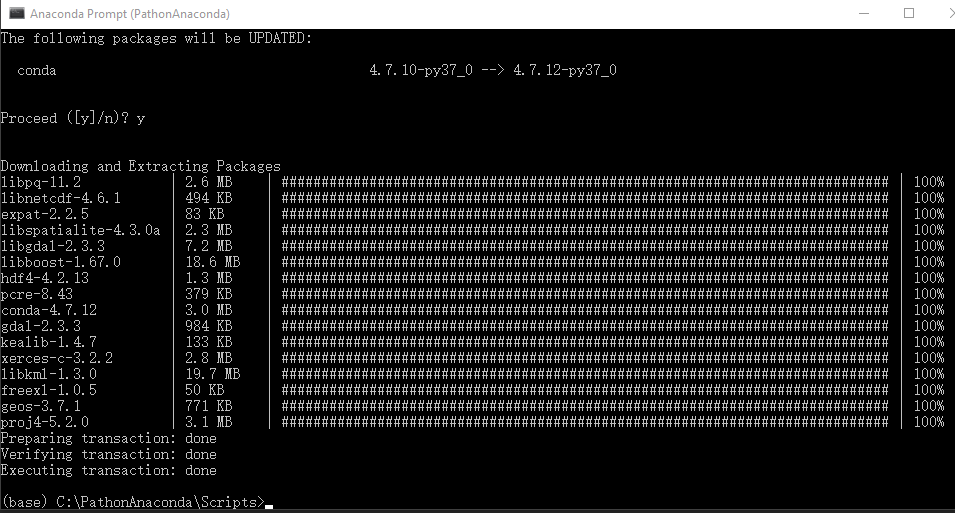
1. Locate your Python **Scripts** path (can be found within the Anaconda installation folder) and press **Enter**. In my case, the Python Scripts path is: D:\Anaconda\Scripts, so in the pop-out window, type “cd D:\Anaconda\Scripts” and the press “enter”



1. Type “**conda install gdal” and press “enter”** toinstall the required Python package **gdal** (other required packages include os, numpy, yaml, statsmodels, tkinter idlwrap, many of which have been included in Anaconda, if not, please use **pip install packagename to install required packages**). Type “y” and press “enter” when the window shows the following message:

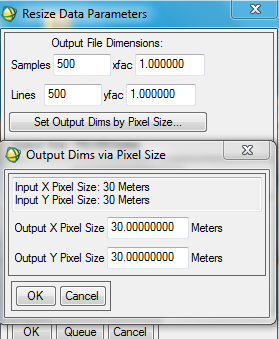


1. It is done **when you see the following text** (if no errors appear, then the package was successfully installed)



**Step 2 Data Prepocessing**

* In ENVI: resample the MODIS image to the same spatial resolution as Landsat images, i.e. 30m; (Basic tools/resize data/resize data parameters)
* Change 500 to 30:
* Resampling:
* Bilinear is recommended to reduce the effect of geo-referencing error



**Step 3**

* Geo-rectified MODIS image to Landsat: Choose resampled Landsat as reference, correct MODIS.
* Envi/map-registration/ select GCPs: image to image

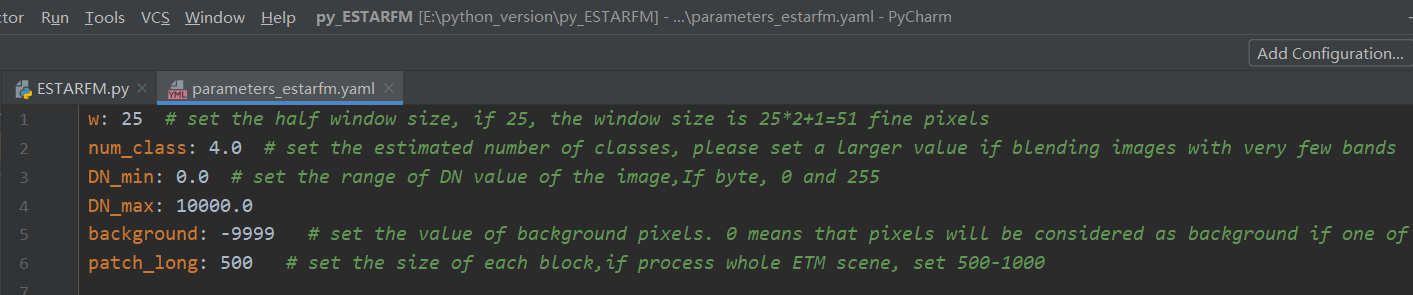
**Step 4**

* Crop all MODIS images by Landsat, make sure they are with exactly same size:
* Envi/File/save file as envi standard/import file-select MODIS image/spatial subset/file-select Landsat/ok

**Note: For the test data, we have done step2-step4!**

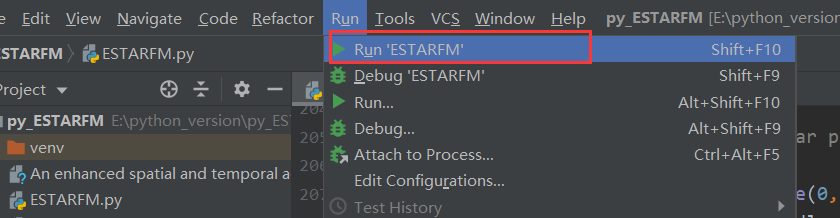
**Step 5 Set the parameters**

1. Please follow the explanation or the paper to set the parameters, which can be set in **parameters\_estarfm.yaml (and parameters\_estarfm\_fast.yaml)**. The default parameters are used for test data, you can change these parameters according to your own data before using this parameter file.



**Step 6: Run**

Click Run -> Run ‘ESTARFM’



Open files according to the name of pop-up windows

* Open the parameter settings file (**parameters\_estarfm.yaml or parameters\_estarfm\_fast.yaml if using ESTARFM\_FAST**)
* Set the temporary folder
* open the fine image of the first pair
* open the coarse image of the first pair
* open the fine image of the second pair
* open the coarse image of the second pair
* open the coarse image of the prediction time

Thanks for using ESTARFM algorithm. If you meet any problems, please feel free to contact Miss Yue Sun or Dr. Xiaolin Zhu.