SETTING UP YOUR COMPUTER TO DOWNSCALE ECOSTRESS LST WITH PYDMS

ECOSTRESS TUTORIALS

This tutorial will show you how to prepare and download everything for the good use of the downscaling algorithm on Windows.

Questions or comments: quentindehaene@gmail.com or glynn.hulley@jpl.nasa.gov

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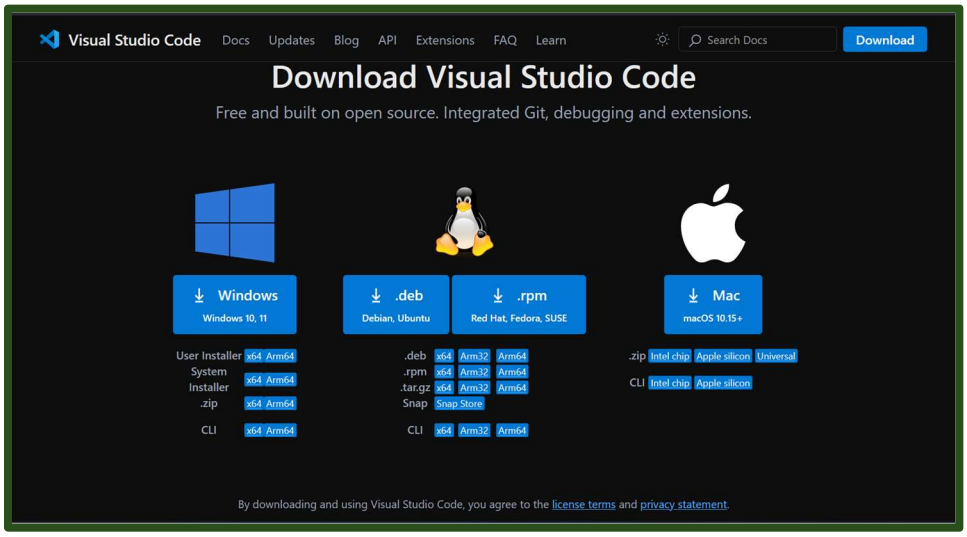
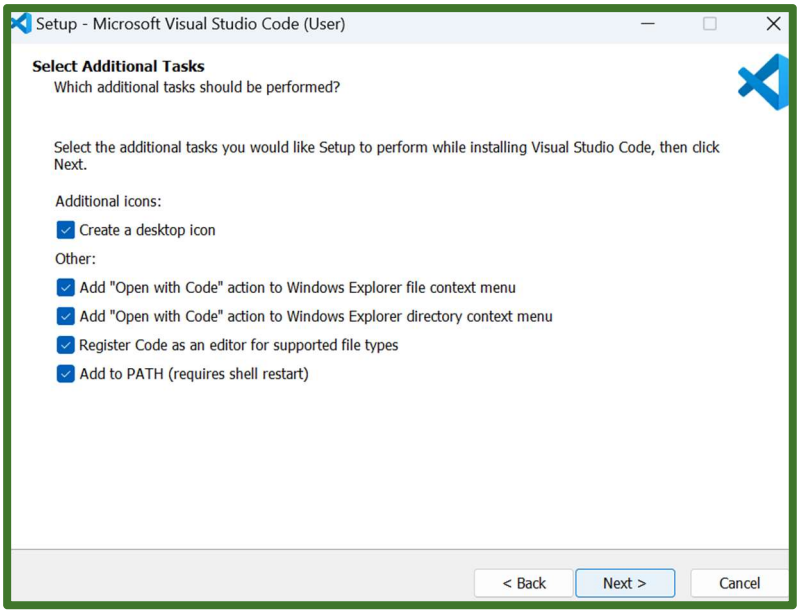
HOW TO INSTALL VISUAL STUDIO CODE

Start by going to https://code.visualstudio.com/download or by searching the web for Visual Studio Code (VS Code). Click the appropriate icon for your OS. In our case, Windows.

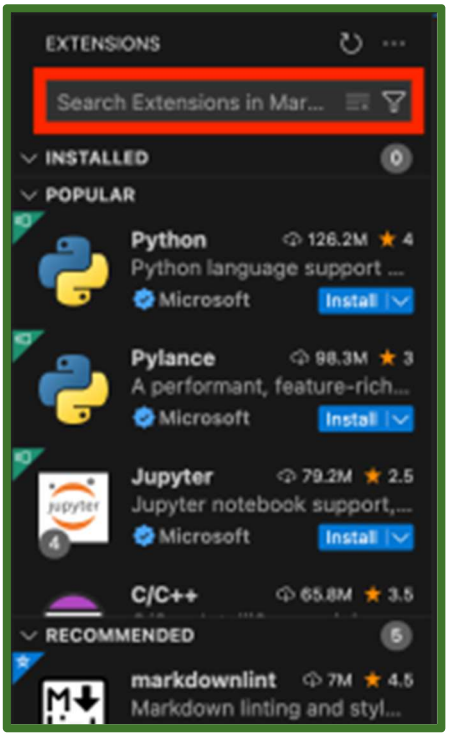


1. Now let's execute the newly downloaded VSCodeUserSetup-xxxxxx.exe file. Click next on the first pages, then agree to the license. Click next until you see this window. I advise you to check all these boxes (the first 3 are optional but they come in handy).

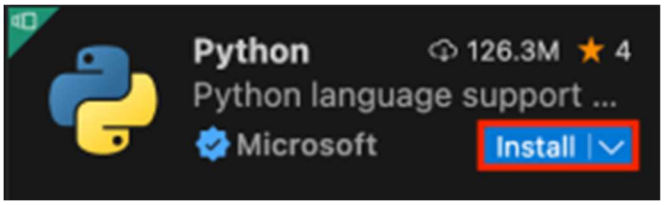


2. Open the newly installed application Visual studio Code.
3. Once the application is open, let's install some extensions to allow us to use Python and Jupyter notebooks in Visual Studio Code. On the left side of the application, look for the **extensions** icon and **click** on it.

4. A new **panel** should open prompting you to search for extensions.



5. In the search bar, type **Python**. Once you have found the extension, click the blue install button. It should say "installing" for a moment, and then it will be installed.



6. Do the same installation with Jupyter. You can also add other extensions such as formatters (Black formatter, Prettier) or the Python Debugger.

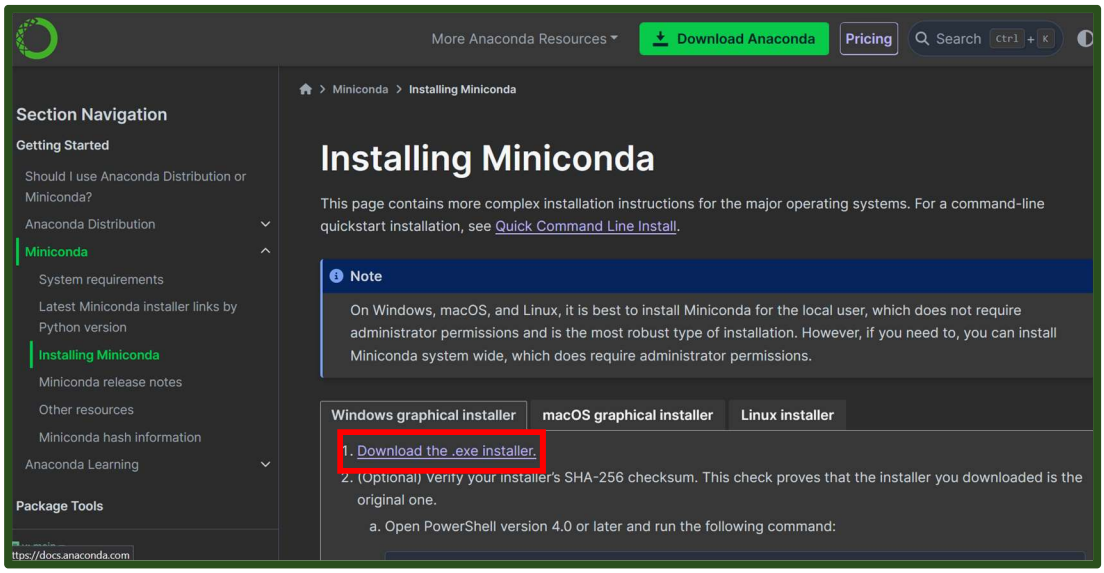
What is Conda?

Conda is a package management system used to install and manage software. We can use it to create environments for different projects.

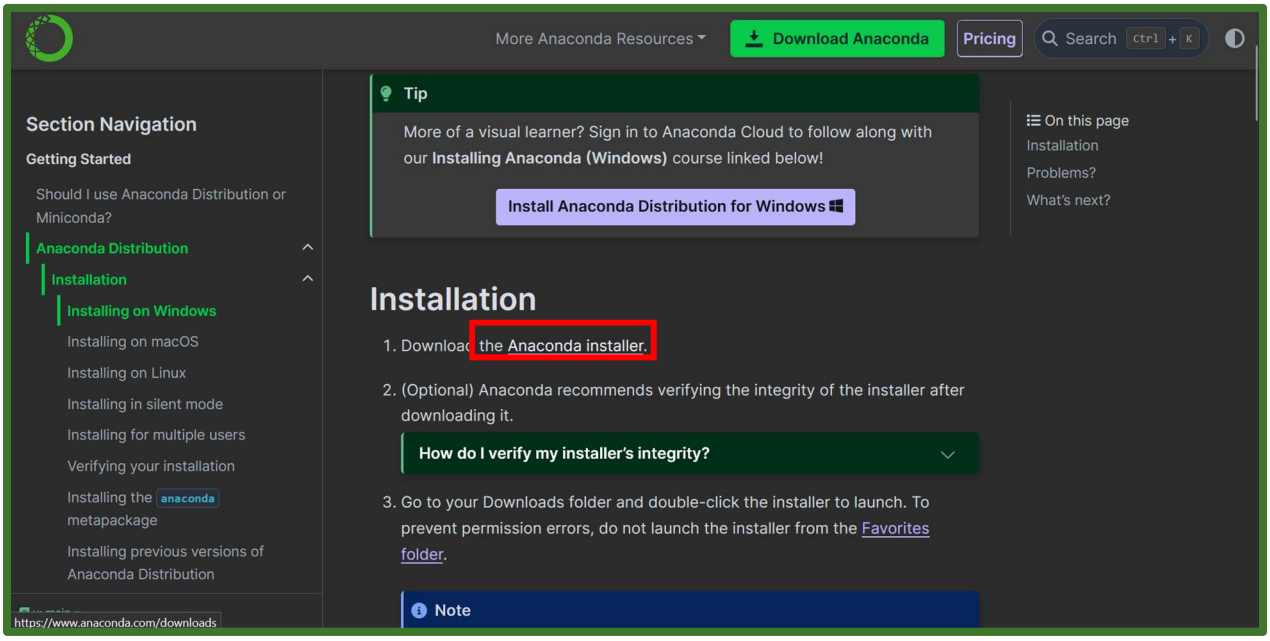
HOW TO INSTALL CONDA

In this case we have two possibilities that are equivalent: Anaconda and Miniconda. As its name suggests, Miniconda is a lighter version, for user with little storage on their computer. I have decided to install Miniconda in my case.

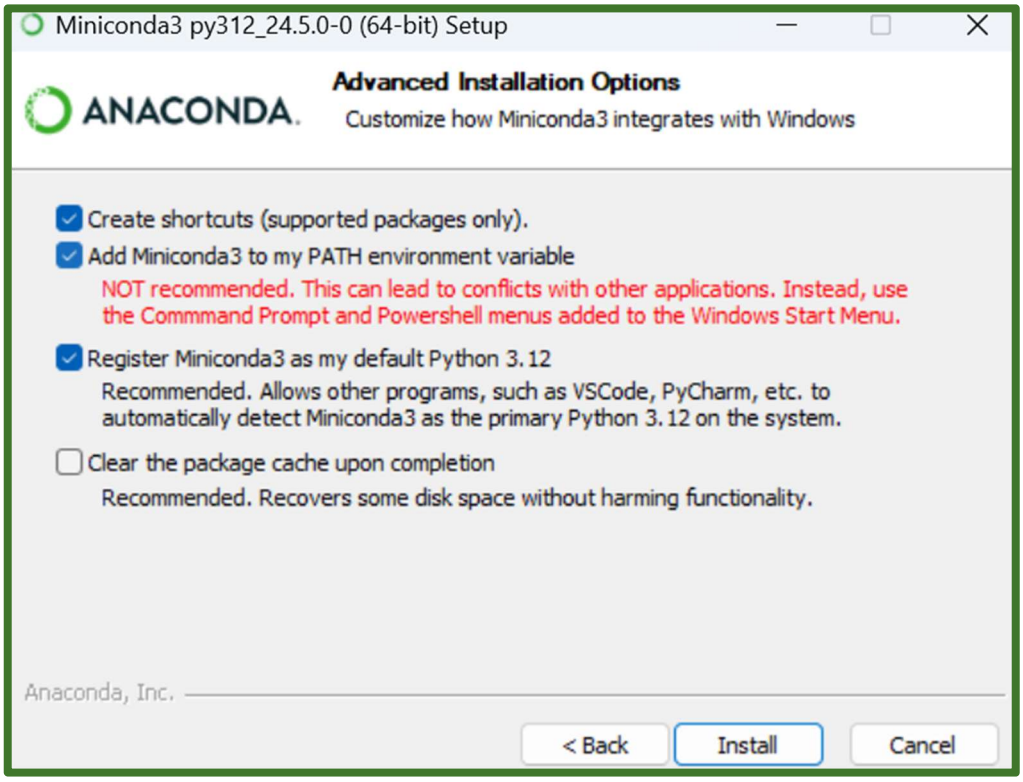
1. Go to https://docs.anaconda.com/miniconda/miniconda-install/ and click on the "Download the.exe installer" link.



If you wish to install Anaconda go to https://docs.anaconda.com/anaconda/install/windows/ and click on the highlighted link. The rest of the process is then exactly similar.



2. Execute the downloaded installer and follow the process until you see this window. Here it is **very important** that you check the second box. If you don't VS Code won't recognize conda and you'll have to add it to PATH manually.



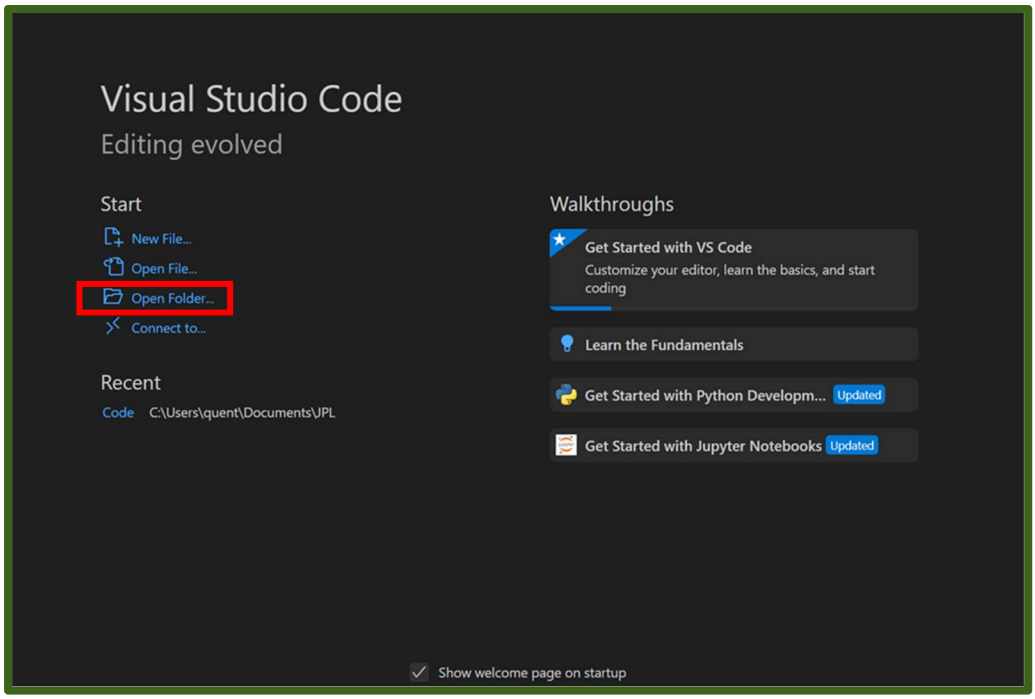
What is an Environment?

An environment is a separate place on your computer where you can install software and libraries specific to the project you are working on. This allows you to have multiple projects all with their unique requirements. We need to create an environment that has all the tools we need to work with ECOSTRESS data.

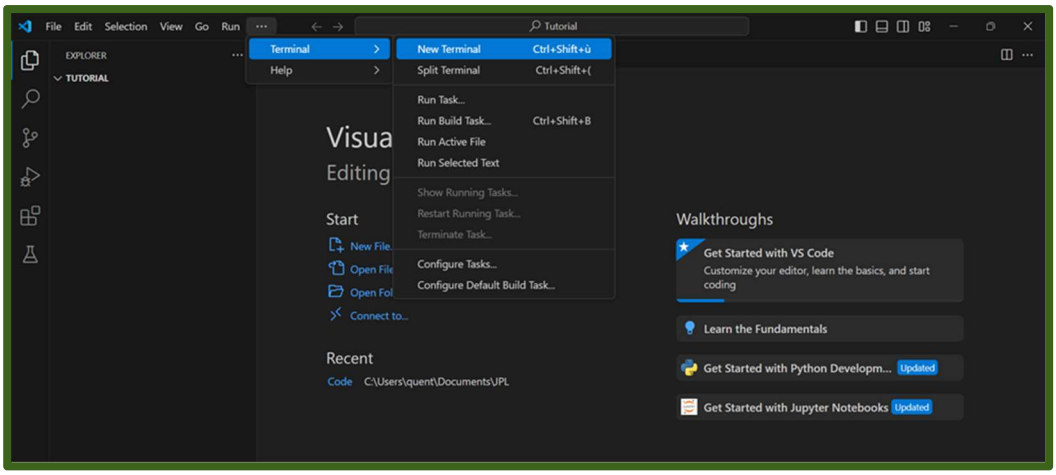
HOW TO CREATE AN ENVIRONMENT

You might have create other envrionements in the past for other projects, there are many ways to create and set up you environment. I personally like to use this because it doesn't require to leave VS Code, but do what you are comfortable with.

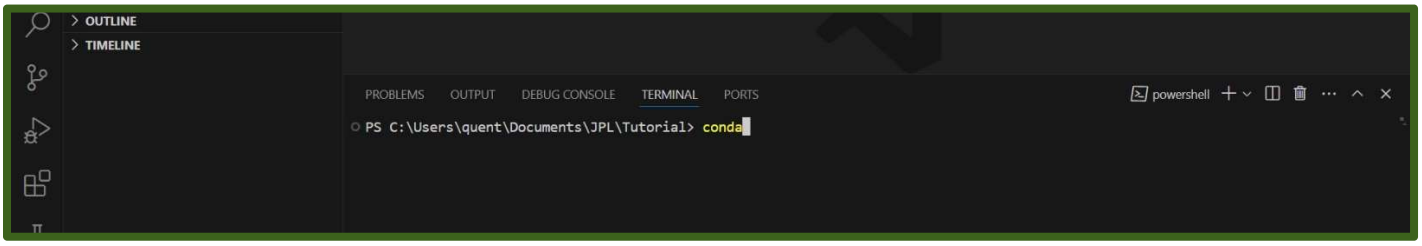
1. Open Visual Studio Code with the desktop icon if you created one while installing or search for the application in the Windows search bar. Click on **Open Folder.** Select the folder of your choosing, here I have previously created a folder especially for this tutorial.



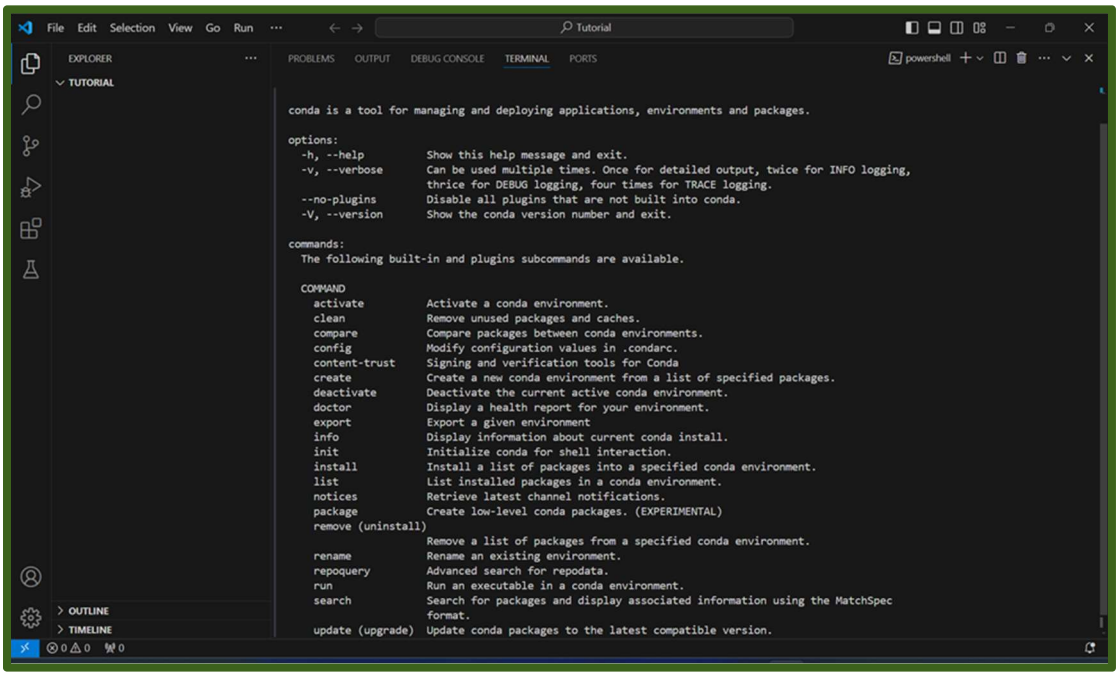
2. Open a new terminal in VS Code as such.



3. As a first test, **type** conda and run this command.

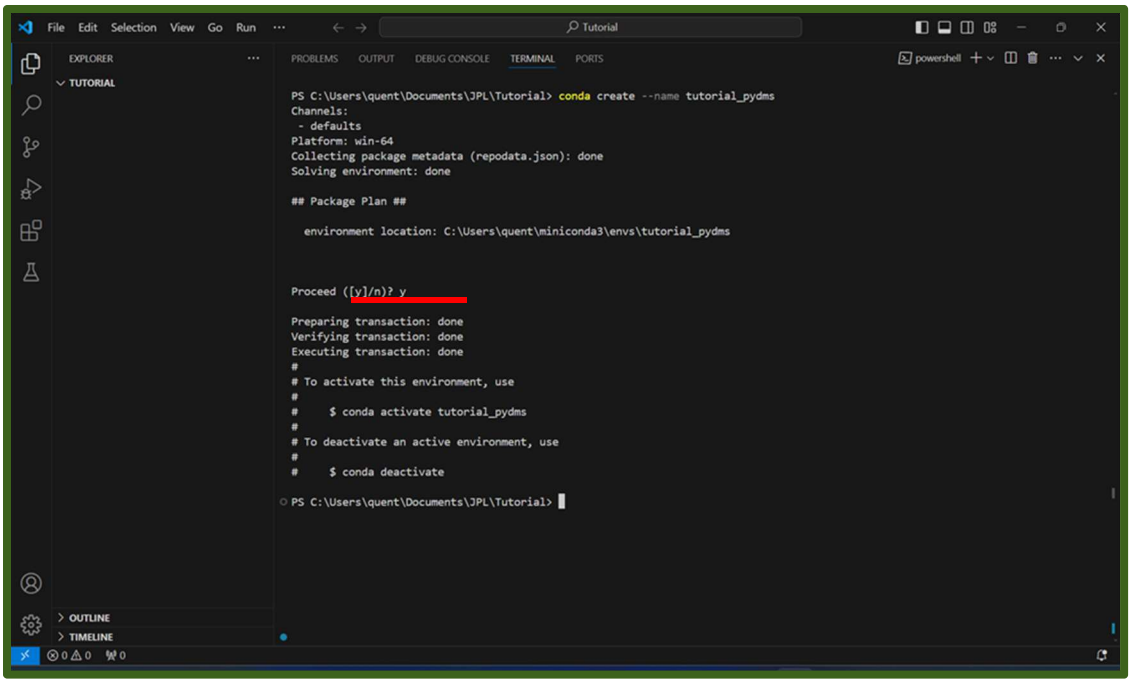


You should see:



If you're returned an error saying that the command is unknown, it's most likely because it wasn't added to PATH during the installation.

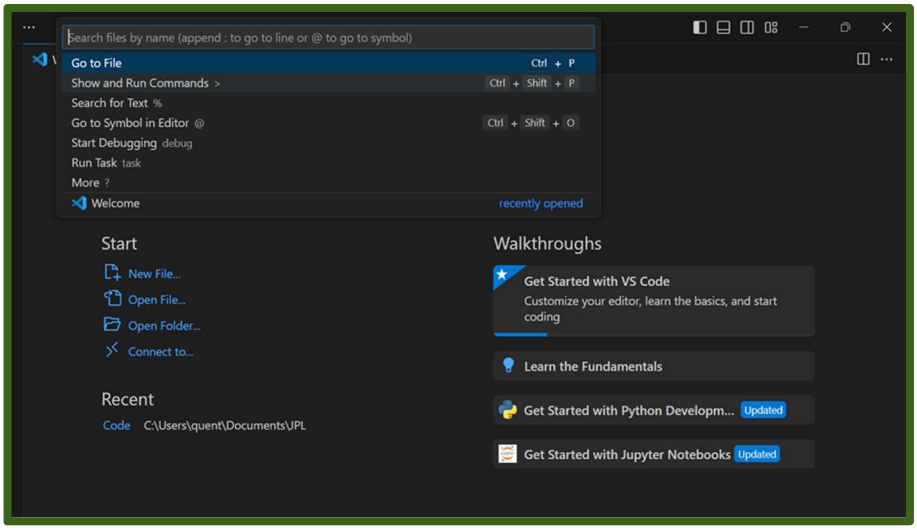
4. Once we check that conda was properly installed. We can create an environment. To do so, run the command: conda create --name nameofyourenvironment
   You can add the option python=3.x where you precise the version of python you want to use for you environment. This can be helpful if you have different versions of python installed and that you don't want to confuse your environments.

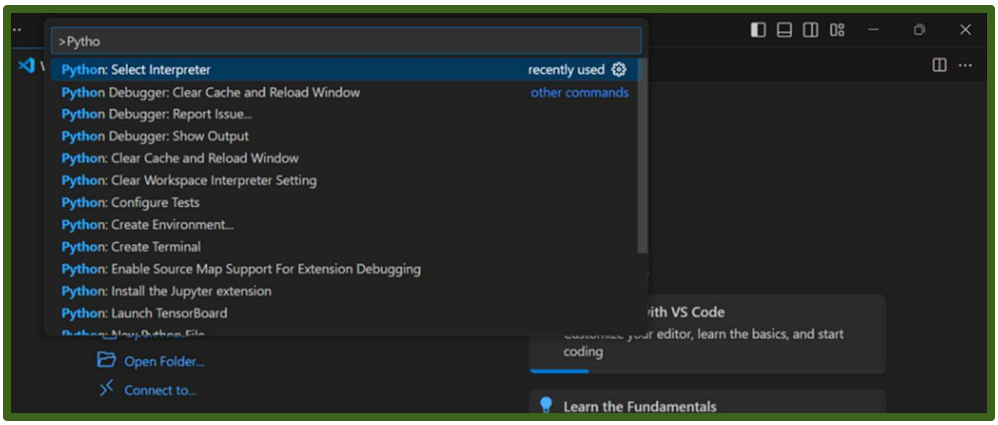


Most of the time when you create, delete, install or uninstall, conda will ask you to confirm by typing y in the terminal as underlined here.

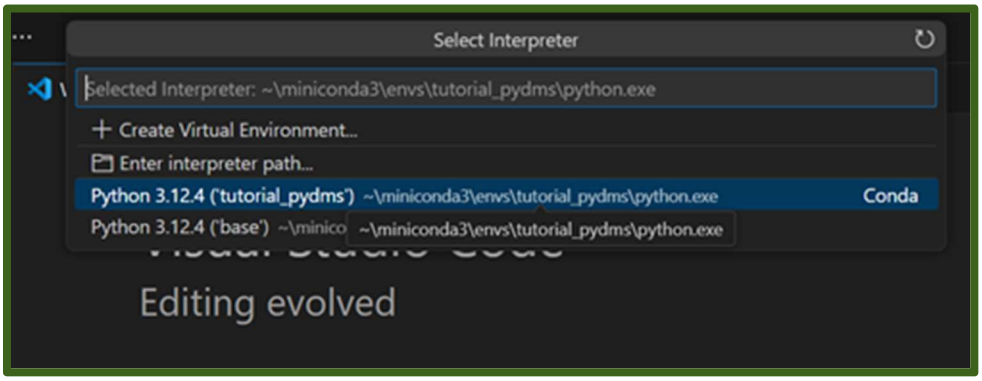
HOW TO PREPARE AN ENVIRONMENT FOR PYDMS

1. Now, to use this newly created environment as our interpreter for our codes and commands. Click on the search bar on top of the window and **type**: > Python: Select Interpreter.

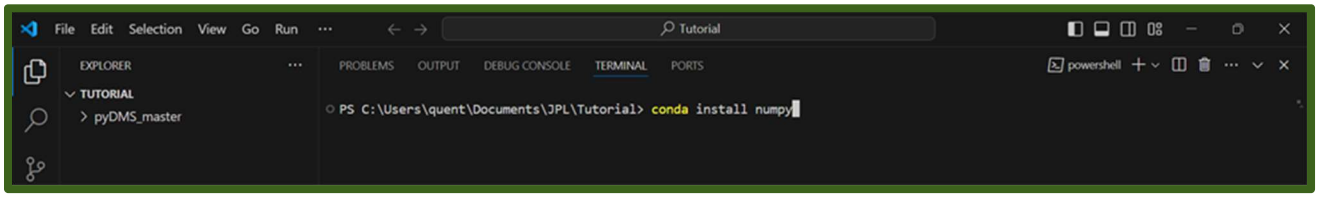




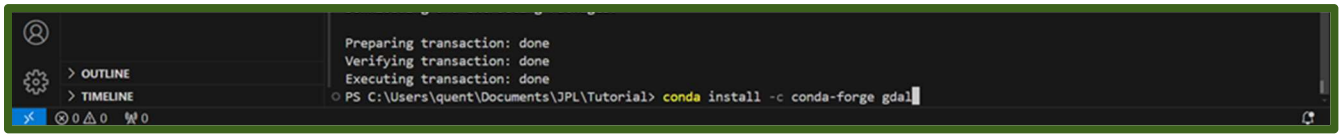
2. Select the newly created environment and open a new terminal.



3. It's now time to install the libraries needed to run the downscaling notebook. To install basic packages simply run: conda install nameofthepackage. For example, here with the package numpy.



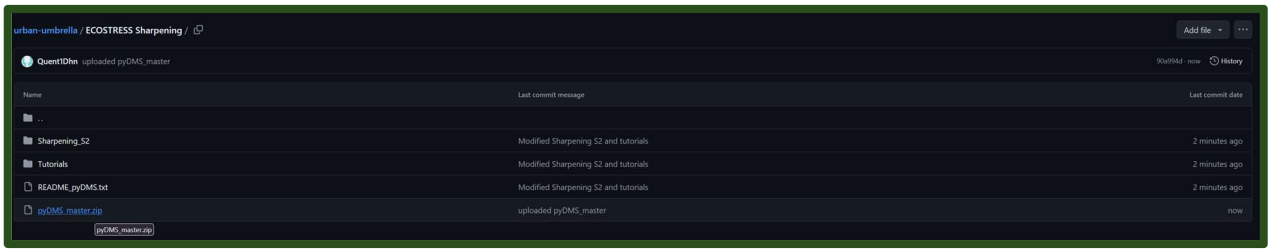
Some packages are not available in the default channel so it requires an extra option to be able to install them: conda install -c conda-forge nameofthepackage. For instance, with the package gdal.



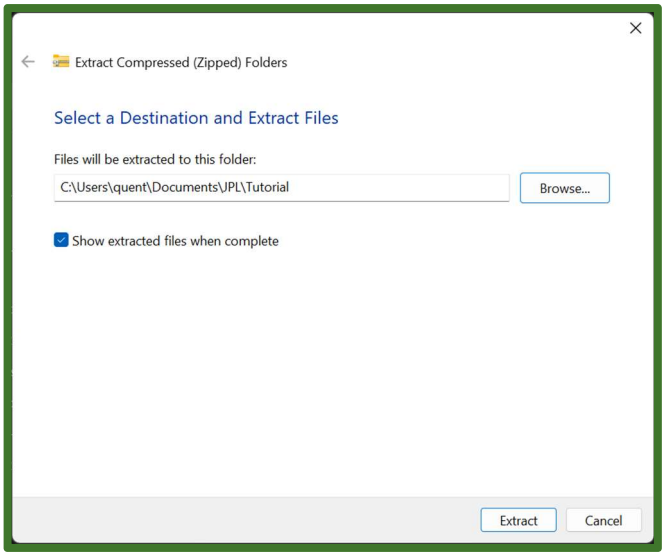
To be able to run the notebook fully, you'll need to install numpy, matplotlib, rasterio, rioxarray (option not necessary) and gdal and sentinelhub (option required). You can run the command "conda list" to read the list of the installed packages in your active environment.

HOW TO INSTALL AND SETUP PYDMS

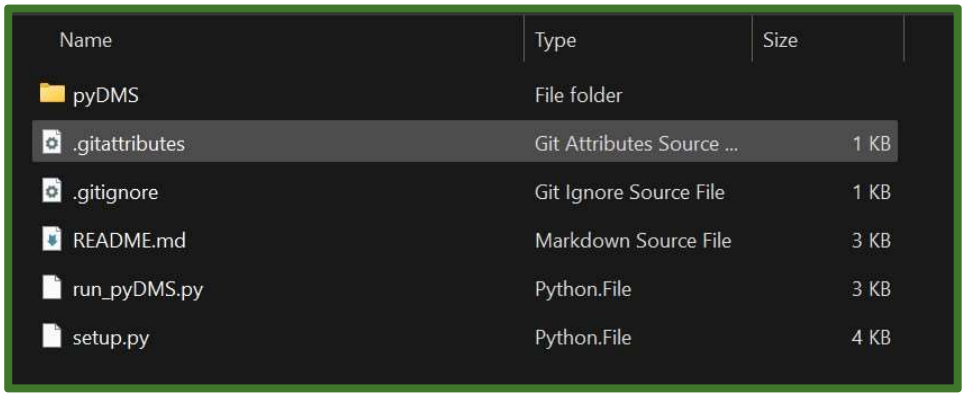
1. Go to the GitHub page of the project (https://github.com/ghulley/urban-umbrella/tree/main/ECOSTRESS%20Sharpening) and download the pyDMS_master.zip file.



2. Extract the downloaded files to the folder you have opened on VS Code.



Here is what the folder should contain:



Pay attention depending on your decompression tool, sometimes the extraction may have created an extra pyDMS_master folder in the parent folder. We only want one pyDMS_master folder in the directory opened in code (Tutorial in our example). That pyDMS_master folder should directly contain the files above.

3. Go back to your terminal (or open a new one) and change the directory to the newly extracted pyDMS_master with the command: cd .\pyDMS_master\
   To be certain that you are using the correct environment run the command: conda info.

Check in the response that the active environment is the one you installed all the packages.

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    powershell - pyDMS_master

PS C:\Users\quent\Documents\JPL\Tutorial\pyDMS_master> conda info

     active environment : tutorial_pydms
    active env location : C:\Users\quent\miniconda3\envs\tutorial_pydms
            shell level : 1
       user config file : C:\Users\quent\.condarc
 populated config files :
          conda version : 24.7.1
    conda-build version : not installed
         python version : 3.12.4.final.0
                 solver : libmamba (default)
       virtual packages : __archspec=1=skylake
                          __conda=24.7.1=0
                          __win=0=0
      base environment : C:\Users\quent\miniconda3  (writable)
     conda av data dir : C:\Users\quent\miniconda3\etc\conda
 conda av metadata url : None
          channel URLs : https://repo.anaconda.com/pkgs/main/win-64
                         https://repo.anaconda.com/pkgs/main/noarch
                         https://repo.anaconda.com/pkgs/r/win-64
                         https://repo.anaconda.com/pkgs/r/noarch
                         https://repo.anaconda.com/pkgs/msys2/win-64
                         https://repo.anaconda.com/pkgs/msys2/noarch
         package cache : C:\Users\quent\miniconda3\pkgs
                         C:\Users\quent\.conda\pkgs
                         C:\Users\quent\AppData\Local\conda\conda\pkgs
       envs directories : C:\Users\quent\miniconda3\envs
                         C:\Users\quent\.conda\envs
                         C:\Users\quent\AppData\Local\conda\conda\envs
```

4. Finally, you can run this last command: python setup.py install

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS                    powershell - pyDMS_master

PS C:\Users\quent\Documents\JPL\Tutorial\pyDMS_master> python setup.py install
```

You are now ready to use the downscaling notebook to upsample ECOSTRESS LST from 70m to Sentinel 2 resolution. Follow the instructions in the notebook, read the comments for explanations and use the document listing some frequents errors if you encounter an issue.