



Installing Python with Anaconda

Please follow the following instructions to install Python 2.7. **If you encounter a problem, please look for a solution online or with your IT department.** Due to limited resources, ARSET is not able to further assist you in the Python installation process.

Download & Installing Anaconda

1. Make sure you have administrative privileges on your computer or install on a local directory to avoid any permission issues
2. Download the Anaconda installer at <http://www.continuum.io/downloads/>
3. For this training, we recommend you install Python 2.7

Installing Packages

4. Once you have installed Anaconda, open an Anaconda Prompt (e.g. Terminal/CMD) and enter the following command:

```
conda install pyhdf
```

5. If this does not work, try the following commands:
conda install -c conda-forge pyhdf
or
conda install -c cistools pyhdf

Anaconda will then display a description of what it intends to install before asking you to confirm installation. **Read this carefully** anytime you install a package with Anaconda. It sometimes upgrades or downgrades packages (if needed), which can cause previously installed packages to stop working.

6. Install `mpl_toolkits.basemap` using
conda install basemap
7. If this does not work, try the following commands:
conda install -c conda-forge basemap
 - Note: you can check which packages are installed with the following:
conda list



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8. List of packages required for this course are:

- pyhdf
- numpy
- sys
- mpl_toolkits.basemap
- matplotlib
- linearSegmentedColormap
- h5py
- time
- calendar

9. If needed, you can update a package by repeating the installation command

Using Integrated Development Environments (IDEs) with Anaconda

Depending on the IDE you are trying to use, it may be possible to set up your IDE to use the Anaconda environment. This will mean using the interpreter and packages installed with Anaconda. For specific instructions on how to do this, visit:

<http://docs.continuum.io/anaconda/user-guide/tasks/integration/>

Note: Anaconda comes with a minimal IDE named Spyder, which is available from the Anaconda Navigator.

Further Anaconda Details and Capabilities

In addition to being a package management software, Anaconda is also an environment management software. This means two things:

- It stores all files (including the Python interpreter and packages) in the anaconda directory, which can lead to difficulties if you try to use the files in an external version of Python
- It can manage multiple versions of Python separately

For more details, visit: <http://conda.io/docs/py2or3.html>



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Test Python Installation

After successful installation of Python 2.7 and packages using [Anaconda](#), the following test can be run to check proper installation of all the packages without error.

1. Download MODIS Data and Python Codes using following link
 - https://arset.gsfc.nasa.gov/sites/default/files/airquality/webinars/18-hires/py_test_code.zip
2. Test python and package installations using following python test code
 - **test_python.py**
3. Open the spyder editor inside Anaconda
4. Open test_python.py
5. Make sure directory has python code and hdf file
6. Open 'ipython' console in the spyder
7. Run the code using green 'arrow' on the top
8. Output should be an image as shown on the right

The screenshot shows the Spyder Python IDE interface. The left pane displays the test code for `test_python.py`, which includes imports for `SD`, `numpy`, `Basemap`, `plt`, `sys`, `spy`, `time`, and `calendar`. The code defines a file path, reads an HDF4 file, and generates a map of optical depth. The right pane shows the IPython console output, including the Python version (2.7.13), IPython version (5.3.0), and the execution of the script. The output includes a map titled "MYD04_L2_A2017249_2105_006_2017250160535 Image_Optical_Depth_Land_And_Ocean" with a color scale for AOD from 0 to 5. The map shows a geographical region with varying optical depth values. The console also displays a deprecation warning for the `axishold` function.

Test Code

```
1#!/usr/bin/python
2'''
3Module: read_and_map_mod_aerosol.py
4
5Disclaimer: The code is for demonstration purposes only. Users are responsible to check for acc
6
7Author: Justin Roberts-Piere1, 2015
8Organization: NASA ARSET
9Purpose: To extract AOD data from a MODIS HDF4 file (or series of files) and create a map of th
10
11See the README associated with this module for more information.
12'''
13'''
14
15#Import necessary modules
16from pyhdf import SD
17import numpy as np
18from mpl_toolkits.basemap import Basemap, cm
19import matplotlib.pyplot as plt
20import sys
21import spy
22import time
23import calendar
24
25
26FILE_NAME='MYD04_L2_A2017249_2105_006_2017250160535.hdf'
27
28hdf=SD.SD(FILE_NAME)
29# Get lat and lon info
30lat = hdf.select('Latitude')
31latitude = lat[:]
32min_lat=latitude.min()
33max_lat=latitude.max()
34lon = hdf.select('Longitude')
35longitude = lon[:]
36min_lon=longitude.min()
37max_lon=longitude.max()
38SDS_NAME='Image_Optical_Depth_Land_And_Ocean'
39sds=hdf.select(SDS_NAME)
40#get scale factor for AOD SDS
41attributes=sds.attributes()
42scale_factor=attributes['scale_factor']
43#get valid range for AOD SDS
44range=sds.getrange()
45min_range=min(range)
46max_range=max(range)
47
48#get SDS data
49data=sds.get()
50#get data within valid range
51valid_data=data.ravel()
52valid_data=[x for x in valid_data if x>=min_range]
53valid_data=[x for x in valid_data if x<=max_range]
54valid_data=valid_data.reshape((valid_data
```

ipython

Output