

Working of Plugin - MODIS Data processing

Import Data: The input data has to be fed to the plugin, user has to select input data in HDF EOS Format. The user downloads the raw freely available satellite data from NASA's LPDAAC Website. Using Import data option, user can browse and select a single compressed HDF file of satellite data of the area of interest. By clicking on the browse button on the proposed plug it will give the user access to the Browser Window

In the Browser Window, based on the choice made, user has to find the path of file in the system by clicking on the browse button on the window. The plugin checks for the extension of the file selected if the extension is .hdf the user can select the downloaded HDF File and will be considered for processing.

Output File Location: The location of the processed data must be specified by the user by clicking on the browse button. Based on all the inputs taken from user, tool starts to process on the raw data. Once the output folder is selected tool creates a new folder called "MODIS-DIR*data* *time*" in the output location.

If the browse directory already consists a folder named above, tool creates a new name every second in order to avoid overwriting of data. Now in the output file location string is replaced by the location of the newly created folder.

Select Layer: The SDS Layers of input HDF File will appear on the dropdown menu, the user has to select the layers to be processed. The selected layers will be converted to a standard form of Output (Geotiff). The user can select multiple Layers for processing at a time. The plugin will name each of the SDS Layer processed as "_SDS layer name".tif in the newly created folder "MODIS-DIR*data* *time*" in the output location.

For Example: C:\Users\Data\ out_folder\MODIS-DIR_20190315_104434_Fpar_500m.tif

Re-project the selected Layer: The raw Level 3 and Level 4 may be swath data, data with sinusoidal Projection, Lat/Long Grid Projection. The user can re-project this raw data to the WGS84 standard projection. The plugin will name each of the SDS Layer processed as "r_SDS layer name".tif in the newly created folder "MODIS-DIR*data* *time*" in the output location.

For Example: C:\Users\Data\ out_folder\MODIS-DIR_20190315_104434\r_Fpar_500m.tif

Clipping: This is optional and is left to the user based on requirement of their study. When the user clicks on the “Clipping” checkbox .The browse button to “Select Area of Interest” gets activated The browse button redirects to the browse window find the path of the shape file of the area of interest. The user has to select the .shp (ESRI shapefile) file of area of interest from the system. The plugin will name each of the SDS Layer processed as “clip_SDS layer name”.tif in the newly created folder “MODIS-DIR*data* *time*” in the output location.

For Example: C:\Users\Data\ out_folder\MODIS-DIR_20190315_104434\clip_Fpar_500m.tif

Scale Factor: Generally MODIS Data products which are available as 16 bit unsigned integers for storage purpose needs to be scaled using a scale factor which is different for different MODIS products, in order to get the values of the output parameters within a Valid range. This is optional when the user clicks on the “Apply Scale Factor” checkbox, in the display window the Scale factor of all the SDS layers of the input file appears and based on the layers selected user manually enters the scale factor in the space provided. The plugin will name each of the SDS Layer processed as “sf_SDS layer name”.tif in the newly created folder “MODIS-DIR*data* *time*” in the output location.

For Example: C:\Users\Data\ out_folder\MODIS-DIR_20190315_104434\sف_Fpar_500m.tif

Start Processing: Based on all the inputs taken from the user, tool starts to process on the raw data. This button becomes processes data after tool receives minimum required user inputs. When this button is clicked the each function in the code runs and process data based on the input given by the user.

Working of Plugin-Time Series Analysis

The user has to tick off this option as per their requirement. The change in the pixel values of satellite data for different time periods of the same area of interest has prominent importance in many research work. The plug-in will provide an opportunity to estimate the changes in Land surface temperature, Emissivity, NDVI, EVI and other parameters over time.

Import TSA Data: The user has click on the browse button and through the Browser Window the user has to navigate to the folder containing multiple satellite dataset over different time period of the area of interest.

TSA Output File Location: The location of the processed data must be specified by the user by clicking on the browse button. Once the folder where the output CSV (.csv) is selected tool creates a new file called “tsa_*data* *time*” in the output folder.

If the browse directory already consists a folder named above, tool creates a new name every second in order to avoid overwriting of data. Now in the output file location string is replaced by the location of the newly created CSV (.csv) file.

Time Series Analysis in the plug-in has two modes based on the requirement of the user:

1. Single Co-ordinate Analysis
2. Multiple Co-ordinate Analysis

Single Co-ordinate Analysis: The user will click on the “Single Co-ordinate Analysis” if pixel value for has to be extracted from the input raster files at a single point. When the user click on the “Single Co-ordinate Analysis” the tab (line edit) for the users to give coordinates of the location will get activated. The user has to manually enter the Latitude and Longitude of the location in decimal values.

Multiple Co-ordinate Analysis: The user will click on the “Multiple Co-ordinate Analysis” if pixel value for has to be extracted from the input raster files at a multiple point. When the user click on the “Multiple Co-ordinate Analysis” the browse button to give input point shapefile gets activated.

Input Point Shape file: The user has click on the browse button and through the Browser Window the user has to navigate to the ESRI shape file (.shp). This file is a point shape file of the co-ordinates of multiple location where the pixel value of raster file is to be extracted.

Start Processing (Push Button): Based on all the inputs taken from the user, tool starts to process on the raw data. This button becomes processes data after tool receives minimum required user inputs. When this button is clicked the each function in the code runs and process data based on the input given by the user.

Show Graph of Single Co-ordinate Analysis: This checkbox gets activated when the user has clicked on Single Co-ordinate Analysis. When this checkbox is clicked a line graph showing the variation of pixel value in the raster files pops up. The graph can be saved in different image

formats as per user convenience. The X Axis in the graph is the raster files used and Y Axis is the pixel value. The graph is created from the data in Output CSV file (.csv) processed from the plugin. The graph can be saved in SVG(Scalable Vector Graphic), JPEG (Joint Photographic Export Group), PNG(Portable Network Graphic), PDF(Portable Document Format),TIF(Tagged Image Format). The Name of the axis, Title can be edited from the pop up window and then be saved as per user requirement.

Show Graph of Multiple Co-ordinate Analysis: This checkbox gets activated when the user has clicked on Multiple Co-ordinate Analysis. When this checkbox is clicked data from Output CSV file (.csv) processed from the plugin is formatted and read.

View Graph: This button will read the formatted CSV (.csv) file and plot a line graph showing the variation of pixel value in the raster files. The graph can be saved in different image formats as per user convenience. The X Axis in the graph is the raster files used and Y Axis is the pixel value. Each line plot in the graph will show the variation in pixel value at different stations. The graph can be saved in SVG(Scalable Vector Graphic), JPEG (Joint Photographic Export Group), PNG(Portable Network Graphic), PDF(Portable Document Format),TIF(Tagged Image Format). The Name of the axis, Title can be edited from the pop up window and then be saved as per user requirement