

Functions to code

Elaborating on the flow chart

Create the shell of the final product

Creates the hdf file and the base organization scheme (i.e., by dates).

Iterate over and chose the flashes data

Iterate over the flashes data, using the other functions to build the final product one flash (and its associated data) at a time. The first and last date (start and stop point of the loop) to be read as well as the latitude/longitude extents would be parameters so the flashes to be read can be specifically determined and additional data can be added later.

Within the “Iterate over flashes data” function

Read the LIS Flash data

Reads the Cluster index, footprint, location, radiance and TAI93 time from the LIS flashes data for a particular flash.

Create a flash’s own groups

In the appropriate groups of the organization scheme, creates a group for a flash’s associated data containing the following groups: LIS_flashes, MODIS_fires (Aqua, Terra), NTL_Power_Outages, and OMI/Aura_NO2.

Choose which data to read from MODIS fires Aqua

Based on the LIS flash data, choose which data to read from the MODIS fires Aqua by creating parameters for the “Read the MODIS Aqua Fires data” function.

Choose which data to read from the MODIS fires Terra

Based on the LIS flash data, choose which data to read from the MODIS fires Terra by creating parameters for the “Read the MODIS Terra Fires data” function.

Choose which data to read from the NTL Power Outages data

Based on the LIS flash data choose which data to read from the NTL Power Outages by creating parameters for the “Read the NTL Power Outages data” function.

Choose which data to read from the OMI/Aura NO2 data

Based on the LIS flash data choose which data to read from the OMI/Aura NO2 by creating parameters for the “Read the OMI/Aura NO2 data” function.

Read the MODIS Aqua Fires data

Reads the Aqua satellite's fire mask, confidence, land, latitude, line, longitude, numvalid, power, and time based on the provided parameters.

Read the MODIS Terra Fires data

Reads the Terra satellite's fire mask, confidence, land, latitude, line, longitude, numvalid, power, and time based on the provided parameters.

Read the NTL Power Outages data

Reads the gap filled DNB BRDF Corrected NTL, GF cloud mask, mandatory quality flag, and time based on the provided parameters.

Read the OMI/Aura NO2 data

Reads the ColumnAmountNO2Trop, ColumnAmountNO2TropStd, Latitude, Longitude, Time based on the provided parameters.

Resize/reshape pixels of flash data

Resize the pixels of the LIS flash's data to fit a 500 m X 500 m grid. This includes all data previously downloaded using the "Read the LIS Flashes data" function. . If using the group/event data to increase the accuracy, then those will have to be retrieved using the child data identifiers (can be a separate function) and used to calculate the pixel locations of the lightning strike (another function) and the values of the accompanying data (can be separate functions).

Resize/reshape pixels of Aqua/Terra Fire data

Resize the pixels of the flash's MODIS Aqua/Terra fire data to fit a 500 m X 500 m grid. This includes all Aqua/Terra fire data previously downloaded. See the EarthData website to understand the shape of the original data grid is a rectangle on an angle.

Resize/reshape pixels of NO2 data

Resize the pixels of the flash's OMI/Aura NO2 data to fit a 500 m X 500 m grid. This includes all NO2 data previously downloaded using the "Read the OMI/Aura NO2 data". See the EarthData website to understand that the original grid is a rectangle on an angle.

Create flash corner pixel locations

Calculate the locations of the corners of each pixel in the LIS data product.

Relocate pixels of Aqua/Terra Fire data

Modify the resized pixels of the Aqua/Terra Fire so their location matches that of the flash data. Take proportional averages of the original pixels to make the data within the new pixels.

Relocate pixels of Power Outages data

Modify the resized pixels of the NTL Power Outages so their location matches that of the flash data. Take proportional averages of the original pixels to make the data within the new pixels.

Relocate pixels of NO2 data

Modify the resized pixels of the OMI/Aura NO2 data so their location matches that of the flash data. Take proportional averages of the original pixels to make the data within the new pixels.

Create corner pixel locations

Calculate the locations of the corners of each pixel in each type of data product.

Synchronize flash times

Transform the time record system of LIS flash data to the Gregorian calendar system.

Synchronize fire times

Transform the time record system of Aqua/Terra fire data to the Gregorian calendar system.

Synchronize Power Outages times

Transform the time record system of NTL Power Outages data to the Gregorian calendar system.

Synchronize NO2 times

Transform the time record system of OMI/Aura NO2 data to the Gregorian calendar system.

Send data to the flashes final product

Places the data in the LIS flashes group of the final product. A parameter could be the identifier of the flash's own group.

Send data to the Aqua Fires final product

Places the data in the MODIS Fires Aqua group of the final product. A parameter could be the identifier of the flash's group with which this data is associated.

Send data to the Terra Fires final product

Places the data in the MODIS Fires Terra group of the final product. A parameter could be the identifier of the flash's group with which this data is associated.

Send data to the Power Outages final product

Places the data in the NTL Power Outages group of the final product. A parameter could be the identifier of the flash's group with which this data is associated.

Send data to the NO2 final product

Places the data in the OMI/Aura NO2 group of the final product. A parameter could be the identifier of the flash's group with which this data is associated.

Return to the beginning of the "Iterate over flashes data" function

Within the “choosing data” functions

Create a location parameter

Based on the location of the flash, create a location parameter for the data to be read from the dataset.

Create a date parameter

Based on the date and time of the flash, create a date (and possibly time) parameter for the data to be read from the dataset.

Within the “reading data based on location/time parameters” functions

Determine which granule

Determine which granule of the overall dataset to read the data from based on the location/time parameters.

Iterate over a list of datasets

Iterate over a list or dictionary of datasets to read data from.

Read the data from a specific dataset

Reading the data which fits the location/time parameters in a specific dataset from a specified granule.

Package the datasets

Package the datasets so when they're returned they're easy to manipulate.
