**Sensor-Independent LAI/FPAR CDR Description**

**Department of Earth and Environment**

**Boston University**

**Cliveg Research Group**

**June 20, 2023**

README FILE AND SCRIPTS

**1. DATA DESCRIPTION**

The Sensor-Independent LAI/FPAR climate dataset record (CDR) is derived from high quality LAI/FPAR from MOD15AH C6, MYD15A2H C6, and VNP15A2H C1 products. The low-quality LAI/FPARs were first removed by quality control method and the high-quality LAI/FPARs were merged into Sensor-Independent LAI/FPAR data. The missing values are then gap filled by spatial-temporal tensor completion model. The Sensor-Independent LAI/FPAR CDR is produced based on different projections and spatial/temporal resolutions. The characteristic of the Sensor-Independent LAI/FPAR CDR can be found in Table 1.

**Table 1.** Data description of Sensor-Independent LAI/FPAR CDR

|  |  |
| --- | --- |
| Data Name | Sensor-Independent LAI/FPAR CDR |
| Raw Dataset | MOD15AH C6 (February 18, 2000 – December 31,20), MYD15A2H C6 (July 14, 2002 – December 31,20), VNP15A2H C1 (January 17, 2012 – December 31,20), LAI/FPAR products |
| Area | Global Vegetation Area |
| Projection | Sinusoidal/WGS1984 |
| Spatial Resolution | 500m/5km/0.05 degree |
| Temporal Resolution | 8 days/Half month |
| Temporal Coverage | February 18, 2000 – December 31,2022 |
| Fill Value | 255 |
| Data Type | Uint8 |
| Valid Range | 0 ~ 70 for LAI and 0 ~ 100 for FPAR |
| Multiply By Scale Factor | 0.1 for LAI and 0.01 for FPAR |
| Data Sets | First Layer for LAI and Second Layer for FPAR |
| File Format | TIFF(.tif) |

There are six versions of Sensor-Independent LAI/FPAR CDR in different projections and spatial/temporal resolutions (Table 2).

**Table 2.** Projections and spatial/temporal resolutions of Sensor-Independent LAI/FPAR CDR

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Name | Projection | Spatial Resolution | Temporal Resolution | Area | Dimensions |
| Sin\_500m\_8d | Sinusoidal | 500m | 8 days | ~ 10 x 10 degrees lat/long for every tile | 2400 x 2400 rows/columns |
| Sin\_500m\_bimonth | Sinusoidal | 500m | Half month | ~ 10 x 10 degrees lat/long for every tile | 2400 x 2400 rows/columns |
| Sin\_5km\_8d | Sinusoidal | 5km | 8 days | Global Vegetation Area | 4320 x 8640 rows/columns |
| Sin\_5km\_bimonth | Sinusoidal | 5km | Half month | Global Vegetation Area | 4320 x 8640 rows/columns |
| WGS84\_0.05degree\_8d | WGS1984 | 0.05 degree | 8 days | Global Vegetation Area | 3600 x 7200 rows/columns |
| WGS84\_0.05degree\_bimonth | WGS1984 | 0.05 degree | Half month | Global Vegetation Area | 3600 x 7200 rows/columns |

**2. DATA AVAILABLITY**

The Sensor-Independent LAI/FPAR CDR were all uploaded to Google Earth Engine for users to mix and match with other datasets and the ease of using this in Google Earth Engine. All datasets were reprojected to WGS1984 using the gdalwarp function with a crs of EPSG:4326 for ease of ingestion. The dataset links are as follows:

1. <https://code.earthengine.google.com/?asset=projects/sat-io/open-datasets/BU_LAI_FPAR/wgs_500m_8d> (spatial resolution is 500m and temporal resolution is 8 days)
2. <https://code.earthengine.google.com/?asset=projects/sat-io/open-datasets/BU_LAI_FPAR/wgs_5km_8d> (spatial resolution is 5km and temporal resolution is 8 days)
3. <https://code.earthengine.google.com/?asset=projects/sat-io/open-datasets/BU_LAI_FPAR/wgs_005degree_8d> (spatial resolution is 0.05 degree and temporal resolution is 8 days)
4. Etc

**3. DATA READ EXAMPLE (For Google Earth Engine)**

Here is a Google Earth Engine example:

var wgs\_500m\_8d = ee.ImageCollection("projects/sat-io/open-datasets/BU\_LAI\_FPAR/wgs\_500m\_8d")

print(wgs\_500m\_8d)

Map.addLayer(wgs\_500m\_8d.filterDate('2010-201').first().select('LAI').multiply(0.1),{min:0,max:6,palette: ['#a89247','#5e963b','#75b84f','#8bd162','#f3e24d','#f7eb6b','#fbe789']},'LAI sample')

Map.addLayer(wgs\_500m\_8d.filterDate('2010-201').first().select('FPAR').multiply(0.01),{min:0,max:0.9,palette:['#ff0000','#ff4500','#ff7f00','#ffa500','#ffcf00','#ffff00','#ffff66']},'FPAR sample')

var Maize = ee.Feature(

ee.Geometry.Rectangle(123.269, 48.0495, 123.272, 48.0511),

{label: 'Maize'});

var Corn = ee.Feature(

ee.Geometry.Rectangle(123.2892, 48.0599, 123.2907, 48.0582),

{label: 'Corn'});

var Soybean = ee.Feature(

ee.Geometry.Rectangle(123.2442, 48.0813, 123.2455, 48.0799),

{label: 'Soybean'});

var cropRegions = new ee.FeatureCollection([Maize,Corn,Soybean]);

var CDR= wgs\_500m\_8d.filterDate('2010-01-01', '2022-12-31')

.filterBounds(cropRegions);

var LAITimeSeries = ui.Chart.image.seriesByRegion({

imageCollection: CDR,

regions: cropRegions,

reducer: ee.Reducer.mean(),

band: 'LAI',

scale: 10,

xProperty: 'system:time\_start',

seriesProperty: 'label'

});

var COLOR = {

SOYBEAN: '7FFF00',

MAIZE: 'ff0000',

CORN: '0000ff'

};

LAITimeSeries.setChartType('ScatterChart');

LAITimeSeries.setOptions({

title: 'Crop Sensor-Independent LAI CDR',

vAxis: {

title: 'LAI (Scale:0.1)'

},

lineWidth: 1,

pointSize: 4,

series: {

0: {color: COLOR.MAIZE},

1: {color: COLOR.CORN},

2: {color: COLOR.SOYBEAN}

}

});

print(LAITimeSeries);

\* Any questions about the dataset can be corresponded to Jiabin Pu (om7759@bu.edu)