



# Efficient Geospatial Data Access with NASA's AppEEARS

A stylized world map with green continents and blue oceans. Several yellow circular markers are placed on the map: one in North America, one in Europe, one in Asia, and a cluster of three in the Pacific region. A yellow square highlights a specific area in South America.

AppEEARS  
Application for Extracting and  
Exploring Analysis Ready Samples

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KBR, Contractor to USGS EROS Center

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for NASA contract NNG14HH33I

# About the LP DAAC

- Land Processes (LP) Distributed Active Archive Center (DAAC)
- NASA's Land Discipline Archive (one of several DAACS)
- A NASA-USGS Partnership since 1990
- Sponsored by the NASA Earth Observing System Data and Information System (EOSDIS)
- Located and Managed at USGS EROS, Sioux Falls, SD
- All data and resources available at no cost



# Application for Extracting and Exploring Analysis Ready Samples

- Discover, mine, and visualize
- At-archive data reduction
- Increased usability, interoperability, and interpretability
- Traceability and reproducibility

## Welcome to AppEEARS!

### Application for **Extracting** and **Exploring Analysis Ready Samples (AppEEARS)**

The Application for Extracting and Exploring Analysis Ready Samples (*AppEEARS*) offers a simple and efficient way to access and transform geospatial data from a variety of federal data archives. *AppEEARS* enables users to subset **geospatial datasets** using spatial, temporal, and band/layer parameters. Two types of sample requests are available: **point samples** for geographic coordinates and **area samples** for spatial areas via vector polygons. Sample requests submitted to *AppEEARS* provide users not only with data values, but also associated quality data values. Interactive visualizations with summary statistics are provided for each sample within the application, which allow users to preview and interact with their samples before downloading their data. Get started with a sample request using the Extract option above, or visit the [Help page](#) to learn more.



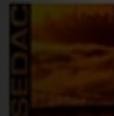
National Aeronautics and  
Space Administration



Land Processes  
Distributed Active Archive Center



National Snow and Ice Data Center  
Distributed Active Archive Center



Socioeconomic Data and  
Applications Center



Oak Ridge National Laboratory  
Distributed Active Archive Center



science for a changing world  
United States Geological Survey

# Not the first time here

- First appearance: October 2017
- Since then:
  - Release AppEEARS API
  - Added ~80 additional data products
  - Moved AppEEARS to Earthdata Cloud
    - Download & Direct S3 access
  - Considerable increase in users and requests
    - 6-month average
      - Users – 161 vs 1301
      - Requests – 744 vs 47818

AppEEARS\_Webinar\_presentation\_Final\_ppt

USGS science for a changing world NASA

Using NASA's AppEEARS to Slice and Dice Big Earth Data

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\*Work performed under USGS contract G15PD00467

U.S. Department of the Interior  
U.S. Geological Survey

Play (k)

3:01 / 1:12:50

Using NASA's AppEEARS to Slice and Dice Big Earth Data

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1.4K views 6 years ago 2017 NASA Earthdata Webinars

The NASA Application for Extracting and Exploring Analysis Ready Samples (AppEEARS) brings efficiency to your scientific workflow through its ability to subset, reformat, and reproject in one step. View this webinar to learn more!

...more

# “Efficient Geospatial Data Access”

## Dataset nuances

- File names
- Metadata references (e.g., shortname, concept id, etc.)
- Tiles, grids, scenes, projections
- Dates & time

## Workflow

- Search & discovery
- Access
- Exploratory data analysis
- Preprocessing
  - Mosaic, clipping, reprojections
- Quality Associations

Sample

HighProductivity\_UC

Layer Comparison Categorical Overview

US-Ha1, DBF, 42 5378, -72 1715

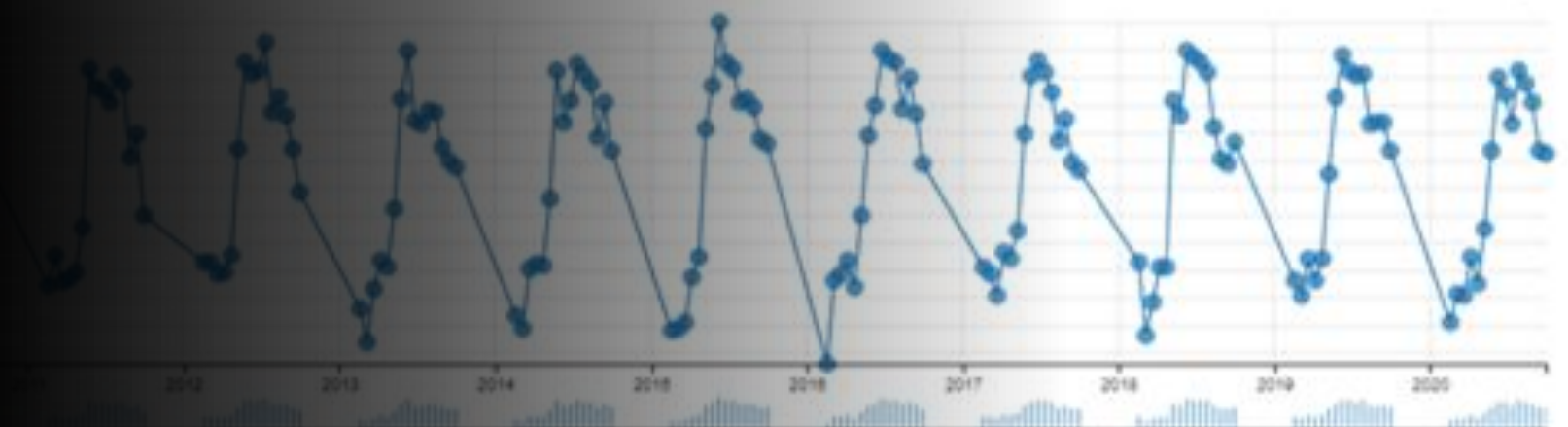
US-Ha1, DBF, 500m, 16\_days, EVI



Select a site and view coordinate details by clicking the markers on the map

Time Series

Add Line



What can  
AppEEARS do?

# Point Sample

USGS AppEEARS Extract Explore Admin Help

### Extract Point Sample

Enter a name to identify your sample  
AmeriFlux\_Sample

Upload coordinates from a file

Drop a CSV file containing the coordinates or click here to select the file. Coordinates can also be entered manually in the uploaded coordinates box.

The CSV file can contain up to 4 columns separated by commas with each coordinate on a separate line.

1. ID (optional) - uniquely identifies the coordinate
2. Category (optional) - label to group common coordinates
3. Latitude - latitude in decimal degrees (-90 to 90)
4. Longitude - longitude in decimal degrees (-180 to 180)

Uploaded coordinates (ID, Category, Lat, Long): 9

```
US-Am, MF, 33.3825, -81.5653
US-CC1, CRO, 44.0732, -89.6787
US-CC2, CRO, 44.1039, -89.6196
US-CS4, CRO, 44.1597, -89.5475
US-DS1, CRO, 38.1335, -121.5339
US-KS3, WET, 28.7084, -80.7427
US-St, GRA, 38.0402, -121.7272
US-TCS, WET, 25.8221, -81.1017
US-Tw5, WET, 38.1072, -121.6426
```

Start Date: 06-01 End Date: 09-30

Is Date Recurring? Year Range: 2000 - 2022

Selected coordinates

Lat: 15.741 Lon: -85.289

Select the layers to include in the sample

Selected layers

Submit Cancel

# Area Sample

USGS AppEEARS Extract Explore Admin Help

### Extract Area Sample

Enter a name to identify your sample  
Upper Colorado Basin - MOD13Q1

Upload a file or draw a polygon using the [icon] or [icon] icon

Drop a vector polygon file containing the area feature(s) to extract or click here to select the file.

Supported file formats:

- Shapefile (.zip including .shp, .dbf, .prj and .srs files)
- GeoJSON (.json or .geojson)

Selected file (Upper\_Colorado\_River\_Basin\_Boundary)

Start Date: 01-01-2020 End Date: 02-01-2022

Is Date Recurring?

Select the layers to include in the sample

Selected layers

Output Options

File Format: GeoTiff

Projection: Native Projection

NOTE: Be aware that any reprojection of data from its source projection to a different projection will inherently change the data from its original format. All reprojections use GDAL's gdalwarp function in combination with the PROJ.4 string listed above. For additional information, see the AppEEARS help documentation.

Submit Cancel

Point locations  
or  
area of interests

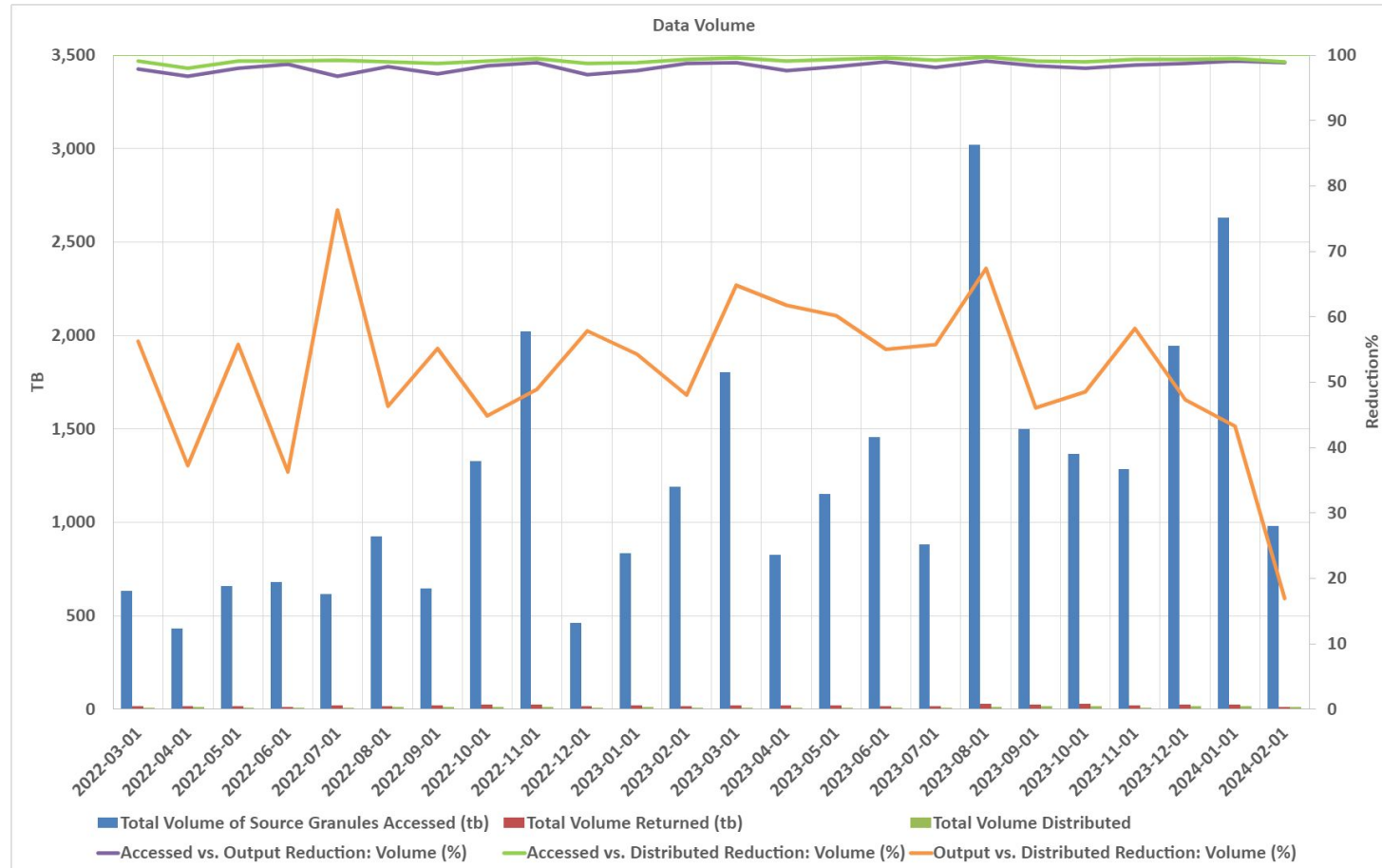
Date range  
or  
recurring date range

Select variables of  
interest (access to  
multiple federal  
archives)

Select output format  
and output CRS/Proj

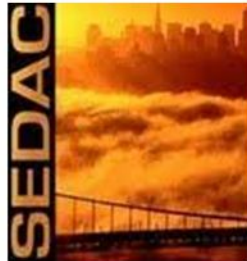
Analysis ready /  
reproducible  
outputs

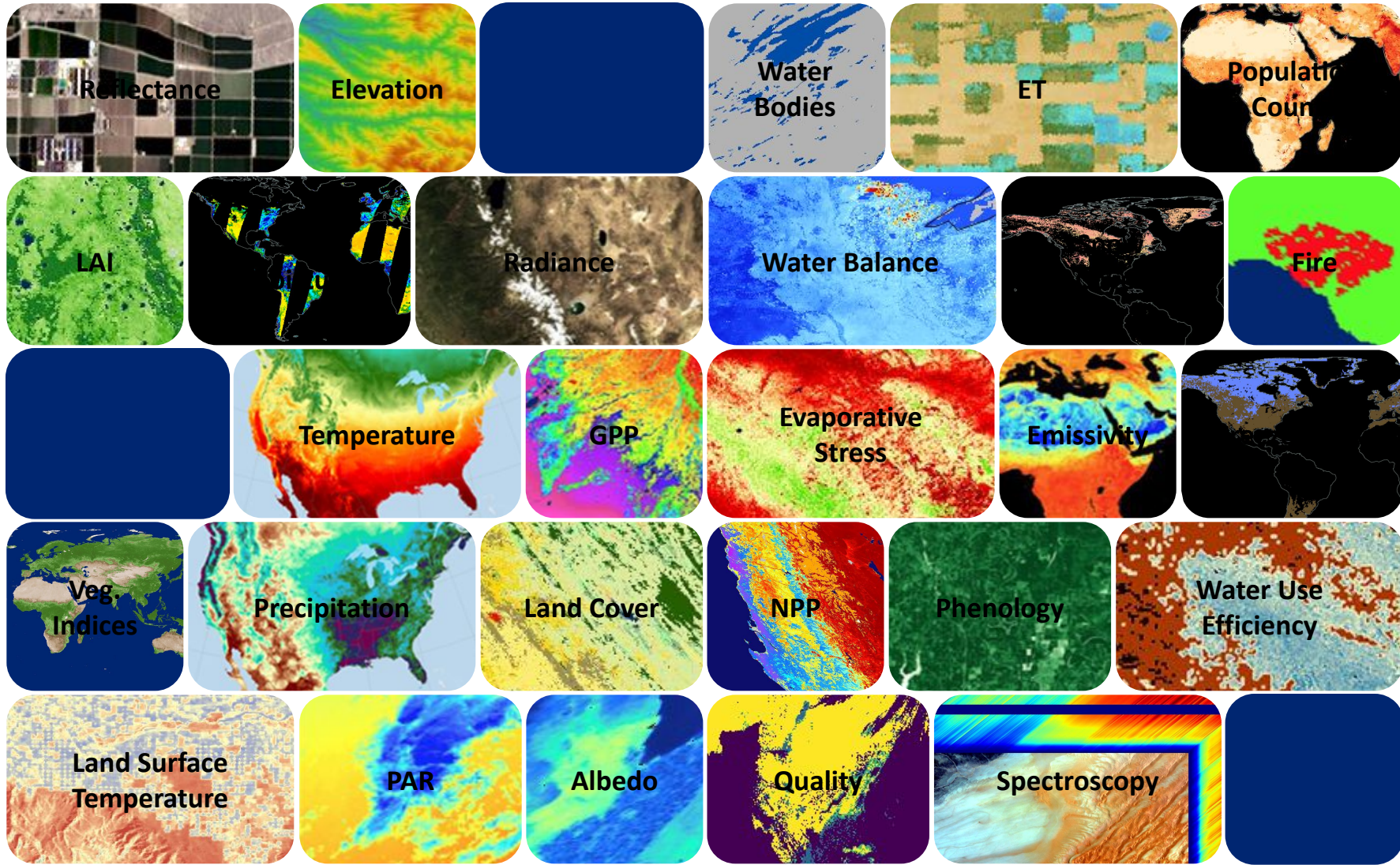
# Data Reduction Machine!





# What data is available from AppEEARS?





# Demos

## User interface walk-through

Enter a name to identify your sample

Upper Colorado Basin - MOD13Q1

Upload a file or draw a polygon using the or icon

Drop a vector polygon file containing the area feature(s) to extract or [click here](#) to select the file.

Supported file formats:

- Shapefile (.zip including .shp, .dbf, .prj and .shx files)
- GeoJSON (.json or .geojson)

Start Date: 01-01-2020

End Date: 02-01-2022

Is Date Recurring?

Select the layers to include in the sample

Terra MODIS Vegetation Indices (NDVI & EVI)  
MOD13Q1.061, 250m, 16 day, (2000-02-18 to Present)

- \_250m\_16\_days\_EVI
- \_250m\_16\_days\_MIR\_reflectance
- 250m\_16\_days\_NIR\_reflectance

Selected file (Upper\_Colorado\_River\_Basin\_Boundary)

Selected layers

|                    |              |
|--------------------|--------------|
| NASADEM_HGT        | 30m, Static  |
| _250m_16_days_NDVI | 250m, 16 day |

## AppEEARS API in AWS

**Submit task**

This API call provides a way to submit a new request to be processed. It can accept data via JSON, query string, or a combination of both. If both are specified, data from the query string takes precedent over JSON data (see [query parameters](#) for more information).

In order for your request JSON to be accepted, it must be defined with certain required properties as described in the [task object section](#). In order for query string data to be accepted, it must be defined as described in the [task query parameters section](#).

When a request has been successfully submitted, a `task_id` will be returned in the HTTP Location header with a relative URL that defines where you can access the status of the newly submitted request. The `task_id` is the unique identifier used to access anything relating to the request.

Below are example JSON files that can be used to load the task request from a file:

[Point Example JSON](#)

[Area Example JSON](#)

```
import json
import requests

# Load the task request from a file
with open('sample-request.json') as json_file:
    task = json.load(json_file)

# submit the task request
token = token_response['token']
response = requests.post(
    'https://appeears.earthdatacloud.nasa.gov/api/task',
    json=task,
    headers={'Authorization': 'Bearer {}'.format(token)})
task_response = response.json()
print(task_response)
```

```
import requests

# create the task request
task = {
    'task_type': 'point',
    'task_name': 'my-task',
    'params': {
        'dates': [
            {
                'startDate': '01-01-2010',
                'endDate': '01-31-2010'
            }
        ],
        'layers': [
```

# Use Cases

Coordinate - uniquely identifies the coordinate  
Label - label to group common coordinates  
Latitude - latitude in decimal degrees (-90 to 90)  
Longitude - longitude in decimal degrees (-180 to 180)

```
US-ARc, GRA, 35.5497, -98.0402  
US-ARc, GRA, 35.5465, -98.04  
US-ARM, CRO, 36.6058, -97.4888  
US-Atq, WET, 70.4696, -157.4089  
US-Aud, GRA, 31.5907, -110.5104
```

End Date ⓘ

09-30

Year Range: 2010 - 2020

Selected coordinates



Add coordinates using the  tool. View coordinate details by clicking the markers on the map.

Layers to include in the sample ⓘ

Selected layers

Gpp\_500m  
500m, 8 day  
MODIS/Terra Gross Primary Production (GPP) 8-Day LA...

ParNet\_500m  
500m, 8 day  
MODIS/Terra Net Photosynthesis (GPP - maint resp) 8-



- EMIT L1B At-Sensor Calibrated Radiance and Geolocation Data
- EMIT L2A Estimated Surface Reflectance and Uncertainty and Masks

## Extract Point Sample

Enter a name to identify your sample

EMIT Point Sample

Upload coordinates from a file

Drop a CSV file containing the coordinates or [click here](#) to select the file. Coordinates can also be entered manually in the uploaded coordinates box.

The CSV file can contain up to 4 columns separated by commas with each coordinate on a separate line.

1. ID (optional) - uniquely identifies the coordinate
2. Category (optional) - label to group common coordinates
3. Latitude - latitude in decimal degrees (-90 to 90)
4. Longitude - longitude in decimal degrees (-180 to 180)

Uploaded coordinates (ID, Category, Lat, Long): 50

```
0, 34.498141194886635, -120.41506456577207
1, 34.56260816062396, -120.4454724134345
2, 34.51986996729968, -120.41445609910532
3, 34.51135743384579, -120.44653719182776
4, 34.48366374857756, -120.37733961864895
5, 34.556090732850194, -120.38622749248115
6, 34.54055238477587, -120.37406167448789
7, 34.56740345940065, -120.38213598804163
8, 34.46108960617545, -120.38443271818441
9, 34.525311944602024, -120.48630736609077
10, 34.482209724859835, -120.40992108981511
11, 34.45750151413664, -120.48512298874037
```

Start Date: 01-01-2023 End Date: 06-30-2023

Is Date Recurring?

Select the layers to include in the sample

EMIT Estimated Surface Reflectance  
EMIT\_L2A\_RFL\_001, 60m, ISS-dependent, (2022-08-09 to Present)

There are no layers available for this product.

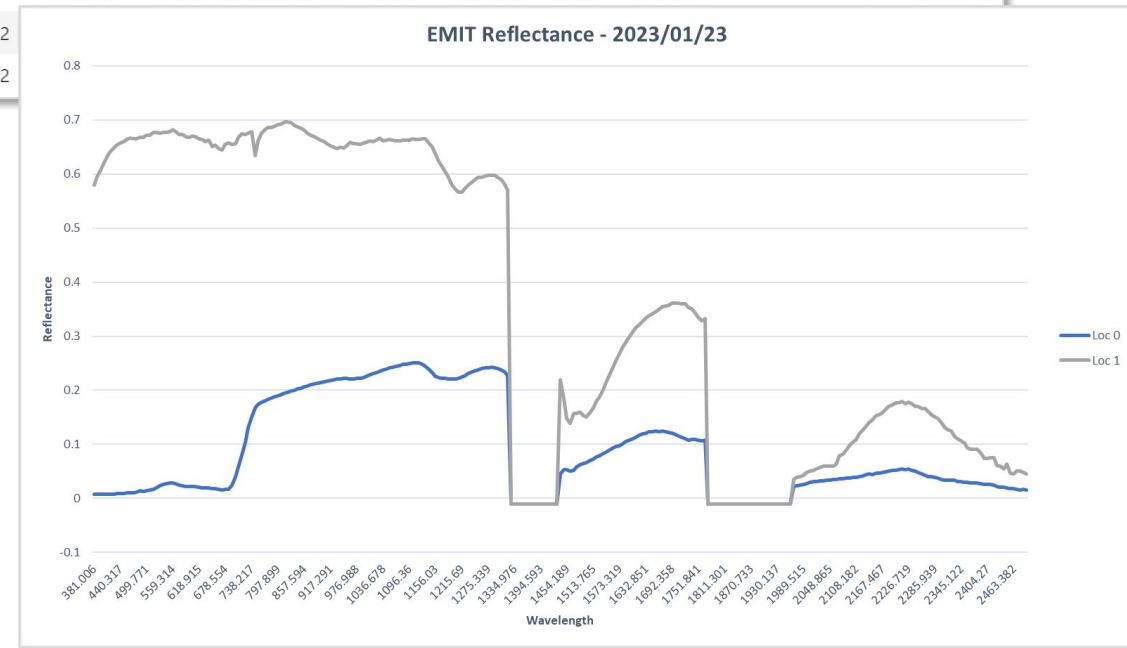
Selected layers

- B001  
60m, ISS-dependent  
Reflectance for Wavelength: 381.006 nm, FWHM: 8.415 ...
- B002  
60m, ISS-dependent  
Reflectance for Wavelength: 388.409 nm, FWHM: 8.415 ...
- B003  
60m, ISS-dependent  
Reflectance for Wavelength: 395.816 nm, FWHM: 8.415 ...

Remove All (285)

Submit Cancel

|  | ID     | Latitude  | Longitude   | Date                    | Band | wavelength | fwhm  | reflectance | good_wavelengths | elev       |
|--|--------|-----------|-------------|-------------------------|------|------------|-------|-------------|------------------|------------|
|  | 0      | 34.498141 | -120.415065 | 2023-01-29 21:13:08 UTC | B001 | 381.006    | 8.415 | 0.008307    | 1.0              | 291.464554 |
|  | 1      | 34.498141 | -120.415065 | 2023-01-29 21:13:08 UTC | B002 | 388.409    | 8.415 | 0.008064    | 1.0              | 291.464554 |
|  | 2      | 34.498141 | -120.415065 | 2023-01-29 21:13:08 UTC | B003 | 395.816    | 8.415 | 0.007821    | 1.0              | 291.464554 |
|  | 3      | 34.498141 | -120.415065 | 2023-01-29 21:13:08 UTC | B004 | 403.225    | 8.415 | 0.007582    | 1.0              | 291.464554 |
|  | 4      | 34.498141 | -120.415065 | 2023-01-29 21:13:08 UTC | B005 | 410.638    | 8.417 | 0.007499    | 1.0              | 291.464554 |
|  | ...    | ...       | ...         | ...                     | ...  | ...        | ...   | ...         | ...              | ...        |
|  | 117700 | 34.525312 | -120.486307 | 2023-06-29 17:04:49 UTC | B281 | 2463.382   | 8.803 | 0.080405    | 1.0              | 76.241964  |
|  | 117701 | 34.525312 | -120.486307 | 2023-06-29 17:04:49 UTC | B282 | 2470.768   | 8.804 | 0.076033    | 1.0              | 76.241964  |
|  | 117702 | 34.525312 | -120.486307 | 2023-06-29 17:04:49 UTC | B283 | 2478.153   | 8.806 | 0.076020    | 1.0              | 76.241964  |
|  | 117703 | 34.525312 |             |                         |      |            |       |             |                  |            |
|  | 117704 | 34.525312 |             |                         |      |            |       |             |                  |            |



EMIT Data Volume: 27.49 GB

AppEARS Output Volume: 12.3 MB

Data Reduction: >99%

# Ameriflux Point Sample

**Researcher:** Gil

**Objective:** Intercompare and evaluate vegetation productivity using satellite remote sensing observations and measurements taken from Ameriflux sites

## What this highlights

- Point sample extraction
- Data from multiple collections
- Spatial and re-occurring temporal subsetting
- User interface exploration

## Extract Point Sample

Enter a name to identify your sample

AmerFlux\_VegProductivity\_UC

Upload coordinates from a file

Drop a CSV file containing the coordinates or click here to select the file. Coordinates can also be entered manually in the uploaded coordinates box.

The CSV file can contain up to 4 columns separated by commas with each coordinate on a separate line.

1. ID (optional) - uniquely identifies the coordinate
2. Category (optional) - label to group common coordinates
3. Latitude - latitude in decimal degrees (-90 to 90)
4. Longitude - longitude in decimal degrees (-180 to 180)

Uploaded coordinates (ID, Category, Lat, Long): 198

```
US-ADR, BSV, 36.7853, -116.6933
US-Ain, MF, 33.3833, -81.5658
US-An1, OSH, 68.99, -150.28
US-An2, OSH, 68.99, -150.21
US-An3, OSH, 68.93, -150.27
US-AR1, GRA, 36.4267, -99.42
US-AR2, GRA, 36.6358, -99.5975
US-ARb, GRA, 35.5497, -98.0402
US-ARc, GRA, 35.5485, -98.04
US-ARM, CRO, 36.6058, -97.4888
US-Ata, WET, 70.4696, -157.4089
US-Aud, GRA, 31.5907, -110.5104
```

Start Date

03-01

End Date

09-30

Is Date Recurring?

Year Range: 2010 - 2020

Selected coordinates



Add coordinates using the **+** text. View coordinate details by clicking the markers on the map.

Select the layers to include in the sample

Search for a product

Selected layers

Gpp\_500m  
500m, 8 day  
MODIS/Terra Gross Primary Production (GPP) 8-Day L4...

PanNet\_500m  
500m, 8 day  
MODIS/Terra Net Photosynthesis (GPP - maint resp) 8-...

\_500m\_16\_days\_EV1  
500m, 16 day  
500m 16 days EV1

Remove All (3)

Submit Cancel

- 198 Point Locations
- Touches 7568 files
- Extracts and decode QA
- ~ 2 hrs to complete



### View Point Sample

Request: AmeriFlux\_VegProductivity\_UC

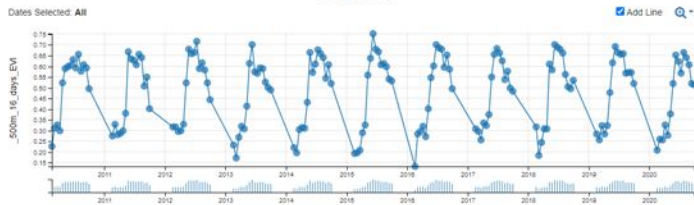
Temporal Comparison Layer Comparison Categorical Overview

Site: US-H41\_DBF\_42.5378\_-72.1715  
 Quality: Show All  
 Layer: MOD13A1\_061\_500m\_16\_days\_EVI

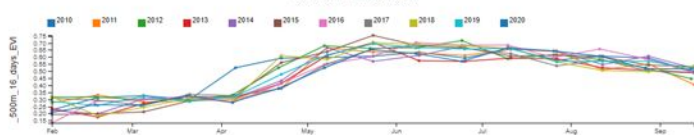


Select a site and view coordinate details by clicking the markers on the map.

### Time Series



### Stacked Time Series



| Date       | MOD13A1_061_500m_16_days_EVI | Quality | Quality Description                      |
|------------|------------------------------|---------|--|
| 09-29-2020 | 0.5129                       | 0       | VI produced with good quality            |
| 09-13-2020 | 0.5192                       | 0       | VI produced with good quality            |
| 08-28-2020 | 0.6082                       | 0       | VI produced with good quality            |
| 08-12-2020 | 0.6408                       | 0       | VI produced with good quality            |
| 07-27-2020 | 0.664                        | 0       | VI produced with good quality            |
| 07-11-2020 | 0.5681                       | 0       | VI produced with good quality            |
| 06-25-2020 | 0.6225                       | 0       | VI produced with good quality            |
| 06-09-2020 | 0.653                        | 0       | VI produced with good quality            |
| 05-24-2020 | 0.5213                       | 0       | VI produced with good quality            |
| 05-08-2020 | 0.3773                       | 0       | VI produced with good quality            |
| 04-22-2020 | 0.2783                       | 0       | VI produced with good quality            |
| 04-06-2020 | 0.3262                       | 0       | VI produced with good quality            |
| 03-21-2020 | 0.2557                       | 0       | VI produced with good quality            |
| 03-05-2020 | 0.2616                       | 0       | VI produced with good quality            |
| 02-18-2020 | 0.2081                       | 2       | Pixel produced, but most probably cloudy |
| 09-30-2019 | 0.5203                       | 0       | VI produced with good quality            |
| 09-14-2019 | 0.5708                       | 0       | VI produced with good quality            |
| 08-29-2019 | 0.5702                       | 0       | VI produced with good quality            |
| 08-13-2019 | 0.5654                       | 0       | VI produced with good quality            |
| 07-28-2019 | 0.6601                       | 0       | VI produced with good quality            |

1 to 20 displayed, 165 in total

### View Point Sample

Request: AmeriFlux\_VegProductivity\_UC

Temporal Comparison Layer Comparison Categorical Overview

Site: US-H41\_DBF\_42.5378\_-72.1715  
 Quality: Show All  
 Layer 1: MOD13A1\_061\_500m\_16\_days\_EVI  
 Layer 2: MOD17A2HGF\_061\_Cpp\_500m

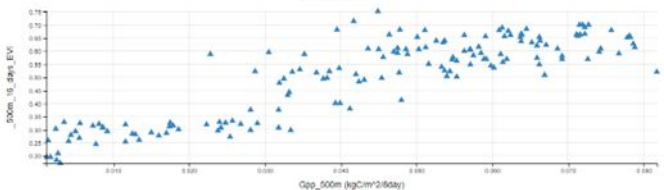


Select a site and view coordinate details by clicking the markers on the map.

### Time Series



### Scatter Plot



| Date       | MOD13A1_061_500m_16_days_EVI | MOD13A1_061_500m_16_days_EVI Quality | MOD13A1_061_500m_16_days_EVI Quality Description |
|------------|------------------------------|--------------------------------------|--|
| 09-29-2020 | 0.5129                       | 0                                    | VI produced with good quality                    |
| 09-13-2020 | 0.5192                       | 0                                    | VI produced with good quality                    |
| 08-28-2020 | 0.6082                       | 0                                    | VI produced with good quality                    |
| 08-12-2020 | 0.6408                       | 0                                    | VI produced with good quality                    |
| 07-27-2020 | 0.664                        | 0                                    | VI produced with good quality                    |
| 07-11-2020 | 0.5681                       | 0                                    | VI produced with good quality                    |
| 06-25-2020 | 0.6225                       | 0                                    | VI produced with good quality                    |
| 06-09-2020 | 0.653                        | 0                                    | VI produced with good quality                    |
| 05-24-2020 | 0.5213                       | 0                                    | VI produced with good quality                    |
| 05-08-2020 | 0.3773                       | 0                                    | VI produced with good quality                    |
| 04-22-2020 | 0.2783                       | 0                                    | VI produced with good quality                    |
| 04-06-2020 | 0.3262                       | 0                                    | VI produced with good quality                    |
| 03-21-2020 | 0.2557                       | 0                                    | VI produced with good quality                    |
| 03-05-2020 | 0.2616                       | 0                                    | VI produced with good quality                    |
| 09-30-2019 | 0.5203                       | 0                                    | VI produced with good quality                    |
| 09-14-2019 | 0.5708                       | 0                                    | VI produced with good quality                    |
| 08-29-2019 | 0.5702                       | 0                                    | VI produced with good quality                    |
| 08-13-2019 | 0.5654                       | 0                                    | VI produced with good quality                    |
| 07-28-2019 | 0.6601                       | 0                                    | VI produced with good quality                    |

1 to 20 displayed, 154 in total

### View Point Sample

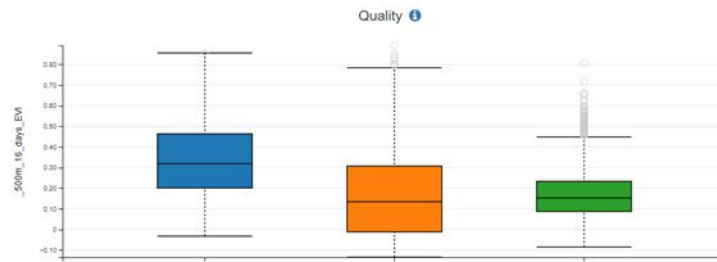
Request: AmeriFlux\_VegProductivity\_UC

Temporal Comparison Layer Comparison Categorical Overview

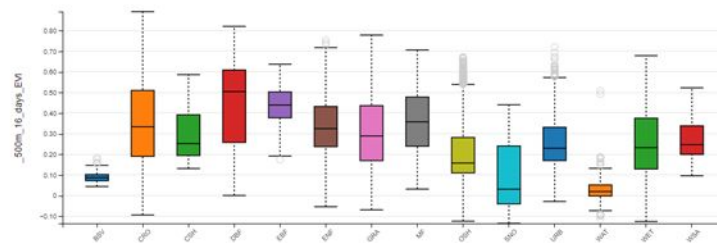
Layer: MOD13A1\_061\_500m\_16\_days\_EVI



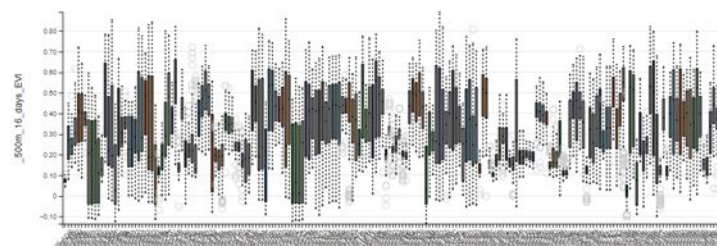
Data Selected: All



### Categories



### Sites




## Download Point Sample





Request: AmeriFlux\_VegProductivity\_UC >

 Download Zip

### Supporting Files

|  |   |          |
|--|---|----------|
|  AmeriFlux-VegProductivity-UC-MOD13A1-061-metadata.xml    | ISO 19115 Metadata                                  | 83.8 KB  |
|  AmeriFlux-VegProductivity-UC-MOD17A2HGF-061-metadata.xml | ISO 19115 Metadata                                  | 83.84 KB |
|  AmeriFlux-VegProductivity-UC-granule-list.txt            | URLs for all source data used in the extraction     | 1.21 MB  |
|  README.md  | Instructions and details about the request          | 33.71 KB |
|  AmeriFlux-VegProductivity-UC-request.json                | JSON file which can be used to create a new request | 16.47 KB |

Search keyword  0 Selected Download 

| <input type="checkbox"/> | Name   | Size  |
|--------------------------|---|--|
| <input type="checkbox"/> |  AmeriFlux-VegProductivity-UC-MOD13A1-061-results.csv    | 7.28 MB  |
| <input type="checkbox"/> |  AmeriFlux-VegProductivity-UC-MOD17A2HGF-061-results.csv | 16.76 MB   |

1 - 2 displayed, 2 in total < >

# Crop Monitoring – User Drawn Feature

**Researcher:** Ed

**Objective:** Create snow zone maps for the western United States and evaluate how meteorological and topographic variables impact snow zone extent and persistence.

## **What this highlights**

- User drawn feature extraction
- Swath to grid transformation of ECOSTRESS
- Temporal and Spatial Subsetting
- Reprojection

## Extract Area Sample

Enter a name to identify your sample

Crop\_Monitoring\_UC

Upload a file or draw a polygon using the or icon

Drop a vector polygon file containing the area feature(s) to extract or [click here](#) to select the file.

Supported file formats:

- Shapefile (zip including .shp, .dbf, .prj, and .shx files)
- GeoJSON (.json or .geojson)

Start Date: 04-01

End Date: 09-30

Is Date Recurring?

Year Range: 2021 - 2023

Select the layers to include in the sample

Search for a product

Selected layers:

- 30m, Daily
- BBA 30m, Daily
- EVAPOTRANSPIRATION\_PT\_JPL\_ETdaily 70m, ISS-dependent
- SDS\_LST 70m, ISS-dependent

Remove All (6)

Output Options

File Format: GeoTiff

Projection: Geographic

Datum: WGS84  
EPSG: 4326  
PROJ 4: +proj=longlat +datum=WGS84 +no\_defs=True

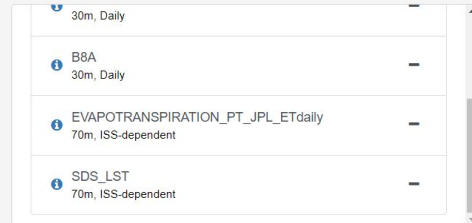
**NOTE:** Be aware that any reprojection of data from its source projection to a different projection will inherently change the data from its original format. All reprojections use GDAL's `gdalwarp` function in combination with the PROJ string listed above. For additional information, see the [AppEEARS help documentation](#).

Selected file (User-Drawn-Polygon)

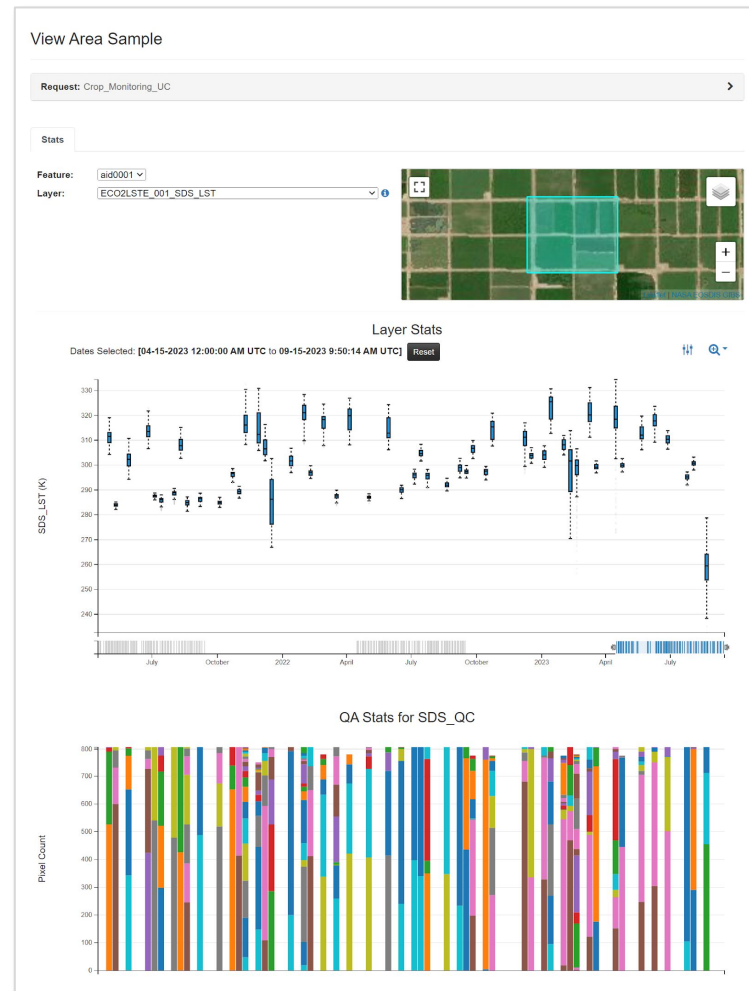


To clear a polygon, draw a new polygon or upload a vector polygon file.

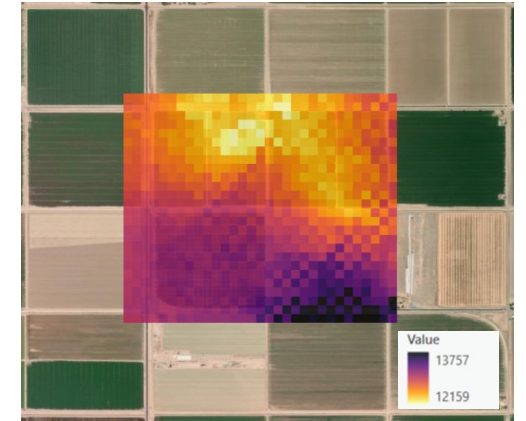
Selected layers



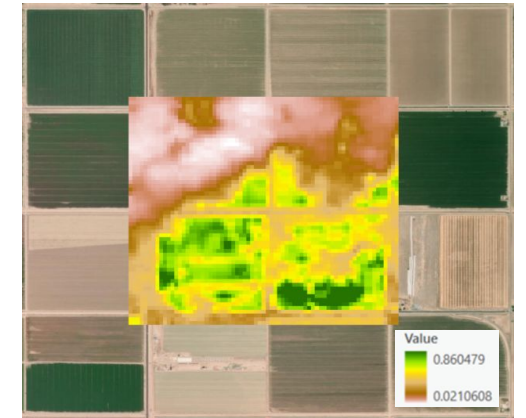
Remove All (6)



## ECOSTRESS LST



## HLS Derived NDVI



W/out AppEEARS

- 1647 Files
- 603 GB

With AppEEARS

- 1254 Files
- 5.72 MB

# Snow Zones

**Researcher:** Lindsey

**Objective:** Create snow zone maps for the western United States and evaluate how meteorological and topographic variables impact snow zone extent and persistence.

## What this highlights

- Large area extraction
- Data from multiple providers
- Temporal and Spatial Subsetting
- Reprojection

Moore C, Kampf S, Stone B, Richer E. 2015. A GIS-based method for defining snow zones: application to the Western United States. *Geocarto Int.* 3(1): 62–81, doi: [10.1080/10106049.2014.885089](https://doi.org/10.1080/10106049.2014.885089).



### Study Area

- Western United States
  - 11 States
- Single feature shapefile

### Time Span

- 2000 – 2010
- January 1<sup>st</sup> – Jul 1<sup>st</sup>

### Format

- GeoTIFF

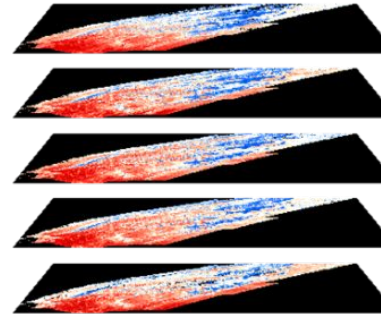
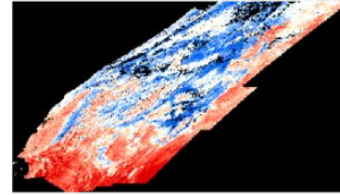
### Datasets

- MODIS 8d/500 m Snow
  - Snow Cover
  - Snow Extent
- MODIS 8d/1,000 m LST
  - LST
- NASA SRTM 3 arc second
  - Elevation

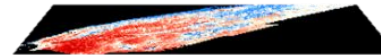
### Projection

- Sinusoidal

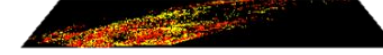
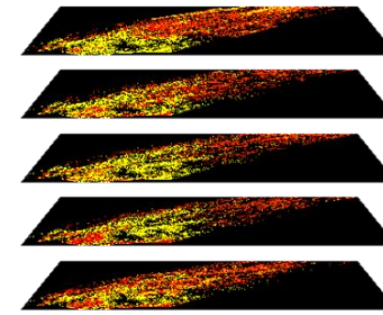
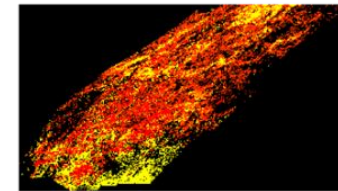
MOD11A2.061  
LST\_Day\_1km



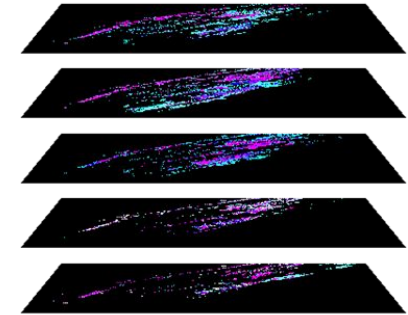
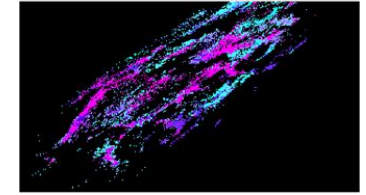
Time



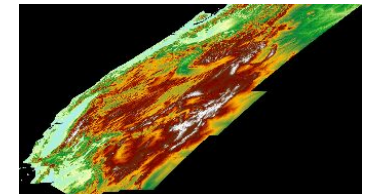
MOD11A2.061  
QC\_Day



MOD10A2.061  
8\_Day\_Snow\_Cover



SRTMGL3  
Elevation



**Without  
AppEEARS**  
• 3,074 files  
• 7+ GB

**With  
AppEEARS**  
• 386 files  
• 1.85 GB

# Thank You!

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