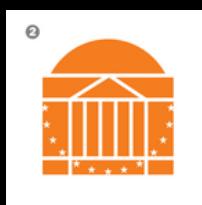


# A primer on using satellite remote sensing data to support eddy covariance measurements

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Credit: BigFoot

Name a satellite **sensor** you know

# NOAA/AVHRR & MODIS

## New Era for Global Monitoring



- TIROS - N satellite
- Sun-synchronous orbit
- Temporal resolution of NDVI products: monthly
- Spatial resolution: 8 km
- Terra & Aqua satellites
- Sun-synchronous orbit
- Twice per day (4 times for the twin satellites)
- NDVI products: 8-day composite
- Spatial resolution: 250m - 1km

# MODIS bands

The flagship sensor for NASA Earth Observation

<b>Band</b>	<b>Wavelength (nm)</b>	<b>Resolution (m)</b>	<b>Primary Use</b>
1	620-672	250m	Land/Cloud/Aerosols Boundaries
2	841-890	250m	
3	459-479	500m	
4	545-565	500m	
5	1230-1250	500m	Land/Cloud/Aerosols Properties
6	1628-1652	500m	
7	2105-2155	500m	
8	405-420	1000m	
9	438-448	1000m	
10	483-493	1000m	
11	526-536	1000m	Ocean Color/ Phytoplankton/ Biogeochemistry
12	546-556	1000m	
13	662-672	1000m	
14	673-683	1000m	
15	743-753	1000m	
16	862-877	1000m	
17	890-920	1000m	
18	931-941	1000m	
19	915-965	1000m	Atmospheric Water Vapor

<b>Band</b>	<b>Wavelength (μm)</b>	<b>Resolution (m)</b>	<b>Primary Use</b>
20	3.660-3.840	1000m	
21	3.929-3.989	1000m	Surface/Cloud Temperature
22	3.929-3.989	1000m	
23	4.020-4.080	1000m	
24	4.433-4.498	1000m	Atmospheric Temperature
25	4.482-4.549	1000m	
26	1.360-1.390	1000m	Cirrus Clouds Water Vapor
27	6.535-6.895	1000m	
28	7.175-7.475	1000m	
29	8.400-8.700	1000m	Cloud Properties
30	9.580-9.880	1000m	Ozone
31	10.780-11.280	1000m	Surface/Cloud Temperature
32	11.770-12.270	1000m	
33	13.185-13.485	1000m	
34	13.485-13.785	1000m	Cloud Top Altitude
35	13.785-14.085	1000m	
36	14.085-14.385	1000m	

# MODIS land products

- Land surface reflectance
- Vegetation indices; Leaf Area Index.
- Land cover/land use
- Thermal Anomalies
- Gross Primary Productivity (Photosynthesis)
- Aerosol
- Cloud
- Snow cover/ Sea Ice
- Sea Surface Temperature
- Land
- Atmosphere
- Cryosphere
- Ocean

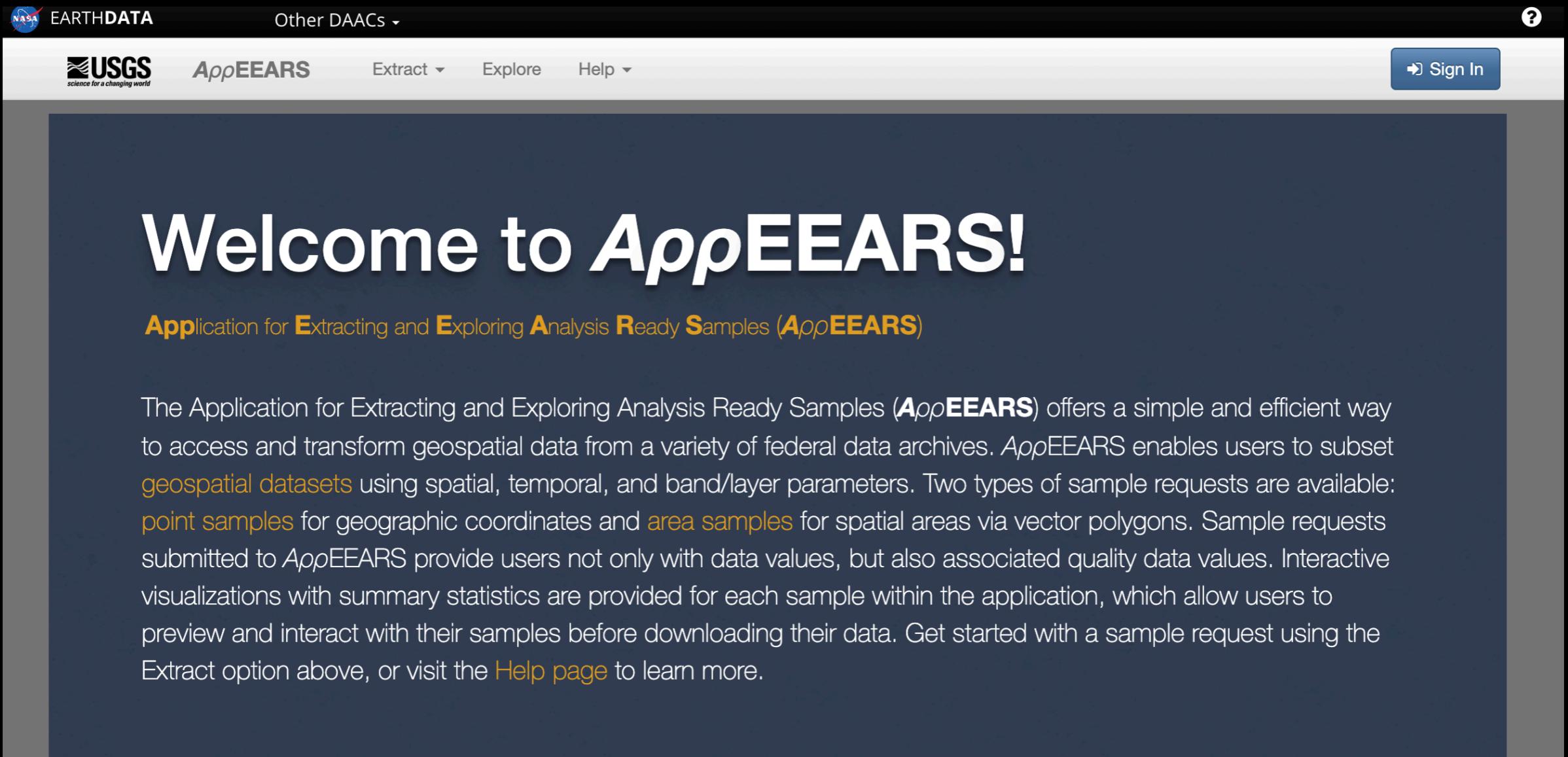
## Practice:

1. Download MODIS data of an area of any shape
2. Download MODIS data for Ameriflux and NEON towers and visualize the time-series

# NASA/USGS APPEARS

<https://lpdaacsvc.cr.usgs.gov/appears/>

Provide HDF or GeoTIFF files for MODIS product

A screenshot of the AppEEARS web application. The top navigation bar includes the NASA Earthdata logo, a dropdown for "Other DAACs", a question mark icon, and a "Sign In" button. Below the navigation is a large dark blue header with the text "Welcome to AppEEARS!" in white. Underneath the header, the text "Application for Extracting and Exploring Analysis Ready Samples (AppEEARS)" is displayed in orange. The main content area contains a detailed description of the service in white text, explaining its purpose of extracting geospatial data from federal archives using various parameters like spatial, temporal, and band/layer filters. It highlights the ability to request point or area samples and provides interactive visualizations and quality data values. A "Help page" link is mentioned at the end of the text.

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.

# ORNL DAAC MODIS/VIIRS subset

<https://modis.ornl.gov/data.html>

Provide CSV for MODIS product

The screenshot shows the ORNL DAAC MODIS/VIIRS Subsets website. The header features the ORNL DAAC logo, the text "MODIS/VIIRS Subsets", "Moderate Resolution Imaging Spectroradiometer/Visible Infrared Imaging Radiometer Suite Land Products Subsets", and the NASA logo. The navigation bar includes links for Home, Get Data (which is highlighted), Documentation, Resources, Publications, and Sign in. Below the navigation bar, the breadcrumb trail shows "Home > Get Data". The main content area is titled "Get Data" and contains three sections: "Global Subsets Tool", "Fixed Sites Subsets Tool", and "Web Service".

**Global Subsets Tool**  
Request a subset for any location on earth, provided as GeoTiff and text format, including interactive time-series plots and more. Users specify a site by entering the site's geographic coordinates and the area surrounding that site, from

**Fixed Sites Subsets Tool**  
Download pre-processed subsets for 2000+ field and flux tower sites for validation of models and remote sensing products. The goal of the Fixed Sites Subsets Tool is to prepare summaries of selected

**Web Service**  
Retrieve subset data (in real-time) for any location(s), time period and area programmatically using a REST web service. Web service client and libraries are available in multiple programming languages, allowing integration of subsets into

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