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

Xi Yang

University of Virginia

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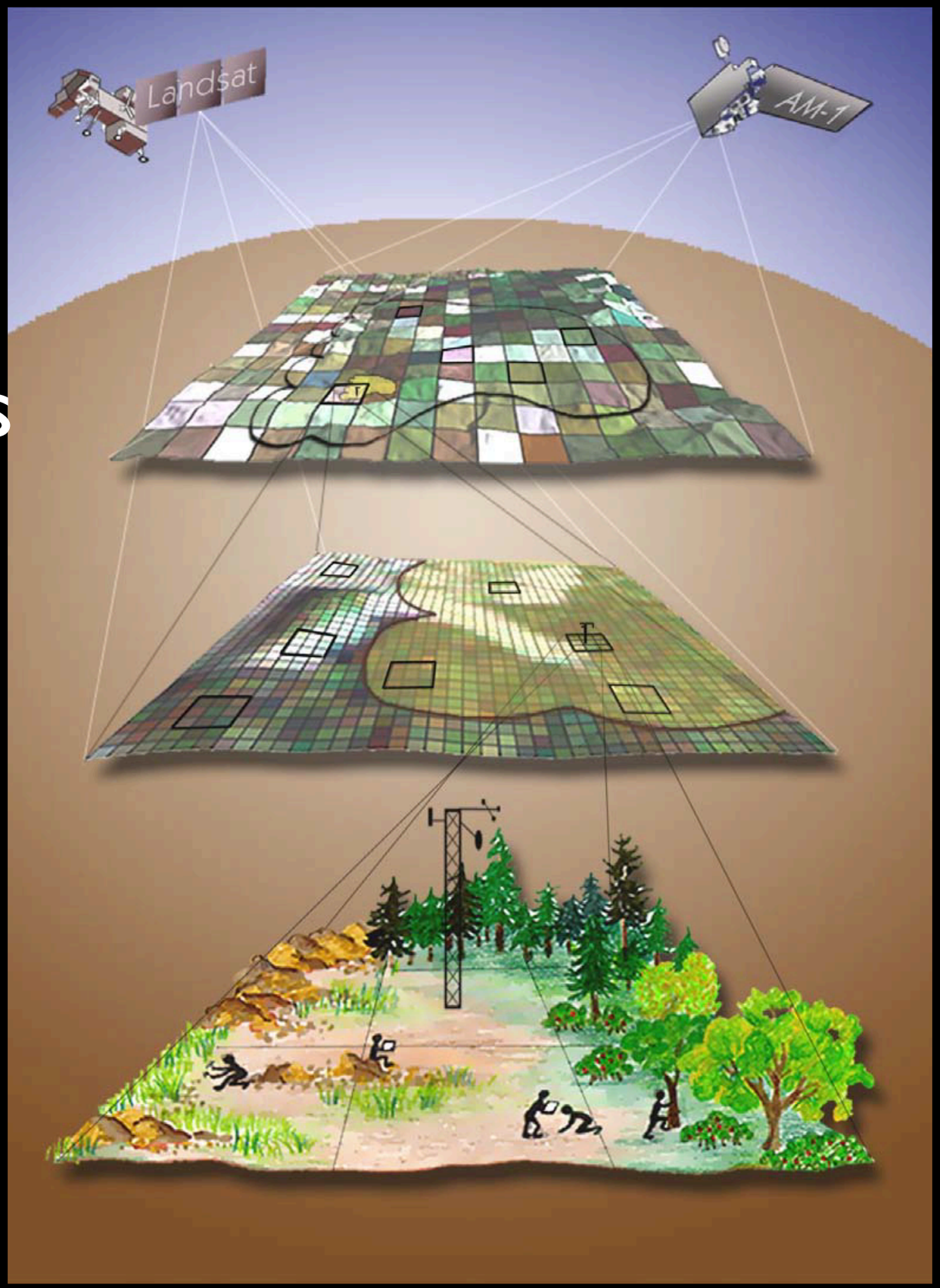


Credit: BigFoot

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

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

Band	Wavelength (μm)	Resolution (m)	Primary Use
20	3.660-3.840	1000m	Surface/Cloud Temperature
21	3.929-3.989	1000m	
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	Cloud Top Altitude
34	13.485-13.785	1000m	
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

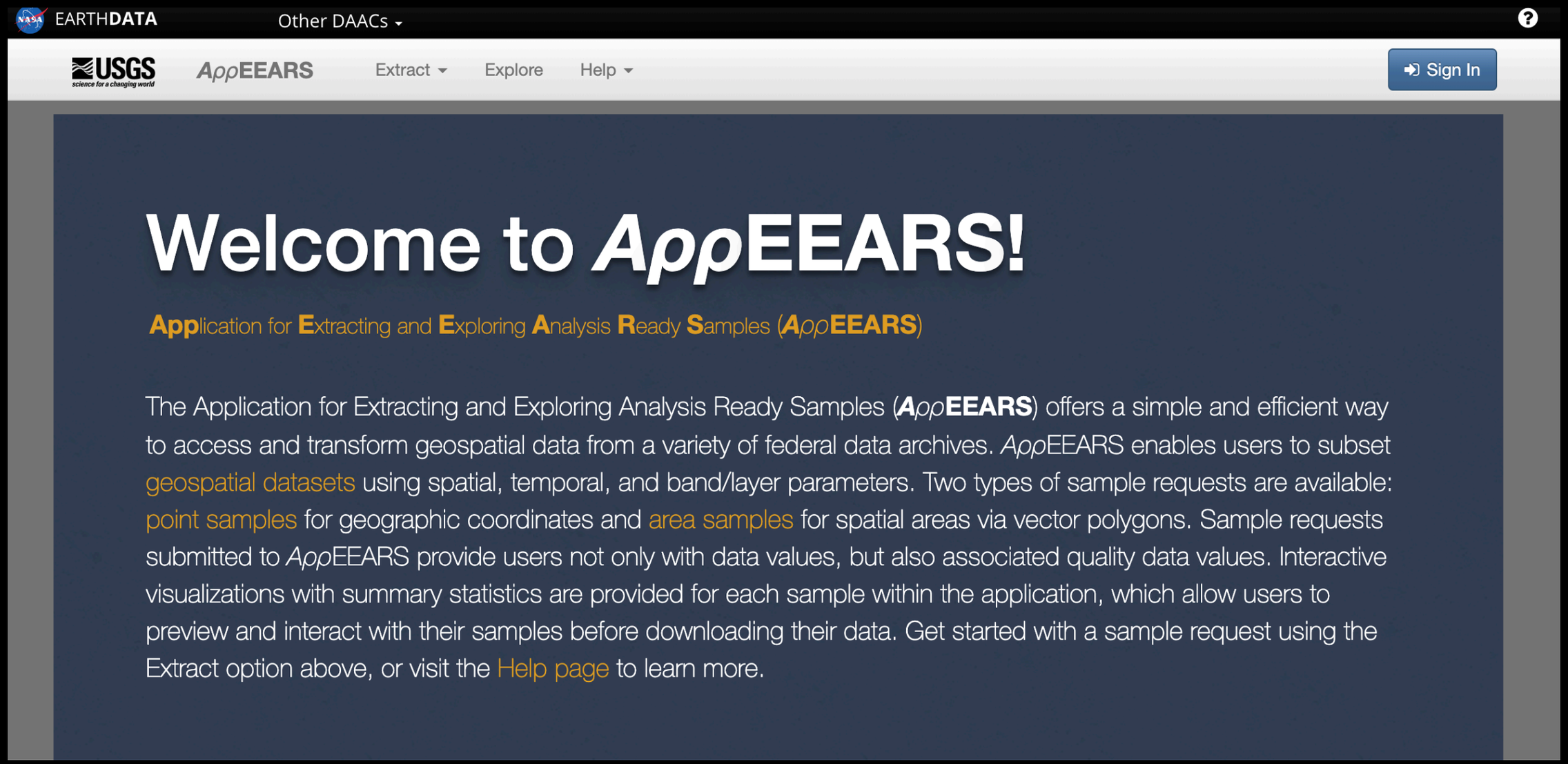
Practice:

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/appeears/

Provide HDF or GeoTIFF files for MODIS product



ORNL DAAC MODIS/VIIRS subset

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

Provide CSV for MODIS product