NASA's Terrestrial Ecology Data Repository: ORNL DAAC

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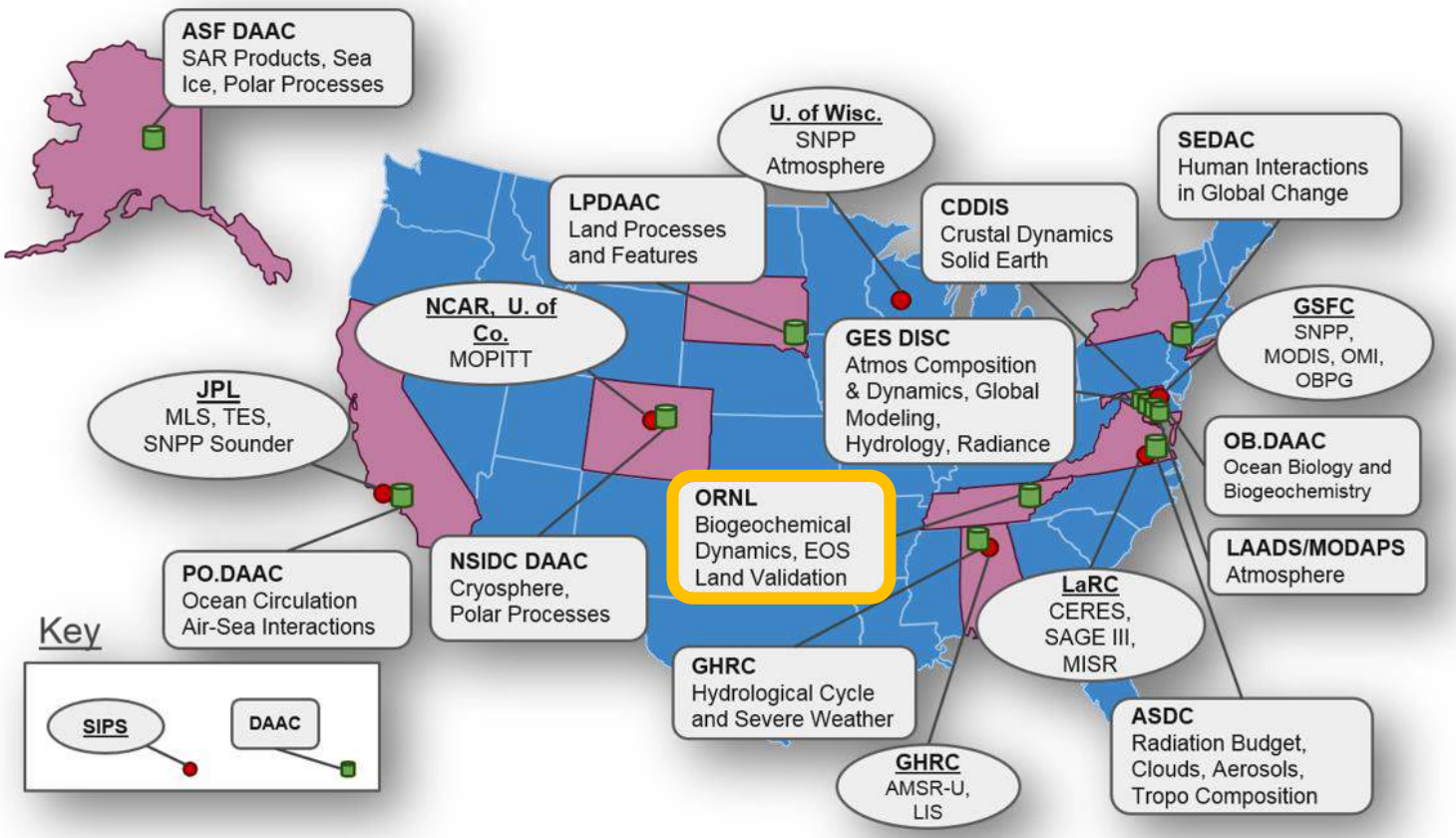
Michele Thornton and Jess Welch

Oak Ridge National Laboratory (ORNL) DAAC

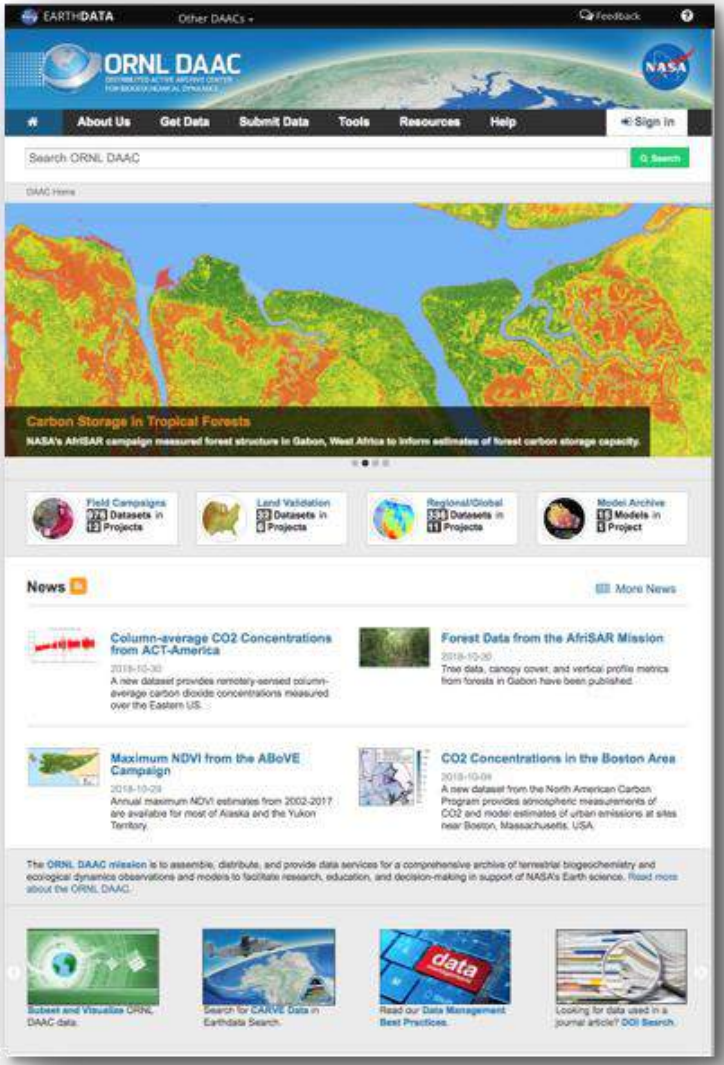
Terrestrial Ecology Program Science Team Meeting
The University of Maryland
September 25, 2019

EOSDIS Distributed Active Archive Centers

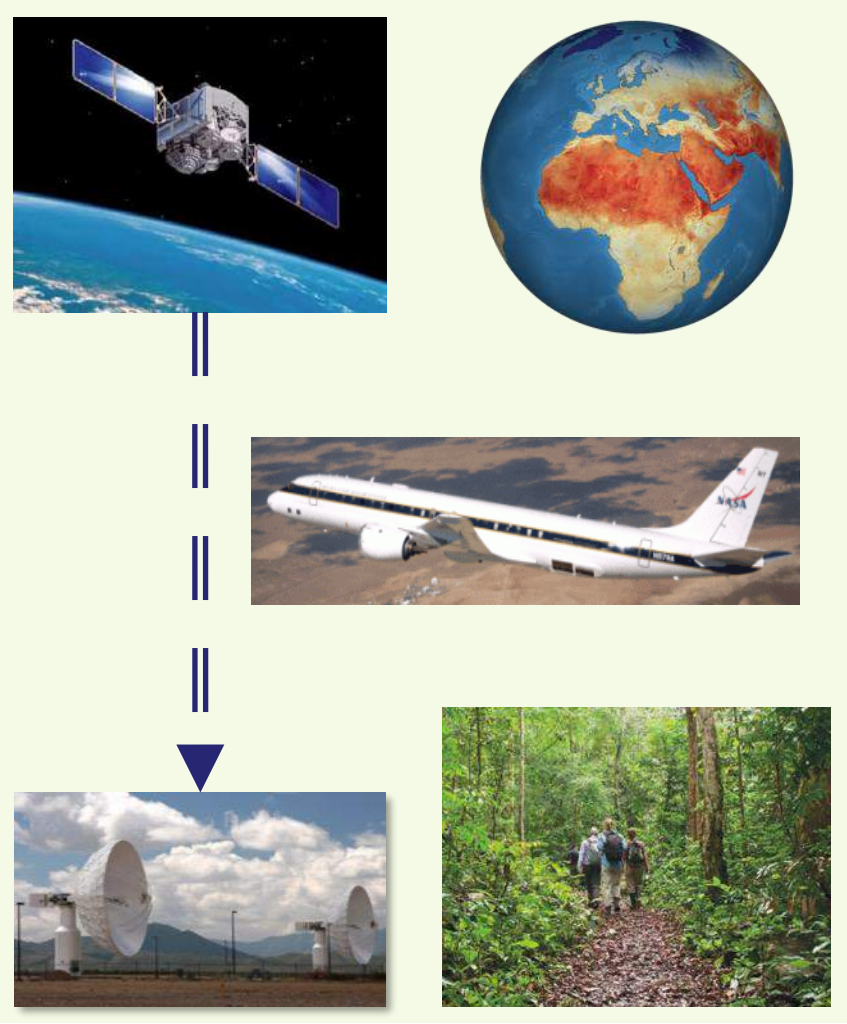


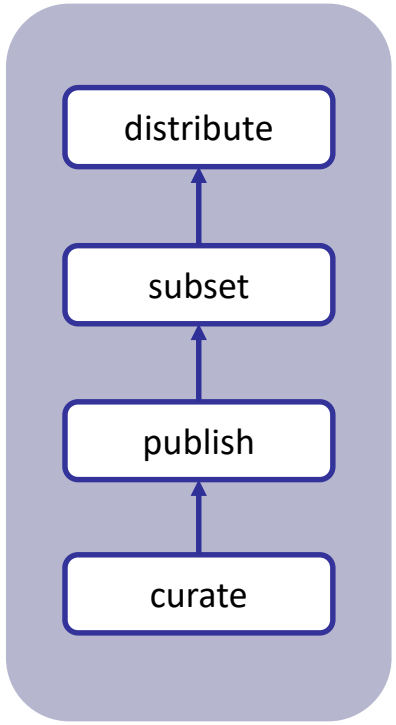
The ORNL DAAC https://daac.ornl.gov

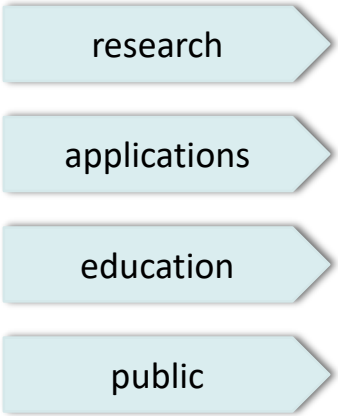
The ***O**ak **R**idge **N**ational **L**aboratory **D**istributed **A**ctive **A**rchive **C**enter* archives data produced by NASA's Terrestrial Ecology Program in support of NASA's Carbon Cycle and Ecosystems focus area.



What does the ORNL DAAC do?

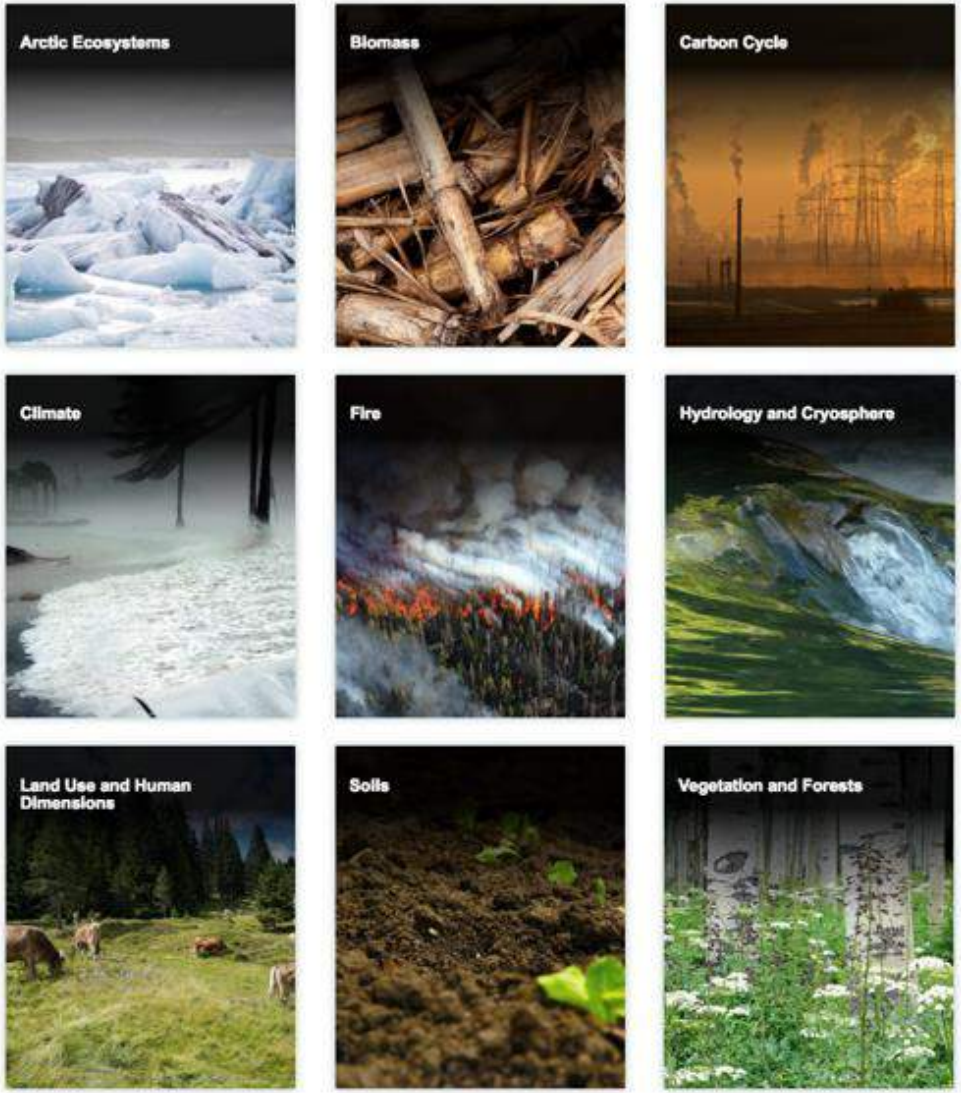






Data at ORNL DAAC

- 1400+ datasets
- 9 Science Themes
- 30,000+ users per year
- 4,200 data citations



NASA Projects

ABoVE
ARCTIC BOREAL VULNERABILITY EXPERIMENT

FLUXNET
A Global Network

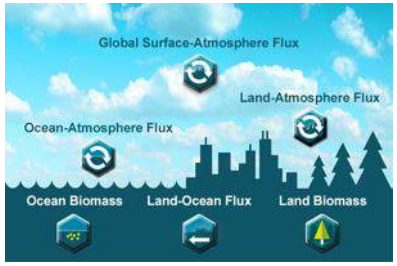
CARVE
CARBON IN ARCTIC RESERVOIRS VULNERABILITY EXPERIMENT

NASA ATOM
ATMOSPHERIC TOMOGRAPHY MISSION
EVS-2

Fluxes
Sources
Sinks
CO_2 & CH_4 Concentration
Atmospheric Carbon & Transport
Transport

GEDI
ECOSYSTEM LIDAR

FIRST ISLSCP FIELD EXPERIMENT
FIFE



Carbon Monitoring System

SAFARI 2000
CSIR UB NASA ZMD WITS

LBA
THE LARGE SCALE BIOSPHERE-ATMOSPHERE EXPERIMENT IN AMAZONIA - LBA

Delta-X

A Core Element of the U.S. Global Change Research Program
NORTH AMERICAN CARBON PROGRAM
CONTINENTAL CARBON BUDGETS • PROCESSES • MANAGEMENT

NASA AirMOSS EV-1
Airborne Microwave Observatory of Subcanopy and Subsurface Project

New Missions

Multi-beam waveform **lidar instrument on ISS**. L3+ data at ORNL DAAC will include gridded biomass, canopy cover, height, LAI, vertical foliage profile. (PI: Ralph Dubayah)

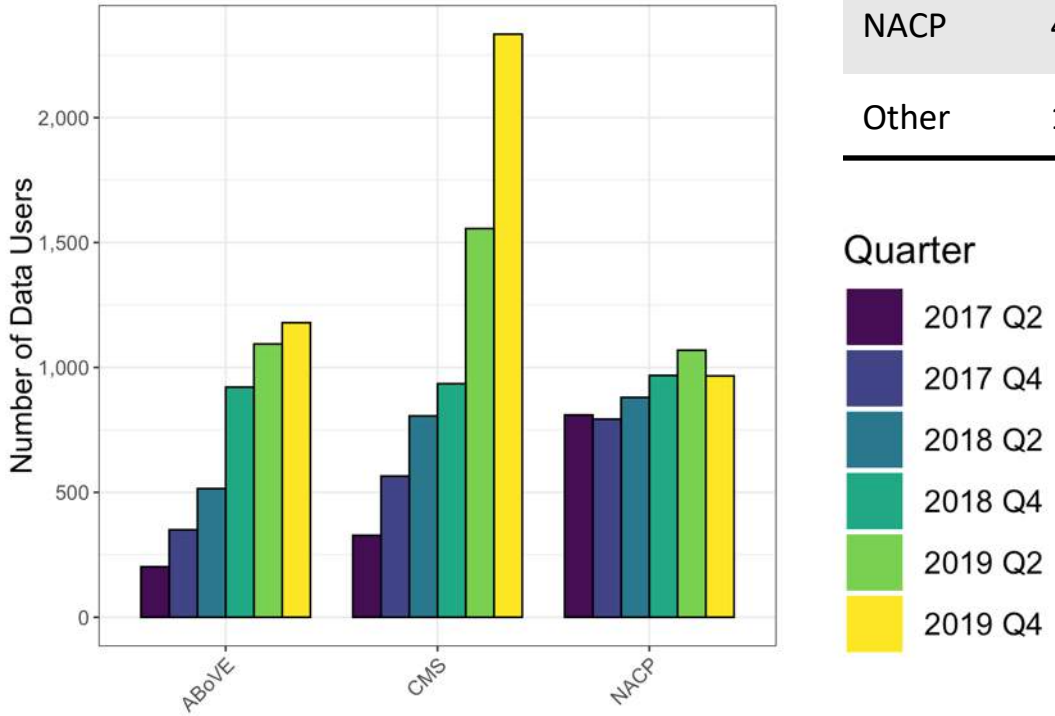
Airborne Mission studying sea-level change and deltaic evolution in the **Mississippi River Delta**. Flying AVIRIS-NG, AirSWOT & UAVSAR in summer 2020. (PI: Marc Simard)

Multi-decadal time series of vegetation **chlorophyll fluorescence (SIF)** and derived gross primary production (PI: Nick Parazoo)

NASA TE Data Impact

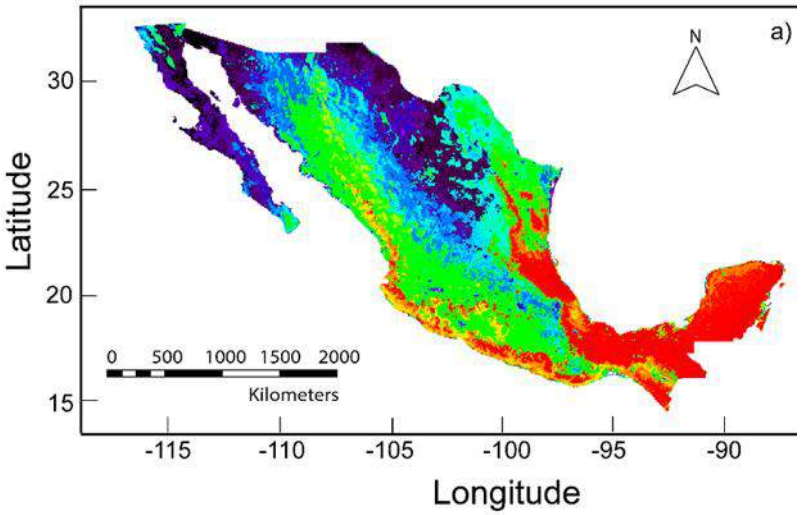
~200 datasets produced by NASA TE-funded science since 2015

Program	Datasets	Downloads	Citations
ABoVE	95	473K	16
CMS	51	550K	39
NACP	42	1.5 mil	221
Other	13	9K	13

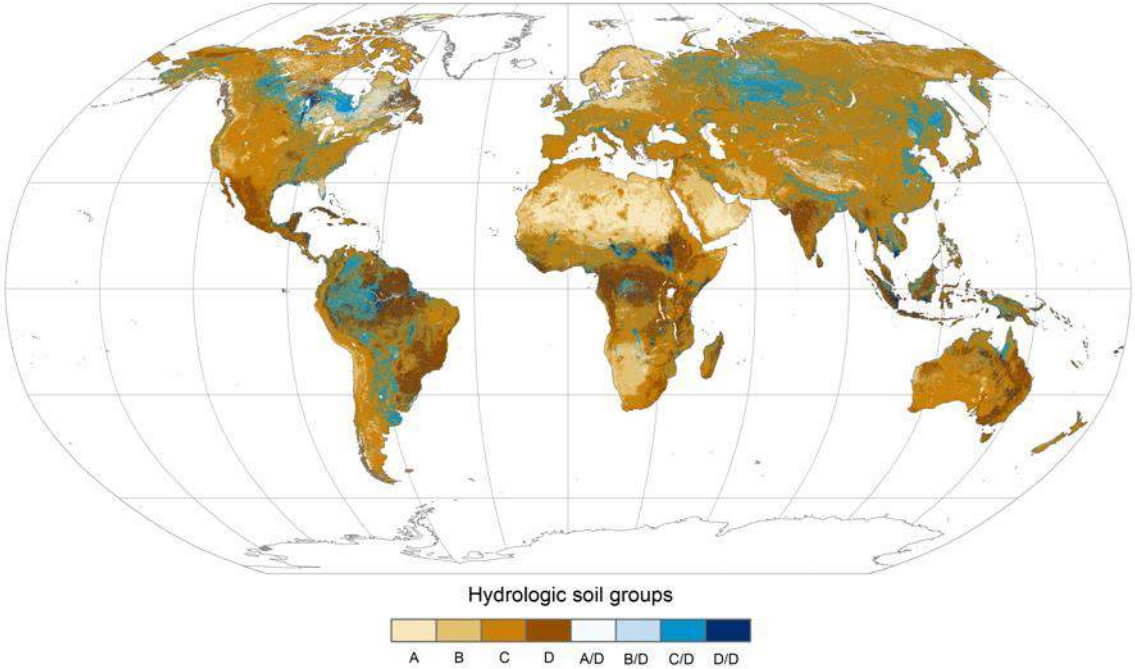


New and Notable Data Releases

- High Resolution Global Contiguous SIF Estimates Derived from OCO-2 SIF and MODIS
- PhenoCam Dataset v2.0: Vegetation Phenology from Digital Camera Imagery, 2000-2018
- Forest Carbon Stocks, Fluxes and Productivity Estimates, Western USA, 1979-2099
- Ecosystem Functional Type Distribution Map for Mexico, 2001-2014
- Synthesis of Winter In Situ Soil CO2 Flux in pan-Arctic and Boreal Regions, 1989-2017
- Landsat-derived Annual Dominant Land Cover Across ABoVE Core Domain, 1984-2014
- Reflectance Spectra of Tundra Plant Communities across Northern Alaska



Data Awards: Most Downloaded



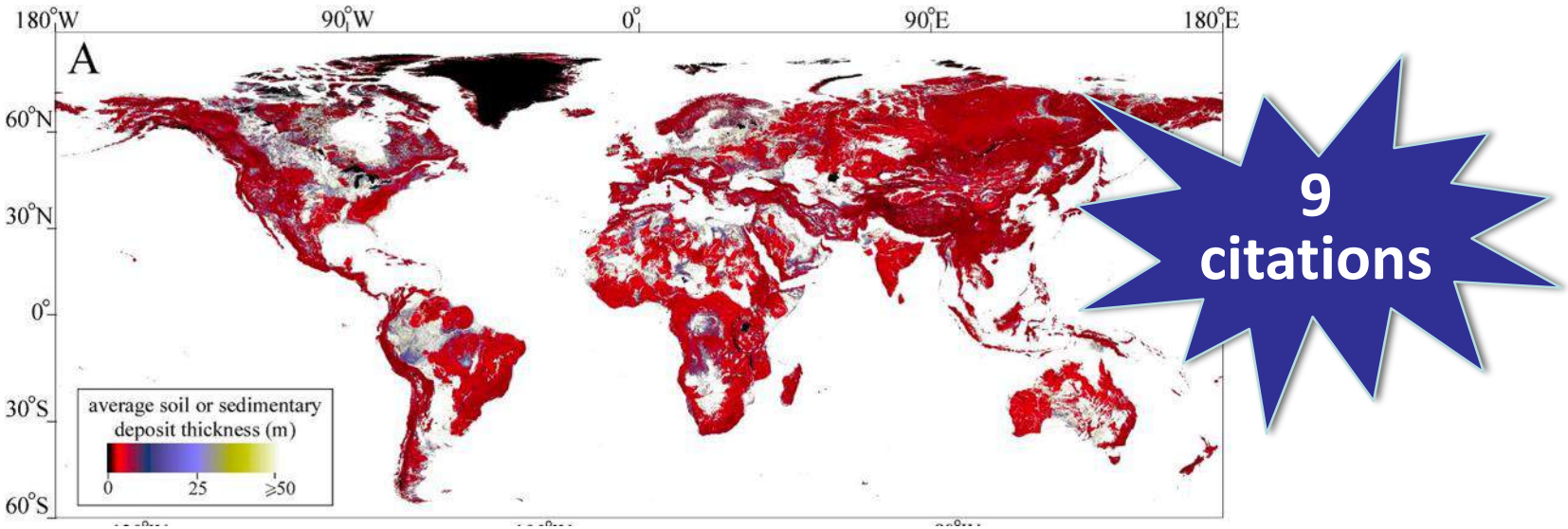
3,322 downloads

Global Hydrologic Soil Groups (HYSOGs250m) for Curve Number-Based Runoff Modeling

Ross, C.W., L. Prihodko, J. Anchang, S. Kumar, W. Ji, and N.P. Hanan (*Team led by Niall Hanan, New Mexico State University*)

https://doi.org/10.3334/ORNLDAAC/1566

Data Awards: Most Cited



Global 1-km Gridded Thickness of Soil, Regolith, and Sedimentary Deposit Layers

J.D. Pelletier, P.D. Broxton, P. Hazenberg, X. Zeng, P.A. Troch, G. Niu, Z.C. Williams, M.A. Brunke, & D. Gochis (*Team led by Jon Pelletier, University of Arizona*)

https://doi.org/10.3334/ORNLDAAC/1304

Data Awards: Most Data Products

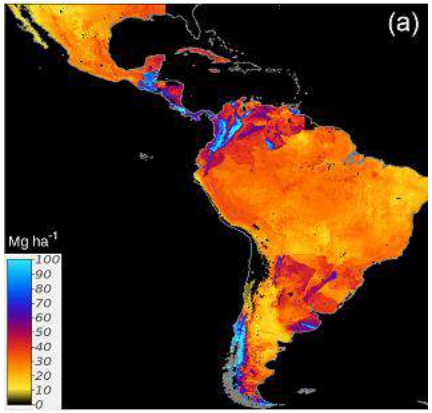
8

Lola Fatoyinbo and team

Mangrove forests in coastal Gabon

6

Rodrigo Vargas and team



Predictions of soil organic carbon across Latin America

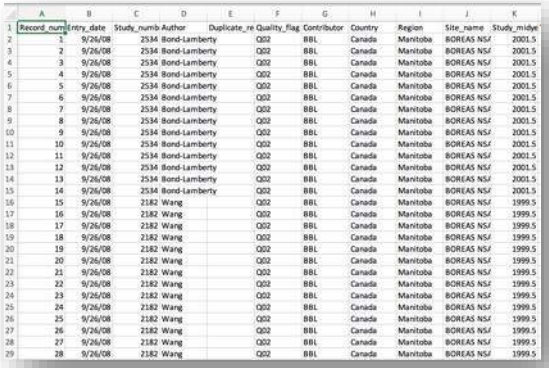
Publishing Data with ORNL DAAC

Investigators

- Collect
- Document
- QA / QC
- Analyze
- Publish

DAAC

- QA Review
- Standards & Metadata
- Document
- Archive
- Distribute
- User Support



	A	B	C	D	E	F	G	H	I	J	K
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2	1	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
3	2	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
4	3	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
5	4	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
6	5	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
7	6	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
8	7	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
9	8	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
10	9	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
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14	13	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
15	14	9/26/08	2534	Bond-Lamberty		Q02	BBL	Canada	Manitoba	BOREAS NSA	2001.5
16	15	9/26/08	2182	Wang		Q02	BBL	Canada	Manitoba	BOREAS NSA	1999.5
17	16	9/26/08	2182	Wang		Q02	BBL	Canada	Manitoba	BOREAS NSA	1999.5
18	17	9/26/08	2182	Wang		Q02	BBL	Canada	Manitoba	BOREAS NSA	1999.5
19	18	9/26/08	2182	Wang		Q02	BBL	Canada	Manitoba	BOREAS NSA	1999.5
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27	26	9/26/08	2182	Wang		Q02	BBL	Canada	Manitoba	BOREAS NSA	1999.5
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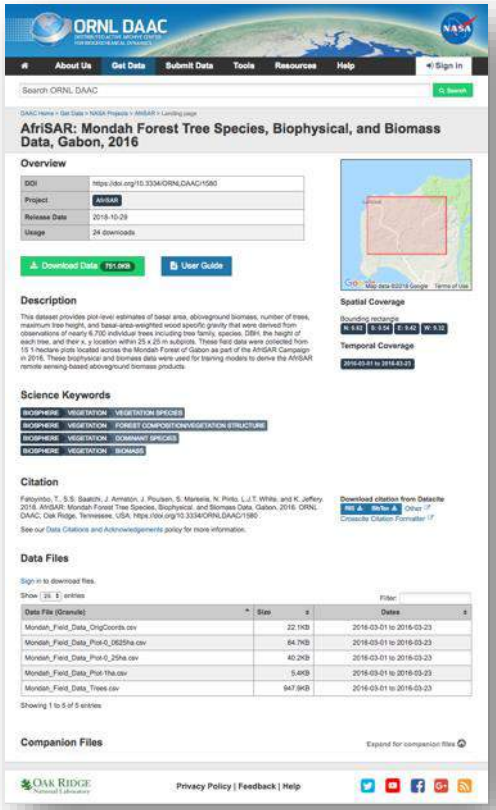
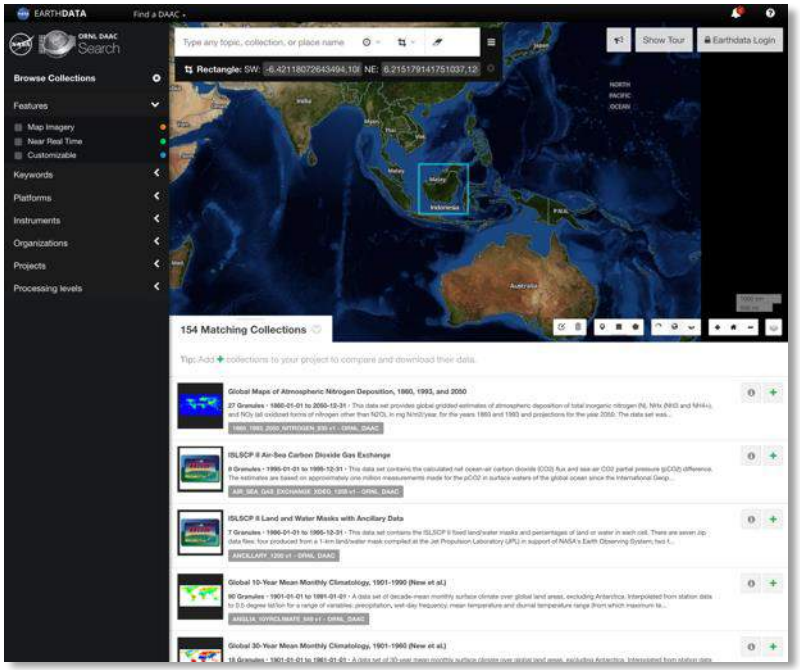
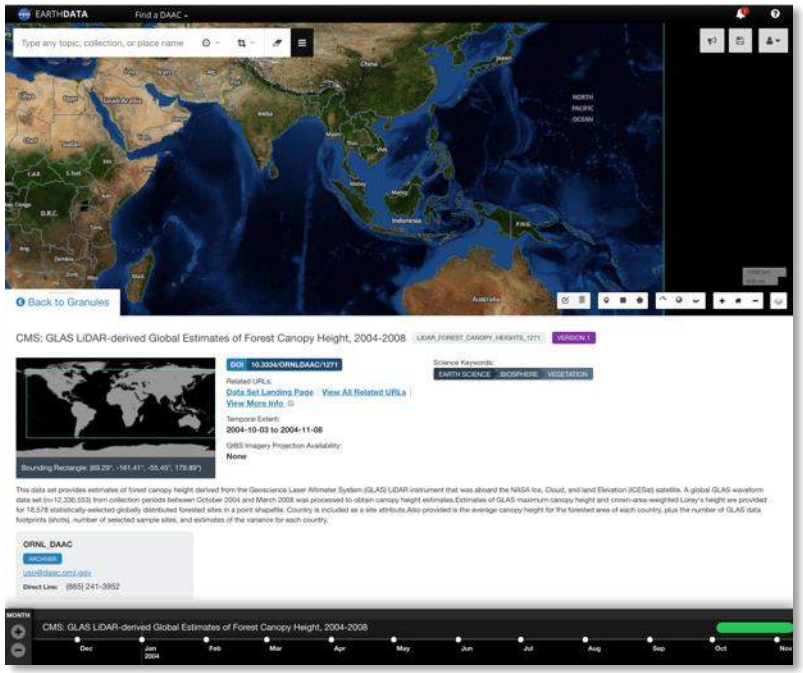


Earthdata Search

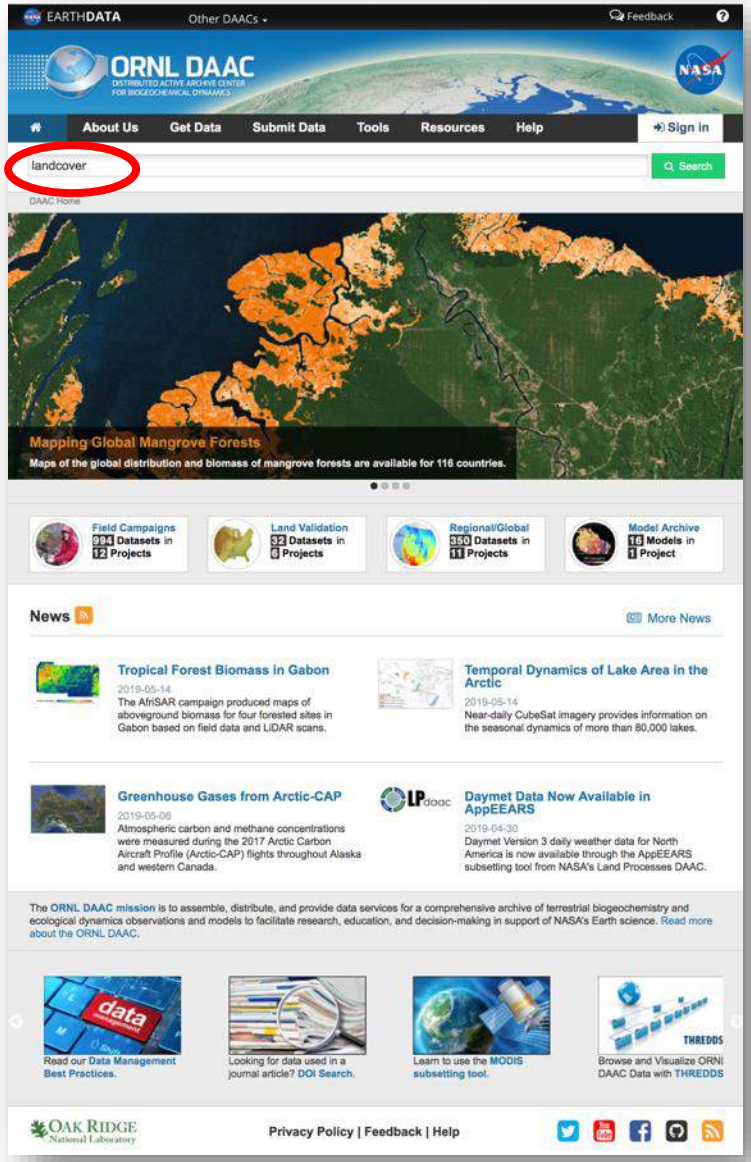
Spatial and Temporal Search: https://search.earthdata.nasa.gov

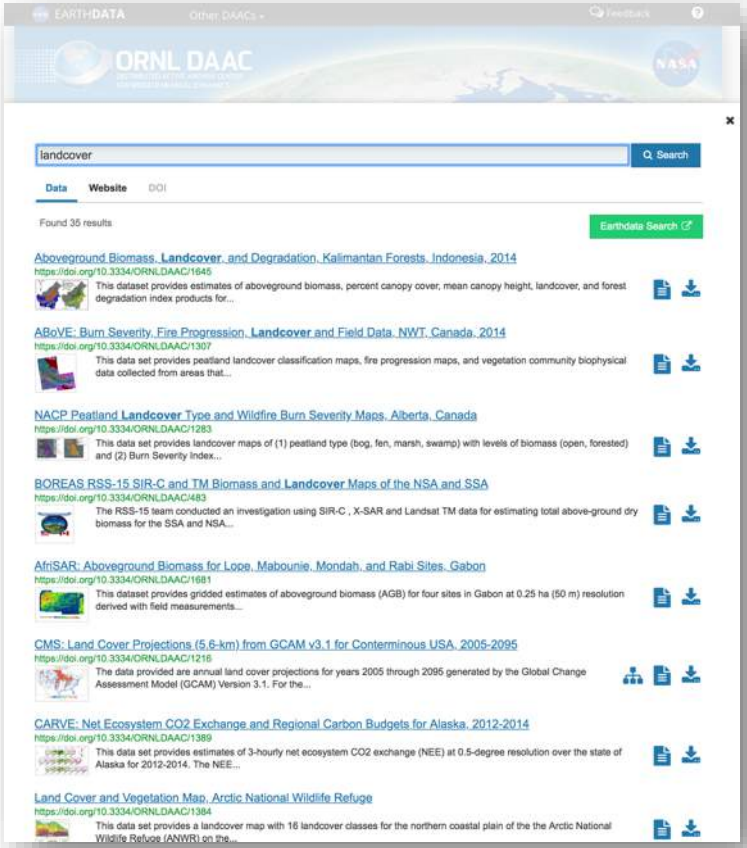




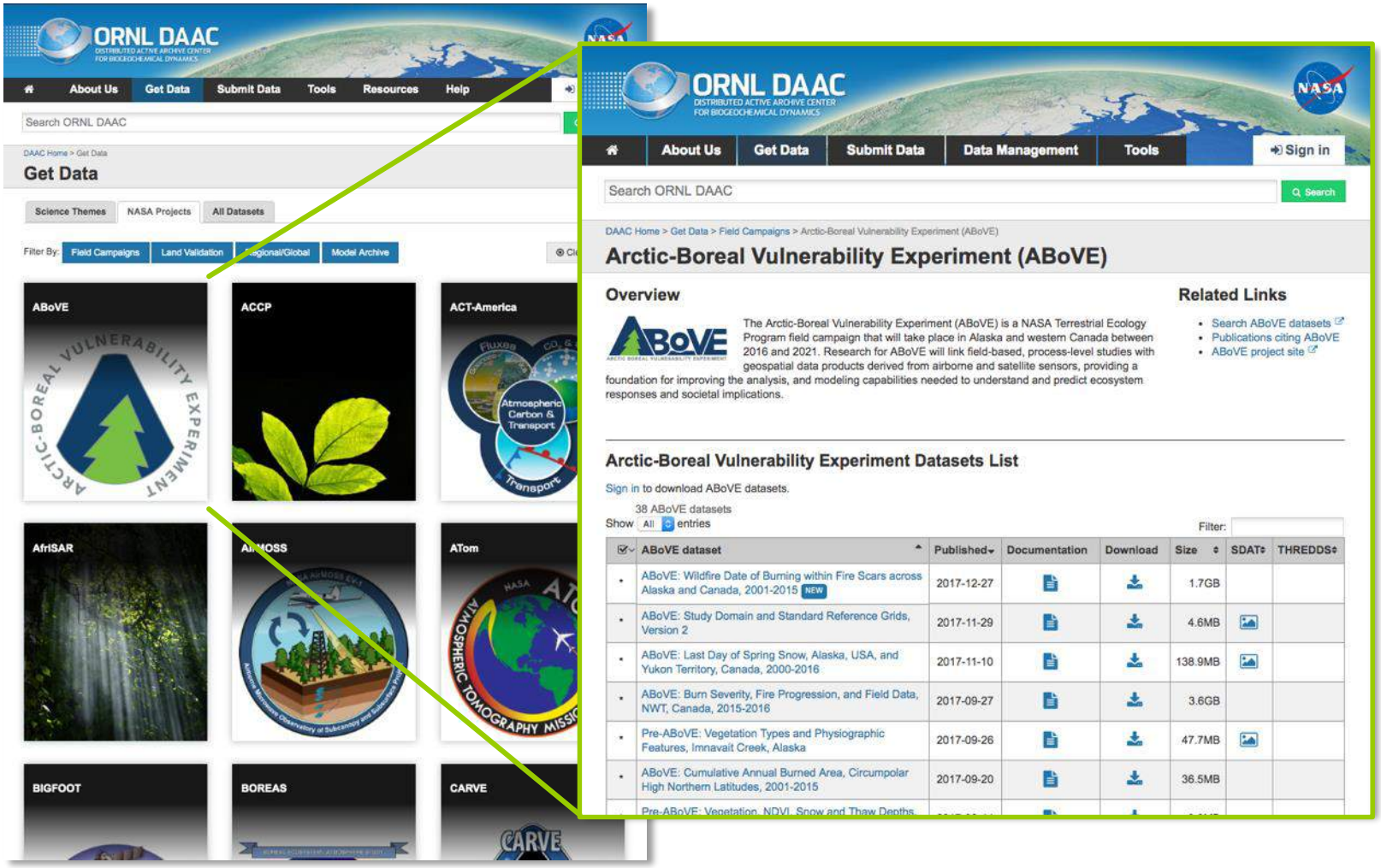
DEMO: daac.ornl.gov/resources/tutorials/search-above-data/

Searching for Data at ORNL DAAC





Data organization by NASA program



https://webmap.ornl.gov/ogc

Spatial Data Access Tool (SDAT)

Visualize

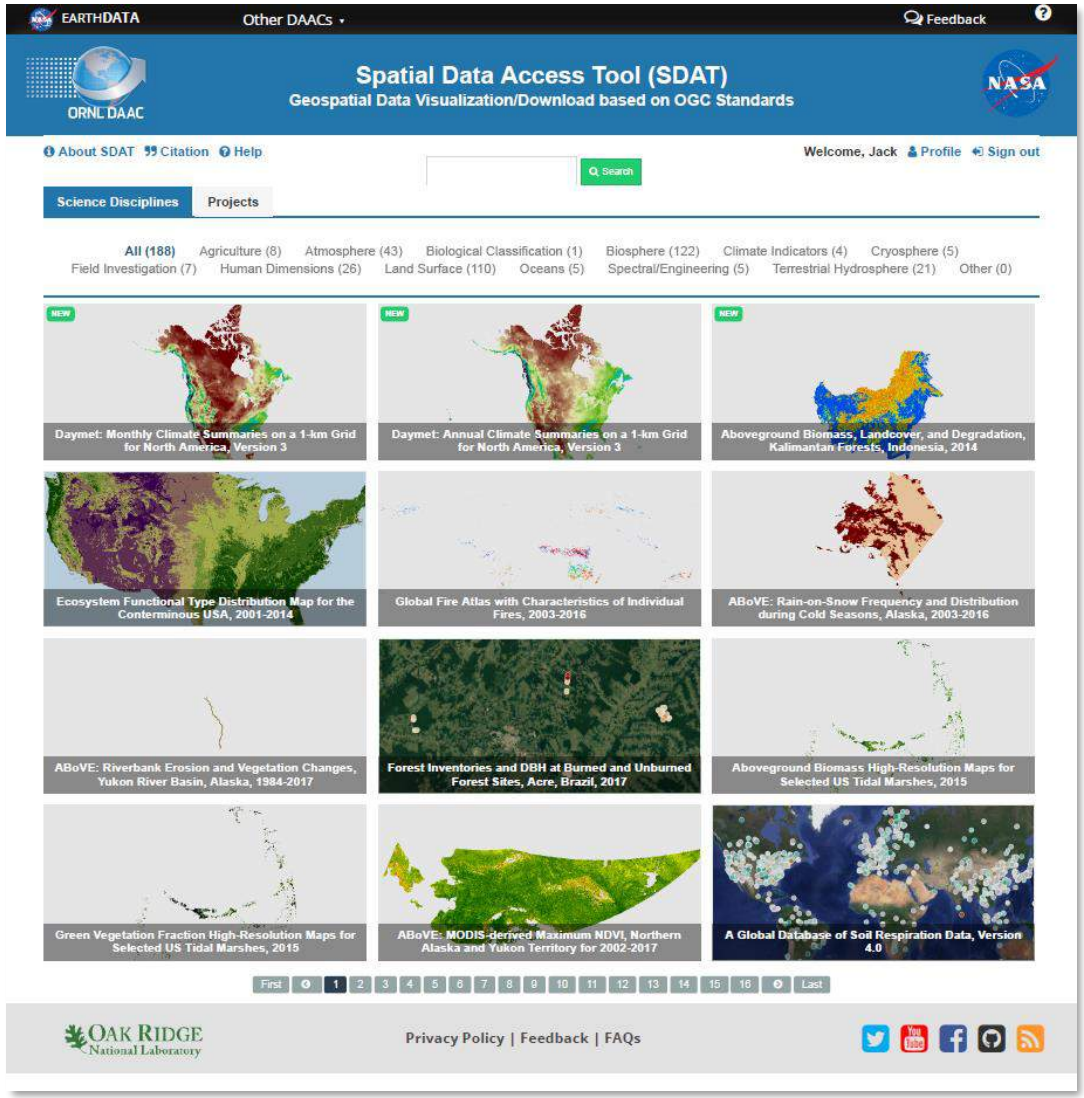
Subset

Regrid

Reformat

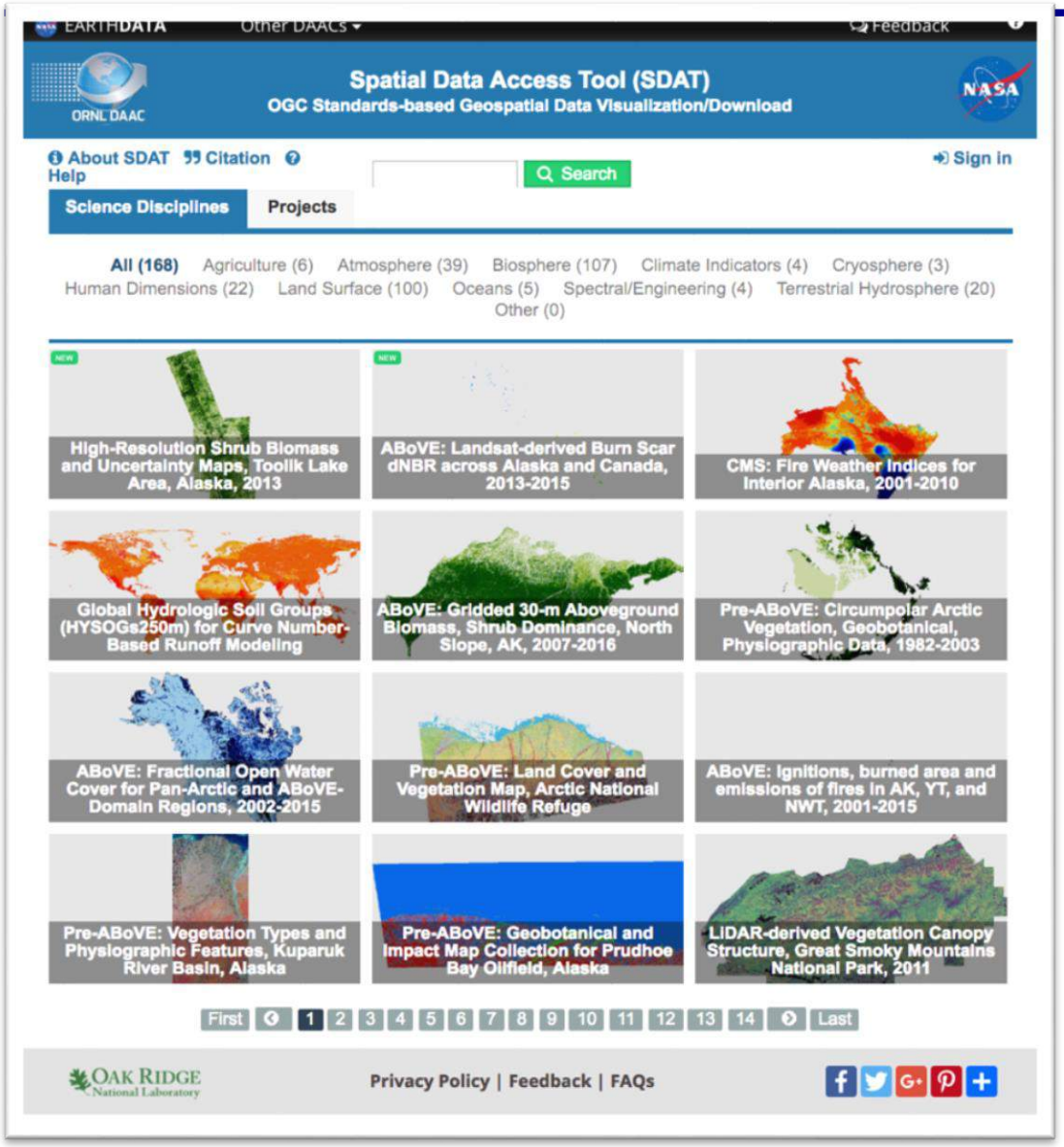
Reproject

… all from your web browser!



Spatial Data Access Tool

https://webmap.ornl.gov/ogc

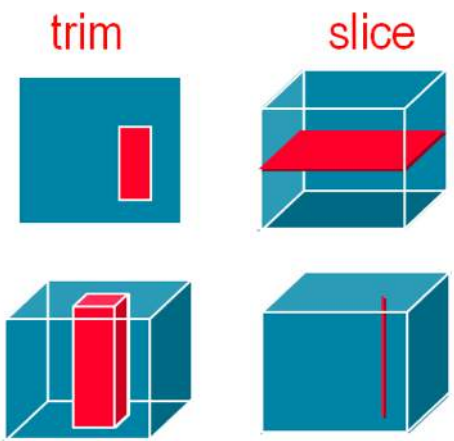


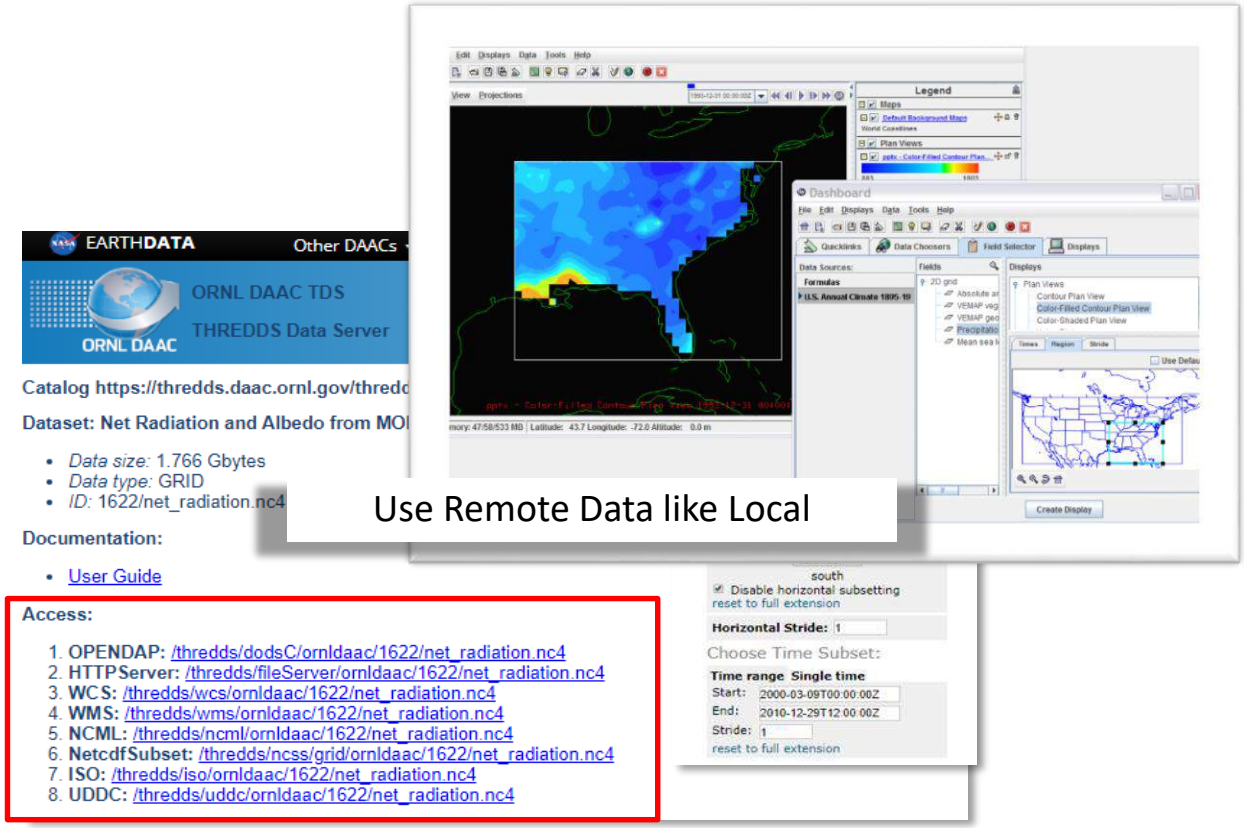
Data Server - THREDDS

Find, visualize, and subset multidimensional data

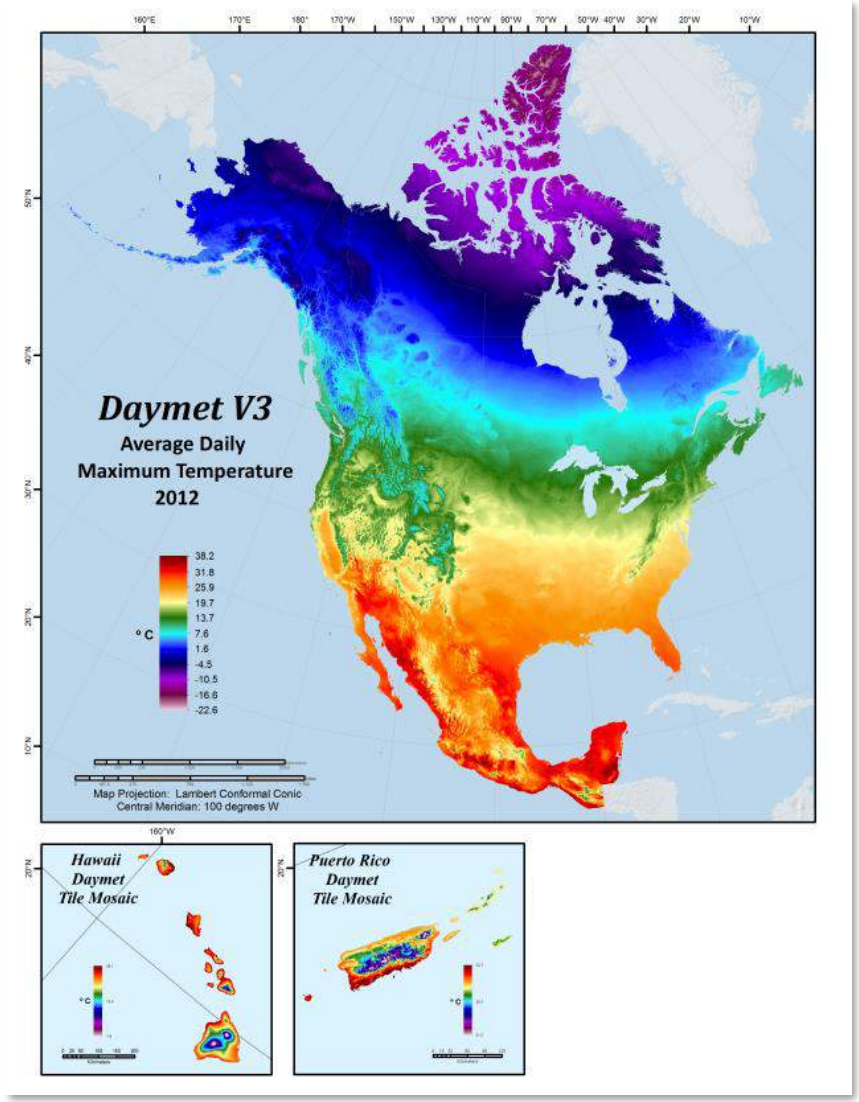
Modelers

Multi-dimensional Data Subsets





Daymet



Daily surface weather and climatological summaries.

Spatial Resolution: 1 km^2

Temporal Resolution: daily

Spatial Range: N. America, Hawaii, Puerto Rico

Temporal Range: 1980 – 2018

Variables
maximum temperature
minimum temperature
shortwave radiation
vapor pressure
snow water equivalent
precipitation
day length

Subsetting Tools

MODIS and VIIRS Land Products

Product	Description
MOD09, MYD09, VNP09	Surface Reflectance
MCD12	Land Cover Type and Dynamics
MCD19	MAIAC Albedo
MCD43	Albedo/BRDF/NBAR
MOD11, MYD11	Land Surface Temperature/Emissivity
MCD64	Burned Area
MOD13, MYD13, VNP13	Vegetation Indices
MOD14, MYD14	Thermal Anomalies/Fire
MCD15, VNP15	Leaf Area Index/FPAR
MOD16, MYD16	Evapotranspiration
MOD17, MYD17	Gross/Net Primary Productivity
Daymet	Daily Surface Weather Data, 1 km^2

Fixed Sites Subsets

pre-processed subsets for 2000+ field and flux tower sites

Global Subsets

request a subset for any location on earth

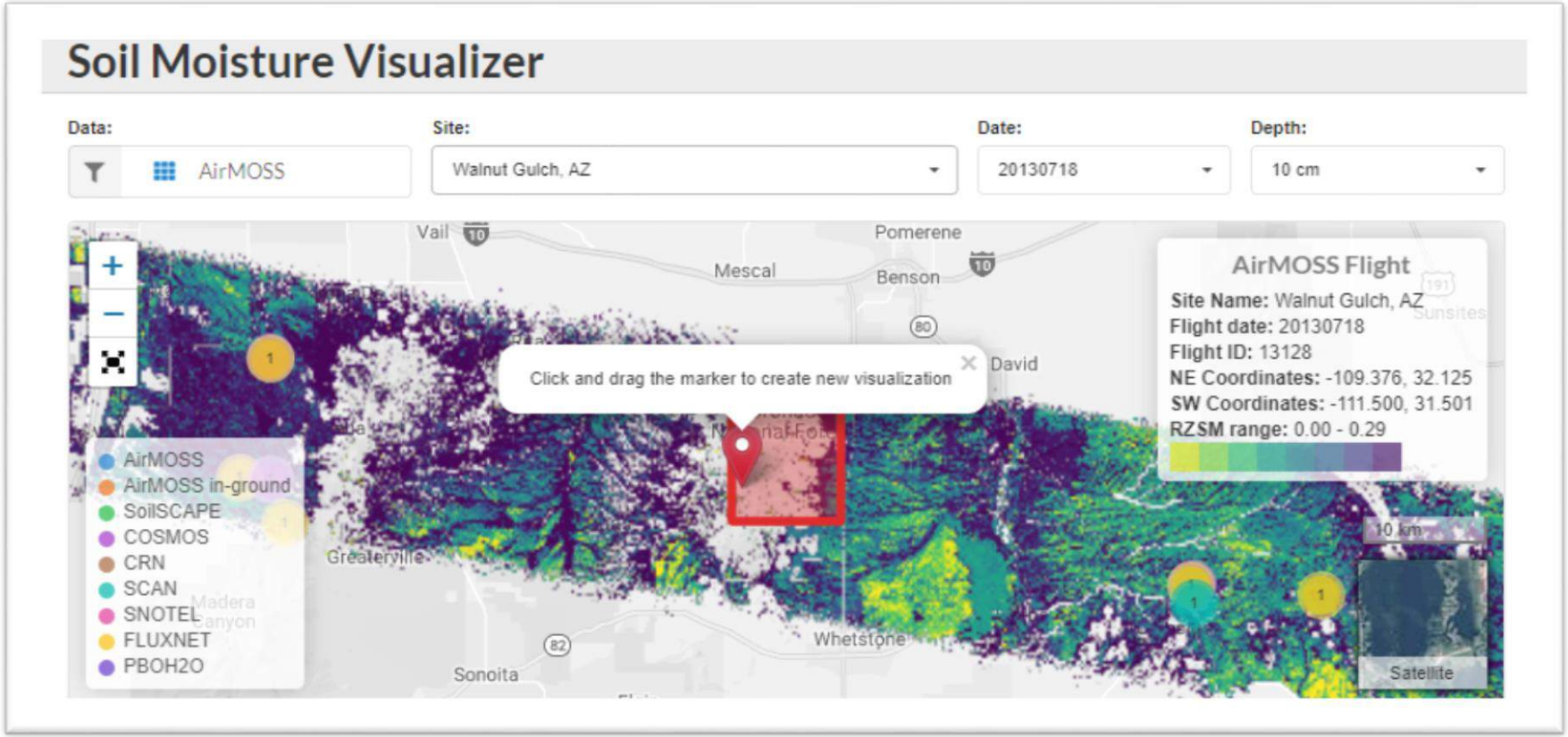
Web Service

Retrieve subset data for any location, time period and area programmatically

Soil Moisture Visualizer (SMV)

Harmonizes surface and root zone soil moisture data sets from **multiple sources** that encompass a range of spatial footprints, soil depths and measurement frequencies.

(https://daac.ornl.gov/soilmoisture/)



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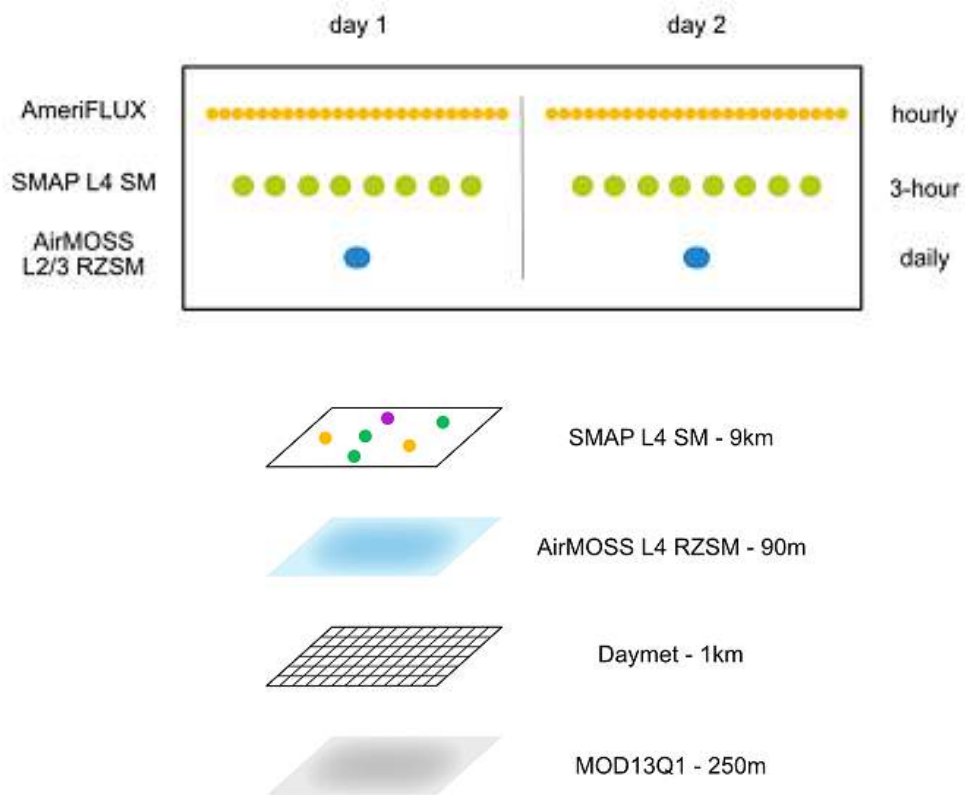
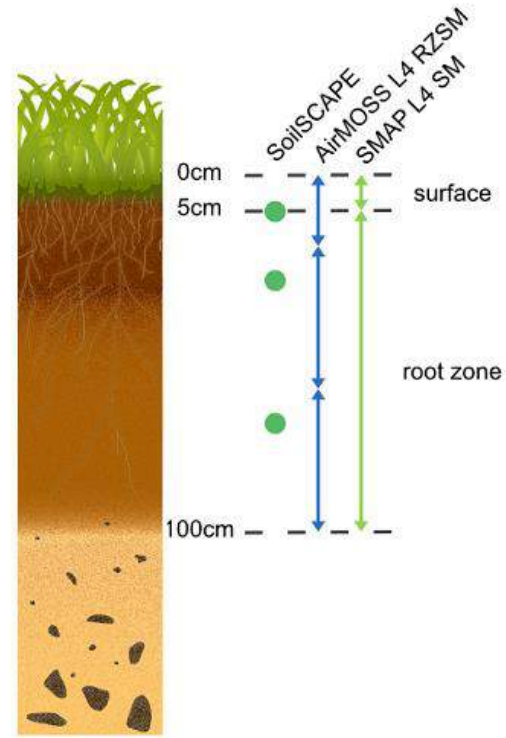
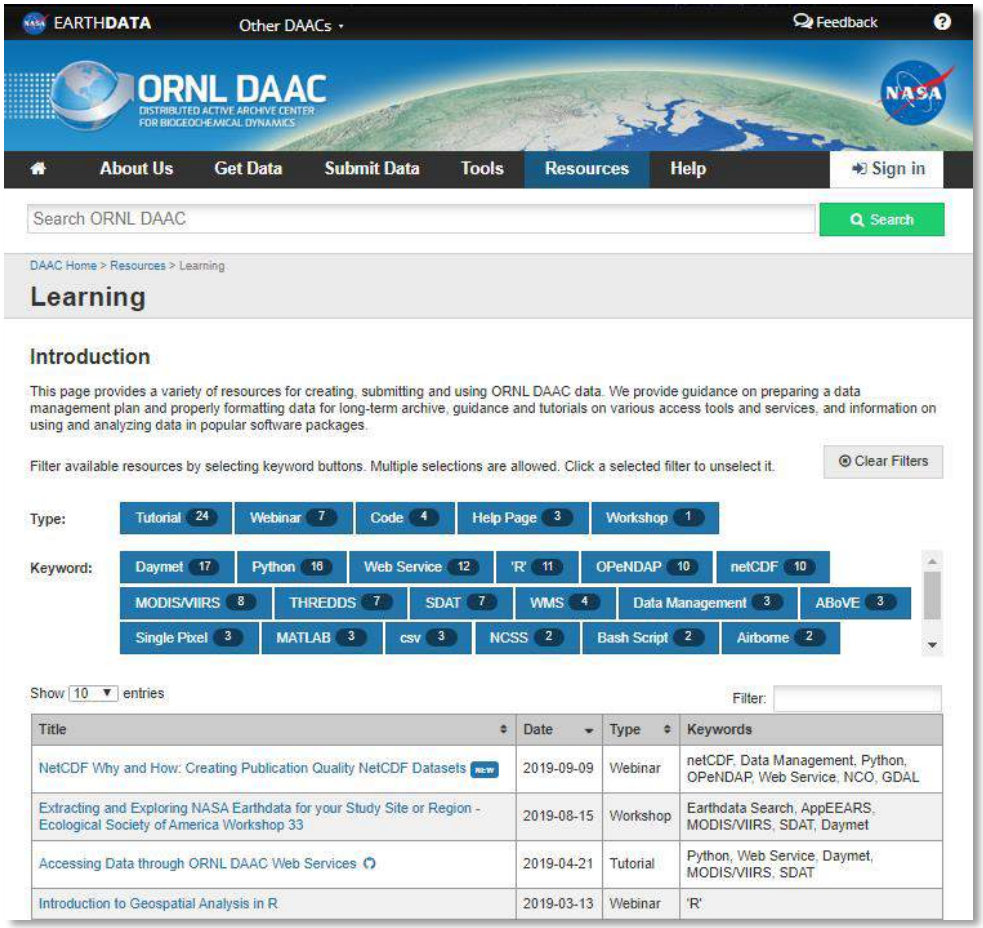




(https://daac.ornl.gov/soilmoisture/)

Learning Resources

daac.ornl.gov/resources



Filter by type

- Tutorials
- Webinars

Filter by keyword

- Daymet
- Python
- R
- ABoVE

WORKSHOP

TODAY, 1 PM to 3 PM in the Crossland Ballroom

DATA MANAGEMENT & PUBLISHING FOR NASA TE PROJECTS