

# POWER Technical Showcase



# Data System Improvements: Migration to Data version 10

The POWER Project is happy to announce the targeted public release of Data v10 is January 2025!

POWER Data v10 builds upon prior optimizations and enables cloud-based processing to lower data latency and includes new capabilities.

**Limited Preview  
Available Now**

## Enhancements

- **Spatially and Temporally** - Enable efficient loading for pre-processed data structures in cloud-based storage.
- **Fault-Tolerant Processing** - Enable workflows to enable graceful stop and start of processing to allow for rapid fault recovery.
- **Data Lineage** - Enhanced data traceability to the source data product.
- **Data Store Structure** - Include better storage units, data types, and metadata to support efficient direct access and enhanced usability for communities.





The Registry of Open Data on AWS is now available on AWS Data Exchange

All datasets on the Registry of Open Data are now discoverable on AWS Data Exchange alongside 3,000+ existing data products from category-leading data providers across industries. Explore the catalog to find open, free, and commercial data sets. [Learn more about AWS Data Exchange](#)

[Explore the catalog](#)

## NASA Prediction of Worldwide Energy Resources (POWER)

agriculture air quality analytics archives atmosphere climate climate model data assimilation deep learning earth observation energy environmental forecast geoscience  
geospatial global history imaging industry machine learning machine translation metadata meteorological model netcdf opendap radiation satellite imagery solar  
statistics sustainability time series forecasting water weather zarr

### Description

NASA's goal in Earth science is to observe, understand, and model the Earth system to discover how it is changing, to better predict change, and to understand the consequences for life on Earth. The Applied Sciences Program serves NASA and Society by expanding and accelerating the realization of societal and economic benefits from Earth science, information, and technology research and development.

The NASA Prediction Of Worldwide Energy Resources (POWER) Project, a NASA Applied Sciences program, improves the accessibility and usage NASA Earth Observations (EO) supporting community research in three focus areas: 1) renewable energy development, 2) building energy efficiency, and 3) agroclimatology applications. POWER can help communities be resilient amid observed climate variability through the easy access of solar and meteorological data via a variety of access methods.

The latest POWER version includes hourly-based source Analysis Ready Data (ARD), in addition to enhanced daily, monthly, annual, and climatology ARD. The daily time-series spans 40 years for meteorology available from 1981 and solar-based parameters start in 1984. The hourly source data are from Clouds and the Earth's Radiant Energy System (CERES) and Global Modeling and Assimilation Office (GMAO), spanning 20 years from 2001. The hourly data will provide users the ARD needed to model the energy performance of building systems, providing information directly amenable to decision support tools introducing the industry standard EPW (EnergyPlus Weather file).

POWER also provides parameters at daily, monthly, annual, and user-defined time periods, spanning from 1984 through to within a week of real time. Additionally,

The ARD and climate analytics will be readily accessible through POWER's integrated services suite, including the Data Access Viewer (DAV). The DAV has recently been

### Resources on AWS

#### Description

POWER's Zarr Analysis Ready Data (ARD) Datasets

#### Resource type

S3 Bucket

#### Amazon Resource Name (ARN)

`arn:aws:s3:::power-analysis-ready-datastore`

#### AWS Region

`us-west-2`

#### AWS CLI Access (No AWS account required)

`aws s3 ls --no-sign-request s3://power-analysis-ready-datastore/`

#### Explore

[Browse Bucket](#)

#### Description

POWER's NetCDF Datastore

#### Resource type

S3 Bucket

#### Amazon Resource Name (ARN)

`arn:aws:s3:::power-datastore`

#### AWS Region

#### Explore

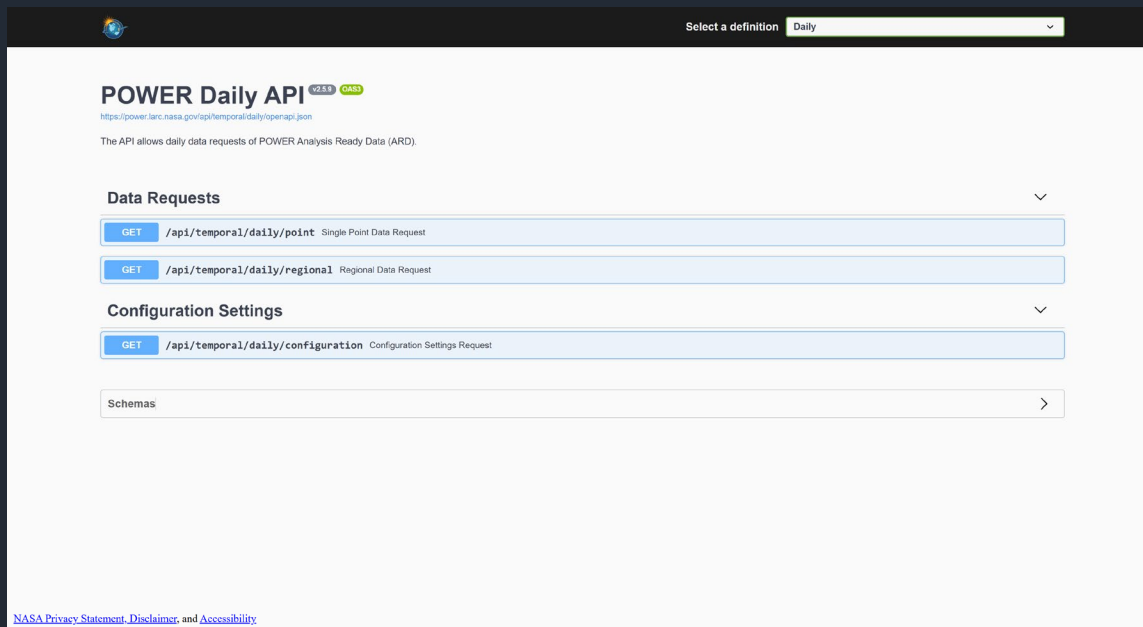
[Browse Bucket](#)



# Data Services Catalog

## Application Programming Interface (API)

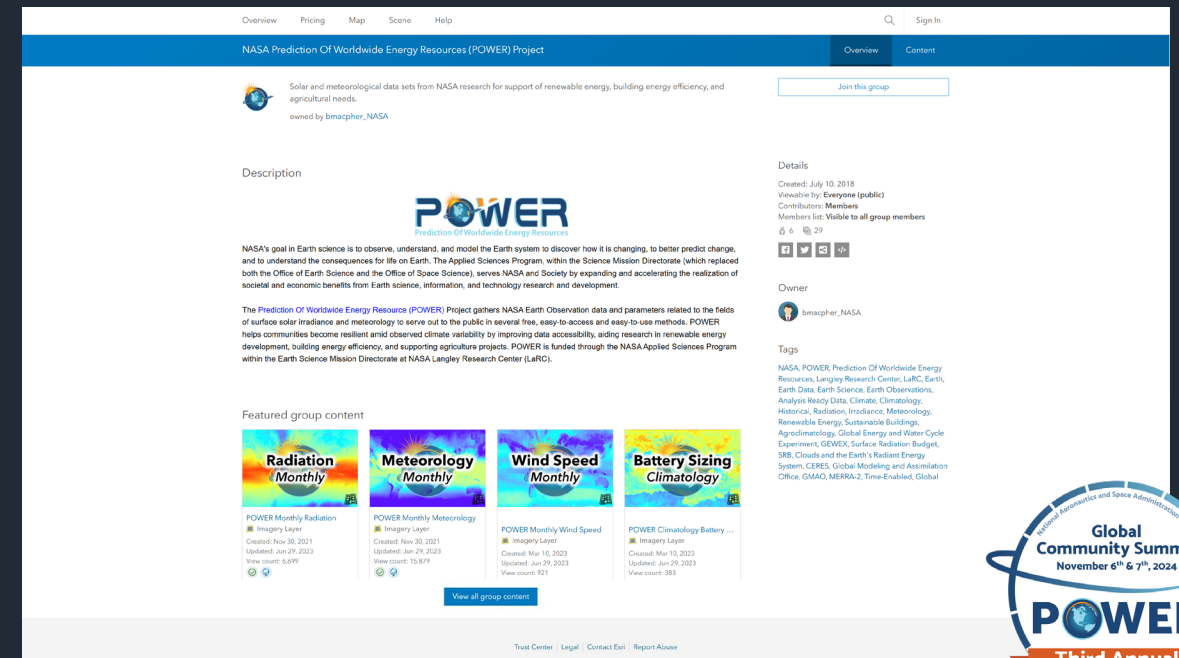
Continually updating the API endpoints with improvements and enhancements from the community.



The screenshot shows the 'POWER Daily API' documentation page. At the top, there's a navigation bar with 'Select a definition' and a dropdown menu set to 'Daily'. Below this, the title 'POWER Daily API' is followed by version 'v2.8.1' and a 'GAS' badge. The URL 'https://power.larc.nasa.gov/api/temporal/daily/openapi.json' is provided. A brief description states: 'The API allows daily data requests of POWER Analysis Ready Data (ARD)'. The page is organized into sections: 'Data Requests' and 'Configuration Settings', each with a dropdown arrow. Under 'Data Requests', there are two entries: 'GET /api/temporal/daily/point Single Point Data Request' and 'GET /api/temporal/daily/regional Regional Data Request'. Under 'Configuration Settings', there is one entry: 'GET /api/temporal/daily/configuration Configuration Settings Request'. At the bottom, there is a 'Schemas' section with a right-pointing arrow. A footer link for 'NASA Privacy Statement, Disclaimer, and Accessibility' is visible.

## ArcGIS Image Services

Migrated from on-premise to cloud-hosting provided by the NASA's EGIS Team supported by ESDIS.



The screenshot displays the ArcGIS Image Services page for the 'NASA Prediction Of Worldwide Energy Resources (POWER) Project'. The top navigation bar includes 'Overview', 'Pricing', 'Map', 'Scene', and 'Help'. A search bar and 'Sign In' link are on the right. The main content area features a description of the project, which aims to provide solar and meteorological data for renewable energy research. It includes a 'Join this group' button. The 'Details' section on the right lists the creation date (July 10, 2018), visibility (Everyone public), and contributors (Members). The 'Owner' is identified as 'bmagher, NASA'. The 'Tags' section lists various energy and climate-related terms. The 'Featured group content' section at the bottom showcases four featured items: 'Radiation Monthly', 'Meteorology Monthly', 'Wind Speed Monthly', and 'Battery Sizing Climatology', each with a thumbnail image and metadata. A 'View all group content' button is located below these items. The footer contains links for 'Trust Center', 'Legal', 'Contact Us', and 'Report Abuse'. A circular badge in the bottom right corner promotes the 'Global Community Summit' on November 6th & 7th, 2024, with the 'POWER' logo and 'Third Annual' text.

# Data Access Viewer (DAV): Overview

POWER Community for providing feedback for the DAV. The Migration was complete, and the classic DAV was decommissioned.

Community provided over 75 feedback items to improve the DAV usability and overall capabilities.

**Fully Available**  
**2024/06/05**

## Enhancements

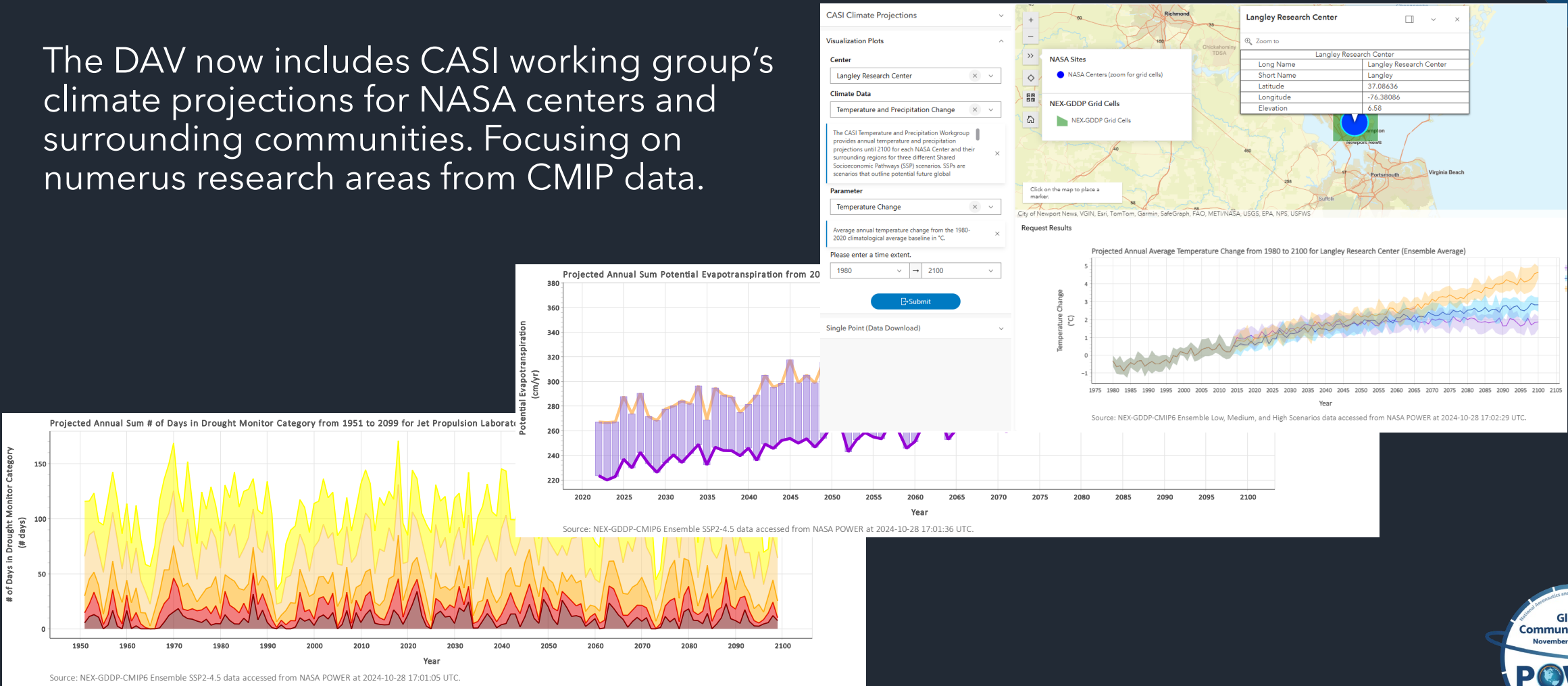
- **Updated Layout** – Supports efficient navigation of the application's tools and input forms.
- **Integrated Tools** – Enables in-application analysis and review of reports, plotting, and data download.
- **Graphing Capabilities** – Supports additional point analysis tools to support data-driven decision making.
- **Visualization Capabilities** – Supports viewing continuous data on a map with comparison tools.





# Data Access Viewer (DAV): CASI WG Climate data Integration

The DAV now includes CASI working group's climate projections for NASA centers and surrounding communities. Focusing on numerous research areas from CMIP data.

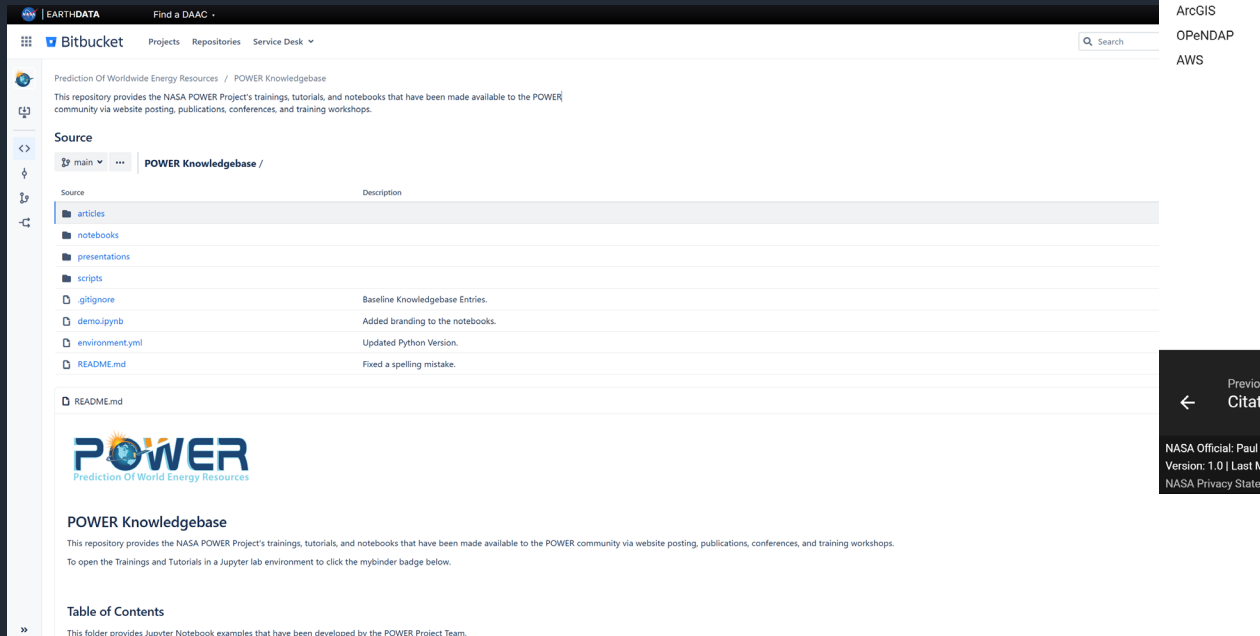






# Knowledge Base: Docs & Jupiter Notebooks

The project provides example code recipes to interact with the POWER Data directly and through the Services Suite in Docs and Notebooks.



The screenshot shows the Bitbucket repository page for the POWER Knowledgebase. The repository is named "Prediction Of Worldwide Energy Resources / POWER Knowledgebase". The page includes a sidebar with a file explorer showing folders like "articles", "notebooks", "presentations", and "scripts". The main content area displays a table of files with their descriptions. Below the table, there is a section for the "POWER Knowledgebase" with a description of the repository and a "Table of Contents" link.

| Source          | Description                      |
|-----------------|----------------------------------|
| articles        |                                  |
| notebooks       |                                  |
| presentations   |                                  |
| scripts         |                                  |
| gltignore       | Baseline Knowledgebase Entries.  |
| demo.ipynb      | Added branding to the notebooks. |
| environment.yml | Updated Python Version.          |
| README.md       | Fixed a spelling mistake.        |

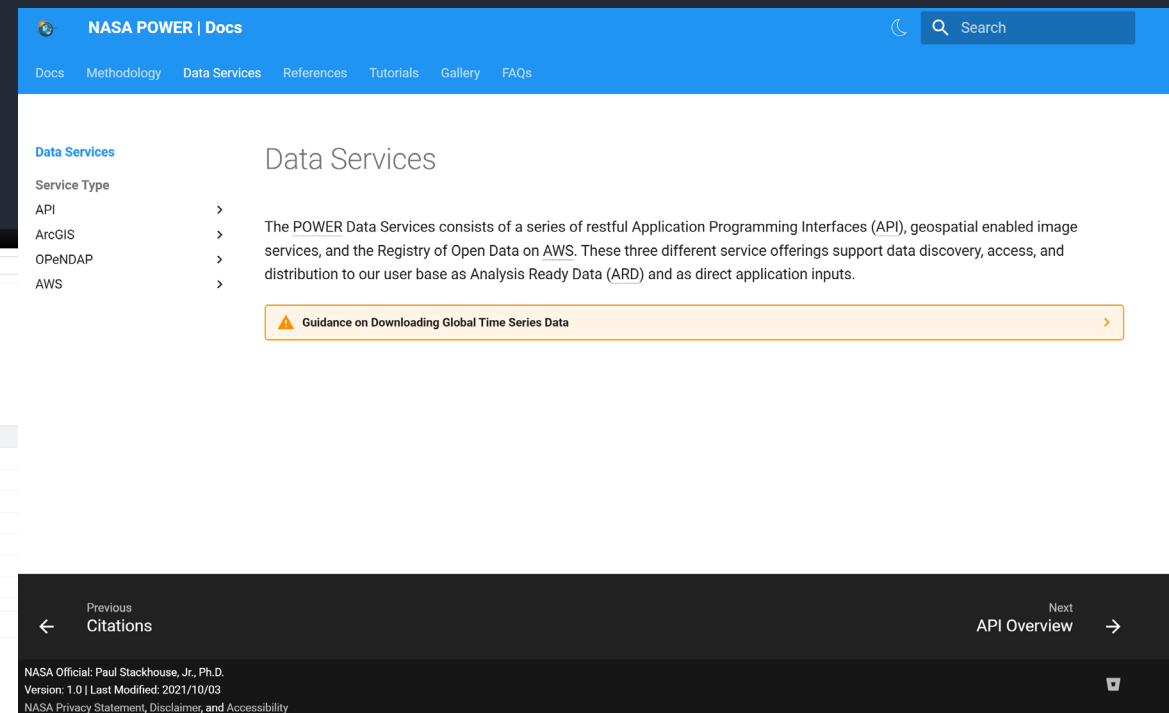
**POWER Knowledgebase**

This repository provides the NASA POWER Project's trainings, tutorials, and notebooks that have been made available to the POWER community via website posting, publications, conferences, and training workshops.

To open the Trainings and Tutorials in a Jupiter lab environment to click the mybinder badge below.

**Table of Contents**

This folder provides Jupiter Notebook examples that have been developed by the POWER Project Team.



The screenshot shows the NASA POWER | Docs page. The page has a blue header with the NASA POWER logo and a search bar. The main content area is titled "Data Services" and includes a list of service types: API, ArcGIS, OPeNDAP, and AWS. A callout box provides "Guidance on Downloading Global Time Series Data". The footer contains navigation links for "Previous Citations" and "Next API Overview", along with version information and a privacy statement link.

## NASA POWER | Docs

Docs Methodology Data Services References Tutorials Gallery FAQs

### Data Services

**Service Type**

- API
- ArcGIS
- OPeNDAP
- AWS

The POWER Data Services consists of a series of restful Application Programming Interfaces (API), geospatial enabled image services, and the Registry of Open Data on AWS. These three different service offerings support data discovery, access, and distribution to our user base as Analysis Ready Data (ARD) and as direct application inputs.

**Guidance on Downloading Global Time Series Data**

Previous Citations Next API Overview

NASA Official: Paul Stockhouse, Jr., Ph.D.  
Version: 1.0 | Last Modified: 2021/10/03  
NASA Privacy Statement, Disclaimer, and Accessibility



# Future Applications: PaRameter Uncertainty ViEwer (PRUVE)

PRUVE provides data validation capabilities utilizing statistical analysis and visualizations for solar radiation and meteorological data parameters compared to in situ surface observations and across data sources.

Conducted a stakeholder feedback process to assess usability and overall capabilities of the PRUVE.

**Beta Available**  
**2023/12/13**

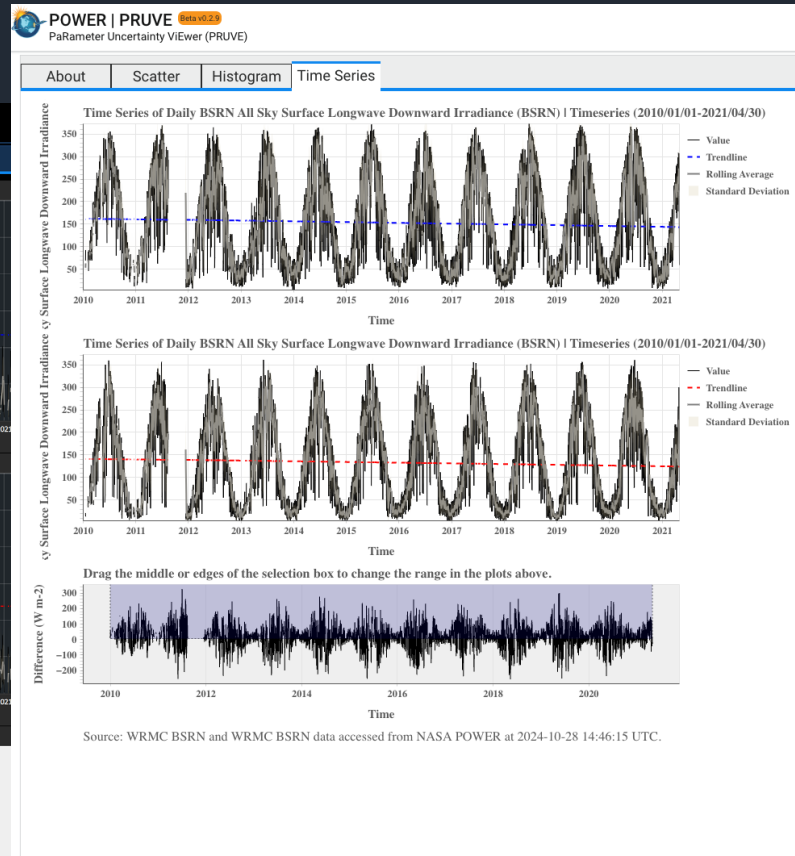
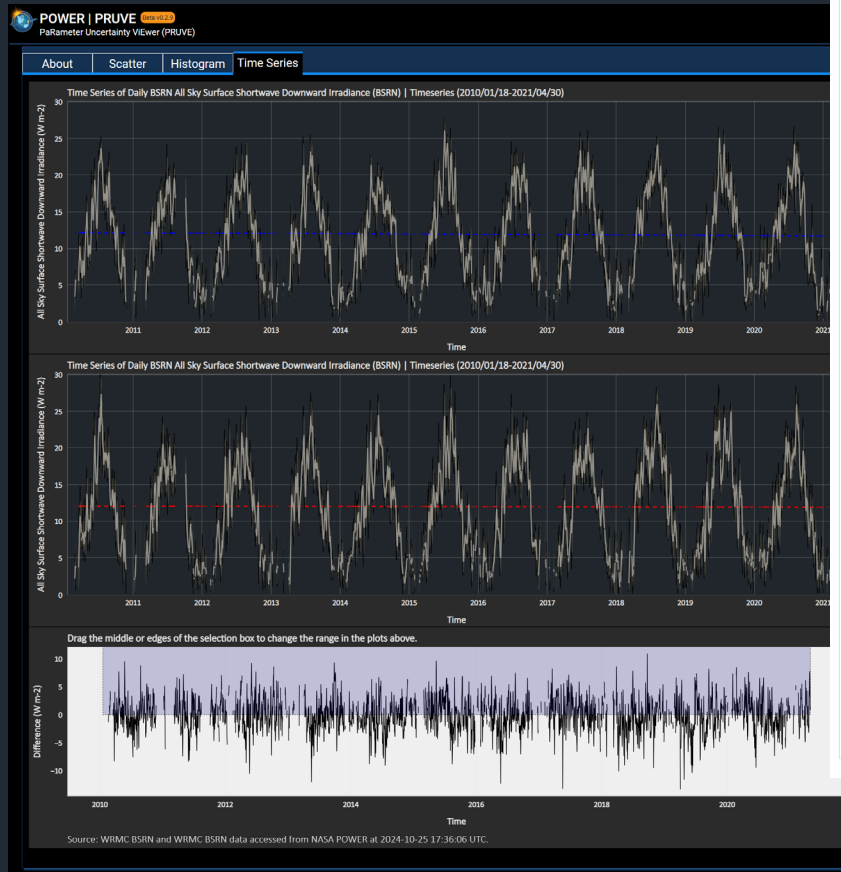
## Capabilities

- **Statistical Analysis and Visualization** – Lowers complexity and technical burden of conducting data uncertainty analysis.
- **Descriptive Statistics** – Provides descriptive statistics summary and a time series plot for a selected variable showing at a point location.
- **Comparative Analysis** – Conducts comparisons on two sources providing scatter and histogram plots with component statistics for a selected variable showing at a point location.





# Future Applications: PaRameter Uncertainty ViEwer (PRUVE)



**POWER | PRUVE** Beta v0.2.0  
PaRameter Uncertainty ViEwer (PRUVE)

Home | Descriptive Statistics | **Comparative Analysis** | Advanced Plots | ? | FAQ | Settings | Feedback | Tutorial

Find address or place

Click on the map to select the closest available surface site.

Esri, TomTom, Garmin, FAO, NOAA, USGS, EPA, USFWS

Powered by Esri

Point | Info | Statistics

Temporal Level: Daily

Start Time: 1/1/2010 End Time: 12/31/2022

Source One: Baseline Surface Radiation Network (BSRN)

Parameters Source One: All Sky Surface Longwave Downward Irradiance (ALLSKY\_SFC\_LW\_DWN)

Source One Latitude: 46 Source One Longitude: 5

Source Two: Baseline Surface Radiation Network (BSRN)

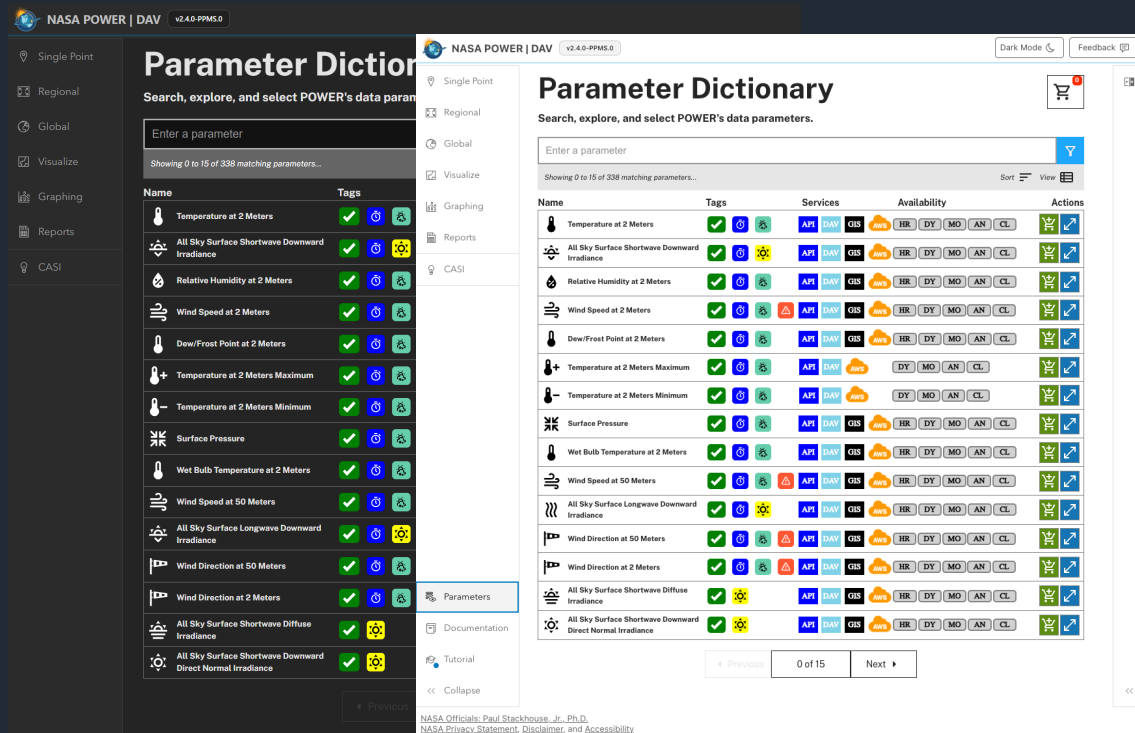
Parameters Source Two: All Sky Surface Longwave Downward Irradiance (ALLSKY\_SFC\_LW\_DWN)

Source Two Latitude: 51 Source Two Longitude: 14

Submit

# Parameter Dictionary

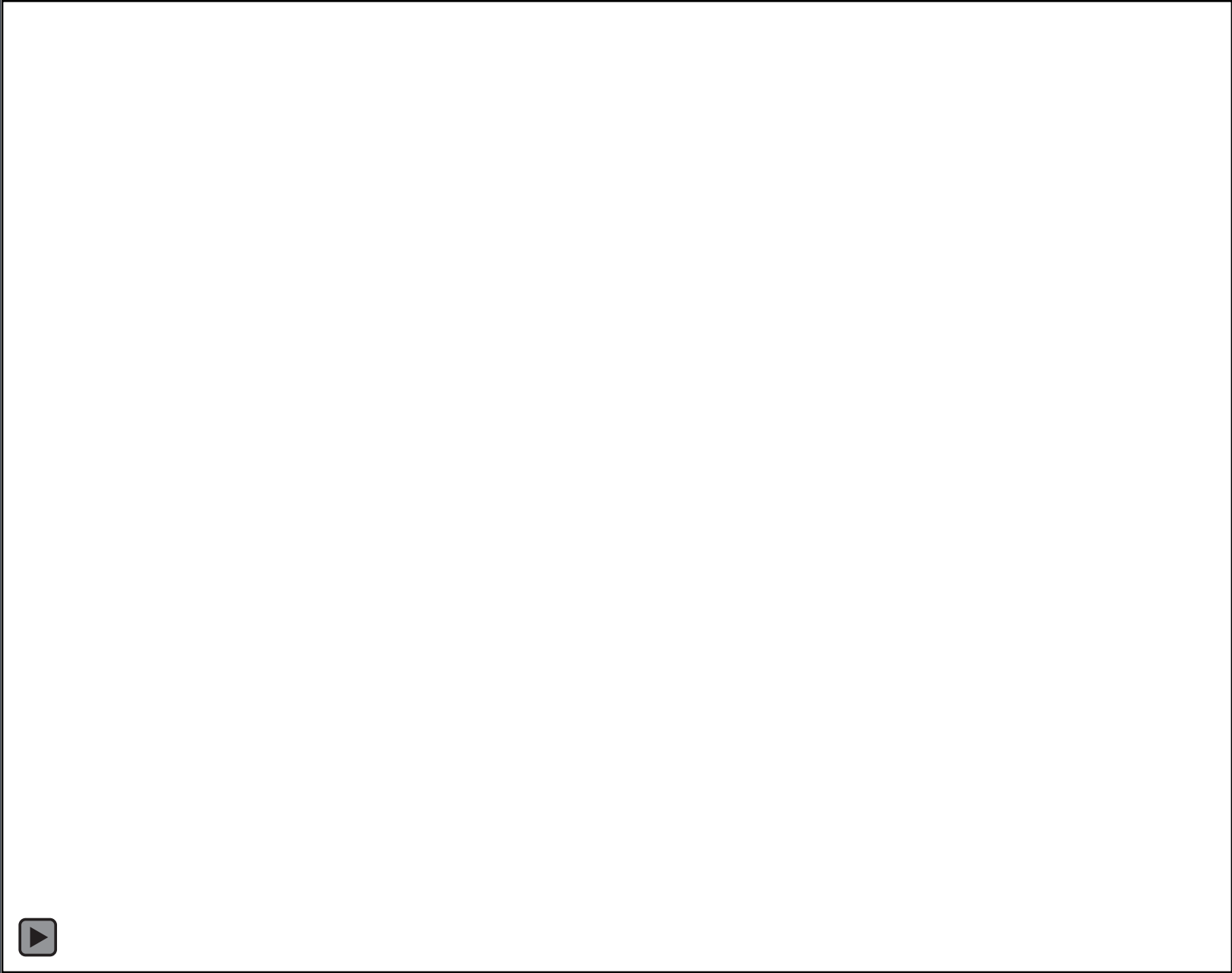
As an outcome of the 2023 GloCo feedback session, we prioritized the development of a parameter search framework to highlight the available data parameters.



## Capabilities

- **Efficient Search** – Enable efficient listing for available data parameters based on filter criteria.
- **Complete Metadata** – Provide detailed information of data parameters including units, provider, and definitions.
- **Centralized Parameters** – All data parameters from datastores, API only, or custom sets show in one tool.
- **Cart Catalog** – Allows for the parameters metadata to be downloaded and opened in applications.





Thank you!

