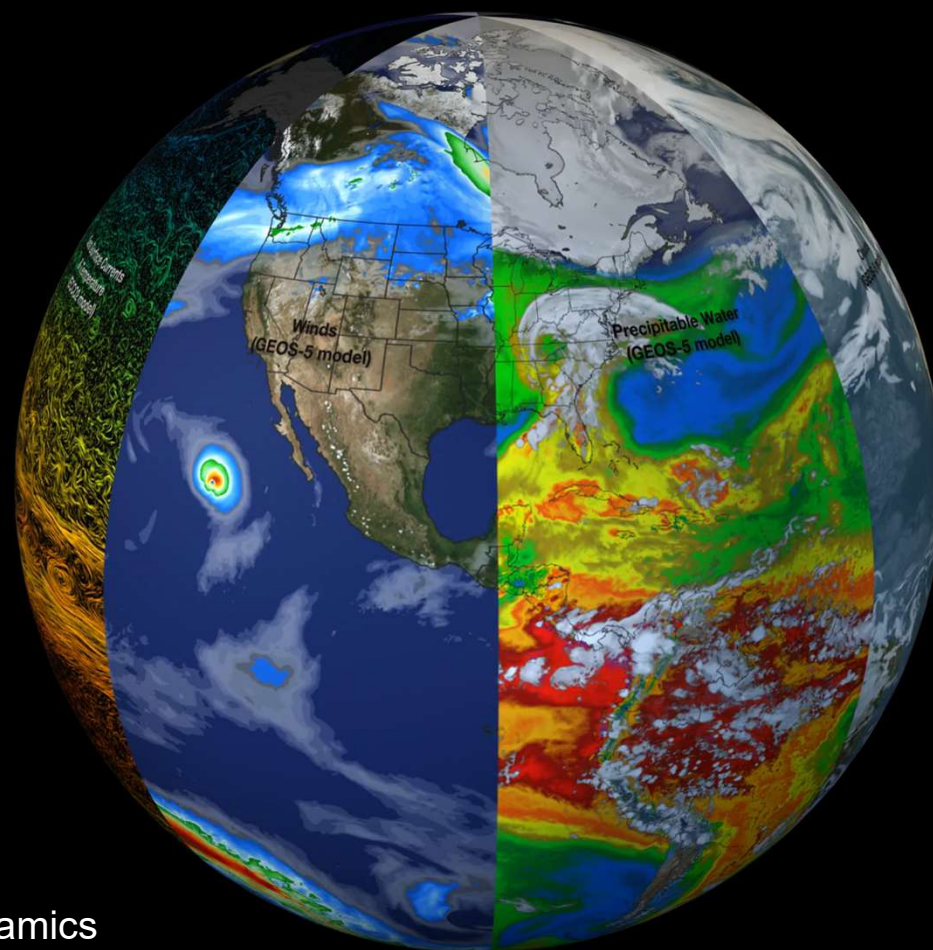


NASA Earth System Science

NASA Earth System Science



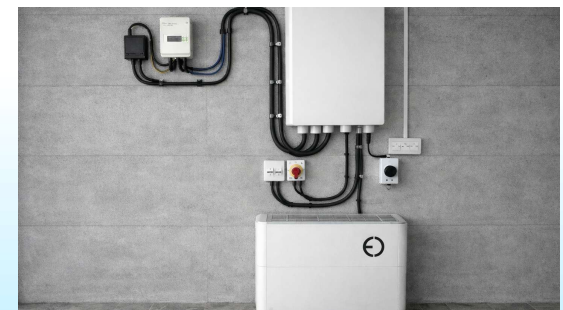
Atmospheric Composition
Carbon Cycle and Ecosystems
Climate Variability and Change
Earth Surface and Interior
Water and Energy Cycle
Weather and Atmospheric Dynamics

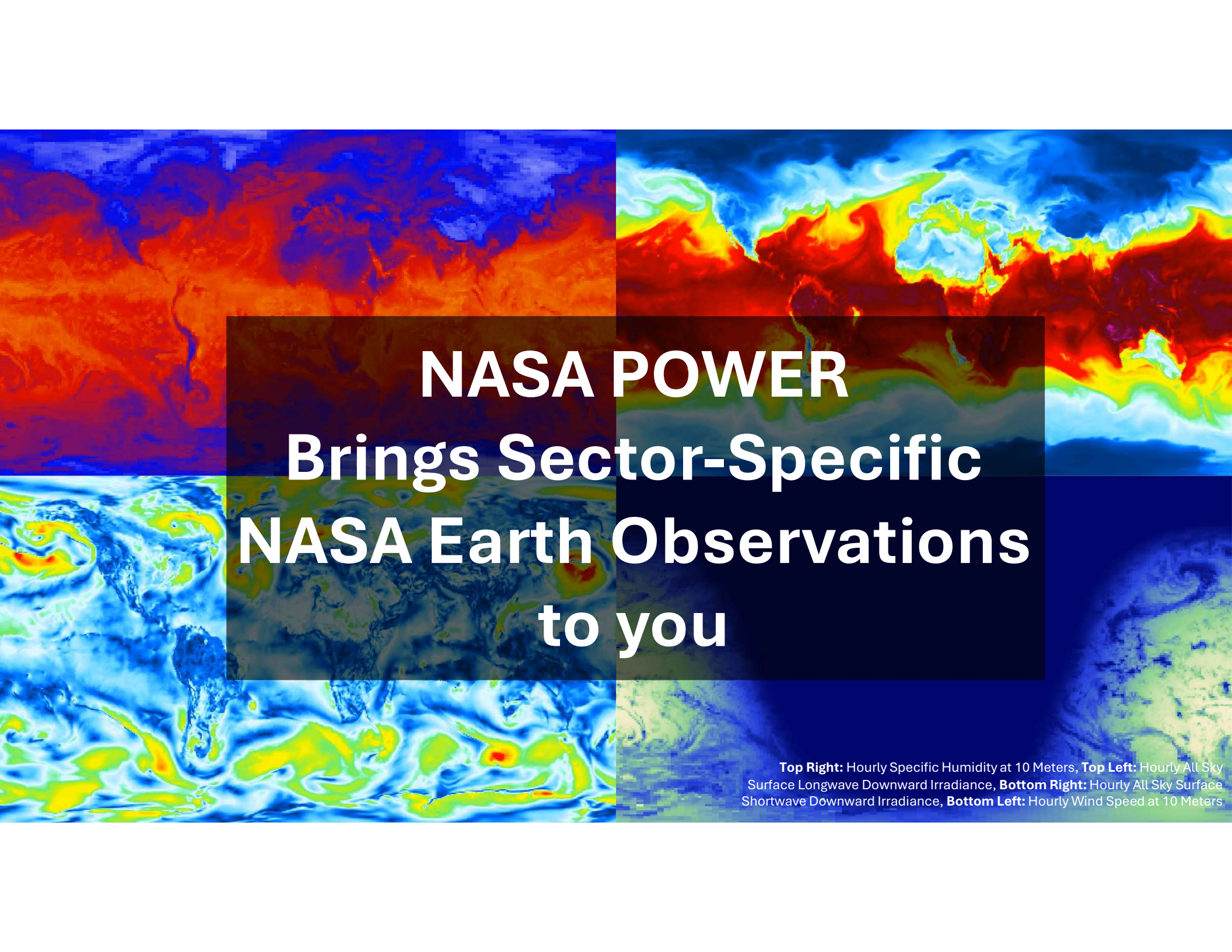
NASA Scientific Visualization Studio
svs.gsfc.nasa.gov/30701





Safer, stronger, and more prosperous





NASA POWER Brings Sector-Specific NASA Earth Observations to you

Top Right: Hourly Specific Humidity at 10 Meters, **Top Left:** Hourly All Sky Surface Longwave Downward Irradiance, **Bottom Right:** Hourly All Sky Surface Shortwave Downward Irradiance, **Bottom Left:** Hourly Wind Speed at 10 Meters



National Aeronautics and
Space Administration

POWER Project

Prediction Of Worldwide Energy Resources

Principal Investigators: Dr. Paul W. Stackhouse, Jr. &
Dr. Falguni Patadia (NASA Langley Research Center)

Team Members: Nikhil Aluru, A. Jason Barnett, Christopher
Higham, Bradley Macpherson, Amanda Merritt, Brianna Sanders, Haley
Jolly, Zack Borges-Rowe (Booz Allen); Robyn Boeke, Bradley Hegyi,
Neha Khadka, Colleen Mikovitz, & Taiping Zhang (Analytical Mechanics
Associates)



Trade names and trademarks are used in this presentation for identification only. Their usage does not constitute an official endorsement, either expressed or implied, by the National Aeronautics and Space Administration.



NASA Earth Action

Empowering communities across the world to find solutions to the challenges they face every day. Drawing on **more than 50 years of experience observing the Earth**, NASA Earth Action provides technical support, funding, training, and workforce development to expand the application of Earth observations.



Agriculture



Ecological
Conservation



Health and
Air Quality



Wildland
Fires



Disasters



Energy &
Infrastructure



Water
Resources

NASA Prediction of Worldwide Energy Resources (POWER) Project

NASA POWER improves the capability to integrate NASA Earth observations and model data specific to **surface solar irradiance and meteorological parameters** into decision processes related to energy, buildings, and agriculture.

- **No-cost**, no-account-needed.
- **Multi-decadal**, low-latency, high-accuracy, **community-specific** datasets offered in customizable units and formats.
- Hourly, daily, monthly, annual, and climatology time scales at a global coverage.

Energy Development



Assisting in
Energy System
Design

Building Systems & Infrastructure



Informing
Building
Energy System
Performance &
Resilience

Agroclimatology Applications



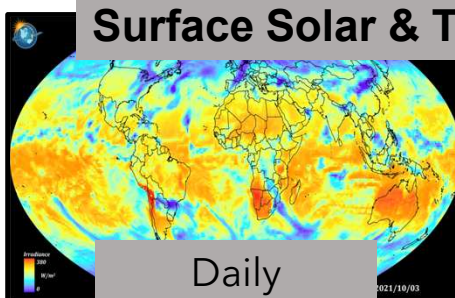
Enhancing Food
Security



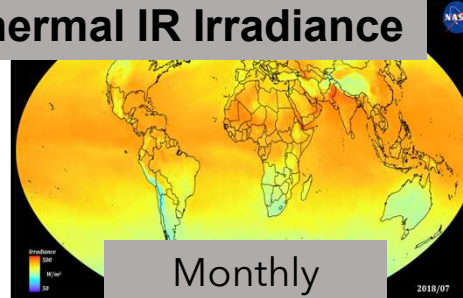
Global Solar & Meteorological Data Products



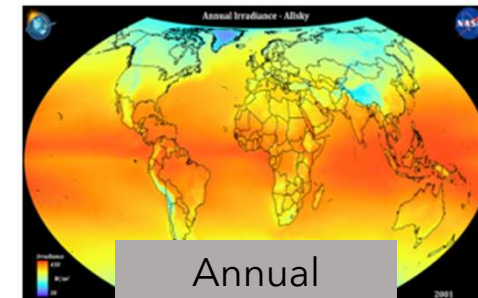
Hourly



Daily

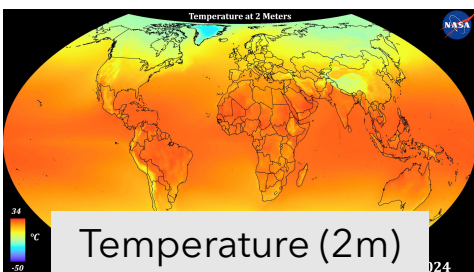


Monthly

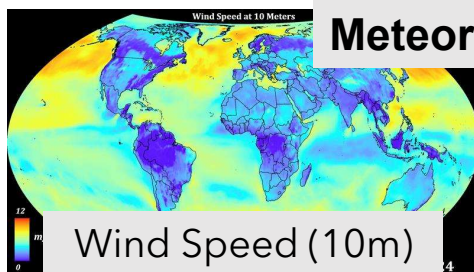


Annual

Surface Solar & Thermal IR Irradiance

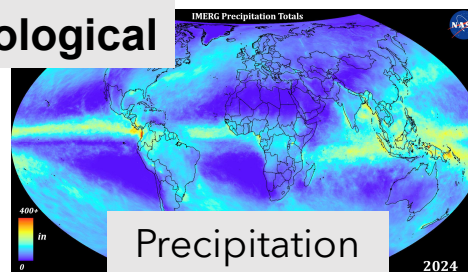


Temperature (2m)

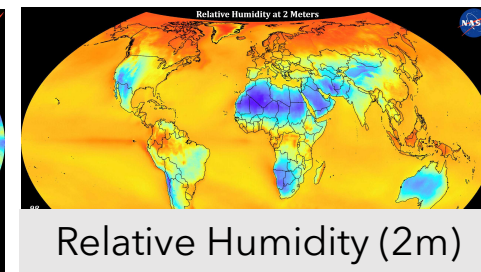


Wind Speed (10m)

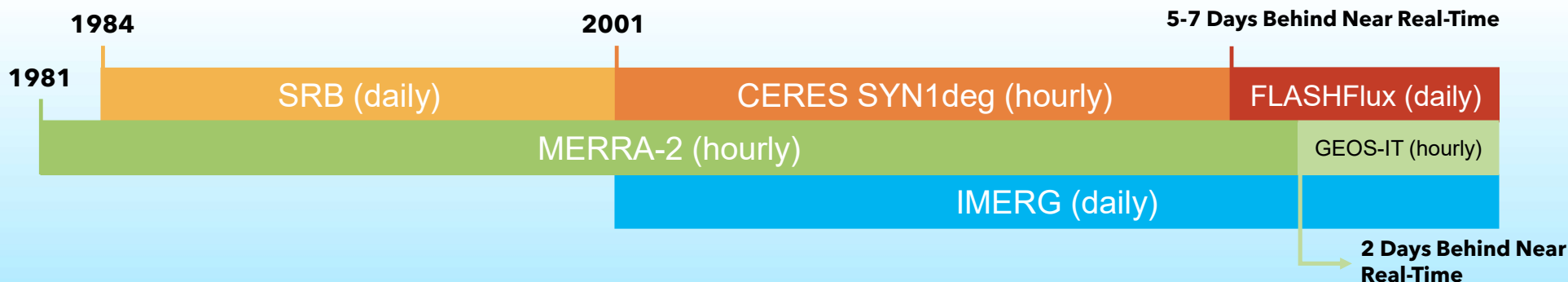
Meteorological



Precipitation



Relative Humidity (2m)





Data Requests

28

Years of POWER!

Since 2018 ...

900 Million Total Requests

2 Million Unique Users

170 Terabytes of Data Served

**Metrics cover 2018 to present and only include API.*

User Location

Request Arcs

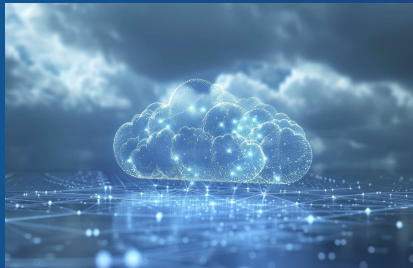
Data Location

Prediction Of Worldwide Energy Resources

2025/03/20 00:00:00

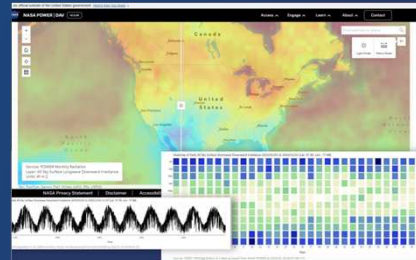


Enhancing Accessibility Through a Range of Tools & Applications



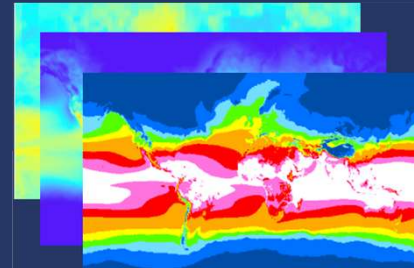
Application Programming Interface (API)

The API delivers analysis ready data for direct integration into decision support tools, modeling and forecasting packages, and as inputs to scientific research.



Data Access Viewer (DAV)

The DAV is a web-based data access application for visualizing, analyzing, subsetting, and downloading 300+ parameters in community-specific units and output formats.



Geospatial Services

POWER provides Esri ArcGIS Image and Feature Services to enable efficient interaction with POWER data in GIS applications. Available on Esri Living Atlas of the World and NASA ArcGIS Online.



Amazon Web Services (AWS)

Direct access to POWER's ~8.5TB of analysis ready data through AWS follows open standards, OpenAPI, and GeoJSON.



Multi-decadal, high-accuracy, community-specific datasets



Hourly, daily, monthly, annual, & climatology scales w/ global coverage



Numerous access options ranging from an API, user interface application, & geospatial services



Customized data products, units, & formats for specific user communities (improves usability & lowers adoption costs)

Data Access Viewer

Subsetting & Visualization



An official website of the United States government [Here's how you know](#)

NASA POWER | Data Access Viewer (DAV) v2.5.38

Access ^ Engage ^ Learn ^ About ^ [Contact](#)

- Single Point
- Regional
- Global
- Visualize
- Graphing
- Reports
- RASI

Validate

Parameters

Documentation

<< Collapse

Click on the map to place a marker.

Find address or place

Light Mode Metric Mode

Latitude: 40.51
Longitude: -102.24

Powered by [Esri](#)

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

[NASA Privacy Statement](#) | [Disclaimer](#) | [Accessibility](#) | [Updated: 03/11/2026](#) | [NASA Official: Paul Stackhouse](#) | [Contact: NASA POWER](#)



Data Access Viewer

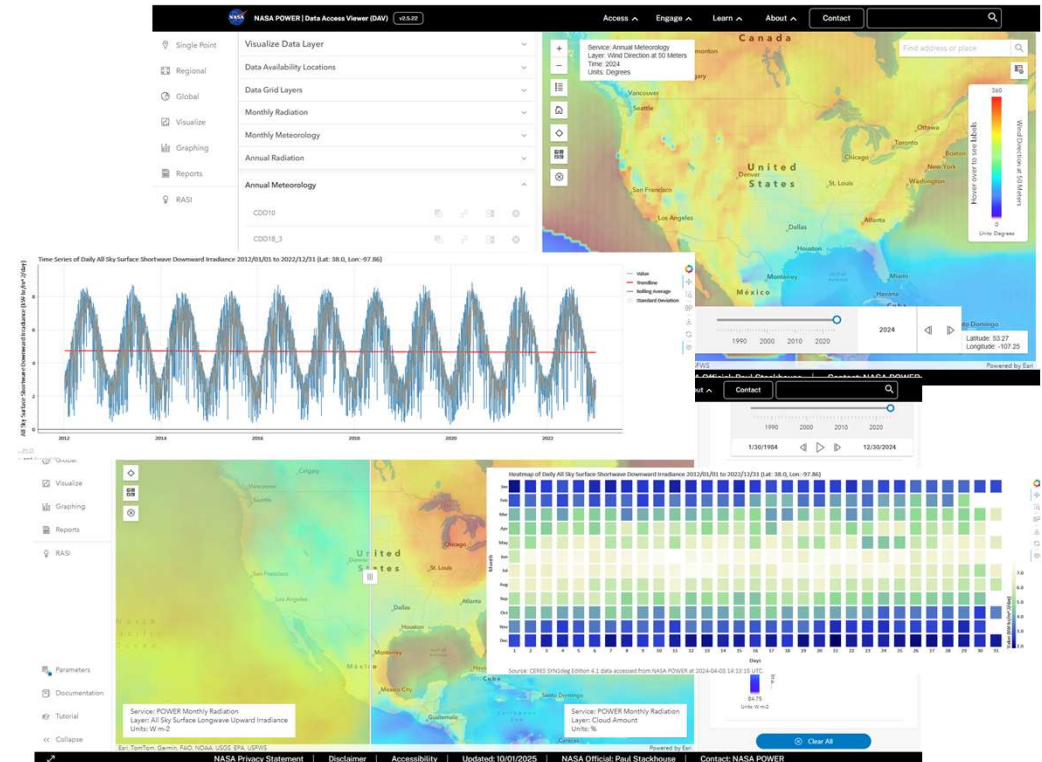
Data Subsetting & Visualization

Enhanced user interface that enables:

- Selection of parameters based on community standards and units.
- Ability to download parameters in general and community-specific formats.

Visualization and charting of key data parameters such as:

- Thermal zones
- Anomalies
- Monthly heatmaps
- Annual cycles



Scan the QR to
explore NASA
POWER data

Integrated reporting capabilities such as standardized climatic design conditions derived from ASHRAE equations



Software Ready Formats

All Sectors

CSV

Comma-Separated Values

ASCII

American Standard Code for
Information Interchange

NetCDF

Network Common Data Form

GeoJSON

Geographical JavaScript
Object Notation

Energy

Solar & Wind
Analysis

SAM

NREL System Advisor Model

Hydro
Analysis

DSS

Data Storage System

SWAT

Soil and Water Assessment Tool

Infrastructure

Building Energy
Analysis

EPW

EnergyPlus Weather Format

DDY

Design Day File

T/X/FMY

Typical/Extreme/Future
Meteorological Year

Hygrothermal
Analysis

WUFI

Wärme- und Feuchtetransport
instationär

Agriculture

Crop
Analysis

ICASA

International Consortium for
Agricultural Systems Applications

Available

Assessing



NASA POWER

User Applications Impact Stories



POWER's Impact

POWER highlights user impact stories that show how the data is used in many different types of applications. We regularly put new stories on the website.

Have a success story with POWER data?

Share your use case with us so we can highlight the breadth of real-world application of POWER data and impact to communities worldwide.

 NASA Prediction Of Worldwide Energy Resources

Access ^ Engage ^ Learn ^ About ^ Contact

Home / Engage / Impact Stories

User Impact Stories

NASA POWER data enables actionable decisions, accelerates learning, and improves outcomes in energy, infrastructure, and agriculture around the globe. Meet some of our users by reading their stories.

FILTERS

Topic ^ Data Tool ^ Data Source ^

Q Search

Copy Link

Clear All



6 MIN READ
Transforming Buildings and Budgets Through Data-Driven Solutions
NASA POWER awards four innovative users of POWER data through the RETScreen decision-support tool at the 2024 Global Community Summit.
SEPTEMBER 9, 2026



7 MIN READ
Smart Battery Optimization Creates Affordable Energy with POWER Data
NASA POWER data informs artificial intelligence software to help smart battery owners optimize usage and charging while saving on energy costs.
AUGUST 27, 2026



6 MIN READ
NASA POWER and RETScreen A Collaboration to Improve Energy Infrastructure Worldwide
NASA POWER's long-term collaboration with RETScreen provides users with data they need to build efficient, economical, and sustainable energy infrastructure.
JUNE 15, 2026



6 MIN READ
POWERing Education in Off-Grid Communities
Solar data helped a faith-based, non-profit supply energy to develop the tools needed to educate communities around the world.
MARCH 4, 2026



9 MIN READ
Resilient Energy Strategy in Times of "Dark Calm"
NASA POWER solar and wind data provide insight into demand, market pricing, and energy supply required to maintain power and keep U.S. citizens...
MARCH 4, 2026



7 MIN READ
POWER Data Fuels Resilient Farming and Richer Harvests
NASA POWER weather and solar data inform farmers in making vital decisions for their land resulting in more successful and nutrient-rich crop growth.
FEBRUARY 19, 2026



9 MIN READ
NASA POWER's Dependable Data Ensures Dependable Energy for U.S. Utility Company
Reliable solar and weather data provides accurate performance monitoring for 360 community solar garden locations, reducing stress on electric grids and...
SEPTEMBER 22, 2025



8 MIN READ
POWER Data Informs Global Wastewater Treatment
Solar and weather data leads the way for efficient and cost-effective wastewater treatment, keeping our waterways clean both in the United States and across the...
SEPTEMBER 22, 2025

Want to share your story? Email the POWER team at larc-power-project@mail.nasa.gov



User Impact **ACES**

POWER Data Points to Dependable Energy in Times of “Dark Calm”

- ACES analyzed 20 years of hourly data across 19 states to identify periods of no and low sun or wind for the Platte River Power Authority in northern Colorado.
- POWER data helped ACES advise on resilient energy solutions and market pricing during high demand, ensuring customers have dependable energy that keeps them safe and comfortable.

“We needed datasets with long historical records and wide geographical coverage to ensure the analysis appropriately captured this risk. ACES was able to get this data from NASA POWER.”

- *Platte River Power Authority senior resource planning manager*





User Impact Xcel Energy

Monitoring Community Solar Garden Performance

- Xcel Energy serves nearly four million electricity customers and more than two million natural gas customers across eight Southwest and Midwest states.
- Observes hourly solar, precipitation, wind, and temperature data through the POWER open data files on AWS to supplement bad reads from in-situ ground sensors.

“All of the wind turbines froze up, the solar panels were covered in snow....This type of data would help us understand and quantify those risks and plan accordingly for that.”

– Xcel Energy data scientist regarding Winter Storm Uri in 2021



Image Credit: Xcel Energy



User Impact

Delaware Department of Natural Resources (DNREC)

POWER Data Determines Optimal Solar Rooftop Locations

- A NASA DEVELOP team utilized POWER solar data to determine rooftop locations in Wilmington, Delaware that had optimal conditions for community solar panels.
- The locations determined would support the city's most energy burdened households.
- Wilmington is on track to become the first city in Delaware to pilot rooftop community solar and battery storage.

“The POWER data and the analysis the DEVELOP team produced are what got us to this point, it's the foundation everything else is being built on.”

-- DNREC energy planner





POWER's Global Impact

Infrastructure User Stories



Urban Planning **RWDI**

By leveraging POWER's data, RWDI helps decrease the carbon footprint of buildings and cities and increase efficiency while providing the most cost-effective solutions.



Predictive Modeling **GAF**

GAF, North America's largest roofing manufacturer, uses POWER data in roof assessments and predictive modeling to increase longevity and resilience.



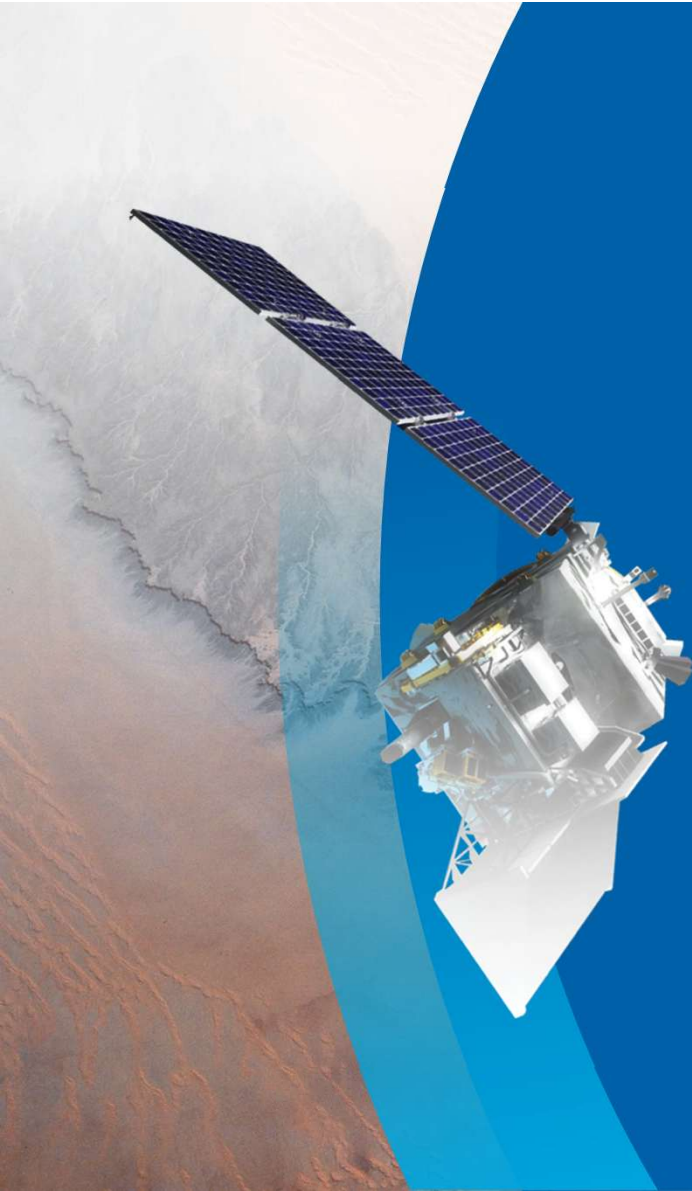
Building Simulation **Gamma Technologies**

Gamma Technologies pulls POWER data into its simulation software to help engineers analyze ambient conditions when developing machinery, energy systems, and industrial facilities.



Air Quality **HGA**

HGA, an architecture and engineering firm, uses POWER data to build HVAC systems for data centers, hospitals, and laboratories.



N A S A P O W E R

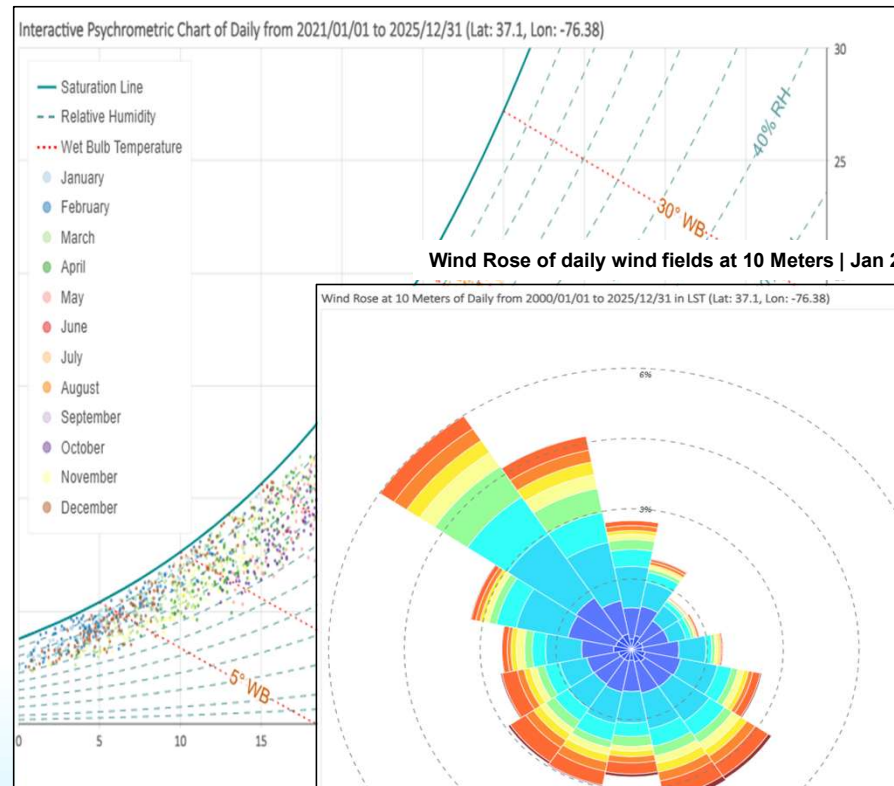
Driven By Users Meeting Needs



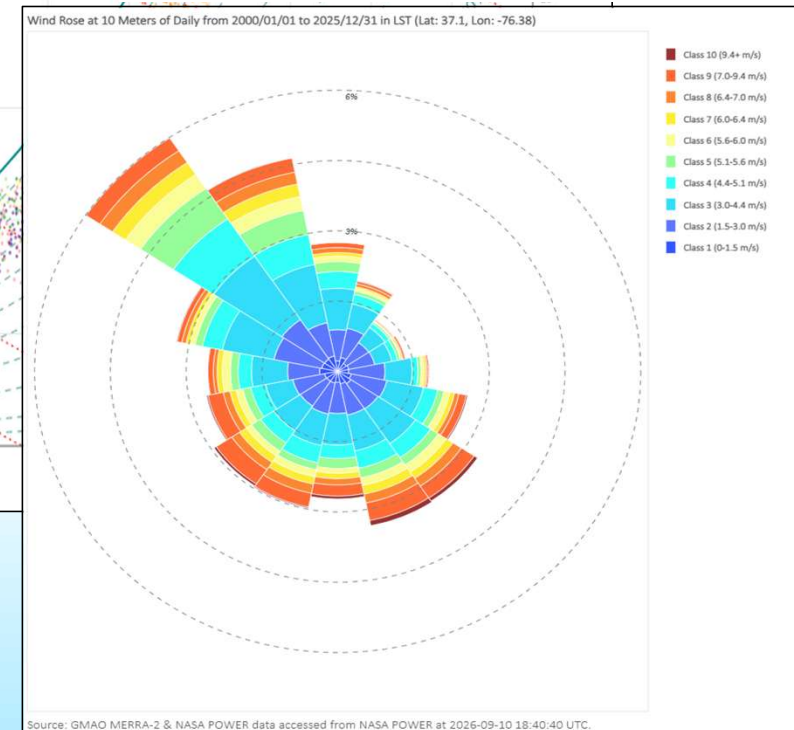
Expanding our Customized Charts

- **Released psychrometric report**, which interprets the relationship between temperature and humidity over time.
- **Released annual windrose plotting** to visualize wind speed and direction distribution throughout the year.

Interactive Psychrometric Chart of Daily Parameters | Jan 2021 – Dec 2025



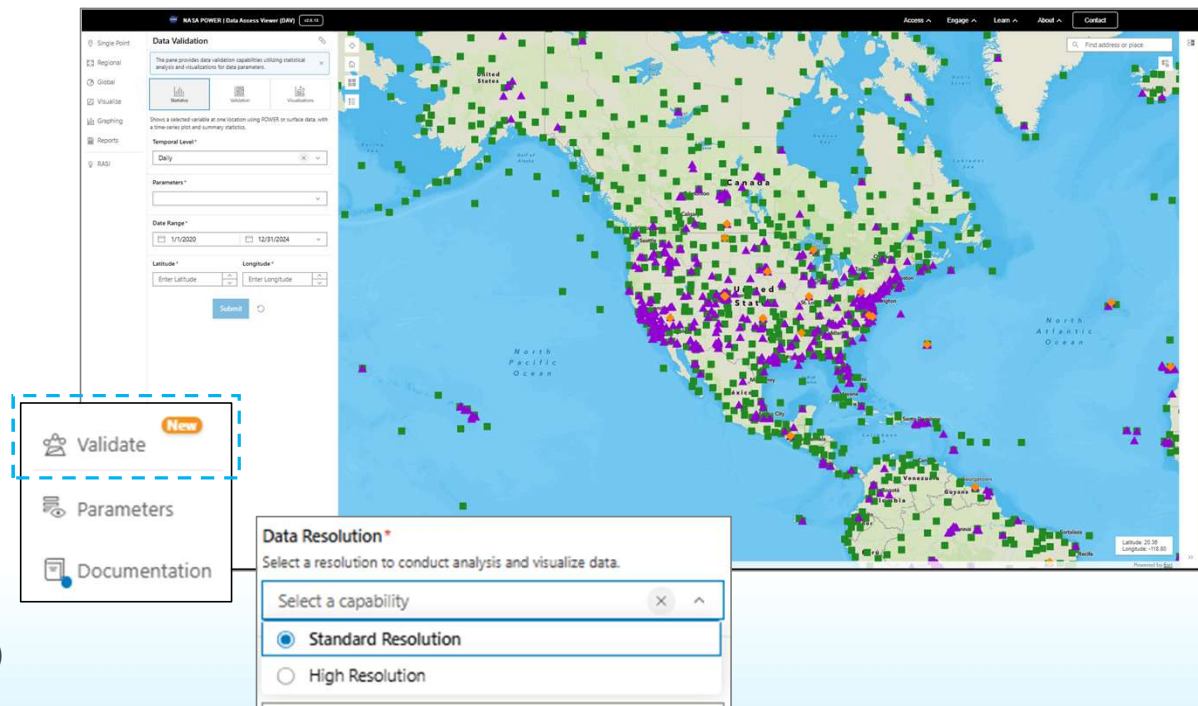
Wind Rose of daily wind fields at 10 Meters | Jan 2021 – Dec 2025



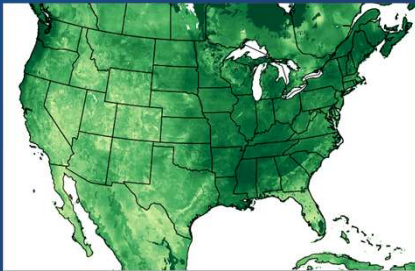


Embedded Validation Capabilities

- **POWER's validation capability** (formerly the PaParameter Uncertainty ViEwer, aka PRUVE) available in the Data Access Viewer.
 - Compares surface satellite-based and assimilation data products to in-situ surface site measurements.
 - Reprocessed and updated the surface measurements of meteorological, solar and AERONET aerosol amounts.
- Added a **high resolution and standard resolution toggle** within the Data Access Viewer. (in anticipation of future enhanced resolution in selected regions)



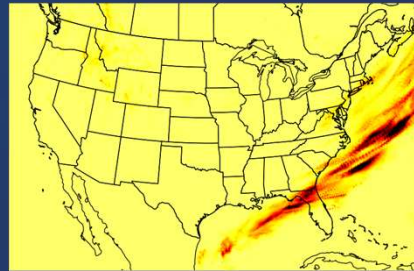
New & Updated Data Sources



New **SMAP**

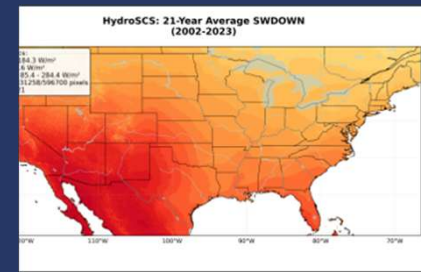
SMAP measures and maps Earth's soil moisture and freeze/thaw state.

SMAP is designed to measure soil moisture, every 2-3 days, allowing the observation of major storms to repeated, long-term changes.



Updated **IMERG**

IMERG estimates precipitation over the majority of the Earth's surface and is particularly valuable over areas that lack ground-based instruments, including oceans and remote areas.

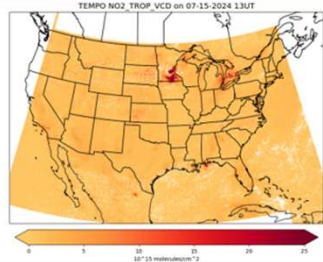


Updated **PRECIPITATION**

MERRA-2 and GEOS-IT precipitation data was updated to resolve inconsistencies with expected units and values at every temporal level.

Energy/Hydropower, Infrastructure & Agriculture

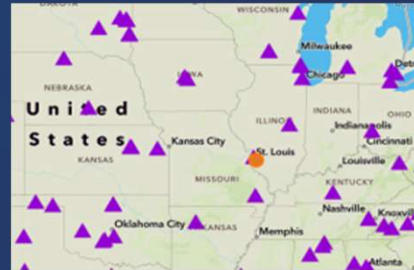
New & Updated Data Sources



New TEMPO

The TEMPO mission measures ozone, aerosols, and clouds over the Northern Hemisphere.

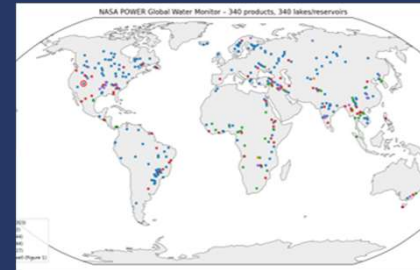
**Building Ventilation &
Operations**



New AERONET

To support validation, surface pollutant data from AERONET was integrated into the Data Access Viewer.

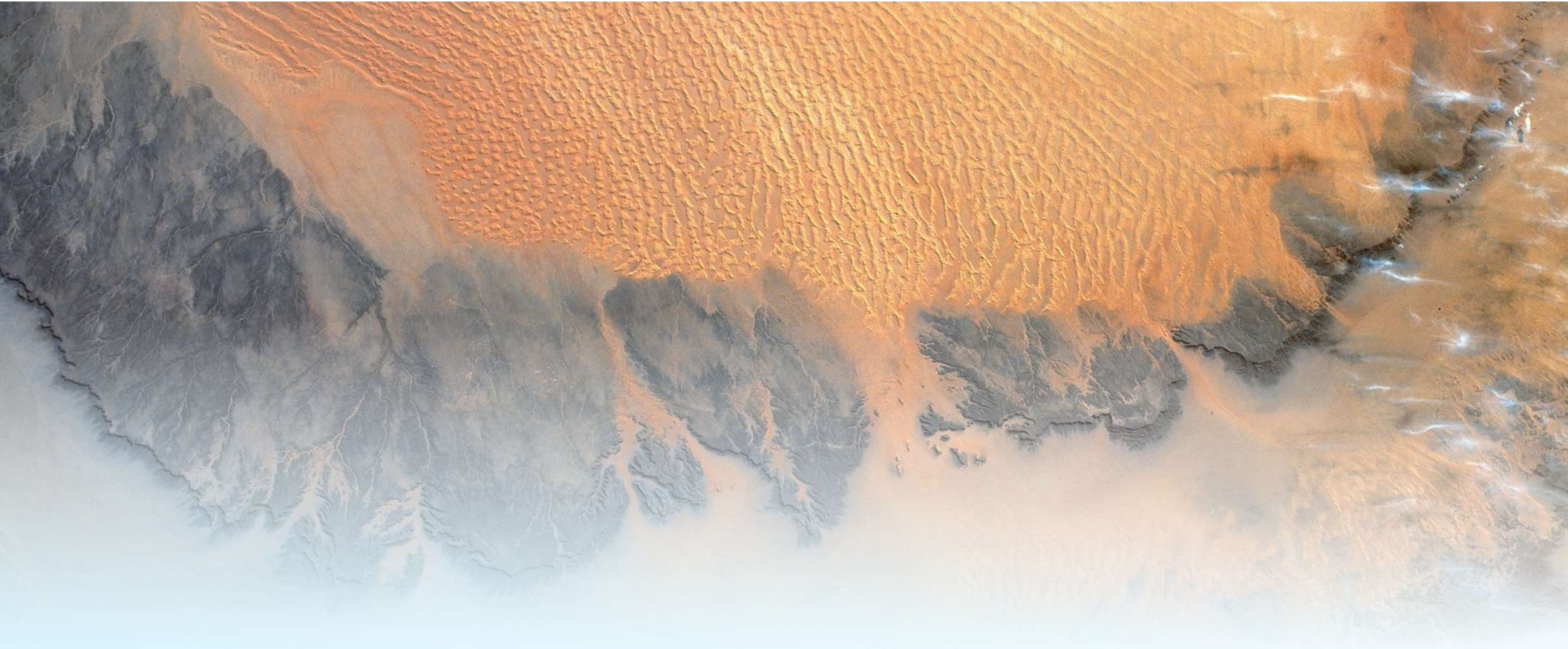
**Building Ventilation &
Operations**



Updated GWM

To support hydropower electric applications with reservoir heights, a subset of Global Water Measurements (GWM) from NASA Goddard has been implemented.

Hydropower



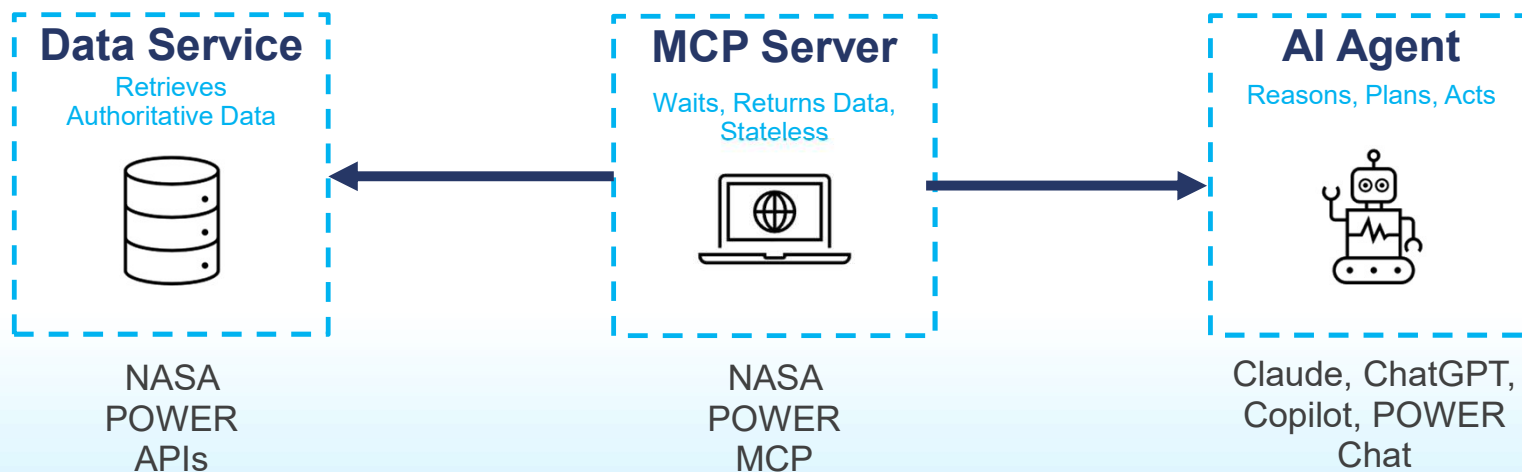
NASA POWER

Moving Forward **Capabilities To Come**



Model Context Protocol (MCP) Server Connecting Authoritative Data to Generative AI

- MCP is an open standard that helps AI agents work with data services (e.g., POWER APIs) and different models. An AI agent **thinks and decides** while a MCP **serves and responds**.
- An AI agent connected to the POWER MCP can access POWER's authoritative data and metadata. Generative outputs should still be verified.



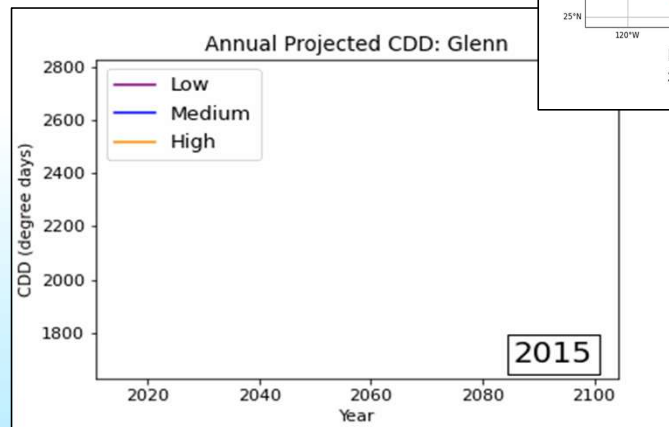
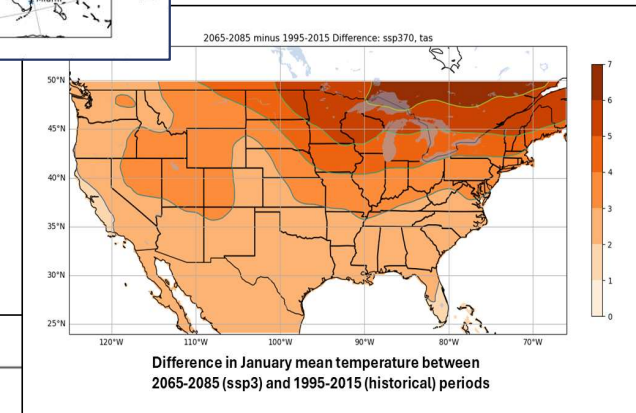
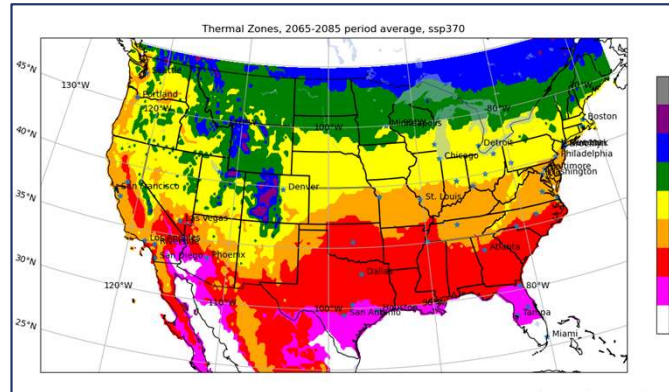
Visit <https://power.larc.nasa.gov/ai/mcp/> to get started!



Future Capabilities: Future Weather Forecasts Data & Services

Expansion & Long-Term Climate Scenario Data

- Expanding **NEX-GDDP CMIP6 future weather (1950 - 2100) coverage** from limited test locations to continuous coverage across CONUS, Alaska, and Hawaii.
- Users will gain access to **daily, long-range projection data** tailored for realistic modeling and scenarios.
- Users will be able to explore **curated individual models** (six) and ensemble averages across **three realistic emissions scenarios**, supporting robust scenario-based decisions.



Stay Connected!

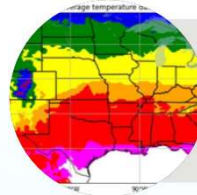
Reach out to the POWER team directly with questions or feedback via email at larc-power-project@mail.nasa.gov



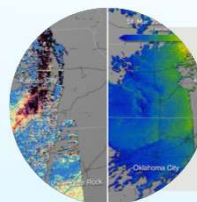
Scan the QR code to visit the POWER website



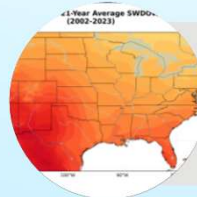
Higher resolution regional insights



Climate projections for energy and infrastructure across the continental U.S.



Air pollution data to support ventilation/filtration and energy mitigation efforts



Improved low latency and higher spatial products