

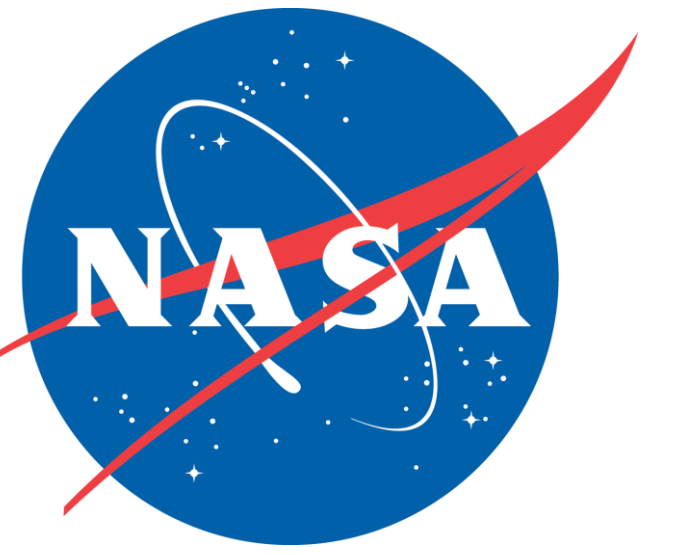
Transforming NASA Earth Observation Data with POWER

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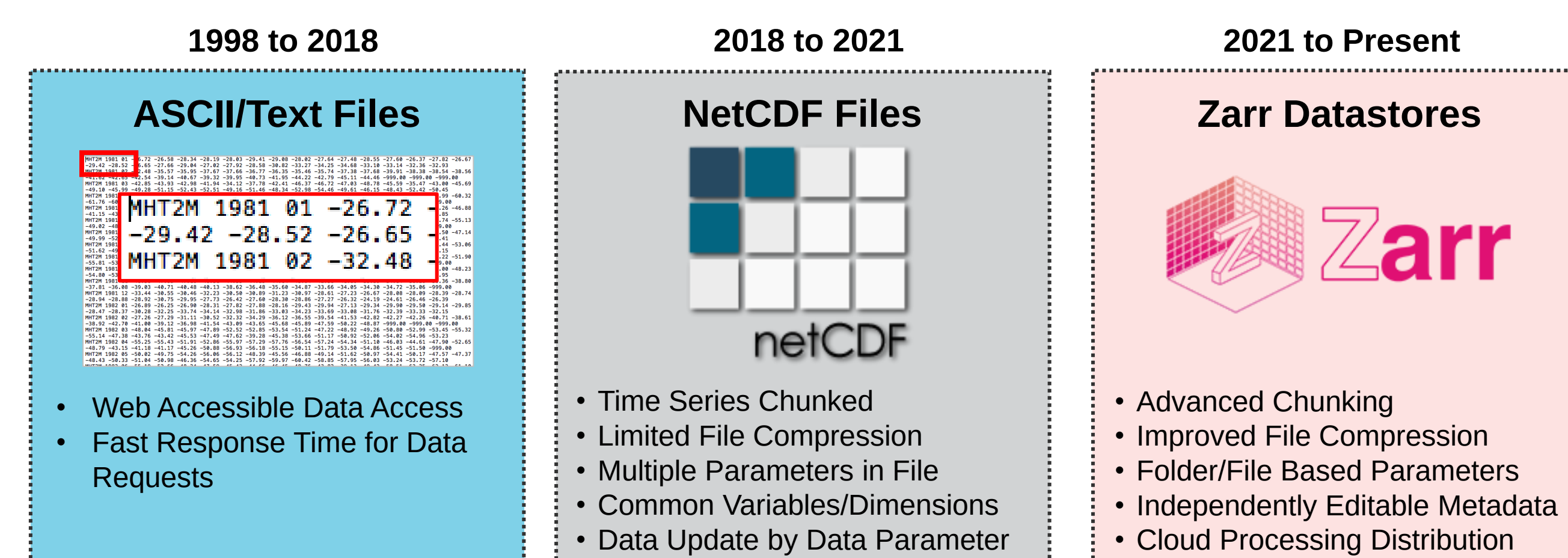
Mission

The **Prediction Of Worldwide Energy Resources (POWER)** Project's mission is to improve learning, decisions, and outcomes in the renewable energy, sustainable infrastructure, and agroclimatology user communities. **For any location in the world, the project provides easily accessible, customized, and trusted NASA solar and meteorological data for past, current, and future climates.** POWER improves the public and private capability for integrating these NASA Earth Observations (EO) and model data into their workflows by offering a diverse suite of tools and services to access this data. The project provides free access to its Analysis Ready Data (ARD) via POWER's Application Programming Interface (API), Data Access Viewer (DAV), Geographic Information System (GIS) services, and cloud-enabled data store.



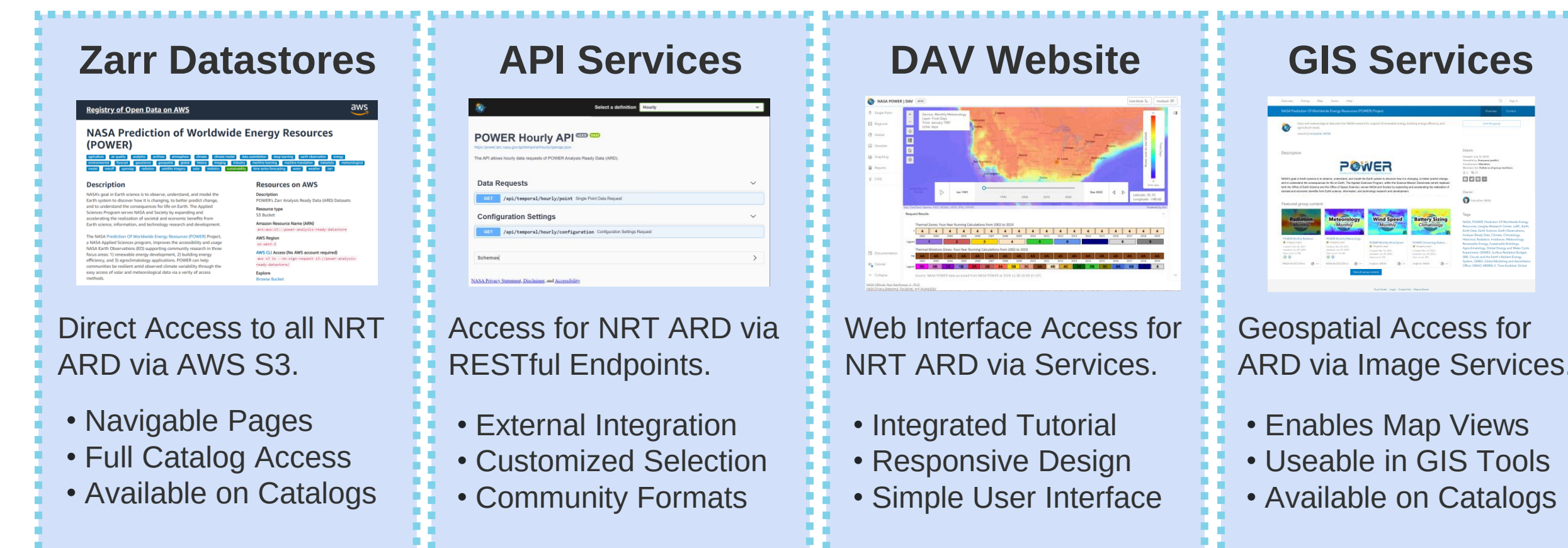
Transformation

The POWER Project assesses emerging data formats and standards to replace our production system periodically. **In each phase of the project's lifecycle, a consistent focus on optimization of data storage, processing, and distribution to enhance downstream services was a priority.** Throughout the project's lifecycle three main technology frameworks – each building off the previous framework – were utilized:



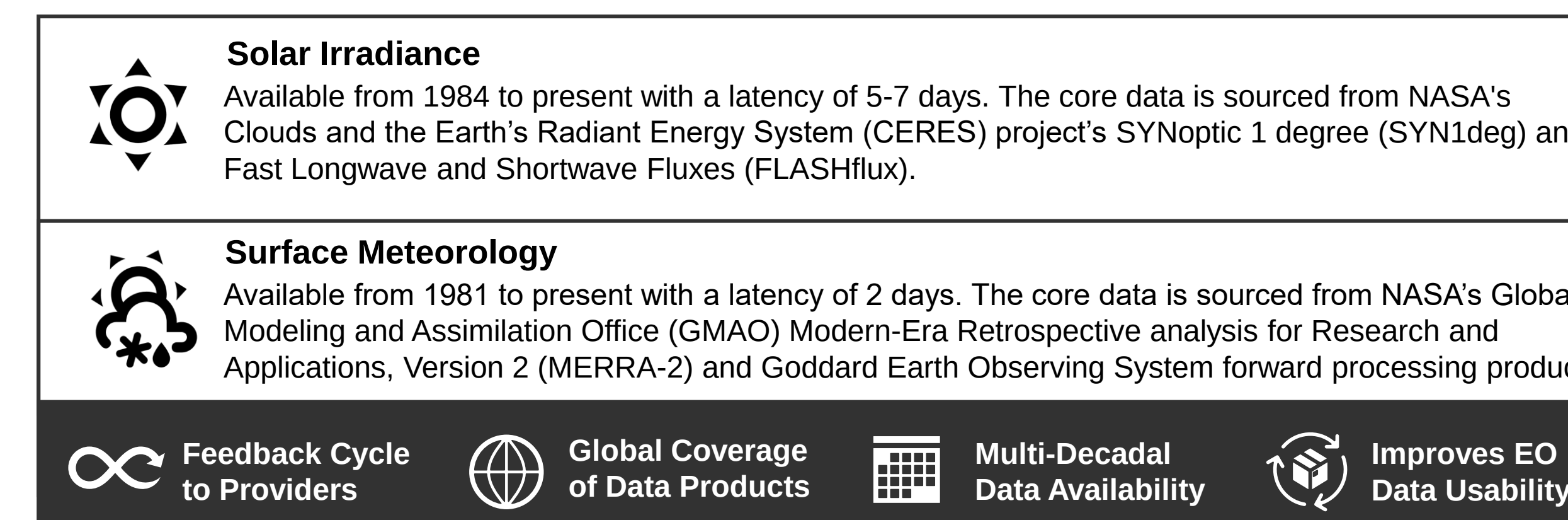
Services

The POWER Project's data services are key components in transforming NASA EO data products into actionable information. The services provide data and insights to be **utilized immediately as inputs to decision support tools, modeling and forecasting packages, and as inputs to scientific research.** This service enablement aligns with the broader NASA open science goals to improve accessibility and increase the ease of access. **The central focus is the common ARD Zarr Datastores back end that all services utilize.** The Zarr Datastores provides Near Real Time (NRT) data updates for the API, GIS, and DAV, further reducing barriers to access and use several terabytes of EO data through POWER's data services. **In short, POWER data services enable no-code access to community-specific data with subsetting capabilities for desktop and mobile use.**



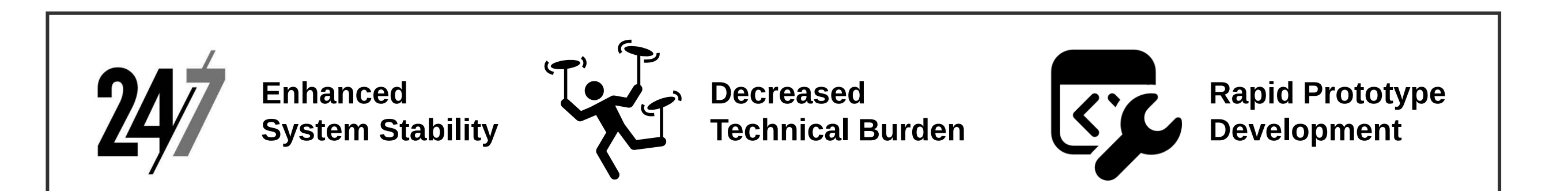
Providers

Official data products from NASA science teams constitutes the source EO and modeling datasets for POWER's Services. **We process and store the core solar irradiance and surface meteorology parameters from these official datasets.** We use the processed data products to derive the additional value-added parameters. The entire data catalogue is then made available through our services. **Throughout this process, POWER provides feedback and findings to the science teams, contributing to the improvement of EO data at NASA.**



Implementation

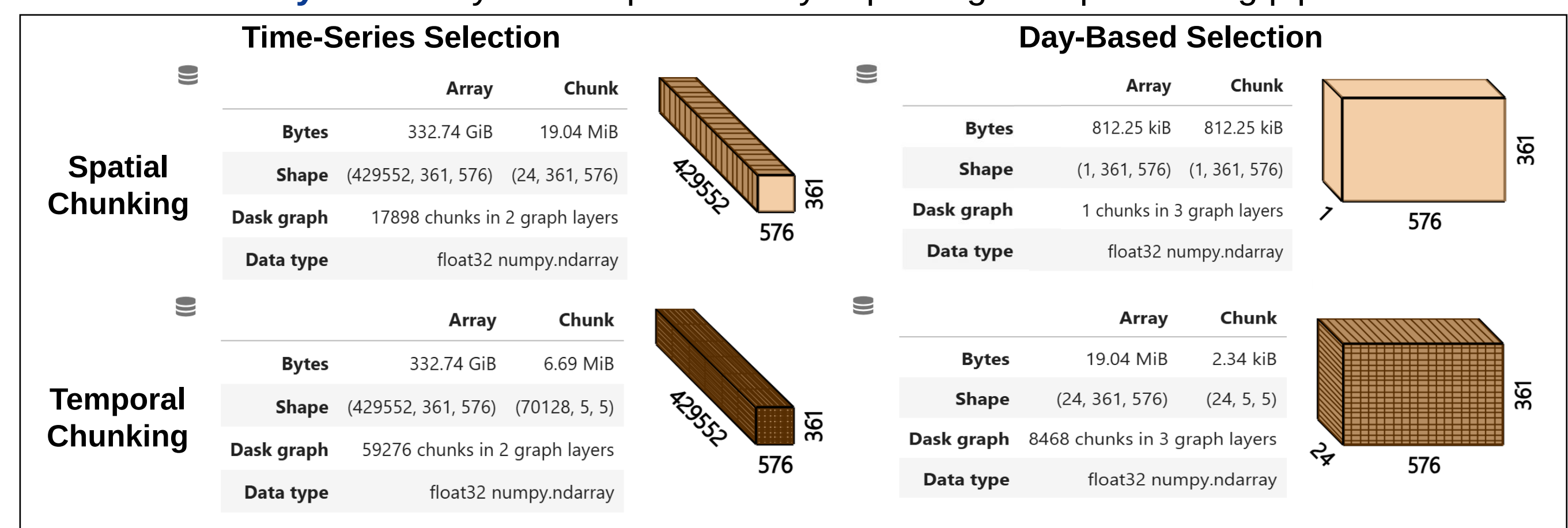
The POWER Project implemented a series of architecture technology enhancements that significantly improved capability and services to the public. **These improvements specially correspond to enhanced data transformation, particularly where a new data storage format was implemented.** The forthcoming data processing pipeline continues expanding the capabilities of the Zarr format while taking full advantage of the cloud-based architecture. **These changes will lower the technical burden of system maintenance and sustainment activities and enable serverless, concurrent processing to decrease the overall processing latency and system costs.**



Data Version 10 Release

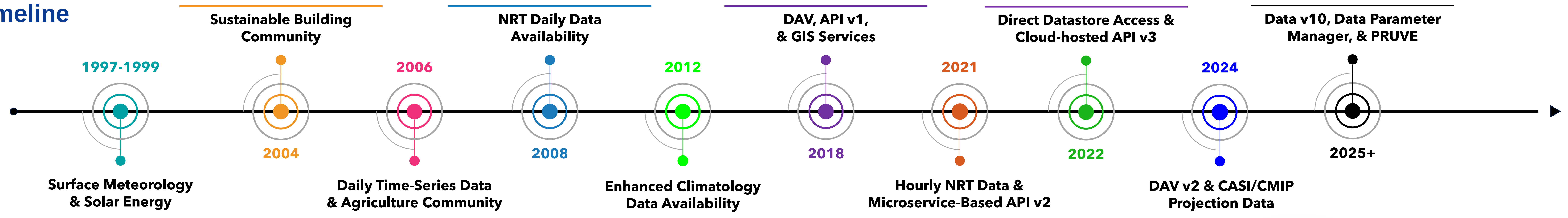
The POWER Project is happy to announce the **targeted public release of Data v10 is January 2025!** Along with updated data parameters, data v10 builds upon prior optimizations and enables **cloud-based processing to lower data latency** and includes new capabilities:

- **Spatially and Temporally Chunked** – Enables efficient loading for pre-processed data structures in cloud-based storage.
- **Fault-Tolerant Processing** – Enables workflows to facilitate graceful stop and start of processing, allowing for rapid fault recovery.
- **Data Lineage** – Enhanced data traceability to the source data product.
- **Data Store Structure** – Includes better storage units, data types, and metadata to support efficient direct access and enhanced usability for communities.
- **Low Latency** – Delivery of NRT products by improving data processing pipelines.



POWER Data v10 single-parameter quad-based chunking performance diagram.

Timeline



Scan the QR code to access NASA POWER data!
power.larc.nasa.gov | larc-power-project@mail.nasa.gov

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