

## **The NASA POWER Global Solar Insolation and Meteorological Parameter Web Services Through NASA/AWS Cloud-based Services**

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To address the needs of resilience and sustainability within the energy, sustainable buildings and agricultural industries, the NASA Prediction of Worldwide Energy Resource (POWER) project facilitates the use of NASA Earth Science data on a global scale. To this end solar data from several NASA projects and meteorological data from NASA assimilation models have been reformatted and disseminated to the public via a user-friendly web GIS-enabled based data portal (<https://power.larc.nasa.gov>) at the native resolution of each data products. Parameters and units are customized relative to needs of the various supported communities. Selectable data formats are available that are immediately amenable to key industry wide decision support tools in renewable energy, building design and crop modeling. Through the various web services that POWER now provides, these current data products have successfully ordered 230 million times by over 500,000 estimated users since May 2018.

This talk provides an overview of the framework for processing the various sources of data and making them accessible to the public using a suite of web-based services. Connections to the scientific teams producing the data products are maintained such that key product upgrades are made and disseminated to the users quickly. Currently source data products are comprised of radiative flux products from NASA/GEWEX Surface Radiation Budget (SRB) and Clouds and the Earth's Radiant Energy System (CERES) data products spanning from 2001 to a few days from near-real time. The meteorological parameters are taken from the NASA Modern Era Retrospective-analysis for Research and Applications (MERRA-2) data set covering the entire globe with supplementation of precipitation using the NASA GPM IMERG data products. From these base parameters, a large number of value-added data products are provided specifically aimed to address data needs in the various communities. This includes parameters relevant solar energy applications, including estimates of solar tilted irradiance and key statistics used to assess battery backup needs. These parameters are selected and derived as a result of key partnerships and collaboration within each user community. Thorough documentation including information on validation is maintained and updated.

Data products are made available to the public via an entire suite of data services including a complete API service, an interactive user tool, image services and various methods of direct download. To accommodate the data distributions demands of the growing number of users, considering the shift towards OpenData and OpenScience protocols, and the NASA objective to utilize Cloud-based computing and OpenData distribution resources, the POWER web services has been transitioned NASA/Amazon Web Services, Inc. (AWS) systems leveraging joint agreement. This presentation reviews recent advances in both the data products and distribution methods of the POWER web services. We show impact of providing data services through these AWS Cloud-based services, via OpenData portals and new web image services available through ArcGIS on-line portals at NASA and the Esri Living Atlas. Examples of how renewable energy community have utilized the data products to make decisions are shown. Lastly, a preview of future advances both in data products expansion and web services is provided.