

## **Overview**

**DASH 2024** 

European Space Astronomy Centre (ESAC) October 14–16, 2024

The LASP Interactive Solar IRradiance Datacenter (LISIRD) is a website that provides convenient, standardized access to solar data from a variety of missions, instruments, models, and laboratories.

LISIRD's core objectives include:

- **Discoverability**: Make solar data more openly available.
- **Standardization**: Provide a unified interface for accessing diverse datasets.
- Modernization: Offer advanced data access methods beyond basic static file downloads.
- Analyzability: Deliver analysis-ready data by streamlining preprocessing tasks to reduce workflow complexity.

## Key features

- **Detailed metadata**: LISIRD provides researchers with comprehensive metadata, offering a wealth of contextual information that enriches the transparency, understanding, and utilization of each dataset.
- Interactive plotting capabilities: LISIRD offers an array of intuitive and robust plotting tools, enabling researchers to visualize and explore solar datasets effortlessly.
- Collaborative analysis: LISIRD facilitates the convenient saving and sharing of plot configurations, streamlining collaborative research efforts.
- Customizable data downloads: LISIRD empowers users to download data in various file formats, refine data acquisition by specifying temporal and spectral ranges of interest, and even apply minor operations like variable renaming and time format customization. This flexibility ensures that researchers receive data optimized for their specific workflow needs.

## Next steps

- Refine metadata and standardize on common metadata vocabularies to aid interoperability and data discovery.
- Improve integration with popular tools like Python, IDL, and Jupyter Notebooks to support diverse user workflows.
- Migrate LISIRD to the cloud for dynamic resource scaling, enabling support for larger and higher-resolution datasets.
- Expand dataset offerings based on community feedback and evolving research needs.
- Continue enhancing data search capabilities, interactive plotting tools, and download options, ensuring that LISIRD remains a powerful, user-friendly tool for researchers of all backgrounds and levels of expertise.

## **Contact us**

lisird@lasp.colorado.edu

We welcome your feedback and suggestions!

### Data

## LISIRD: A Web-Based Tool for Accessible Heliophysics Research

Hunter Leise, Doug Lindholm, Chris Lindholm, Ransom Christofferson, Odele Coddington, Courtney Peck, Don Woodraska, and the LASP Web Team

# Over 130 solar datasets from LASP, NASA, NOAA, NSO, and more!

## Discover

	Data About Contact						
EQ, Search 🔗 Plot	😓 Download						
Data search	130 Datasets						
COLLAPSE ALL     CLEAR ALL	Info Dataset name 个	Туре	Variables	Start date	End date	Spectral min	Spectral max
Search	American Relative Sunspot Number - Daily	~	Sunspot Number	Jan 01, 1945	Sep 05, 2024		
	American Relative Sunspot Number - Monthly Averages	~	Sunspot Number	Dec 01, 1944	Sep 05, 2024		
Data type     CLEAR     Solar spectral irradiance (54)     Spectral bands (35)	Bremen Composite Magnesium II Index	~	<ul> <li>Magnesium II Index</li> <li>Uncertainty</li> <li>Source ID</li> </ul>	Nov 07, 1978	Sep 05, 2024	280 nm	280 nm
<ul> <li>Total solar irradiance (17)</li> <li>Sunspot (9)</li> <li>Composite (8)</li> <li>Solar radio flux (7)</li> <li>Solar images (6)</li> <li>Reference spectra (3)</li> <li>1-AU correction (2)</li> </ul>	Call K-Line	~	<ul> <li>Ca K Emission Index</li> <li>K2V/K2R</li> <li>K2V/K3</li> <li>K1V-K2R</li> <li>K2V-K2R</li> <li>Wilson-Bappu Parameter</li> <li>K3 Intensity</li> </ul>	Nov 20, 1976	Sep 30, 2015		
Update status     CLEAR     Ongoing data	CLS Solar Radio Flux at 10.7 cm	~	0 of 8 variables selected 💌	Nov 01, 1951	Sep 05, 2024	10.7 cm	10.7 cm
Archival data	CLS Solar Radio Flux at 15 cm	~	0 of 8 variables selected 💌	Nov 01, 1951	Sep 05, 2024	15 cm	15 cm
Start date	CLS Solar Radio Flux at 3.2 cm	~	0 of 8 variables selected 👻	Nov 01, 1951	Sep 05, 2024	3.2 cm	3.2 cm
End date	CLS Solar Radio Flux at 30 cm	~	0 of 8 variables selected 💌	Nov 01, 1951	Sep 05, 2024	30 cm	30 cm
	CLS Solar Radio Flux at 8 cm	~	0 of 8 variables selected 👻	Nov 01, 1951	Sep 05, 2024	8 cm	8 cm
Wavelength range					SHOW SELECTIO	NS NS PLOT	

## Filterable catalog of over 130 datasets

Overview	Variables	Publications	Acknowledgment	ts Support						
Details										
Version:	3			Overview	Variables	Publications	Acknowledgments	Support		
Processing level:	3		- E							
Publishers:	NASA 🖪			Independen	t variables					
Update status:	Laboratory for Atmo Archived	spheric and Space Phy	sics (LASP) ⊠	Time						
Time range:	Nov 08, 1978 to Nov	21, 2019		Units:	Julian Date					
Spectral range:	0.5 nm to 1597.5 nm	ı		Resolution:	1 day					
				Coverage:	Nov 8, 1978 to Nov 3	21, 2019				
Description				Description:	Dates for each spec	trum in Julian Day forr	nat.			
The new SSI3 com GSFC SSI2 compo (OMI for 265-500	nposite has extensions site with adjustments nm and SORCE elsew	s up to 1600 nm using s guided by proxy mode here).	SORCE SIM data ling of SORCE ai	Wavelength	nm					
The updated SSI3 composite has extensions down to 0.5 nm using SORCE XPS		sing SORCE XPS	Coverage:	0 5 pm to 1507 5 pp	2					
TIMED SEE (33–120 nm). It also has correction for 500–1600 nm range to agree on March 14, 2018. This correction is less than 1% for 500–900 nm and is as la			Coverage. 0.5 min to 1597.5 min							
The motivation for these adjustments to GSFC SSI2 is to reduce the offset leve measurement sets and to adjust the UV part of the SSI2 composite to the same higher radiometric accuracy than past observations. This approach does remore composite that is not consistent with the proxy long term trends. Several differ of different layers of the solar atmosphere and sources of solar variability. Non long-term trend, so any significant offsets in the SSI composite are assumed to between different instruments and should be corrected.			Description: wavelengths from 0.5 nm to 1597.5 nm in 1-nm bins up to 750 nm and in 5-nm bins above 750 nm.							
			Dependent v Irradiance	variables						
For more details, p	please see:			Units:	mW/m^2/nm					
• README: htt	<ul> <li>README: <u>https://lasp.colorado.edu/lisird/resources/gsfc/ReadMe_SSI3</u></li> <li>Presentation slides: <u>https://lasp.colorado.edu/lisird/resources/gsfc/Woods_SSI3_Composite</u></li> </ul>		/ReadMe_SSI3_	Missing value:	-999					
<ul> <li>Presentation <u>https://lasp.</u></li> </ul>			SI3_Composite	Description:	Description: SSI3 composite spectral irradiance data. This includes adjustments to the GS 500 nm) and extensions out to 1600 nm using SORCE SIM data. Proxy mode gaps					
Release not	es				gaps.					
https://lasp.colora	do.edu/lisird/resource	es/gsfc/ReadMe_SSI3	Extend_2021-0	Model Irradiand	ce					
Data sources			Units:	mW/m^2/nm						
			Missing value:	-999						
IDL SAV: <u>http</u> NetCDF: <u>http</u>	os://lasp.colorado.edu os://lasp.colorado.edu	/lisird/resources/gsfc/ /lisird/resources/gsfc/	ssi3_ext_0nm_1 ssi3_ext_0nm_1	Description:	Proxy model irradiar 265-500 nm range a	nce time series as base nd SORCE is used for	ed on SORCE or OMI meas 115-265 nm and 500-1600	urements. OMI is used for nm ranges.		
				Source Flag						
				Units:	unitless					
			1	Description:	Number from -1 to 1 10 (Nimbus-7), 20 (9	39 that represents the SME), 30 (NOAA-9), 40	e data source. The 10's digi (NOAA-11). 50 (UARS-SUS	t indicates the instrument: IM), 60 (UARS-SOLSTICE).		

### **Detailed metadata**

# Visualize



Interactive image dataset viewer

lasp.colorado.edu/lisird



Laboratory for Atmospheric and Space Physics University of Colorado **Boulder** 

## Download

### LISIRD Home Data About Contact

#### **Download data**

🔍 Search 🛛 🥕 Plot 📃 Download

Standard datasets					
Datasets SDO EVE Solar Spectral Irradiance - Level 3, Accuracy, Irradiance, 🔻	Acknowledgments Source API				
Time Custom: 2010-01-01T00:00:00 to 2020-01-01T00:00:00	To programmatically access data from the LaTIS API II, use one of the following retrieval methods.				
Wavelength Entire available range	SDO EVE Solar Spectral Irradiance - Level 3				
Time format ISO: 2023-10-04T18:13:14	<pre>https://lasp.colorado.edu/lisird/latis/dap/sdo_eve_ssi_1nm_13.csv? time,wavelength,accuracy,irradiance,precision,stdev&amp;time&gt;=2010-01-01T00:00:00Z&amp;time&lt;=2020-01- 01T00:00Z&amp;formatTime(vvvv-MM-dd'T'HH:mm:ss)&amp;replace_missing(NaN)</pre>				
File format csv: Comma delimited ASCII with simple header.	SORCE Solar Spectral Irradiance				
+ ADVANCED OPTIONS All datasets Replace missing = NaN	<pre>https://lasp.colorado.edu/lisird/latis/dap/sorce_ssi_l3.csv? time,wavelength,quality,irradiance,uncertainty&amp;time&gt;=2010-01-01T00:00:002&amp;time&lt;=2020-01- 01T00:00:002&amp;formatTime(yyyy-MM-dd'T'HH:mm:ss)&amp;replace_missing(NaN)&amp;rename(time,t)</pre>				
SORCE Solar Spectral Irradiance Rename "time" to "t"	TSIS-1 Solar Spectral Irradiance - Daily Average				
By downloading data, you agree to cite the data source in presentations or publications.  DOWNLOAD	<pre>https://lasp.colorado.edu/lisird/latis/dap/tsis_ssi_24hr.csv? time,wavelength,additional_uncertainty,quality,instrument_uncertainty,irradiance,measurement_precision,measurement_stability&amp;time&gt;=2010-01-01T00:00:002&amp;time&lt;=2020-01-01T00:00:002&amp;formatTime(yyyy-MM- dd'T'HH:mm:ss)&amp;replace_missing(NaN)</pre>				

## Customizable data downloads

### LaTiS

aTiS is the data access library underlying LISIRD. LaTiS supports multiple service interfaces including HAPI I and DAP2 (OPeNDAP 🗷). The LaTiS API allows software programs to access most of the datasets in the data center. It mplements a Functional Data Model 12 to provide customizable data access via a query language that leverages LaTiS's functional algebra.

- Clients can query LaTiS with URLs tha
- Select a dataset

the source is not operational.

Using LaTiS with Python

- Specify the desired variables
- Specify the desired range • Pass the result through a number of other operations

well as in the "Original files" tab on the Download page.

Specify an output format

#### aTiS accesses data in real time from its source repository and a possible. The original source for data in LISIRD can be viewed by

Because each dataset is accessed from its original source, its da

For a Jupyter notebook 🗷 example of how to use the LaTiS API in

https://mybinder.org/v2/gh/lasp/latis-notebooks/main?filepath=

### LaTiS usage

ttps://lasp.colorado.edu/lisird/latis/dap/dataset.suffix?projec

#### The dataset to request (see Available Datasets

- Type of output (see Output Options)
- Comma-separated list of variables to return. Default to all. The Dataset Descriptor Structure (DDS) will describe the variables for each dataset. Use the .dds suffix to get a dataset's DDS.
- Zero or more relative constraints on a variable (e.g. &time<=2010-01-01T12:00 or &irradiance>1360). Each must be separated by an '&
- Zero or more other operations to be applied to the data (see <u>Operation Options</u>). Each must be separated by an '&

LaTIS URLs are also useful for accessing data from the command line (see Using LaTIS with wget and curl).

### Programmatic data access via the LaTiS and HAPI APIs

