The Helioviewer Project

Heloview.org: Enhanced Solar and Heliospheric Data Visualization

Project Overview

The Helioviewer Project is an open-source effort to provide simple and intuitive interfaces to solar datasets in service of both the scientific community and the general public.

The Project is comprised of:

- [Heloview.org](http://helioviewer.org) — Web app, desktop client, & public API
- [Heloview](http://helioviewer.org) — Java/OpenGL desktop client
- [ESA JPIP Server](http://jipip.esa.int) — JPIP & JIPX viewer

This poster highlights the latest enhancements to the web client application and the public API.

Open Source

Heloview.org has been split into two repositories. One for the web client front-end and another for the backend API.

The open source repositories are version controlled with Bazaar (bzr) and hosted online at [http://launchpad.net/Helioviewer](http://launchpad.net/Helioviewer).

Plans are in place to migrate to git and github in the near future.

All New User Interface

The Helioviewer.org web application has received a user-interface refresh for version 3.0.

The changes bring solar imagery front and center with an always full-screen, immersive design. Sidebars are re-implemented as transparent drawers that can be toggled open and closed.

The “Data Sources” drawer on the left is where image layers are configured, along with the solar features and events annotation layer and observation date and time navigation.

The “Data Export” drawer on the right features new tools for requesting science data downloads from multiple sources, the generation and download of custom screenshots and movies, as well as a gallery of shared videos and Helioviewer Project news and tweets.

The “Data Timeline” drawer on the bottom of the screen provides a way of visualizing the availability of data sources, improving the browse-ability of sparse data sets.

Finally, contextual help buttons are peppered throughout, making Helioviewer.org easier to learn for new users.

Improved Social Sharing

Easily share a custom screenshot and direct link matching any Helioviewer.org browsing session.

Obtain a shortened link, or share directly to Twitter, Facebook, and Pinterest. User-generated movies are easily shared to YouTube.

Simpler Data-Source Selection

Helioviewer.org no longer requires each data source be described by a rigid four-level hierarchy of observatory, instrument, detector, and measurement.

Data sources may utilize anywhere from two to five levels of hierarchy with custom labels. For instance, TRACE data can simply be organized by observatory and measurement name, while HINODE XRT data can be organized by observatory, instrument, filter wheel 1 and filter wheel 2 positions.

Conceptually it is a small change, but is vital for enabling the support of more data sources. It required a non-backwards compatible change to the API, which has been published as API v3.


Science Data Downloads

Heloview.org is primarily a browsing and visualization tool, allowing users to discover and compare data of interest. Science quality data files are requested for a more rigorous analysis.

New in Version 3.0 is tight integration with external providers of science data. Use Helioviewer.org to visually determine the exact data set of interest and then request the original science data matching your browser session with a couple clicks.

Helioviewer.org can build custom scripts for acquiring science data using Python and SunPy or IDL and SolarSoft (SSW). It can also pre-populate VSO web forms.

Science data export features can be found in the “Data Export” sidebar on the right side of the web app.

Currently supported external data sources are the Virtual Solar Observatory (VSO) as well as the AIA/HMI Cut-out Service and the Helioseismic and Magnetic Imager (HMI) of the Solar Dynamics Observatory (SDO) may be requested as full-disk images or sub-field cut-outs.

LMSAL AIA/HMI Cut-out Service

Science data from the Atmospheric Imaging Assembly (AIA) and Helioseismic and Magnetic Imager (HMI) of the Solar Dynamics Observatory (SDO) may be requested as full-disk images or sub-field cut-outs.

Cut-out regions are easily defined by dragging and resizing a selection box in the image Viewport. You will see a live readout of the center of your defined region as well as its width and height in arc seconds. Mostly those numbers directly and see your changes reflected life in the image Viewport and thumbnail previews.

After precisely selecting your cut-out’s location, size, and shape, Helioviewer.org can generate a custom Python/SunPy or IDL/SSW script or open a pre-populated web form for submitting the download request.

The Virtual Solar Observatory

Science data from each of the sources supported by Helioviewer.org may be requested via the VSO. The web application automatically generates a VSO link for each image layer visible in your current browse session.

You may also request a sequence of images from the VSO through Helioviewer.org. Set a starting and ending date for your sequence and Helioviewer will display preview images for each image layer corresponding to the specified dates and times. This way you can be confident that the data you are requesting is exactly what you intended and nothing more. With the click of a button, Helioviewer will launch the VSO page corresponding to your request or download a custom Python/SunPy or IDL/SSW script.

Science Data Downloads

You can also view the list of science data available in the “Data Sources” drawer on the left.

All science data sources are represented as trees of “observatory, instrument, detector, and measurement.”

You can expand and collapse these trees, clicking on each level one by one to reveal data sources from multiple levels of hierarchy with custom labels. For instance, TRACE data can simply be organized by observatory and measurement name, while HINODE XRT data can be organized by observatory, instrument, filter wheel 1 and filter wheel 2 positions.

Conceptually it is a small change, but is vital for enabling the support of more data sources. It required a non-backwards compatible change to the API, which has been published as API v3.


Public API version 2

Advanced users and software developers have access to the same data used by the official Helioviewer.org web application and the Helioviewer desktop client via our Public API:


Version 2 delivers changes that were necessary to enable the new version 3.0 user interface.

Support for our legacy API will continue through the end of 2015. It is crucial that you upgrade your software for compatibility with API version 2 prior to that date. You will find the changes to be minor and easy to implement.

Our API documentation has been greatly expanded, now covering all available API endpoints. For each API, a detailed listing of required and optional parameters is provided along with parameter descriptions, example requests, and example responses.

Integration with open source libraries for Python, PHP, Java, Ruby, Objective-C, Node.js, .NET, and Windows 8 help get your project off the ground much more quickly than ever before.