

Helioviewer User Guide

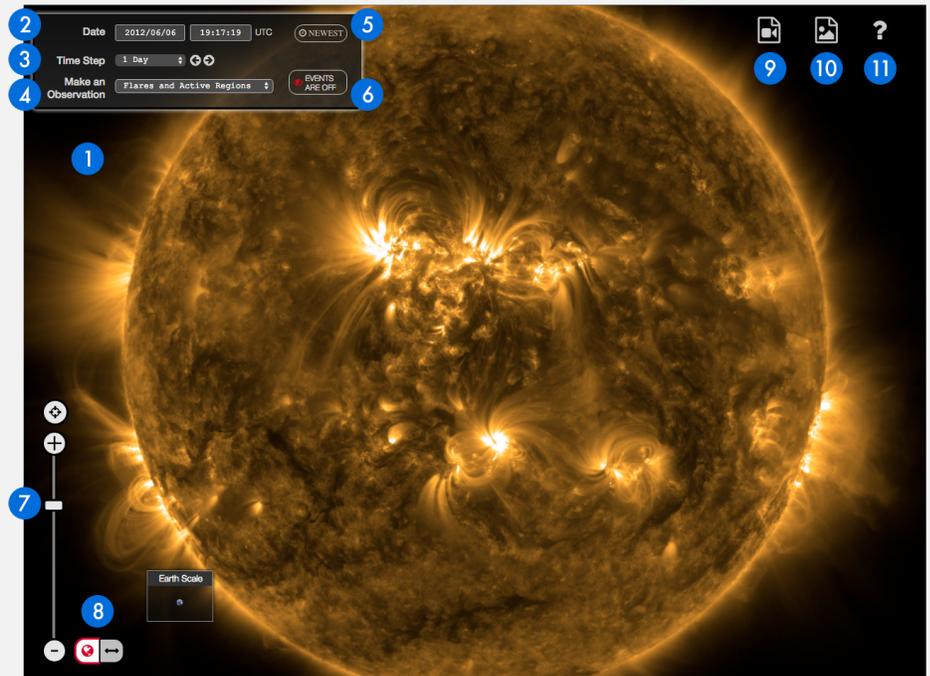
<https://student.helioviewer.org/>

INTRODUCTION

Helioviewer allows users to observe solar phenomena from over the last two decades up to near-real time and to create screenshots and movies. With this student version of Helioviewer, students can access authentic satellite data on solar features and events, including sunspots, flares, and active regions on the Sun's surface; holes in the corona; eruptions, such as filaments and coronal mass ejections; and the Sun's magnetic activity.

PARTS OF THE HELIOVIEWER

1. Viewport
2. Date
3. Time Step
4. Make an Observation
5. Newest
6. Events
7. Zoom and Center
8. Earth/Bar Scale
9. Make a Movie
10. Take a Picture
11. Help



VISUALIZING SOLAR DATA

The Helioviewer opens with current solar data in near-real time. Use the controls to customize your view of the Sun.

1. **VIEWPORT:** This is the view window that displays the selected images.
2. **DATE:** Select the date by using the pop-up calendar or enter the date manually in yyyy/mm/dd format. Choose the time from the drop-down menu or enter it manually in hh:mm:ss format, Coordinated Universal Time (UTC).

Time zone conversions:

Standard Time

Pacific Standard Time (PST) = UTC-8hrs
 Mountain Standard Time (MST) = UTC-7hrs
 Central Standard Time (CST) = UTC-6hrs
 Eastern Standard Time (EST) = UTC-5hrs

Daylight Saving Time

Pacific Daylight Time (PDT) = UTC-7hrs
 Mountain Daylight Time (MDT) = UTC-6hrs
 Central Daylight Time (CDT) = UTC-5hrs
 Eastern Daylight Time (EDT) = UTC-4hrs

3. **TIME STEP:** Select the time-step from the drop-down menu. Click on the left or right arrow to move backward or forward in time, by 1 second, 1 minute, 5 minutes, 15 minutes, 1 hour, 6 hours, 12 hours, 1 day, 1 week, 28 days (about one full rotation of the Sun), or 1 year.
4. **MAKE AN OBSERVATION:** Select one of five viewing options that display data about: Flares and Active Regions, Eruptions and CMEs, Magnetic Field, Sunspots, or Coronal Holes. Further details on each of the data presets, including date range and imaging rate, are listed on pp. 3–4 of the User Guide. *Note:* It is important to keep in mind that these images represent actual data. At times, there may be data gaps where there are few or no images (for various reasons, such as spacecraft operations or glitches in the image-creation pipeline).
5. **NEWEST:** Click to view the most recent (near-real time) view of the Sun.
6. **EVENTS:** Click to toggle event marker pins on or off. A subset of observed phenomena is indicated by event marker pins, which can be toggled on and off. Features and events are integrated from an external database, where they have been analyzed and classified both by algorithms and expert human observers. Events may not be available for some of the newest image observations. Selected event state (on/off) will be used when making movies or taking pictures.
7. **ZOOM AND CENTER:** Click on the "+" or "-" to zoom in or out of the image. Click on the target symbol above the "+" to place the center of the Sun in the center of the viewport.
8. **EARTH/BAR SCALE:** Click on the Earth icon to show the size of Earth relative to the Sun at the current scale of view. Click on the double arrow icon to show a linear scale in kilometers. Click and drag the scale box to move it. The scale box may be turned off by clicking again on the Earth icon or double arrow icon, when in Earth Scale or Bar Scale mode, respectively.
9. **MAKE A MOVIE:** Choose the movie icon and click "Full Screen" to make a movie of the entire viewport. Or, choose "Select Area" to focus on a particular area within the viewport and then click confirm selection. Next, in the movie dialogue box, specify:
Movie Settings:
 - Duration: Select the range of time for the data.
 - Length (s): Enter how long you would like the movie to be, in seconds (10–100).Advanced Settings:
 - Start/End: Enter the start and end dates/times for the data.
 - Length (s): Enter how long you would like the movie to be, in seconds (10–100).
 - Size: The size of the movie is automatically set to 720p (1280 x 720) HD Ready format.Your generated movie will appear under "Movie History" in the movie dialogue box, listed by instrument name/wavelength. Once processing is complete, clicking on the

movie opens it up in an in-browser movie player window, which offers the option to download the movie as an MP4 file. Control(Ctrl) + Clicking on a movie in the "Movie History" list will copy the link for the movie so that it can be retrieved at a later time or on a different computer (this is especially useful when you do not have time to wait for the movie to finish processing).

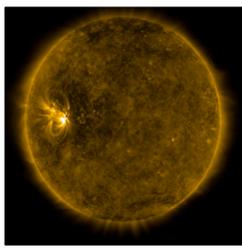
10. **TAKE A PICTURE:** Choose the screenshot icon. In the screenshot dialogue box, click "Full Screen" to take a screenshot of the entire view area. Or, use "Select Area" to focus on a particular area within the viewport. The screenshot will be available for download. Screenshots taken will be listed under Screenshot History by instrument name/wavelength and are available for download as PNG files.
11. **HELP:** Click to access the Helioviewer User Guide.

DATA PRESETS

Views are available in five different data presets, using data from various instruments aboard the Solar Dynamics Observatory (SDO) and Solar and Heliospheric Observatory (SOHO). Most of the observed wavelengths are not visible light; the data is colorized to make the images.

SDO:	SOHO:
Atmospheric Imaging Assembly (AIA)	Extreme Ultraviolet Imaging Telescope (EIT)
Helioseismic and Magnetic Imager (HMI)	Michelson Doppler Imager (MDI)
	Large Angle and Spectrometric Coronagraph (LASCO)

Flares and Active Regions: This view shows the corona in extreme ultraviolet, colorized in gold.



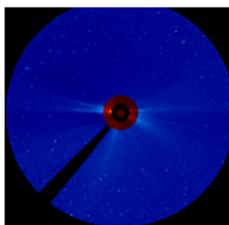
Event Marker Tags: (AR) Active Region; (FL) Solar Flare

SDO AIA ,171 Å: 2010/06/02–present, every 12 seconds; Helioviewer includes every third image from this dataset.

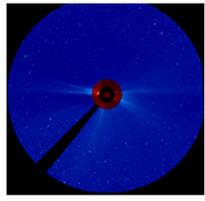
SOHO EIT, 171 Å: 1996/01/05–2013/08/07, every 12 minutes.

Note: Helioviewer automatically switches from SOHO EIT to SDO AIA when the higher spatial resolution data of AIA is available.

Eruptions and CMEs: This view combines images from several instruments to show the corona extended to about 30 solar radii. Superimposed on the black circle of the coronagraphs is the solar disk in extreme ultraviolet, colorized in red. Zoom out using the slider or the "-" button to observe the full extent of the blue coronagraph.



Event Marker Tags: (ER) Eruption, (FI) Filament, (FA) Filament Activation, (FE) Filament Eruption, (CME) Coronal Mass Ejection



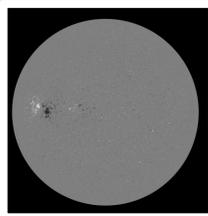
SOHO LASCO C2 (red coronagraph): 1996/04/01–present, ~every 12 minutes; images corona from ~1.5 to 6 solar radii

SOHO LASCO C3 (blue coronagraph): 1996/04/14–present, ~every 30 minutes; images corona from ~3.5 to 30 solar radii

SDO AIA 304 Å (solar disk within coronagraphs): 2010/06/02–present, every 12 seconds; Helioviewer includes every third image from this dataset.

SOHO EIT 304 Å (solar disk within coronagraphs): 1996/01/05–2013/08/07, every 12 minutes. *Note:* Helioviewer automatically switches from SOHO EIT to SDO AIA when the higher spatial resolution data of AIA is available.

Magnetic Field: This view shows the strength and direction of magnetic fields on the solar surface. Colors: gray = low or no magnetic field; black = strong negative polarity magnetic fields; white = strong positive polarity magnetic fields.

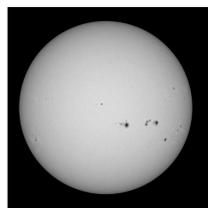


Event Marker Tags: (EF) Emerging Flux

SDO HMI magnetograms: 2010/12/06–present, every 45 seconds

SOHO MDI magnetograms: 1996/05/19–2011/01/11, every 96 minutes. *Note:* Helioviewer automatically switches from SOHO MDI to SDO HMI when the higher spatial resolution data of HMI is available.

Sunspots: This view shows the photosphere at visible wavelengths.

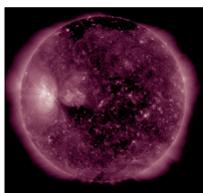


Event Marker Tags: (SS) Sunspot

SDO HMI continuum: 2010/12/06–present, every 45 seconds

SOHO MDI continuum: 1996/05/19–2011/01/11, every 96 minutes. *Note:* Helioviewer automatically switches from SOHO MDI to SDO HMI when the higher spatial resolution data of HMI is available.

Coronal Holes: This view shows the corona in extreme ultraviolet, colorized in purple.



Event Marker Tags: (CH) Coronal Hole

SDO AIA 211 Å: 2010/06/02–present, every 12 seconds; Helioviewer includes every third image from this dataset.

All images produced from the Helioviewer. The Helioviewer was created by the following scientific teams: SDO (NASA), SOHO (ESA/NASA), STEREO (NASA), PROBA2 (ESA), Yohkoh (JAXA/NASA/PPARC), Hinode (JAXA/NASA/PPARC), GSFC, Royal Observatory of Belgium, LMSAL, SDAC, Stanford University, Harvard-Smithsonian Astrophysical Observatory, MSU/SDO-FFT. ©2018 WGBH Educational Foundation. All Rights Reserved.