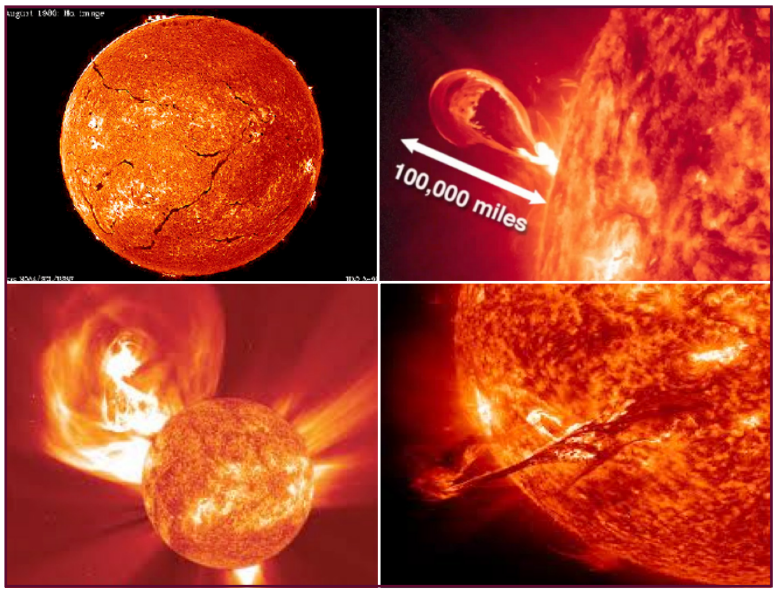
Activity - Solar Observations Practice

Objective

In this activity, students practice making and recording solar observations. They'll be required to identify the solar events and features shown in the videos provided. This practice is meant to prepare students for making solar observations in real time using the Meade Coronado Personal Solar Telescope.

Materials

- Sunspot.mp4
- Filaments.mp4
- Prominence.mpg
- Solar Flare1.mp4
- Solar Flare2.mp4
- CME.mp4



Background

Sunspots are caused by the Sun's magnetic field bursting through the surface, which can push glowing surface matter out of the way. That's why sunspots look dark. They come and go, and so are considered temporary.

Filaments and ***Prominences*** are essentially the same thing. When viewed against the solar disk, it's called a filament. When viewed on the Sun's outer edge, it's called a prominence. These are bright and often looping features extending from the Sun. They contain cooler and denser plasma, which is trapped along magnetic fields.

A ***Solar Flare*** is a sudden release of electromagnetic energy. Solar flares look like a bright flash of light. They release the same energy as a billion megatons of TNT of energy into the solar system on an almost daily basis.

Sometimes, solar flares cause part of the Sun's upper atmosphere (corona) to erupt in an explosion of particles, mostly protons, electrons, and magnetic field. This is called a "***Coronal Mass Ejection (CME)***". These particles can hit Earth and cause technology disruptions.

Directions

1. Watch the provided videos. In each video, students sketch what they observe.

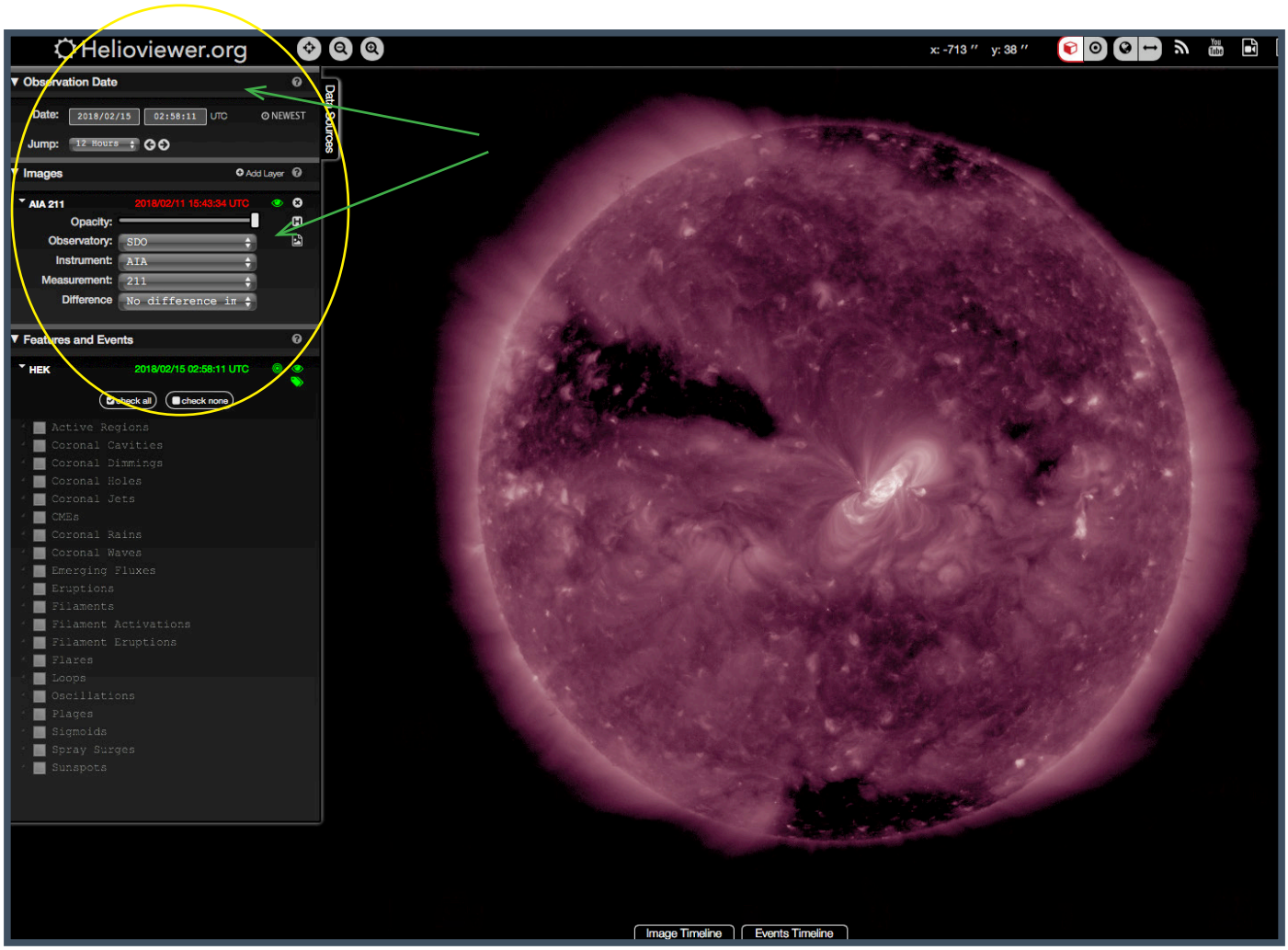
2. Next, students identify solar events or features (i.e. Sunspots, filaments, etc.), which they will then circle in their sketches.

3. Lastly, students record notes on anything specific that they observe.

   ***For Example**: How many sunspots are there? How many filaments? Were there any differences observed between similar features in different videos?*

4. To create solar movies of your own, visit helioviewer.org. Helioviewer is a free solar and heliospheric image visualization tool that allows users to create images and movies using near real-time images and data taken from professional solar observatories. Toggle between different dates, observatories, instruments, wavelength channels, and measurements to customize your movie.

   Helioviewer User Guide: wiki.helioviewer.org/wiki/Helioviewer.org_User_Guide_3.1.0

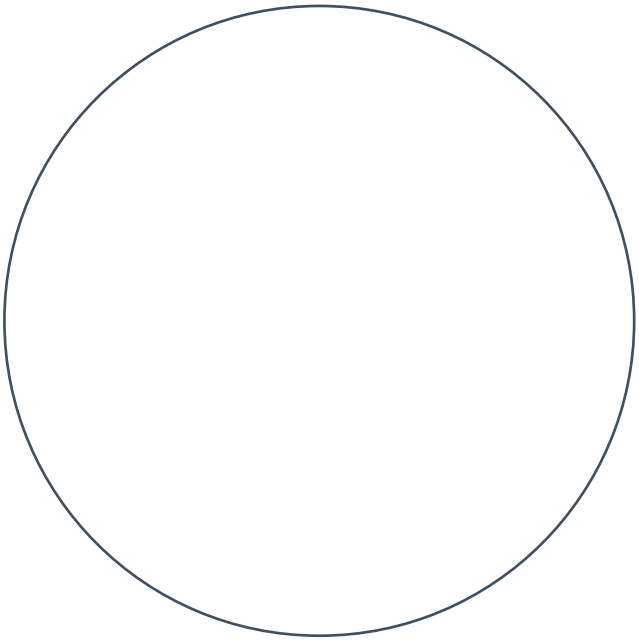


Helioviewer Selection Guide

To see → / Select ↓	Sunspots	Filamemts/ Prominances	Coronal Loops	Flares	CMEs Zoom out!
Observatory	SDO	SDO	SDO	SDO	SOHO
Instrument	AIA	AIA	AIA	AIA	LASCO
Measurement	1600, 1700, 4500	304	171, 193, 335	94, 131, 211, 195	C2, C3
Observatory	SDO	SOHO	PROBA2	PROBA2	STEREO-A or -B
Instrument	HMI	EIT*	SWAP	SWAP	SECCHI → COR1 or COR2
Measurement	Continuum, magnetogram	304	174	174	White light
Observatory	SOHO	STEREO-A or -B	STEREO-A or -B	STEREO-A or -B	
Instrument	MDI*	SECCHI →EUVI	SECCHI →EUVI	SECCHI →EUVI	
Measurement	Continuum, magnetogram	304	171, 195, 284	171, 195, 284	

*EIT and MDI have been turned off since 2013 and 2011 respectively. No data is available from these instruments after these dates.

Student Data Sheet



Identify the solar events!
Find the solar features!

(circle and label what you find, or draw each in a specific ink color)

Notes:

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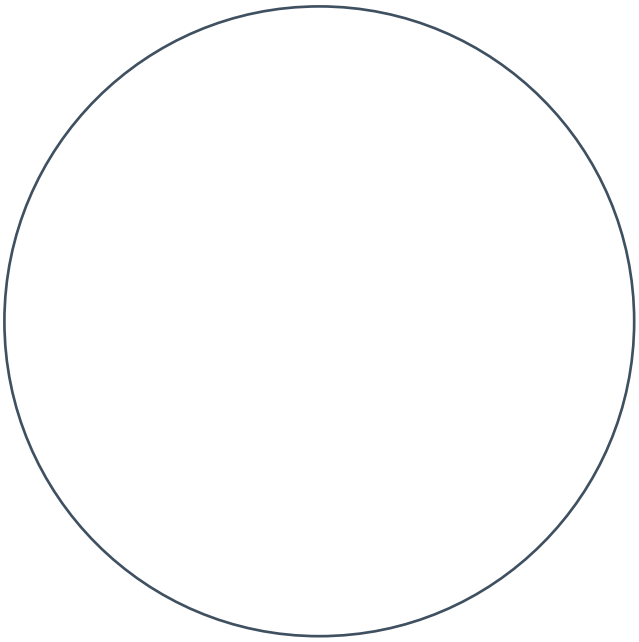

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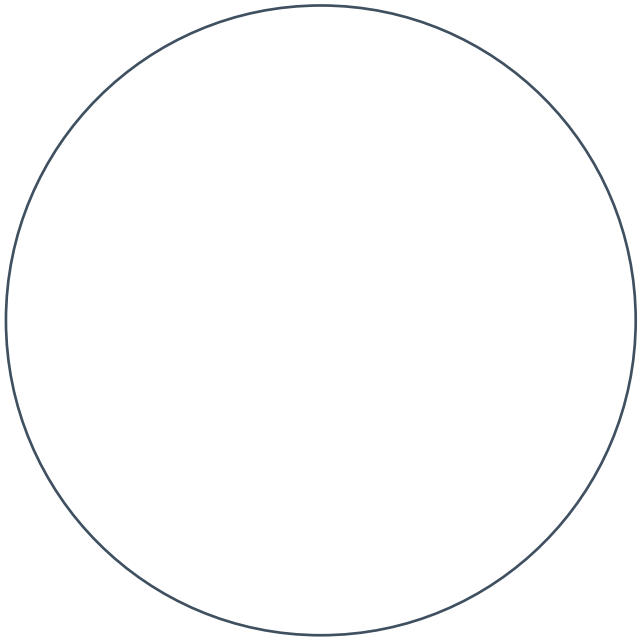

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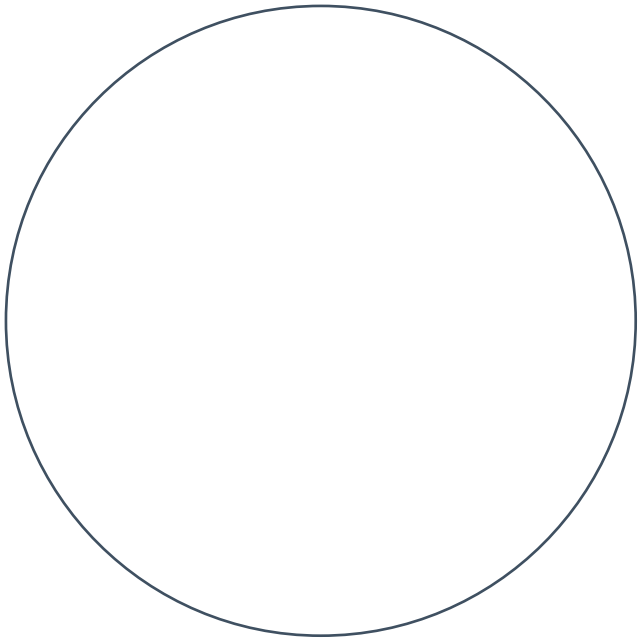

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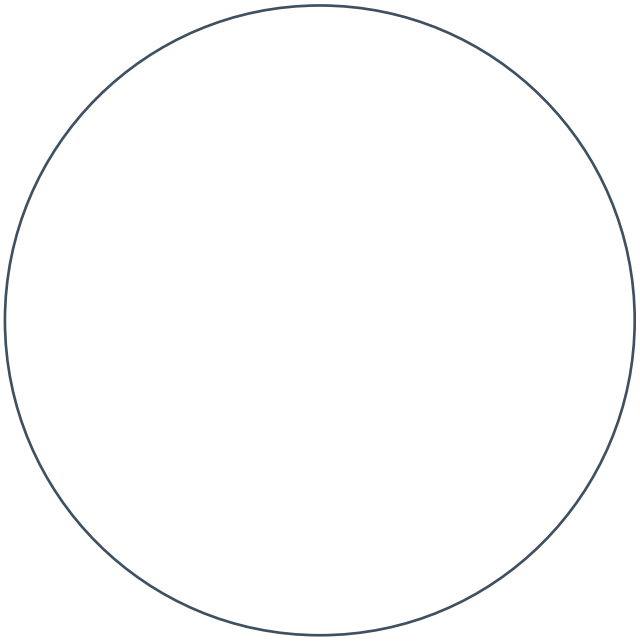

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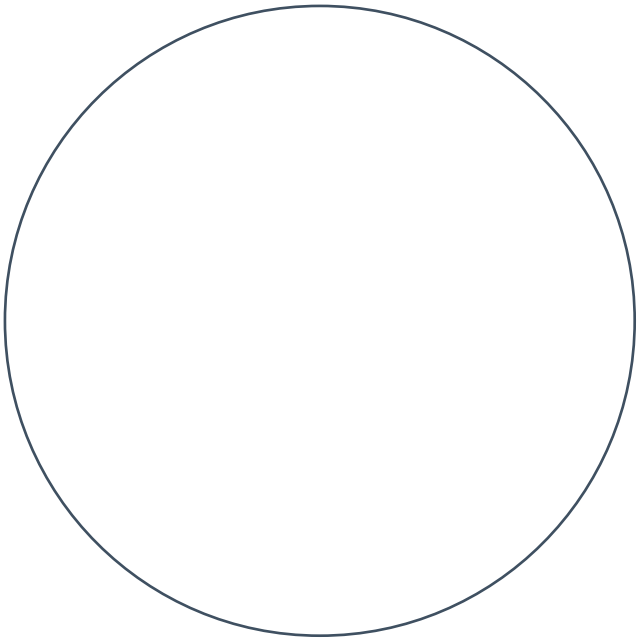

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