

# STEREO Science Center

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# Current Status #1

- Telemetry ingest
  - Successful test during Sim #2
- Archiving
  - Web sites are up and running
  - Mirroring MOC archive using rsync
    - Would like to also use rsync to pull instrument data
  - New servers and RAIDs have arrived, and are in the process of being installed

# Current Status #2

- Space Weather Beacon
  - Test plan with NOAA antenna partners
    - Network throughput test partially complete
  - Delivery of instrument software imminent
- Browsers
  - Planning several browsers, one for images, one for in-situ, and one events page for each spacecraft
  - Started looking at converting SolarSoft “Latest Events” to STEREO usage

# SolarSoft Library

- Have started a “STEREO-generic” tree within the SolarSoft library
  - The main component right now is software to handle the SPICE orbit and attitude files
    - Orbit and attitude files distributed as part of SolarSoft
- Branches for each of the STEREO instruments
  - SECCHI and SSC branches are populated

# STEREO and VSO

- Defined the instrument schemas.
- VSO currently has the following interfaces:
  - Web based
  - Command line (*unix shell*)
  - **IDL** (*in development, will be put in SolarSoft*)
  - An API for new interfaces
- Portions of VSO are also searchable through EGSO and VSPO. In-situ data will also be served from VHO.
- Currently serving some event lists.
  - Design work going on to make sure that VSO has a good framework for event lists, using VOTable.

# Software & Data Handling Telecons

- Have started a series of monthly teleconference meetings to discuss software and data handling issues.
- So far have held eight telecons:
  - **21-Jan-2005**: Mission Simulations
  - **14-Feb-2005**: Coordinates
  - **18-Mar-2005**: Beacon processing
  - **20-Apr-2005**: Catalogs
  - **9-Jun-2005**: Beacon processing
  - **Aug-2005**: Data browsers (virtual)
  - **10-Oct-2005**: Beacon processing
  - **3-Nov-2005**: SolarSoft library
- All the minutes are on the “Intranet” site

# EPO Activities

STEREO - Definitions - Netscape

File Edit View Go Bookmarks Tools Window Help

http://stereo.gsfc.nasa.gov/classroom/definitions.shtml

3-D VIEW OF THE SUN AND HELIOSPHERE

STEREO

HOME CONTACT SITE MAP

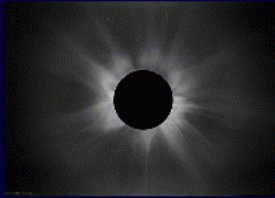
**Important STEREO Science Concepts**

If you are reading through the STEREO web pages you may come across a number of terms that are not exactly household words, but are central to a real understanding STEREO science.

Here are brief discussions of a few of important STEREO Science Concepts:

- [Corona](#)
- [Solar Wind](#)
- [Coronal Mass Ejections](#)
- [Solar Flares](#)
- [Interplanetary Magnetic Field](#)
- [Solar Energetic Particles](#)
- [Space Weather](#)

**CORONA**



*The beautiful corona during a 1980 total solar eclipse. Image courtesy of the High Altitude Observatory and Rhodes College.*

The corona is the Sun's hot, thin outer atmosphere. From Earth it is most easily seen during a total solar eclipse in which the Sun's bright disk is covered by the Moon, revealing the much fainter corona.

The highly structured corona is shaped by the Sun's complex magnetic field, and is very active, exhibiting [coronal mass ejections](#) and [flares](#) among other solar magnetic phenomena. The corona is so hot at over a million degrees celcius that it produces ultraviolet light and

## Important STEREO Science Concepts

- Describes basic concepts, such as “What is the corona?”
- Has links to other sites for more information.
- Covered topics:
  - Corona
  - Solar Wind
  - Coronal Mass Ejections
  - Solar Flares
  - Interplanetary Magnetic Field
  - Solar Energetic Particles
  - Space Weather

# Posters

- The new STEREO poster has been released
- The STEREO/EPO poster is awaiting approval.
- Our website now has an eclipse section, to build on “Sun-Earth Day 2006: Eclipses in a Different Light”
- Eclipse poster available in multiple languages: *English, Spanish, French, Arabic.*
- Other languages?

**SUN**

The Sun is at the center of our Solar System and contains more than 99.8% of the System's total mass. The Sun is an average star. There are many other stars that are much larger than the Sun and many that are much smaller.

Because it is so close to us, the Sun looks bigger and brighter in our sky than any other star!

Our own the Sun, is a great big ball of plasma made up mostly of hydrogen (approximately 75%) and helium (approximately 25%). The remaining 0.1% is made up of heavier elements, such as carbon, oxygen, nitrogen, neon, magnesium, silicon and iron. The percentages change slowly over time as the Sun converts hydrogen to helium in its core.



The core is one of six layers of the Sun. From the center out the layers include:

**CORE:** The innermost layer of the Sun produces tremendous amounts of energy through the process of nuclear fusion. This conversion of hydrogen to helium powers the Sun and is responsible for all of the heat and light we receive on Earth. The core has a density of more than 150 times that of water!

**RADIATIVE ZONE:** The innermost shell right above the core where energy is carried away by radiation. Here the plasma velocity is very high and the radiation gets bounced around following a zigzag path. It takes about 170 thousand years for radiation to make its way from the core to the top of the radiative zone!

**CONVECTIVE ZONE:** The outermost shell surrounding the core where plasma is too cool and dense to allow radiation to pass. Instead, large convection currents form and huge bubbles of hot plasma move up towards the surface (similar to a boiling pot of water heated on a stove)

**PHOTOSPHERE:** The Sun's visible surface has a temperature of about 5,500°C. It is often marked by the presence of sunspots which appear dark because they are about 2,000°C cooler than the surrounding photosphere.

**CHROMOSPHERE:** A thin layer just above the photosphere. The name chromosphere is derived from the word chromos, the Greek word for color. It can be observed in total eclipses where light scattering that it appears bright red. The chromosphere is often seen for a few seconds just as a total solar eclipse begins and ends.

**CORONA:** The outermost layer of the Sun. The corona extends millions of kilometers into space and is visible only during total solar eclipses. Its temperature is about 2,000,000°C.

The Sun has a complicated and changing magnetic field, which leads to such features as sunspots and active regions. The magnetic field causes solar eruptions, including hot clouds of plasma and energetic particles known as the solar wind. In space, solar wind can reach Earth at speeds up to 400km/hr. These energetic particles can have dangerous effects such as damage satellite components and can expose astronauts to harmful levels of radiation. But they are also responsible for the beautiful auroras.

The solar magnetic field changes over an 11-year cycle, often referred to as the Sunspot Cycle or the Solar Cycle. Every solar cycle, the number of sunspots, flares, and solar storms increases to a peak, known as solar maximum. After a few years of high activity, the Sun ramps down to a several years of low activity, solar minimum.

**TYPES OF ECLIPSES**

By a remarkable coincidence, the Moon and Sun appear the same size in the sky as viewed from the Earth. A solar eclipse occurs when all three bodies are perfectly aligned and the Moon passes directly between the Earth and Sun. There are two to five solar eclipses every year.

During a solar eclipse, a partial eclipse is visible over a large portion of the Earth. However, a total eclipse can only be seen from within a narrow track known as the path of totality. This path is typically just 100 miles wide. If you stay within your line of sight, you may see a partial eclipse several times per day. But since the path of totality is so small it is very unlikely that it will cross your house. So, people often travel all over the world just to see a total solar eclipse. To stand in the shadow of the Moon is a unique experience. For a few precious minutes, it gets dark in the middle of the day. The temperature drops, and the stars come out and the Sun's glorious solar corona is visible in view. Animals and birds often act like it's time to sleep.



The Moon's shadow falls on Earth. The umbra is the dark inner shadow. Total eclipses are seen from within the umbra. The penumbra is the dark inner shadow. Total eclipses are seen from within the umbra.

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The moon, earth's only natural satellite, orbits the earth every 29 and half days. New moon occurs when the moon passes between earth and the sun. A solar eclipse is possible only at new moon when, during its monthly revolution around the earth, the moon happens to exactly line up between the earth and the sun. Then why isn't there an eclipse every month? The moon's orbit around the earth is tilted by 5 degrees so that the moon usually passes a little higher or a little lower than the sun at new moon. At least twice a year, all three bodies line up providing us with some of the most spectacular views of the sun visible from earth.

There are four types of solar eclipses:

**Partial Solar Eclipse: only part of the Sun and Moon overlap.**  
When only the Moon's penumbral shadow strikes Earth, we see a partial eclipse of the Sun from that region. Partial eclipses are dangerous to look at because the un-eclipsed part of the Sun is still very bright.

**Total Solar Eclipse: all of the Sun is hidden or eclipsed by the Moon.**  
When the Moon's dark umbral shadow sweeps across Earth's surface, there is total eclipse of the Sun to those. The track of the Moon's shadow across Earth's surface is called the path of totality. It is typically 10,000 miles long but only 100 miles or so wide. In order to observe the Sun totally eclipsed by the Moon, you must be on the path of totality.

The total phase of a solar eclipse is very brief. It rarely lasts more than several minutes. However, these few short minutes provide one of the most amazing views one could ever see: the dramatic view of the Sun's corona!

**Annular Eclipse: A ring of the Sun can still be seen around the Moon (passed by the Moon's umbra failing to reach the Earth's surface).**  
Annularity can last as long as 100 minutes, but is more typically about half that length. Because the Sun is not completely covered by the moon, its beautiful corona remains hidden from view. However, annular eclipses are still amazing events to observe!

**Hybrid Eclipse: The curvature of Earth's surface causes a single solar eclipse to be observed as annular from some locations but total from other locations.**

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