

IMPORTANT SOLAR TERMS

Aditya-L1

Context

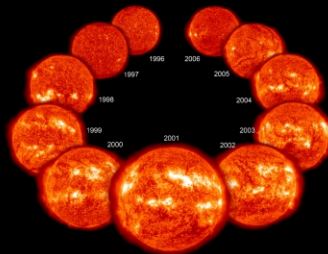
- ✓ The Indian Space Research Organization (ISRO) recently completed the launch of **Aditya-L1, its first Solar Mission**.
- ✓ The PSLV-C57 rocket was used for the launch. The fourth stage of the PSLV was fired twice, a first in ISRO history, to perfectly place the spacecraft in its elliptical orbit.

About

- ✓ Aditya-L1 is India's first space-based observatory-class solar mission, studying the Sun from a distance of 1.5 million kilometers. The L1 milestone will be reached in around 125 days.
- ✓ Aditya-L1 is also ISRO's second observatory-class mission, following AstroSat (2015).
- ✓ The journey is far shorter than that of India's last Mars orbiter project, Mangalyaan.
- ✓ The spacecraft will be deployed in a halo orbit around the Sun-Earth system's Lagrangian point 1 (L1).

What is the solar cycle?

- ✓ The solar cycle is the cycle that the Sun's magnetic field goes through approximately every 11 years.
- ✓ Our Sun is a huge ball of electrically charged hot gas. This charged gas moves, generating a powerful magnetic field.
- ✓ The Sun's magnetic field goes through a cycle, called the solar cycle.
- ✓ Every 11 years or so, the Sun's magnetic field completely flips. This means that the Sun's north and south poles switch places. Then it takes about another 11 years for the Sun's north and south poles to flip back again.
- ✓ The solar cycle affects activity on the surface of the Sun, such as sunspots which are caused by the Sun's magnetic fields. As the magnetic fields change, so does the amount of activity on the Sun's surface.
- ✓ One way to track the solar cycle is by counting the number of sunspots. The beginning of a solar cycle is a solar minimum, or when the Sun has the least sunspots. Over time, solar activity—and the number of sunspots—increases.
- ✓ The middle of the solar cycle is the solar maximum, or when the Sun has the most sunspots. As the cycle ends, it fades back to the solar minimum, and then a new cycle begins.

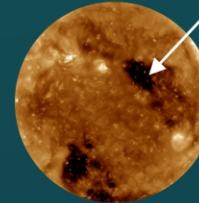


Do space weather effects / solar storms affect Earth?

- ✓ Large solar flares can lead to a radio blackout storm on Earth.
- ✓ The solar storm can endanger astronauts and Earth-orbiting spacecraft.
- ✓ The solar storm can hit Earth's magnetosphere and induce currents in electrical systems on Earth.
- ✓ During this time, power grids are vulnerable and can cause major blackouts.

Important Solar terms:

What are coronal holes?



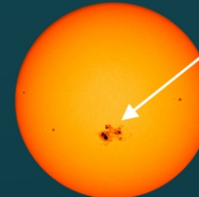
- ✓ Coronal holes appear as dark areas in the solar corona in extreme ultraviolet (EUV) and soft X-ray solar images.
- ✓ They appear dark because they are cooler, less dense regions than the surrounding plasma and are regions of open, unipolar magnetic fields.
- ✓ This open, magnetic field line structure allows the solar wind to escape more readily into space, resulting in streams of relatively fast solar wind and is often referred to as a high-speed stream in the context of analysis of structures in interplanetary space.

What is a geomagnetic storm?



- ✓ A geomagnetic storm, also known as a magnetic storm, is a temporary disturbance of the Earth's magnetosphere caused by a solar wind shock wave and/or cloud of magnetic field that interacts with the Earth's magnetic field.

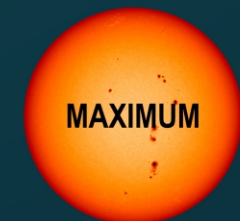
What is a sunspot?



- ✓ Sunspots are dark, planet-size regions of strong magnetic fields on the surface of the sun.
- ✓ They can spawn eruptive disturbances such as solar flares and coronal mass ejections (CMEs).
- ✓ These regions of the sun appear darker because they are cooler than their surroundings.
- ✓ The central dark region, the umbra, is about 6,300 degrees Fahrenheit (3,500 degrees Celsius), whereas the surrounding photosphere is about 10,000 F (5,500 C), according to the National Weather Service (NWS).



MINIMUM



MAXIMUM

What is solar maximum and solar minimum?

- ✓ The beginning of a solar cycle is a solar minimum, or when the Sun has the least sunspots.
- ✓ Over time, solar activity and the number of sunspots increase.
- ✓ The middle of the solar cycle is the solar maximum, or when the Sun has the most sunspots.

