

Aurora Lights In India

Why In News

- **Aurora lights in red hues** were visible from Ladakh's pristine skies late at night, in the intervening hours between Friday and Saturday. Astronomers of the Indian Institute of Astrophysics, Bengaluru (IIA) captured the auroras through all-sky cameras positioned around the **Indian Astronomical Observatory (IAO)** in Hanle, Ladakh.



- Owned and **operated by the IIA**, **IAO** is equipped with these cameras capable of constantly imaging the sky. It showed that space activity persisted between midnight and the twilight hours of Saturday, with the peak activity reported at 2 am on Saturday.
- These lights, called **auroras**, are usually seen in high-latitude regions (when measured from the equator), namely the North and the South Pole. When witnessed near the North they are called Aurora Borealis, while those in the South are called Aurora Australis.

What Are Auroras

- **Auroras are bright and colourful lights**, formed due to an active interaction in Space between charged solar winds and the **Earth's magnetosphere**. Solar winds are ejections of charged particles from the Sun's atmosphere, mostly composed of protons and electrons.



NOAA

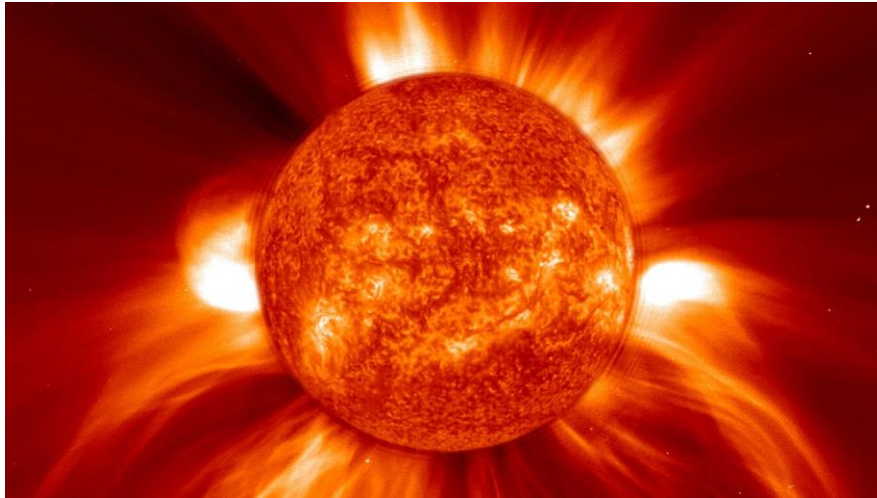
- The magnetosphere is the region surrounding the Earth where the dominant **magnetic field** is the Earth's, rather than the magnetic field of interplanetary Space, according to the US National Oceanic and Atmospheric Administration (NOAA). It protects the Earth against solar winds and is strongest at the poles.



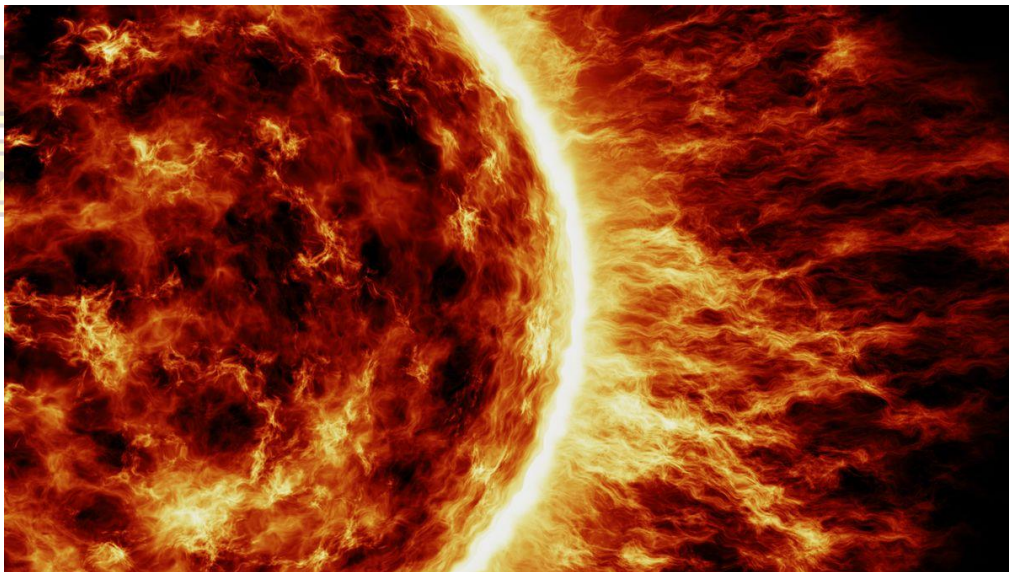
- However, sometimes **solar wind particles flow** down the Earth's magnetic field. Auroras are produced when these particles collide with atoms and molecules in the Earth's upper atmosphere. The collisions produce light, "much like how electrons flowing through gas in a neon light collide with neon and other gasses to produce different colored light bulbs," the NOAA website says.

Why Were Auroras Visible From Ladakh

- It has to do with heightened solar flare activity in Space. Solar physicists at the Centre of Excellence in Space Science India, at the **Indian Institutes of Science Education and Research (IISER)** Kolkata, said that at least four strong solar storms arrived over Earth between Friday and Saturday.
- The source of these storms was **Coronal Mass Ejections (CMEs)**, which are large ejections of magnetic particles and plasma from the Sun's corona – the outermost part of its atmosphere. These CMEs emerged from AR13664, currently an active region on the Sun, on May 8.



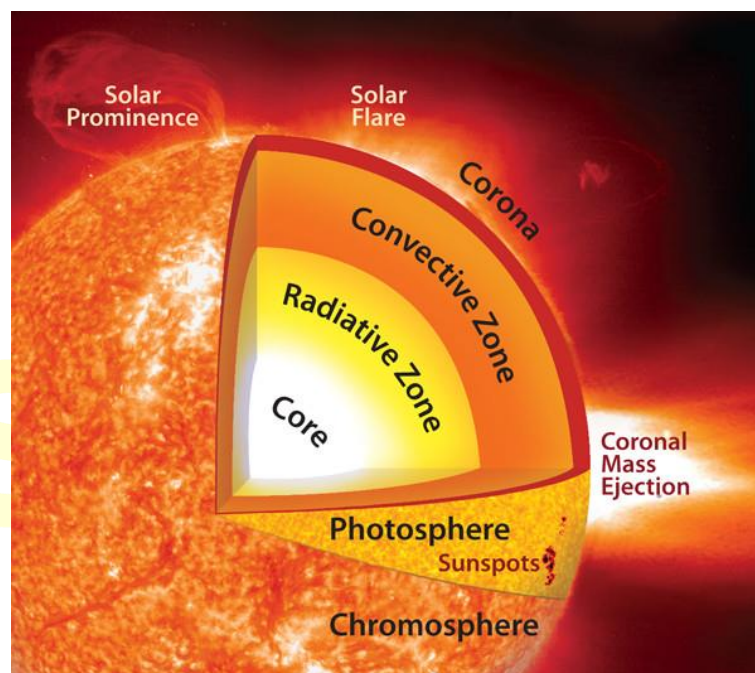
- Travelling at **700km/second**, the Earth-bound CMEs reached the closest to the Earth's atmosphere on May 10 and 11, disturbing the otherwise calm Space weather. Solar flares travelling at a speed of 815km/second were recorded when they hit the Earth.



- According to **Indian solar physicists**, the intensity of these incoming solar storms was much higher than average.
- One of the **manifestations of the solar storm's** interactions with the Earth's atmosphere was the emergence of auroras in red, violet and blue colours. So strong were the storms that the aurora lights were visible from many lower-latitude regions. The auroras were also visible in parts of the US and the UK.

How Hazardous Are Solar Storms

- **Intense solar storms** can be harmful as they can interfere with and threaten the smooth operations of satellites operating in the Low Earth Orbit or LEO (an altitude ranging between 200-1,600km).
- The most **common satellites functioning** from the LEO are used for multiple purposes, such as navigation, military, intelligence, communications, etc. Thus, Earth's satellite-based GPS, navigation systems, etc. could be vulnerable to solar storms.



- The **highly energetic particle environment** created by these solar storms can also induce heating in the upper atmosphere. This increases the risk of radiation hazards, causing a drag effect on satellites positioned at LEO.
- An **excessive drag can mean satellites** facing intolerable amounts of friction, which in extreme cases can ignite and burn down the satellites, ceasing their operations completely.