



# Aurora Borealis in India

## Why in News?

Recently, **Auroras** which are typically visible in **high-latitude regions** such as the **North and South Poles**, were observed worldwide, including in areas where they are uncommon.

- In India, they were observed through all-sky cameras positioned around the [Indian Astronomical Observatory \(IAO\)](#) in [Hanle, Ladakh](#).

## What is the Aurora Phenomenon?

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### ▪ About:

- **Auroras** are **bright and colourful lights**, formed due to an active interaction in Space between charged **solar winds** and the **Earth's magnetosphere**.
- They occur when **violent solar events** eject charged particles into space, which become trapped in [Earth's magnetic field](#) and interact with atmospheric atoms, ultimately resulting in [geomagnetic storms](#) and the **creation of aurora**.
  - The constantly changing inputs from the sun, the varying responses from the Earth's upper atmosphere, and the motion of the planet and particles in near-Earth

space all **work together to create different auroral motions and shapes.**

- In the Northern Hemisphere, the phenomenon is called the northern lights (***aurora borealis***), while in the Southern Hemisphere, it's called the southern lights (***aurora australis***).
- **Composition and Colors:**
  - Auroras **consist of gases and particles**, including oxygen and nitrogen.
  - The collisions of these particles with the atmosphere release energy in the form of light.
  - The colors observed in auroras depend on the **type of gas and altitude** of the collisions.
- **Impact:**
  - They can trigger **blackouts on the Earth**, knock out **satellites in space**, endanger the lives of astronauts, and affect **space weather** throughout the Solar System.

**Note: STEVE** is an **aurora-like phenomenon** that appears as a distinct, purple-colored arc with a moving green "picket-fence" structure. It can be observed from **lower latitudes** than the typical northern and southern lights.

## Geomagnetic Storm

- A geomagnetic storm is a major disturbance of Earth's magnetosphere that occurs when there is a very **efficient exchange of energy** from the solar wind into the space environment surrounding Earth.
- **Violent geomagnetic storms are rare**, occurring around once every few decades.
  - The last time charged particles from the Sun blew into the Earth with similar energy and intensity was in 2003.

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### Prelims

**Q. Consider the following statements: (2018)**

1. The Earth's magnetic field has reversed every few hundred thousand years.
2. When the Earth was created more than 4000 million years ago, there was 54% oxygen and no carbon dioxide.
3. When living organisms originated, they modified the early atmosphere of the Earth.

**Which of the statements given above is/are correct?**

- (a) 1 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: (c)**

**Q. Electrically charged particles from space travelling at speeds of several hundred km/sec can severely harm living beings if they reach the surface of the Earth. What prevents them from reaching the surface of the Earth? (2012)**

- (a) The Earth's magnetic field diverts them towards its poles

**(b)** Ozone layer around the Earth reflects them back to outer space.

**(c)** Moisture in the upper layers of atmosphere prevents them from reaching the surface of the Earth

**(d)** None of the statements (a), (b) and (c) given above is correct

**Ans: (a)**

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