



## Kodaikanal Solar Observatory

**For Prelims:** [India's Aditya-L1 Mission](#), Solar Observatory, Sunspots and Solar Flares, KoSO (Kodaikanal Solar Observatory).

**For Mains:** Solar Observatory, Achievements of Indians in Science & technology.

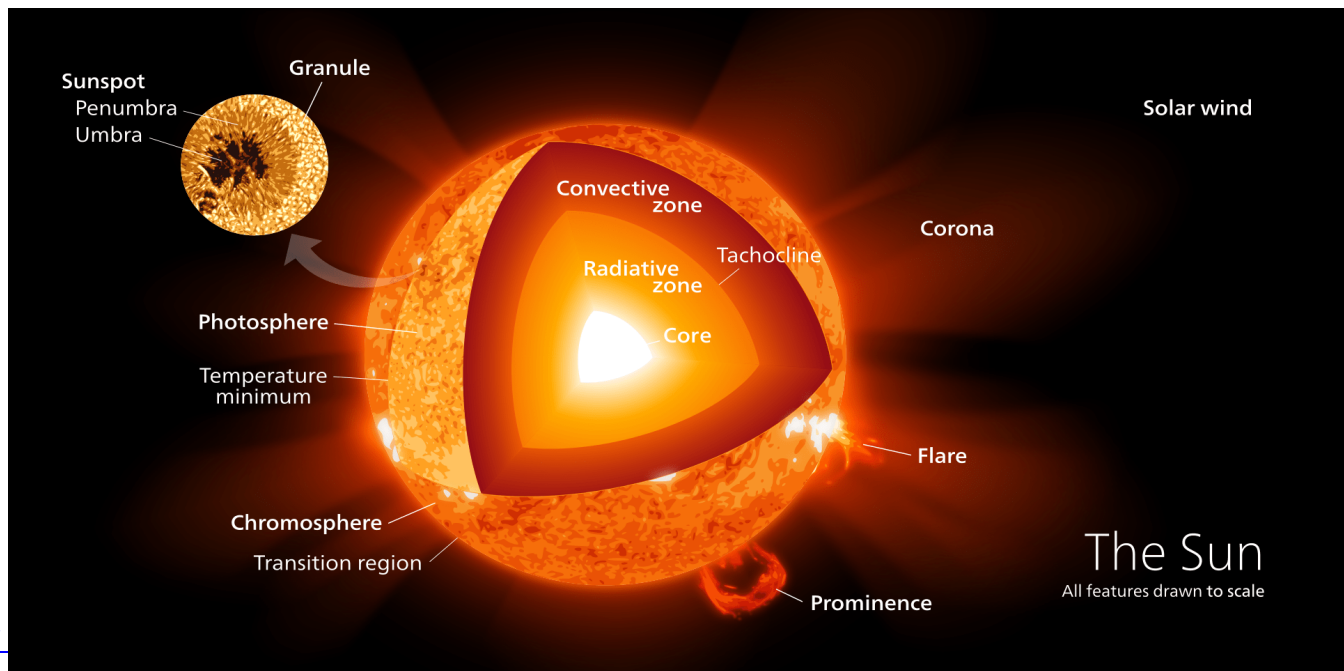
**Source:** IE

### Why in News?

Recently, **Kodaikanal Solar Observatory** celebrated its 125<sup>th</sup> birth anniversary. Over the years, it has played a crucial role in advancing our understanding of **solar activity** and its impact on **Earth's climate and space weather**.

### What is a Solar Observatory?

- **About:** A solar observatory is a facility or institution dedicated to observing and studying the Sun.
  - These observatories use specialised telescopes and instruments to observe various phenomena on the Sun's surface, in its atmosphere, and in the surrounding space.
- **Need:** The Sun serves as the main source of energy for life on Earth, and alterations in its surface or surrounding areas have the potential to greatly impact our Earth's atmosphere.
  - Intense solar storms and **Solar flares** pose significant risks to satellite operations, power grids, and **navigation systems** reliant on **space-based technology**.
  - Through solar observatories, scientists can monitor these events and predict major events that can have an impact on earth's atmosphere.



## What is the Kodaikanal Solar Observatory?

- **About:** The Kodaikanal Solar Observatory is a solar observatory owned and operated by the **Indian Institute of Astrophysics**. It was established in 1899.
  - It is on the southern tip of the **Palani Hills**.
  - The **Evershed effect** (apparent radial flow of gas observed in the penumbra (outer region) of sunspots on the Sun )was first detected at this observatory in **January 1909**.
- **Cause of Establishment: The establishment of the Kodaikanal Solar Observatory (KoSO) in India, was motivated by the need to understand the link between solar activity and monsoons.**
  - The devastating Great Drought of 1875-1877 in India highlighted the potential link between **solar activity and seasonal rainfall patterns**.
    - India, along with **China, Egypt, Morocco, Ethiopia, southern Africa, Brazil, Columbia and Venezuela**, suffered concurrent multi-year droughts during 1876-1878, later named the Great Drought, and an associated global famine that killed nearly 50 million.
  - The Famine Commission recommended establishing a **solar observatory for systematic solar observations** to understand this connection.
  - Charles Michie Smith, a physicist, was entrusted with **finding a suitable location**.
    - **Kodaikanal in Tamil Nadu** was chosen for its clear skies, low humidity, and minimal fog.
- **Madras Observatory (Chennai, 1792): In 1792, the British East India Company established the Madras Observatory, a first of its kind in this part of the world.**
  - Here, astronomical observations of the Sun, the Moon, bright stars and planets recorded **during 1812-1825 were preserved in two large data volumes**.
  - It was merged with the KoSO following the reorganisation of all Indian observatories in **April 1899**.

## What are the Other Major Space Observatories Established in India?

- **Indian Astronomical Observatory (IAO), Hanle:** It is situated in Hanle Ladakh and one of the country's premier astronomical facilities.
  - It is operated by the Indian Institute of Astrophysics and plays a vital role in advancing India's contributions to the field of astronomy and astrophysics.
- **Mt. Abu Infrared Observatory (MIO):** It is situated at the top of Mount Abu

**(at Gurushikhar) in the Aravalli Range of Rajasthan, India.**

- It is operated by the Physical Research Laboratory (PRL).
- Infrared astronomy involves observing celestial objects and phenomena in the infrared portion of the electromagnetic spectrum.
- **Giant Metrewave Radio Telescope:** It is a prominent radio astronomy facility located near Pune, India.
  - Operated by the **National Centre for Radio Astrophysics (NCRA)**, the GMRT comprises 30 fully steerable parabolic radio telescopes spread over a large area.
  - Its design is based on the SMART Concept: **Stretch Mesh Attached to Rope Trusses.**

## What are the Other Global Efforts and Missions to Study the Sun?

- **India's Aditya-L1 Mission:** Aditya-L1 is the first space-based observatory class Indian solar mission to study the Sun from a substantial distance of 1.5 million kilometres.
- **NASA's Parker Solar Probe:** It aims to trace how energy and heat move through the Sun's corona and to study the source of the solar wind's acceleration.
  - It recently made a 1<sup>st</sup>-of-its-kind observation within a coronal mass ejection.
- **Helios 2 Solar Probe:** The earlier Helios 2 solar probe, a joint venture between NASA and the space agency of erstwhile West Germany, went within 43 million km of the Sun's surface in 1976.
- **Solar Orbiter:** A joint mission between the European Space Agency and NASA to collect data that will help answer a central question of heliophysics like how the Sun creates and controls the constantly changing space environment throughout the solar system.

### Drishti Mains Question

**Q:** How do solar observations and solar activity data aid in the prediction and anticipation of severe geological and atmospheric phenomena? Discuss in context with India's progress in this field.

## UPSC Civil Services Examination, Previous Year Question (PYQ)

### Prelims

**Q. Consider the following statements: (2016)**

The Mangalyaan launched by ISRO

1. is also called the Mars Orbiter Mission
2. made India the second country to have a spacecraft orbit the Mars after USA
3. made India the only country to be successful in making its spacecraft orbit the Mars in its very first attempt

**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)**

### Mains:

**Q.** Discuss India's achievements in the field of Space Science and Technology. How the application of this

technology has helped India in its socio-economic development? (2016)

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