



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.

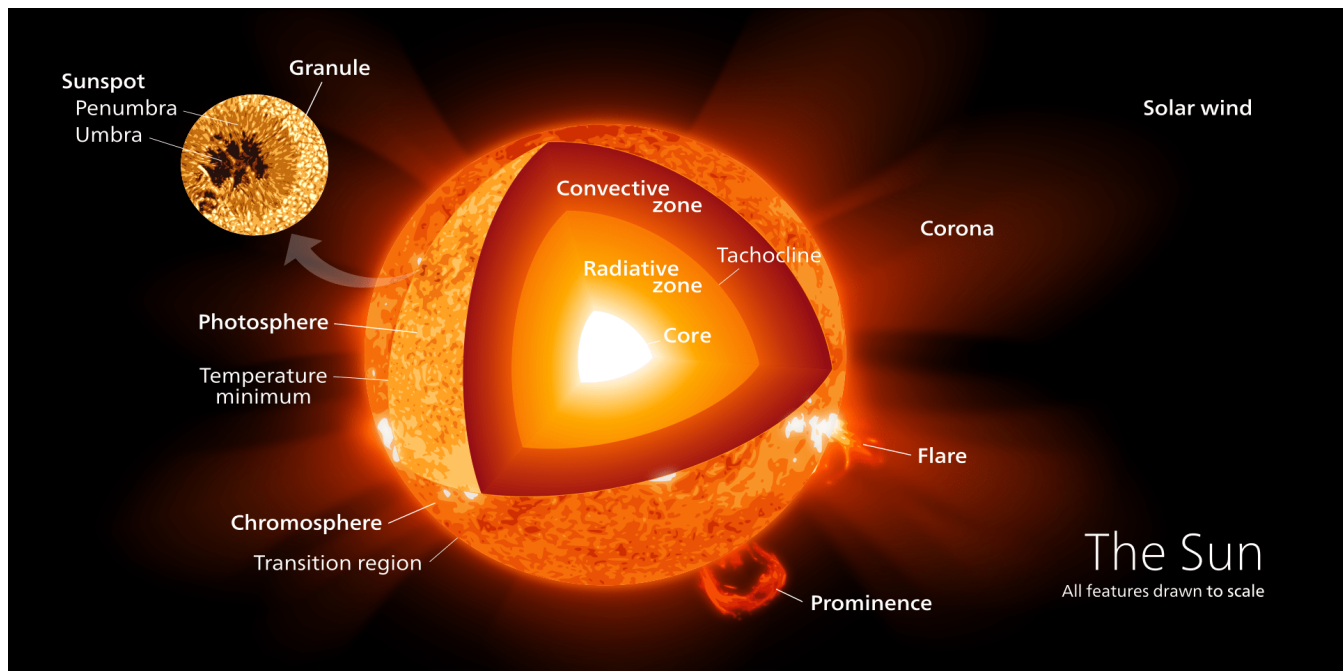
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Why in News?

Recently, **Kodaikanal Solar Observatory** celebrated its 125th 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 1st-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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