

How India's first solar observatory was set up in Kodaikanal 125 yrs ago

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SINCE ANCIENT times, seafarers, mathematicians, astronomers, and physicists have studied the Sun. In 1792, the British East India Company established the Madras Observatory, a first-of-its-kind facility in this part of the world, where early solar and other astronomical observations in India began.

On April 1, 1889, it was merged with Kodaikanal's Solar Physics Observatory and it then became the Kodaikanal Solar Observatory (KoSo), which has been operational for 125 years.

Roots in Great Drought

Scanty rainfall over South India in 1875 triggered a terrible drought that led to the deaths of many millions of people across the Madras and Mysore Provinces between 1875 and 1877. Countries such as China, Egypt, and Morocco also suffered multi-

year droughts during this period, and an associated global famine is estimated to have killed nearly 50 million people.

The Great Drought was due to multiple factors — solar activity, cool Pacific Ocean conditions followed by a record-breaking El Niño (1877-1878), strong Indian Ocean Dipole, and warm North Atlantic Ocean conditions.

Why Kodaikanal was chosen

Based on evidence that sunspot periodicity (a solar cycle of 11 years, when the Sun's activity can be at maxima or minima) was linked to the seasonal rainfall distribution over

India, the Famine Inquiry Commission recommended that the Government of India undertake regular solar observations and establish a dedicated solar observatory in southern India. Thus, the idea for an Indian solar observatory was born.

Scotland-born Charles Michie Smith, who had briefly served as the Government Astronomer at the Madras Observatory, was

asked to locate a site. Leh, Mussoorie, and Shimla in North India were rejected for being dusty and cloudy, with an unstable atmosphere. Regular solar observations from southern Indian hilltops were found to be better.

Smith surveyed Kodaikanal in the Palani hills and Kotagiri in the Nilgiris on parameters like rainfall, cloud cover, sky transparency, haze, atmospheric stability, humidity, fog, and mist. Kodaikanal was finally chosen as the ideal location.

In August 1893, the government of the Raj sanctioned the Solar Physics Observatory under the meteorological budget. In 1895, Lord Wenlock, then Governor of Madras, laid its foundation stone.

Under Smith, who later became the first director of the renamed KoSO, construction of the observatory picked up pace. By the end of 1900, the main observatory building and two adjacent domes had been built.

Why study the Sun

Being the primary source of energy, the Sun supports life on Earth. Any change on the solar surface or its periphery significantly im-



The Kodaikanal Solar Observatory.
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pacts the Earth's atmosphere. Powerful solar storms and solar flares can potentially harm satellite-based operations, power grids, and navigation networks.

Expanding scope of study

Following the reorganisation of all Indian observatories, implemented by the Government of India on April 1, 1899, the

Madras Observatory was merged with KoSO. Systematic solar observations commenced here on March 14, 1901.

The Bhavnagar Telescope, named after Maharaja of Bhavnagar, operated at KoSO during its nascent years. This 16-inch Newtonian (later Cassegrain) mobile telescope was imported from Dublin, Ireland, and first established at the Maharaja Takhtasinghji Observatory in Poona (now Pune) around 1888. However, when the Poona observatory closed down, it was sent to KoSO in 1912.

Initial KoSO solar observations included tracing bright lines from the Sun's atmospheric layers, measuring solar radiations, and the direct photography of the Sun in monochromatic lights of calcium and hydrogen (done to show specific features clearly).

Until the end of World War II in 1945, KoSO was dedicated to solar physics. Thereafter, it expanded its ambit to study cosmic rays, radio astronomy, ionospheric physics, etc. The continuous recording of the solar radio noise flux (an indicator of solar activity) commenced in 1952 and is considered India's earliest solar radio observations.

KoSO at age 125

After astrophysics was separated from the India Meteorological Department (IMD), KoSO was reconstituted into an autonomous institution named the Indian Institute of Astrophysics (IIA) on April 1, 1971.

From solar data recorded on basic photographic plates or films, KoSO boasts a huge digital repository containing 1.48 lakh digitised solar images. These include 33,500 white-light images (showing sunspots) and thousands of other images of the Sun recorded every day since the start of the 20th century. It is the only observatory offering high-resolution digitised images for such a long period.

Currently, it houses a spectrum of advanced instruments like a White light Active Region Monitor (WARM), with calcium and sodium filters to make full disc simultaneous observations of the photosphere and chromosphere layers of the Sun.

The KoSO's rich data repository could help reconstruct the Sun's past and link its behavioural changes to understand and predict its future impact.

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