



## India's First Commercial SSA Observatory

**For Prelims:** Space Debris, Project NETRA, Clearspace-1, Space Situational Awareness (SSA)

**For Mains:** Space Situational Awareness (SSA), Space Debris, India as Space Power

### Why in News?

India's **first commercial [Space Situational Awareness \(SSA\) Observatory](#)** will be set up in the Garhwal region of **Uttarakhand**.

- The observatory will be set up by **Digantara, a Bengaluru-based space sector start-up**.

### What are the Key Points of the Observatory?

- The observatory will be the **first-of-its-kind in the region**, set up to augment the start-up's SSA capabilities.
- It will be **strategically positioned to serve global space traffic management** operations.
- It will **assist in tracking any activity in space** including that of **[space debris](#) and [military satellites](#)** hovering over the region.
  - At present, the **US is a dominant player in monitoring space debris**.
- The observatory will bring value to the nation by **servicing as an essential data source for advancing knowledge** of the realm of space.
- It will be able to supplement its **space-based sensors** in their mission to monitor satellites and debris in orbits ranging from Low Earth Orbit (LEO) to **[Geosynchronous Earth Orbit \(GEO\)](#)**.

### What is Space Debris?

- Space debris consists of **spent rocket stages, dead satellites, fragments of space objects** resulting from **[Anti-satellite \(ASAT\) System \(ASAT\)](#)**.
- Hurling at an average speed of 27,000 kmph in **[Low Earth Orbit \(LEO\)](#)**, these objects **pose a very real threat** as collisions involving even centimetre-sized fragments can be **lethal to satellites**.
- This free floating space debris is a **potential hazard for operational satellites** and colliding with them can leave the satellites dysfunctional.
- If there is too much space junk in orbit, it could result in a chain reaction where more and more objects will collide and create new space junk in the process, to the point where **Earth's orbit becomes unusable - a Domino Effect**.

### What about India's Current Scenario regarding SSA?

- **About SSA:**

- **Space Situational Awareness (SSA)** refers to keeping track of objects in orbit and predicting where they will be at any given time.
- It involves monitoring the movement of all objects — **natural (meteors) and man-made (satellites)** — and **tracking space weather**.
- SSA is generally understood as covering three main areas:
  - Space Surveillance and Tracking (SST) of man-made objects.
  - Space Weather (SWE) monitoring and forecast.
  - Near-Earth Objects (NEO) monitoring (only natural space objects).
- **India's SSA Capability:**
  - At present, India uses a **Multi Object Tracking Radar at Sriharikota range** (Andhra Pradesh), but it has a limited range.
  - Further, for SSA, **India depends on data from NORAD (North American Aerospace Defence Command)** and others available in the public domain.
    - However, these platforms don't provide accurate or comprehensive information.
- **Nodal Agency:**
  - **ISRO's** efforts towards SSA is coordinated by the **SSA Control Centre in Bengaluru** and managed by the **Directorate of Space Situational Awareness and Management** at the ISRO headquarters.
- **Related Initiatives:**
  - **Project NETRA:** '**Project NETRA**' will be an early warning system in space to detect space debris and other hazards to Indian satellites.
    - Once operational, **it will give India its own capability in Space Situational Awareness (SSA)** like the other space powers.
    - Under this project, a space debris tracking radar with a range of 1,500 km and an optical telescope will be inducted
  - **Clearspace-1:** At global level, this initiative of the **European Space Agency**, scheduled to launch in 2025, will be the **first space mission to eliminate debris** from orbit.

## What is the Significance of the Upcoming SSA Observatory?

- **Reduce Collision Rates:**
  - The observatory is designed with a **capability to track objects as small as 10cm (in size)**. It would be able to **reduce the potential for collisions between satellites** and other spacecraft by making **more accurate predictions of their location, speed, and trajectory**
- **Tracking and Identifying Pre-Existing RSOs:**
  - It would improve the effectiveness of tracking and identifying **pre-existing Resident Space Objects (RSO)**.
- **Enhancing Indigenous Capabilities:**
  - Promoting development of such critical technology and infrastructure is necessary towards **building indigenous resilient capabilities and compete on a global stage**.
  - It will result in the **creation of a hybrid data pool** that will **serve both the commercial and the defence sectors** of the space industry.
- **Supplement Global Networks:**
  - A data gap has been witnessed due to the **lack of dedicated SSA sensors** between Australia and southern Africa
  - The observatory will play a vital role in **monitoring space activities above the Indian subcontinent**, relaying real-time data essential to safeguard the Indian assets.
    - Global networks of SSA sensors will be supplemented by this observatory to **offer constant tracking of objects over this part of the globe**.

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

### Prelims

**Q. With reference to 'Astrosat', the astronomical observatory launched by India, which of the following statements is/are correct? (2016)**

1. Other than USA and Russia, India is the only country to have launched a similar observatory into

space.

2. Astrosat is a 2000 kg satellite placed in an orbit at 1650 km above the surface of the Earth.

**Select the correct answer using the code given below:**

- (a) 1 only
- (b) 2 only
- (c) Both 1 and 2
- (d) Neither 1 nor 2

**Ans: (d)**

- **AstroSat** is the first dedicated Indian astronomy mission **aimed at studying celestial sources in X-ray, optical and UV spectral bands simultaneously.**
- **India is the 5<sup>th</sup> country to join space observatory elite list after the USA, Russia, Japan and Europe. Hence, statement 1 is not correct.**
- AstroSat with a lift-off mass of about 1513 kg was launched into a 650 km orbit inclined at an angle of 6 degrees to the equator by PSLV-C30. **Hence, statement 2 is not correct.**
- **Therefore, option (d) is the correct answer.**

### **Mains**

**Q.** What is India's plan to have its own space station and how will it benefit our space programme? **(2019)**

**Q.** India has achieved remarkable successes in unmanned space missions including the Chandrayaan and Mars Orbiter Mission, but has not ventured into manned space mission. What are the main obstacles to launching a manned space mission, both in terms of technology and logistics? Examine critically. **(2017)**

**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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