08th January 2026: DSC

Aditya-L1 AO Data Call — ISRO Opens Solar Mission Data to Indian Scientists

Why is it in news?

Marking the second anniversary of India's maiden solar observatory mission, **Aditya-L1**, the Indian Space Research Organisation (ISRO) has released an **Announcement of Opportunity (AO)** inviting Indian scientists and academic researchers to utilise the mission's first AO-cycle data for advanced solar-science investigations.

The Aditya-L1 spacecraft successfully entered a **halo orbit around the Sun–Earth Lagrange Point-1 (L1)** on **6 January 2024**, nearly **127 days after its launch on 2 September 2023**. Since then, the mission has been conducting uninterrupted observations of the Sun. ISRO has now made **over 23 terabytes of high-value scientific data** publicly available, enabling both national and global research participation.

Relevance

GS-III | Science & Technology — Space Research, Heliophysics, Space-based Observations

Facts & Data — Mission Status and Scientific Output

- **Mission Objective:** India's first dedicated solar mission designed to study the Sun continuously from the L1 vantage point (approximately **1.5 million km from Earth**), free from eclipses or Earth-shadow interruptions.
- **Orbit Position:** Halo orbit around L1 enabling constant monitoring of:
    - solar corona
    - solar wind
    - coronal mass ejections (CMEs)
    - magnetic fields
    - high-energy solar radiation
- **Data Generated:**
    - More than **23 TB of solar observation data** released so far
    - Multiple **peer-reviewed scientific publications** already produced using mission datasets
- **Key Instruments (illustrative):**
    - **VELC, SUIT, ASPEX, PAPA, SoLEXS, HEL1OS, MAG** — covering coronagraphy, spectroscopy, energetic particle analysis, and magnetic-field measurements

What ISRO's AO Call Involves?

- **Eligibility:** Indian scientists and researchers affiliated with universities, national laboratories, institutes, and colleges engaged in solar or space sciences.

- **Mode of Participation:** Applicants may apply as **Principal Investigators (PIs)** with detailed research proposals outlining:
    - scientific objectives and justification
    - data-analysis strategy
    - anticipated research outputs and deliverables
- **Core Objective:** To maximise scientific returns from the Aditya-L1 mission by broadening community participation and fostering collaborative, multi-institutional solar research.

Why this matters?

- Democratises access to mission-critical space-science datasets, strengthening India's domestic solar-physics research ecosystem.
- Enhances national **space-weather forecasting capacity**, with implications for satellite safety, power grids, aviation, navigation, and communication systems.
- Positions India as an active global contributor to **heliophysics research**, alongside missions such as SOHO, Parker Solar Probe, and Solar Orbiter.
- Encourages domestic research capacity-building, high-impact publications, and innovation in astrophysics and space-instrumentation science.

Indigenous Biomaterials — A Pathway to Cut Fossil-Based Imports and Build a Bio-Economy

Why is it in news?

The article draws attention to India's increasing strategic emphasis on **indigenous biomaterials and biomanufacturing** as a means to reduce reliance on fossil-based imports, enhance industrial competitiveness, and advance environmental sustainability while also improving farmer incomes.

As global markets shift toward **low-carbon, circular, and bio-based materials**, India's biomaterials sector has emerged as an estimated **USD 500-million industry in 2024**, spanning bioplastics, biopolymers, and bio-derived materials. However, scaling this opportunity requires coordinated investments in infrastructure, feedstocks, waste-management systems, and policy alignment to remain globally competitive.

Relevance

GS-III | Economy, Environment, Science & Technology — bio-economy, circular economy, import substitution, sustainable materials, industrial policy, farmer value-chains.

Facts & Data — What are Biomaterials?

- **Definition:** Materials wholly or partially derived from biological sources, or engineered through biological processes, intended to replace, complement, or interact with conventional petroleum-based materials.
- **Application Areas:** Packaging, textiles, construction, healthcare, composites, and consumer goods.

Three Broad Categories

- **Drop-in biomaterials:** Chemically identical to petro-based materials and compatible with existing manufacturing systems (e.g., bio-PET).
- **Drop-out biomaterials:** Chemically distinct and requiring new processing or end-of-life systems (e.g., PLA — polylactic acid).
- **Novel biomaterials:** Materials with entirely new properties, such as self-healing materials, bio-active implants, and advanced biocomposites.

Why Biomaterials Matter for India?

- **Strategic import substitution:** Reduces dependence on fossil-based imports in plastics, chemicals, and materials.
- **Industrial expansion:** Strengthens domestic biomanufacturing value chains and industrial competitiveness.
- **Farmer livelihood diversification:** Generates new income streams from agricultural residues and bio-feedstocks.
- **Climate and sustainability alignment:** Supports single-use plastic bans, circular-economy objectives, and climate-action commitments.
- **Export competitiveness:** Aligns Indian products with evolving global low-carbon regulations and consumer preferences.

Where India Stands — Sector Snapshot

- **Bioplastics market size (2024):** Approximately **USD 500 million**, with strong growth potential.
- **Key domestic initiatives:**
    - **Balrampur Chini Mills:** PLA manufacturing plant in Uttar Pradesh — among the largest planned biomaterials investments in India.
    - **Praj Industries:** Demonstration-scale bioplastics facility.
    - **Start-ups:** Phool.co (temple-waste-to-biomaterials) and others promoting circular bio-economy models.
- **Capability gap:** Continued dependence on foreign technologies for converting biomass feedstocks into commercially viable biomaterials in several segments.

Risks & Constraints

- Potential competition between feedstocks and food crops if scaling is poorly managed.
- Risk of water and soil degradation from intensive biomass cultivation.
- Weak composting and waste-segregation systems that may undermine environmental benefits.
- Fragmented policy silos across agriculture, industry, and environment.

- Risk of falling behind in the global biomaterials race, leading to future import dependence.

Way Forward — Action Priorities

- Scale up biomanufacturing infrastructure: fermentation units, polymerisation facilities, pilot plants, and shared R&D platforms.
- Improve feedstock productivity using advanced agritech and bioprocess innovations.
- Increase R&D and standard-setting for drop-in and novel biomaterials.
- Provide regulatory clarity on definitions, labelling, recycling, and composting norms.
- Deploy market-shaping tools such as government procurement, time-bound incentives, and early-investment de-risking.

Classical Language Heritage — Govt Releases 55 Volumes of Indian Literary Works

Why is it in news?

The Union Education Minister has released **55 volumes of literary works** in India's classical languages, including **Kannada, Odia, Telugu, Malayalam, and Tamil**, alongside a **sign-language adaptation of the Tirukkural** by the Tamil poet Thiruvalluvar.

The initiative is part of a broader national programme to promote India's linguistic and literary heritage, led by the **Centres of Excellence for Classical Languages** under the **Central Institute of Indian Languages (CIIL)** and the **Central Institute of Classical Tamil**.

Relevance

- **GS-I | Indian Heritage & Culture** — Classical languages, literature, civilisational legacy
- **GS-II | Governance** — NEP 2020, cultural policy, inclusion and accessibility

Facts & Data — What was released?

- **Total publications:** 55 volumes
- **CIIL Centres of Excellence:** 41 works
- **Central Institute of Classical Tamil:** 13 books plus a sign-language Tirukkural series
- **Languages covered:** Kannada, Odia, Telugu, Malayalam, Tamil
- **Formats:** Literary texts, translations, scholarly commentaries, and sign-language editions.

Key Literary Works & Highlights

- **Tamil:** Tirukkural (including sign-language version), Silappathikaram, Nannool, classical commentaries
- **Malayalam:** Purananooru, Pathuppattu
- **Odia:** Charyapada, Madalapanji

- **Kannada & Telugu:** Classical and medieval texts with translations and linguistic documentation

Purpose & Policy Linkages

- Aligns with **NEP 2020** emphasis on Indian languages, knowledge systems, and cultural heritage.
- Promotes classical languages as instruments of national unity, dialogue, and inclusiveness.
- Strengthens research, translation initiatives, and public access to ancient and medieval literature.

Why this matters?

- **Cultural preservation:** Institutional support for endangered literary traditions.
- **Academic enrichment:** Expands resources for linguistics, history, and literary research.
- **Inclusive access:** Sign-language editions broaden participation.
- **Soft power:** Reinforces India's civilisational identity and linguistic diversity.

Classical Languages Recognised by the Government of India

Tamil, Sanskrit, Telugu, Kannada, Malayalam, Odia, Marathi, Pali, Prakrit, Assamese, Bengali.

Grasslands in Climate Policy — Recognising Rangelands as Carbon Sinks Beyond Forests

Why is it in news?

Following the UN declaration of **2026 as the International Year of Rangelands and Pastoralists**, renewed attention has been drawn to the under-recognition of grasslands and savannahs in climate policy. Despite repeated UNFCCC climate summits — including **COP30 in Belém, Brazil** — climate finance and mitigation frameworks remain heavily forest-centric.

Scientists, Indigenous communities, and policy organisations caution that grasslands are among the most threatened biomes globally, facing rapid degradation from agriculture, mining, invasive species, fire suppression, and policy neglect — despite their critical role in carbon storage, hydrology, biodiversity, and livelihoods.

Relevance

- **GS-III | Environment, Climate Change, Conservation, Land Use**
- **GS-II | Multilateralism, Indigenous Rights, Natural-Resource Governance**

Facts & Data — Why Grasslands Matter

- **Global coverage:** Grasslands and savannahs account for nearly **40% of Earth's land surface**.

- **Carbon storage:** Large proportion of carbon stored underground in soils, making them stable long-term sinks.
- **Ecosystem resilience:** Often more resilient than forests to droughts and fires when managed traditionally.

Threats & Regional Evidence

- **Australia:** Desert grasslands impacted by buffel grass invasion, intensifying fires and displacing native species; Indigenous land management practices remain under-funded.
- **Brazil:** Cerrado savannah losing habitat at nearly twice the rate of the Amazon; linked to agriculture, mining, and toxic waste dumping.

Policy Context

- UNFCCC climate finance remains forest-focused.
- Grasslands better addressed under **CBD and UNCCD**.
- UNCCD COP16 Resolution L15 highlights rangelands as complex socio-ecological systems.

India-Specific Insights

- Grasslands fall under **18 different Ministries**, leading to fragmented governance.
- Often misclassified as wastelands or afforestation zones.
- India's NDC targets forest-based sinks; including grasslands would strengthen mitigation.

What Needs to Change?

- Recognise grasslands as independent ecosystems.
- Integrate them into NDCs, biodiversity and land-degradation frameworks.
- Secure Indigenous and community land rights.
- Improve cross-convention coordination (UNFCCC-CBD-UNCCD).

FTA Impact — India's Trade Deficit with Partner Countries Widens Despite Export Gains

Why is it in news?

According to **NITI Aayog's Trade Watch Quarterly (January 2026)**, India's trade deficit with FTA partner countries increased by **59.2% year-on-year during April–June 2025**, even as exports — particularly electronics — recorded strong growth.

The findings emerge amid India's expanding FTA negotiations with the EU, U.S., Australia, EAEU, GCC, Canada, SACU, and prospective PTAs with Brazil and Israel, raising concerns over trade imbalances and domestic competitiveness.

Relevance

GS-III | Economy — External Sector, FTAs, Trade Balance, Manufacturing Competitiveness

Facts & Data — Trade Deficit Trends

- **Deficit growth:** +59.2% YoY (Apr–Jun 2025).
- **Drivers:** Rising petroleum and gold imports, weak exports in several sectors, and strong import demand from FTA partners.

Sectoral Performance

- **Electronics exports:** 47% YoY growth; now India's second-largest export sector.
- **Deficit pressure:** Petroleum oils, gold, and intermediate goods.

Geographic Patterns

- Rising imports from UAE, China, and the U.S.
- Export growth to South Korea, Japan, Thailand, and Bhutan.
- Export contraction in Singapore, Australia, and Saudi Arabia.

Policy Significance

- Reinforces a recurring FTA pattern where imports rise faster than exports without domestic capacity upgrades.
- Highlights electronics PLI success but underscores lack of broad-based export competitiveness.
- Signals need to align FTA strategy with industrial policy, rules-of-origin enforcement, and trade-deficit management.

08th January 2026: Daily MCQs

Q1. With reference to the Aditya-L1 mission, consider the following statements:

1. The spacecraft is placed in a halo orbit around the Sun–Earth Lagrange Point-1, enabling continuous solar observations without Earth eclipses.
2. More than 23 terabytes of Aditya-L1 data have already been placed in the public domain for scientific research.
3. ISRO's Announcement of Opportunity (AO) is open only to scientists affiliated with ISRO centres.

Which of the statements given above is/are correct?

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

Answer: (a)
Explanation: AO is open to Indian scientists from universities and institutes, not limited to ISRO.

Q2. Consider the following instruments associated with the Aditya-L1 mission:

1. VELC
2. SUIT
3. ASPEX
4. RISAT

Which of the above are onboard Aditya-L1?

(a) 1, 2 and 3 only
(b) 2 and 4 only
(c) 1 and 4 only
(d) 1, 2, 3 and 4

Answer: (a)
Explanation: RISAT is a radar Earth-observation satellite series, not part of Aditya-L1.

Q3. With reference to biomaterials, consider the following pairs:

Category	Description
1. Drop-in biomaterials	Chemically identical to petro-materials
2. Drop-out biomaterials	Require new processing and end-of-life systems
3. Novel biomaterials	Always biodegradable and compostable

Which of the pairs given above is/are correctly matched?

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

Answer: (a)
Explanation: Novel biomaterials are not necessarily biodegradable; they may have new functional properties.

Q4. Which of the following is highlighted as a major *risk* in scaling up indigenous biomaterials in India?

(a) Over-reliance on mineral imports
(b) Competition between biomass feedstocks and food crops
(c) Excessive mechanisation of agriculture
(d) Declining demand for bio-based products globally

Answer: (b)
Explanation: Feedstock–food competition and resource stress are explicitly flagged.

Q5. The recently released 55 volumes of classical literary works were developed primarily under which institutional framework?

(a) Archaeological Survey of India
(b) National Council of Educational Research and Training
(c) Centres of Excellence under CIIL and Central Institute of Classical Tamil
(d) Sahitya Akademi alone

Answer: (c)
Explanation: CIIL Centres of Excellence and the Central Institute of Classical Tamil led the initiative.

Q6. Which of the following classical languages were covered in the latest release of literary volumes?

1. Kannada
2. Odia
3. Telugu
4. Assamese

Select the correct answer using the code below:

(a) 1, 2 and 3 only
(b) 1 and 4 only
(c) 2, 3 and 4 only
(d) 1, 2, 3 and 4

Answer: (a)
Explanation: Assamese is a classical language but not part of this specific release.

Q7. With reference to grasslands in climate policy, consider the following statements:

1. Grasslands store a significant proportion of carbon underground in soils.
2. Grasslands are fully integrated into UNFCCC climate-finance mechanisms.
3. Indigenous land-management practices often enhance grassland resilience to fires.

Which of the statements given above is/are correct?

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

Answer: (a)
Explanation: Grasslands remain under-recognised in UNFCCC frameworks.

Q8. The UN resolution that explicitly recognises rangelands as complex socio-ecological systems was adopted under which convention?

(a) UNFCCC
(b) Convention on Biological Diversity
(c) United Nations Convention to Combat Desertification
(d) Ramsar Convention

Answer: (c)
Explanation: UNCCD COP16 Resolution L15 addresses rangelands.

Q9. In the Indian context, grasslands are administratively fragmented because they fall under:

(a) Only the Ministry of Environment, Forest and Climate Change
(b) The concurrent jurisdiction of States and Panchayats
(c) Multiple Ministries with overlapping and conflicting classifications
(d) Exclusive control of the Ministry of Rural Development

Answer: (c)
Explanation: Grasslands fall under about 18 Ministries with differing classifications.

Q10. According to NITI Aayog's 'Trade Watch Quarterly', India's trade deficit with FTA partners widened primarily due to:

1. Rising petroleum import values
2. Surge in gold imports
3. Uniform export growth across all manufacturing sectors

Which of the above factors contributed to the widening deficit?

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

Answer: (a)
Explanation: Export growth was uneven; electronics grew, but not all sectors.

Q11. Which sector emerged as India's second-largest export sector during April–June 2025?

(a) Pharmaceuticals
(b) Engineering goods
(c) Electronics
(d) Textiles

Answer: (c)
Explanation: Electronics exports grew by about 47% YoY.

Q12. Which of the following is the key policy concern highlighted regarding India's FTAs?

(a) FTAs always worsen trade deficits irrespective of sectoral performance
(b) Export gains automatically translate into current-account surpluses
(c) Imports often rise faster than exports without domestic capacity upgrades
(d) FTAs discourage participation in global value chains

Answer: (c)
Explanation: The report stresses the need for industrial upgrading and value-addition.

Mains: India's classical languages represent a continuous civilisational knowledge system rather than static literary relics. Discuss the significance of the recent release of classical literary volumes in strengthening cultural preservation, academic research, and inclusive access.