

ISRO seized of the issue of proliferation of large number of Low Earth Orbit (LEO) Satellite constellations or Satellite Internet constellations causing accumulation of Space debris and is taking all possible steps for its mitigation and prevention: Dr Jitendra Singh

ISRO's 'Debris Free Space Mission' to play key role in safeguarding space assets and limiting further generation of debris through Active Debris Removal (ADR) and other means: Dr Jitendra Singh

ISRO Has Been a Member of Inter-Agency Space Debris Coordination Committee Since 1996: Dr. Jitendra Singh

Indian Space Policy Mandates Internationally Recognised Guidelines for End-of-Life Disposal of Satellites

Space Situational Awareness, Active Debris Removal and Indigenous Monitoring Capabilities Key to Long-Term Space Sustainability

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The Indian Space Research Organisation (ISRO) is seized of the issue of proliferation of a large number of Low Earth Orbit (LEO) satellite constellations or Satellite Internet constellations causing accumulation of Space debris and is taking all possible steps for its mitigation and prevention, Minister of State for Personnel, Public Grievances & Pensions and Prime Minister's Office, Dr. Jitendra Singh, said in a reply in the Rajya Sabha today.

ISRO's 'Debris Free Space Mission' will play a key role in safeguarding space assets and limiting further generation of debris through Active Debris Removal (ADR) and other means, the Minister added.

Dr. Jitendra Singh stated that satellite constellations for internet connectivity typically consist of a few thousand satellites, significantly increasing collision risks in orbital regions around their respective orbital shells. While many large constellations have autonomous collision avoidance capabilities, some satellites may fail on-orbit and may not be capable of manoeuvring to avoid collisions.

The Minister further noted that small-sized untrackable debris poses an additional risk, as such debris cannot be avoided through collision avoidance or adequately shielded against. An impact can cause mission-ending damage, rendering a satellite non-functional and generating further debris. Given the large number of satellites involved, the aggregate risk of debris creation is significant. He also pointed out that any fragmentation event, whether caused by a collision or accidental break-up near a populated orbital shell, could further escalate these risks.

Highlighting India's institutional engagement on space debris monitoring and mitigation, Dr. Jitendra Singh informed that the Inter-Agency Space Debris Coordination Committee (IADC), formed in 1993, is considered the most recognised body dealing with space debris monitoring and mitigation matters. ISRO under the Department of Space has been a member of IADC since 1996. He also stated that the United Nations Committee on the Peaceful Uses of Outer Space (UN-COPUOS) addresses space debris mitigation and long-term sustainability matters, including the safety of space operations.

India is represented in international fora dealing with space debris, including the IADC, UN Scientific and Technical Subcommittee (UN-STSC) Working Group on Long-Term Sustainability and Expert Group on Space Situational Awareness (SSA). Dr. Jitendra Singh stated that IADC members regularly deliberate on space debris-related matters and revise space debris mitigation guidelines in response to the evolving space debris environment. Space debris monitoring and spaceflight safety aspects are also discussed in the Long-Term Sustainability and Space Situational Awareness working groups.

He further informed that other international platforms, including the IAA Space Debris Working Group and ISO Working Group 7, provide avenues for coordination between the Department of Space and international agencies on space debris monitoring and mitigation.

On end-of-life disposal of satellites, Dr. Jitendra Singh said the Indian Space Policy mandates adoption of internationally recognised guidelines on space debris mitigation, including measures relating to end-of-life disposal, in the Indian space programme. The Debris Free Space Mission initiative, spearheaded by ISRO, is a proactive step towards implementing guidelines on end-of-life disposal of satellites.

The Minister also stated that the Norms, Guidelines and Procedures released by IN-SPACe in 2024 encourage all Indian space actors to adopt adequate post-mission disposal measures or ensure that their space assets have very limited orbital life through natural orbital decay.

Dr. Jitendra Singh identified Space Situational Awareness (SSA) as one of the most crucial enablers of long-term space sustainability. He said other important requirements include operators fulfilling technical requirements such as manoeuvrability and trackability, meeting basic obligations including registration and sharing of points of contact, and ensuring a robust regulatory framework.

The Minister further stated that wider implementation of internationally recognised space debris mitigation measures and better compliance with the requirements of the Debris Free Space Mission will play a key role in safeguarding space assets and limiting further generation of debris. He also highlighted the importance of Active Debris Removal (ADR) in curtailing the growth of space debris. Activities serving as precursors to ADR have already been initiated through on-orbit demonstrations and are expected to mature over time.

Emphasising the importance of both international cooperation and indigenous capabilities, Dr. Jitendra Singh said international collaboration and data sharing are essential for comprehensive Space Situational Awareness and long-term sustainability. At the same time, self-reliance through indigenous capacity building for space object monitoring will be pursued along with innovative measures and R&D to address emerging challenges. He also stressed the importance of raising awareness among space actors about the fragility of utilisable regions of the space environment to ensure long-term sustainability.



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