

Tiangong-1 Downing and Space Debris

What is the issue?

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- The recent downing of Tiangong-1 ended concerns about where the debris from the space station would fall.

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- It has however reignited the larger debate about space debris itself.

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What is Tiangong-1?

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- Tiangong-1 is China's space station.

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- Launched in 2011, it made China just the third country to launch a space station.

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- The Chinese used it to demonstrate spacecraft docking capabilities.

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- Six astronauts visited Tinangong-1 in 2012 and 2013 in two crews.

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- It included China's first woman astronauts, Liu Yang and Wang Yaping.

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What happened to it?

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- Chinese lost control of the station in 2016.

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- After losing control, China notified the United Nations Office for Outer Space Affairs and the Inter-Agency Space Debris Coordination Committee.

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- Much of Tiangong burnt up in the atmosphere, until it finally splashed into

the ocean.

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- Weighing 8.5 tonnes, it dropped out of orbit and splashed into the South Pacific Ocean, just northwest of Tahiti.

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- Tiangong-2 continues to be operational.

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- This lab was launched the same year the Chinese lost control of the now-downed space station.

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What are the concerns with space debris?

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- At least 500,000 pieces of space debris, of various sizes, are orbiting the Earth.

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- Nearly 7,500 tonnes of estimated amount of defunct, artificially created objects are currently in space.

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- The speed up to which space junk travel is 28,000 kph.

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- This is fast enough to destroy a spacecraft.

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- Probability of an individual on Earth being hit by falling debris is 1 in 1 trillion.

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- **ISRO** - PSLV-C19 had launched radar imaging satellite RISAT-1 in 2012.

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- Recently, PSLV-C19's 4th stage burnt up over the Central Atlantic.

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What is a spacecraft graveyard?

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- There are larger space objects that may not entirely burn up before reaching the ground.

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- Spacecraft operators can thus plan for the final destination of their old satellites to make sure that any debris falls into a remote area.

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- A 1,500 sq km area in Southern Pacific Ocean is said to be the spacecraft graveyard or spacecraft cemetery.
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- This is suitably far from any coast and human habitations thereby.
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- Notably, more than 260 satellites were brought down there so far.
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What could be done?

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 - **Passivation** - Satellite explosions are reduced by deactivating various systems.
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 - **Design for demise** - Designing with material that burn up on re-entry.
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 - **Deorbiting systems** - Under international guidelines, satellites are brought down within 25 years after mission life.
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 - **Design for servicing** - Grips or handles can be caught by a robotic arm or astronauts for repairs.
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 - **RemoveDEBRIS** - An innovation led by University of Surrey's Space Centre, UK.
 - It was launched on a SpaceX flight to International Space Station recently.
 - It will be released into low-earth orbit, where it will release a smaller satellite that will recapture space junk with a harpoon.
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 - **ISRO** - ISRO is looking to develop reusable launch vehicles.
 - It had notably conducted a space capsule recovery experiment in 2007.

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Source: Indian Express

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Quick Fact

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United Nations Office for Outer Space Affairs (UNOOSA)

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- The UNOOSA works to promote international cooperation in the peaceful use and exploration of space.
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- The Office assists any United Nations Member States to establish legal and regulatory frameworks to govern space activities.
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- It also strengthens the capacity of developing countries to use space science technology and applications for economic and social development.
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- It does this by helping to integrate space capabilities into national development programmes.
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Inter-Agency Space Debris Coordination Committee (IADC)

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- The IADC is an international governmental forum.
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- It works for worldwide coordination of activities related to the issues of man-made and natural debris in space.
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- The primary purposes of the IADC are to -
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- i. exchange information on space debris research activities between member space agencies
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- ii. facilitate opportunities for cooperation in space debris research
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- iii. review the progress of ongoing cooperative activities
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- iv. identify debris mitigation options
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