

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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 \bullet It has however reignited the larger debate about space debris itself. $\ensuremath{^{\backslash n}}$

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What is Tiangong-1?

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• Tiangong-1 is China's space station.

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

- After losing control, China notified the United Nations Office for Outer Space Affairs and the Inter-Agency Space Debris Coordination Committee.
- 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.
- Tiangong-2 continues to be operational.
- 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.

• 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. \n
- 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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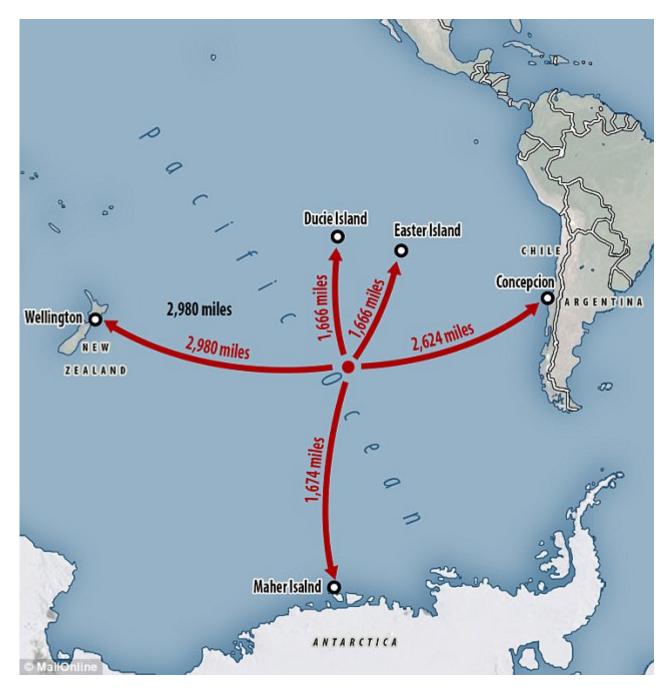
• There are larger space objects that may not entirely burn up before reaching

the ground.

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- \bullet Spacecraft operators can thus plan for the final destination of their old satellites to make sure that any debris falls into a remote area. \n
- A 1,500 sq km area in Southern Pacific Ocean is said to be the spacecraft graveyard or spacecraft cemetery.
- \bullet This is suitably far from any coast and human habitations thereby. $\mbox{\ensuremath{\backslash}} n$
- \bullet Notably, more than 260 satellites were brought down there so far. $\ensuremath{^{\backslash n}}$

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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. $\ensuremath{\backslash} n$

- **Deorbiting systems** Under international guidelines, satellites are brought down within 25 years after mission life.
- Design for servicing Grips or handles can be caught by a robotic arm or astronauts for repairs.
- **RemoveDEBRIS** An innovation led by University of Surrey's Space Centre, UK.

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- It was launched on a SpaceX flight to International Space Station recently.
- \bullet It will be released into low-earth orbit, where it will release a smaller satellite that will recapture space junk with a harpoon. \n
- **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.
- The Office assists any United Nations Member States to establish legal and regulatory frameworks to govern space activities.
- It also strengthens the capacity of developing countries to use space science

technology and applications for economic and social development.

• 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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- It works for worldwide coordination of activities related to the issues of manmade and natural debris in space.
- \bullet The primary purposes of the IADC are to $\ensuremath{^{\backslash n}}$

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i. exchange information on space debris research activities between member space agencies

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- $_{\text{ii.}}$ facilitate opportunities for cooperation in space debris research $_{\text{n}}$
- iii. review the progress of ongoing cooperative activities $\ensuremath{^{\backslash n}}$
- iv. identify debris mitigation options \n

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