



Return of Butch Wilmore and Sunita Williams from ISS

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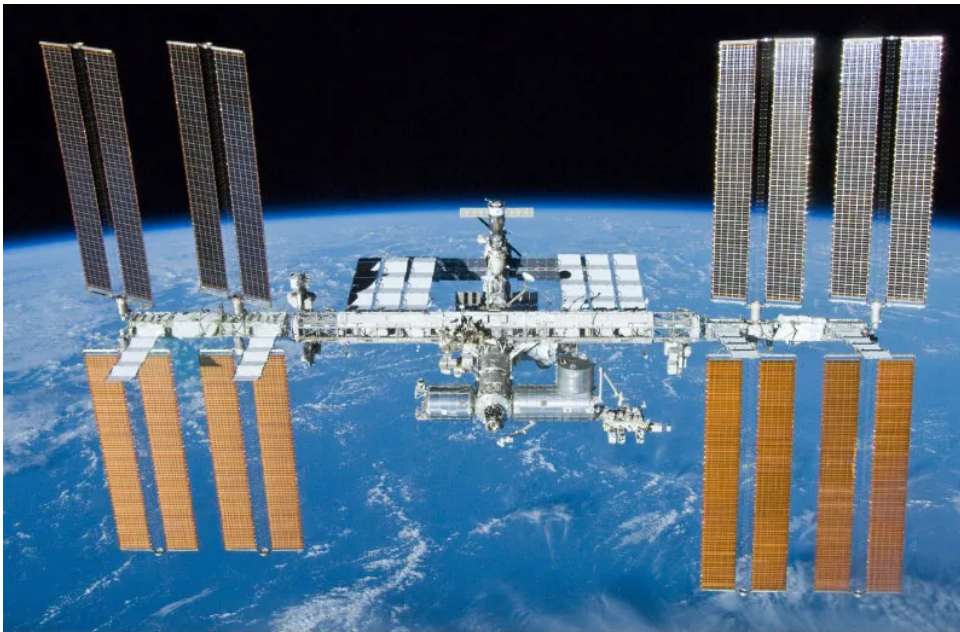
Why in News?

[National Aeronautics and Space Administration \(NASA\)](#) astronauts **Butch Wilmore and Sunita Williams** have returned to Earth after an **unexpectedly long 286-day mission** aboard the [International Space Station \(ISS\)](#).

- Initially planned for a 8-day mission, their return was delayed due to [issues with Boeing's Starliner spacecraft](#). They finally came back via [SpaceX's Crew Dragon](#), highlighting the technological and health challenges of prolonged space travel.

What are the Key Facts About Starliner Spacecraft and SpaceX's Crew Dragon?

- **Starliner Spacecraft:** Developed by **Boeing** in collaboration with [NASA's Commercial Crew Program \(CCP\)](#), was designed to **transport astronauts to and from low Earth orbit (LEO)**.
 - Boeing's Starliner took **Williams and Wilmore** to the ISS in 2024 but **propulsion issues** delayed their return.
- **SpaceX's Crew Dragon:** Crew Dragon is one of the two variants of **SpaceX's Dragon 2 spacecraft**, featuring a reusable capsule and launching atop a **Falcon 9 rocket**. Developed under NASA's CCP, it primarily ferries astronauts to the ISS. The other variant, Cargo Dragon, transports cargo to the station.
 - **NASA's SpaceX Crew-9 mission** returned Williams and Wilmore from the ISS aboard the Crew Dragon spacecraft named **Freedom**.



International Space Station: Interesting facts:a

The International Space Station is a large spacecraft. It orbits around Earth. It is a home where astronauts live.

The space station is also a science lab. Many countries worked together to build it. They also work together to use it.

The space station is made of many pieces. The pieces were put together in space by astronauts. The space station's orbit is approximately 250 miles above Earth.

The first piece of the International Space Station was launched in 1998. A Russian rocket launched that piece. After that, more pieces were added. Two years later, the station was ready for people.

The space station is as big inside as a house with five bedrooms. It has two bathrooms, a gymnasium and a big bay window. Six people are able to live there. It weighs almost a million pounds.

The space station is a home in orbit. People have lived in space every day since the year 2000. The space station's labs are where crew members do research.

Astronauts and supplies are ferried by the U.S. space shuttles and the Russian Soyuz and Progress spacecraft.



What are the Health Implications of Space Travel?

- **Space Anemia:** A condition where astronauts experience a **drop in red blood cell count** due to fluid shifts in **microgravity**, leading to fatigue, dizziness, and **cardiovascular risks post-mission**.
- **Spaceflight-Associated Neuro-ocular Syndrome (SANS):** It is a vision impairment caused by fluid shifts in microgravity, leading to optic disc swelling and farsightedness.
- **Baby Feet Syndrome:** It refers to the **hypersensitivity of the soles and difficulty in walking** experienced by astronauts after prolonged space missions.
 - In microgravity, the **lack of weight-bearing activity causes foot calluses** to disappear, making the skin soft and sensitive upon return to Earth.
- **Bone Density Loss:** NASA studies show that astronauts lose around 2% of bone density per month in space. **Without proper countermeasures like exercise**, this loss can lead to osteoporosis-like conditions.
- **Risks of Cosmic Radiation Exposure:** In space, astronauts face direct exposure to **cosmic rays and solar radiation**, unlike on Earth, where the **atmosphere and magnetic field** provide protection.
 - This can cause **DNA damage, genetic mutations, and increased cancer risk**.
 - Deep-space missions to **Mars and the Moon pose higher risks** due to prolonged exposure.

India's Gaganyaan Mission and Bhartiya Antriksh Station (BAS)

- **Gaganyaan Mission:** Aims to send **three astronauts on a 3-day mission to a 400 km orbit and return them safely to Earth**. This would place India alongside the US, Russia, and China in human spaceflight.
 - The **Gaganyaan mission's** short-term goal is to demonstrate human spaceflight to Low Earth Orbit, with a long-term aim of establishing a sustained **Indian human space exploration program**.
- **Bhartiya Antriksh Station:** The **BAS** is India's planned space station, set to orbit 400–450 km above Earth.
 - The first module, the Base Module, will be launched in 2028, with full operationalization by 2035.
 - It will support human spaceflight, Earth observation, and microgravity research while fostering technological innovations.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. What is the purpose of the US Space Agency's Themis Mission, which was recently in the news? (2008)

- (a) To study the possibility of life on Mars
- (b) To study the satellites of Saturn
- (c) To study the colourful display of high latitude skies
- (d) To build a space laboratory to study the stellar explosions

Ans: (c)

Q. In the context of space technology, what is "Bhuvan", recently in the news? (2010)

- (a) A mini satellite launched by ISRO for promoting the distance education in India
- (b) The name given to the next Moon Impact Probe, for Chandrayaan-II
- (c) A geoportal of ISRO with 3D imaging capabilities of India
- (d) A space telescope developed by India

Ans: (c)

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