

Space & Astronomy:

I. Indian Space Exploration - Shubhanshu Shukla & Gaganyaan

Shubhanshu Shukla's Return: Indian astronaut Group Captain Shubhanshu Shukla, along with the Ax-4 crew members, successfully splashed down in the Pacific Ocean off the coast of Southern California today, July 15, 2025.

The crew departed the International Space Station (ISS) on July 14, 2025, after spending 18 days aboard.

Shukla, as the mission pilot, piloted the SpaceX Dragon spacecraft back to Earth.

His mission marks a significant milestone for India, making him the first Indian astronaut to visit the ISS and the second Indian to travel to space after Rakesh Sharma in 1984.

During his 18-day stay, Shukla participated in over 60 scientific experiments, including seven ISRO-designed experiments. These included research on seed germination in microgravity (Sprouts project), microalgae for oxygen/food production, health monitoring tools, cognitive load, and stem cell research.

He also engaged in public outreach, including a video conference with Indian Prime Minister Narendra Modi and ham radio conversations with school students.

The mission, a collaboration between Axiom Space, NASA, and SpaceX, is the first government-backed human spaceflight to the ISS for India, Poland, and Hungary.

Gaganyaan Project Boost: Shukla's mission is expected to significantly boost India's Gaganyaan project, India's maiden human spaceflight mission.

ISRO has successfully completed key development and hot tests for the Gaganyaan Service Module Propulsion System (SMPS) in July 2025. This includes a full-duration hot test of 350 seconds and earlier short-duration tests validating the system's performance for various mission profiles, including abort scenarios.

The SMPS is a critical component for orbital maneuvers, on-orbit control, de-boost, and abort capabilities.

ISRO plans to conduct at least two crucial Gaganyaan-related missions this year: a second test vehicle mission and an uncrewed mission, with their success determining the future course of action for the crewed flight.

Ax-4 Mission Concludes: The Axiom Mission 4 (Ax-4) concluded with the splashdown of its four-person international crew, including India's Shubhanshu Shukla. The mission involved extensive scientific research and outreach.

Upcoming Crew-11 Launch: NASA and SpaceX are targeting July 31 for the Crew-11 launch to the International Space Station. This will be the first time a Crew Dragon capsule completes six missions.

ARISS SSTV Event: Amateur Radio on the International Space Station (ARISS) is conducting a Slow-Scan Television (SSTV) event, which began on July 14 and is scheduled to end on July 20. This event features images related to the Apollo Soyuz mission and STS 51F.

Chinese Cargo Resupply: China is scheduled to launch a Long March 7 rocket today, July 15, to deliver the Tianzhou-9 space station resupply mission to the Tiangong Space Station.

III. Space & Astronomy Discoveries and Developments

Satellite Constellations and Night Sky: New research reveals that major satellite constellations like Starlink and OneWeb are far brighter than international safety limits, threatening both cutting-edge astronomy and the visibility of the night sky.

Solar Mystery Solved: German scientists have reportedly solved a 400-year-old mystery, cracking the code behind sunspot stability and how these magnetic monsters maintain their grip on the solar surface. This breakthrough could improve predictions of explosive solar storms.

Origin of Earth's Water: Scientists are still exploring the compelling question of Earth's water origin: whether it was delivered by comets and meteorites after formation or became part of the planet as it formed.

Lunar Base Concepts: A new paper suggests that future lunar bases could start with a dome over a 17-meter crater, made from a lunar regolith-based geopolymer using 3D printing. This would offer protection from radiation and potentially maintain a pressurized habitat.

Exoplanet on a Death Spiral: Astronomers have discovered an Earth-sized exoplanet on a very tight orbit around its star, completing an orbit in just 5 hours and 22 minutes. Unfortunately, it is predicted to be torn apart or crash into its star in about 31 million years.

Milky Way Satellite Galaxies: A new simulation suggests the Milky Way could be surrounded by as many as 80 to 100 satellite galaxies, more than the currently detected 60. These additional galaxies are difficult to find due to mass stripping by the Milky Way's gravity, but new telescopes like Vera Rubin might be able to spot them.

Upcoming Launches (July 16 onwards):

SpaceX Falcon 9: Multiple Starlink launches and the first Project Kuiper megaconstellation internet satellites (for Amazon) are scheduled from July 16.

Gilmour Space Technologies Eris-1: Maiden flight of Australia's Gilmour Space's orbital launch vehicle Eris is scheduled for July 16.

Russian Federal Space Agency (ROSCOSMOS) Soyuz 2.1b/Fregat-M: Ionosfera-M 3 & 4 research satellites on July 25.

Arianespace Vega-C: CO3D (Earth observation) and MicroCarb (greenhouse gas-measuring) satellites on July 25.

Indian Space Research Organization GSLV Mk II: The NISAR (NASA-ISRO Synthetic Aperture Radar) satellite is scheduled for July 25 from Satish Dhawan Space Centre.

Geomagnetic Activity: G1 (Minor) geomagnetic storms are expected early on July 15 due to coronal hole high-speed solar wind influences. R1-R2 (Minor-Moderate) radio blackouts are likely from July 15-17.

Sky Tonight: The center of our Milky Way galaxy is visible overnight on summer evenings in the southern sky, near the Sagittarius Teapot's spout. Two globular clusters, NGC 6528 and NGC

6522, are visible with binoculars or a telescope near the star Gamma Sgr.

MCQS

1. Indian astronaut Group Captain Shubhanshu Shukla, along with the Ax-4 crew, successfully splashed down today, July 15, 2025, in which ocean?

- a) Atlantic Ocean
- b) Indian Ocean
- c) Pacific Ocean
- d) Arctic Ocean

Answer: c) Pacific Ocean

The news states, "Indian astronaut Group Captain Shubhanshu Shukla, along with the Ax-4 crew members, successfully splashed down in the Pacific Ocean off the coast of Southern California today, July 15, 2025."

2. How many days did Group Captain Shubhanshu Shukla spend aboard the International Space Station (ISS) during his Ax-4 mission?

- a) 7 days
- b) 10 days
- c) 18 days
- d) 25 days

Answer: c) 18 days

The text mentions, "The crew departed the International Space Station (ISS) on July 14, 2025, after spending 18 days aboard."

3. Group Captain Shubhanshu Shukla's mission marks a significant milestone for India, making him the first Indian astronaut to visit the ISS and the ___ Indian to travel to space after Rakesh Sharma in 1984.

- a) first
- b) second
- c) third

d) fourth

Answer: b) second

The news highlights, "His mission marks a significant milestone for India, making him the first Indian astronaut to visit the ISS and the second Indian to travel to space after Rakesh Sharma in 1984."

4. ISRO has successfully completed key development and hot tests for which critical component of the Gaganyaan project in July 2025?

- a) Crew Escape System
- b) Human-rated Launch Vehicle
- c) Service Module Propulsion System (SMPS)
- d) Crew Module Re-entry System

Answer: c) Service Module Propulsion System (SMPS)

The text states, "ISRO has successfully completed key development and hot tests for the Gaganyaan Service Module Propulsion System (SMPS) in July 2025."

5. NASA and SpaceX are targeting which date for the Crew-11 launch to the International Space Station?

- a) July 20
- b) July 25
- c) July 31
- d) August 15

Answer: c) July 31

The information provided says, "NASA and SpaceX are targeting July 31 for the Crew-11 launch to the International Space Station."

6. China is scheduled to launch a Long March 7 rocket today, July 15, to deliver which cargo resupply mission to the Tiangong Space Station?

- a) Shenzhou-20
- b) Tianzhou-9

- c) Chang'e-6
d) Xuntian

Answer: b) Tianzhou-9

The news states, "China is scheduled to launch a Long March 7 rocket today, July 15, to deliver the Tianzhou-9 space station resupply mission to the Tiangong Space Station."

7. New research reveals that major satellite constellations like Starlink and OneWeb are brighter than international safety limits, threatening which two aspects?

- a) Satellite communication and space tourism
b) Deep space probes and asteroid detection
c) Cutting-edge astronomy and the visibility of the night sky
d) Lunar exploration and Martian missions

Answer: c) Cutting-edge astronomy and the visibility of the night sky

The text mentions, "New research reveals that major satellite constellations like Starlink and OneWeb are far brighter than international safety limits, threatening both cutting-edge astronomy and the visibility of the night sky."

8. German scientists have reportedly solved a 400-year-old mystery concerning what solar phenomenon?

- a) Solar flares
b) Coronal mass ejections
c) Sunspot stability
d) Solar wind acceleration

Answer: c) Sunspot stability

The news states, "German scientists have reportedly solved a 400-year-old mystery, cracking the code behind sunspot stability."

9. A new paper suggests that future lunar bases could start with a dome over a 17-meter crater, made from a lunar regolith-based geopolymer using what technology?

- a) Laser ablation
b) Robotic excavation
c) 3D printing
d) In-situ resource extraction

Answer: c) 3D printing

The text indicates, "A new paper suggests that future lunar bases could start with a dome over a 17-meter crater, made from a lunar regolith-based geopolymer using 3D printing."

10. Astronomers have discovered an Earth-sized exoplanet on a very tight orbit, completing an orbit in just how many hours and minutes?

- a) 3 hours and 30 minutes
b) 5 hours and 22 minutes
c) 10 hours and 15 minutes
d) 24 hours and 0 minutes

Answer: b) 5 hours and 22 minutes

The news mentions, "It completes an orbit in just 5 hours and 22 minutes."

11. A new simulation suggests the Milky Way could be surrounded by how many satellite galaxies, more than the currently detected 60?

- a) 65 to 70
b) 70 to 80
c) 80 to 100
d) Over 100

Answer: c) 80 to 100

The text states, "A new simulation suggests the Milky Way could be surrounded by as many as 80 to 100 satellite galaxies."

12. What is scheduled for July 16, representing the maiden flight of Australia's Gilmour Space's orbital launch vehicle?

- a) Starlink launch
- b) Project Kuiper launch
- c) Eris-1
- d) NISAR satellite launch

Answer: c) Eris-1

The news mentions, "Maiden flight of Australia's Gilmour Space's orbital launch vehicle Eris is scheduled for July 16."

13. The NISAR (NASA-ISRO Synthetic Aperture Radar) satellite is scheduled for launch on July 25 from Satish Dhawan Space Centre using which Indian launch vehicle?

- a) PSLV
- b) GSLV Mk II
- c) LVM3
- d) SSLV

Answer: b) GSLV Mk II

The text states, "Indian Space Research Organization GSLV Mk II: The NISAR (NASA-ISRO Synthetic Aperture Radar) satellite is scheduled for July 25 from Satish Dhawan Space Centre."

14. What level of geomagnetic storms are expected early on July 15 due to coronal hole high-speed solar wind influences?

- a) G1 (Minor)
- b) G2 (Moderate)
- c) G3 (Strong)
- d) G4 (Severe)

Answer: a) G1 (Minor)

The news mentions, "G1 (Minor) geomagnetic storms are expected early on July 15 due to coronal hole high-speed solar wind influences."

15. The center of our Milky Way galaxy is visible overnight on summer evenings in which part of the sky?

- a) Northern sky
- b) Eastern sky
- c) Western sky
- d) Southern sky

Answer: d) Southern sky

The text states, "The center of our Milky Way galaxy is visible overnight on summer evenings in the southern sky, near the Sagittarius Teapot's spout."