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2024 in spaceflight

This article documents notable **spaceflight events that have happened or are going to happen during the year 2024**. Upcoming astronomical and space events for 2024 have been presented in *The New York Times*.[1]

Overview

Astronomy and Astrophysics

On New Year's Day at 3:40 UTC marking the first launch of the new year , ISRO launched their XPoSat for studying X-ray polarization. It will serve as a complement to the present IXPE probe of NASA.[2][3][4] Later the ISRO's Aditya-L1 spacecraft launched 5 months previously was inserted into a halo orbit around the Earth-Sun L1 point on January 6. It will study the solar atmosphere, solar magnetic storms, and their impact on the environment around Earth.

Einstein Probe, X-ray space telescope mission by Chinese Academy of Sciences (CAS) in partnership with ESA and the Max Planck Institute for Extraterrestrial Physics (MPE) dedicated to time-domain high-energy astrophysics, was launched on 9 January 2024.[5]

European Space Agency will launch their PROBA-3 dual satellites for solar coronagraphy.

Exploration of the Solar System

Mars helicopter *Ingenuity* flew its 72nd and last flight, when all four of its rotor blades were damaged, causing NASA to retire the craft.[6][7]

NASA plans to launch the Europa Clipper in October, which will study the Jovian moon Europa while in orbit around Jupiter.

Hera will launch to Didymos asteroid to study the after effects of Double Asteroid Redirection Test.

NASA's EscaPADE mission to Mars is also planned to launch this year.

Lunar exploration

Peregrine lunar lander was successfully launched on 8 January, but after the launch a propellant leak was detected that precluded any attempt to perform a lunar landing. In the end, the Peregrine spacecraft never left the (highly elliptical) Earth orbit it was injected into by the carrier rocket, and the mission ended ten days later (after one orbit) on 18 January when the spacecraft re-entered the Earth's atmosphere (under control of the mission team) and was destroyed.

SLIM achieved the first-ever lunar soft landing for a Japanese spacecraft.[8] It landed on 19 January 2024 at 15:20 UTC, making Japan the 5th country to soft land on the Moon.[9] Although it landed successfully, its in wrong attitude, because the solar panels are oriented westwards facing opposite the Sun at the start of lunar day, thereby failing to generate enough power.[10] The lander operated on internal battery power, which was fully drained that day. The mission's operators hope that the lander will wake up after a few days when sunlight should hit the solar panels.[11]

Irrespective of this solar array issue on lander, the two LEV 1 and 2 rovers, deployed during hovering just before final landing are working as expected and LEV-1 communicating independently to the ground stations.[11] LEV-1 conducted seven hops over 107 minutes on lunar surface. Images taken by LEV-2 show the wrong attitude landing with loss of an engine nozzle during descent and even possible sustained damage to lander's Earth bound antenna, that is not pointed towards Earth.[12] Irrespective of wrong attitude and loss of communication with the lander, the mission is already fully successful after confirmation of its primary goal landing within 100 m (330 ft) of its landing spot was already achieved.[13][14][15]

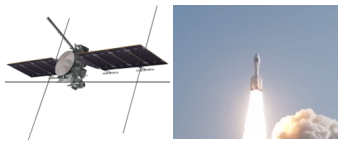
On 29 January, the lander resumed operations after being shut for a week. JAXA said it re-established contact with the lander and its solar cells were working again after a shift in lighting conditions allowed it to catch sunlight.[16] After that, SLIM was put in sleep mode for impending harsh lunar night. SLIM was expected to operate only for one lunar daylight period, or 14 Earth days, and the on-board electronics were not designed to withstand the −120 °C (−184 °F) nighttime temperatures on the Moon. On 25 February 2024, JAXA sent wake-up calls and found SLIM had successfully survived the night on the lunar surface while maintaining communication capabilities. Since it was midday of the lunar day on the moon on 25 February 2024, the temperature of the communications payload was extremely high, so communication was terminated after only a short period of time. JAXA is now preparing for resumed operations, once the temperature has fallen sufficiently. This feat of surviving lunar night without a Radioisotope heater unit is only achieved by some landers in Surveyor Program.[17]

IM-1 Nova-C Odysseus launched on 15 February 2024 towards the Moon via Falcon 9 on a direct intercept trajectory and later landed in the south polar region of the Moon on 22 February 2024 and became the first successful private lander and the first to do so using cryogenic propellants. Though it landed successfully, one of the lander's legs broke upon landing and it tilted up on other side, 18° due to landing on a slope, but the lander survived and payloads are functioning as expected.[18] EagleCam was not ejected prior to landing.

Just before landing, at approximately 30 m (98 ft) above the lunar surface, the *Odysseus* lander was planned to eject the EagleCam camera-equipped CubeSat, which would have been dropped onto the lunar surface near the lander, with an impact velocity of about 10 m/s (22 mph). However, due to complications arising from the software patch, it was decided that EagleCam would not be ejected upon landing. It was later ejected on 28 February but was partially failure as it returned all types of data, except post IM-1 landing images that were the main aim of its mission.[19][20][21][22]

China plans to send Chang'e 6 in May, which will conduct the first lunar sample return from the far side of the Moon.[23] This will be China's second lunar sample return mission, the first was achieved by Chang'e 5 from the lunar near side 4 years ago. Pakistan will send a lunar orbiter called ICECUBE-Q along with Chang'e 6.

2024 in spaceflight



Highlights from spaceflight in 2024[a]

Orbital launches	
First	1 January
Last	29 February
Total	41
Successes	41
Failures	0
Catalogued	32
National firsts	
Space traveller	Turkey
Rockets	
Maiden flights	Gravity-1 Vulcan Centaur VC2S
Crewed flights	
Orbital	1
Orbital travellers	4
Suborbital	1
Suborbital travellers	6
Total travellers	10

Nova-C 2 and 3, VIPER and Blue Ghost are all planned to launch to the Moon this year.

Human spaceflight

ISRO will launch their Gaganyaan uncrewed missions and SPADEX docking experiment this year.

Private human spaceflight and space tourism

Polaris Dawn, featuring the first commercial spacewalk, is also on track to launch in this year.

SpaceX launched Axiom Mission 3 aboard a Crew Dragon spacecraft on a Falcon 9 rocket to the International Space Station (ISS) on 18 January 2024. The successful mission ended with a splashdown on 9 February 2024.

SpaceX also plans to launch Axiom Mission 4 to the ISS later in the year 2024.

On 26 January[24] Virgin Galactic's SpaceShipTwo VSS *Unity* was successfully launched from Spaceport America on Galactic 06 suborbital space tourism mission.

Rocket innovation

The maiden flight of United Launch Alliance's Vulcan Centaur took place on 8 January 2024. Vulcan is the first methane fueled rocket to reach orbit on its first attempt, and the first methane fueled rocket to reach orbit from the US.[25]

China's Orienspace's Gravity-1 rocket completed its successful maiden flight on January 11, 2024, debuting on a new mobile sea platform in the Yellow Sea while breaking records as both the world's largest solid-fuel carrier rocket and China's most powerful commercial launch vehicle to date (as of 2024).

Space Pioneer (aka Tianbing) of China plans to launch its Falcon 9 class kerolox rocket Tianlong-3 in June.

The maiden flight of Blue Origin's New Glenn is planned for August 2024.[26]

Satellite technology

NISAR, the most expensive and largest radar imaging satellite will be launched from India onboard GSLV Mk-II by late February 2024.[27]

Plankton, Aerosol, Cloud, ocean Ecosystem or PACE, a NASA Earth observing satellite, launched on 8 February 2024.

NASA's Dream Chaser spaceplane, developed by Sierra Space, is scheduled to have its first flight in June.[28] It will visit the International Space Station.[29]

Orbital launches

List of orbital launches

Month	Num. of successes	Num. of failures	Num. of partial failures
January	22	0	0
February	19	0	0
March	*TBD*	*TBD*	*TBD*
April	*TBD*	*TBD*	*TBD*
May	*TBD*	*TBD*	*TBD*
June	*TBD*	*TBD*	*TBD*
July	*TBD*	*TBD*	*TBD*
August	*TBD*	*TBD*	*TBD*
September	*TBD*	*TBD*	*TBD*
October	*TBD*	*TBD*	*TBD*
November	*TBD*	*TBD*	*TBD*
December	*TBD*	*TBD*	*TBD*
Total	**41**	**0**	**0**

Deep-space rendezvous

Date (UTC)	Spacecraft	Event	Remarks
19 January	SLIM	Lunar landing	Success[30]
Late January	*Peregrine*	Lunar orbit insertion	Precluded due to propellant leak developing shortly after launch.[31]
3 February	*Juno*	58th perijove	On the day of this perijove, *Juno* flew by Io at a distance of 1,500 km. Orbital period around Jupiter reduced to 33 days.[32][33]
21 February	Nova-C (IM-1 *Odysseus*)	Lunar orbit insertion	Success[34]
22 February	Nova-C (IM-1)	Lunar landing	Partial success; lander touched down successfully, but one of the footpads came to rest on a rock, and the lander leaned over, then toppled on its side. The lander survived the fall, with instrumentation and solar panels oriented upward.[35]
23 August	JUICE	Gravity assist at Earth and Moon	
5 September	*BepiColombo*	Fourth gravity assist at Mercury	
6 November	*Parker Solar Probe*	Seventh gravity assist at Venus	
2 December	*BepiColombo*	Fifth gravity assist at Mercury	
13 December	*Lucy*	Second gravity assist at Earth	Target altitude 350 km
24 December	*Parker Solar Probe*	22nd perihelion, closest approach to the Sun	

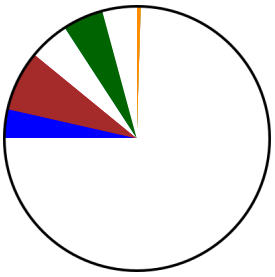
Extravehicular activities (EVAs)

Start Date/Time	Duration	End Time	Spacecraft	Crew	Remarks

Orbital launch statistics

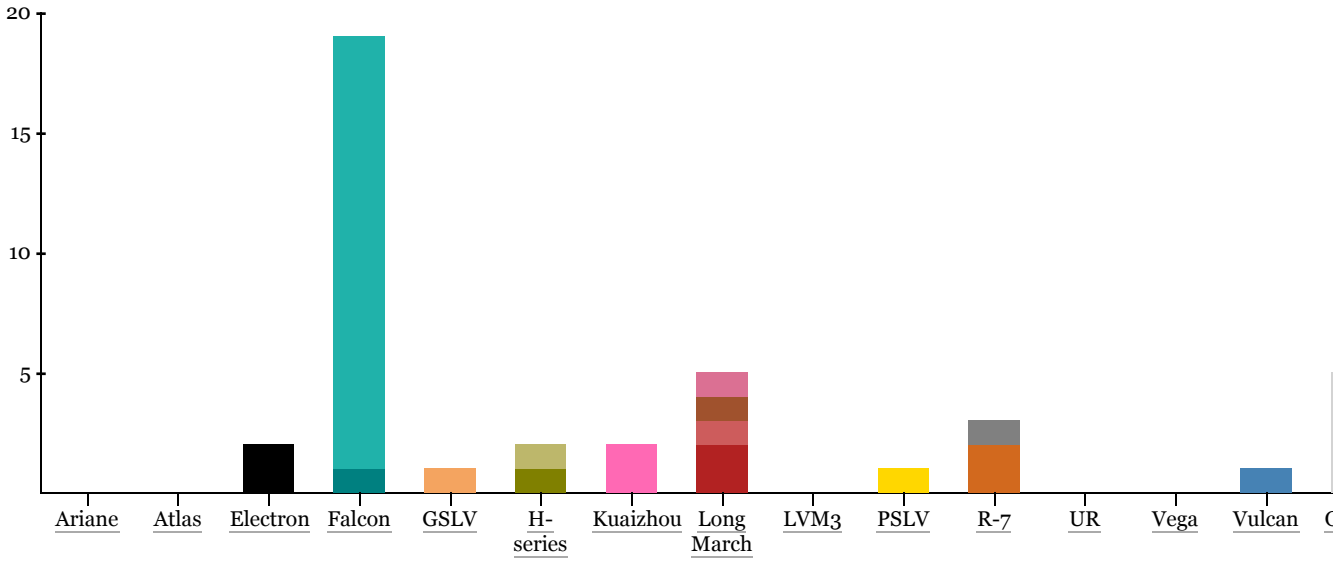
By country

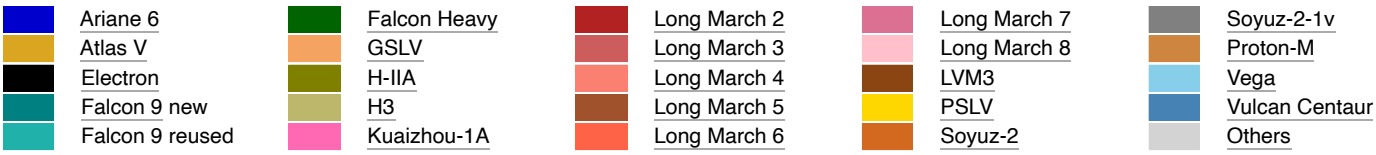
For the purposes of this section, the yearly tally of orbital launches by country assigns each flight to the country of origin of the rocket, not to the launch services provider or the spaceport. For example, Electron rockets launched from the Mahia Peninsula in New Zealand are counted under the United States because Electron is an American rocket.



Country	Launches	Successes	Failures	Partial failures	Remarks
China	10	10	0	0	
India	2	2	0	0	
Iran	2	2	0	0	
Japan	2	2	0	0	
Russia	3	3	0	0	
United States	22	22	0	0	Includes Electron launches from Mahia
World	**41**	**41**	**0**	**0**	

By rocket





By family

Family [show]	Country	Launches	Successes	Failures	Partial failures	Remarks
Electron	United States	2	2	0	0	
Falcon	United States	19	19	0	0	
GSLV	India	1	1	0	0	
Gravity	China	1	1	0	0	Maiden flight
H-series	Japan	2	2	0	0	
Jielong	China	1	1	0	0	
Kinetica	China	1	1	0	0	
Kuaizhou	China	2	2	0	0	
Long March	China	5	5	0	0	
PSLV	India	1	1	0	0	
Qaem	Iran	1	1	0	0	
R-7	Russia	3	3	0	0	
Simorgh	Iran	1	1	0	0	
Vulcan	United States	1	1	0	0	Maiden flight

By type

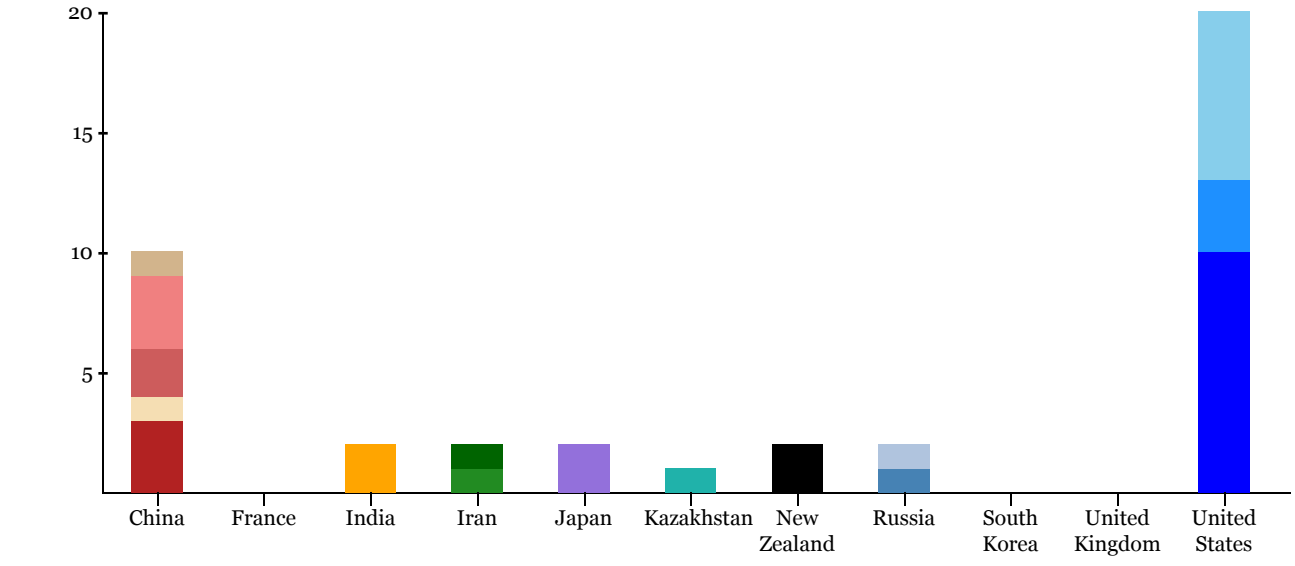
Rocket [show]	Country	Family	Launches	Successes	Failures	Partial failures	Remarks
Electron	United States	Electron	2	2	0	0	
Falcon 9	United States	Falcon	19	19	0	0	
GSLV	India	GSLV	1	1	0	0	
Gravity-1	China	Gravity	1	1	0	0	Maiden flight
H-IIA	Japan	H-series	1	1	0	0	
H3	Japan	H-series	1	1	0	0	
Jielong 3	China	Jielong	1	1	0	0	
Kinetica 1	China	Kinetica	1	1	0	0	
Kuaizhou-1	China	Kuaizhou	2	2	0	0	
Long March 2	China	Long March	2	2	0	0	
Long March 3	China	Long March	1	1	0	0	
Long March 5	China	Long March	1	1	0	0	
Long March 7	China	Long March	1	1	0	0	
PSLV	India	PSLV	1	1	0	0	
Qaem 100	Iran	Qaem	1	1	0	0	
Simorgh	Iran	Simorgh	1	1	0	0	
Soyuz-2	Russia	R-7	3	3	0	0	
Vulcan Centaur	United States	Vulcan	1	1	0	0	Maiden flight

By configuration

Rocket [show]	Country	Type	Launches	Successes	Failures	Partial failures	Remarks
Electron	United States	Electron	2	2	0	0	
Falcon 9 Block 5	United States	Falcon 9	19	19	0	0	
GSLV Mk-II	India	GSLV	1	1	0	0	
Gravity-1	China	Gravity-1	1	1	0	0	Maiden flight
H-IIA 202	Japan	H-IIA	1	1	0	0	
H3-22S	Japan	H3	1	1	0	0	
Jielong 3	China	Jielong 3	1	1	0	0	
Kinetica 1	China	Kinetica 1	1	1	0	0	
Kuaizhou-1A	China	Kuaizhou-1	2	2	0	0	
Long March 2C	China	Long March 2	2	2	0	0	

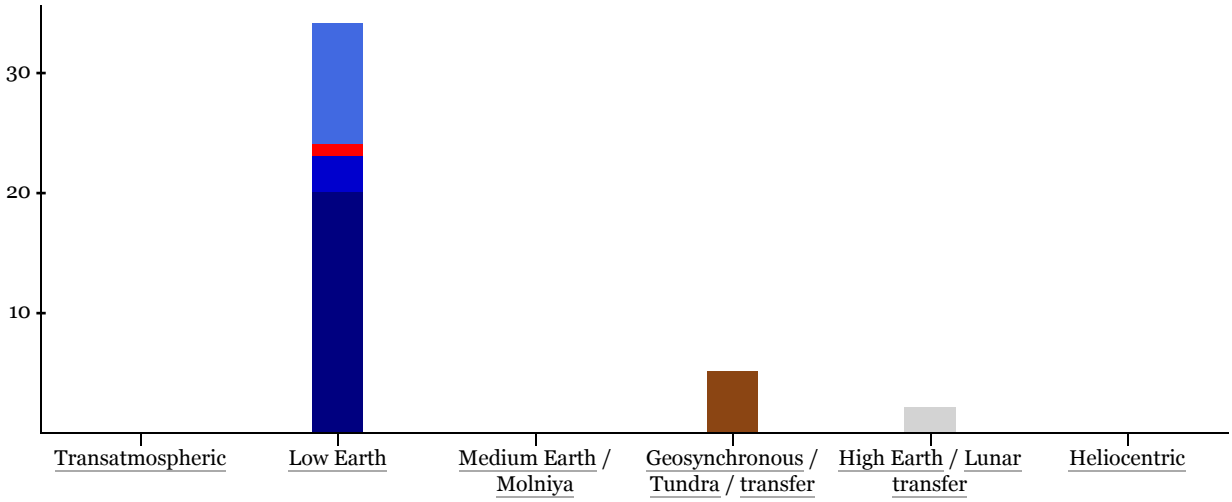
Rocket	Country	Type	Launches	Successes	Failures	Partial failures	Remarks
Long March 3B/E	China	Long March 3	1	1	0	0	
Long March 5	China	Long March 5	1	1	0	0	
Long March 7	China	Long March 7	1	1	0	0	
PSLV-DL	India	PSLV	1	1	0	0	
Qaem 100	Iran	Qaem 100	1	1	0	0	
Simorgh	Iran	Simorgh	1	1	0	0	
Soyuz-2.1a	Russia	Soyuz-2	1	1	0	0	
Soyuz-2.1b / Fregat	Russia	Soyuz-2	1	1	0	0	
Soyuz-2-1v	Russia	Soyuz-2	1	1	0	0	
Vulcan Centaur VC2S	United States	Vulcan Centaur	1	1	0	0	Maiden flight

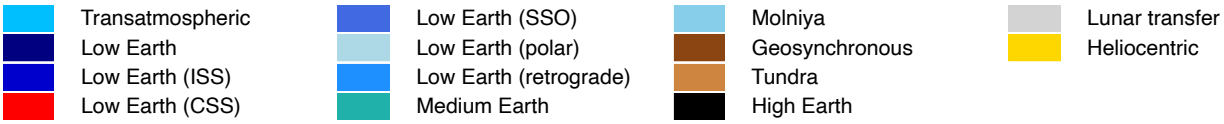
By spaceport



Site	Country	Launches	Successes	Failures	Partial failures	Remarks
Baikonur	Kazakhstan	1	1	0	0	
Cape Canaveral	United States	10	10	0	0	
Jiuquan	China	3	3	0	0	
Kennedy	United States	3	3	0	0	
Mahia	New Zealand	2	2	0	0	
Plesetsk	Russia	1	1	0	0	
Satish Dhawan	India	2	2	0	0	
Semnan	Iran	1	1	0	0	
Shahroud	Iran	1	1	0	0	
South China Sea	China	1	1	0	0	
Tanegashima	Japan	2	2	0	0	
Vandenberg	United States	7	7	0	0	
Vostochny	Russia	1	1	0	0	
Wenchang	China	2	2	0	0	
Xichang	China	3	3	0	0	
Yellow Sea	China	1	1	0	0	
Total		**41**	**41**	**0**	**0**	

By orbit



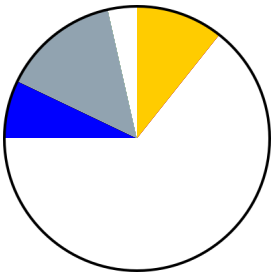


Orbital regime	Launches	Achieved	Not achieved	Accidentally achieved	Remarks
Transatmospheric	0	0	0	0	
Low Earth / Sun-synchronous	34	34	0	0	Including flights to ISS and Tiangong (CSS)
Geosynchronous / Tundra / GTO	5	5	0	0	
Medium Earth / Molniya	0	0	0	0	
High Earth / Lunar transfer	2	2	0	0	
Heliocentric orbit / Planetary transfer	0	0	0	0	
Total	**41**	**41**	**0**	**0**	

Suborbital launch statistics

By country

For the purposes of this section, the yearly tally of suborbital launches by country assigns each flight to the country of origin of the rocket, not to the launch services provider or the spaceport. Flights intended to fly below 80 km (50 mi) are omitted.



Country	Launches	Successes	Failures	Partial failures	Remarks
Brazil	1	1	0	0	
Germany	1	1	0	0	
Netherlands	1	0	0	1	
United States	4	3	1	0	
World	**7**	**5**	**1**	**1**	

Planned maiden flights

- Ariane 6 – Arianespace – Europe (ESA) – June[36]
- Aurora – Reaction Dynamics – Canada – Q4[37]
- Darwin-II – Rocket Pi – China
- Daytona – Phantom Space Corporation – USA
- Eris Block 1 – Gilmour Space Technologies – Australia – March[38]
- Hanbit-Nano – Innospace – South Korea [39]
- Kairos – Space One – Japan – 9 March [40]
- Long March 6C – CASC – China [41]
- Nebula-1 – Deep Blue Aerospace – China [42]
- Neutron – Rocket Lab – USA [43]
- New Glenn – Blue Origin – USA – Q3 [26]
- Pallas-1 – Galactic Energy – China – November[44]
- RFA One – Rocket Factory Augsburg – Germany – Summer[45]

- Rocket 4 – Astra Space – USA
- Skyrora XL – Skyrora – United Kingdom[46][47]
- Tianlong-3 – Space Pioneer – China – June[48]
- Vikram-1 – Skyroot Aerospace – India – Q1[49]
- XLV – CASC – China

Notes

a. Clockwise from top left:
   - NASA's Europa Clipper spacecraft will be launched on a mission to study the Jovian moon Europa in 2024.
   - Maiden flight of Gravity-1, the world's largest solid-fuel powered carrier rocket as of 2024.

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