

Chinas Human Spaceflight Program Turns 30.

Compiled by Joachim Kehr, Editor, August 2022

The Chinese National Manned Space Program was given the designation of *Project 921* in 1992, a number which is often used to identify Chinese spaceplane programs.

This broad project name was divided into three phases: 921-1 to launch a crewed mission by 2002 in a craft that became the *Shenzhou*, the Project 921-2 temporary space station by 2010, and the 921-3 permanent space station by 2020.

In 1992, authorization and funding was given for the first phase of Project 921, which was a plan to launch a crewed spacecraft. The Shenzhou program had four un-crewed test flights and two crewed missions. The first uncrewed one was Shenzhou 1 on November 20, 1999. On January 9, 2001 Shenzhou 2 launched carrying test animals. Shenzhou 3 and Shenzhou 4 were launched in 2002, carrying test dummies. [1], [2]

Following these demonstration flights was the successful Shenzhou 5 launch, China's first crewed mission in space on October 15, 2003, which carried Yang Liwei for 21 hours around the Earth and made China the third nation to launch a human into orbit. Shenzhou 6 followed two years later ending the first phase of Project 921.

The first missions were launched on the Long March CZ 2F rockets (2 stages plus 4 strap-on boosters, total length 58.34 m, 3.35 m in diameter, 493t lift-off mass, 6512 kn liftoff thrust, 8,800 kg payload to LEO) from the Jiuquan Satellite Launch Center.

The China Manned Space Agency (CMSA) provided engineering and administrative support for the crewed Shenzhou missions. [3]

Since the first crewed mission in October 2003 the Tiangong stations were constructed and crewed as shown in the following tables. [4], [5].

Flight	Mission	Crew	Crew photo	Crew patch	Mission Start	Mission End	Notes
1	Shenzhou 12	 Nie Haisheng  Liu Boming  Tang Hongbo			17 June 2021 ^[1]	17 September 2021	Deliver 3 astronauts to the Tiangong space station, first crewed mission to Tiangong
2	Shenzhou 13	 Zhai Zhigang  Wang Yaping  Ye Guangfu			15 October 2021 ^[2]	15 April 2022	Deliver 3 astronauts to the Tiangong space station, second crewed mission to Tiangong

Flight number	Serial number	Date (UTC)	Launch site	Payload	Orbit	Crew	Result	Remarks
1	Y1	19 November 1999 22:30	LA-4/SLS-1, JSLC	Shenzhou 1	LEO	N/A	Success	First uncrewed test of the Shenzhou spacecraft
2	Y2	9 January 2001 17:00	LA-4/SLS-1, JSLC	Shenzhou 2	LEO	N/A	Success	Second uncrewed test of the Shenzhou spacecraft, carried live animals.
3	Y3	25 March 2002 14:15	LA-4/SLS-1, JSLC	Shenzhou 3	LEO	N/A	Success	Third uncrewed test of the Shenzhou spacecraft.
4	Y4	29 December 2002 16:40	LA-4/SLS-1, JSLC	Shenzhou 4	LEO	N/A	Success	Final uncrewed test of the Shenzhou spacecraft prior to flying with crew.
5	Y5	15 October 2003 01:00	LA-4/SLS-1, JSLC	Shenzhou 5	LEO	 Yang Liwei	Success	China's first crewed spaceflight.
6	Y6	12 October 2005 01:00	LA-4/SLS-1, JSLC	Shenzhou 6	LEO	 Fei Junlong  Nie Haisheng	Success	Second crewed spaceflight, first with two astronauts.
7	Y7	25 September 2008 13:10	LA-4/SLS-1, JSLC	Shenzhou 7	LEO	 Zhai Zhigang  Liu Boming  Jing Haipeng	Success	First flight with three crew members, first to feature extravehicular activity.
8	T1	29 September 2011 13:16	LA-4/SLS-1, JSLC	Tiangong 1	LEO	N/A	Success	The first Chinese space station. Modified version Long March 2F/G with larger payload fairing ^[10]
9	Y8	31 October 2011 21:58	LA-4/SLS-1, JSLC	Shenzhou 8	LEO	N/A	Success	Uncrewed spaceflight to test automatic rendezvous and docking with Tiangong-1
10	Y9	16 June 2012 10:37	LA-4/SLS-1, JSLC	Shenzhou 9	LEO	 Jing Haipeng  Liu Wang  Liu Yang	Success	Three crew members, to test rendezvous and docking with Tiangong-1.

11	Y10	11 June 2013 09:38	LA-4/SLS-1, JSLC	Shenzhou 10	LEO	 Nie Haisheng  Zhang Xiaoguang  Wang Yaping	Success	Three crew members; rendezvous and docking with Tiangong-1.
12	T2	15 September 2016 14:04	LA-4/SLS-1, JSLC	Tiangong 2	LEO	N/A	Success	Second Chinese space laboratory Tiangong-2, launched by 2F/G variant.
13	Y11	16 October 2016 23:30	LA-4/SLS-1, JSLC	Shenzhou 11	LEO	 Jing Haipeng  Chen Dong	Success	Two crew members; ^[16] rendezvous and docking with Tiangong-2 for a 30-day mission.
14	T3	4 September 2020 07:30	LA-4/SLS-1, JSLC	Reusable Experimental Spacecraft ^[15]	LEO	N/A	Success	Test flight of a reusable experimental spacecraft. ^{[16][17]}
15	Y12	17 June 2021 01:22	LA-4/SLS-1, JSLC	Shenzhou 12	LEO	 Nie Haisheng  Liu Boming  Tang Hongbo	Success	Three crew members; first visit to Tianhe, the first module of the Chinese Space Station, for a three-month mission.
16	Y13	15 October 2021 16:23	LA-4/SLS-1, JSLC	Shenzhou 13	LEO	 Zhai Zhigang  Wang Yaping  Ye Guangfu	Success	Three crew members; visited Tianhe to continue construction of the space station for a six-month mission. ^[18]
17	Y14	5 June 2022 02:44	LA-4/SLS-1, JSLC	Shenzhou 14	LEO	 Chen Dong  Liu Yang  Cai Xuzhe	Success	Three crew members; rendezvous and docking with the Chinese space station for a six-month mission. ^[19]
18	T4	4 August 2022 16:00	LA-4/SLS-1, JSLC	Reusable Experimental Spacecraft	LEO	N/A	Success	Second test flight of a reusable experimental spacecraft. ^{[20][21]}
19	Y15	December 2022	LA-4/SLS-1, JSLC	Shenzhou 15	LEO	 TBA  TBA  TBA	Planned	Three crew members; rendezvous and docking with the Chinese space station for a six-month mission. ^[22]
20	Y16	June 2023	LA-4/SLS-1, JSLC	Shenzhou 16	LEO	 TBA  TBA  TBA	Planned	Three crew members; rendezvous and docking with the Chinese space station for a six-month mission.

On June 5, 2022 a launch celebration was held for the Shenzhou-14 mission at the Jiuquan Cosmodrome, also marking the start of the Program 921 30 years ago and also the 20 anniversary of the Shenzhou 3 and 4 launches demonstrating Chinese ability to lift (dummy-) crews into orbit and bring them back unharmed as of 2002.



Chen Dong (in the middle) Liu Yang right and Cai Xuzhe left, just before the start of their 6-month Shenzhou 14 mission. (Photo Xinhua, China Rundschau, CW26, 2022) [1]

Shenzhou 14 was successfully launched on June 5, 2022 at 02:44 UTC on a Long March CZ 2F/G variant from Jiuquan.



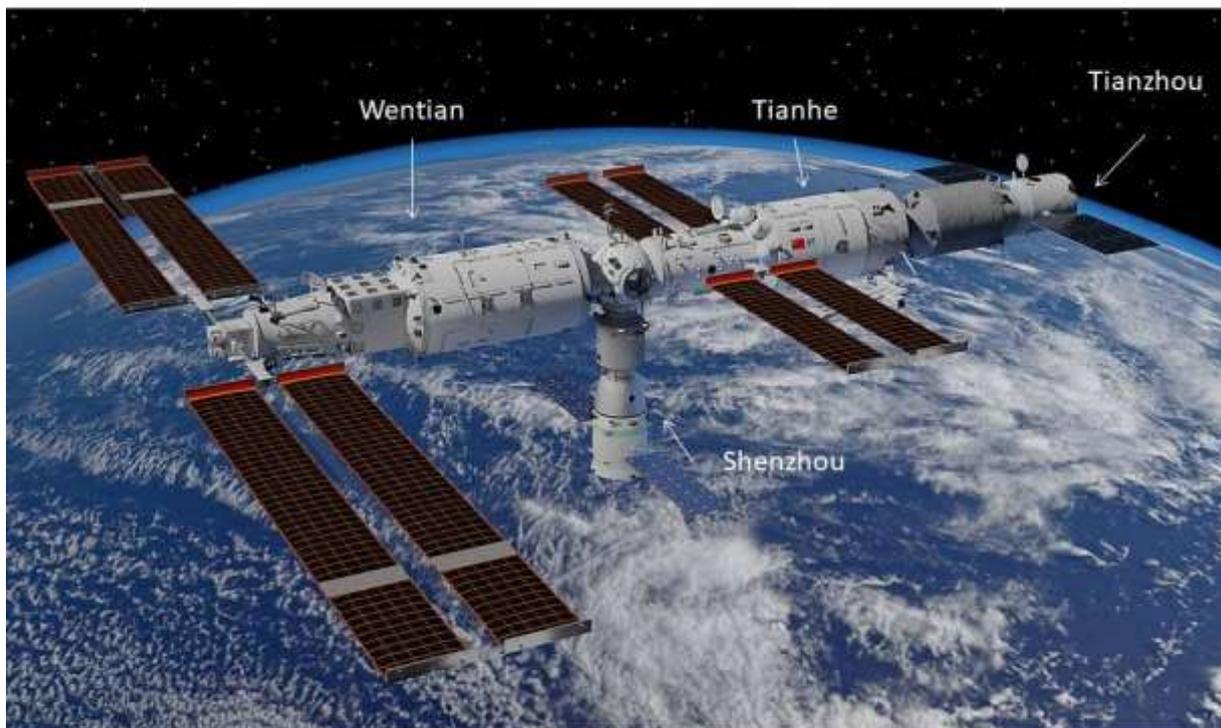
Lift-off CZ 2F with Shenzhou 14 on June5, 2022



Inflight, first stage burn and two strap-ons

The Tiangong Space Station [6]

Tiangong (Chinese :天宮; pinyin: Tiāngōng; lit.Palace in the Sky'), officially the Tiangong Space Station (Chinese: 天宫空间站; pinyin: Tiāngōng kōngjiānzàn), is a space station being constructed by China in low Earth orbit between 340 and 450 km (210 and 280 mi, inclination 41,47⁰) above the surface.



Rendering of the Tiangong Space Station in its current construction state as of August 2022: the *Tianhe* core module with docking node (launched April 29, 2021 on a CZ-5B) in the middle, *Wentian* second core module (launched July 24, 2022 on a CZ-5B) on the left, *Tianzhou-4*, robotic cargo craft, (docked May 9, 2022, launched with a CZ-7) on the right and the Shenzhou crew vehicle docked at the nadir of the multiple port docking node. (image by Shujianyang - Own work, CC BY-SA 4.0). [7]

The Tiangong Space Station must not be confused with the precursor “test” stations Tiangong-1 (2011-2018) and Tiangong-2 (2016-2018), both de-orbited in 2018. The *Tiangong Space Station* being

China's first long-term space station achieved the goal of the "third Step" of China's manned space program as planned.

Once completed, Tiangong space station will have a mass between 80 and 100 t (180,000 and 220,000 lb), roughly one-fifth the mass of the International Space Station (ISS) and about the size of the decommissioned Russian Mir space station. Tiangong's length is ~20 m, ~4,20 m in diameter, the habitable volume will be 110 m³ which compares to 916 m³ of the ISS.

Project 921 was implemented according to schedule and yielded respectable results for China's human space program. It compares well with the build-up of the International space station (ISS) which took approximately the same time but was a joint effort of the USA, Russia, Japan, Canada and Europe, all of them experienced space faring nations, contributing their own resources according to the "partner"-principle.

China's human space program deserves unreserved professional acknowledgement and may those achievements pave the way for a broadened international co-operation in space with China on equal footing despite political hurdles!

References

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- [2] Project 921 (<http://www.astronautix.com/p/project921.html>)
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- [6] Tiangong space station https://en.wikipedia.org/wiki/Tiangong_space_station
- [7] Tiangong rendering <https://commons.wikimedia.org/w/index.php?curid=121057752>