

29 AUGUST 2021

THE FINAL FRONTIER FLASH

Developments & Analysis
of the Space Domain

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China Launches Tianhui 2-02

18 August 2021: China launched a Long March 4B rocket from Taiyuan with two Tianhui (TH 2-02) radar mapping satellites into orbit. The two satellites will join a similar pair of spacecraft launched in April 2019, working in tandem to bounce radar beams off Earth's surface to generate detailed three-dimensional maps. [Launch VIDEO](#).

- The Tianhui 2 ("Sky drawing") series are a quasi-secretive group of Earth observation satellites designed to monitor Earth's surface. They are constructed by Dong Feng Hong and operated by the People's Liberation Army.
- The TH-2 satellite system is China's first microwave surveying satellite system based on synthetic aperture radar technology.
- TH-2 operates in the X-band, with the resolution of 3 m and a solar synchronous orbit of 500 km. It is composed of two identical satellites. It can measure the global digital surface models and acquire radar orthophotos in a short time.
- The satellites will work in tandem, using X-band radar instruments to measure the exact distance from the spacecraft to Earth's surface. The continuous radar observations will gather data to help Chinese analysts produce regularly-updated three-dimensional maps of the planet.
- TH 2-02 is in a very similar orbit to its predecessors TH 2-01.
- China also launched the Tianhui 1-04 satellite on 29 July 2021 from the Jiuquan space center in the NW Gobi Desert.
- There are now a total of 8 Tianhui satellites in orbit. The 4 TH-1 satellites are believed to contain optical sensors and operate at a slightly lower altitude.
- There are now 4 TH-2 satellites which are believed to contain radar sensors.

TANHUI-2 02

LAUNCH PROVIDER & CONTRACT
China Aerospace Science and Technology Corporation (CASC)

MISSION TYPE
Earth Observation / Remote Sensing

PAYLOADS (2)
Tanhui-2 02

LAUNCH VEHICLE
LONG MARCH 4B

ENGINE BLOCKS

LAUNCH SPACEPORT
Jiuquan Satellite Launch Center, China

DESTINATION
Low Earth Orbit (LEO-SSO)

RECOVERY
None

LAUNCH WINDOW
AUGUST 18 22:22 UTC 2021

LAUNCH DATE
AUGUST 18 18:32 EDT

HEIGHT
144.1 m

WEIGHT
13.35 m

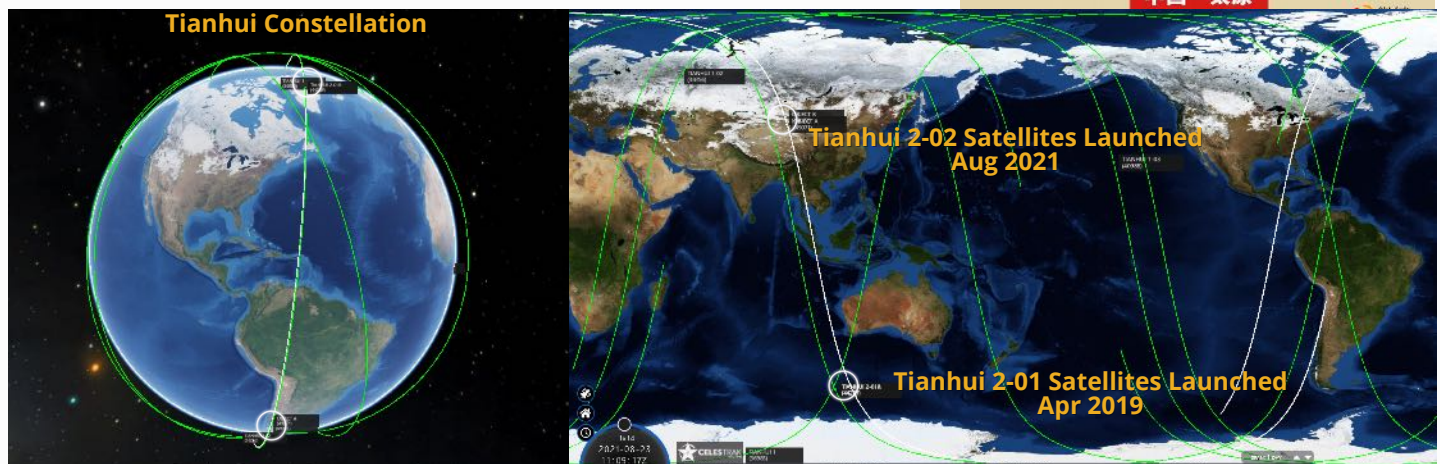
LAUNCH WEIGHT
245 tons

RECOVERY
None

our space 2021年8月19日

我国成功发射天绘二号02组卫星

中国·太原

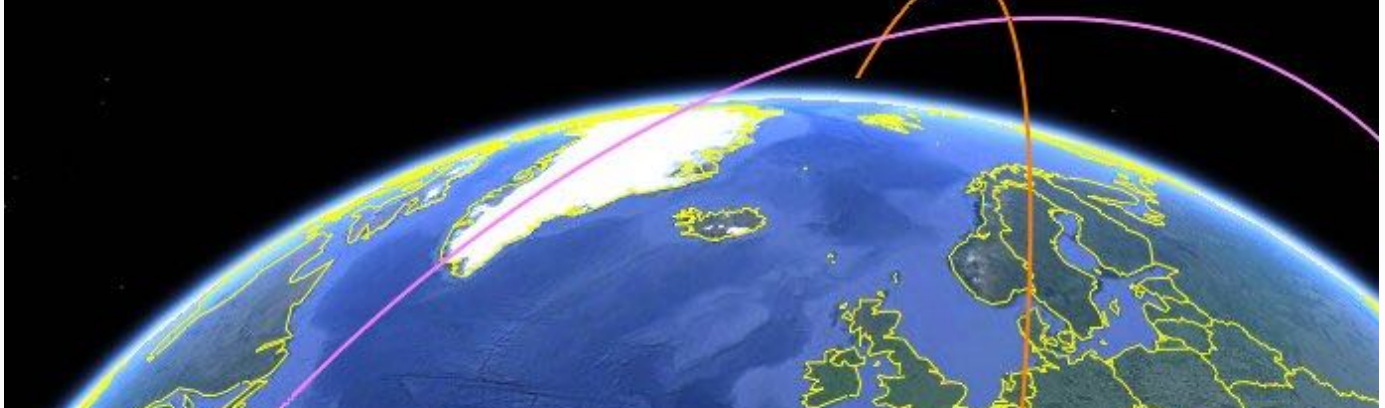


In a scientific paper, Chinese officials said the Tianhui 2 satellites are similar to the German TerraSAR X and TanDEM X radar observation satellites. The use of two satellites flying in formation yields stereo data critical to generate 3D maps. Tianhui 2 radar capabilities will complement the optical Tianhui 1 imaging satellites with a similar 3D mapping mission. The optical satellites are sensitive to spectral differences, allowing users to determine information related to vegetation and agriculture, land use, and natural resources.

Revisionist History: China Satellite Collides with Russian Space Debris

14 August 2021: Astronomer Jonathan McDowell spotted an update in the Space-Track.org catalog, which included "a note for object 48078, 1996-051Q: 'Collided with satellite.' The satellite in question is believed to be China's Yunhai 1-02 meteorological satellite.

**The Yunhai 1-02 v Obj 48078 collision occurred at 0741:19 UTC 18 Mar 2021,
780 km above Tromsø, Norway (at 19.4E 70.9N),
Relative velocity was 13.26 km/s (29,660 mph)**



- In March, the U.S. Space Force's 18th Space Control Squadron (18SPCS) reported the breakup of Yunhai 1-02, a Chinese military satellite that launched in September 2019. It was unclear at the time whether the spacecraft had suffered some sort of failure — an explosion in its propulsion system, perhaps — or if it had collided with something in orbit.
- Object 48078 is a small piece of space junk — likely a piece of debris between 4 to 20 inches wide (10 to 50 centimeters) — from the Zenit-2 rocket that launched Russia's Tselina-2 spy satellite in September 1996.
- Yunhai 1-02 and Object 48078 passed within 0.6 miles (1 kilometer) of each other — within the margin of error of the tracking system — at 3:41 a.m. EDT (0741 GMT) on March 18, "exactly when 18SPCS reports Yunhai broke up," McDowell wrote.
- The collision spawned 37 debris objects that have been detected to date...there are likely others that remain untracked.
- Yunhai 1-02 apparently survived the violent encounter...amateur radio trackers have continued to detect signals from the satellite, it is unclear if Yunhai 1-02 remains operational.
- Orbital debris is a growing problem. Small debris is tough to track, and there's already a lot of it up there. About 900,000 objects between 0.4 inches and 4 inches wide (1 to 10 cm) are whizzing around our planet, the European Space Agency estimates. And Earth orbit hosts 128 million pieces of junk 0.04 inches to 0.4 inches (1 mm to 1 cm) in diameter, according to the European Space Agency.

LAUNCH SERVICE PROVIDER/MISSION CONTRACTS
China Aerospace Science and Technology Corporation

LONG MARCH-2D/ YUNHAI-1-02
Launch Date: 25 Sept 2019
Launch Window: 12:58 AM UTC (06:25 AM IST)

MISSION TYPE: Meteorology, Earth Observation
Orbital Destination: SUN SYNCHRONOUS ORBIT
780 km x 787 km, 98.5°

Yunhai-1 is a series of Chinese meteorological satellites.
The Yunhai-1 satellites are built by Shanghai Academy of Spaceflight Technology (SAST).
Configured by chinese CAST2000 bus Powered by 2 deployable solar arrays and batteries
The satellite will be used for observation of atmospheric, marine and space environment, disaster prevention and mitigation, and scientific experiments.

Payload: YUNHAI-1(02)
Chang Zheng 2D (CZ 2D) YZ-3
SAST China

Height: 41.05m
Diameter: 3.35m
No of Stages: 3
St ON Booster: 0

Launching From: LA-4, Jiuquan Satellite Launch Center, CHINA

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"Collisions are proportional to the square of the number of things in orbit," McDowell told Space.com. "That is to say, if you have 10 times as many satellites, you're going to get 100 times as many collisions. So, as the traffic density goes up, collisions are going to go from being a minor constituent of the space junk problem to being the major constituent. That's just math."

China Launches TJS-7 Satellite (possible SIGINT or MW)

24 August 2021: China launched a Long March 3B rocket with the Tongxin Jishu Shiyan Weixing 7 (TJS) 7 satellite from Xichang. As of 27 Aug satellite remains in Geosynchronous Transfer Orbit (GTO). Previous TJS satellites are believed to carry out signals intelligence or missile warning missions. [Launch VIDEO](#).

- CASC, the government-run contractor that oversees the Chinese space program, said the TJS 7 satellite will be “mainly used to carry out communication technology test missions.”

- Analysts believe the TJS series of satellites actually serve the Chinese military, providing early warning and intelligence-gathering functions.

- Previous TJS missions have reportedly been Huoyan infrared missile warning satellites.

- TJS-7 was manufactured by the Shanghai Academy of Spaceflight Technology (SAST). While officially for “communication testing,” based on SAST and their TJS history, it is likely the TJS-7 spacecraft is of the Huoyan-1 series – military satellites that are thought to be part of an early-warning missile detection system for China

- Unconfirmed reports stated TJS-7 will settle into GEO near TJS-6 at 178.5° E.

- TJS-1 launched in 2015 and successfully deployed China’s first large-aperture reflector antenna in orbit. It is possibly the first vehicle in the Qianshao-3 SIGINT satellite series developed by the China Academy of

Spaceflight Technology (CAST). The satellite has a large mesh antenna, with a diameter of ~32 meters...ideal for SIGINT operations.

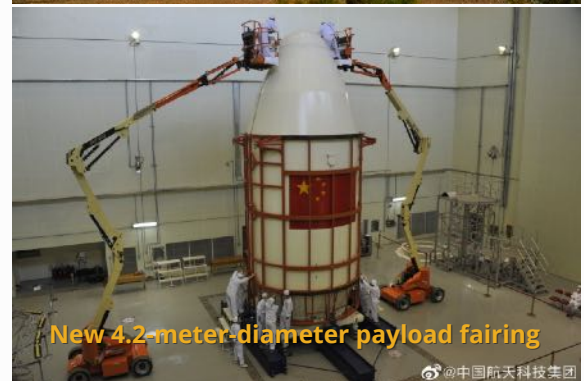


Other TJS launches occurred in 2017 (TJS-2), 2018 (TJS-3), 2019 (TJS-4) and 2020 (TJS-5). The same secrecy surrounded each launch. There is speculation that TJSW-2, -5 and -6 might be military Huoyan-1 early warning satellites while TJS-4 may be another SIGINT collector similar to TJS-1.

China launches satellites for internet constellation

24 August 2021: China launched a Long March 2C rocket with a Yuanzheng-1S upper stage & 4.2m diameter fairing from Jiuquan. The payload was 3 LEO "integrated experimental satellites" for communications technology tests. Launch [VIDEO](#).

- China launched two test payloads Tuesday for a planned constellation of internet satellites, a step that could lead to launches of thousands more Chinese spacecraft to match similar commercial networks already being deployed by SpaceX and OneWeb.
- An unidentified third satellite, also with a communications tech demo mission, was also on-board.
- The Long March 2C flew for the first time with a wider payload fairing to provide more volume for launches of larger numbers of satellites on a single mission.
- The rocket's Yuanzheng 1S upper stage delivered two satellites, into an orbit about 680 miles (1,100 kilometers) above Earth with an inclination of 89.4 degrees to the equator.
- The third stage, the Yuanzheng, is a restartable upper stage. The Yuanzheng allows launch vehicles to deploy their payloads directly into high energy orbits, like medium Earth orbit (MEO) and geosynchronous orbit (GSO). The stage can perform at least two burns within its lifespan of 6.5 hours.
- The Long March 2C rocket debuted a new 13.8-foot-diameter (4.2-meter) payload fairing. The nose shroud is wider than fairings flown on past Long March 2C rockets, giving each launcher a larger payload volume to accommodate more satellites on a single mission.
- The Long March 2C rocket also launched with a tube-shaped multi-satellite adapter structure inside its payload fairing. On future missions, the support tube will have mounting points for multiple spacecraft, similar to mechanisms used by OneWeb and other companies to deploy numerous satellites.



China is planning to launch a constellation of up to 13,000 satellites to provide global internet connectivity, according to

regulatory filings with the International Telecommunication Union. Plans indicate that the sub-constellations will range from 500-1,145 km in altitude, with inclinations between 30-85 degrees, and the satellites will cover a wide range of frequency bands. SpaceX is deploying a network of 12,000 Starlink internet satellites operating at 550km altitude, and the company has signaled plans to launch 30,000 additional spacecraft for additional broadband coverage. OneWeb has launched 288 satellites of a planned fleet of 648 spacecraft operating at 1,200km altitude. Like SpaceX, OneWeb has preliminary plans to launch thousands more satellites if market demand materializes. Amazon's Kuiper satellite internet network is in an earlier stage development, and the European Union is studying its own satellite communications mega-constellation. The age of the mega-constellation is upon us.

Pics o' the week!



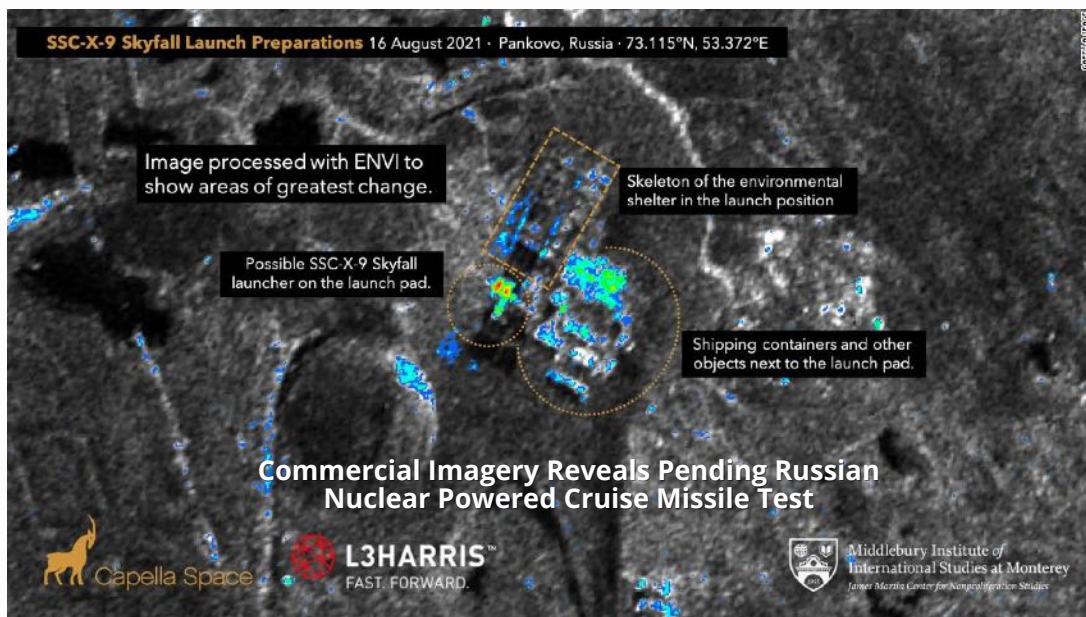
Olympus Mons compared with the Island of Ireland



Mars Rover Vehicle Navigator



The struggle is real...and so is the gamma decay.



James Webb Space Telescope prepares for shipment. Launch scheduled for Dec 2021.



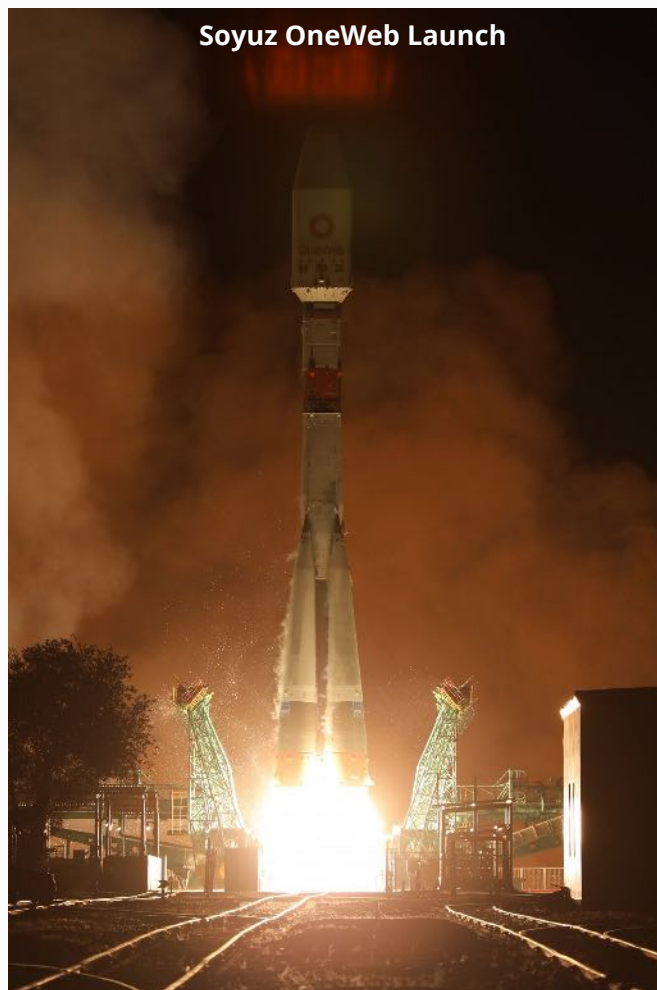
Why we space. Surface of Pluto as seen from New Horizons spacecraft



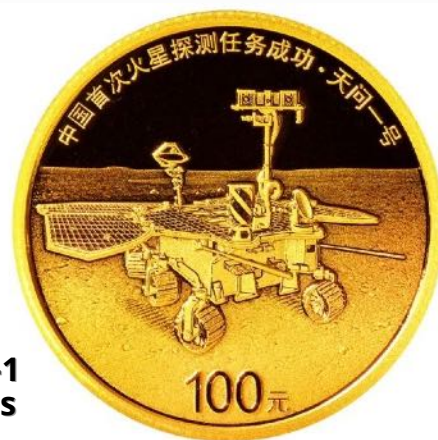
Final launch of the Apollo program



Soyuz OneWeb Launch



China Issues Tianwen-1 Commemorative Coins



150克圆形精制金质纪念币背面图案

8克圆形精制金质纪念币背面图案



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