

Visit Archive & Subscribe (it's FREE!)

<https://integrityflash.com/subscribe>

THE INTEGRITY FLASH

Analysis of Developments in the Space Domain

ISSUE 108 | 27 OCT 2024



In This Issue

Pg 3 - [China Launches 3 Yaogan-43 03 Satellites](#)

Pg 4 - [China Launches 2d Batch of 18 Qianfan \(G60 Starlink\)](#)

Pg 5 - [China Launches Gaofen-12 05 SAR Satellite](#)

Pg 6 - [China's WHG-03 Settles into GEO over Western Hemisphere](#)

Pg 6 - [China Launches 3 Tianping-3 Radar Calibration Satellites](#)

Pg 7 - [China's SY-12 01 Conducts Fly-By of Indonesia's BRIsat](#)

@johnkrausphoto via X

contact@integrityisr.com

[Catalog](#)

China Launches 3 Yaogan-43 03 Satellites

22 Oct: China launched a Long March-2C (LM-2C) with the third set of Yaogan-43 satellites (YG-43 03) from Xichang. The launch carried 3 satellites to a 500km/35° orbit. The 3 YG-43 03 satellites (61617-61619) are co-planar (matching inclination and RAAN) with the 6 YG-43 02 (60945-60950) satellites China launched on 3 Sep 2024. According to official sources, the satellites entered the preset orbit and will be “mainly used for carrying out tests on new technologies of low-orbit constellations”. [Launch Video](#).

- The two previous YG-43 launches both used the larger LM-4B launch vehicle. In order to use the LM-2C for a multi-satellite launch China used an extended central load-bearing deployment platform, allowing the 3 YG-43 03 satellites to be side-mounted and improve the payload fairing's space utilization.

- The LM-2C is a 2 stage rocket capable of placing ~4,000kg into Low Earth Orbit (LEO). In contrast the LM-4B is a 3 stage rocket capable of delivering ~4,200kg to LEO.

- With the 3 YG-43 03 satellites joining the 6 YG-43 02 in the same orbit (co-planar and equal SMA) there are now 9 total YG-43 satellites (60458-60466) in this particular plane. (see graphic below)

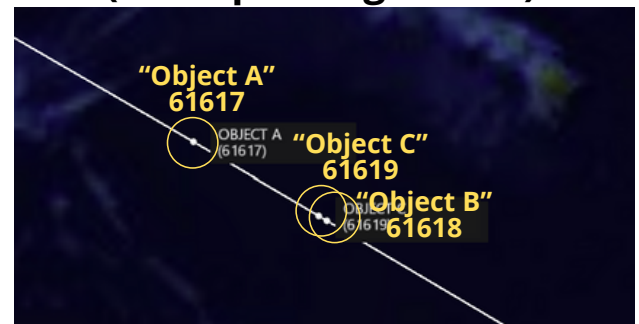
- The YG-43 02/03 satellites are also co-planar with YG-35 03, YG-36 04 and YG-39 02 satellites.

- I will continue to monitor the YG-43 03 satellites to determine if they are integrated into the YG-43 02 “formation.” China launched YG-43 03 into the middle of the YG-43 02 train. As of 25 Oct 2024 none of the YG-43 03 satellites has maneuvered.

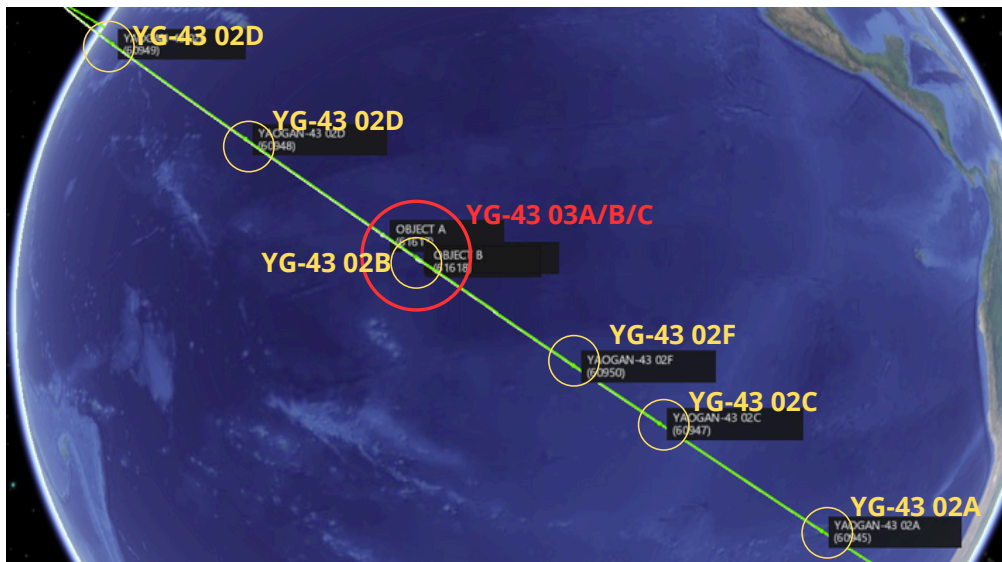
- It will be interesting to compare YG-43 01 satellite spacing with the YG-43 02/03. More to follow!



YG-43 03 Mission Logo & LM-2C Fairing
(nasaspaceflight.com)



YG-43 03 Orbits 25 Oct 2024
(spaceaware.io)



**YG-43 03 (Red)
with
YG-43 02 (Yellow)
25 Oct 2024**
(spaceaware.io)

China Launches 2d Batch of 18 Qianfan (G60 Starlink)

15 Oct: China launched a Long March-6A launch vehicle (LM-6A) with the second group of 18 Qianfan (SpaceSail Polar Orbit) satellites from Taiyuan. According to official sources, the 18 satellites constitute the second batch of the first generation of the SpaceSail Constellation, developed by Shanghai SpaceSail Technologies (SSST) Co., Ltd. to “provide global users with low-latency, high-speed and ultra-reliable satellite broadband internet services” Thankfully there were no reports of orbital debris resulting from the LM-6A upper stage. Launch [Video](#).

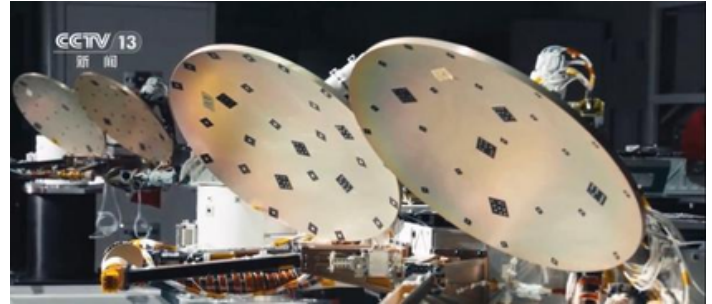
- As of 26 October none of the satellites had been cataloged (2024-185).

- From [Andrew Jones Article](#): “The Long March 6A upper stage deployed the flat panel Qianfan (or “Thousand Sails”) Polar Orbit-02 group of 18 satellites into polar orbit for Shanghai Spacecom Satellite Technology (SSST). The project is sometimes referred to as G60 Starlink.

- SSST plans for the constellation’s first stage to consist of 1,296 satellites. 648 of these are to be launched by the end of 2025 to provide regional network coverage. The completed network will consist of more than 14,000 low Earth orbit broadband multimedia satellites.”

-Checking up on the first 18 Qianfan satellites:

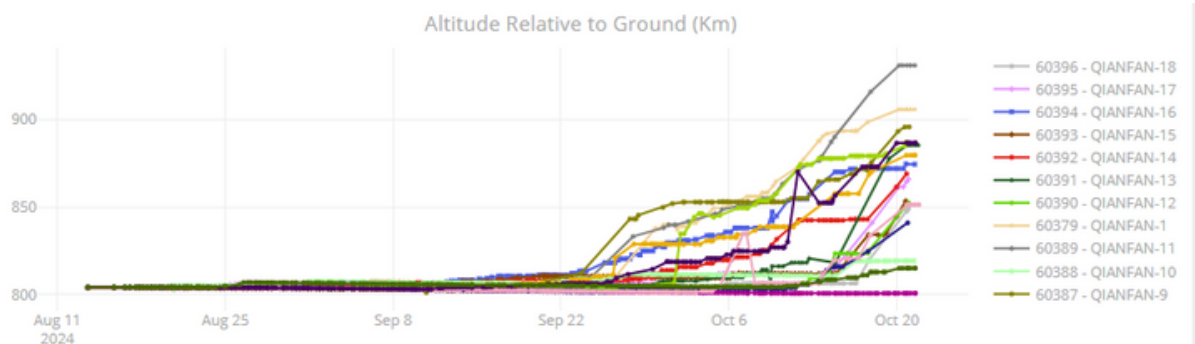
- China launched satellites (2024-140A-T) on 6 Aug 2024. That launch also used the LM-6A and unfortunately there was a destructive event involving the upper stage resulting in at least 700 pieces of debris.
- Since the launch, 17 of the 18 satellites have maneuvered. The one outlier is Qianfan-7 (60385). 60388 appears at lower SMA than rest (see graphic). SMA range is 931km (Qianfan-3) to 800km (Qianfan-7). It is too early to assess if any of the satellites has experienced an anomaly. As of 22 Oct 2024 the satellites are co-planar but are not evenly spaced .



G60 Satellites Under Construction
([nasaspaceflight.com](#))



Qianfan 1-18 as of 21 Oct 2024
([nasaspaceflight.com](#))



SMA Comparison for Qianfan 1-18
([spacecockpit.com](#))

China Launches Gaofen-12 05 SAR Satellite

16 Oct: China launched a Long March-4C (LM-4C) with Gaofen-12 05 (61571) synthetic aperture radar (SAR) imaging satellite from Jiuquan. According to official sources, Gaofen-12 05 entered the planned orbit successfully and “will be used in a variety of fields including land surveys, urban planning, road network design, crop yield estimation and disaster relief”. [Launch Video](#).

- GF-12 05 is in a 626 x 612km sun-synchronous orbit (SSO) with an inclination of 97.9°.

- As the name suggests, this is China’s 5th Gaofen-12 launch. All used the LM-4C launch vehicle and all 4 of the 5 launches have been from Jiuquan. The only exception was GF-12 01 (44819) which launched from Taiyuan in 2019.

- GF-12 05 appears to be near its operational orbit as its perigee and apogee values are within 5km of the other GF-12 satellites. Overall SMA is within 2km of GF-12 01-04 (628.6km to 626.5km avg).

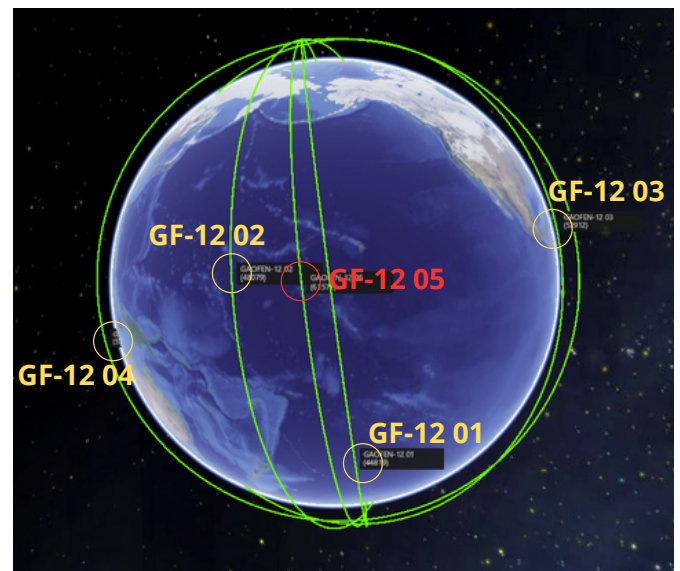
- The Gaofen-12 satellites are part of the civilian China High-resolution Earth Observation System (CHEOS).

- Background on the CHEOS program: As noted in the Eleventh Five-Year Plan, CHEOS aims to build an Earth observation system with high spatial, temporal and spectral resolution in an all around way, and actively meet the major national strategic needs of China's national defense, natural resource survey, disaster response and prevention. CHEOS has promoted the continuous maturity of high-resolution Earth observation technology in China, and the wide application of high-resolution images.

- According to Li Deren, a top Chinese remote sensing scientist, China has invested ¥ 50 billion in the CHEOS (Gaofen) program, and the resolutions for civil and military use have reached 0.3m and 0.1m, respectively. Interestingly, Li presented a slide that explicitly mentioned the Gaofen-8-14 Satellites were "military satellites."

- From Gunther's Space Page: “GF 12 has been reported to be equipped with a high-resolution Earth observation system. It uses a microwave remote sensing system with ground resolution up to the sub-meter level, to be mainly used in land census, urban planning, land rights, road network design, crop estimation and disaster prevention and mitigation and other fields. Possibly it is a civilian version of the Yaogan 29 type satellite.”

LM-4C Lift Off from Jiuquan
(nasaspaceflight.com)



5x GF-12 Satellites in Orbit
(spaceaware.io)



Launch and Satellite Logos
(@Cosmic_Penguin via X)

China's WHG-03 Settles into GEO over Western Hemisphere

21 Oct: After spending ~11 days in Geostationary Transfer Orbit (GTO), China conducted a circularization burn and placed its "High Orbit Internet Services Satellite," WHG-03 (61503) into GEO stationary orbit. The satellite is now orbiting at 77.1° WEST longitude with a 0° inclination. WHG-03 joins TJS-7 (49115) as China's only 2 active GEO satellites operating over the Western Hemisphere.

- China has released no details regarding the mission and capabilities for the WHG satellite series.
- A November 2023 Xinhua report noted the China Aerospace Science and Technology (CAST) Corporation had completed the first high-orbit satellite Internet. The report noted that the purpose of the satellites was to completely cover the entire territory of China and key areas along the "Belt and Road" countries.
- WHG-03 is located 22.5° east of TJS-7 which has been at 99.6°W after it relocated from 146.5°E.
- As a refresher: In late Oct 2022, TJS-7 decreased its Semi-Major Axis (SMA) 332.3km and drifted East. TJS-7 maintained its drift for most of Nov 2022, rejoining the GEO belt around 26 Nov 2022.
- TJS-7's position at 99.6° W longitude which is centered on the continental US. The location seems to support either the SIGINT or missile warning missions suspected of the other TJS satellites.



WHG Constellation + TJS-07
(spaceaware.io)

China Launches 3 Tianping-3 Radar Calibration Satellites

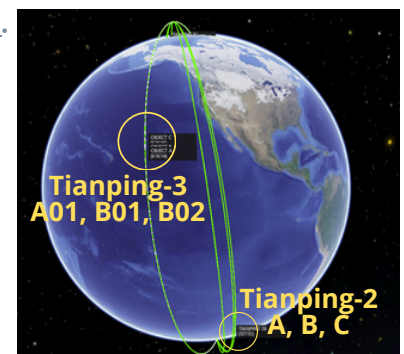
22 Oct: China launched a Long March-6 with three Tianping-3 satellites (61614-61616) from Taiyuan. The satellites are Tianping-3 A(01), B(01), and B(02). According to official sources, Tianping-3 A(01) is "mainly used for ground radar equipment calibration and RCS measurement, provides support for ground optical equipment imaging experiments and low-orbit space environment detection experiments, and provides services for atmospheric space environment measurements and orbit prediction model corrections". Launch Video.

- The Tianping-3 A01, B01 and B02 satellites join 4 other Tianping satellites currently in orbit. The newest Tianping satellites are in an ~566 x 555km with 97.6° inclination.

- China launched the first Tianping satellites, Tianping-1A and 1B (43712 & 43714) in 2018. Tianping-1A re-entered on ~7 Oct 2024. Tianping-1B appears to be heading toward a similar fate and is in a naturally decaying orbit.

- China launched the Tianping-2A, 2B & 2C satellites on 30 Mar 2022. All appear to be maintaining their orbits.

-Per Andrew Jones: "Tianping-3 satellites can be used as benchmarks to compare and validate the measurements of ground-based radars, offering highly accurate measurements of their RCS. The satellites may have corner reflectors or transponders on board to provide a strong and well-characterized signal to ground-based radars. This signal helps in calibrating the radar's performance, such as its power levels, antenna alignment, and other critical parameters."



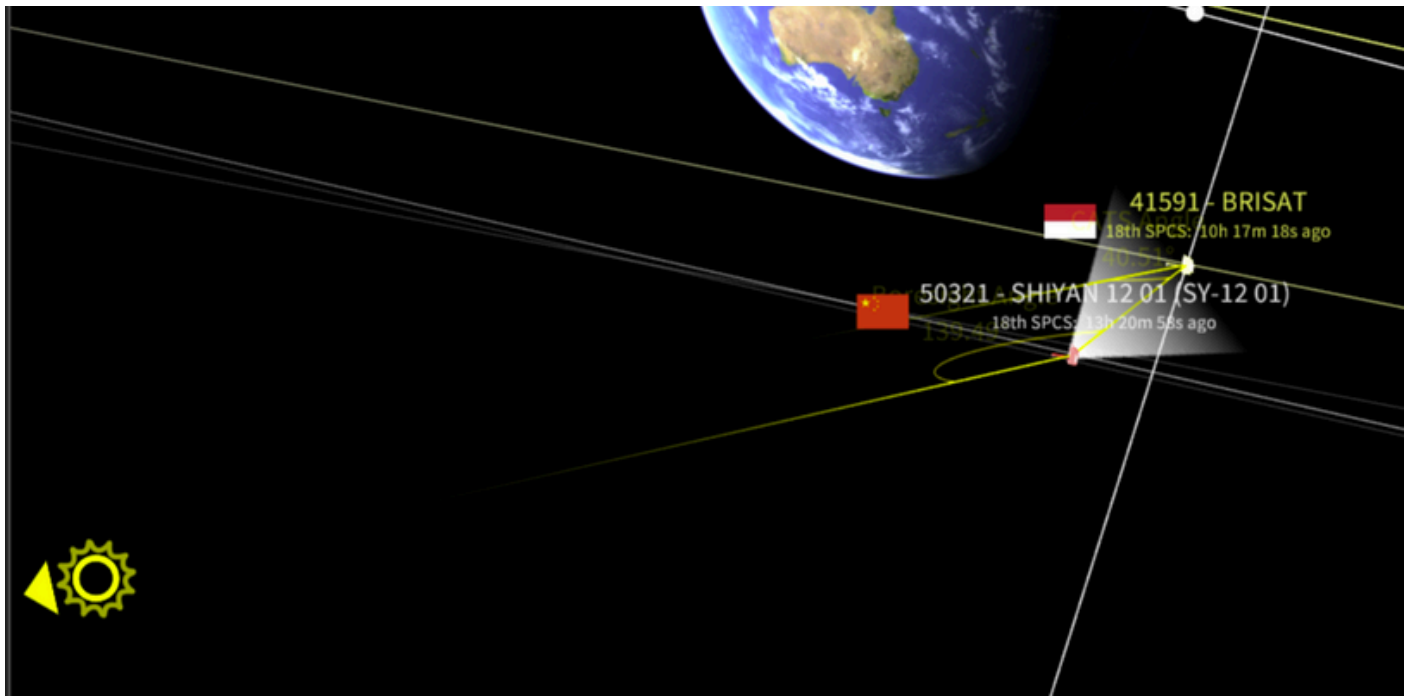
Tianping Constellation
(spaceaware.io)

China's SY-12 01 Conducts Fly-By of Indonesia's BRIsat

25 Oct: One of China's suspected inspection satellites, Shiyang-12 01 (SH-12 01/50321) came within 50km of Indonesia's BRISAT (41591). At the point of closest approach the lighting conditions were optimal (solar phase angle (SPA) $>130^\circ$) for SY-12 01 to image BRIsat. SPA remained $>130^\circ$ optimal for ~15 minutes when the satellites were ~85km apart.

SY-12 01 last maneuvered on ~11 Sep 2024 when it increased its altitude to initiate a Westward drift. It does not appear that SY-12 01 made any maneuvers in preparation for its fly-by of BRIsat. SY-12 01 remains 45.4km above the GEO belt and is drifting 0.6° per day.

BRIsat has been in GEO since its launch in 2016 and is located at 150.5°E longitude. Per Gunther's Space Page: BRIsat has "45 transponders (9 Ku-band, 36 C-band), which cover areas in Indonesia, ASEAN, North east of Asia, some Pacific area and West Australia. From its orbital position at 150.5° East, it delivers highly reliable communications services to BRI's 11,000 bank branches across the Indonesian archipelago."



**Illustration of SY-12 01 and BRIsat at Point of Closest Approach (50km Separation)
At POCA Solar Phase Angle from SY-12 01 to BRIsat was 139° ...optimal for optical imagery
(spacecockpit.com)**



**BRIsat Preparing for Launch (left)
(satellitetoday.com)
&
Artist Rendering of BRIsat on-orbit
(GMV.com)**

ISR University

Develop Your Future!



ISR University revolutionizes learning through innovative use of technology and resources to deliver agile, student-centric & customer-focused learning anywhere, anytime. Our highly qualified instructors leverage decades of operational, instructional, and educational experience to maximize student learning and knowledge sharing.

Certified Space Professional 1 (CSP-1)

SP100 - Introduction to the Space
Environment & Space Systems
CSP1 Certification Exam

Certified Space Professional 2 (CSP-2)

SP200 - Space Systems Design
CSP2 Certification Exam

Certified Space Professional 3 (CSP-3)

SP300 - Adversary Space Capabilities I
SP310 - Adversary Space Capabilities II

Certified Space Professional Executive (CSP-E)

SP900 - The Space Domain & National
Security Executive Seminar

Continuing Space Education

SP101 - Introduction to Space Operations
SP102 - Introduction to Space
SP103 - Math for Space
SP201 - Space Race 2.0
SP202 - Advanced Orbital Mechanics
SP203 - Joint Planning Process
SP204 - Space Surveillance Network/Object
Surveillance & ID
SP301 - Electromagnetic Warfare
SP302 - Cyberspace
SP303 - Anti-Satellite Weapons

Space Specializations - Coming This Fall!

SP400 - Space Operations Planning
SP410 - Rendezvous and Proximity
Operations
SP420 - Space Domain Awareness
SP430 - Space Control
SP440 - Space ISR
SP450 - Space Battle Management
SP460 - International Space Policy and
Strategy
SP470 - Space Acquisitions
SP480 - Intelligence Support to Space

Analytic Thought

AW100 - Foundations of Analytic Writing
AW200 - Analytical Writing
AW300 - Collaborative Analytical Writing
CT100 - Foundations of Critical Thinking &
Structured Analysis
CT200 - Critical Thinking for Analysts
CT300 - Advanced Critical Thinking for Analysts
CT500 - Leading Critical Thinkers
CT600 - Critical Thinking for Learning
Professionals
CT700 - Critical Thinking for Executives
DA100 - Foundations of Data Analytics
DA200 - The Art & Science of Data Analytics

Cyber

CYBER900 - Cyber Security Strategy
ENG200 - English for Cyber

Faculty Development

FD600 - Facilitation for Learning Professionals
CT600 - Critical Thinking for Learning
Professionals

ISR - Analysis

PED100 - Intelligence Planning Cycle
EM110 - Electromagnetic Spectrum
Fundamentals
IADS100 - IADS Foundations
IADS200 - Rethinking IADS
IADS310 - Advanced IADS Analysis

ISR - Targeting

TGT110 - Fundamentals of Targeting
TGT210 - Target Development I
TGT211 - Target Development II
TGT212 - Target Capabilities Analysis
TGT213 - Target Force Assignments
TGT214 - Mission Planning & Force Execution
TGT215 - Combat Assessment
TGT310 - Weaponizing and Collateral Damage
Assessment
TGT311 - HVI Target Development
TGT312 - Precision Point Mensuration
TGT315 - Targeting Professional

CONTACT US

DANIELLE STORAN, PMP

President & CEO
757.870.7237
Danielle.Storan@IntegrityISR.com

DUNS:

048869303

NAICS:

611512 (Flight Training)
611519 (Other Technical Training
and Trade Schools)

DDTC/ITAR Registered

Company Address:

3461 Frances Berkeley
Williamsburg VA 23188

On The Web:

IntegrityISR.com
ISRUniversity.com
LinkedIn

ISR University Managing Director

Jason Dean

Jason.Dean@IntegrityISR.com

Pics o' the week!

China Space Activity Overview

Based on open source information as of March 31, 2024.
Note that China does not acknowledge national security payloads in open source literature.



Spacecraft Launched by China

800 Total Operational
(as of January 1, 2024)



672 LEO Satellites



31 MEO Satellites



91 GEO Satellites



Tiangong space station final configuration



China's Current Satellite Capabilities

As of December 31, 2023



Positioning, Navigation, and Timing (PNT)
10 m Positional accuracy worldwide
5 m Positional accuracy in Asia Pacific
150+ Number of BeiDou reference stations



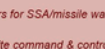
Satellite Remote Sensing
467 Number of satellites
20-30 cm Highest spatial resolution



Satellite Telecommunications
95 Number of satellites
51 LEO **44** GEO



Ground Assets
4 Large phased array radars for SSA/missile warning
~6 Ground stations for satellite command & control



5 Ground stations for remote sensing downlink
500 m Aperture size of world's largest radio telescope, open to international scientists

Orbital Launch Sites

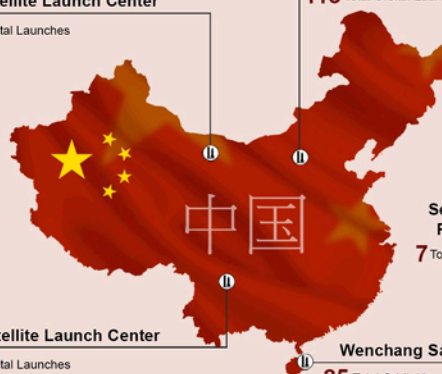
2000 - 2023

Jiuquan Satellite Launch Center

193 Total Orbital Launches

Taiyuan Satellite Launch Center

113 Total Orbital Launches



Sea Launch Platforms

7 Total Orbital Launches

Xichang Satellite Launch Center

172 Total Orbital Launches

Wenchang Satellite Launch Center

25 Total Orbital Launches

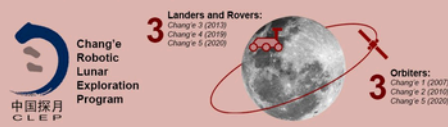
Primary Payload Ownership on Chinese Launches

2000 - 2023



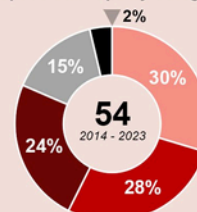
© 2024 BryceTech. All rights reserved. This infographic is for informational purposes only. Unauthorized use, distribution, or reproduction is prohibited.

Civil Space Exploration Missions

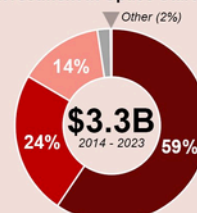


Commercial Industry Statistics

Space Start-ups by Category

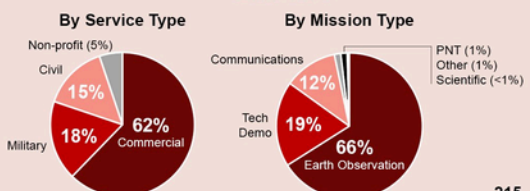


Investment in Space Start-ups



2023 Satellite Deployments

212 Total Spacecraft Launched



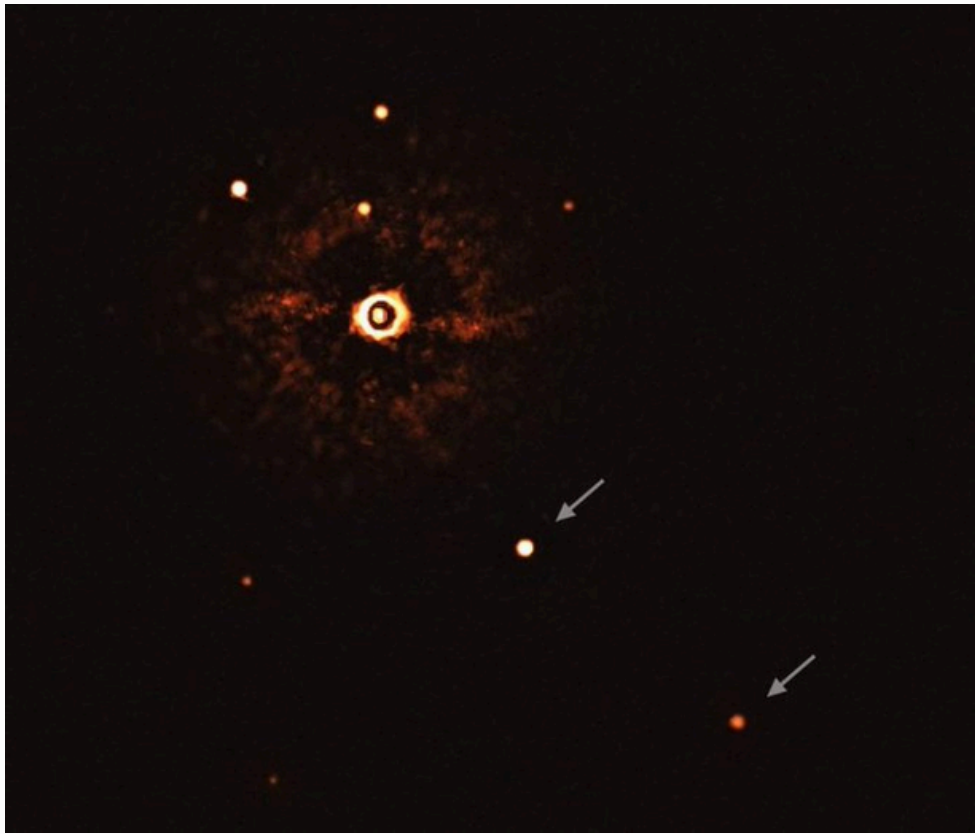
Excellent Infographic from BryceTech
(@ BryceTech via X)



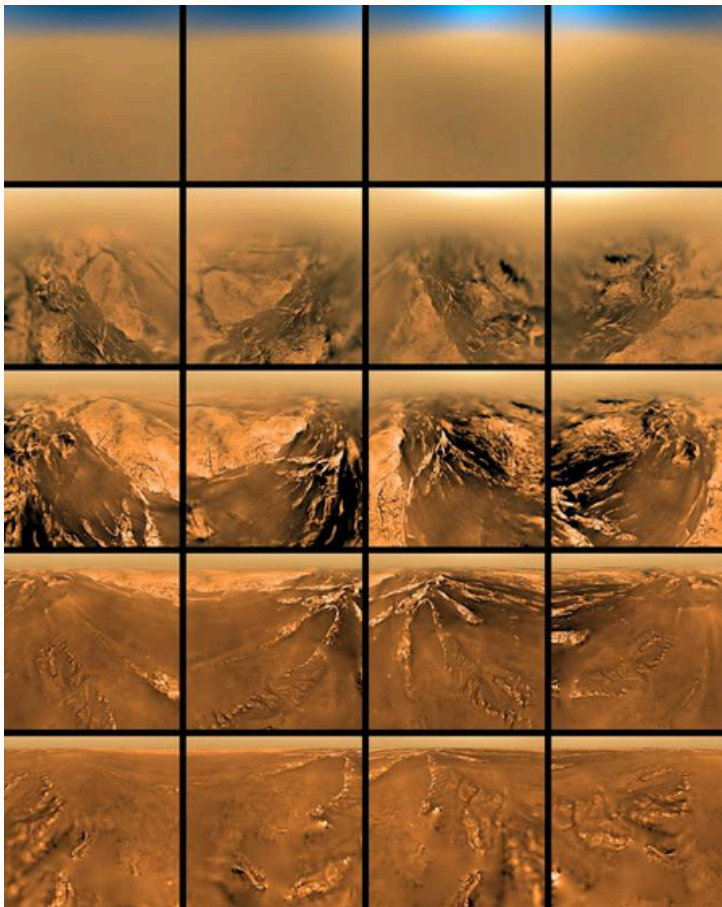
(@MAstronomers via X)

**Massive Abandoned Soviet
Antenna**
(@konstruktivizm via X)

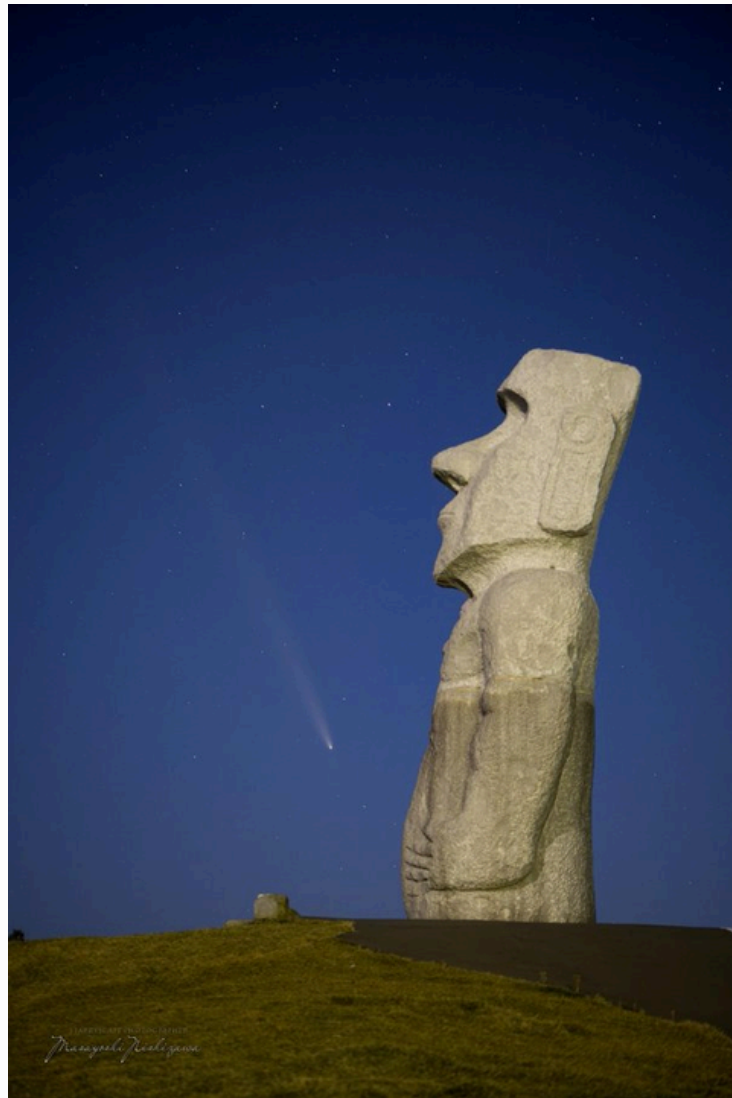




First Ever Image of a Multi-Planet System around a Sun-like Star (NASA)
([@konstruktivizm](#) via X)



Images from Titans Atmosphere
([@konstruktivizm](#) via X)



**Comet over Easter Island
([@konstruktivizm](#) via X)**

ISR UNIVERSITY

Williamsburg VA 23188

isruniversity.com
integrityisr.com

#WeKnowISR



555 E. Pikes Peak Ave
Colorado Springs, CO 80903

ussfa.org

#WeKnowSpace

WHO WE ARE

Integrity ISR employs a diverse group of former military service members, national security experts, and academic professionals to deliver innovative C4ISR, Space & Cyber solutions.

WHAT WE DO

Integrity ISR offers a wide-range of services for multi-domain C4ISR, Space & Cyber strategy, training and operations – enabling operations in any domain under any conditions, from permissive to highly contested and denied environments.

WHY WE DO IT

Our number one priority is to strengthen US national security – increasing US readiness and lethality, building C4ISR, Space & Cyber capabilities for the US and our allies, and fostering increased interoperability for tomorrow's coalition.

WE ARE HIRING!

<https://integrityisr.com/careers/>

OPEN POSITIONS

ALL SOURCE ANALYST SIGINT
SCENARIO DEVELOPER
(NELLIS AFB, NV)



INTEGRITY **ISR**

GLOBAL INNOVATIVE
SOLUTIONS FOR
C4ISR, SPACE &
CYBER
STRATEGY,
TRAINING, AND
OPERATIONS

An Economically
Disadvantaged,
Woman-Owned
Small Business