25 APRIL 2021

THE FINAL FRONTIER FLASH

Developments & Analysis of the Space Domain

In This Issue

All hyperlinks are underlined

The Amazing Veil Nebula
(Courtesy of Hubble)

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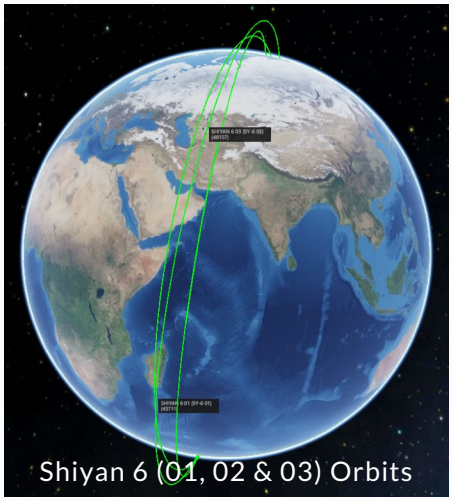
China Launches Shiyan 6 (03)


Shiyan 6 (03) Launch from Taiyuan

8 April 2021: China launched the third in a series of experimental Shiyan 6 satellites April 8 aboard a Long March 4B rocket. Not much is known about the satellite other than it will test new space technologies, including a new super-black coating to absorb stray light and improve the sensitivity of on-board optics. See VIDEO

- The Long March 4B rocket carried the Shiyan 6 spacecraft into a polar orbit about 620 miles (1,000 km) above Earth, with an inclination of 99.5 degrees to the equator.


Shiyan 6 (01, 02 & 03) Orbits

Shiyan 6 (03) Mission Patch

- This is the third in a series of Shiyan 6-type satellites. The first two Shiyan 6 satellites launched on Long March 2D rockets from the Jiuquan space center in northwestern China in November 2018 and July 2020. The first two Shiyan 6 satellites were deployed at lower altitudes.

- Shiyan means "experiment" in Chinese.

- One of the technologies to be tested on the Shiyan 6 spacecraft is a new super-black coating designed to prevent stray light from disrupting optical cameras.

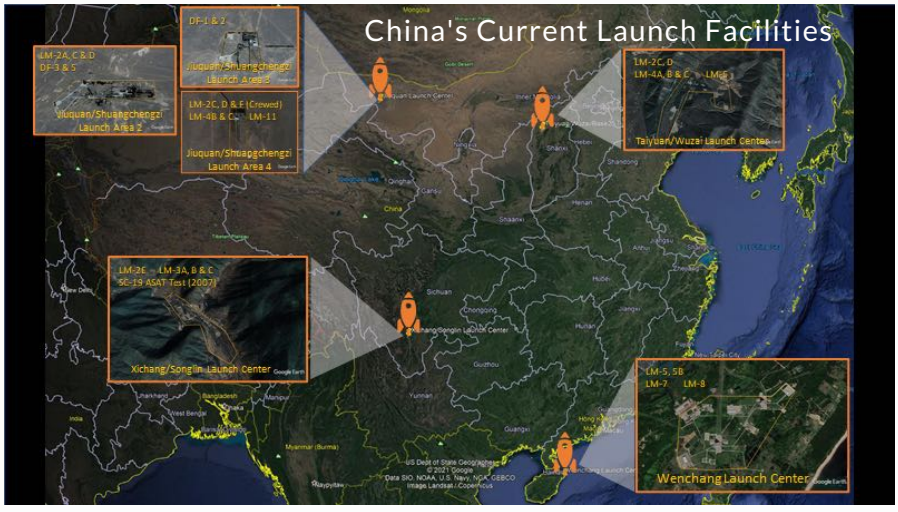
China's National Center for Nanoscience and Technology said that the "nanocomposite" dark coating was installed on the Shiyan 6 satellite's optical system. The dark material is designed to suppress stray light from the sun and Earth and "greatly improve the satellite optical system's ability to detect dim targets." The super-black material will absorb 99.6% of ultraviolet, visible, and near-infrared light...and has broad application prospects in dim target detection, interstellar navigation, infrared stealth and other fields." Dim target detection capabilities can aid in tracking other satellites in orbit.

Fun Fact: 60 years ago, Soviet cosmonaut Yuri Alekseyevich Gagarin was the first human in space on Vostok-1, became was a worldwide celebrity, and awarded the Order of Lenin. However, Soviet space successes were attributable chiefly to one man: Sergei Pavlovich Korolev. He was part of a team that launched the first Soviet liquid-fueled rocket in 1933. In 1938 he was convicted of treason and sabotage and sentenced to 10 years in a labor camp. In 1945, Korolev was sent to Germany to learn about the V-2 rocket. By 1954 he built a rocket that could carry a 5-ton nuclear warhead leading to the launch of the first ICBM in 1957. On 4 Oct , 1957, Sputnik 1 was fired into Earth's orbit, and Korolev, still technically a prisoner, was officially rehabilitated. Throughout his life, Korolev remained anonymous, known only as the "Chief Designer." Upon his death in 1966, his identity was revealed to the world, and he was buried in the Kremlin wall as a hero of the USSR.

China to Build Ningbo Commercial Spaceport

8 April 21: The eastern port city of Ningbo in eastern Zhejiang province has committed a total investment of 20 billion yuan ($3 billion) to establish a spaceport at Xiangshan. It is to be capable of launching up to 100 missions per year.

- The spaceport will cover 67 square kilometers, consisting 35 square kilometers for launch sites and 32 square kilometers for support facilities.
- The site will be situated on the eastern coast and at a similar latitude to China's Xichang Satellite Launch Center and Cape Canaveral in Florida.
- A wider industrial base including a research and development, manufacturing, and satellite data application centers will also be based at Xiangshan's Ningbo Aerospace Science and Technology Town.
- China is planning to begin launches for a 13,000-strong low Earth orbit satellite internet constellation named Guowang in the next few years.
- A number of commercial satellite constellations for remote sensing, communications and navigation enhancement are also being planned.
- China's current launch sites include three inland at Jiuquan in the northwest, Taiyuan in the north and Xichang in the southwest of the country and the new coastal Wenchang center on the southern island of Hainan (see graphic).



The commercial spaceport would be expected to serve launch companies which have emerged since a 2014 central government decision to open portions of the space sector to private capital. A Chinese commercial spaceport was included in a list of national projects in the recently formulated 14th Five-Year Plan which covers 2021-2025. New coastal spaceports would also help ameliorate the issue of falling rocket debris from launches at inland launch centers.

Rocket stages occasionally fall in inhabited areas, bringing risks as well as expensive and disruptive pre-launch precautions and post-mission clear up.

Russia Counterspace Lasers

From June 2020 Space Review: "Since last year, our troops have been armed with laser weapons. I do not want to reveal more details. It is not the time yet. But experts will understand that with such weaponry, Russia's defense capacity has multiplied." - Russian President Vladimir Putin in Mar, 2018 (Video)


Russian Peresvet laser system

- Videos released by the Russian government revealed a series of shelters. Amateur researchers studying satellite imagery on Google Earth found that the shelters were located at bases of the Strategic Missile Forces operating road-mobile intercontinental ballistic missiles. More specifically, the shelters were seen at ICBM garrisons near Teykovo, Yoshkar-Ola, and Novosbirsk, with some of the imagery showing Peresvet laser trucks parked outside.


RS-24/Yars ICBM

- All of these bases have been or are being armed with mobile versions of a new-generation ICBM called Yars, also known as Topol-MR and RS-24, with the NATO reporting name being SS-29 or SS-27 Mod 2.
- Most analysts agreed that the Peresvet was probably not powerful enough to physically destroy targets, but was designed to damage optical systems of vehicles trying to attack or image mobile ICBMs: aircraft, drones, cruise missiles, or satellites.
- In 2019 the Chief of the General Staff of Russia's Armed Forces Valeriy Gerasimov confirmed that Peresvet's task is to "conceal the movements" of mobile missile systems. Defense Minister Sergei Shoigu announced somewhat later that Peresvet had been declared operational at five missile divisions on December 1, 2019.
- The exact type of high-power laser used by Peresvet remains unknown.
- Four of Peresvet's home bases can now be positively identified from the available contracts: 1) the 54th Missile Division near Teykovo; 2) the 39th Missile Division near Novosibirsk; 3) the 35th Missile Division near Barnaul; and 4)the 14th Missile Division near Yoshkar-Ola.

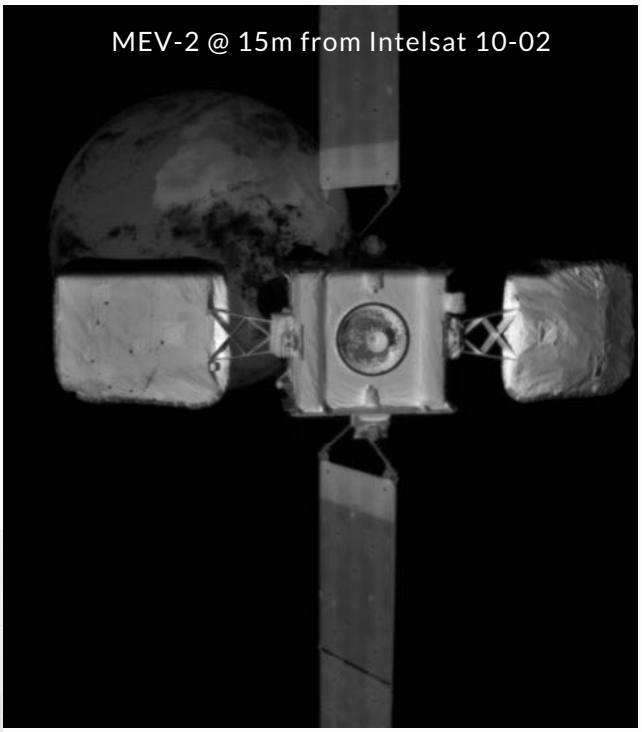
Documentary evidence has confirmed the Peresvet laser complex unveiled by President Putin in March 2018 has an anti-satellite role. The system is designed to conceal the movements of road-mobile ICBMs by temporarily dazzling or permanently blinding optical systems of enemy reconnaissance satellites. Russian officials have stated that Peresvet is an operational system, which, if true, means that it may well have been tested in conjunction with Russian satellites and has overcome significant technical challenges. Russia seems to be building up a counterspace capability unmatched by that of any other nation. The multitude of ASAT systems is possibly seen as a deterrent against the growing military space capabilities of both the United States and China, which over the past decade have fielded a fleet of military satellites far outnumbering those of Russia.

Mission Extension Vehicle 2 (MEV-2) Docking

12 April 2021: A robotic spacecraft from Northrop Grumman latched onto an old communications satellite in deep orbit and extended its lifespan by five more years.

- MEV-2 launched in August last year from French Guiana in South America. It spent 6 months raising its orbit to rendezvous with Intelsat's 10-02 (IS-10-02) 17-year-old communications satellite.

- IS-10-02 was running out of fuel and was getting old; it had operated far beyond its expected lifespan while still providing broadband communications to three continents.


MEV-2 @ 15m from Intelsat 10-02


MEV-2 Preparing for Launch

- MEV-2 is currently clamped to the back of IS-10-02, serving as the satellite's life support by providing renewed power and navigation control. The two will operate as a "combined stack" for the next five years. After that, MEV-2 will undock from IS-10-02 and set off to rendezvous with another client satellite.


Artist Rendition of MEV and Client Satellite

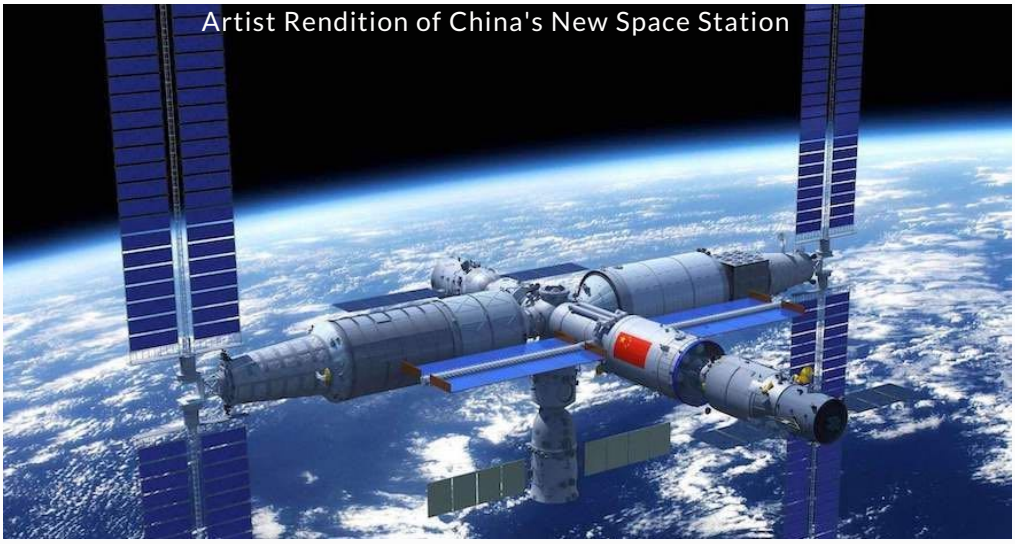
- IS-10-02 will die after MEV-2 leaves. A company spokeswoman said the satellite will retire to a "graveyard orbit," or the place in space where old satellites can turn into space junk without getting in the way of younger satellites.

- In 2024, Northrop plans to launch a "Mission Robotic Vehicle" that can provide basic inspection and repair services and deploy mission extension pods to satellites. After this, the company plans to develop refueling capabilities and debris removal from the vicinity of high-value satellites. Finally, in the 2030s, the company intends to begin in-orbit assembly and manufacturing capabilities.

Northrop sold the first two mission-extension missions to a commercial customer, Intelsat. However, the company expects that much of its future business may come from governments seeking to protect and extend the life of their most valuable assets in space. Northrop Grumman has made meaningful progress toward such a future of satellite servicing. As a result, reusability is now moving into space.

Upcoming China Space Station Missions

13 April 2021: China is preparing for a series of 3 launches over the coming months to establish a 3 module space station.

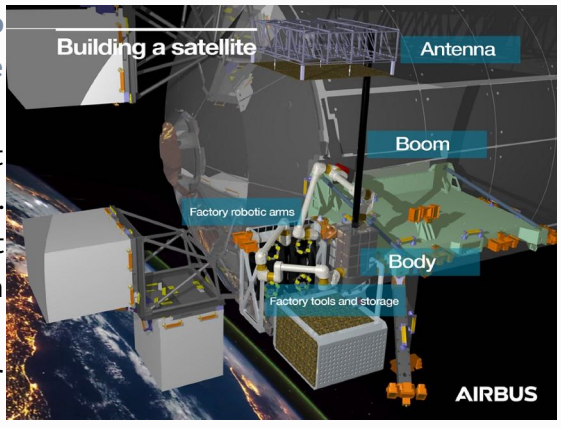

Artist Rendition of China's New Space Station

- China is readying a Long March 5B rocket to launch Tianhe, a roughly 22-metric-ton spacecraft which will serve as the core space station module. That mission is expected to launch on 29 April.
- A Long March 7 rocket arrived at China's coastal Wenchang spaceport to facilitate the Tianzhou-2 supply mission to Tianhe. Launch is expected in mid-May.
- Finally China is preparing to send 3 astronauts to the Tianhe core module on the Shenzhou-12 mission, launching on a Long March 2F rocket from Jiuquan. Shenzhou-12 could launch in June.

China is aiming to construct its three-module space station with 11 launches across 2021-2022. These will consist of three module launches and visits by four crewed missions and four cargo spacecraft. The outpost will orbit at between 340-450 kilometers for at least 10 years. Orbital inclination will be around 43 degrees to allow crewed launches to the station from Jiuquan in the Gobi Desert. The station could potentially be expanded to six modules, using apparent backup modules.

Airbus to Lead On-Orbit Manufacturing Study

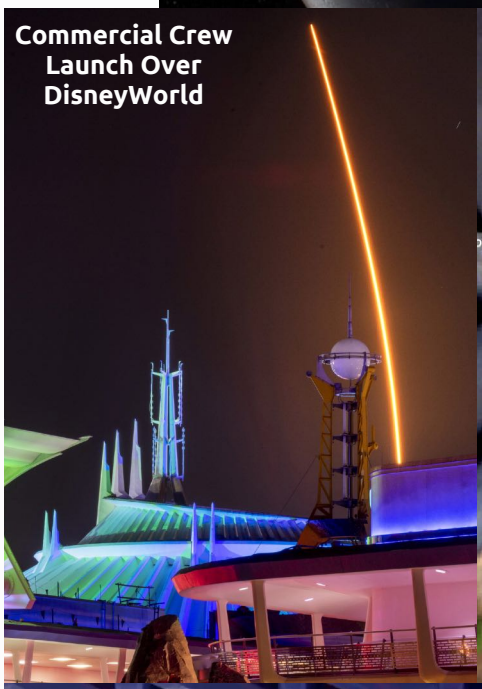
11 March 2021: European Commission selected Airbus to study spacecraft manufacturing in space through the Horizon 2020 Programm.



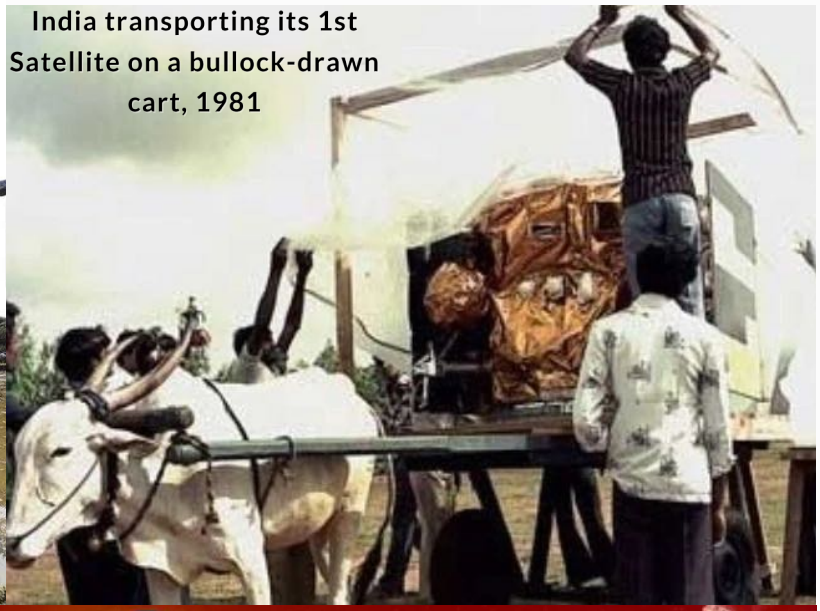
- The PERIOD (PERASPERA In-Orbit Demonstration) project focuses on satellite assembly and manufacturing in orbit. This A/B1 phase study contract, worth € 3 million, will last two years, with the objective to continue with a demonstrator in orbit.
- The "orbital factory" envisioned by PERIOD will pioneer construction of major components such as antenna reflectors, assembly of spacecraft components and satellite payload replacements, directly in space.

This is the precursor to future manufacturing of large structures in orbit. Producing directly in orbit will revolutionize the way space systems are designed, built and operated. It has significant advantages over the traditional approach – where everything is produced on Earth and subsequently transported to space – since objects made in space are freed from the constraints and requirements of launch (launcher mass and volume limitations, structural strength to withstand launch).

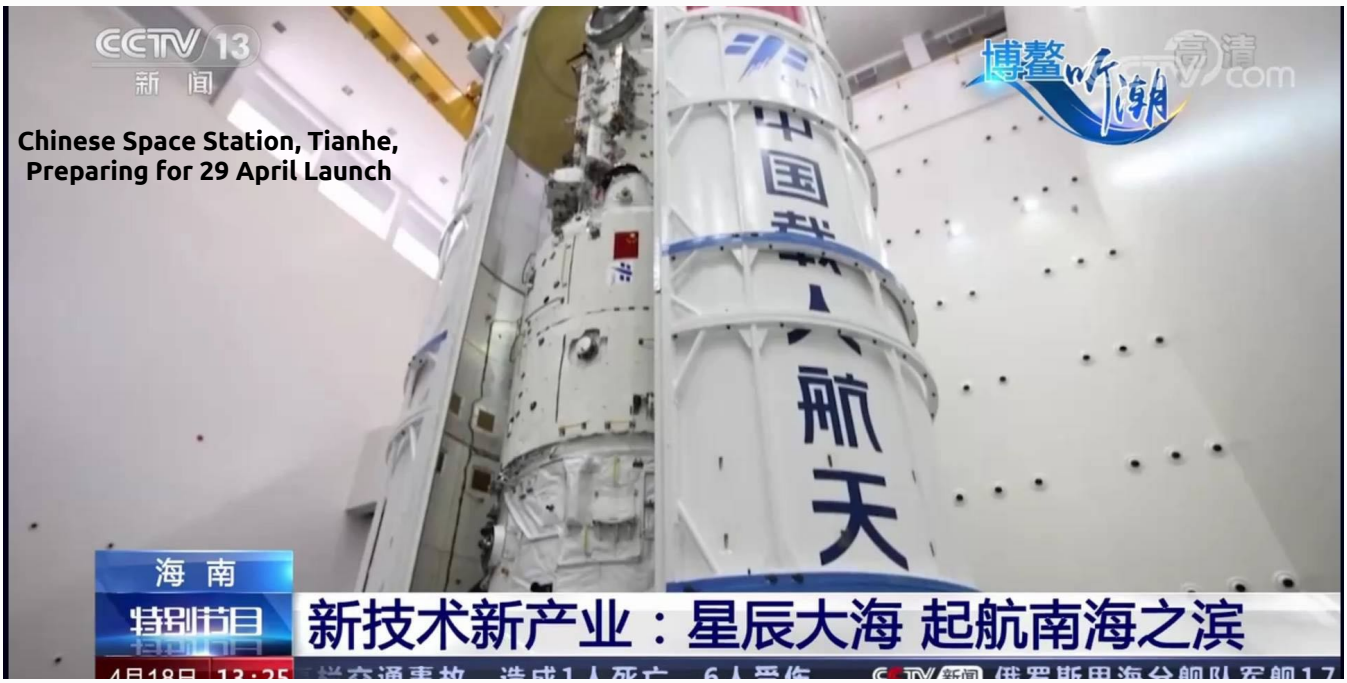
Pics o' the week!




Questionable
Safety Standards


India transporting its 1st
Satellite on a bullock-drawn
cart, 1981


新起点 新征程 新愿景
2021
中国航天大会
CHINA SPACE
CONFERENCE
中国·南京
China Space Day Announcement


CCTV 13
新闻
Chinese Space Station, Tianhe,
Preparing for 29 April Launch
博鳌听潮
海南
特别节目
新技术新产业：星辰大海 起航南海之滨