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CHINESE ASAT MISSILE – DN 3

CHINA'S NEW ANTI-SATELLITE MISSILE DN-3: CAPABLE OF DESTROYING ENEMY COMMUNICATIONS. The Chinese ballistic missile defense test that took place on February 5, 2018 involved a Dong Neng-3 (DN-3/KO09) hit-to-kill midcourse interceptor successfully striking a target DF-21 (CSS-5) medium-range ballistic missile.

The interceptor in the test was launched from the Korla Missile Test Complex, in China's Xinjiang province. The system's target capabilities are analogous to U.S. Standard Missile-3 midcourse interceptors, but it has yet to be successfully tested against an intermediate-range or intercontinental-range-class target. (The DN-3 is also thought to be physically much larger than the U.S. SM-3 series of missiles.)

The test was publicly reported by Chinese state media, though few details were provided. Exo-atmospheric midcourse kinetic interceptors like China's DN-3 target an incoming ballistic target after its active flight phase has concluded and the missile is outside the earth's atmosphere, on its way toward descending at hypersonic speeds. ***This capability also makes the DN-3 a capable anti-satellite (ASAT) platform.***

China's latest successful DN-3 test also comes just days after the U.S. Missile Defense Agency saw a second Standard Missile-3 Block IIA midcourse interceptor failure, compounding on a failure from 2017 that the Agency attributed to human error. (The test targeted a more challenging intermediate-range ballistic missile target than the MRBM-class DF-21 target the Chinese DN-3 intercepted.)

The DN-3 is thought to be China's most capable midcourse hit-to-kill interceptor, but the country has other systems capable of exo-atmospheric ballistic and anti-satellite interception, including the DN-2, the HQ-19, and the ASAT-oriented SC-19.

In 2013 China tested a DN2, a predecessor to the current model. It travelled 18,600 miles (30,000km) into space, the orbital region of US intelligence satellites. The DN-3 was first tested in October 2015 with another in December 2016. That test was also masked as an anti-missile interceptor test.

It also emerged in December last year that Beijing may also be developing its own satellite capable of grabbing its rivals in space. They will be small manoeuvring satellites capable of both seizing and destroying other satellites. Few additional details are known about the missile and the satellite.

CHINA'S DN-3 TEST ON 23 JULY 2017 TRACKED BY THE US

(https://thediplomat.com/2018/02/revealed-the-details-of-chinas-latest-hit-to-kill-interceptor-test/ https://www.dailymail.co.uk/sciencetech/article-4753602/China-tests-new-missile-capable-destroying-satellites.html https://freebeacon.com/national-security/china-carries-flight-test-anti-satellite-missile/)

CHINESE SOLAR POWER UNMANNED AIRCRAFT AND ICEBREAKING VEHICLE

China-Made Solar-Powered Unmanned Aircraft Makes Maiden Flight.

"MOZI 2" solar-powered unmanned aircraft on its maiden flight

China-developed solar-powered unmanned aircraft "MOZI 2" has completed a successful maiden flight, on 27 July 19. The flight was conducted at an airport in Deqing County in Zhejiang Province. The UAV, designed with a wingspan of 15 meters and solely powered by solar cells, can fly up to a maximum altitude of 8,000 meters. It can cruise at a low speed for up to 12 hours during the night after charging in the sunlight for eight hours. The aircraft is expected to be used for disaster relief, reconnaissance and communication. Manufacturers of this UAV seek to work with 5G service providers to further expand the applications of this UAV.

Comments. China has a very robust UAV industrial complex, both in the public and private industrial bases. UAVs from micro to very large sizes, capable of carrying out broad spectrum of activities - from mundane civil applications to long endurance jet powered military attack variants - are all being produced in China. It is also exporting military usage UAVs to Pakistan and many other countries.

Source: ***http://en.people.cn/n3/2019/0731/c90000-9601911.html***

China Delivers First Self-Built Icebreaking Research Vessel. The first self-developed icebreaking research vessel of China – Xuelong 2 (Snow Dragon 2) was delivered to the Polar Research Institute of China on 11 July 2019, the Maritime Day of China. Compared with its predecessor Snow Dragon, the Snow Dragon 2 is equipped with two-way icebreaking technology – the first of its kind in the world, and is able to continuously break ice as thick as 1.5 meters - with 0.2 meters of snow on top - at speeds of 2 to 3 knots.

In order to break thick ice layers, 'Xuelong 2' is built with special steel, measuring 100 millimeters at the thickest points. In addition, a total of over 7,000 smart sensors are installed in the body and equipment of the expedition vessel, which enables 'Xuelong 2' to monitor and collect extensive data on ice.

Comments. The icebreaking vessel is a result of Chinese collaboration with foreign companies. The basic design was provided by Finland's Aker Arctic Technology, but Chinese institutes and enterprises also had an in-depth participation during its building.

The research vessel which is expected to proceed to both, the Antarctic and Arctic this year for expedition, will improve China's capability to conduct scientific investigations in the Polar Regions. In coordination with the 'Xuelong-1', it will greatly expand the coverage and duration of Chinese polar expeditions. The idea to build a new polar expedition vessel originated in 2008 when Chinese scientists found the 'Xuelong-1' was not able to meet the demand of investigations. Though vessel-based scientific expeditions to Antarctica were mostly conducted in summer, global expedition teams still couldn't get through the ice shelf regions due to limited icebreaking capability.

Source: ***http://en.people.cn/n3/2019/0712/c90000-9596658.html***

CHINESE INNOVATION IN SPACE

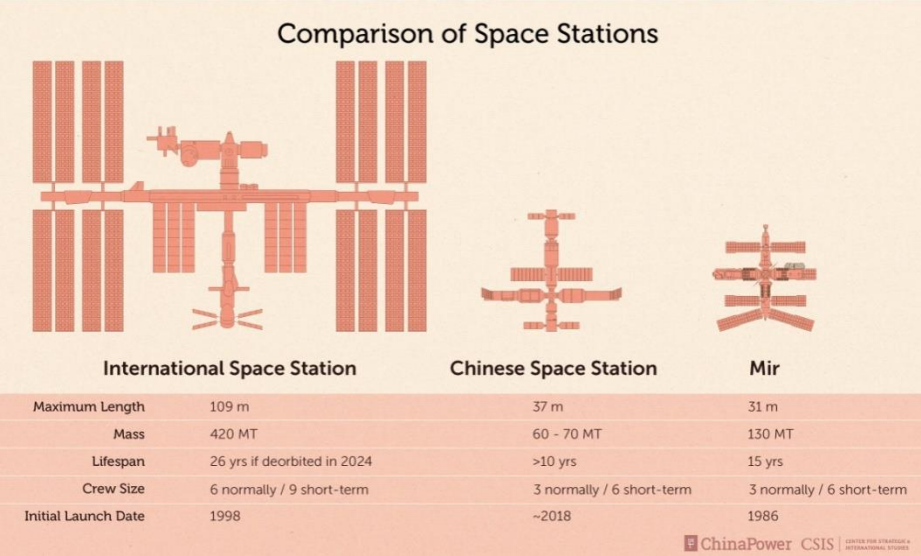
How China is Pushing Innovation in Space[1]. China became the first country in the world to send a quantum satellite, a new type of encrypted communications technology, into orbit. While it hasn't quite caught up to NASA yet, the Chinese space program is making steady progress. Some of the most exciting projects it is undertaking include manned trips to the Moon, an orbital space station, Mars rover landings, and even orbital solar panel fields that would beam renewable energy back to earth.

[1] ***http://blog.tutorming.com/expats/chinese-space-program***

Following from the success of the *Tiangong* missions, it has been reported that China is now in the process of building the core CSS module. The module was originally planned for launch in 2018, but officials announced in March 2018 that the launch would be delayed until 2020.The Chinese station is expected to have a mass between 60 and 70 MT – this number may increase with vessels or additional modules docked – while the ISS has a mass over 420 MT, and Mir had a mass of approximately 130 MT.

The smaller size of the CSS may lend itself to operational efficiency and cost savings, but it comes with significant trade-offs. Reduced capacity for astronauts, equipment, and research may limit the utility of the station as a laboratory for scientific discovery. While Chinese engineers have noted that the station could be expanded via international cooperation, the CSS is designed to host three *taikonauts(Chinese name for Astronaut)* for 3 to 6-month intervals (or six-person crews for shorter periods).

Although more recently constructed than either Mir or the ISS, the CSS is expected have a shorter lifespan. Zhu Zongpeng, chief architect of China's space lab system, indicated in 2016 that the Chinese space station may stay in orbit for around ten years. Mir remained operational for 15 years before Russian controllers guided its descent into the South Pacific in 2001, and the ISS, which launched in 1998, will have functioned for 26 years if de-orbited as planned in 2024.[2]



Future Projects. China's plan to launch space-based solar panel satellites which would beam solar power back to Earth. An article from the Ministry of Science and Technology suggests that the satellite would span one square kilometer, becoming by far the biggest man-made object in space – both physically and in terms of significance. Advocates of the program say the impact would be "the equivalent of an Apollo program for energy." The proposed date of completion would be around 2050, so quite a distance in the future, but exciting enough to draw attention to China's space program.

[2] ***https://chinapower.csis.org/wp-content/uploads/2017/07/Space_Station_Comparison.jpeg***

CHINESE ELECTRICALLY POWERED HELICOPTERS

Electrically Powered Helicopter Development by China. Electrically powered helicopter if successfully operationalised will have several advantages over conventional design. Power transmission problems associated with mechanical design will give way to a simple, easy to maintain system. Many benefits of an electric car design could be incorporated in the helicopter design as well. A team of Chinese engineers are reportedly working on an electric helicopter. The team is hoping that the use of electric motors could not only save fuel but make helicopters lighter and easier to control[3]. According to chief designer Deng Jinghui from the China Helicopter Research and Development Institute in Jingdezhen, Jiangxi province, the team will first replace the tail rotor of a traditional helicopter with an electric motor for exploring and verifying the technical feasibility of an all-electric helicopter. If all goes well, the team will experiment with replacing the main engine and rotor as well. The removal of transmissions and the use of electric motors are likely to reduce a helicopter's weight, streamline its structure, make control easier and also improve reliability.

It wouldn't be the first electric helicopter in existence. Connecticut-based Aviation Company Sikorsky Aircraft's 'Sikorsky Firefly' all-electric helicopter has been referred to as the first of its kind when it was announced in 2010. The Sikorsky Firefly is an all-electric helicopter built for research purposes by Sikorsky Aircraft. It has been called the world's first all-electric helicopter[4]. The Firefly is a modified Sikorsky S-300C helicopter with its engine replaced by an electric motor and two lithium-ion battery packs. The helicopter can accommodate only the pilot, no passengers, and operate for 12 to 15 minutes. It has a top speed of about 92 mph.

Companies are planning on electric and hybrid-electric engines to increase the transportation capacity of traditional helicopters and make them quieter, more fuel efficient and safer. Airbus Industries reportedly will fly an H130 with a 100-kilowatt electric motor and batteries, attributes which will allow much easier autorotation to improve safety. One passenger could also be carried due to extra power[5].

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[3] https://futurism.com/the-byte/chinese-researchers-electric-helicopter; JULY 31ST 19__VICTOR TANGERMANN__FILED UNDER: ADVANCED TRANSPORT

[4] https://en.wikipedia.org/wiki/Sikorsky_Firefly

[5] Frank Wolfe; http://interactive.rotorandwing.com/hybrid-electric-helicopters/

(Courtesy Airbus Helicopters)

Rolls-Royce Electrical is also developing modular and scalable systems that can be used on a number of emerging as well as existing flying platforms encompassing pure electric, hybrid-electric and more electric solutions[6]. For instance, a combination of electric motor, energy storage battery and associated power management and control electronics can provide turbo-boost as well as an emergency landing system to provide the pilot with an effective means to carry out a controlled landing of the aircraft.

United Technologies' Collins Aerospace reportedly intends to spend $150 million on electric systems in the next three years. Recently, the company announced it is investing $50 million in a lab that will design and test megawatt class motors, power electronics, and generators for electric aircraft for commercial and military purposes[7].

Safran, which is building the hybrid-electric engine for the Bell Nexus eVTOL vehicle, is also exploring uses for its electric and hybrid-electric engines on traditional helicopters. While Safran is targeting its ENGINeUS 45 motor for future eVTOL aircraft, the engine may also have uses in traditional helicopters[8]. The engine, which has a continuous power of 45 kilowatts, has built-in, dedicated control electronics with an energy efficiency of more than 94 percent and a power-to-weight ratio of 2.5 kilowatt per kilogram at 2,500 rpm, according to Safran.

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[6] ibid
[7] ibid
[8] ibid

Chinese designers of the electric helicopters are likely to exploit all available technologies and come up with a much improved version in a compressed timeframe as has been seen on several occasions in the past.