

THE ACCELERATION OF THE CHINESE SPACE PROGRAM

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Abstract: The acceleration of the Chinese Space program in the recent years is undisputable and definitive, asserting China's ambitions towards the space sector and a contest of the final frontier. The pace of this acceleration has intensified as the Chinese space progress has amplified in the last years, allowing the People's Republic of China (PRC) to dwell upon decades of space research and create space technologies with the ability to match the capabilities of traditional space nations. The Chinese National Space Agency (CNSA) has been at the helm of the developing space capabilities enabling China to compete and cooperate with other nations in outer space. Due to the nature of space, the discourse of international relations has become encompassing and dynamic, allowing the participants of the upcoming space race to shift the balance of power and project their power across the international spectrum. Recent developments in the space sector illustrate the Chinese attempts to intensify the utilization of space as a key area of interest and expand their influence globally.

Keywords: CNSA; space race; space technology; realism; determinism; international relations;

Introduction

The space progress of the People's Republic of China finds its origins in the mid-late 20th century, with the launch of their first satellite in 1970, the Dongfanghong-1, orchestrated by the father of Chinese rocketry Qian Xuesen (Matignon 2019, pass.)². As a nation trailing in terms of power, compared to the Soviet

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² Matignon, L. “Dong Fang Hong I, the First Chinese Satellite”. Space Legal Issues. 2019. Available at: <https://web.archive.org/web/20201020001022/https://www.spacelegalissues.com/space-law-dong-fang-hong-i-the-first-chinese-satellite/> [Accessed 15 September 2022]

Union and the United States, China achieves a technological feat some nations still aspire to. The advancement of the Chinese space program dwindles down in the next decades, as the national focus concentrates upon the development of practical national power, industries, military and economy. Only in nineties and the beginning of 2000s, the PRC begins to realize a feasible space program, with clear intentions to become a leader in space and exert their national power across all domains of interest. In the year 2003, the People's Republic of China achieves a space victory, by sending their first taikonaut (the equivalent of an astronaut) into outer space. Yang Liwei becomes the first Chinese citizen to roam the skies and tell about it, after the successful human-crewed space mission on the 15th of October 2003, proving Chinese ingenuity in the space sector and paving the way for the successful execution of other future space projects and plans (Beijing Time 2003, pass.)³.

Following the success of the Shenzhou-5 mission, the Chinese space program begins a rapid development affecting all facets of their space exploration activities and elaborating on already existing space technology, enabling the possibility of future competition or cooperation with already existing traditional space power. Through a rejuvenated partnership with the Russian Federation, the People's Republic of China dwell on Soviet technology invented during the Cold War, improving their designs with the ambition to go faster, farther and more efficiently towards the final frontier. The technological exchange previously mentioned ranges between: life support system, the shell of a descent module, space suits for EVA, and a docking unit, all used to increase Chinese space capability and their efforts to become a space nation (Perfilyev 2010: 23)⁴. As a rule of thumb, China views space expansion as a prerequisite to the expansion of national power across the international stage, utilizing the space sector as a key area of interest, reinforcing their determination for global superiority.

Following the successful launch of their first human-crewed spacecraft, the Chinese National Space Agency focuses on the formulation of a comprehensive Lunar program, aiming to establish a permanent Chinese presence in near-Earth vicinity and exploiting the high-ground advantage according to military scientists. The Chinese Lunar Program begins the year after the Shenzhou – 5 mission, with Premier Wen Jiabao of the State Council approving the establishment of a lunar exploration project and setting initial steps towards the

³ Beijing Times. "President Hu hails successful launch of Shenzhou V", Sci-Edu, Home, 2003. Available at: http://en.people.cn/200310/15/eng20031015_126054.shtml [Accessed 16 September 2022]

⁴ Perfilyev, N. The Sino-Russian Space Entente, *Astropolitics: The International Journal of Space Politics & Policy*, 8:1, 2010, pp. 19 – 34

ongoing Chinese space expansion (CNSA 2015, pass.)⁵. The Chang'e-1 mission along with their successors until Chang'e 3 pave the way for expansion into outer space and the successful Chinese landing on the Moon in 2013, portraying a continuous effort to assimilate the space sector as the next domain of interest in the balance of power. The consecutive Lunar endeavors from the PRC, are rewarded with the Chang'e-4 mission triumphantly landing on the dark side of the Moon, certifying China as the first nation on Earth attempting and accomplishing this herculean feat (Moritsugu 2019, pass.)⁶. Eventually the appropriation of the Lunar surface is the next logical step for humanity in their conquest of our galaxy, expanding the capabilities of all participants, enabling them to contest a new area of interest and paving the way for humanity to expand above their reach.

China's second biggest space project is their first expeditions to Mars, observing, studying and exploiting the closest potentially habitable planet in the Solar system. The colonization of a neighboring planet is the next rational step towards the expansion of national interests and safeguarding the future of humanity. The first ever Chinese attempt to reach Mars was the Fobos-Grunt mission in 2011, co-organized with the Russian Federation, attempting to place a satellite in the Martian orbit, exploring various aspects of the Red planet (Hand 2011, pass.)⁷. Although the mission is not successful, the People's Republic of China persevere and begin an independent Mars project, successfully launching and landing on our neighboring planet through the Tianwen-1 mission executed between July 2020 and May 2021 (XinhuaNET 2021, pass.)⁸. The Martian mission portrays Chinese technological ability nearing their biggest competitors, the United States, as well as proving every other space nation, the significance space beholds in the acquisition of power and expansion of national interest. The People's Republic of China becomes only the third nation to reach Mars, sending an orbiter, successfully landing on our neighbor's surface, and deploying a Martian rover in their scientific attempt to study and explore humanities

⁵ CNSA, Chinese Lunar and Deep Space Exploration Program, Project Introduction > Home, 2015. Available at: <http://www.clep.org.cn/n487137/index.html> [Accessed 16 September 2022]

⁶ Moritsugu, K. China lunar probe sheds light on the 'dark' side of the moon, Associated Press News, 2019. Available at: <https://apnews.com/article/science-europe-asia-pacific-ap-top-news-china-c4dc6858a32b4b61bdbc6aebf5459a91> [Accessed 16 September 2022]

⁷ Hand, E. Russia takes aim at Phobos, Nature, 2011. Available at: <https://www.nature.com/articles/news.2011.630> [Accessed 18 September 2022]

⁸ Xinhua, China's Tianwen-1 probe sends back Mars landing visuals, XinhuaNET, 2021. Available at: http://www.xinhuanet.com/english/2021-05/19/c_139956617.htm [Accessed 18 September 2022]

new possible habitat. The Tianwen-1 mission depicts a technological determinism, driven by the United States and their own recent achievements on the Red planet. The successful execution of a space mission to Mars further underlines Chinese space ambitions towards equalizing the balance of power in space on the international scene, directly challenging current US hegemony.

Due to the Wolf Amendment, passed by the U.S. Congress in 2011, the People's Republic of China, becomes isolated from participation in any space projects, involving the United States, including the International Space Station (DoD 2011, pass.)⁹. Related to this American legislature is China's third biggest triumph in space, the Tiangong orbital space station, designed, constructed and deployed throughout the last decade. The earliest mention of a Chinese permanent presence in orbit came in 2011, when the director of the Chinese Manned Space Agency announced initial plans for the development of such station and asked the public to participate in the nomenclature of this new project. The construction deadline for the Chinese Space Station (CSS) is initially set for 2020 – 2022, and the People's Republic of China has successfully executed this plan, launching the 'Tianhe' core module, in April 2021 (McDonnell 2021, pass.)¹⁰. Consecutively the Wentian lab module was launched and assembled in July 2022 (Reuters World 2022, pass.)¹¹, further expecting the Mengtian module to be launched in October 2022 (Jones 2022, pass.)¹² completing the main body of the orbital station. Supplementing the three modules will be a telescope comparable to Hubble, named Xuntian, currently being developed and expected to launch the following year (Liu 2022, pass.)¹³. The establishment of permanent Chinese presence in Earth's orbit is a necessary prerequisite to several aspects for the PRC: the continuous exploration of outer space, the procurement of international relations with other space nations and the increase of both Chinese

⁹ DoD, Department of Defense and Full-Year Continuing Appropriations Act, United States Congress, 2011. Available at: <https://www.congress.gov/112/plaws/publ10/PLAW-112publ10.htm> [Accessed 18 September 2022]

¹⁰ McDonnell, S. "China launches first module of new space station", BBC, 2021. Available at: <https://www.bbc.com/news/world-asia-china-56924370> [Accessed 18 September 2022]

¹¹ Reuters, "China launches second space station module, Wentian" China > World, 2022. Available at: <https://www.reuters.com/world/china/china-launches-second-space-station-module-wentian-2022-07-24/#:~:text=China%20began%20constructing%20the%20space,uncrewed%20missions%20in%20the%20undertaking> [Accessed 18 September 2022]

¹² Jones, A. "Rocket to launch China's next space station module arrives at launch center", SpaceNews, 2022. Available at: <https://spacenews.com/rocket-to-launch-chinas-next-space-station-module-arrives-at-launch-center/> [Accessed 18 September 2022]

¹³ Liu, J. "Flagship Chinese Space Telescope to Unravel Cosmic Mysteries, CAS, 2022. Available at: https://english.cas.cn/newsroom/cas_media/202205/t20220507_305162.shtml [Accessed 18 September 2022]

national power and prestige worldwide. In addition, the creation of an orbital space station, portrays levels of technological ingenuity only a couple countries have achieved and can afford to maintain economically. Finally, the International Space Station (ISS) is the only active orbital station people possess, but it is also reaching its end-of-life cycle, threatening to leave us without outer space presence. In this sense, the CSS, becomes the obvious and perfect candidate for replacement, as it is already deployed and almost fully operational.

The above three covered space missions formulate the core of China's space program, portraying its progress in the short span of two decades. Besides them, the PRC also works on many other space-related projects and technologies attempting to alleviate their technological expertise and project their national power globally. This paper will examine the near-term projects China is attempting, as well as other long-term space programs it looks to develop in a quest for outer space presence. Such continuous strive towards the space sector posits various hypothesis on the future of space exploration, as well as the overall development of international relations. Finally, the article seeks to highlight the significance of a Chinese national space program to the realm of geopolitics and explain how the procurement of such endeavor, affects the overall global balance of power.

Near Future plans

Reviewing the PRC's space plans for the upcoming year, it is evident that the Chinese progress in the space sector shows no signs of decelerating. During the next months China will continue to expand their presence in outer space, launching various rockets, reaching its goals to expand their space capabilities. A certain number of missions are scheduled to take place throughout 2023, launching various types of satellites complementing the already comprehensive fleet China operates. Additionally, the CNSA will look to complete the Chinese Space Station with the launches of both the Mengtian lab research module and the Xuntian space telescope, concluding the construction of the T-shaped space station. Last but not least, besides the already proposed new rocket launchers from the China Academy of Launch Vehicle Technology (CALT), a number of Chinese private space companies are set to debut their own reusable launch vehicles, adding to the already extensive rocket fleet China possesses. The aforementioned near future plans either look to dwell on the already established Chinese space capabilities or seek to create new means in their quest for balance of power, both in outer space and on the international scene.

Currently China is the second country with most satellites in space after the United States. Whilst the USA controls over 2,804 artificial bodies orbiting

Earth, the PRC, stands at 467 (DEWESoft 2022, pass.)¹⁴. The two figures show the current gap between the leading power in space, and the newest joiner to the space race, the Republic of China. This discrepancy mainly accounts for the American victory during the first Space Race, and the relatively short amount of time, twenty years, China has been actively deploying satellites in Earth's orbit. Nevertheless, for this short span of two decades the Dragon of the east has successfully claimed the second spot in this prestigious category. The development, successful launch and deployment of a spacecraft is both an expensive and complicated endeavor, and only a handful of nations can boast with the operation of such technology, let alone a constellation or a fleet of satellites.

The People's Republic of China has planned more than twenty launches in the upcoming year ranging among communication, observation and navigation satellites to be deployed anywhere between the Low-Earth orbit (LEO) and the high geosynchronous orbit. Six of the proposed satellites will serve to modernize the Beidou constellation, introducing new frequencies and augmenting the navigational capabilities for the PRC, scheduled for launch on the 31st of December 2022 (Spaceflightfans 2022, pass.)¹⁵. The enhancement of the Beidou system improves Chinese spatial awareness civilly, commercially and militarily, posing a direct challenge to the dominating US-made GPS. Additionally, China plans to launch a few more communications satellites, boosting their transmission capability with the ChinaSat-26 spacecraft (Wang 2022, pass.)¹⁶, APStar 6E (Jones 2020, pass.)¹⁷ and the Startime-1 (Startime 2021, pass.)¹⁸ time telecommunications satellite, adding to the already extensive spacecraft fleet allowing an informational advantage over adversaries. As we currently live in the digital age, the constant provision of data is a crucial prerequisite to informational superior-

¹⁴ DEWESoft, "Every Satellite Orbiting Earth and Who Owns Them", 2022. Available at: <https://dewesoft.com/daq/every-satellite-orbiting-earth-and-who-owns-them> [Accessed 19 September 2022]

¹⁵ Spaceflightfans, Beidou-3 medium orbit augmentation system, 56/57 Beidou navigation satellite, BD-3-MEO-25/26, 2022. Available at: <https://web.archive.org/web/20210820054242/http://www.spaceflightfans.cn/event/> 【2022年待定】长征三号乙改三z远征一号-.-北斗三号 [Accessed 19 September 2022]

¹⁶ Wang, L. "中国卫通：全面开启我国卫星互联网应用服务新时代" [China Satcom: Fully Opening a New Era of Our Country's Satellite Internet Application Services]. *China Securities Journal* (in Chinese), 2022. Available at: https://www.cs.com.cn/cj2020/202209/t20220913_6297631.html [Accessed 19 September 2022]

¹⁷ Jones, A. "APT Satellite orders new small HTS satellite from China's CGWIC", *SpaceNews*, 2020. Available at: <https://spacenews.com/apt-satellite-orders-new-small-hts-satellite-from-chinas-cgwic/> [Accessed 19 September 2022]

¹⁸ Startime "星空1号" [Startime-1]. *Beijing Star Time Telecommunications* (in Chinese), 2021. Available at: <http://startime.cn/cn/Article/13.html> [Accessed 19 September 2022]

ity. A fast, substantial and reliable transmission of data is basic necessity to any nation wishing to either extend their sphere of influence or alter the balance of power.

Supplementing the large number of satellite deployments are several rocket launches, making their debut in space, affirming the private space sector and boosting the overall launch capability of China. The successful expansion of the private space rocket industry in China, enables the competition in the global launch market, rivaling companies such as SpaceX, Boeing and other upcoming companies. Throughout the next year, there are four scheduled maiden flights of private rocket companies, paving their own way in the space sector and boosting the overall Chinese launch capabilities. The first of these private ventures is the Rocket Pi company, set to debut in the first quarter of 2023, with their Darwin-1 reusable rocket. The rocket is powered by methane-liquid oxygen engine and will look to contribute to the development of an “Earth-moon space economic zone” as per the words of its founder, Cheng Wei (Jones 2021, *pass.*)¹⁹. The second private launch of 2023, will be conducted by Galactic Energy, and their newly developed reusable rocket, the Pallas-1. The launching vehicle will be powered by oxygen and kerosene, capable of deploying a 4t cargo in the Low-Earth orbit and 2t in the sun-synchronous orbit (Messier 2022, *pass.*)²⁰. As an experienced and proven rocket launcher, Galactic Energy looks to continue their successful record aiding the expansion of the Chinese private space sector. The third company attempting a maiden flight in mid-2023 is Orienspace, with their Gravity-1 rocket, capable of lifting 6,5t of cargo to LEO and 3,7t to the sun-synchronous orbit (Yao 2022, *pass.*)²¹. The newly established enterprise is set to complement the already existing comprehensive fleet of launch vehicles China utilizes, providing an alternative to an already saturated global market. Finally, the Hyperbola-2 is an upcoming small reusable launch vehicle, manufactured by i-Space, set to be tested with an unknown date in 2023 (i-Space 2022, *pass.*)²². As

¹⁹ Jones, A. New Chinese launch firm signs deal for reusable rocket engines, SpaceNews, 2021. Available at: <https://spacenews.com/new-chinese-launch-firm-signs-deal-for-reusable-rocket-engines/> [Accessed 19 September 2022]

²⁰ Messier, D. Galactic Energy Raises \$200 Million to Continue Development of Reusable Pallas-1 Launch Vehicle, Parabolic Arc, 2022. Available at: <http://www.parabolicarc.com/2022/01/24/galactic-energy-raises-200-million-to-continue-development-of-reusable-pallas-1-launch-vehicle/> [Accessed 20 September 2022]

²¹ Yao, S. “China Space Startup Orienspace Bags Nearly USD 60 Mn in Series A Round”, Technology, EqualOcean, 2022. Available at: <https://equalocean.com/news/2022052118087> [Accessed 20 September 2022]

²² i-Space, Small Solid Launch Vehicle, Hyperbola-1, Product Service, 2022. Available at: <http://www.i-space.com.cn/index.php?m=content&c=index&a=lists&catid=4> [Accessed 20 September 2022]

for the company, the rocket is of a two-stage configuration for launching small satellite services, using a mixture of liquid oxygen and methane as propellant, reducing the carbon footprint and utilizing a vertical recovery for reducing the cost of satellite launch services. The Hyperbola-2 will also serve as an alternative launch vehicle to China's growing fleet of rockets capable of enhancing their presence in Earth's orbit. The above mentioned rockets, developed by private companies in China look to both increase Chinese capabilities in outer space, as well as help the PRC develop a commercially viable sector enabling China to contest American dominance in the space sector. The growth of Chinese private rocket launchers guarantees PRC's presence in an upcoming Space Race, ensuring both an alternative to China's comprehensive rocket fleet, as well as alternative for nations to launch their own satellites in Earth's orbit.

Finally, there is the Einstein Probe, the People's Republic of China seeks to launch in 2023. The mission is a collaboration with the European Space Agency (ESA), looking to discover high-energy transients and monitor variable objects (ESA 2022, *pass.*)²³. The Einstein probe will further look to observe distant interactions such as tidal disruption events, where stars are pulled apart by supermassive black holes, detecting and localizing high-energy, electromagnetic counterparts. In addition to the scientific benefit, the project looks to further evolve the relationship between CNSA and ESA, portraying cooperation between two of the biggest space agencies and signaling the ever-growing Chinese presence in outer space affairs. According to near-term plans and space projects, the PRC looks for the continuous expansion in outer space, intensifying both their progress and presence in the final frontier. The successful execution of the upcoming Chinese missions in 2023 will cement their place in the contest for the space domain, portraying their willingness to challenge the current hegemon, the United States, and affirm their own positions on the international stage.

Long term goals

Besides detailed plans for near term space expansion, the People's Republic of China have also set forth long term plans, both advancing already ongoing space projects and initiating new space missions. Due to the nature of space exploration, many of the long-term objectives China has set forth need extensive research and preparation before their final execution. As for the Chinese National

²³ European Space Agency, Einstein Probe Latest News, Einstein Probe Information Pages, 2022. Available at: <https://www.cosmos.esa.int/web/einstein-probe> [Accessed 20 September 2022]

Space Administration, there are several long term goals including: strong space presence, development of space technology and systems, deep space exploration and developing and expanding space application industry (CNSA 2022, pass.)²⁴. Achieving these goals will be no easy task for China, nevertheless their progress solely throughout the past ten years, speaks for the determination and capability of this upcoming space power.

In terms of continuation towards the Moon and its further exploration, the PRC is entering the fourth phase of their Lunar programme, with the planned Change-6, Change-7 and Change-8 missions looking to explore the south pole of the Moon for natural resources and perhaps 3D printing structures on the surface (Williams 2021, pass.)²⁵. Change-6 and Change-7 are scheduled to take place in 2024, whereas Change – 8 will possibly take place in 2027. Whilst the first two will look to explore the Lunar surface and bring back samples, Change – 8 will attempt to begin the construction of a Lunar science base, later to be used by Taikonauts, during the 2030s. Although all celestial objects are deemed neutral and cannot be claimed by any nation on Earth, the successful exploration of Moon's surface will inevitably enhance China's prestige, meanwhile boosting their national power as a successful space faring nation. Strategically, the extension of Chinese influence to the Lunar surface and beyond Earth, will have direct repercussions to international relations and prove Chinese capability of matching even the most developed traditional space power, the United States.

Supplementing the Chinese Lunar project is their Martian program commenced in July 2020 consisting of an orbiter, lander and rover deployed to study the Red planet (Planetary.org 2021, pass.)²⁶. Besides a tremendous technological achievement, the launch, landing and deployment of both an orbiter and lander in one single mission, clearly signals the reduction of the technological gap between the PRC and USA in terms of space technology. In 2022, the CNSA announced the second mission planned for Mars is due to be conducted in 2025, including objectives such as: remote sensing, robotic landing and sample return (Xu; Zou & Jia 2018: 591 – 592)²⁷. The Tianwen-2 mission looks to build upon

²⁴ CNSA, China's Space Program: A 2021 Perspective, Policies and Announcement, 2022. Available at: <http://www.cnsa.gov.cn/english/n6465645/n6465648/c6813088/content.html> [Accessed 21 September 2022]

²⁵ Williams, D. Future Chinese Lunar Missions, Planetary > Lunar, NASA Goddard Space Flight Center, 2021. Available at: https://nssdc.gsfc.nasa.gov/planetary/lunar/cnsa_moon_future.html [Accessed 21 September 2022]

²⁶ Planetary.org, Tianwen-1 and Zhurong, China's Mars orbiter and rover, Space Missions, 2021. Available at: <https://www.planetary.org/space-missions/tianwen-1> [Accessed 21 September 2022]

²⁷ Xu, L., Zou Y. & Jia Y., "China's Planning for Deep Space Exploration and Lunar Exploration before 2030" *Chin. J. Space Sci.*, 2018, 38(5): 591 – 592

Chinese technical expertise, by attempting to retrieve an asteroid sample and return it to Earth. In addition, the PRC plans the Tianwen-3 mission, another sample return mission from the Martian surface, scheduled to take place somewhere in the late 2020's. According to the 2016 white papers, as well as presentations by high-ranking CNSA officials, the PRC remain bound on executing their Martian project (Jones 2017, pass.)²⁸.

In addition to the continuation of the Lunar and Martian space programs, China also plans a couple of more deep space exploration voyages. The 'Interstellar Express' will be China's first probe to the heliosphere and interstellar space, being the first non-American spacecraft attempting to leave the solar system (Song 2019, pass.)²⁹. According to initial mission plans, two probes are to be launched in 2025 and 2030, in opposite directions exploring the heliospheric physics and observing the interstellar space surrounding out star system. Should the mission be successful, the 'Interstellar Express' will become only the third man-made object to reach such far distances, expanding our horizons as a civilization.

The last approved deep-space voyage China plans, is a mission to the planet Jupiter at the end of this decade. The Tianwen-4 mission, previously known as Gan De, was first announced in 2018 by the deputy director Pei Zhaoyu, of CNSA's Lunar Exploration program (XinhuaNet 2018, pass.)³⁰. The mission to Jupiter will attempt an orbital exploration of Jupiter and its four largest moons, study of the overall Jupiter system, and investigate the internal composition of both Jupiter's atmosphere and moons, especially Callisto.

Naturally the successful execution of these complicated missions, also requires a new improved type of launch vehicles, which the Chinese Academy of Launch Technology develops actively. The two new rockets, which China will be using mainly to conduct their missions are the Long March-7 (CZ-7) and the Long March-9 (CZ-9). The first one, the CZ-7, is a medium lift launch vehicle, using kerosene and LOX as propellants, with the capability of placing 5t into the sun-synchronous orbit. The CZ-7 will be used primarily for the deployment of new satellites and helping the CNSA, maintain the CSS (Clark 2022, pass.)³¹.

²⁸ Jones, A. "A closer look at China's audacious Mars sample return plans", 2017. Available at: <https://www.planetary.org/articles/20171219-china-mars-sample-return-plans> [Accessed 22 September 2022]

²⁹ Song, J. "Interstellar Express": A Possible Successor of Voyagers", Bulletin of the CAS, 2019. Available at: http://www.bcas.cas.cn/infocus/201911/t20191111_223051.html [Accessed 22 September 2022]

³⁰ XinhuaNet, "China outlines roadmap for deep space exploration", 2018. Available at: https://web.archive.org/web/20180425130223/http://www.xinhuanet.com/english/201804/25/c_137136188.html [Accessed 22 September 2022]

³¹ Clark, S. "Chinese Long March 7 rocket launches military communications satellite", SpaceFlightNow, 2022, Available at: <https://spaceflightnow.com/2022/09/16/chinese-long-march-7-rocket-launches-military-communications-satellite/> [Accessed 22 September 2022]

The maiden flight took place in 2016, from the Wenchang space station, deploying five satellites in the LEO. The Long March – 9 is the newest approved rocket by the Chinese government, currently undergoing development. The launch vehicle will be a super-heavy rocket capable of carrying 150t to the LEO and 50t to the Lunar surface (iNews 2022, pass.)³². It is worth to note, that the booster of the Long March – 9 will be reusable, in accordance with modern technological and economic demands. The CZ – 9 is set to be China’s biggest and most powerful launch vehicle enabling deep space exploration and directly challenging traditional space nations and their plans for space expansion.

The comprehensive approach of the PRC, complementing their already ongoing space ventures signals Chinese readiness, to both contest and cooperate in the final frontier, dwelling on their own space capacity, competencies and self-interest. Moreover, with the successful accomplishment of deep space missions, China displays national capabilities very few countries are able to achieve, clearly indicating an upcoming space force, which is to be reckoned with. In the final paragraph of this article, the Chinese motives for the acceleration of their space program are analyzed, suggesting possible future alternations in the overall balance of power in geopolitics. Space as the newest and final frontier has a very loose and limited legal framework regulating it. These circumstances dictate an unpredictable development of international affairs in outer space. The growing Chinese expansion towards the stars, sets an exciting stage for the global strive for national power and the intensification of state-to-state relations, especially concerning space-faring nations and their ambitions for power projection, beyond Earth’s boundaries.

Cooperation vs Competition in the Final Frontier

Ongoing developments on the geopolitical stage posit a likely shuffle in the balance of power, altering the status quo in international relations. Currently the People’s Republic of China is the second biggest economy in the world, (WorldData 2022, pass.)³³, number one according to active military personnel (Statista 2022, pass.)³⁴, number six in terms of natural resources (Anthony 2022,

³² iNews, “10 more engines! The Long March 9 rocket has a new configuration, which is thicker and taller and can be reused”, 2022. Available at: <https://inf.news/en/military/5249f3bc1a4f016c8781df63714ee5e3.html> [Accessed 22 September 2022]

³³ WorldData, “The world largest economies”, WorldData.info, 2021, Available at: <https://www.worlddata.info/largesteconomies.php#:~:text=With%20a%20GDP%20of%2023.0,ninth%20place%20in%20this%20ranking> [Accessed 22 September 2022]

³⁴ Statista, “Largest armies in the world ranked by active military personnel in 2022”, Statista.com, 2022. Available at: <https://www.statista.com/statistics/264443/the-worlds-largest-armies-based-on-active-force-level/> [Accessed 22 September 2022]

pass.)³⁵ and the most rapidly developing nation in the space sector. All these factors portray China's ambitions to achieve the number one country status, in a world previously dominated by the United States, after their Cold War victory against the Soviet Union. For the last thirty years, international relations have been dominated by American foreign policy and the democratic unipolar values. However, in the last decade we have seen the rise of both Russia and China, as major participants in the 21st century world order, projecting their own values and power across the international scene. This creates a multipolar setting, where cooperation and competition become driving actions behind any state-to-state relationships. Cooperation is a vital form of communication among states for the successful pursuit of multilateral projects, plans and missions in any sphere of life (Tian 2021: 134 – 141)³⁶. Competition on the other hand is also a pivotal aspect of humanity's progress and growth towards new technologies and processes benefiting our development as human species. Both activities will be driven by relations on Earth, stimulating future space expansion.

The rapid technological progress made by China in the 21st century is based on both their cooperation with other nations and their ambition to become the dominant state in space affairs. First and foremost, China's biggest partner in the space sector is the Russian Federation, dating back from the age of the Cold War. China traditionally enjoys a positive relationship with Russia and has recently moved from closer cooperation in line of both countries national interests, to strategic partnership supporting each other's plans, participating in joint military drills and expanding their collaboration in different areas including the aforementioned space sector. The most recent revival of friendship between the People's Republic of China and the Russian Federation begins with the signing

³⁵ Anthony, C. "10 Countries With the Most Natural Resources", *Economy, Economics*, 2022. Available at: <https://www.investopedia.com/articles/markets-economy/090516/10-countries-most-natural-resources.asp> [Accessed 22 September 2022]

³⁶ The cooperation between Bulgaria and China for the successful implementation of multilateral projects, plans and missions in various spheres of life, including spiritual, political, economic, commercial, etc. is the object of research interest of the famous Bulgarian sinologist Assoc. Prof. Mariana Tian. Her analytical publications in English, presented in the form of reports at prestigious international scientific forums abroad, deserve the greatest attention in this regard, including: "Bulgaria's contribution to the B&R Initiative in the context of the geopolitical state of the Balkans", published in *Executive Intelligence Review (EIR)* of Lyndon H. La Rouse in Washington (Tian 2017: (A) 25 – 28); „The participation of Bulgaria in the initiatives of the 'New Silk road' – Achievements and challenges", published in *Thematical Proceeding from the International Scientific Conference: Initiatives of the 'New Silk Road' – Achievements and Challenges* in Belgrade (Tian 2017: (B) 178 – 191); "Bulgarian-Chinese trade, economic and financial relations within the initiative "One Belt, One Road" – Challenges and Prospects in the New Post-Covid World", published in *Proceedings of the International Scientific conference: 2020 "China and Central & Eastern Europe"* in Shanghai (Tian 2021: 134 – 141).

of the Treaty of Good-Neighborliness and Friendly Cooperation in 2001, a 20 year pact supporting economic, military and strategic growth for both parties (MFA PRC 2001, pass.)³⁷. In 2021, the leaders of the two countries announced that the treaty will be renewed for an addition five years, when it expires in 2022 (Reuters 2021, pass.)³⁸. This clearly indicates the desire of both countries to continue supporting the defense of their national unity and territorial integrity. Furthermore, the extension of the treaty allows for the progression of economic activity between the two nations, promoting trade and increasing financial stability. In general, the trade between the two countries has grown exponentially from around 9 billion, to over 100 billion for the twenty years, the treaty was in effect (OEC 2020, pass.)³⁹. This year Russia projected, that the figure will rise to over 200 billion by 2024, especially with mounting pressure from the West and sanctions imposed on the country, due to the conflict in Ukraine (Reuters Business 2022, pass.)⁴⁰.

In terms of defense cooperation, the two countries have been holding military exercises together, ever since Peace Mission in 2005, consisting of 10,000 troops strong from both countries, targeting counter-terrorism. During the latest series of joint-military exercises in 2022, more nations took part in these war games, including India, Laos, Mongolia, Syria, Nicaragua and several ex-Soviet republics (Al-Jazeera 2022, pass.)⁴¹. These multilateral military drills, resemble NATO exercises also held yearly, strengthening military cooperation between nations and establishing new alliances, and generally consolidating the balance of power. The continuous cooperation of war games for both blocs is setting a competitive tone for the future development of international relations between the West and the East.

³⁷ MFA PRC, Treaty of Good-Neighborliness and Friendly Cooperation Between the People's Republic of China and the Russian Federation, Communiqués > Policies and Activities > Home, 2001. Available at: <https://web.archive.org/web/20110605071535/http://www.fmprc.gov.cn/eng/wjdt/2649/t15771.htm> [Accessed 23 September 2022]

³⁸ Reuters, "Russia, China extend friendship and cooperation treaty – Kremlin", Reuters News Agency, 2021. Available at: <https://www.reuters.com/world/china/russia-china-extend-friendship-cooperation-treaty-kremlin-2021-06-28/> [Accessed 23 September 2022]

³⁹ Observatory of Economic Complexity "China/Russia", Bilateral Trade, 2020. Available at: <https://oec.world/en/profile/bilateralcountry/chn/partner/rus?dynamicBilateralTradeSelector=year2020&dynamicYearGeomapSelector=year2001> [Accessed 23 September 2022]

⁴⁰ Reuters, "Russia expects trade with China to reach \$200 billion by 2024", Business, Reuters News Agency, 2022. Available at: <https://www.reuters.com/business/russia-expects-trade-with-china-reach-200-bln-by-2024-ifax-2022-04-30/> [Accessed 23 September 2022]

⁴¹ Al-Jazeera, "Kremlin says Putin attends military exercises with Chinese forces", Al-Jazeera News Agency, 2022. Available at: <https://www.aljazeera.com/news/2022/9/6/putin-at-tends-military-exercises-involving-china-forces-kremlin> [Accessed 23 September 2022]

Besides economic, strategic and military cooperation, China collaborates effectively with the Russian Federation in the space sector. The first instances of joint-space collaboration come in the beginning of the nineties, with a series of delegations sent to both Moscow and Beijing, with Chinese hopes of accelerating their space ambitions. In 1995, in a further development of relations, the Chinese purchase equipment for human space missions, environmental control systems, as well as docking and emergency systems (Perfilyev 2010: 19–34)⁴². Following that visit in 1996, China sends two trainees, Li Qinglong and Wu Jie, to be trained as “instructor astronauts” for any future missions, the PRC planned to conduct. All these developments, help about the setting the foundation of the future Sino-manned space program and the current progressive pace China is thriving on currently. In the following fifteen years, China manages to progress on their own, making great leaps towards the final frontier, launching their first taikonaut in space in 2003 and launching their Lunar Exploration program in 2007. It must be noted that these feats are accomplished, mainly due to Russian cooperation in the space sector, providing China with an essential technology to further their technological progress and expand their space capabilities. The strategic cooperation in the space sector continues to expand in the last decade with the continuation of Chinese space projects and a rejuvenated cooperation between China and Russia. In 2021 a Memorandum of Understanding on Lunar Research Cooperation and more specifically on the establishment of an International Lunar Research Station (ILRS) was signed between China and Russia. As per Chinese official sources “CNSA and ROSCOSMOS will adhere to the principle of ‘co consultation, joint construction, and shared benefits’, facilitate extensive cooperation in the ILRS, open to all interested countries and international partners, strengthen scientific research exchanges, and promote humanity’s exploration and use of outer space for peaceful purpose (CNSA 2021, pass.)⁴³. The development of such a project necessitates both extensive cooperation and a national dedication, which both countries are willing to demonstrate for the sake of their national interests. Currently the exploration and exploitation of the Moon’s surface requires an effort of cooperation to any nation willing to achieve such undertaking. Furthermore, the successful execution of such endeavors involves a complex set of geopolitical processes aiming to determine a new dominant in the space sector and reshuffle the

⁴² Perfilyev, N. The Sino-Russian Space Entente, *Astropolitics: The International Journal of Space Politics & Policy*, 8:1, 2010, pp. 19–34.

⁴³ Chinese National Space Agency, China and Russia sign a Memorandum of Understanding Regarding Cooperation for the Construction of ILRS, 2021. Available at: <http://www.cnsa.gov.cn/english/n6465652/n6465653/c6811380/content.html> [Accessed 23 September 2022]

balance of power with a newly established key area of interest in the space sector. China already possesses a number of allies, willing to cooperate in that same sector, promoting their own self-interest and aiding the People's Republic of China accomplish their goals in the space sector. Through the development of cooperative mechanisms such as Chinese space projects, the PRC look to further their own interests, whilst hoping other nations establish a foothold in space and enhance their technological abilities. It is important to note, that the People's Republic of China looks to both cooperate with nations aligned to their vision, as well as compete with others willing to challenge Chinese future hegemony of the space sector. Whichever way international relations look to develop, it will be according state-to-state relationships, which will take place on Earth, all in the view of Chinese attitude towards their self-expansion towards the space sector. Both principles of cooperation and competition will be utilized by the PRC in line of their self-interest and ambition to achieve a greater status both in international relations and the world stage.

Conclusion

This paper has attempted to explore the short- and long-term plans of the Chinese space program, as well as the facets of both cooperation and competition in the future exploitations of the space sector and the restructuring of the balance of power associated with it. The People's Republic of China is continuing to expand their projects in outer space and project their national power across the international scene. The dominion of space is going to be the next key area of interest to all parties involved, encompassing global relations, portraying a new scene in a struggle for supremacy. The contest in the space sector will be conducted by both competition and cooperation among various nation states, and China definitively looks to be a force reckoned with, in any upcoming space endeavors. The improvement of technology, the growth of the economic capacity and the ambition to become a leader among the superpowers makes China likely to grow its presence in space and inevitably work towards the advancement of both its own interests and the interests of human civilization. The PRC will look to explore any means necessary to further their own projection of power and expand their space capabilities, by both cooperating and competing with other nations willing to participate in a new Space Race.

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