EXAMINING CHINA'S SPACE STRATEGY

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That China will emerge as a great power in this century (unless there is a domestic upheaval of sorts or an international conflict that disturbs the country's focus on growth and development) is now a well accepted fact. Its sustained high economic growth has allowed the country to spend liberally on its hard power attributes. At the same time, comfortable foreign exchange coffers have enabled it to provide generous assistance, particularly of the military kind, to countries it perceives as being of economic or strategic value in its rise, and to complicate the calculations of its existing and potential rivals.

It has also been evident for a fairly long time that China is well aware that it cannot claim great power status without establishing a high profile presence in outer space. Three White Papers on Space Activities, in 2000, 2006 and 2011, have systematically mapped the expanding scope of China's activities in space. The first paper listed "exploration, applications and promotion of economic development" as the three broad aims of China's space efforts. The latest version expands the horizon of China's ambition further with plans to "launch space laboratories, manned spaceships and space freighters, make breakthroughs in, and master, space station key technologies, including astronauts' medium stay, regenerative life support and propellant refueling, conduct space applications to a certain extent and

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Beijing has concluded that it has to stake its own claim in outer space to deny American ambitions of 'space control' and 'space dominance'.

make technological preparations for the construction of space stations." These pronouncements reflect an ambitious approach anchored in a growing confidence coming from the country's impressive track record of translating plans into achievements from the 1970s onwards.

Over the last five decades, as China's own capability of exploiting space has steadily grown, and as it has keenly observed how the US used it for military objectives during its wars in the Gulf and Afghanistan, Beijing has concluded that it has to stake its own claim in outer space to deny American ambitions of 'space control' and 'space dominance' – its freedom to attack and freedom from attack.[1] While Beijing has not publicly articulated any similar concepts and nor can it hope to match the US, its achievements, nevertheless, have been built in a manner to sufficiently project deterrence. In fact, it is a travesty of sorts that China's space programme appears to be coming into its own at a time when the USA is perceived to be pulling back on its space budget. Of course, this is only relative considering the magnitude and range of space capability that the US has already built in outer space. But perceptions on 'rise' and 'decline' have a role to play in international relations.

It is against this background that their paper examines China's space strategy. What specific role does China ascribe to its space programme for its national security? What are the major characteristics of its space strategy? To what extent would China be willing to follow the 'existing rules of the road' or constructively participate in the formulation of new ones that support peaceful exploitation of outer space? Would an enhancement of its offensive and defensive capability tempt China to indulge in disruptive behaviour with military intent? These are some of the issues that need to be analysed, especially by India, given that the country has yet unresolved territorial disputes with China. As both nations 'rise', the possibilities of

1. As articulated in Counterspace Operations, Air Force Doctrine Document 2-2.1, August 2, 2004, available at http://www.dtic.mil/doctrine/jel/service_pubs/afdd2_2_1.pdf

their engagement – in conflict or in peace — will also increase. The paper concludes with some implications of China's increasing engagement in outer space for India's national security.

CHINA'S 'LONG MARCH'[2] INTO OUTER SPACE

Officially, China has never acknowledged the launch of a single military satellite, admitting at most that its space assets might have a dual role. However, there is no reason to believe that China was ever oblivious to the military uses of outer space given that Mao Zedong and Zhou Enlai, both proponents of equipping China with military might, were the political drivers of the space programme till they died in 1976. Thereafter, Deng Xiaoping did endeavour to prioritise efforts towards practical civilian application of satellite technology in keeping with his strategy of four modernisations in which the military occupied the last place. Indeed, the 1980s and 1990s were marked by some remarkable achievements—launch of scientific satellites, success of the recoverable satellite programme, introduction of microbiology experiments, launch of communication satellites (Dongfanghong-2A and DFH-3 series) and meteorological satellites (Feng Yun series), as well as the first flight of the Shenzhou, the prototype manned spacecraft. By 2000, a total of about 47 Chinese spacecraft had been launched.

In the new millennium, the speed of China's space activity shifted into higher gear. In the decade 2000-10, 70 satellites, some Chinese and some for other countries, were sent into orbit for performing a range of functions – some primarily civilian like telecommunications, weather forecasting, scientific Research and Development (R&D), space mapping, disaster relief, maritime observation and remote sensing; and other more military like intelligence, surveillance and reconnaissance, navigation and military communications.

Obviously, China's space capability has travelled a long way from the day in April 1970 when its first man-made satellite, the Dongfanghong-1 (the

2. Long March is the name designated to one family of Chinese launchers that are used to send its spacecraft into orbit. Four versions of this launcher have been used and Long March 5 is presently under development. Long March is symbolic of the time in 1932 when Mao Zedong had led the Communist Army over 8,000 km to the north of the country in order to escape the Nationalist government.

A few of the notable achievements in China's space programme over the last five years have made the world sit up and take note.

east is red) was launched.[3] Slowly and steadily, and moving at a pace, and toward milestones, it set for itself, China has enhanced its civilian, military and commercial exploitation of outer space. In fact, in the year 2010, China equalled the number of American launches of 15 satellites.[4] And, in 2011, it surpassed the USA by reaching the figure of 18 launches in one year.

A few of the notable achievements in China's space programme over the last five years that have made the world sit up and take note need to be mentioned. The most significant of these took place on January 11, 2007, when China demonstrated its anti-satellite prowess by shooting down its own satellite at an altitude of about 800 km. Later the same year, China launched its first lunar probe, the Chang'e, which brought back scientific data and a map of the Moon to successfully establish China's credentials in deep space exploration. In 2008, with the successful launch of the Shenzhou-7, which took three men on a three-day mission to outer space, China became the third country to have an astronaut perform a space walk. In 2010, China demonstrated a successful Ballistic Missile Defence (BMD) intercept and also launched a second lunar probe, the Chang'e-2. In September 2011, China placed Tiangong 1[5], an experimental space laboratory into orbit. Two successful dockings with this spacecraft have since been conducted. The first of these was of the Shenzhou-8, an unmanned capsule, in November the same year itself. But more recently, in June this year, taking a step further in its human space flight and orbital space station programme, China launched the Shenzhou-9 carrying three astronauts (one of them being a woman) to dock with the orbiting laboratory. The crew successfully returned to Earth on June 29 after spending three days in space. With this feat, China has been able to establish

3. James Clay Moltz, "The Chinese Space Program" in *Asia's Space Race: National Motivations, Regional Rivalries and International Risks* (New York: Columbia University Press, 2012), pp. 70-109. For the history of China's space programme, see chapter 3.
4. Jeff Foust, "Space Challenges for 2011", *Space Review*, January 3, 2011.
5. The Tiangong-1 weighs less than 10 metric tonnes compared to the International Space Station's 400 metric tonnes.

that it can manoeuvre a space capsule to rendezvous with, and attach itself to, a port on the station in order to transfer people and material to sustain a space station. Three more Shenzhou missions by 2014 are expected to help the country in mastering manoeuvring and long-duration life support systems, thereby laying the foundation for a future space station, which is scheduled to become operational by 2020.

Since 1992, when the Standing Committee of the Politburo approved the manned space flight programme, the construction of a space station has been the long-term objective of the country and it is likely to be realised within a decade from now. Interestingly, this will also be about the time that the International Space Station, a joint endeavour of the USA, Russia, Japan, Europe and Canada would have lived its life and be ready to be de-orbited in 2020. In the next decade then, China might be the only country with a permanent human presence in low earth orbit.

What would be the significance of this? US defence analysts are divided on whether the Chinese human space flight programme is driven by military objectives. Some such as former National Aeronautics and Space Administration (NASA) administrator Michael Griffin, and senior Carnegie scholar Ashley Tellis believe it is so. There are reports that the Shenzhou missions have been "equipped with either electronic intelligence or image intelligence gathering devices."[6] In fact, Tellis describes the entire space enterprise as being "centered on the primacy of military considerations which suffuse even the scientific, domestic, and commercial elements of the space effort".[7] Larry Wortzel too believes that there is a distinct military game plan behind this and that the "PLA is serious about space warfare".[8]

On the other hand, scholars like Gregory Kulacki of the Union of Concerned Scientists do not perceive China's manned missions as a threatening development. Echoing the same thought, Joan Johnson-Freese too argues that China has a "soft power approach to space relying on prestige,

6. "China in Space: The Possibilities and Risks", http:///www.sinodaily.com, November 28, 2005, accessed on February 6, 2012.
7. Ashley Tellis, "China's Space Capabilities and their Impact on US National Security", Testimony before the US-China Economic and Security Review Commission, May 20, 2008 , p. 3. available at http://www.ceip.org
8. As cited in Moltz, n. 3, p. 71.

international cooperation and commerce plus *modest military hedging*".[9] The truth, as always, may lie somewhere in between.

A Chinese space station would certainly have tremendous symbolic value for power projection and establishing deterrence. Achieving the feat would reflect favourably on the scientific, technological and industrial/manufacturing capability of the country. It would build China's reputation as a committed space-faring nation with a robust space infrastructure on the ground as well as showcase its ability to use space for military applications. In fact, the dual-use utility of such a project was clearly highlighted in the 2006 version of China's White Paper on National Defence[10]:

> Major scientific and technological projects, such as manned space flights and the lunar probe project, are being carried out *to spur the leapfrogging development of high-tech enterprises combining military and civilian needs and to bring about overall improvements in defense-related science and technology*… As a result, a fairly mature scientific and technological infrastructure is taking shape, which is well configured, multi-functional, efficient and based on close cooperation between the military and civilian sectors.

Therefore, China perceives great value in these projects and will persist in its efforts towards setting up a space station and the exploration of the Moon. In fact, China has announced plans of mapping "every inch" of the surface of the Moon to enable eventual exploitation of Helium 3 from lunar rocks. Meanwhile, as an added bonus, the success of these plans would do wonders for the Party's self-confidence and allow China to participate in any future international space negotiations from a position of strength.

OUTER SPACE IN CHINA'S NATIONAL SECURITY

China has been candid enough to admit that acquisition and expansion of Comprehensive National Power (CNP) is its foremost objective. The attributes of CNP include economic growth and development, preservation

9. Ibid., p. 71.
10. *China's National Defense in 2006*, Information Office of the State Council of the People's Republic of China. Emphasis added.

of internal stability, and adequate military capability to deter/meet threats from the external environment. China realises that the achievement of each of these objectives can be furthered through its engagement in outer space. Therefore, the value of outer space for China's national security in both the tangible and intangible dimensions is critical. Four of these can be identified.

For 'Recovering Greatness' and Legitimising Party Rule

The pursuit of certain capabilities has come to be associated with showcasing the scientific and technological prowess and prestige of a country. Nuclear technology and outer space exploration and exploitation constitute two such examples. For a country like China, which is acutely image conscious, these are of special relevance for power projection abroad, as well as for maintaining the domestic stature and legitimacy of the regime at home.

A hint of this motivation was evident in 1958 itself when approval was first granted for the construction of a Chinese earth satellite. Mao wholeheartedly backed the proposal with the "only rider that a Chinese satellite should be large and not the size of the small American satellites then being put into orbit"[11]. This was thought necessary for "impressing foreign powers" by making it visible. It was equally to be a showpiece for the domestic population and was fitted with a tape recorder that played revolutionary tunes. The Chinese media hailed the event more for its "politico-revolutionary portentousness" than for its scientific import.[12]

From then to the most recent achievement of the docking of the Shenzhou-9, China has retained what Richard Fisher, Vice President of the International Assessment Strategy Centre and a keen China watcher, had once described as the "political" purpose of the Chinese space programme. Its successes have been interpreted as necessary to allow "the Communist Party-led government in Beijing to prove to the Chinese people that it can produce a major technological success that can lift the glory of China and give

11. Brian Harvey, *China's Space Program: From Conception to Manned Sapceflight* (UK: Praxis Publishing, 2004), p.27. Mao was apparently impressed with the Soviet Sputnik which weighed a whopping 1.5 ton compared to the Vanguard 1 of the US at a mere 1.5 kg
12. Ibid., p. 50. Harvey writes, "The satellite's main role appears to have been to broadcast 'the east is red'", p. 59.

China witnessed the relevance of space technologies for modern warfare during the first Gulf War in the early 1990s.

them reason to be proud of the achievements of the Communist Party".[13] Indeed, China's achievements in space "provide symbolic gains that enable China's rulers to justify their continued rule".[14]

For Socio-Economic and Development Benefits

There is no doubt that like India, China too seeks to use its space activities for improving the socio-economic conditions of the country. Deng Xiaoping was particularly keen on this and since the 1980s, China has used its satellites for agricultural purposes such as land resources survey, crop mapping, meteorological monitoring, remote sensing for better land use, water resources management and other economic activities. Satellite-based communications and broadcasting have also been of special relevance given the vast landmass of the country.

Besides the direct benefits, there have been several collateral spin-offs of the space programme, including by way of increased employment opportunities in the space and ancillary industries.[15] The country has gained in the development of computers, transistors, modern electronics, precision engineering, metallurgy, materials science, welding skills, etc. This has generally raised the quality consciousness and appreciation of technical education. In turn, economic growth and development have implications for internal stability too and the Chinese leadership is more than conscious of this. China has also used space enabled services for discharging law and order functions and for disaster relief.

For Enhancing Military Capabilities

China witnessed the relevance of space technologies for modern warfare during the first Gulf War in the early 1990s. The lessons were further

13. "China in Space: The Possibilities and Risks", http:///www.sinodaily.com, 28 Nov 2005, accessed on 6 Feb 2012.
14. Tellis, n.7
15. While conducting a peer review of this article, it was pointed out by Prof Srikanth Kondapalli, a renowned China expert in India, that the stock value of satellite companies has risen manifold in the last few years.

reinforced in 1995-96 during the Taiwan crisis when China had to put up with the deployment of two US carrier groups in the region. Beijing found to its great discomfiture that it had no means of locating or tracking, leave alone threatening, the American naval assets. Obviously, that served as a major wake-up call and China quickly realised that if it had to deny American forces the ability to interfere with its plans for reunification with Taiwan in the future, then it had to enhance its military capability in space. It is entirely to the credit of the Chinese leadership that the necessary adjustments at the budgetary and organisational levels were accordingly quickly made.

Amongst the military relevant space capabilities that China has consciously built up is that of Intelligence, Surveillance and Reconnaissance (ISR).

Within a decade from 1991, the country was ready with its first White Paper on the subject and it clearly reflected some of the lessons that China had assimilated through the 1990s. One capability of the US military that had impressed China was its network-centricity. Little wonder then that by the mid-2000s, China was looking to build capability to fight a "high-tech war under informationized conditions", China's term for networked forces that could conduct military operations through better connectivity enabled by information gathering, sharing and exploitation of space-based assets.

Amongst the military relevant space capabilities that China has consciously built up is that of Intelligence, Surveillance and Reconnaissance (ISR). A rapid launch of a constellation of satellites has enabled the country to fulfill its objective of 'informationising' its operations. The Yaogan family of spacecraft (officially billed as satellites for crop monitoring) form the core of Chinese military space operations: 13 of these have been in orbit since 2006. They are believed to be of four military designs, including satellites with electro-optical digital imaging cameras, another one with Synthetic Aperture Radar (SAR) imaging, a third with signal intercept and a fourth with electronic eavesdropping capability. A fifth one is also planned for formation flight and has ocean surveillance sensors.[16]

16. Craig Covault, "China's Military Space Surge", *Aerospace America*, March 2011, p. 34.

According to one assessment, "Next to China, only the United States possesses more capable tactical support systems in space for tactical operations".[17] This is hardly surprising given that since 2001, China has launched 32 reconnaissance satellites that could be used for tactical support. Even if American estimates do not yet credit China with "continuous, real-time tactical coverage", there is little doubt that China has certainly acquired "*frequent and dependable coverage of stationary targets* and at least a *basic ability to identify, track and target vessels at sea*".[18] This has been helpful in supporting China's anti-access/denial capabilities. The recent demonstration of the 1500 km+ range DF-21D new Anti-Ship Ballistic Missile (ASBM), as well as mobile Anti-Ballistic Missile (ABM) capability are only possible through the support provided from its assets in space. The imaging satellites have been described as a "force multiplier in the service of long-range cruise missiles, standoff precision attacks, stealth technology, damage assessment, joint combat operations as well as overall battlefield awareness."[19] According to one estimate, it is evident that the "PLA is developing a tightly integrated information loop dedicated to supporting data fusion for missile targeting, damage assessment and overall battlefield awareness with space-based reconnaissance at the centre."[20]

In view of this, China's White Paper on National Defence, 2011, is able to claim that "significant progress has been made in building information systems for reconnaissance and intelligence, command and control, and battlefield environment awareness." It also lists improvements in operational command systems as well as integrated support capabilities with services such as command and control, ISR, communications, surveying and mapping, navigation, meteorological and hydrological support all being part of the battlefield support capability to conduct defensive and offensive operations.

Another capability of military relevance that China has focussed on is the development of small satellites. These could be microsatellites (less

17. Eric Hagt and Matthew Durnin, "Space, China's Tactical Frontier", *Journal of Strategic Studies*, vol 34, no.5, October 2011, p. 734.
18. Ibid., p. 748. Emphasis added.
19. Ibid., p. 748.
20. Ibid., p. 752.

than 100 kg) and nanosatellites (less than 10 kg) or even picosatellites (less than 1 kg). These provide the facility of quick launch in order to urgently respond to any degradation – inadvertent or deliberate -- in its satellites. According to an estimate, China has already launched 40 satellites weighing less than 500 kg for purposes ranging from defence, civil and academic.[21] Smaller satellites also provide the advantage of being used for "coorbital spacecraft formations like triangles or echelons that can detect ships and calculate location, speed and direction of travel." For instance, the Yaogan-9 positioned three satellites in a triangular formation, which indicates the deployment of a dedicated naval ocean surveillance satellite system to support its ASBM through surveillance and cueing help. More recently, a further launch of the three-satellite Yaogan-11 constellation is believed to provide the all-weather, day-night capability to China for tracking carrier strike groups.

China has also exhibited the ability to conduct complex orbital manoeuvres.

China has also exhibited the ability to conduct complex orbital manoeuvres. A recent example of this was the adjustment in orbits of satellites carried out by the Xi'an satellite control centre to avoid collision with space debris. In 2010 too, there were reports that several Shijian satellites had conducted "highly sophisticated proximity maneuvers, perhaps even making physical contact".[22] The military significance of these manoeuvres is to be able to adjust the satellite's trajectory to revisit a point on Earth more frequently. While this can obviously not compare with the level of broad scale, persistent surveillance that the US system can manage, it nevertheless demonstrates China's ingenuity to manage with less.

Unlike the case in the US where the focus has been on building larger, more sophisticated, built-to-specification systems for military satellites, which are obviously expensive and have longer R&D lives, China has demonstrated a tendency to enhance cost-effectiveness by using common and smaller platforms for civilian and military systems.

21. Covault, n. 16, p. 35.
22. Brian Weeden, "Dancing in the Dark: The Orbital Rendezvous of SJ-12 and SJ-06F", *Space Review*, August 30, 2010, http://www.thespacereview.com/article/1689/1>.

China's White Paper on Space Activities, 2011, lists bilateral space cooperation agreements with no less than 11 nations today.

While the buses are evolutionary in design and capability, this has allowed the Chinese space industry to reap the benefits of standardisation, modular design and serial production. For example, the DFH-3/3A platforms are known to have been used for roughly 20 satellites ranging from military and civilian communication satellites, to the Beidou navigation satellites, to the Chang'e lunar exploration spacecraft, to the Tianlian data relay systems.[23] Such an approach has aided China in reducing R&D timelines for individual satellites. Use of mature technologies with incremental innovation has enabled serial production and mating of well developed platforms with a range of payloads. By following such an approach, "China may not need to develop superior heavy spacecraft technologies, but end up with military space capabilities greater than the sum of its parts".[24] Meanwhile, it has also provided the added benefit of making it more difficult for the outside world to know the exact number or nature of the military satellites.

In any case, China evinces an asymmetric advantage in space given the high dependence of the US on its space assets for its economic and military operations. China will build its future military capability keeping this American vulnerability in mind.

For Forging Bilateral Relations

China's White Paper on Space Activities, 2011, lists bilateral space cooperation agreements with no less than 11 nations today. This is a quantum change from the situation in the 1990s when China's space programme was isolated and largely friendless. Though the first Chinese efforts in space were made with the help of the USSR, the relationship had soured by 1959-60. Thereafter, the country's space programme grew out of indigenous efforts

23. Hagt and Durnin, n.17, p. 755.
24. Covault, n. 16, p. 36.

and Zhou Enlai, at the launch of the first satellite in 1970, ensured that the press statement carried a sentence saying, "We did this through our own unaided efforts".

In the 1970s, China tried to make use of the diplomatic opening with Washington to seek an advanced communication satellite, forge a close relationship with NASA on possible hosting of Chinese scientific payloads on future US space shuttles, as well as an agreement seeking US assistance in developing a civil communications and broadcast system for China through the purchase of an American satellite launched by NASA but operated by China. Not all of these fructified, especially after the espionage allegations by the Cox Committee in the late 1990s. It was only recently, in November 2009, that a joint statement issued on the occasion of the visit of President Obama to Beijing mentioned "expanding discussions on space science cooperation and starting a dialogue on human space flight and space exploration".

Meanwhile, for its own technology development, China has engaged with Brazil, France, Russia, Ukraine and the UK for collaborative missions or actual joint development of spacecraft. China's first imaging satellite of military significance was the China-Brazil Earth Resources Satellite (CBERS-1) in 1999. Operated along with Brazil, it provided medium resolution imagery for military planners. But, more importantly, it laid the foundation for the subsequent Ziyuan–2A satellite which transmitted military relevant imagery to ground stations.[25]

China's indigenous achievements in space launch and satellite construction are perceived as an important "instrument to boost its soft power status"[26]. Not surprisingly, therefore, there are separate sections on international exchanges and cooperation in the three Chinese White Papers on Space Activities. Realising the commercial and strategic opportunity offered by this sector, China has concentrated on building an impressive infrastructure for undertaking satellite launches. It has carried out 33 commercial satellite launches for international customers and placed 39

25. Hagt and Durnin, n.17, p. 736.
26. Ajey Lele and Gunjan Singh, "China's White Papers on Space: An Analysis", *IDSA Issue Brief*, January 20, 2012.

satellites in orbit. Interestingly, China and India also signed a Memorandum of Understanding on Space Science and Technology in 2006 but nothing concrete has emerged yet out of this.

For a large part of the developing world, however, China has become a key provider of technology and training. Pakistan has been an important client of China. In fact, Pakistan became the second customer of China's launch facilities when it contracted its first small satellite, the Badr, to be launched into low earth orbit aboard a Long March 2E booster in July 1990 at a cost of US $395,000. Since then, China has also launched satellites for Sweden, Australia and some other Western nations. On at least four occasions in the 1990s, Chinese launches also suffered failures. But these spurred China to become more quality conscious and it has constantly striven to promote itself as a cheap and reliable service provider for commercial space launches. In 2011, China undertook three commercial launches. In August, it launched a Chinese made communications satellite for Pakistan; in October, it launched a French made communications satellite for Eutelsat; and before the year was out, it had launched another Chinese made communications satellite for Nigeria.

Besides establishing commercial relations, China has also sought to occupy the place of a mentor in space for many smaller countries in Asia. Since 1992, Beijing led the initiative on Asia-Pacific Multilateral Cooperation in Space Technology and Applications (AP-MCSTA). Placing itself as a regional leader in the group, China held meetings for exchange of information with Thailand, Pakistan, South Korea, Bahrain, and Iran. But in 2005, this was turned into a more formal, paid membership body called the Asia-Pacific Space Cooperation Organisation (APSCO). With its headquarters in Beijing, it comprises Bangladesh, Indonesia, Iran, Mongolia, Pakistan, Peru and Thailand and was formally inaugurated in December 2008. Training of foreign scientists at Chinese institutes and donation of ground stations to member countries to receive information from Chinese satellites are some of the activities that the organisation has undertaken. More recently, with Sri Lanka, China has concluded an agreement to build

and launch a communications satellite by 2015.[27] The ground station would be in Kandy and Sri Lankans would get on the job training from Chinese engineers for its operation.

China has shown competence in building large and small satellites, has an impressive family of launchers and variants, and is able to put a range of payloads into several types of orbits.

MAJOR CHARACTERISTICS OF CHINA'S SPACE STRATEGY

Clarity of Thought and Objectives

An examination of the history of the Chinese space programme reveals a fair amount of clarity on the rationale and importance that China has accorded to this project. Of course, there were inter-departmental issues and discussions within the Party on what aspects of the capability to focus on, but the commanding role of Mao and Zhou Enlai kept the programme focussed. Since 2000, the White Papers clearly indicate a steadfast commitment to vision and clarity in objectives. The Party leadership has wholeheartedly backed, even pushed and directed, the scientific establishment towards its goals, including through streamlining efforts at developing China's aerospace engineering potential. For instance, in 2011, the Chinese Academy of Engineering and China Aerospace Science and Technology Corporation jointly founded a research institute to study and provide consultative services on aerospace engineering development strategies and national special aerospace programmes. The institute would also collaborate with the private sector, colleges and other research institutes.

Comprehensive in Approach

The range of space activities being undertaken in China span the entire spectrum from R&D in deep space exploration to the development of the necessary infrastructure for design and manufacture of satellites, launch

27. Shirajiv Sirimane, "Lanka to Own Communication Satellite by 2015", *Ceylon Daily News*, August 10, 2012.

capability, telemetry, tracking and control networks, as well as the ability to place all kinds of payloads to conduct activities such as communications, meteorological, navigation, remote sensing, reconnaissance, and electronic intelligence. China has shown competence in building large and small satellites, has an impressive family of launchers and variants, and is able to put a range of payloads into several types of orbits. The country has also focussed on a manned space programme and the construction of a space station.

The development of the end-to-end capability endows China's space programme with a comprehensiveness that does not exist in many space-faring nations. In fact, while the number of countries having a presence in space has increased considerably over the recent decades, very few have the entire range of capability or even plans to build it all.

Control of the Army over the Space Programme

On October 8, 1956, the Central Committee of the Communist Party of China (CPC), chaired by Mao Zedong, established the Fifth Research Academy of the Ministry of National Defence to develop the space programme. But it was during the Cultural Revolution, when the space programme was under threat, that Zhou Enlai persuaded the Central Committee to bring it under military control. There the programme has remained ever since as a military directed programme in which the "military develops and operates its satellites and runs its infrastructure, including China's launch sites and satellite operations center".[28] In fact, the PLA's General Staff Department (GSD) undertakes the tasking of reconnaissance satellites. Command centres for all satellites are controlled by the People's Liberation Army's (PLA's) General Armaments Department which theoretically makes all Chinese satellites available for military application, as and when deemed necessary. This is in complete contrast to the situation in India where the space programme is distinctly and predominantly civilian, and the military, in fact, has a very limited role and influence on the overall roadmap for space plans.

28. Kevin Pollpeter, *Building for the Future: China's Progress in Space Technology During the Tenth 5-Year Plan and the US Response* (Carlisle Barracks, PA: Strategic Studies Institute, 2008), pp. 44-45. Cited by Tellis, n.7.

Commercial Focus

In 1985, China first publicly expressed a desire to commercially exploit its space capability by offering its launchers to the West. With the reprioritisation of government spending by Deng Xiaoping, the space agencies felt the need to generate additional income by offering the services of the Long March launchers to Western communication companies. After passing through a phase of American commercial and military restrictions as well as imposition of trade quotas that did not allow China to launch more than a specific number of satellites in a year and not to offer prices less than 15 percent below Western rates, China's commercial missions successfully took off in the 1990s.

Since then, China has exploited a lucrative market in commercial space launches, providing this facility to many countries in the region and beyond. In fact, to enable this, the space organisation of the country was restructured in the mid-2000s, with the China National Space Administration emerging as the civilian front for international cooperation and liaison between the military and the Chinese defence industry. Three launch sites equipped with spacecraft testing, preparation, launch and in-flight tracking and safety control provide cost-effective services in this field because of its unique strategy of using common platforms.

Emphasis on Counter-Space Capabilities

The conduct of the Anti-Satellite (ASAT) test in January 2007 was the most overt action of China in the field of building capabilities that would seek to deny/degrade adversaries space assets. Given that the USA has identified space as "critical national infrastructure" in its National Security Space Strategy prepared by the Department of Defence and issued in January 2011, the US Administrations have categorically stated the objective of seeking "space control". In contrast, China's trajectory of capability development tends to veer towards attempts not at acquiring space control itself but to deny it to others. This amounts to focussing on developing tracking capabilities in order to identify and track US satellites for any hostile measures that may be planned in the future, as well as building hard and

soft kill options to destroy/deactivate the satellites. Dazzling, blinding or destruction of satellites using strong laser beams, disabling satellite control facilities through cyber warfare techniques, anti-satellite kinetic attacks, and development of 'space landmines"[29] or parasitic nano or microsatellites to interfere in a satellite's functioning are some of the measures that China is known to be working on. The same was elaborated upon by former US Director of National Intelligence, Adm Dennis Blair in his testimony to the Congress in 2009 when he stated that "China continues to pursue a long-term program to develop a capability to disrupt and damage critical foreign space systems. Counter-space systems, including anti-satellite weapons, also rank among the country's highest military priorities".[30] China is also developing small high energy lasers or high power microwave systems for incorporating self-defence for satellites. Development of such counter-space capabilities provides for effective deterrence since it is widely perceived that in case of a US-China military crisis, possibly over Taiwan, the US would be far more dependent on space for the conduct of its military operations than China.

Participation in Regulating Space Activities

In its White Paper on National Defence issued in March 2011, China's opening statement expresses the view that "seeking mutual benefit and engaging in win-win cooperation are the only ways for humankind to achieve common development and prosperity". However, the fact that China well understands the limits of cooperation to regulate activities in outer space is also clear from its own development of capabilities that would enable it to stand up in its own defence. Along with Russia, China had tabled a draft treaty on Prevention of Placement of Weapons in Outer Space and the Threat of Use of Force against Outer Space Objects at the Conference on Disarmament in the late 1990s, and again in 2008, after the demonstration of its ASAT capability. The signal was clear. Not only was China willing to negotiate from a position of strength but was also keen

29. For more on this concept, see G.S. Sachdeva, *Outer Space: Security and Legal Challenges* (New Delhi: Knowledge World, 2010), pp, 187-205.
30. As cited in Covault, n. 16.

to halt more countries from acquiring/demonstrating the same capability. However, there have been few takers for the treaty from among the space-faring nations.

In the coming years, it is likely that China would be willing to participate in the creation of an equal opportunity space governance regime since it is well aware of its own vulnerabilities, and, more importantly, since it has already shown its strength in the field. China has articulated the need for a code under a multilateral framework that includes discussion among all space-faring powers. But it has also made it clear that it won't agree to any arbitrary or ad hoc arrangements.

CONCLUSION

That China has a coherent and ambitious space policy is fairly clear. It has been steadily increasing its presence in this domain and reaping the benefits for its economic growth, social development, military enhancement and projection of international profile. Unlike the space programmes of the US and USSR that were drafted with a clear military orientation and civilian benefits emerged as spinoffs, China has categorically maintained a dual use thrust. China is well aware of the twin benefits and it today has the financial resources to pursue both aspects with equal enthusiasm. In fact, this approach is clearly outlined in the White Paper on National Defence 2011, which states that China strives to "optimize those research and production systems for weaponry and equipment which cater to both military and civilian needs and sustain military potential in civilian capabilities."

China has retained developmental goals such as building of communication infrastructure, better land and maritime management, early warning system for disaster relief, etc. as key objectives. Yet, after witnessing the phenomenal use of space by the US for its military operations and owing to a reassessment of its own security environment after the Taiwan crisis, China began to focus on building dedicated military capabilities in space. However, this task has been undertaken with the understanding of the rise in vulnerabilities that accompanies increased dependence on space assets. Perhaps, it is for this reason that there is a greater focus on

construction of a space station or a Moon mission or other such high profile or other industrial/commercial ventures. These perform the critical task of raising the international profile of China as a 'modern and technologically advanced' nation and serve the purpose of perception management for effective deterrence without really making China as vulnerable as it perceives the US to be.

Implications for India

Space systems enhance all forms of deterrence. For conventional deterrence, they make it possible to fight non-contact, non-linear, asymmetrical wars. At the same time, they can degrade the adversary's nuclear deterrence by striking against his Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) or nuclear assets. Above all, as space systems affect not just military but other aspects of a nation's life, the damage has wide ranging repercussions.

China's presence in outer space is progressively increasing. Since most of the Chinese space assets have a dual role, there are serious implications of this expanding Chinese footprint on India's national security. Some of the more specific repercussions are highlighted in the following points.

- China's earth observation satellites are equipped with sophisticated, all-weather, day and night imaging capabilities which makes India transparent. This has implications for the choices that India must make for ensuring the survivability of conventional and nuclear assets. Given its own transparency to US ISR capabilities, China has focussed on building mobility into its systems. China's strategic modernisation has focussed on increasing its complement of mobile, solid fuelled missiles, as well as building a mobile BMD capability. India too will have to follow a similar trajectory while enhancing its own military reconnaissance and surveillance capabilities to have a deeper visual reach into the Chinese territory for ensuring real-time intelligence.
- Use of space-based systems for navigation would be particularly helpful in increasing the accuracies of Chinese conventional and nuclear missiles. This has implications for the targeting philosophy of China. For instance,

more accurate nuclear missiles allow China to shift from purely counter-value to counter-force options. This could alter China's approach to nuclear deterrence by tempting it towards first use of nuclear weapons and then imposing intra-war deterrence by suggesting more counter-value strikes. The DF-21D has been demonstrated as being usable against manoeuvrable targets largely because of the navigational guidance possible from space. As the Beidou regional navigation system assumes full operation, China's capability in this sphere will only increase.

- Space enabled communications allow China's military to realise its vision of informationisation. Better networked forces at both the strategic and tactical levels will provide for optimum battlefield management and resource mobilisation in the conduct of military operations.
- Space assets also enhance the BMD capability of China. The efficacy of the BMD is critically dependent on early warning and this is best provided from space. An improved C4ISR can make all the difference for the success of an interception. This will have implications for India's deterrence, including for the number of nuclear weapons.
- China's demonstration of ASAT capability poses a direct threat to Indian space assets. By overtly performing the feat, China has managed to project deterrence, which places psychological pressure on diverse Indian activities.
- China's expertise in launching small satellites with variegated payloads offers it the advantage of using these for offensive and defensive purposes. Quick launches could be useful in plugging gaps created by a deliberate or inadvertent loss of a spacecraft, while these could also be manoeuvred into the path of another satellite of the adversary to act as a 'space mine'.
- Every official Chinese pronouncement on space weapons condemns them. However, it is certain that Beijing closely follows the American debate and developments on the space weapons/systems such as space-based kinetic kill vehicles, space-based lasers, hypervelocity rod bundles, space-based radio frequency energy weapons, space manoeuvre vehicles, etc that are often mentioned in US reports. For instance, the President of China Arms Control and Disarmament Association had stated in

China's increased confidence in space capabilities allows Beijing to exhibit assertive behaviour in other domains.

2005 that China was aware of the "approaching bugling (*sic*) of war. The space military technology is advancing rapidly. New military and combat concepts and theories like 'control of space' and 'occupation of space' are emerging. Research and development programs of space weapons are in implementation."[31] Given the opacity of the Chinese political system, it is unlikely that China's efforts in developing its own systems of the kind will be visible till such time as the USA reveals its intentions. But once that happens, China will be able to quickly respond with a demonstration of its own capability. This would obviously have implications for the nature of its deterrence relationship with India.

- China's increased confidence in space capabilities allows Beijing to exhibit assertive behaviour in other domains. There is certainly a link between China's growing capability in space and other strategic systems and its behaviour in inter-state relations. One example of this is visible in China's relations with Iran and Pakistan, in the case of both of which, it is unwilling to change course despite widespread allegations that it is abetting proliferation. The same assertiveness would likely emerge in China's future approach in several multilateral fora. US Secretary of Defence Leon Panetta, during his visit to Asia in June 2012, specifically mentioned the need for China to follow existing international rules and norms in the interest of international security. But a China that is more strategically capable would be more interested in making rules for others to follow rather than succumbing tamely to earlier or others' formulations.
- At a more political level, China's use of its 'soft power' in space arising from its expanding infrastructure, growing cadre of scientists and engineers and active outreach efforts, as evident in bilateral agreement and in APSCO denies India a leadership role in regional space cooperation. While India has not expressed any such desire in the past,

31. Li Daoyu, "Prevention of the Weaponization of, and an Arms Race in, Outer Space: An Urgent Task with No Time to Delay", statement at UNIDIR conference, Geneva, March 21, 2005.

the geo-political and commercial benefits of this for a country that has plans for an ambitious space programme in the coming decades cannot be dismissed lightly.

As far as China's activities in outer space are concerned, a silver lining may be found in the fact that its increasing dependence on space also increases its vulnerabilities and could contribute to self-deterrence. Therefore, China may be more willing to constructively participate in the creation of some 'rules of the road' or code of conduct in outer space than is normally assumed. While it is true that China contributed massively to the creation of space debris through its ASAT in 2007 despite its commitment to space debris mitigation at the UN, its own satellites are not immune to the shards in orbit.

As the stakes of the country in outer space increase, China may be willing to protect its national interests through more collective efforts. In the interests of its own national security, India too should push for universal acceptance of norms of behaviour. The introduction of space weapons would not only be detrimental to the security of space-based assets but also complicate terrestrial security by evoking asymmetric responses. As a Chinese Ambassador pointed out, "With lethal weapons flying overhead in orbit and disrupting global strategic stability, why should people eliminate WMD or missiles on the ground? This cannot but do harm to global peace, security and stability, hence, be detrimental to the fundamental interests of all states".[32]

While India can wholeheartedly agree with this statement, it must closely monitor and analyse China's increasing capabilities to effectively exploit outer space. Simultaneously, India must have a clear-headed strategy to fortify its own capabilities to exploit space and to defend its freedom of action in and from space.

32. Hu Xiaodi, remarks at a panel discussion on "A Treaty to Prohibit Weapons and War in Space?", as cited in Hui Zhang, "Chinese Perspectives on Space Weapons", in *Russian and Chinese Responses to US Military Plans in Space* (Report by the American Academy of Arts and Sciences, March 2008), p. 43.