WEAPONISATION OF SPACE

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Irrespective of how one evaluates the impact of ballistic missile defences (BMD) on future international strategic stability, these defences are here to stay. The USA is well on course towards their testing and deployment, and the Russians, the Chinese, the Europeans and others are resigned to the fact. In fact, countries are now preoccupied with either building their own missile defences or developing counter-measures to defeat the US national missile defence (NMD).

One significant accompaniment of the BMD that will increasingly begin to matter in the coming years shall be its implications for weaponisation of outer space.[1] This would include the deployment of weapons in space with the explicit mission of destroying/disabling other satellites or targets in space, air or on ground. The repertoire of space weapons is large and varied, ranging from nuclear explosions that produce electromagnetic pulse or increased charged particle radiation, to kinetic energy weapons such as missiles, kill vehicles and collision devices to hit space objects, to directed energy weapons emitting microwaves, laser beams or atomic particles, to miniature satellites that can dock onto another one to cause malfunctioning or manipulation.

Until the year 2003, the 1972 Anti-Ballistic Missile (ABM) Treaty had placed some sort of a check on the weaponisation of space by disallowing the US and Russia to develop, test or deploy ABM systems. It also ruled

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1. Interestingly, from a strictly legal point of view, there is no internationally acceptable definition of outer space. It is mostly understood to begin at an altitude of 100 miles, though in the US, astronaut wings are awarded even for flights that reach a height of 50 miles. Information as available from the US Space Command spokesman, "Down to Earth Space Questions," <http://www.spacedaily.com> April 9, 2001.

against the deployment of interceptors or sensors in space that could substitute ground-based ABM radars and had also banned anti-satellite weapons (ASAT) systems with ABM capabilities, besides outlawing concealment from, and interference with, the other side's "national technical means of verification (NTM)."[2] But since the US' withdrawal from the treaty in June 2003, the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, or the Outer Space Treaty (OST) remains the only legal instrument prohibiting a marginal degree of space weaponisation. Defining outer space as a common heritage for peaceful purposes, with no boundaries, no private property for exploitation, and no sovereign rights, the OST bans testing of weapons, conduct of military manoeuvres or the establishment of military bases in space, on the moon or other celestial bodies. But it does accept the passive military use of space for reconnaissance satellites, surveillance and early warning systems as well as communications. It also does not prohibit other conventional weapon systems or ASAT from being used in or from space. Neither does it cover the transit of nuclear weapons through space or their being launched from earth into space for destroying incoming missiles.

Of course, at the time when the OST was concluded, the possibilities of deployment of weapons in outer space, or even their use in this medium, were confined to science fiction. But today, advancements in space technology have brought the possibility of space-based warfare closer to reality. Consequently, with no treaty specifically addressing the issue of weaponisation of outer space, and with the present US Administration showing a resolute determination to move ahead with strategies aimed not just at *protecting* its substantive military and commercial assets in outer space, but at *dominating and controlling* activities on earth from space, the future battleground could shift into this new realm. Just as military superiority on land, sea and air have been critical elements of military

2. National technical means of verification are normally used to refer to photographic satellites in the low earth orbit that are used for information gathering on compliance with arms control measures.

strategy, supremacy in outer space is now projected as an essential element of successful warfare in the future.

In the light of this reality, this paper examines the relationship between BMD and space weaponisation and highlights how these developments would not only trigger off another arms race but also increase the vulnerability of civil, commercial, communication, verification and intelligence assets in space. It traces the direction of contemporary space-related technical developments and analyses the trends that are likely to prevail, particularly in the policies of the USA and China. Naturally, these impinge on India's national security and the paper flags some possible implications for India.

DUAL USE OF SPACE

Before exploring the primarily military dimension of space, it is pertinent to understand that like many technologies in use today, space too has a dual dimension. In fact, the commercial, peaceful use of space is a long-standing fact of life today. Satellite services enable global communication, television broadcasting, weather forecasting, ship navigation, as also of aircraft, trucks, and cars, besides synchronising computers, communications and electric power grids. According to a study by the Union of Concerned Scientists, the US has about 200 commercial and civil satellites in operation today, Russia has about 30, European Space Agency has about 50 and Japan about 25 such satellites in orbit.[3] These commercial satellites presently far outnumber those being used for military purposes. Moreover, the use of space-based technologies for these purposes is not the exclusive preserve of states with domestic space military programmes only. Rather, the widespread dissemination of information and enhanced communications enabled by these technologies are instrumental in creating the 'global village.'

In fact, with greater awareness, more and more developing countries are conscious of the benefits of peaceful space technology and wish to reap the

3. Philip E. Coyle and John B. Rhinelander, "The Path to Controlling Weapons in Space," unpublished paper presented at the 52nd Pugwash meeting 275 on Science, Sustainability and Security at California, August 10–14, 2002.

benefits of activities such as e-health, e-learning, monitoring and protection of natural resources, and disaster management. Representing the Indian Space Research Organisation (ISRO) at an international conference, Gopalakrishnan Narayanan had outlined some of the specific ways in which space technology could be applied to development goals. For instance, sophisticated satellite imaging systems that enable the collection of critical data regarding wastelands, groundwater levels and watersheds, droughts and ocean productivity, etc. could help in ensuring food security through agricultural forecasting and disaster management. Also, the monitoring of forest and coastal areas could enable sound environmental decisions, enabling "digitally empowered decision making for development."[4] Narayanan's presentation also underlined the importance of space-based communication, which has enabled vital information such as expert medical advice to reach even the most remote villages. Evidently, then, space technologies are of particular importance for developing countries with poor infrastructure and, hence, it is critical that the peaceful use of space is guaranteed and protected for all.

In the light of such benefits, it is not surprising that a growing number of governments perceive the security of space as of serious concern. Concerns arise mainly over the developments in technology that could weaponise space[5] and thereby pose a threat to other space-based assets that have become increasingly vital for a wide range of essential human activities worldwide.

There is a very close linkage between the commercial and military uses of satellites. For instance, satellites that are in use for commercial communications are also being used by the military for collecting information on capabilities and intentions of potential adversaries, navigation and weather forecasting. The US Department of Defence has seen greater merit in using commercial satellites instead of investing too much of its defence

4. UNIDIR, "Safeguarding Space for All: Security and Peaceful Uses," Conference Report, March 25–26, 2004.

5. There is a subtle difference between militarisation and weaponisation of space. The former refers to developing space assets for military uses such as early warning, or strategic communications for verification of arms control treaties and even anti-satellite (ASAT) weaponry. It helps to improve military command, control and communications, strategic and battlefield surveillance, and weapons targeting. The latter refers to the actual placements of weapon systems in space.

budget towards military assets in space. Obviously, other countries too have done the same and, therefore, commercial satellites are being used for military purposes, including as NTM for monitoring treaties and agreements.

At the same time, it may be recalled that since the 1960s, military satellites have been tasked to perform communication functions, mapping, providing meteorological and navigational support, tracking enemy missile tests, performing a strategic early warning function for possible nuclear attacks, providing tactical warning and attack assessments as well as spying on each other's militaries, leadership and strategic assets. This deep linkage between the civil and military uses of space now forecloses the possibility of designating it as a sanctuary in which all kinds of military activities, including reconnaissance, surveillance and communications are banned. Rather, this linkage has only been reinforced over the past few decades as advances in weapons technology have produced new, high-tech precision missiles and bombs, whose accuracy depends on the uninterrupted flow of information from satellites in space. These developments have further strengthened the military dimension of space and created the concept of military power in space.

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As more and more countries realise the importance of synergy of space supremacy with land, sea and air superiority and aspire for full spectrum dominance, the feasibility of constraining the scope of activities in space would proportionately fall. Even now it may only be possible to prohibit the deployment of military strike vehicles for war in space. As argued by Coyle and Rhinelander, "Space weaponisation, if defined as dealing with strike vehicles but not sensors, is the classification that presumably would ban activities of greatest concern and where agreement might be possible at some point in time."[6]

6. Ibid.

BMD AND WEAPONISATION OF SPACE

The US is engaged in the process of testing and building a multi-tiered missile defence system that would eventually be capable of intercepting and annihilating intermediate range or intercontinental ballistic missiles. It envisages the placement of strike weapons in space, as the NMD would lead to a phenomenal enhancement of US space capabilities. In fact, it has been established that a land or sea-based missile defence capable of intercepting missiles would automatically also be capable of intercepting satellites in low earth orbit (LEO)[7]. And, the maximum number of earth-orbiting satellites for military and civil purposes is concentrated in LEO. Thus, the BMD could directly take war into outer space. At the same time, by contributing to the military infrastructure in space for communication, reconnaissance, surveillance and tracking, such as the space-based infra-red satellites (SBIRS), the BMD could increase the likelihood of conflict in space.

Space currently greatly preoccupies US military strategy. US Secretary of Defence Donald Rumsfeld has bestowed tremendous importance upon space for future US security. In fact, even before he took over his present appointment in the Bush Administration, he had chaired the Commission to Assess United States National Security Space Management and Organisation in 2001, wherein he had recommended that US national space policy be brought into the *centre of defence planning, encompassing an early review and revision of policy priorities with the objective of developing concepts for operations and capabilities for space, including weapon systems*.[8] Subsequently, he identified "*maintaining unhindered access to space and protecting US space assets from enemy attack*" as one of the "transformational goals" before the US military.[9] For him, power projection in, from, and through, space is a critical goal for the US military.

7. LEO ranges from about 180 miles to 1,200 miles up.
8. The commission submitted its report to Congress on January 11, 2001.The text of the report is available on < http://www.space.gov/commission/report.htm>. Emphasis added.
9. Donald Rumsfeld, "Transforming the Military," *Foreign Affairs,* May–June 2002.

To this effect, he has created a cadre of space professionals, and brought national security space policy under the "deliberate leadership" of the US president. In June 2001, the US Space Command and the US Strategic Command were merged to create a structure "responsible for both early warning of and defense against missile attack as well as long range conventional attacks."[10] A Policy Coordinating Committee for Space has also been established within the National Security Council to provide an appropriate forum to develop, coordinate, and monitor space activities.

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Several Service documents authored over the last four years, such as the *Quadrennial Defence Review* and the *Nuclear Posture Review*, designate space as "a fundamentally new and better way to apply military force—by promptly striking adversary centres of gravity, or minimizing or bypassing high cost, high risk conflicts."[11] General Ralph Eberhart, commander-in-chief, North American Aerospace Defence Command & United States Space Command, states:

> It is time to push up the 'space superiority throttle.' We have left this throttle at a low power setting for too long. We must ensure our continued access to space, to deny space to others when directed…This is a medium crucial to our American military operations and one we'll have to fight for in the future.

Accordingly, current US military strategy draws upon four operational concepts as developed by the US Space Command over the last few years. These include:

- Control over or superiority in space for force application and to assure or deny access for freedom of operation within space.

10. Martin Malin, "Arms Control in Search of Constituencies," unpublished paper presented at the 52nd Pugwash meeting 275 on Science, Sustainability and Security at California, August 10–14, 2002.
11. US Space Command website Document as quoted in Malin, Ibid.

- Global engagement that combines integrated, focussed surveillance and missile defences with a potential ability to apply force from space. "Full spectrum dominance of the battle-space" through a space-based ABM system, and land-based and sea-based anti-satellite systems. US Space Command Vision 2020 looks to "[I]ntegrating Space Forces into war-fighting capabilities across the full spectrum of conflict."[12]
- Full force integration of space forces and space-derived information for air, land and sea operations through the application of precision force from, to and through space.
- Global partnerships for augmenting military space capabilities through exploitation of civil, commercial and international space systems, including bilateral partnerships with US allies in Europe and Asia.

Indeed, the present US Administration is preoccupied with turning the vision of space-based military operations into a reality. It is engaged in the development of advanced space weaponry—in particular, the space-based laser (SBL) and space-based kinetic kill vehicles. The SBL is considered the "follow-on" technology to missile defence, and would deploy a constellation of 20–30 lasers orbiting the earth. Possibly powered by nuclear reactors, they would be tasked to destroy/disable other "competitor" satellites or targets on earth.[13] Most of these systems derive sustenance and support from a report entitled, "Joint Operations Superiority in the 21st Century," prepared in 1999 by the Defence Science Board. It had then identified certain advanced technologies that US military operations in 2010 and beyond would need to develop and induct into operations. These included two-stage ballistic missile launched precision weapons for attacking high-value ground targets; global positioning system (GPS) satellites used in conjunction with kinetic energy or conventional penetrator projectiles; a constellation of SBLs to provide global coverage and defence against hostile missile launches; and a fleet of space orbiting vehicles carrying rods of heavy material in highly

12. Paper prepared by Edy Korthals Altes and Alyn Ware, "Weaponization of Space," for the World Conference on Religion and Peace, The Hague, May 4, 2001
13. For more on this see, *Militarisation of Outer Space*, Document no. 7 prepared by International Peace Bureau (Geneva) and available at website http://www.ipb.org

elliptical orbits to reenter and transit the atmosphere, striking targets at hypersonic speeds (Mach 10 or 10,000 feet per second).

At the same time, the US is improving upon ASATs to arm them with a potential to destroy or disable a satellite. In fact, the US and Russia have been developing ASATs since the late 1950s.[14] The first generation ASATs were non-nuclear or nuclear ballistic missile launched weapons that were either direct hit-to-kill devices, or satellites that would explode in close proximity to the target satellite so that the resultant debris would destroy the target satellite. However, ASAT capabilities were not tested frequently during the Cold War, owing largely to the critical roles satellites played as lynchpins of strategic nuclear stability between the superpowers, providing hotline links for crisis diplomacy, early-warning systems of nuclear attack, and military communications central to deterrence. Attacks on these satellites could presumably be linked to an attack on deployed nuclear forces and, hence, space was widely viewed as an environment exempt from the testing of war-fighting capabilities.

But this is no longer the case. The contemporary generation of ASATs includes directed energy weapons (DEWs) that are space-based laser weapons using nuclear detonation in space to produce x-rays, neutrons, gamma rays, or other parts of the electro-magnetic spectrum directed at the target satellite. It is, therefore, with a clear strategy in mind that the US budget today allocates $ 30 billion for a space weaponisation programme. In fact, there are reports that the Missile Defence Agency will spend $284.8 million for development of SBL alone for the period 2003–07. At the same time, it has also sought $1.33 billion for space-based kinetic kill vehicles over the same period. All put together, the US outspends the rest of the world by vast amounts in the military space arena.[15]

14. The first successful satellite intercept reported as a close intercept occurred on May 24, 1962, and was launched by the U.S. from Kwajalein Atoll.

15. Theresa Hitchens, “Developments in Military Space: Movement Towards Space Weapons?”, Centre for Defense Information, http://www.cdi.org. The USA accounted for almost 95 per cent of global military space spending in 1999.

IMPLICATIONS OF SPACE WEAPONISATION

Space weaponisation, along with BMD and use of precision weapons will certainly disturb the existing strategic stability among nations. For one, it will increase the temptation for preemption, and not surprisingly, the US has already officially proclaimed preemptive strikes as part of its military strategy. Secondly, missile defence, along with the placement of offensive weapons in space, threatens to overwhelm the deterrent capabilities of adversaries. While this may be reassuring for the US, it nevertheless raises threat perceptions of countries across the world, ripples of which shall be felt in many ways and regions in the coming years. Thirdly, international suspicion of American intentions is heightened by its unwillingness to negotiate a legal regime on the Prevention of an Arms Race in Outer Space (PAROS). The US has expressed its readiness to only discuss this. Fourthly, space weapons would not only be expensive, but also provocative and escalatory. For instance, fielding an ASAT weapon will spur others to develop and deploy their own counter-measures. Therefore, any initial advantage gained by a country that is the first to put weapons in space would soon be neutralised as others develop similar weapons, or as lesser powers offset them with asymmetric responses.

It may be recalled that the US seriously undere-stimated the speed with which its advantage as the sole nuclear power in 1945 would erode. In less than five years after the US took the lead, the USSR and UK had caught up. The same could be repeated with space weapons too. Several countries, including Russia and China, have developed sophisticated anti-satellite weapons, and several others are seeking such technologies. If these continue to proliferate, ASAT weapons would undermine fundamental US interests, and endanger international security and commerce.[16] The latter would be particularly debilitating since satellites are now as important to global

16. The commercial implication of any disturbance in space can be gauged from the failure in May 1998 of a single *Galaxy IV* satellite that caused 80 per cent of the pagers in America to go dead, affecting some 37 million users. Information as cited in article of Michael Krepon in *Foreign Affairs*, 2002.

commerce as to tactical military operations.[17] While satellite vulnerability is not a new phenomenon, it must now also factor in the increased likelihood of asymmetric warfare, wherein non-state actors or other smaller states could resort to cyber warfare to disrupt information and transmission networks that rely heavily on satellites.

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In another ramification, the weaponisation of outer space could also jeopardise the chances of the abolition of weapons of mass destruction. Some achievements in outer space technology are actively used for such "auxiliary" military purposes as communication, navigation, global positioning systems, etc. collectively known as NTM that help to maintain strategic stability in the world by ensuring compliance with disarmament arrangements. But with weapons in space, trust levels between countries could plummet and more nations could see merit in acquiring nuclear weapons for offering at least some notional amount of deterrence. Meanwhile, space technologies coupled with nuclear weapons would lead to an appreciable growth in military capabilities and war-fighting options.

At another level, the problem of space debris cannot be taken lightly either. Amidst the several hundred active satellites currently in orbit around the earth, there are also thousands of pieces of space debris resulting from spent rocket stages that never reentered the atmosphere and from particles of propellant and corrosive byproducts of satellites. In fact, the LEO has been described as a space "garbage heap." There are currently over 10,000 orbital objects larger than 4 inches (10 centimetres) in diameter that can be tracked by radar and optical telescopes. Of these, over 8,500 are catalogued by the US Space Command. Only 5 per cent are operational spacecraft. The

17. During the 1991 military campaign against Saddam Hussein, none of the US air-delivered munitions was guided to target by satellites. By the time of US operations in Kosovo, they constituted 3 per cent of all such munitions. That figure jumped to 32 per cent by the time of operations against the Taliban and Al Qaeda in Afghanistan.

rest is space debris. In addition, there are also tens or even hundreds of thousands of objects from 1 to 10 centimetres in size (half an inch to four inches in size) which are very difficult, if not impossible to keep track of. These objects travel at tens of thousands of miles per hour and represent a threat to active satellites and manned spacecraft that have become increasingly vital for a wide range of human activities.

Chinese Response

Among the countries / regions that are carefully monitoring the US efforts towards BMD and assessing its implications for weaponisation of outer space, Russia[18], Europe[19] and China stand out. Each one is devising its own ways, individually and sometimes collectively to shore up its defences. This paper, however, confines itself to examining only the Chinese response to these developments.

China has largely adopted a two-pronged approach, defensive and offensive, to meeting the challenge of BMD and weaponisation of space. Beijing's strategy, on the one hand, involves working on public opinion in the USA and elsewhere to make moral and diplomatic arguments against weapons in space and forming international coalitions to limit the way that the US can use space. On the other hand, it is developing its own weapon

18. Russia has argued in favour of the use of outer space in the interest of maintaining peace and security and promoting international cooperation. It has sought a multinational obligation not to put into orbit any objects with any kind of weapons and not to install such weapons on celestial bodies or deploy them in outer space and not to resort to use or threat of use of force with regard to space objects.

19. American allies in Europe too are apprehensive of US domination of space. Countries that are likely to host some components of missile defence have witnessed popular demonstrations against the projected deployments. For example, on March 4, 2000, some 300 protesters demonstrated against construction of the US-backed SBIRS system in the UK. Greenland's Parliament declared in November 1999 that if US NMD plans violate the ABM Treaty, then Greenland "can't support plans for an upgrade of the Thule radar." Danish Foreign Minister Niels Helveg Peterson backed this up on February 25, 2000, asserting that a "firm component" of Denmark's policy is that use of the Thule radar not be "in violation of international rules." These comments reflect a gulf between US and NATO views on missile defence policy. Some European countries have also expressed the apprehension that the NMD and eventual space domination might decouple American security policy from Europe and it is significant that the European Space Agency is engaged in developing independent space capabilities for observation, remote sensing and navigation.

systems, including directed energy weapons that can kill satellites and particle beam weapons that can engage missiles in flight to counter US satellites and space-based weapons.

As part of its defensive strategy premised on diplomatic overtures, China is seeking to block Washington from developing and deploying its own anti-satellite weapons and space-based missile defence systems. For instance, in June 2002, Beijing along with Moscow, introduced a joint working paper at the Conference on Disarmament (CD) to this effect. Entitled "Possible Elements for a Future International Legal Agreement on the Prevention of the Deployment of Weapons in Outer Space, the Threat or Use of Force Against Outer Space Objects," the paper suggested banning SBWs or the threat and use of force against outer space objects.[20] Realising the vulnerability of its relatively small posse of intercontinental ballistic missiles (ICBMs) to the NMD[21], China has consistently maintained that PAROS is the most urgent issue before the international community, even more than the negotiation of the Fissile Material Cut-off Treaty (FMCT). Chinese officials have used every opportunity and forum to highlight aspects of the risks involved with space weaponisation, ranging from the arms race and conflict in space to problems of space debris and crowding of LEO that would limit orbit usage for civilian purposes. Chinese focus on these issues was well illustrated at a recent conference in Beijing on the enactment and improvement of laws on human space activity. Before an audience of approximately 100 space experts from the United States, Russia, China, France, Germany, Japan and India, Wang Liheng, president of the China Institute of Space Law, brought up the need to enact new laws that would ensure the exploration and use of space, and protection of the environment of space. He cited space debris from the disintegration of launch vehicles, use of nuclear powered devices in deep space exploration, and irrecoverable satellites and materials from earth as important issues that needed to be

20. The paper can be found at http://www.basicint.org

21. A space-based system of 1,000 kinetic interceptors could nullify the simultaneous launch of 20 Chinese CSS-2 missiles. Larry M. Wortzel, "China and the Battlefield in Space," WebMemo no. 346, The Heritage Foundation, October 15, 2003.

addressed for protecting the space environment.[22] He pointed out the lacuna in the existing legal regimes with respect to the military use of space and pressed for urgent rectification.

Indeed, Beijing is acutely conscious that control of space and missile defence capability coupled with precision strike weapons could raise the possibility of US intervention in any conflict over Taiwan. Deployed space-based interceptors would negate the new Chinese longer-range theatre missile forces designed to attack Taiwan and US bases in Okinawa and Guam. However, China is also prudently aware of the limited impact of its diplomatic attempts at putting brakes on the US space weaponisation programme. Consequently, it has accelerated its own attempts at exploitation of space for military purposes. In fact, the announcement of China's ambitious space programme for 2004, just prior to President Bush's announcement of a major American initiative to establish a lunar base by 2020 and send astronauts to Mars, may not have been entirely coincidental and does reflect a game of one-upmanship between the US and China . Analysts such as Kevin Pollpeter of RAND have interpreted China's proposed plans as a reflection of its determination to become a major space-faring power, exhibiting the success of its improved engineering technology and standards.[23]

Indeed, there can be no denying that China's space programme that began in the late 1950s with the "12-year development plan of science and technology," that included rocket programming, radio electronics, automatic control, computer and semi-conductor technology[24] has today come a long way. It has evolved into an independent programme based on a sophisticated infrastructure of space institutions, including research and development centres, launching sites, tracking, telemetry, command stations and centres, and manufacturing plants. China sent its first man-made earth satellite,

22. "Beijing Hosts Two-Day International Space Law Conference," *Xinhua*, April 26, 2004, in FBIS CPP20040426000241

23. "China to Embark on Ambitious Space Programs in 2004," *South China Morning Post*, January 19, 2004, in FBISCPP20040119000063.

24. As quoted in A.V. Lele, "China as a Space Power", *Strategic Analysis* (New Delhi: IDSA, 2002).

Dongfanghong-1, into space in 1970. It was the fifth country to exhibit this capability, following the then USSR, the US, France, and Japan.[8] In 1975, China became the third nation after the US and the erstwhile USSR to successfully launch a recoverable satellite with the first FSW-0 photo reconnaissance/remote sensing satellite.[25]

In order to be a space power, a nation must have launchers and satellites, and a mission support capability to monitor a satellite launched by it and utilise the information. The People's Republic of China (PRC) has succeeded in creating a "full end-to-end research, design, trial-manufacture, production, and testing system" for both satellites and launchers. China launched its first military communications satellite in January 2000 as part of its command and control network linking forces for combat. This will eventually be connected to air-borne and ground-based sensors to give ballistic missiles, cruise missiles, aircraft and ships a seamless tactical-to-strategic targeting capability. Studies are under way to develop a global mobile satellite information system (GMSIS), which would provide personal hand-held communications via 18 to 24 satellites in medium orbits.[26] The US Department of Defence believes that China could field a direct-ascent anti-satellite system in the next two to six years.[27] If all its programmes proceed on schedule, China could trump the second-tier space powers such as Japan, India, and even the European Space Agency.

Significantly, the PRC has also been exploring the possibility of micro-satellites, which are smaller than most satellites and, therefore, less expensive. A satellite in this category, Tsinghua 1, was launched on June 28, 2000, by a Russian booster.[28] Its launch put China into the select bracket of countries that can design and operate micro and nano-sized satellites. This success has implications for both China's scientific programmes as well as for enhanced military satellite capabilities since the technology has legitimate civilian applications like repairing and refuelling of satellites, etc., besides

25. Ibid.
26. Ibid.
27. Wortzel, n. 21.
28. It was a joint project of Tsinghua University of Beijing and Surrey Satellite Technology Limited (UK).

being an ASAT weapon. The Chinese Space Technology Research Academy has been developing an advanced anti-satellite weapon that has been characterised as a "piggyback satellite." The system is designed to attack a space station, a space-based laser or another satellite by attaching itself like a parasite to the enemy system and then jamming or destroying it.[29] US analysts believe that China's civilian and military space programmes provide many of the capabilities that would be necessary to support an ASAT programme.[30] Examples of such ASAT-enabling capabilities include on-orbit manoeuvring, mission management, and high-powered laser technology. Miniaturisation of satellites would also allow for lower cost access to space and an enhanced level of manoeuvrability, while increasing the ability for launch-on-demand. According to some published Chinese military "White Papers," one kind of ASAT weapon that would be effective against SBL is being developed as part of China's asymmetrical warfare strategy "to fight and win a high-tech war against a powerful adversary," most notably the technologically-superior military capabilities of the United States.[31] According to a Pentagon report too, "China's PLA is building lasers to destroy satellites and already has beam weapons capable of damaging sensors on space-based reconnaissance and intelligence systems. Consequently, China could blind the US intelligence and military space equipment systems vital for deploying US military forces in current and future warfare."[32] Beijing's decision to develop and deploy the ASAT system meets its long-term objective of establishing a strategic balance among the larger nations, and

"China's PLA is building lasers to destroy satellites and already has beam weapons capable of damaging sensors on space-based reconnaissance and intelligence systems."

29. Wortzel, n. 21.
30. Phillip Saunders, Jing-dong Yuan, Stephanie Lieggi, and Angela Deters, "China's Space Capabilities and the Strategic Logic of Anti-Satellite Weapons," Centre for Non-proliferation Studies, July 22, 2002. http://www.cns.miis.edu
31. As reported in the Worldnetdaily of January 20, 2001.
32. Lele, n.24.

breaking the monopoly on use of space, thus, weakening their capabilities in information warfare. Besides, China is reported to be developing a space-based electronic intelligence (ELINT) capability that will be integrated with photoreconnaissance and communications satellites. The People's Liberation Army (PLA) writings suggest that given heavy US reliance on satellites and other space assets for military operations, jamming and destroying these space assets will become increasingly important in a future conflict. As an article by a Chinese defence analyst stated: "For countries that can never win a war with the United States by using the method of tanks and planes, attacking the US space system may be an irresistible and most tempting choice."[33]

Evidently and quite prudently, China's focus on development of its space capabilities is in areas that are most likely to have both military and economic benefit. Over the last 30 years, China has gradually developed a multi-functional, multi-orbit space infrastructure composed of various satellite systems with the simultaneous objective of enhancing its comprehensive national strength, safeguarding its national security and consolidating its status as a powerful country. Certainly, in the coming years, China will strengthen its capabilities in controlling the use of space globally, and thereby seek to change the Sino-American military balance so that the US would not intervene easily in the event of a conflict in Taiwan.

In the view of PLA defence experts, "Whoever has control (or 'hegemony') over space, will also have the ability to help or hinder and affect 'ground' mobility and air, sea and space combat." And while calling for the peace-loving nations and peoples of the world to oppose weaponisation of space, the PLA continues to push China to become a strong military technologically.[34] Chinese advances in space technology will not only force US planners to think differently about their strategy in the Asian theatre because the PRC would be much less vulnerable to asymmetric operations, but it will have huge implications for Indian threat perceptions too.

33. Saunders, et al., n. 30.

34. Wortzel, n. 21.

Implications for India

Any military-related development in China has implications for India's security. Notwithstanding the current upbeat mood in Indo-China relations and the progress towards greater accommodation of each other's viewpoints and positions, territorial disputes still do heckle their relationship. Indian diplomacy still views China as a long-term challenge that could rear its head once China has established itself as a techno-economic power with considerable military strength. China is determinedly working towards both these ends and, for the time being, its diplomatic attempts at reaching out to India are perceived as part of this strategy to stay focussed on economic and military development and away from all distractions. The fears in India are premised on past experience and the well-known fact that a large amount of public posturing that China indulges in tends to hide its real intentions and long-term ambitions of establishing its hegemony in the region. Consequently, it becomes critical for India to keep a close watch on the Chinese advances in space technology and respond with its own calculated efforts in this direction.

India's approach to the issues of BMD and space weaponisation is influenced by two trends. The first of these relates to its traditional principled approach to outer space wherein it has upheld space as common heritage, like the Antarctica. India has maintained that outer space is the province of all mankind. Ever since 1982, it has regularly tabled a resolution at the UN calling for a convention to be negotiated for prohibiting the use or the threat of use of nuclear weapons under any circumstances. These diplomatic attempts emanate from the belief that weaponisation of outer space that will lead to the domination of this medium by the US cannot be in the long-term interests of the country. New Delhi has always upheld the need for multi-polarity in international relations so that every country not only coexists in an environment of security, but also enjoys the sovereign right to make its own choices. This can be possible only when one or a few countries do not have the monopolistic power or capability to unilaterally take preemptive actions against what they consider inimical to their national interest.

Therefore, India has considered space weapons as unnecessary and even destabilising as they would divert economic resources away from more pressing tasks of development.

As a second trend that is more tangibly felt in the contemporary realist foreign policy and military strategy of India is a realisation that there are limits to the success of its diplomatic efforts in this direction. Given US intransigence on this issue, and the ongoing Chinese developments, New Delhi well realises that it is no longer possible to declare outer space a sanctuary that disallows all actions of military utility. Reconnaissance, surveillance and communication for military purposes using the medium of space are now routine tasks performed by national space assets. Space operations in the future will be even more a "pre-requisite for successful intervention on the ground, efficient communication and good coordination of precision strikes."[35] As the US leads, others with space capabilities can be safely expected to follow the trend in the coming years. Already thirty or more nations possess significant space industries and eight countries have direct access to the medium through space launch vehicles. For India, China's growth poses a potential challenge and, hence, it has to move in this direction.

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Consequently, India has speeded up its own efforts at developing/ acquiring missile defences and aerospace assets. Indian Air Force (IAF) Chief S. Krishnaswamy said in 2003 that work was on for the development of an aerospace command to exploit space. Asserting that futuristic weapon systems were no longer in the realms of science fiction, he said, "The IAF has started work on conceptualising such a weapon system and its

35. Therese Delpech as quoted in Gotz Neuneck, "Prospects for Space Arms Control," unpublished paper presented at the 52nd Pugwash meeting 275 on Science, Sustainability and Security at California, August 10–14, 2002.

operational command system."[36] India has also sought the cooperation of Russia in this field. In fact, its involvement in Glonass is significant because it is a rival to the American GPS and, like it, is under military control. The agreement signed between India and Russia, however, envisages only cooperation for the peaceful uses of outer space.[37] India is also expected to be a stakeholder of about $300 million in the Galileo system, a joint venture between the European Union (EU) and the European Space Agency that is expected to out-perform the American GPS.

India has a sophisticated space programme, building and launching its own satellites since 1980, now in both LEO and GEO (geosynchronous earth orbit) orbits. Primarily, India is focussed on using satellites for communications and remote sensing, but it has hinted at planetary exploration and possibly even a manned mission to the moon. In addition, India hopes to sell its launch services to other nations.

While India is required to do the needful in view of its long-term threat perceptions, it still needs to realise that it would be most prudent for it to combine its two approaches to outer space. It must press upon the international community the need to draw a line on space weaponisation. It may still be possible to ban the entry of strike weapons, whether conventional or those of mass destruction, and their delivery vehicles in space. It is not too late to prohibit weapons and regulate space activities to prevent offensive and aggressive deployments and activities. This would call for a fair amount of ingenuity, tactful diplomacy and innovative solutions. But approaching it with a positive attitude and the requisite political will can close the door on unnecessary and wasteful space weaponisation.

CONCLUSION

"... we shall not see space filled with weapons of mass destruction, but with instruments of knowledge and understanding…." So had said President John F. Kennedy in his Moon Speech on September 12, 1962. But that was

36. "India Working on Space Weapons: IAF Chief," October 7, 2003, at http://www.rediff.com//news/2003/oct/06iaf1.htm

37. Bharat Bhushan, "India Russia Plot Space Path," *The Telegraph*, November 13, 2003.

then. Almost three decades later, the Rumsfeld Space Commission had concluded, "Space is not simply a place from which information is acquired and transmitted or through which objects pass.... In the coming period, the US will conduct operations to, from, in and through space in support of its national interests both on earth and in space."[38]

Indeed, perceptions and concepts have changed dramatically as technological capabilities have risen. So much so that today's US military policy appears to be more technology driven than based on any objective threat analysis. This is most evident in the US resolve to weaponise space, even though the threat to US satellites is not only a "low probability/ middle damage threat" but also one that could easily and more effectively be dealt with by universally banning the development of SBWs and ASATs. But the current American thinking and initiatives are moving in a direction that could hurtle the world down an extremely dangerous path.

Nearly half a century ago, the nuclear arms race had taken on an irresistible momentum of its own and proved unstoppable. Precious resources had been squandered in the process and the world was perilously close to extinction. While this situation still persists, the weaponisation of space shall add another and even more dangerous dimension to it. There is an urgent need to develop a verifiable and enforceable international convention prohibiting testing and placing in orbit of any object with a conventional, laser, or kinetic capability that could intentionally damage any other object in space or on the surface of the earth. Rather, it needs to be affirmed that space is maintained as a global commons for the peaceful use of all nations.

Given India's own resolution to employ space for the greater benefit of its population, it cannot sit quietly as the trend swings towards worthless military use. Also, India cannot ignore the potential environmental devastation that could be caused by unregulated space weaponisation. ■

38. *Report of the Commission to Assess United States National Security Space Management and Organization*, January 11, 2001, n.7.