Space: The Future Pivot of Strategic Stability?

Balraj Nagal

Strategic stability has not found a universal definition for many reasons, the primary being the lack of agreeing on the right conceptual thought, and language interpretation also added to the challenge of arriving at an exact terminology. The meaning and implications were agreed and recognised between the two super powers which is Russia and the United States, during the cold war. At present, some Russian and Chinese analysts also offer their in-depth understanding of the topic. Strategic stability between two nuclear states implies the absence of motive to attack to any nation in the knowledge that no gain would accrue. Edward Warner, the erstwhile US Secretary of Defense's representative to the New Strategic Arms Treaty (New START) talks, states the term 'strategic stability' most narrowly, is the absence of incentives to use nuclear weapons first (crisis stability) and the absence of incentives to build up a nuclear force (arms race stability).[1] Perhaps more than any other issue, the threat of surprise attack was the catalyst to the line of thinking that ultimately led to the concept of strategic stability.[2] Strategic stability refers to the existence of conditions that make war between major powers unlikely. Mutual

Lieutenant General **Balraj Nagal** (Retd) is Director, Centre for Land Warfare Studies, New Delhi.

trust, shared values, and common objectives can enhance strategic stability, but the most important requisite is mutual conviction that using military force will result in unacceptable retaliatory damage.[3] The concept was interpreted as mutual nuclear deterrence (or mutually assured destruction—MAD) to avoid a military conflict between the USSR and the US. It was based on the assumption that in a crisis situation a preventive nuclear strike would not give an advantage because a second strike retaliatory would balance the preventive strike. One of the modern and commonly accepted definitions of strategic stability states that strategic stability is a robust strategic nuclear balance that is maintained over a long period of time despite the impact of destabilising factors.[4] A second and slightly broader understanding of Strategic Stability as stated by Edward Warner, was the absence of armed conflict between nuclear-armed states, and the third interpretation was a regional or global security environment in which states enjoy peaceful and harmonious relations.[5]

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The elements or components of strategic stability are dynamic, and fundamentally based on the international political environment and other determinants, expanded with technology. To quote Andrei A. Kokoshin 'Strategic stability is a complex interdisciplinary subject that has incorporated elements from the natural sciences and technical engineering. As a whole, however, it constitutes a subject of political science and political psychology. Integrated man-machine systems of intelligence, targeting, surveillance, communications, data processing, data analysis, command and control—as well as information-security systems that protect communications systems not only from foes but also from various internal fluctuations—all play increasingly important roles in all of this.'[6] 'Overall, strategic stability is a complex multi-political and multidisciplinary problem that requires the constant attention of political and military leaders, national experts who research national security issues, and scientists representing different fields.'[7] Therefore Strategic Stability

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concept is rooted in many disciplines/domains, to include International Relations, Political Science, Psychology, military theory and doctrines, weapons and technology, development of forces, C4I2SR. The last three aspects though terrestrial and located essentially at secure locations are now linked to space in a major way hence, 'space is to be viewed in the context of continuation of terrestrial situation or nuclear stability'.

Space has three unique features which makes it preferred choice and valuable or even indispensable i.e., 'global coverage', 'continuous all weather capability' and 'access to denied areas'. Air space provides access but is limited in duration and subject to a hostile environment dependent on the adversary's capability and of sovereignty issues. Approximately, 110 active satellites are owned by sixty countries performing a wide array of tasks. In recent times, Space has created a niche domain in order to determine Strategic Stability, therefore it is imperative and appropriate in evaluating the scope and the role it may play in the future to ensure continued Strategic Stability, nevertheless, what may be the consequences of disturbing any segments of assets deployed to safeguard and guarantee Space Stability.

Space capabilities by virtue of their unique features have created vital roles for themselves in peace and crisis or war. During peace, these, first provide early warning of threats or adversary initiating or preparing for offensive actions, where nations are on hair trigger alert or follow a policy of first use, it is vital for the opposite side to remain on constant vigil. Strategic Stability improves and increases when the situational awareness satisfies both sides of lack of an immediate offensive intent. Space helps in monitoring the creation of nuclear weapons' facilities and also the development of new delivery systems be it ballistic missiles, hypersonic glide vehicles, cruise missiles, bombers or test ranges or sites, to name a few. The deployment of new nuclear weapon delivery systems, new storage areas are created and any move or enhancement of the existing assets are equally well monitored from the space. This sphere is more

critical when confidence building measures do not exist or adversaries have no common understanding regarding the subject, for fixed assets or structures such as ICBMs. When storage areas remain under monitoring and surveillance, large-scale offensive preparations will indicate an offensive intent easily discernable from space. Command & Control locations coupled with Active Communications are to be kept constantly under observation, space is critical to fulfil this need. Move of the political and military leadership tracked or observed or monitored by communication and listening by space capabilities is a need, to ensure CBMs and also read intent in time of crisis. The second value of space capabilities lay in the field of technical verification of arms control and treaties.[8] The experience of the cold war period provides ample evidence of space capabilities being determinants of ensuring adherence to commitments made and not being violated even surreptitiously. The imbalance in space capabilities of new nuclear-weapon states is a factor which impedes the agreement on CBMs and also generates doubts of the capabilities of the adversary, this aspect needs resolution, whilst nations with advanced space capabilities may be willing to share information, the doubt remains, will the system fall foul of a nation at crucial times.

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Examining the role of space in conventional operations, forces rely on satellites to operate far from established terrestrial communications networks, satellite and communications provide the backbone to ensure that analysts and warfighters receive real-time access to intelligence, surveillance, and reconnaissance data streams. Today, some nations operate Remotely Piloted Vehicles via satellites, others are following suit. The Global Positioning System provides the forces with critical position navigation, and timing information, allowing the forces to better understand the contours of the battle space, and to target with precision, and synchronise

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effects. Satellites provide accurate, timely weather information. 'If both sides depend on space systems, to ensure that military forces can achieve political objectives (or deny the political objectives of an adversary), then the overall stability of the space domain will become a central component of the overall stability of a crisis.'[9]

Continuing the examination forward, it appears that during the period of crisis or war, space assets play a more vital role, broadly related to situational awareness, intelligence, early warning, decision making and damage assessment. For Strategic Stability, Command and Control (C&C) of nuclear forces is the most critical element, which must not be disturbed or snapped or broken during a crisis or war, in the knowledge that the political and military leadership is in hand shake with its forces constitutes the ultimate confidence that the situation is firmly under their control to ensure national security. Any space asset which if disturbed leads to a break in command and control, and is detrimental in preservation of strategic stability.

Communications (all methods and types) based on space assets connect the leadership with nuclear forces and situational awareness systems, a link that becomes the eyes and ears of decision makers, any disruption of the situational awareness may lead to wrong decisions including offensive actions. Whilst survey and mapping is more of a peace-time activity, it retains its importance in the form of reconnaissance during a crisis or war by nature of changes that occur in military movement or deployment in crisis or war. Intelligence is the backbone for correct and timely decisions, space is one of the best sources to fulfil this requirement, any interruption or interference or disturbance is a recipe for mistake to end in a disaster.

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Early Warning has been the pivot of Strategic Stability, and space is the most valuable domain to provide early warning of any nuclear attack.

Surveillance is closely interlinked to intelligence and occupies the same space and importance to maintain Strategic Stability. The third aspect relates to Target Data, whilst peace time data of static targets may not change the mobile targets especially, nuclear forces must be tracked and data maintained to the last moment before a decision is taken to attack the chosen target. Navigation and Weapon Guidance are very important for delivery of weapons to the designated targets, whereas space is one of the means to ensure precision, there are other independent means of equal accuracy, hence space systems are not in the same league of importance as for intelligence and surveillance but still are desirable.

Development of Anti-Ship Ballistic Missiles (ASBM) is one system which is solely based on space systems for the final phase of the missile flight to the moving target. Ballistic Missile Defence (BMD) is dependent on space-based systems for detection and tracking of adversary missiles, at present no alternatives are available, therefore BMD is totally reliant on space systems for detection and initially tracking of enemy missiles. Interdiction is a combination of space-and ground-based tracking instruments, and their greater accuracy is dependent on space systems, and thus retains its primary status. Damage Assessment is one of the prime tasks that provides space-based tools, both in own territory or on own forces, and as well as on adversary nation or its forces. Damage assessment must be a real time for decision making as well as assistance. Many other important areas are space linked, e.g. ElectronicWarfare, Net Centric Operations, Logistics, Automation, Cyber Operations and Information Management. The US Space policy describes the role as, one see with clarity, two communicate with certainty, three navigate with accuracy and four operate with assurance.[10]

The critical functions of C4ISR performed by space assets to ensure Space Stability have made the concept very dependent on space. Three vital functions that the space performs are: first, in maintaining Strategic Stability, that provides real-time intelligence and situational information, second, maintains continuous surveillance of adversary offensive systems, and third, affords the requisite time to take decisions. Any disruption or cessation of the functions can amount to different interpretations or

inferences, with the possibility of decision making in a void, may be even a wrong one.

A broad examination of the space policies of big powers confirms that space is critical to their national security. The US Space policy states, "Develop, acquire, and operate space systems and supporting information systems and networks to support US national security and enable defense and intelligence operations during times of peace, crisis, and conflict; Ensure cost-effective survivability of space capabilities, including supporting information systems and networks that commensurate with their planned use, the consequences of lost or degraded capability, the threat, and the availability of other means to perform the mission; Reinvigorate the US leadership by promoting technology development, improving industrial capacity, and maintaining a robust supplier base which is necessary to support our most critical national security interests. Develop and implement plans, procedures, techniques, and capabilities necessary to assure critical national security space-enabled missions. Options for mission assurance may include rapid restoration of space assets and leveraging allied, foreign, and/or commercial space and non-space capabilities to help perform the mission. Maintain and integrate space surveillance, intelligence, and other information to develop accurate and timely SSA. SSA information shall be used to support national and homeland security, civil space agencies, particularly human space flight activities, and commercial and foreign space operations. Improve, develop, and demonstrate, in cooperation with relevant departments and agencies and commercial and foreign entities, the ability to rapidly detect, warn, characterise, and attribute natural and man-made disturbances to space systems of US interest; and Develop and apply advanced technologies and capabilities that respond to changes to the threat environment.

The fact sheet released after President Obama released the US National Space Policy that listed two needs related to national security as: 'The United States recognises the need for stability in the space environment. The United States will pursue bilateral and multilateral transparency and confidence building measures to encourage responsible actions in space, and will consider proposals and concepts for arms control measures if they

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are equitable, effectively verifiable, and enhance the national security of the United States and its allies. In addition, the United States will enhance its space situational awareness capabilities and will cooperate with foreign nations and industry to augment our shared awareness in space. The United States remains committed to the use of space systems in support of its national and homeland security. The United States will invest in space situational awareness capabilities and launch vehicle technologies; develop the means to assure mission essential functions enabled by space; enhance our ability to identify and characterise threats; and deter, defend, and if necessary, defeat efforts to interfere with or attack US or allied space systems.'[11] The important quote related to national security are: 'Over the past 60 years of remarkable development since its space industry was established in 1956, China has made great achievements in this sphere, including the development of atomic and hydrogen bombs, missiles, man-made satellites, manned space flights and lunar probe,' 'to meet the demands of demands of economic, scientific and technological development, national security and social progress, and to improve the scientific and cultural levels of the Chinese people, protect China's national rights and interests, and build up its overall strength.', 'to effectively and reliably guarantee national security.'[12] Russia too emphasises the use of space for national security. In each case national security is the driving force and all the three do not have a common understanding of its application in the adversarial context. The action by the three powers have resulted in militarisation of space, however, no proof is at hand to indicate that space has been weaponised.

The main space treaty to keep space free from weaponisation has not been able to prevent development of capabilities that can destabilise space stability. The Outer Space Treaty Article iv is the operative item for the use of space by nations, and it states, 'States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons

on celestial bodies, or station such weapons in outer space in any other manner.

The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.'[13] Since the treaty was signed the technological advances in weapons beyond kinetic means has changed the way force can be applied, and also not prevented testing of systems below weapons of mass destruction. Eleven countries have a space launch capability and the space policy and doctrine of some space-faring countries which focus on space deterrence and the military use of this domain are possibly creating a serious risk of reigniting a new round of great power competition thereby generating new vulnerabilities.[14]

The US and the Soviet Union conducted anti-satellite tests during the cold war and developed capabilities to meet their national security requirements. China conducted its first ASAT in 2007 and followed with more in 2010, 2013 and 2014.[15] In the space race-advanced countries are experimenting with the future technologies continuously on newer type of space vehicles that may be used in the future to perform many tasks now in conceptual stages. In addition the testing of non-kinetic means is a continuous process, just in case there is a requirement. At present, there is no ban on testing of offensive and defensive systems in space as long as they do not violate the Outer Space Treaty. Jamming is one of the easiest methods in use, and probably is the most cost-effective. Laser dazzling and directed energy weapons offer scope to achieve objectives without destroying any physical asset, platforms to mount these are satellites or space vehicles being placed in orbit continuously, many secret programmes in the past and present suggest to such capabilities. The US X-37B is one example of secret research in space, the vehicle spends extremely long

time in space without a stated programme.[16] If the eleven countries with space capability put in orbit their capabilities we have a crowded sky.

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The platforms with temporary effects on adversary's systems have the advantage of deniability and lower threshold or brink, these are at a much lower cost and technologically easier to use. Being temporary in nature these may be called less escalatory or not capable of automatic escalation in the violence ladder, however, the danger lies in using it indiscriminately or often and then run the risk of unintentional escalation. Of course, these cannot eliminate a capability permanently if required during a war or crisis. In future, as space launches becomes more widespread and cheap, it may be possible for state-sponsored entities or even non-state actors to possess such capabilities. One of the inherent dangers of use of non-kinetic means is, systems failure of on board equipment can be construed as an attack, leading to unintended escalation.

The second category of offensive capability lies in physical attack or kinetic kill of deployed assets. The past experience demonstrates that a huge amount of debris is created which affects other space assets including own, for a very longer period, dependent on the size of the assets and height of the debris. The debris of its own satellite by a kinetic kill by China in 2007 resulted in hundreds of pieces and will stay in orbit for years. Many nations now have BMD capabilities, which are very sophisticated and precision technologies that are much more complex than ASAT, and hence any nation with BMD will possess capabilities to kinetic kill adversary satellites, besides in future, nations without BMD will be in a position to develop ASAT weapons. Intercepting incoming missiles at a very high mach speeds is more difficult than attacking set course satellites with no variation in flight pattern. The

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dislocation of satellites poses its own threat; any means to shift a satellite from its desired location makes it useless. This first strike capability based on BMD systems is destabilising and can cause an unstable relationship. The use of directed energy weapon will render a satellite ineffective once any part of the satellite is damaged. The growth of technology may allow capturing of satellites and their reorientation, thereby, denying use to the actual owner.

The two methods of offensive action create a dilemma for policy makers because defending assets is far more difficult and costly vis-à-vis attacking them. Building in redundancy or replacement is costly in time and production, whereas defensive systems cater for existential and future threats remain suspect of achieving the aim, the sheer magnitude of the problem may defy a solution considering the numbers involved. The aggressor has the choice of time and place of strike, this was the problem faced by nuclear powers till a secure second strike capability was not fully in place. The elements of space located on ground also contribute to the great vulnerability by virtue of being exposed to physical attacks by conventional means. The development of Ballistic Missile Defence (BMD) has put into place many more systems than were required to monitor missile launches during the cold war, this growth has increased the targets available and also the vulnerability to space stability. In a conventional war some ground-based space stations may be attacked, this again creates a dilemma for decision makers, to discern the intention of the adversary is it to destabilise Strategic Stability or just reduce conventional capability? Most ground-based systems can be dual use, hence their destruction is well within the realm of possibility. Space assets for C4I2SR for conventional operations and nuclear forces have certain commonality, therefore a linkage emerges between the two distinct forms of war, and disrupting one form will endanger the other form's capability.

Any attack intentional or accidental on Command and Control assets or intelligence gathering satellites will carry the danger of escalation, first, the loss of capability and second, the long-replacement time will convince

the attacked nation of the ill-intention of the attacker, it will be interpreted as a natural step to escalation in the nuclear ladder. There may be a case when commercial satellites carrying military communications or other data is disabled, this too may raise a similar situation as described earlier. All military engaged in operations contributes to the lower steps in the escalation ladder, any efforts to destroy their capability can be construed to destabilisation of Strategic Stability. The biggest challenge in space stability is the short time for decision making after any attack on space assets, if it is an intentional attack the worst is to follow soon, this dilemma simply puts inordinate pressure on the leadership if the situation goes wrong and a decision is not forthcoming. Hence the possibility of counter-action has a greater, probability if space assets are attacked initially.

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Another unique aspect of space assets is that there are no human casualties[17] as all assets are unmanned and all attacks are remote actions, so the absence of body bags or media display of grief may tempt action in the belief of non-detection, such miscalculations run extreme risks. Dual use technologies are now the norm and deployment of the assets in space that makes it difficult to differentiate between military and commercial assets, this problem may itself become a challenge whilst determining the targets, and result in instability.

Strategic Stability is intertwined with space stability in an extremely complex manner, beginning with early warning to damage measurement by own weapons, making it very vital devise means and methods to understand the complexities and intricacies involved. Space stability can maintain strategic stability unless political stability is disturbed and becomes the overriding factor for movement up the escalation ladder. Very limited understanding has been reached between nations to put in place treaties and agreements to keep space free from offensive actions which may result in loss of space stability and consequently Strategic Stability. On the contrary, leading space nations are in the race to establish their lead or

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supremacy before any substantive agreements or treaty is discussed which may preclude offensive actions in space. This makes it important that progress is made on reaching an understanding before some nations achieve dominant positions akin to the Non-Proliferation Treaty and then dictate terms. China is well ahead of India in space systems, and India too must increase its assets to meet the needs of national security by developing anti-satellite capabilities on priority. This is not difficult since India already has tested its BMD capability, which is more precise and complex vis-à-vis ASAT. In addition, India must keep ready many reserve satellites for launch on demand to cater for losses to first strike. There is an urgent need to develop capabilities for EW against adversaries for non-permanent kills and defence of own assets. Progress is required in cyber warfare to prevent space attacks. Own satellites must now be designed for constellations to ensure continuity under attack and defeat temporary loss of a few satellites. Emerging technologies offer great scope for developing new capabilities that are more resilient and robust and even self-generating, additive manufacturing and advanced materials are some examples. For India, it is extremely important to match China if not be ahead, time is not too far when Chinese assets will be available to Pakistan for the asking or use by China to perform tasks required by Pakistan, including offensive actions against India's space assets.

Notes

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3. Thomas Fingar and Fan Jishe, "Ties that Bind: Strategic Stability in the US-China Relationship," *The Washington Quarterly*, vol. 36, no. 4, Fall 2013, pp. 125-138.
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15. (DIPLOMAT, China Conducted Anti-Satellite Missile Test, ZACHARY KECK, 29 JUL 2014].
16. (US Air Force's X-37B space plane reaches 600 days in orbit - and its mission STILL remains a mystery, Daily Mail, UK, 10 Jan 2017).
17. Finch, n. 9)