EMERGING SPACE WEAPONS PROBABILITY AND INDIAN QUEST FOR GREAT POWER STATUS: IMPLICATIONS FOR SOUTH ASIAN DETERRENCE STABILITY

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Abstract

Debate about inevitability of space is getting weaponized and a focal issue. Introduction of 3rd and 4th generation of warfare concepts have blurred the conventional warfare a bit further. Destruction associated with lethal weapons on earth have made the great powers' policy makers to think differently and find out the means to enhance their strategic ends by exploiting the technological edge they have over rest. Outer space weapons are expected to be the mean for seeking and maintaining great power status and maintaining it too. The US President; Trump has already shown his willingness to exploit outer space as a domain to ensure safety and security of the US mainland. The US approach under Trump Administration has rung the bells among the US strategic competitors like, Russia and China who view the development against the normative status of outer space i.e. common heritage. Similarly, in the South Asian context, India has been looking for its great power status since its inception in 1947. India, under the leadership of nationalist government, has shown its resolve to exploit its outer space edge in the South Asian region to meet its long awaited end of becoming a great power. However, it is, easier to than to do, Indian major power status through use of space control would be counter-productive for its neighbor – Pakistan, who feels existential threat from it. Thus introduction of space weapons in South Asian security calculus would negatively impact upon strategic and deterrence stability of the region.

Keywords: Space Weapons, Space Control, Ballistic Missile Defence (BMD), Anti-Satellite (ASAT) Weapons, Strategic and Deterrence Stability, Destructive and Non-Destructive Counter Space Capabilities, Strategic Defense Initiative (SDI).

Introduction

Future wars would be the wars of technologies.[1] More a state is technologically advanced more would be its chances of survival in anarchic international political system. Techno-nationalism, a term coined in post-Cold War era, projects that the technological/technical advancement will supersede the military to win the major power status in the international system. Geo-technological advantages vis-à-vis geo-

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political competition's comparative advantages are being debated in favor of technology.[2]

Albeit, the debate about space weapons has been on the lower side of actuality graph, yet it was never out of vision. The US under Trump administration has yet again revived the debate about having space based weapons as it was once initiated by the Regan administration under its Strategic Defense Initiative (SDI) of 1983. The SDI had vision of war on the concept of star wars. SDI manifested that the one who controls the space controls the earth.[3] However, SDI could not be materialized due to huge exchequer involved in its operationalization, besides, it increased stakes in outer space. The US policy makers feared that placement of weapons in outer space could give an incentive to others such as China and Russia to opt for tit-for-tat options. The US having maximum numbers of outer based assets could not afford to let others a free hand for developing counter outer space capability.

Global political power order is being transformed. The US, had gained the sole super power status at the end of Cold War, is being challenged by the rising Russia and China. The US itself has to be blamed for the decline, which overstretched itself throughout the world and launched many campaigns since 1989 onward. Gulf Wars, Global War on Terror (GWOT), Operation Iraqi Freedom and increased collaborative activities in South China Sea have drained the US economically. However, the US has apparently learnt from its strategic mistakes. The US 2017 Afghanistan Policy indicates the transformation in US policies towards Pakistan vis-à-vis India. India has been granted more active role in regional affairs as compared to Pakistan which is almost treated as an enemy.[4] Apparently, the US has relegated the option of launching wars in favor of buck-passing and off-shore balancing.

In order to maintain its global power stature, the US has best choice in form of India to take baton of checkmating Chinese rising power. Consequently, India has discriminately been provided with all possible opportunities to modernize its armed forces including access to the dual use technologies through membership of export control regimes. The US and its allies are also providing support to India at multiple diplomatic and political fora for raising its stature. In this context, space weapons (ASAT) and BMD technologies are two important means that could provide India an opportunity to exert itself in winning its highly desired status of a being great power.

Notwithstanding the above, the realists' desire component intersects with how the Indian state identity is being constructed. In other words, though competition at the international level. Certain elements of India's power might have been encouraging the country to pursue great power status, which somehow or the other is a matter of its identity, i.e. matter of understanding of "self" and "other", through interpreting its past by using the obsessed lenses of "chosen glories" and "chosen traumas". However, the subject angle of analysis is not going to be elaborated being beyond the scope of research.

The paper is an attempt to explore answers to the queries, first, how the IR theories view military modernization as a tool for seeking great power status, second, is

the probability of space getting weaponized has increased or still it is a distant mission among the space faring nations third, why India likes to have space weapons; and how it could impact on South Asian strategic and deterrence stability, and finally the way forward to mitigate the threat emanating from Indian efforts to have space dominance in South Asian context.

IR Theoretical Perspective of Military Modernization to Become a Great Power

The contemporary international political system is anarchical in nature where state on the basis of resource distribution, are questing hard to win the status of major/ great power in the hierarchy of international power structure. The anarchy prone international political system thus pushes states to invest exponentially in modernization of its military industrial complex. Armed forces modernization is directly proportional to the survival rate in the system besides leverage in decision making process in global affairs. However, the out of this proportion armed forces modernization has paradoxes attached to it. In fact, military might provide tangible advantages to its possessor, yet it creates a kind of security dilemma puzzle as for as bilateral or multi-lateral inter-state relationships are concerned. India is no different, which with immense power potential is aspiring for becoming great power.

Although there are multiple criteria for achieving great power status; inter-alia, diplomatic strength, strong economy, established democracy, and the most important one is the military might. Military or hard power is purely realist paradigm centric. To be more précised, realist proponents profess that in the contemporary realpolitik domain, states pursue their national interests through effective exploitation of power politics.[5] Realists also view the hard power as an important and dynamic variable to access the states' behaviors.[6] Zero-sum competition remains the hall mark of power gaining exercise in the form of conventional and unconventional weapons development i.e. a capability attained by one actor is completely denied to its competitor for exploitation through monopolization.[7]

Sequentially in order to survive, weaker states commit themselves into acts of Balance of Power (BoP). As per Headley Bull, BoP is nothing but 'a state of affair, where no one power is dominant and can lay down laws for other'.[8] Besides, the BoP approach, there is yet another approach which is termed as Balance of Terror (BoT) approach within the realist paradigm that speaks about quantitative and qualitative balancing between the nuclear powers in terms of nuclear warheads and delivery means on their inventories. BoT depends on deterrence.[9] As per the deterrence theory, as argued by Zagare, it is the use of a threat (explicit or not) by one party in an attempt to convince another party to maintain the status quo - is a general phenomenon that is not limited to any particular time or space.[10]

While looking pondering over the realist paradigm, arguments given by John. J. Mearsheimer in his book *'The Tragedy of Great Power Politics'*, explicitly reflects the study's basic idea about Indian quest for becoming a great power through modernizing its armed forces.[11] Mearsheimer argues that becoming a great power, regional hegemony

is the best suited route by modernizing its military industrial complex through Revolution in Military Affairs (RMA).[12] Any new technology that directly impinges upon BoP between the two rivals is taken as exponentially destabilizing.[13]

In the above context, India is striving hard for its global status through building its military might. The same is evident from a recent report published by the SIPRI that indicates India being the largest arms importing country from 2011-15.[14] Indian space program is matured and is on course of using it for increasing its global reach. Outer space is expected to be the great powers' strategic competition turf. In technologically advanced era, outer space is likely to be exploited for balancing or outbalancing the equation of deterrence and stability. Ballistic missile defense and Anti-Satellite (ASAT) weapons could thus be used as technological means for having regional hegemony. Both kinds of weapons demand 'space control'[15] i.e. liberty of action without any considerable challenge in outer space.

However, it is not that simple. Pakistan in the South Asian security calculus is maintaining a *full spectrum India centric deterrence*. Any unbalancing act might put into play the normative action-reaction syndrome influenced by the reification (image building) of the strategic environment, thus could severely impact upon already fragile South Asian strategic stability. Realists also warn in this perspective that prescription for protracted peace is glued to sovereign autonomy by deterring adversary through 'military preparedness' and alliances' formations. Indian growing strategic relationship with the US and its other allies has already tilted Pakistan towards Asian powers including China and Russia. Any asymmetry borne discriminatory acts could pitch the great powers against each other in pursuit of their vested interests which put South Asian stability at exponential risk of instability.

Political Debate Increasing Probability of Space Weaponization

Debate about securitizing outer space dates back to 1957, when the Soviet Union launched first ever satellite Sputnik in outer space. The US did not take long to launch its own satellite to show its technology muscles and thereafter the race for gaining and strengthening control of outer space was initiated, being followed till to-date. For the last sixty years, the outer space applications have increased exponentially and domestically day to day life has extensively been made dependent on it. Whether it is communication, banking, traveling, disaster warning or weather update, everything is space applications dependent. However, like any other technology, the outer space applications have dual use and could alternatively be used in supporting military operations. For instance, outer space was used pivotally by US and allied forces during the Gulf and Iraqi wars besides the GWOT.

It is widely believed that the outer space was militarized right from day one of its inception; however, it has yet to be titled as weaponized. For instance, the remote sensing satellites which are primarily to be used for the purpose of remote sensing the impending disasters or locate minerals and other natural resources under the earth surface; could alternatively be used as spying satellites to monitor the adversary's movements and disposition of its troops and logistics. In South Asian stability context,

India recently culminated a military exercise along Pakistani border in Rajasthan where Indian offensive formations validated their plans of striking Pakistan under nuclear, chemical and biological environment duly assisted by the real time battle field situational awareness by using their outer space based surveillance satellites.[16] Similarly, the navigation satellites that guide the commercial aircraft could also alternatively be used for guiding long range ballistic missile etc. to their intended targets with an efficient error free accuracy.

Although, renowned arms control experts including Michael Krepon do not buy the idea that outer space would ever be physically weaponized due to multiple unaffordable political, economic and technological repercussions, yet there are indicators in prevalent anarchic international political system which do point towards option of physically weaponizing the outer space is not completely dead and is still breathing.

In a published 'US 2018 National Defense Strategy', titled, "Sharpening the American Military's Competitive Edge", where it was declared that the US has to prepare itself to help retaining outer space dominance by following the indicators that Russia and China are close to challenge American autonomy in outer space. Following the strategy paper, the US Secretary of Defense Jim Mattis also indicated the preparations for conducting a space war over space-crafts as the US can't fight and win a war of tomorrow with yesterday's old technology weapons. He also said that for the US, outer space is just like any other domain of war like land, air and sea. While warning the rival countries in outer space capabilities, Jim Mattis said, "Don't try it.....In space we [US] will do our best to deter". Mattis; however, clarified that it does not mean that guns would be shooting in space but the war for outer space control would be fought on the Earth instead of outer space.[17]

Besides, in 2018 US Intelligence Report prepared by the US Director of Intelligence revealed that the Russians and Chinese militaries are all set to use destructive (ASAT) and non-destructive (lasers etc.) weapons in any next potential war against US to "reduce US and allied military effectiveness [and] to offset any perceived US military advantage derived from military, civil, or commercial space systems."[18]

On the other hand, Russian space program has mostly remained shrouded under ambiguity canvas. Russia is resurging at global power stage after its dismemberment in 1989. Its outer space program has again paced up under dynamic leadership of President Putin. The US withdrawal from the ABM Treaty in 2002 was the main catalyst behind Russian development of its own BMD systems as well as space denial technologies.

Although Russian Federation does not accept it, yet US military command believes that Russian Federation has developed Japanese famed *Kamikaze* kinds of satellites (Kosmos 2499) which are covertly orbiting in the Earth Orbits as sleeping satellites which would be used on suicidal missions against important satellites of the US during crises.[19]

Russian President Putin during his one of the 2012 address in special meeting on the state weapon program reminded space and other weapons' designers that sufficient funds have been allocated for the State Armament Program till 2020 to develop state of the art weapon systems and stressed:

> *".....to keep the weapons constantly ready and to consider the potential enemy's plans for development of offensive weapons... We [Russian Federation] are not going to enter the arms race, but no one should have any doubts in the reliability and effectiveness of our nuclear potential, as well as the means of air and space defense."*[20]

The assertions made by the Russian President considerably cement the fact that space weapons are being developed if not space based at-least terrestrial based surely.

On the Chinese part, despite being subjected to technological restraints with regard to space technology, it is pursuing its outer space program by following 'buy, copy, or steal' approach in order to seek a continued role at global helm of affairs.[21] China's space program is not differentiated as civil or military facilities and hence is strategic in nature since its inception.[22] Chinese space control capabilities are diverse in nature i.e. both destructive and non-destructive. It is being maintained and controlled by the Peoples Liberation Army (PLA) which is reified by its peer competitors as purely military oriented space program.[23] Chinese test of its ASAT test in 2007 against its of the non-functioning satellites substantiates Chinese ASAT capabilities.

With regard to Indian space program, it is apparently peaceful in nature; however, there have been certain numbers of indicators that its space weapons program is still in latent stage.[24] India has also yet to declare its formal 'Space Policy Document'.[25] It feels that ambiguity serves the purpose more as compared to a declared policy. However, there have been a number of official statements from persons at helm of affairs in space arena which indicate that outer space weapons are being developed. For instance, VK Saraswat, Scientific Advisor to the Indian Defense Minister, stated in 2010 that if the Indian Government desires the DRDO can produce desired capability of fighting space war.[26] Later in April 2012, when India tested its Agni-V test, VK Saraswat had again asserted that India has developed ASAT capability – an offensive terrestrial based ASAT.[27] Indian capacities of developing space launch vehicles (SLVs), Inter-Continental Ballistic Missiles (ICBMs) and BMD systems could alternatively be used as ASAT weapon systems.

In December 2017, Pakistan's National Command Authority resolved to pursue its space vision 2047 objectives. Although details of the subject space vision has yet to be made public, it could be inferred that it includes plans of developing considerable numbers of satellites for remote sensing, navigation, weather warnings and communications. Pakistan's Space Vision- 2047 vis-à-vis Indian matured space program has an element of subjugation and supremacy from India. Although Pakistan does not have any plan to develop ASAT weapons being too nascent program, yet India would

likely take all measures to deter Pakistan from fiddling with its space assets on solo basis or in cooperation with China.[28]

From above debate, it could be inferred that although there is no apparent visibility of space getting physically weaponized; however, terrestrial based offensive space capabilities do exist and are being improved for deterring, if not fighting, a space war. Guards can't be lowered and states would do all possible deterrent based efforts to mitigate infringement with their outer space based assets.

Legal Debate –Increasing Probability of Space Weaponization

There is not a single piece of legal paper that prohibits an orbital [space] war.[29] There are loop holes even within the text of mother space treaty i.e. Outer Space Treaty (OST) of 1967. For instance, the OST does not explicitly cover the definition of space weapon and terms like 'peaceful purposes' etc. Ambiguity of term 'peaceful purposes' gave leverage to the advanced space faring nations to develop space weapons to deter the aggressor for maintaining peace in the outer space.[30]

To prevent weapons in the outer space, treaties like Prevention of Placement of Weapons in Outer Space (PPWT) and Prevention of Arms Race in Outer Space (PAROS) have been blocked by the US at the Conference on Disarmament (CD) as it apparently desires to keep the initiative of developing space weapons whenever needed.[31] In order to compensate for the legal valued treaties, there are informal initiatives and codes to set the norms for outer space activities. For instance, European Union's International Code of Conduct (ICoC) and McGill Center for Research on Air and Space Law's project of developing 'Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS)' with a purpose of:

> *"….objectively articulating and clarifying existing international law applicable to military uses of outer space, including the conduct of hostilities in outer space and military activities in periods of tension."*[32]

The US on the other hand, states that Russia and China promote and are champion of 'no first placement of weapons in outer space' and the champion of treaties like PAROS or PPWT do not cover all kinds of weapons which could be placed in outer space, thus they seek to have leverage in developing those weapons while hedging behind their public positions of keeping space as a heritage. For instance, the proposed treaties do not specify those silent docking satellites which apparently have the missions like re-fueling, inspections or repairs and could alternatively be docked against enemy satellites and then put them in self-destructive mode for destroying the victim satellite of the opponent.[33]

The legalistic debate over space weaponization reveals that the major space faring nations do not have an appetite for the legal valued space related treaties but the non-binding and non-legal valued initiatives like the ICoC etc. They want to keep the initiative in their own hand as the space technology; strategic interests and the threat are dynamic and remain evolving.

Global Technology Control Cartels and their Role in Curbing Space Technology Proliferation Trends

Technology is uncontrollable and is meant to flourish being dynamic. Continued Research and Development (R&D) projects have introduced new weapons suiting the interests of their beholders. The Russian initiative of launching first ever satellite *Sputnik* in 1957, did not let the space technology restricted to the Soviet scientists only, but soon it was spread like a fragrance. Technology has no bounds and doesn't care for a particular creed. Based on the assumption and proliferation trend of technologies especially the dual use technologies i.e. those could contribute towards development of Weapons of Mass Destruction (WMDs), world's technologically advanced countries formed technology control cartels to prohibit these technologies from falling into the wrong hands. Nuclear Suppliers Group (NSG), Missile Technology Control Regime (MTCR), Australia Group (AG) and Wassenaar Group (WA) are the export control cartels meant to exercise stringent controls over the technology transfers related to nuclear, missiles, chem-bio and conventional weapons respectively.

All export control cartels have their own specific control lists which are supposed to be strictly adhered before transferring dual use technologies to a recipient state. The receiving state has to abide by certain rules and regulations including end user certificate, non-transfer of the said technology i.e. proliferation in terms of vertical and horizontal proliferation and most importantly, the verification mechanism as an assurance for supplier to check the judicious use of the transferred technology as per the end user certification.

Entry into these cartels, which have varying numbers of participating or member states, demand a merit based qualification. Any aspiring member state for any of the export control cartel has to have the expertise in related technology, clear proliferation record, commitment to adhere to the respective export control regime's guidelines and strong will to contribute global non-proliferation efforts. The four export control regimes have noble causes, which are committed to control the proliferation of specific lethal and dual use technologies. The cartels performed well and were able to control the proliferation of destructive technologies. The success story could be substantiated by the fact that the US President Kennedy who predicted that by mid 1970s. The world would have 15-20 nuclear weapons states,[34] could not materialize due to strong export control checks by the cartels. However, over a period of time the said cartels have been subjected to the political, diplomatic and economic pressures, thus alleged for being discriminatory in nature. For instance, discriminatory granting of memberships to India is a case in point.

An Analytical Discourse of Indian Quest for Enhanced Global Power Status and Implications

As admitted by an Indian former foreign secretary Lalit Mansingh, India becomes the right choice for US to check mate China in changed global political power framework.[35] India, which is the world's largest populous democracy, the second most populated country, the largest country in South Asia, area wise seventh largest state of

the world and almost the fastest growing economy having around 8% Growth Rate, became logical US choice for the purpose of off shore balancing and buck-passing. India being a revisionist state has been gained of status conscious state. The change of heart by the US who once graded Pakistan as the major non-NATO ally in GWOT relegated it in favor of India for its vested interests. India played its cards well and opted to side with US for meeting its ultimate end of becoming a great power. An analytical discourse of the prevalent strategic environment in which India is being supported un-proportionally by US, has considerable benefits for India however with strings. Benefits which India has acquired from US are stipulated below:

- India found a strong ally in shape of US against an aggression from China. Although, Russia was the long term India's friend; however, Russian and Chinese common ground of communism orientation did not merit it ahead vis-à-vis the US in the eyes of Indian policy makers.
- Indian military industrial complex was strengthened by having western sophisticated technologies instead of crude Russian technologies. It may also be recalled that the Indian military modernization especially the Indian Air Force was already on cards having obsolete aircrafts. With change in hearts the Indian military would have an opportunity to induct advanced western technology and equipment.
- Indian entry into the export control cartels have been smoothened and is being smoothened. Out of four, India has the full membership of three export control cartels with the US support i.e. MTCR (June 2016),[36] AG (January 2018)[37] and WA (February 2018)[38]. Politically, by getting into the export control cartels, India has almost gained status of *De-facto* nuclear weapons state without any obligation of NPT restrictions in legal terms. Membership of MTCR and WA has given India a technological edge over its competitors. MTCR membership would prove to be a catalyst in further maturing Indian space program, thereby, flexing its muscles for exercising space control.
- Recently, Indian Space Research Organisation (ISRO) head revealed that ISRO is indigenously developing state of the art propulsion systems including electric, hybrid, cryogenic and nuclear power propulsion system at one of its subsidiary facility 'Liquid Propulsion Systems Centre (LPSC)' for the space launches. [39] Development of said propulsion systems for SLVs could alternatively be used for perfecting its long range missile program including the BMD and ASAT initiatives, which could be destabilizing for the region. Hence, discriminatory assured technology accesses to India of dual use technologies through MTCR forum is alarming for peace in the region.
- India by developing state of the art BMD systems might pull or drag Pakistan into an action-reaction syndrome scenario, which is like creating a bloodletting kind of situation for Pakistan. If Pakistan, opts for tit-for-tat response, it will get involved in building more number of weapons including its own BMD system, it subsequently will be putting a drain on already struggling economy. A weaker or dependent Pakistan suits Indian ambition of becoming the regional hegemon.

- Indian economy is getting further flourished by Foreign Direct Investment (FDI) as almost all the major powers want to invest in India in various socio, economic and strategic projects so as to have a much bigger share of Indian rising economy pie.
- Finally, all these steps are acting as stepping stones towards Indian getting permanent seat in United Nations Security Council (UNSC). A permanent seat in UNSC coupled with a status of de-jure nuclear weapons state mean rising of India to the status of great power.

Although, India would have many of the above narrated advantages in future, however, an analytical discourse reveals that these advantages to India carry destabilizing strings attached to them for peace of the region:

- Indian entry into export control cartels especially in the NSG would be a political blow to the global non-proliferation regime. It may be recalled that the NSG was formed after the Indian test of its first nuclear device back in 1974 titled, 'Peaceful Nuclear Explosion (PNE)'. International community in general and nuclear weapons aspirant states in particular, would thus get a wrong message of proliferating first and then coercing international community for seeking anticipated power stature. Moreover, the US also set a wrong precedence in the backdrop of Indian 1998 nuclear tests when instead of maintaining sanctions on India, the US President Clinton started rapprochement with it, being a rising economy. The same approach was later carried forward by the Bush Junior and finally culminated into Indo-US nuclear deal of 2008 thereby reversing three decades long sanctions against India.[40] Evidently, India has adopted the same approach in building of its image to get an access to the advanced space technology. It first matured its space program despite ISRO was put to sanctions after PNE in 1974[41] (smells diversion of dual use technologies).
- Deterrence stability in South Asian region would be put to test, in case of *one,* Indian acquisitioning of BMD technology indigenously or through international cooperation and *secondly*, if India opts for seeking viable outer space weapons.
- Sequentially, Indian quest for BMD which has a direct nexus with the Anti-Satellite (ASAT) weapons [42] could exponentially increase probability of initiation of an unprecedented arms race in outer space.
- India, with great power status could further harden its dismissive attitude towards Pakistan, which subsequently is reducing the chances of peace substantially in the region.
- Indian rise to the status of great power would put Pakistan under perpetual existential threat. Pakistan is not an ordinary state but equipped with nuclear weapons. When put to scenario of existential threat by its neighboring *great power* India, it might feel that threshold has been crossed for which it developed nuclear weapons. Use of nuclear weapons whether at tactical or strategic levels i.e. used against counter-force or counter-value targets, would

be catastrophic not only for the region but beyond. Thus, a known element associated with the South Asia i.e. *nuclear flash point* might get activated.

- Last but not the least; the South Asian regional security complex could become volatile. Although, China and the US are not part of the South Asian region; however, the clash of interests in the region of the two super powers might shape-up environment for initiation of World War III.[43] The World War III, in case initiated, wouldn't be a simple conventional war, but it will be a nuclear war to the limit of using thermo-nuclear weapons.

Way Forward

Development of outer space weapons is alarming and has to be addressed at all tiers. Space weapons, if used, could initiate a dangerous war involving even nuclear weapons. Attribution is also difficult in space, hence a chance of misperception has a higher acceptancy. Moreover, resultant debris in outer space due to destruction of space crafts including satellites would be detrimental to life on Earth. Hence, a viable way forward is necessary at international community as well as Pakistan policy levels so that it mitigates the chances of a space war.

Responsibilities of International Community

- **Granting Technology Controls' Membership to Pakistan:** International community has to be impartial with regard to granting access to the dual use technologies. Pakistan being a responsible nuclear weapons state has to be given same status as that of India. South Asian strategic and deterrence stabilities rest on removal of asymmetries and a potent BoP. Being a sovereign state with firm technology base, Pakistan would attempt all measures to defeat the asymmetric scenarios including counter space capabilities. It is better to keep Pakistan in main stream and criteria based approach be practiced with its dual use technologies' requirements as the responsibility and authority are directly proportional to each other.
- **Preventing India from Developing Counter Deterrence Weapons:** International community should play their role in restraining India from developing destabilizing weapon systems including BMD and ASAT weapon systems. The two technologies have been mastered by ISRO after getting an access to the dual use space technologies through MTCR membership.
- **Expedite Negotiating Legal Space Arms Control Treaty:** From arms control perspective, there is a need to initiate negotiation on PAROS treaty. The treaty may include exhaustive definition of space weapons besides other terminologies which have previously been exploited by the advanced space faring nations to extend their zone of military influence to outer space. However, while negotiating, there shouldn't be any discrimination with regard to space 'haves' and 'have-nots', thereby obstructing the nascent space faring nations from acquiring space technology.

Pakistan's Deterrence Based Response Options

Pakistan being at the losing end due to Indian development of counter deterrence weapons including BMD and ASAT weapons has to have viable responsive measures, in case, international community fails to restrain India from destabilizing the stability of the region. A few of the immediate response options to balance the unbalanced deterrence and power equations are as under:

- **Seek International Cooperation in Meeting Space Objectives:** Pakistan may seek international cooperation in seeking its space objectives vide its space vision 2047, besides entering into defense cooperation with regard to defend its space assets. The cooperation may include building destructive and non-destructive counter-space capabilities for maintaining 'full spectrum outer space deterrence'. Destructive space capabilities may not go well with space sensitive experts who are worried about debris; however, non-destructive counter-space capabilities like lasers may be tested for outer space deterrence credibility. Destructive counter-space capability may be simulated for desired results.
- **Development of Micro Satellites/Achieve Redundancy:** Pakistan may make an effort to develop low cost smaller satellites for redundancy. In case its outer space assets (being developed under space vision 2047) are targeted. In technical terms, it is achieving status of 'responsive space'. Responsive space, in simpler terms means replacing a destroyed or out of action satellite with reserve satellites. Easier said than done, it is an expensive option for Pakistan.
- **Development of Hypersonic Missiles:** Hypersonic missiles fly with tremendous speed which is difficult for a normal BMD missile to follow or catch up. Pakistan has an advanced ballistic missile program and over a period of time has demonstrated its capacities to develop advanced versions of ballistic missiles whenever needed to maintain the strategic and deterrence stabilities. For instance, Pakistan had tested its MIRVed ballistic missile '*Ababeel*' for balancing Indian destabilizing act of developing BMD systems against Pakistani ballistic missiles. Along the same pattern, Pakistan could aim for developing hypersonic or glide missiles to avert Indian BMD engagement.[44] Although, it is just hypothetical assertion amid Pakistan's strong commitment towards missiles' non-proliferation, yet, once survivability is put to stakes, states have to acquire whatever counter-measures to bring back the stability. In a recent address by the US under-secretary of defense Michael Griffin at Washington based think tank 'Hudson Institute' showed his concern about hypersonic missiles' detection from outer space and revealed that even the US is not sure of countering Russian or Chinese hypersonic missiles by its matured BMD infrastructure.[45]

Conclusion

Outer space weaponization is yet to be actualized. However, advanced space faring nations have developed their respective destructive and non-destructive technologies to deter an attack on their outer space based assets. Indian space program

is in matured state while Pakistan space program has yet to take off in true sense. Indian perusal of space dominance is natural but would be challenging for the Pakistan's space vision 2047. Pakistan has to be vigilant and exercise all possible options from cooperation to self-sufficiency for addressing the potential space coercive efforts by the Indian side.

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