Centre for Air Power Studies

Rapporteur's Report

2nd Annual Space Security Dialogue

Leveraging Space for National Security

(Organized by Centre for Air Power Studies on 12th May, 2023 at Conference Hall, Air Force Auditorium Subroto Park, New Delhi)

Centre for Air Power Studies (CAPS) organized the **2nd Annual Space Security Dialogue** on **"Leveraging Space for National Security."** The seminar featured distinguished speakers including serving and retired armed forces members, industry experts, stakeholders and scholars dealing with space and national security. In a day of proceedings, the conference participants deliberated on various aspects of space security, which has been advancing rapidly due to technological developments in air and space. The discussions also underlined the importance of occupying a place in space for countries. The competition and the race not so old to space has made space a more congested and contested domain. There are increasing threats to the national security, which has drawn attention to the military readiness in both defensive and offensive space security operations.

The seminar was inaugurated by the **Vice Chief of the Air Staff, IAF, Air Marshal AP Singh PVSM AVSM**. The opening remarks were given by **Air Marshal Anil Chopra PVSM AVSM VM VSM (Retd), Director General, CAPS,** followed by three sessions: 'Defence In and Through Space', 'Challenges in the Space Domain', 'Challenges to Earth Observation'. These sessions were further divided into sub-sessions explained by various speakers.

In his welcome remarks, **Air Marshal Anil Chopra**, emphasized the importance of aerospace power and mentioned that "One who controls Aerospace, controls land". He mentioned about different centres established in India at many places, for instance, ISRO established open space technology incubation centre in many technical universities to boost up Research and Development of space domain for the country. He also mentioned about the Early Warning system initiated by ISRO called Project Netra, in space to detect debris and other hazards to Indian Satellites. He expressed the concerns for India to do more anti-satellite weapon tests, since it has become the 4th nation to conduct successful such tests. He emphasized that there is a need for the Indian military to build its space strategy and doctrinal positions in order to enhance the presence in space. He suggested that along with faster revisits and redundancy, India must conduct more of integrated space warfare exercises.

The inaugural address was given by **Vice Chief of Air Staff, Air Marshal AP Singh PVSM, AVSM**. He began by thanking CAPS for this seminar. He emphasized on the indisputable importance of space and its usage today in navigation systems. He expressed his concerns over space becoming more and more congested since there is lot of competition between many countries to enter space. He stated that India must plan wisely to occupy a strategic

space in space. He expressed that there is a need to address the challenges being faced in terms of security applications of space assets. Since there is a threat to the national security of the country through the medium of space, Air Marshal Singh stated that there is a need to have both defensive and offensive assets available at all times. Additionally, he mentioned that preserving the assets and capabilities would be extremely beneficial for the timely detection and situational awareness. Atmanirbharta, indeed is a main and important pillar of capability building.

The inaugural address was followed by handing over the latest releases (books) by CAPS, to the **Vice Chief of the Air Staff, IAF, Air Marshal AP Singh** by the **Director General, CAPS, Air Marshal Anil Chopra.**

Session I – Defence In and Through Space

The first session was focused on **'Leveraging the potential of space services for armed forces'**. It started with providing the biographical sketches of the speakers by the Chair, **Air Vice Marshal DV Khot AVSM VM, Director General, Defence Space Agency**.

The first speaker of the first session, **Brig. G Manoj, Brig. (SFE), Defence Space Agency** emphasized on the space based services for military looking at various aspects such as Early Warning Systems to attain tactical advantage, Real Transformation and PNT, Critical Support for Logistics and Supply Chain Management, and Satellite based IOT and Messaging. He highlighted the importance on the investments in developments of satellites, Specialized Sensors and Communication systems. He also mentioned about developing new technologies to enhance edge computing and secure communications. He expressed his concerns on the collaborative efforts by government agencies, academia and as well as relevant industries in order to develop military space strategies.

The second speaker, **Col. Navneet Singh, Defence Space Agency**, talked about '**India's Approach to Space Defence and Counter Space Strategies'**. He started with his talk with a truly relevant question – "Can we survive without space?" He mentioned that space has become a more contested, congested and competitive domain than ever before because of different commercial entities and nations exploiting space for their national interests. He emphasized on defensive and offensive counter-space operations. He pointed out that exploiting space by protecting space capabilities from enemy attack or interference represents a defensive counter-space operation and on the other hand, involving anything that precludes an adversary from exploiting space to his advantage represents an offensive counter-space operation. He concluded by mentioning that space infrastructure is being targeted and counter space operations are inescapable requirements to ensure availability of space to conventional forces. Additionally, he pointed out that minimum, credible offensive capacity acts as a deterrence as such.

Air Vice Marshal Rajiva Ranjan VM, ACAS (Ops) Space, Air HQ, was the third speaker of the first session, elaborated on **'Moving towards an Aerospace Force'**. He started by thanking CAPS and the Chair for providing him the platform to express his concerns on the topic. He pointed out that though land and sea are of much importance, air and space together

has projected a greater importance. He highlighted that space though being considered as a domain for peace, is also now a domain for warfighting and power projection. He mentioned that the countries who can control space can control the world. He also highlighted the importance of mastery of air and space to achieve victory and the lack of which makes the victory impossible. He mentioned about the first appearance of the concept of aerospace operation in the Air Force Manual 1-1 (a basic aerospace doctrine published by USAF in 1971). He then laid importance on the recent wars like the Gulf War that had contributed immensely in projecting the significance of the aerospace power. He concluded by highlighting that Air and Space together are a stimulus continuum. He expressed his concerns to the importance of integrating quantum communication emerging and disruptive technologies and machine learning in both air and space domains.

The first session was concluded with a Question and Answer session and indeed was inspiring and intriguing. Some questions revolved around the integration of air and space command to be a single command named as Aerospace Command. While some questions dealt with the future capabilities regarding Satellite Communication systems. The answers provided by the speakers were insightful and justified to large extents. Though there are many questions which still remain unanswered as the Indian space story is still taking momentum. There are major revolutionary decisions that are yet to be considered, looking at how the securitization of space will evolve over time. Time is the key and hopefully provide positive results.

Session II – Challenges in the Space Domain

The second session was focused on the theme **'Challenges in the Space Domain'** chaired by **Dr. Ajay Lele, Consultant, MP-IDSA**. He set the stage by raising a pertinent question Whether the existing legal mechanisms are enough to deal with new threats.

The first speaker of the session was **Gp Capt TH Anand Rao, Senior Fellow, CAPS**. His talk was centered around the **'Indigenous and cooperative approaches to Space Situational Awareness (SSA)'**. The reason for increasing focus on SSA was congestion in space, due to increased traffic which leads to collusion, and thus creates debris. Second reason is, that the detection capability is not in hand with the increase in objects in the space. The whole process involves various steps such as surveillance, tracking, track and catalogue, analyze and inform. He further emphasized that apart from state actors, there are various commercial SSA providers. India's Digantra is one amongst them. He also pointed out some of the important limitations about present SSA. First, there are gaps in surveillance and tracking. For instance, there are more than one million objects between 1-10cm which cannot be detected. Second, with the current level of technology what we know is an opinion formed on the basis of a guess, and not an exact position. Third, lot of automation is needed in information sharing. He concluded his presentation by raising a question whether SSA should be civil or military or both. The civil SSA focuses on an object centric approach while the military SSA has a domain centric approach.

The second speaker was **Dr. Upasana Dasgupta, Assistant Professor, Jindal Global Law School**, and she discussed in detail about **'Legal Challenges with the Emerging Military Space Technologies'.** The talk was initiated by highlighting the fact that every technology has a dual use. She further emphasized on the difference between the sovereignty of airspace and freedom of outer space. Most of the legal challenges occur because there is no proper boundary between airspace and outer space. Various legal mechanisms like Outer Space Treaty, Partial Test Ban Treaty (PTBT), UN Charter and military space applications were also discussed. She concluded by raising a potent question- just the way technology changes, should the legal mechanisms guiding it also change.

The questions raised in the Q & A session were quite thought provoking. The first question was regarding the pushing of large amount of debris to the outer space, despite the availability of the technology. The response to it was the huge cost involved, and the difference in the propulsion system of various satellite which makes it difficult to happen. The second question was about the steps India is taking to secure its objects in the near space, like the recent air balloon incident between U.S. and China. Though the question was quite simulating, but currently India is doing nothing to secure any of the objects in the near space.

Session III – Challenges to Earth Observation

The last session of the Annual Space Security Dialogue was on the **'Challenges to Earth Observation',** chaired by **Rear Admiral MD Suresh AVSM NM (Retd), Director CRSA, NTRO**. He opened the house by raising the biggest challenge to earth observation i.e., how to align with the user's aspiration.

The first speaker of the session was **Gp. Capt. PR Chibber, DIPAC,** who shared his views on **'Earth Observation Requirements for the Armed Forces'**. Earth observation by military includes persistent surveillance employing space based observation systems, strategic and tactical imaging over an area of interest, generate intelligence for informed decision making and planning and execution of military operations. Certain tasks involved in it are payload planning of Indian Defence satellites; acquisition, downloading and processing of imagery data from selected indigenous satellites; analysis of images; dissemination of imagery and IMINT to service HQ's and authorized organizations; procurement of high resolution data from commercial / foreign satellites; and maintaining national repository for defence satellite images. Some of the challenges in this process are interorbital and inter target distance; and limited ground assets which affects the downloading capability. The way ahead involves additional satellites from industry, improved capability of ground segment and additional antennas or earth stations. In order to further reform and improve the data handling and data processing, he emphasized on improved capability of united image indenting and payload planning, and high speed connectivity, and integration of artificial intelligence and machine learning.

The last speaker of the day was **Gp Capt. Arvind Pandey (Retd.), Senior Fellow at CAPS**. He delved on **'Prevailing Challenges in ISR for Targeting and Decision Support**'. He

began his presentation by explaining the meaning of ISR, its enablers which includes intelligence analysts and decision makers. Later he emphasized on the new entrants for ISR which incorporates pseudo satellites (balloon / blimp / airship), very high altitude unmanned aircraft and swarm of micro UAVs. He also covered some of the gaps in present space based ISR like completion of SBS III project is still far away, inability of the government controlled entities to deliver, common operating picture not available for joint operation, and development of complete ISR ecosystem in terms of upstream and downstream not taking place. Some of the emerging enablers includes hyperspectral and IR imaging satellites, use of near space for communication and ISR, availability of common operating picture for decision makers, manned unmanned teaming for ISR, and active use of LEO for communication and ISR.

The last session was again followed by a Q&A round wherein extremely valid points were raised about the data handling and processing. Though artificial intelligence and machine learning are a newly introduced concept in the military and space domain, they hold a very significant role in their overall functioning.

The day-long deliberations and discussions came to an end with the closing remarks delivered by **Air Marshal Anil Chopra (Retd), Director General, CAPS**. Air Marshal Chopra applauded the insightful presentations and presence of all the panelists and then thought-provoking questions by the audience. He thanked all the panelists and participants for their valuable insights and active participation.

Report prepared by – Mr. Vedant Saigal and Ms. Radhey Tambi.