



Centre for Air Power Studies (CAPS)



REPORT ON 10th SUBROTO MUKERJEE SEMINAR

ON

“NATIONAL SECURITY AND AEROSPACE POWER”

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SUBROTO PARK, NEW DELHI





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REPORT ON 10th SUBROTO MUKERJEE SEMINAR ON “NATIONAL SECURITY AND AEROSPACE POWER”

INTRODUCTION

The tenth Subroto Mukerjee Seminar on “**National Security and Aerospace Power**” was held at Air Force Auditorium, Subroto Park, New Delhi from 12-13 November 2013. This is an annual event organised by Centre for Air Power Studies (CAPS), New Delhi, in memory of the late Air Marshal Subroto Mukerjee who was the first Indian Air Chief. The seminar was inaugurated by the Vice Chief of the Air Staff, Air Marshal Arup Raha, PVSM, AVSM, VM, and ADC.

The conduct of the seminar was divided as follows:-

November 12, 2013

- (a) Inaugural Session.
- (b) Security Environment in India’s Neighbourhood.
- (c) Strategic Importance of Air, Space , and Cyberspace.

November 13, 2013

- (a) Technology Advancements in Aerospace Sector.
- (b) Synergising Aerospace Power for National Security.
- (c) Closing Session.





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INAUGURAL SESSION

Welcome Remarks by Director General CAPS

The Director General CAPS, Air Marshal Vinod Patney, SYSM, PVSM, AVSM, VrC (Retd), in his welcome remarks paid tribute to the vision of late Air Commodore Jasjit Singh, Padma Bhushan, AVSM, VrC, VM (Retd), who had started this seminar ten years ago as the founder and first DG of CAPS.



The Director General also congratulated Air Marshal Arup Raha, PVSM, AVSM, VM, ADC, on being designated as the next CAS by the Government of India. He requested the CAS designate, to keep a benign look on CAPS during his tenure as CAS. The Director General said that CAPS' remit is to carry out research on aerospace and national security and to educate junior officers on air power and national security issues. In this activity CAPS has an advantage because it has a relaxed atmosphere while at the same time it maintains the rigour of research discipline. He further said that CAPS also has the advantage of approaching DRDO and other civil agencies for research work.

The Director General informed the audience that CAPS had recently re-organised its website and added a new link called IN FOCUS which covers comments on subjects of topical interest. All these changes in the website had been done by in house expertise. He further said that as a think tank we have two requirements which need to be addressed: the first is infrastructure and the second is funding. The quality of the research staff depends on the availability of these requirements and we must have a HR strategy for retention of our staff. Some of CAPS scholars are of international and national repute and





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some are budding strategic thinkers. In the end he thanked Air HQ for the infra structure they had provided CAPs and hoped this support would continue in the years to come.

Inaugural Address by Air Marshal Arup Raha, PVSM, AVSM, VM, ADC, Vice Chief of the Air Staff

The VCAS in his inaugural address said that national security is not the domain of the armed forces alone. National security includes economic strength, human resources, science and technology, adequate natural resources, cyber security, good governance and capabilities of the armed forces. All this adds up to comprehensive national power (CNP).



He said that India's strategic presence or footprint should provide us the capability to influence the environment from the Suez to Malacca. He felt that it is imperative for the Nation to build capabilities/ assets that provide reach and the desired effect at these ranges. He informed the audience that our defence plans cater to meet these requirements to a large extent.

The VCAS then explained that sub-conventional threat is an immediate challenge to our national security. He gave examples of 9/11, attack on our Parliament and 26/11 and said these emerging war waging trends bring out the importance of tackling sub-conventional threat. Talking about the attacks on Mehran naval base, Minhas Air Base in Pakistan and U.S. bases in Afghanistan, he said that this indicates the vulnerability of high value assets and type of warfare that may unfold in the future.

He said that aerospace power is going to be the primary instrument of military power in any future war. He further stated that neglect of air power can seriously erode a nation's





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military capability. The VCAS further stated that India has no territorial ambitions but we must have offensive capability for a sharp swift war to deter our enemies. He said that it is only air power which has the capability to strike deep inside enemy territory. He further said that while resources will always be limited the budgetary constraints must cater for air power requirements.

The VCAS stated that the lack of adequate indigenous capability is a setback for the growth of our aviation industry. He said core technology in aero-engines, metallurgy, machine tools, testers, avionics and electronic warfare needs to be developed by us. He felt that the private sector must be allowed in the defence sector. He said that the military industries in USA, Europe and Russia are looking for new markets since their own markets are saturated. This is an opportunity for us to develop our aerospace industries. We must capitalise on this opportunity by giving a chance to private players in the defence industries. The new Defence Procurement Policy-13 (DPP-13) encourages private participation in joint ventures with Indian industry under the offset clause.

In the end the VCAS said that in future wars our air power must have the ISR (Intelligence, Surveillance and Reconnaissance) capabilities to enable the IAF to have strategic reach and to carry out precision strikes. Our core competence has to be offensive long range precision strikes. Finally he said that the IAF is committed to serve the nation as was proved during the recent OP RAHAT which provided relief to flood victims in Uttaranchal in June-July 2013.

SESSION - 1 : SECURITY ENVIRONMENT IN INDIA'S NEIGHBOURHOOD

The first session on "Security Environment in India's neighbourhood" was chaired by Air Marshal TM Asthana, PVSM, AVSM, VM (Retd), Distinguished Fellow at CAPS.





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The first speaker Air Vice Marshal M Bahadur, VM, (Retd) spoke on “Regional Security Scan”. He said that India is surrounded by a region in which there is a lot of turbulence, our two neighbours China and Pakistan are both hostile to India. The draw down by US troops from Afghanistan in 2014 will result in increased activity by Al Qaeda terrorists and the fundamentalist organisations like Taliban. This will have its repercussions on India’s national security interests.



He raised the question of what are the extent India’s regional interests. Do our interests extend from West Asia to Myanmar or from Africa to what China calls the second island chain? He left it for the audience to think on this issue. He then explained that the Asian region will be in the lime light in this century due to a number of reasons: Asia houses four of the largest economies in the world, China, Japan, India and USA (USA is included in Asia since it is a global power); this region has many nuclear weapon states; the region has the maximum number of unresolved disputes and post world war-2, most of the long wars have taken place here.

About China he said our problems are related to the border dispute and the trade imbalance in China’s favour is also a cause of worry. He said China is modernising its armed forces to achieve technological asymmetry and this can breed arrogance. Whether China’s rise is going to be a challenge or threat to India will have to be observed in the coming years. As regards Pakistan he said Pakistan’s proxy war against India on Kashmir in collusion with Islamic terrorists, will continue. No change in Pakistan’s hostile attitude to India is possible. The situation with Pakistan is likely to get worse after the American withdrawal of its troops from Afghanistan in 2014. As regards India’s relations with other





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neighbouring countries he said India and Sri Lanka are traditional friends but the Tamil factor can upset the relationship. We need to keep Tamil politics away from our bilateral relations with Sri Lanka lest China and Pakistan step in to undermine our influence. About Myanmar he said we should continue our good relationship with the military junta there to keep China at bay. The Americans have also improved their relations with Myanmar to counter China. Moving onto Bangladesh he said our relations with them depends on the party in power. The Awami party is favourable towards India whereas the others are not. In the end he said that the rise of China poses some strategic uncertainties in terms of whether China will resort to coercion with us or maintain peaceful relations. The American withdrawal from Afghanistan in 2014 may cause instability and China could move in. He also said that the geopolitical equation between America, China and India will also be a factor to be considered for regional stability.

The second speaker Air Vice Marshal AK Tiwari, VSM, (Retd) spoke on “Technological Development: Implications for National Security”. He said that as data sizes and information access increase, the cyber reality is that in spite of all security measures your system will be intruded by advanced persistent threat. To deal with this new reality, he said emphasis must be



placed on creating false and misleading data which is part of the cognitive domain. He said we must develop and use our own cryptography. He also talked of cyber manning model of USA and Israel which laid strong emphasis on induction of youth into cyber security. Further he talked of communication security which should include separating communication between one way broadcast and mutual communication, separating between real-time and other information, planning encryption level as per classification and integrating Radio, TV, Twitter, Facebook, You tube for warnings/information. He also





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elaborated vulnerabilities of UAV communication such as unsecured links, no authentication enabling UAV data to be hijacked or modified. Hence AES Encryption algorithm, authentication must be used and specified frequency spectrum for UAVs must be dedicated.

He further stated vulnerabilities of IPv4 and various means to counter them such as using SNMP version 3, migrating to IPv6, using anti jamming circuit-noise, spot, sweep jamming and spoofing detection. He then talked about GPS security and elaborated various means for the same such as using a mix of satellite navigation systems like GPS, GLONASS, Beidou-2, and also maintain traditional navigation systems like VOR, INS, NDB, mental DR. Once our indigenous GAGAN (GPS Aided Geo Augmented Navigation) and IRNSS (Indian Regional Navigation Satellite System) satellites are operational, their resistance to electronic jamming should be increased. In the end he talked of need for India to develop space security by launching a large number of smaller satellites since their failure rate will be low and it will present more targets to the enemy and small satellites can be launched quickly. He also suggested that we should build multipurpose satellites, develop debris monitoring system and form stronger International alliances to enhance our space security.

The third speaker was Dr Shalini Chawla who spoke on Pakistan's Nuclear Strategy and Missile Capability. She stated that the main aim of Pakistani Nuclear weapons was to neutralize India's conventional superiority and ensure own security. Further she elaborated that Pakistan has deep desire to emerge as a formidable country of the Muslim world and to be visualised as the *leader of the Islamic world*. She also talked about the two main cores of Pakistan's nuclear doctrine- first being Indo Centric and second of Credible Minimum Deterrence evident from Pakistan's inability to cope with India's conventional military capability, primarily due to asymmetry





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with a larger, stronger and better managed India. She said Pakistan believes that being the weaker state it can compensate weakness by taking a bold initiative, preferably with strategic surprise, to attack Indian military capability to reduce adverse margin of capabilities. She also mentioned that Pakistan has often claimed that it would/could use nuclear weapon at the very beginning of the war with India if the Indian military even crossed the international border. Pakistan has also rejected India's proposal for a joint no first-use pledge in the aftermath of the nuclear tests. However in its first use policy and wanting to keep an option open for "Pre-emptive strikes" against India, according to her Pakistan has failed to consider the consequences of the Indian retaliation but has very rationally maintained the posture of Irrationality.

She further stated that Pakistan has an arsenal of about 90-110 nuclear weapons and is also pursuing plutonium-based warheads. Central to that effort is the 40-50 megawatt heavy water Khushab plutonium production reactor. She also mentioned that Pakistan's nuclear delivery systems can be put under three categories: Land-based missiles, Aircraft and Cruise Missiles and various ballistic and cruise missiles from Hatf 3 to Hatf 9. She further elaborated that one can notice that there is a clear correlation between progress in the acquisition of nuclear weapons by Pakistan and the launch of covert war during the last 25 years. The nuclear arsenal has been expanded, so that Pakistan is more capable of "Offensive-Defence". She also mentioned that Pakistan has used the nuclear card successfully with the United States and received enormous financial and military aid in the last twelve years despite deteriorating security situation and accelerating terrorism in the region. She also talked of Pakistani Military relying on the strategy of using terror as an instrument supported by the interpretations of the teachings of holy Quran. She concluded with saying that India's strategy option would be to exploit the strategic space above terrorism but below the nuclear threshold to enable punitive force being applied to change the covert war strategies and policy in Islamabad which would make its nuclear weapons capability unusable without horrendous costs to itself. She also added that India needs to strengthen its resolve against Pakistan and take firm action when needed.





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SESSION – 2 : STRATEGIC IMPORTANCE OF AIR, SPACE AND CYBERSPACE

The second session on “Strategic Importance of Air, Space and Cyberspace” was chaired by Major General Dhruv Katoch, SM, VSM (Retd), Director CLAWS, New Delhi. In his opening remarks he said that for the next ten years there is not likely to be any conventional threat from Pakistan but they are likely to continue their policy of sub conventional threats through terrorism. About China he said

that they are likely to continue their proxy war against India through Pakistan. He said in any future war with China air power is going to play a major role. He further said that China’s strategy against India will be to start with cyber attacks followed by Space dominance operations and then ballistic missile attacks to gain air dominance and their last option will be a land attack. He said that our strategy should be to counter China with our air power and IAF must take the battle into the Tibetan plateau.



The first speaker in this session was Commodore RS Dhankhar, DACID, ISC, HQ IDS, who spoke on “India’s Armed Forces Space Road Map”. He said that in the coming decade weaponisation of space will take place. This is a reality which we have to accept and only political wisdom can stop it. He said that in China the PLA runs the space programme and there is no separation between civil and

military satellites. He explained that even in the American and Russian space programmes the military has a dominant role since space dominance has a direct bearing on national security and it is logical that the military gets the maximum benefit from national space





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assets. On the other hand India's space programme is entirely civilian controlled by ISRO and the military has no say in space affairs. He said this is a serious anomaly and needs to be corrected at the earliest. He further said that our shortcomings in the military use of space were sharply brought to the fore during the Kargil war of 1999, when we did not have critical ISR capabilities to detect and locate Pakistani intrusions. After the war the government set up the Kargil review committee headed by Mr K Subramaniam which recommended deployment of military satellites. As a result of this recommendation today we have three IRS (Indian Remote Sensing) satellites for military use. In addition there are another six civilian IRS satellites in orbit, with resolution ranging from 80cm to 236m. About communication satellites he said we have nine operational satellites of the INSAT/GSAT series out of which only one (GSAT-7) was launched for the defence services. He further said that till date GSAT-7 is India's only dedicated defence satellite launched in August-2013. He also informed the audience that although some transponders from civilian satellites have been given for defence communication needs but this still does not meet the requirement fully. He then explained about India's navigation satellites for providing accurate real time PNT (Position, Navigation and Time) services which includes the GAGAN (GPS Aided GEO-Augmented Navigation) series and the IRNSS (Indian Regional Navigation System) series of satellites. GAGAN payload has already been launched in three geostationary satellites and the system is expected to be operational by 2014. He said the first satellite of IRNSS series, IRNSS-1A has already been installed in July 2013. He explained that these satellites will enhance our long range precision strike capability. Looking ahead into the future he said that India's potential adversaries are getting increasingly assertive and therefore it is incumbent on India to develop military space capabilities for offensive and defensive operations. He said we have to ensure security of our space assets because in any future terrestrial conflict our adversaries can target our orbital satellites and our ground based space assets. About a Joint Space Command he said that it is an absolute must as it will channelize our military efforts in space. In the end he once again emphasised that in the interests of national security India must pursue greater





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military use of space. He also highlighted the importance of space security which is closely linked to terrestrial security.

The next speaker was Wing Commander KK Nair, Joint Director Operations, Space, Air HQ, who spoke on “Militarisation and Weaponisation of Space.” He stated that since time immemorial military planners have placed extra ordinary emphasis on gaining the “high ground” to gain military advantage and space provides the ultimate “high ground”. He said that the concepts for military use of space are not new and are the same as those for air power. He explained that the military perceptions of space missions includes counter space missions; space based force application; space based terrestrial combat support or force enhancement; and space support operations.



Militarisation of space has been going on since the dawn of the space age when the Soviet Union launched the world’s first artificial satellite SPUTNIK-1 in 1957. He informed the audience that the initial utility of space was perceived and designed for military rather than benign civilian use and the first few years following the launch of Sputnik saw a flurry of intense military space activity. He also explained that there is a loop hole in the existing international space law and UN Charter regarding militarisation of space because the UN Charter bans use of nuclear weapons in outer space but does not ban conventional weapons. He said that the reality is that the allure of outer space is too irresistible for militaries across the world but at the same time civilian use of outer space for commercial gain is also increasing at a rapid rate. Thus, both military and civil exploitation of space will continue and every country has to protect its space assets. In 2007 the Chinese launched crude anti satellite space (ASAT) weapon to prove its capabilities. The US and Russia already had ASAT capabilities but in 2008 USA launched a more advanced and precise ASAT weapon to counter the Chinese move. In 2010 USA launched the X-37 common

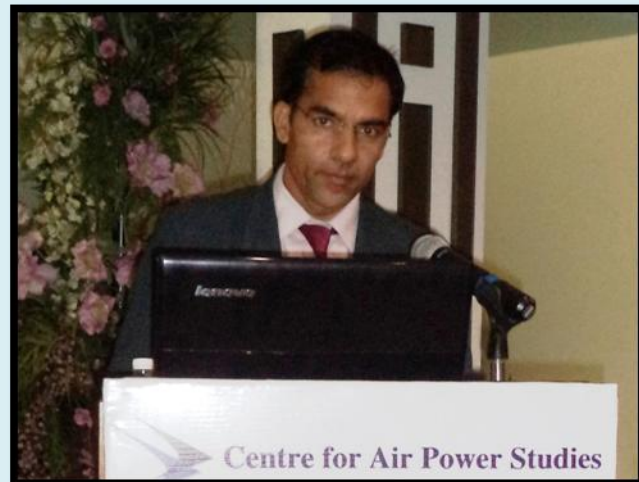




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aerospace vehicle (CAV) which is a reusable robotic space plane. He said the X-37 mission has been kept classified but it is likely to be used for defensive and offensive counter space missions. The Russians and Europeans also have similar CAVs and the Chinese also have a crude space plane called Shenlong. As regards ballistic missile defence (BMD) he said it is a fragile system and can be easily targeted to degrade the entire system. He said the classic BMD umbrella concept continues to be enormously desirable, but whether it is presently or in the near future viable and vital to national defence is questionable, notwithstanding the enticing glossies on the subject. In the end he emphasised that India also needs to have the capability to protect our space assets by having defensive counter space capability. He said that International law does not stop us from protecting our space assets and we must take action now.

The third speaker of this session was Wing Commander MK Sharma, Research Fellow, CAPS, who spoke on “Cyber Security Threats and Countermeasures.” He said that one of the major reasons for the rising vulnerability of cyber networks is the increasing sophistication of hackers with techniques like sweepers, sniffers, stealth diagnostics, and packet forging or what is called Advanced Persistent Threat (APT). He further said that any system, like railways or air defence network, that has a cyber element inside it is vulnerable to hacking and needs cyber security. He then went on to explain about network centric warfare (NCW) and India’s aspirations to be NCW capable. He said that while it is desirable to network every platform right down to the last soldier, as has been reflected in some Western writings, the point is that it will be very costly and India cannot afford such a huge expenditure. He said India should have a canopy of networks with a secure facility for storage of data and we should be able to deliver it to any authorised person at any at any





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time. He explained that the Services project “Network for Spectrum” will provide this capability. He said that this is a Rupees 10,000/- crore project and will provide a dedicated, secure pan India optical fibre network for the Army, Air Force, and Navy. He stated that this will be the world’s largest closed user group (CUG) network with over 60,000 km of optical fibre cable (OFC) connecting 129 Army, 162 Air Force and 33 Navy stations. He said that a military network must have foolproof cyber security because military force is the last instrument of foreign policy available to the government and another reason is that unlike a civil network where cyber security is limited to just being application based, militaries have to maintain end to end security since they are the owner, provider, and operator of the intranet. Militaries have to secure applications, data and the systems. In the end he stated that India has a cyber security policy but does not have a cyber strategy and it is imperative that we must have it in our national interest.

SESSION – 3: TECHNOLOGY ADVANCEMENTS IN AEROSPACE SECTOR

The third session was on “Technology Advancements in Aerospace Sector” and was chaired by Air Marshal Vinod Patney, SYSM,PVSM,AVSM,VrC (Retd).





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The first speaker in this session was Shri PM Soundar Rajan, Outstanding Scientist & Director Defence Avionics Research Establishment, he spoke on “Impact of Artificial Intelligence on Aerospace Power .“ He said that advances in artificial intelligence will enable future military aircraft to have a rather



unique two persons crew – one human and one electronic. He stated that this human-electronic crew team is led by the pilot, with the electronic crew member as a subordinate associate, sharing responsibility, authority and autonomy over many cockpit tasks. He said that as aircraft systems become more complex, the automation that the pilot has to interact with is becoming increasingly intelligent and capable. He said the requirement for useful, intelligent aiding, in a highly dynamic task environment, has led to impressive technical achievements.

The speaker then stated that pilot aiding technology, coupled with adaptive interface controls and displays have the potential of significantly helping pilots efficiently interact with the crew station, while assisting in performing the mission more effectively. Intelligent, cognitively compatible glass cockpit will be the key to making the pilot aided technology a pilot’s friend. He then told the audience that DARE was involved in developing artificial intelligence for the Russia-India Fifth Generation Fighter Aircraft (FGFA) which has stealth technology. He said that we must develop our own customised artificial intelligence (AI) for this aircraft because the Russian artificial intelligence will be as per their doctrine which may not suit us.

He then explained that future research in AI involves development of autonomous unmanned combat aerial vehicles (UCAV) with automatic target recognition (ATR) algorithms. In conclusion he said that AI enables “first detect-first launch” capability. He felt





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that AI designers and IAF operational crew must work together and collate data from war fighting experience/ tactics to enable R&D in AI Expert System design and development (D&D). He also said that we must build a simulator facility to develop and evaluate AI systems for avionics and airborne testing / evaluation could be done on indigenously upgraded aircraft.

In the end the Chairman added that in any artificial intelligence system, a pilot override facility must always be present.

The next speaker was Air Vice Marshal Arjun Subramaniam who spoke on "Air Power Against Non State Actors". He said that the Indian Air Force has been vigorously articulating full spectrum air operations, which means that it has to have air power solutions for the entire spectrum of



conflict and not just for conventional warfare. He said that while a two front conventional conflict is of concern to India, the nation has to be equally worried about the impunity with which non state actors are confronting the Indian state. He said that non state actors pose the gravest threat to our security and the state must employ all the tools it has at its disposal to combat this adversary before the situation gets out of hand. He divided non state actors, in our context, in three categories - the first was the proxy war being waged against India by Pakistan's jihadis which has elements of their Army ISI (Inter Services Intelligence), the terrorists of Lashkar-e-Taiba and the Hizbul Mujahideen of J&K and POK (Pakistan Occupied Kashmir); the second are the Left Wing extremists/Maoist in India; and the third are the insurgents in the North East of India.





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The Pakistani terrorists infiltrate into India in groups of 20-30 men and head towards their arms cache area and then disperse to carry out their terrorist activities. We need to know their training area and line of infiltration. If air power is to be used against them we need to have specific fused intelligence information on them. At present such information is not available. This proxy war threat is going to escalate after the ISAF withdrawal from Afghanistan in 2014. He said that at present our policy is not to use offensive air power inside our own territory but he raised the question that if attrition increases then do we change our policy or not.

The other type of non state actors he said are the left wing extremists / Maoists who operate in Chhatisgarh, Orissa and adjacent states and the insurgents in north eastern states of India. About the left wing extremists he said the IAF has been involved in operations against them since 2008 but only for non kinetic roles like casualty evacuation, surveillance and air mobility. He further said that there has been an increase in the number of paramilitary deployed there but there has been no increase in the number of extremists eliminated. Probably the extremists are waiting to escalate the violence. He said there is also the possibility of the left wing extremists being infiltrated by the jihadis with the lure of money. To counter such a situation he said we must be flexible and If the violence escalates then we must review our policy and consider use of IAF fire power. About insurgents in the north east India he said the situation was under control and returning to normalcy.

He then gave some historical examples from contemporary conflict on how effective air power has been against non state actors. The first example he gave was of 1965 when a few months before the Indo-Pak conflict of September 1965, Pakistan had infiltrated Mujahids inside J&K. In a bold display of firm leadership the then Army Commander, Western Command, Lt Gen Harbaksh Singh ordered the Mi-4 helicopters to be modified to carry bombs and guns and used them very effectively against the Mujahids. In another case in Mizoram in 1966, the insurgents had surrounded the Treasury in Aizawl and were threatening to take it over. Lt Gen Sam Manekshaw attacked the insurgents from the air by





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using Mi-4 helicopters with Hunters as escorts. The insurgents were over powered and the treasury was saved. The speaker then gave the example of use of air power against the LTTE in Sri Lanka. He said that in the first phase when the IPKF was deployed, air power was not effective due to lack of intelligence and the Jaffna operation with attack helicopters was a failure. In the final phase of the operation the Sri Lankan air force used fighter ground attack aircraft to hit the centre of gravity of the LTTE which was the leadership and the sea tigers. The Sri Lankan air force was very effective in keeping the leadership constantly on the run and in destroying LTTE ships in the lagoons. This ultimately led to the victory of the Sri Lankan forces and the LTTE was destroyed.

He then talked about the competencies and capabilities required by the air force for such operations and listed them as intelligence, surveillance and reconnaissance (ISR); air mobility for special forces operations including infiltration and ex-filtration from the combat zone as was done in "Operation Sarp Nash" in 2003 in J&K against the terrorists; casualty evacuation; precision strikes by fighter aircraft. He then said the technologies required are increased night fighting devices; compatible laser designation systems; high end communication devices that can support both data and video streaming.

AVM Subramaniam then painted some likely scenarios and said that post ISAF withdrawal from Afghanistan in 2014 there is a high probability of terrorist activity escalating in J&K. Another scenario he talked of was related to what are we going to do if there was a change in the strategy of the Maoists and they escalate the violence. In such scenarios is the government going to continue with its policy of only non kinetic use of air power? He felt that there are no soft options when it comes to fighting today's non state actors, particularly jihadi terrorists. He said that the armed forces must offer optimal military solutions to the government from time to time and felt that in India there is a lack of understanding of what air power can do or not do, and it is because of this reason that diverse stake holders of national security, including the Army, are exploiting it sub-optimally in the sub-conventional domain. In the end the AVM said there is also a need for





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the IAF to do some introspection on whether they are fully geared up to meet this threat and carry out full spectrum operations particularly in the lower end of the spectrum.

The third speaker in this session was Air Vice Marshal SBP Sinha, AVSM, VM, Assistant Chief of the Air Staff (Plans), Air HQ. He spoke on “Relevance and Use of Legacy Systems in the IAF in the Next Decade.”



He said that India’s armed forces have to be prepared for the contingency of a two front threat from China and Pakistan in collusion and this requires improvements in technological capability and increase in numerical strength. He said that both these requirements take time, require large amount of money, and considering the high capital costs of new equipment, the replacement of old equipment has to be done in a planned and phased manner. He said the IAF force structure has to be capable of operating along the entire spectrum of conflict and to meet this challenge the IAF is transforming itself with induction of new systems in a planned manner and simultaneously upgrading legacy systems. He said upgrade of legacy systems enhances their operational potential in a cost effective manner and stated that our policy is to “Acquire and Upgrade” which will give us a mix of legacy systems and state of the art systems. He said that since new acquisitions are spread over a long period of 10 to 15 years it is imperative that we keep legacy systems operationally capable by upgrading them. He said the while we are inducting new aircraft like the SU-30MKI and have plans to induct the LCA, MMRCA and the FGFA, we have upgraded our older aircraft like the Mig-21 to the Mig-21 Bison, the Mig-27 has also been upgraded and the Mig-29, Jaguar and Mirage-2000 upgrade is going on. He said the Mig-21 is a very potent multi-role fighter and will remain in service till 2026. The upgrades provide greatly enhanced capability with very minimal investments in terms of human resources, maintenance, logistics and infrastructure. He said this is possible as the existing operational/technical manpower continue to operate





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the upgraded aircraft and the maintenance and logistics infrastructure also does not require much change. The IAF has to be ready 24x 7 to be the first responder to meet any contingency for which IAF requires both quantitative and qualitative resources. He said the legacy systems provide the quantitative edge but after being upgraded they also contribute to provide the qualitative edge. In conclusion the AVM said that legacy systems will be a very important part of our force structure and keeping them operationally capable and relevant over their residual life in the future is a thrust area for the IAF.

SESSION - 4 : SYNERGISING AEROSPACE POWER FOR NATIONAL SECURITY

The fourth session was on “Synergising Aerospace Power for National Security” and was chaired by Air Marshal PK Mehra, PVSM, AVSM, VM, (Retd), former AOC-in-C, SWAC.





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The first speaker in this session was Air Vice Marshal PP Khandekar, Commandant and Director, Military Institute of technology, Pune. He said that the Aerospace Industry is an interdisciplinary field that needs to be harnessed in India. He stated that the skill sets required in aviation industry vary since manned and unmanned aerial platforms pose different types of challenges in fundamental sciences, arts and applied research. He felt that the training required for a career in aviation field is different from other fields of education. He said in this field design and development is very important but asked the question whether our education system is giving the right temperament for aerospace design. According to him under graduate education in India is not up to world standards. He said that the developed world is at the front end in this exciting field and their models are studied for reference. The funding of the universities, their concept of higher education, the industry-government-academia interaction also are important for success. He said that there is a huge gap between global and Indian context in aerospace industrial output.



The market is huge in Indian perspective, particularly considering the off-set requirements of military inductions and similar demands from civil aviation sector. R&D establishments are essential for development of technology and nurture. Govt agencies remain vital for R & D in aerospace industry, considering the higher cost and lesser order quantity. Higher education is essential to sustain reliable R&D establishments and to have better academia-industrial interaction. Exploitation of National Knowledge Network, establishment of aerospace educational hubs like Aerospace University, Research Parks for development of core technologies, Aerospace House for handling larger projects and Design Bureaus are essential. In the end he said that there is an urgent need for a government framework in the





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form of Aerospace Technology Commission, to have better academia-industrial interaction to feed appropriate Human Resources and nurture the Aerospace Industry.

The second speaker in this session was Air Vice Marshal SRK Nair, AVSM, VM, ACAS Ops (T&H) who spoke on “IAF as a Regional Humanitarian Aid Provider”.



He said that the Asian region is prone to natural disasters due to its large size and being the most populous continent with roughly 60% of the world's total population. He stated that in 2013, natural disasters in Asia claimed more lives than else in the world and according to experts this trend will continue as populations and industries expand in a region that already houses the world's largest number of urban residents. He said that India has also traditionally been vulnerable to natural disasters and the Indian Armed Forces remain at the core of the government's response to be the first responders in case of a major disaster. The AVM explained that the core characteristics of air power which includes flexibility and versatility, responsiveness, concentration, and reach and said that an understanding of these characteristics and limitations of air power is essential its optimal exploitation in disaster management. He said the transport and helicopter fleets of the IAF can be employed for reconnaissance of the disaster affected area, air transportation, air dropping of food, water and medicines, air evacuation casualties/ marooned people. He then gave past examples where IAF had provided relief in emergencies like the aerial evacuation of Indian citizens; from Kuwait prior to the Gulf war of 1991; from Lebanon in 2006; from Libya in 2011. He said the IAF had taken part in numerous relief missions at national and international level, the most recent being the in the unprecedented flash floods in Uttarakhand. The large scale destruction caused in these floods called for an immediate and massive relief and rescue effort by the IAF. He said the IAF responded with speed, resolve and fortitude with helicopters marshalled from all over





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the country. He said the newly inducted C-130J transport aircraft was also employed for transporting critically required fuel for helicopters operating in the area. He said this relief operation which was code named “OP RAHAT” will go down in military aviation history as the biggest ever humanitarian relief and evacuation effort undertaken by the IAF. He further informed the audience that on August 20, 2013 the C-130J Squadron of the IAF created history by landing the C-130J at Daulat Beg Oldie, an advanced landing ground (ALG) in Ladakh region, at an elevation of 16614 feet. He said this event served to assure the country that the IAF’s airlift capability had ability to deliver mass on ground in any terrain and under any conditions.

In the end the AVM explained the role of media to highlight the disaster relief operations of the IAF. He said the media is a very potent tool in influencing public opinion and the political leadership. He said skilful handling of media is imperative for correct perception management for our own people and the world. Finally he said that the IAF with its modern platforms is an ideal instrument available with the government to provide relief and humanitarian aid and the IAF is fully ready to carry out these tasks whenever required.

The next speaker was Air Vice Marshal Upkarjit Singh who spoke on “Indian Air Power in national Security Calculus 2032.”

He said that the global focus has shifted to Asia in the 21st century due to militarisation of the Indian Ocean caused by threats to energy corridors in this region and India would play a major role in regional and global security in addition to addressing external/ internal threats to its national security. He said all components of national aerospace power namely; Air Force, Air Arms, Civil Aviation, and Space would play a major role in addressing the challenges facing





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the nation. He stated that to keep pace with the requirements of future battlefield, the IAF was in the process of transforming itself through procurements of new state of the art platforms/ systems and upgrade of the existing inventory.

The speaker said that aerospace power is built on the edifice of capable human resource and added that investments in education, training and associated infrastructure would be one of the top priorities in developing aerospace capabilities. In the end he said that only a highly motivated, educated and technically capable work force backed by a robust aerospace industry would enable India to become a formidable aerospace power of the future.

CLOSING SESSION

The valedictory address in the closing session was given by Air Marshal M Matheswaran, AVSM, VM, DCIDS (PP&FD), gave the valedictory address.

He told the audience that the equation between national security and aerospace power is that aerospace power has the capability to exploit the medium of air and space to safeguard the nation. He said



that since ancient times the strong have always ruled the world and this is applicable even today with the Western nations dictate the terms. After World War-2 the West had become very strong and today leads the world in advanced technology and the technological gap between the West and other nations is more than twenty years.

He said that from a national security perspective we are still dependent on advanced countries for critical technologies like aero engines, radars and electronic warfare systems. He said the nation faces many challenges like terrorism, information dominance over our





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adversaries, C4ISR and networking. In the end he said we need radical changes for our R&D to become answerable like the Scientific Advisory Board of the USA.

The Director General then gave a vote of thanks and thanked all the speakers for their valuable contribution to make the seminar useful.

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