



Centre for Air Power Studies (CAPS)

Forum for National Security Studies (FNSS)

Title: CAPS-NIAS INTERACTION ON SPACE, NUCLEAR & CYBER SECURITY

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- On 19th April, 2016 representatives from National Institute of Advance Studies (NIAS) visited the Centre for Air Power Studies for an interaction among the faculties of both the institutes. The representatives from NIAS comprised Prof. Rajaram Nagappa, Prof. S. Chandrashekar, and Dr. Suba Chandran.
- Air Marshal K KNothwar PVSM VM (Retd.), Additional Director General, CAPS made the opening remarks.
- Ms. Chandra Rekha, Associate Fellow at CAPS gave an overview on CAPS.
- The interaction between NIAS and CAPS comprised a single session, split into two presentations made by Mr. Arjun Subramanian P. of CAPS and Prof. Rajaram Nagappa from NIAS, followed by an interaction session among the faculty of both the institutes.

Posers on China's Ballistic Missile Programme - Arjun Subramanian P.

The DF-21 missile, which is based on the JL-1 SLBM design, is the symbol of China's breakthrough in solid rocket motor technology.

The DF-21 comes in three variants: nuclear-capable variant with a large CEP, conventional variant with a CEP of 30 meters, and the highly accurate Anti-Ship Ballistic Missile (ASBM) variant with maneuverable warhead.



The DF-21 was tested on a simulated airbase target, and the blast pattern indicates a cratering/cluster munitions warhead; ineffective against hardened blast pens.

Recent CCTV footage of the DF-21 missile shows new aerodynamic control surfaces at the terminal stage, continuation of the same bi-conic design, and canisterized launch system.

Various media sources claim that the DF-26 missile is an enhanced version of the older DF-16 missile, with a longer payload section, and high ballistic-coefficient for enhanced re-entry velocity. The missile will be based on the DF-21 booster. The high re-entry velocity will enable the DF-26 to defeat Ballistic Missile Defense (BMD), and terminal guidance will allow the missile to carry out conventional precision strike roles.

The warhead section of the DF-16B missile resembles the DF-15B and the body of the missile indicates enhanced range.

The DF-41 missile is an ICBM with a MIRV'ed warhead, containing up to 10 independent warheads. Recent news reports suggest that China has deployed the rail-mobile variant of this missile with help from Ukraine. The deployment pattern of this weapon system could either be random or garrison based. However, since China lacks early-warning systems like Russia - essential for random deployment of rail and road mobile missile systems - China is likely to adopt the garrison-deployment method. The likely deployment area would be Xinyang, in Henan Province. The reason for choosing this area for deployment of the DF-41 missile is twofold: first, the area comes under Base 54 which has the experience of operating road-mobile DF-31 missile, and secondly, the Shijiazhuang-Wuhan high-speed railway passes through the area with numerous underground tunnels on its way.

The recent improvement in missile designs and selection of test targets demonstrates an emphasis on airbases as targets for these missiles. It can be safely argued that the Chinese would depend heavily on ballistic missiles for counter-air operations, possibly during the initial state of hostilities.

However, the lack of focus on hardened aircraft pens during the missile tests demonstrates the use of these missiles against soft-skinned targets such as aircraft parked in the open.

In a deviation from the past, the PLA is demonstrating an increasing tendency to reveal its missile capability via images and videos, and it can be construed as an attempt to signal at both conventional and nuclear level.

The Promise of Small Satellites for National Security - Prof. Rajaram Nagappa

India has in place a demonstrated space capability- application satellites, launch vehicles, and scientific missions. It has the capability for end-to-end planning and implementation in communications satellites, remote sensing, meteorology, navigation, deep-space missions, reusable launch vehicles, human space flight, and multi-satellite launch.

Space programme in India started as a civilian programme and has remained so, and the space capability has not been linked to an effective strategic requirement. However, since space applications are dual-use, security services have benefitted from the spin-offs. In 2008, the Integrated Space Cell was formed to merge space capability with India's strategic interests.

India is yet to acquire the capability to 'detect, deter and defeat' using space based platforms. India's space based communication, optical imaging, and meteorology technology is developed; however, it lacks ELINT and TDRS, and has limited bandwidth and radar imaging capacity.

India has 11 communication satellites (one exclusively for the Indian Navy) with over 200 transponders, two meteorological satellites, six navigational satellites, and 10 remote sensing satellites. The best resolution for optical imaging is in the sub-metre range.

Despite these satellites, India's observation revisit frequency is inadequate to provide constant surveillance of moving objects. Some of the satellites employ steerable cameras, thus providing revisit of four days; otherwise revisit time is typically nine days. The revisit time of RISAT is 25 days with a 12 day revisit in the inner cycle coarse resolution scan SAR mode. Because of such lengthy revisit times, the application of such satellites is only applicable for stationary platforms.

China has a constellation of 18 satellites for earth observation, and some 17 satellites for ELINT purposes, which allows it to make 18 contacts per day with a moving target. The SAR and optical imaging satellites of China provide 24 passes per day over the target.

India can launch micro and small satellites to make up for the lack of regular satellite density in orbit. The PSLV can launch two micro-satellites or four small-satellites in addition to its main payload. In addition to PSLV, the Agni-5 based launch vehicle can be modified to launch such micro and small satellites; thereby increasing India's space launch capacity. Using the mobile platform of Agni-5, the satellites can be launched from Wheeler Island, thereby circumventing the eastwardly trajectory and subsequent dog-legging of PSLV launches from Sriharikota to avoid the EEZ of Sri Lanka. This will save fuel and allow the launch vehicle to carry additional payload weight and place the satellites into more favourable orbits.

Micro and Small satellites can be configured for replacement/on demand services, and these satellites can carry out most operations needed by security services of the country.

There exists a market for private sector participation in building small satellites; however, major organizational restructuring will be needed to facilitate their introduction in the sector.
