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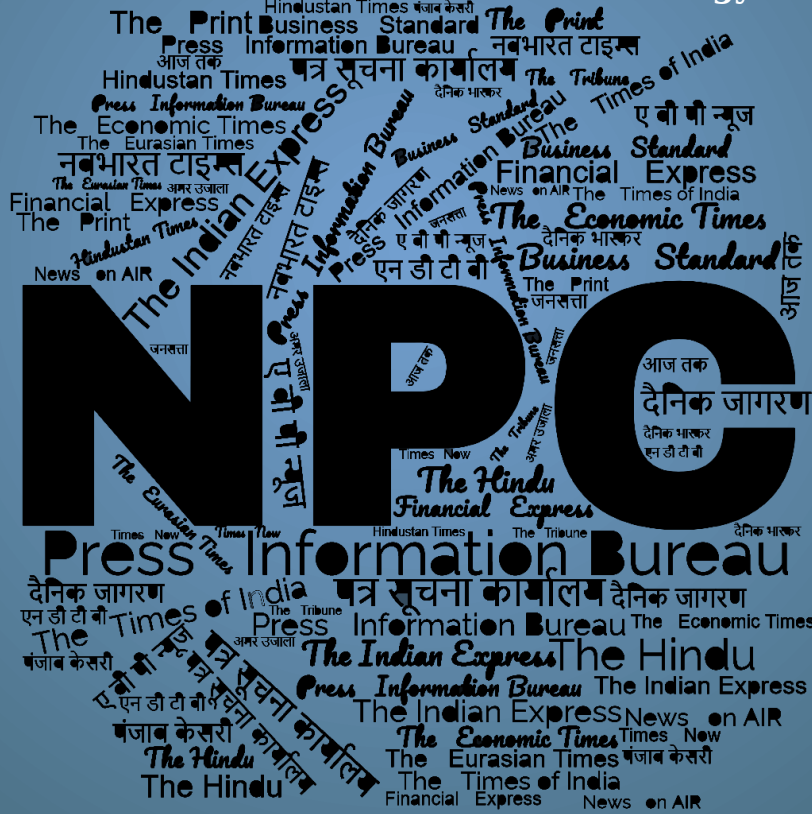
खंड/Vol. : 48 अंक/Issue : 102

01/06/2023

# समाचार पत्रों से चयित अंश Newspapers Clippings

डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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*Wed, 31 May 2023*

## **Ummalaneni to Head DRDO Missiles and Strategic Systems**

Distinguished scientist and Director, RCI, Ummalaneni Raja Babu has been appointed as the director-general (missiles & strategic systems), DRDO, Hyderabad with effect from Thursday.

He replaces Dr B.H.V.S. Narayana Murthy following the latter's superannuation.

Babu, a graduate in mechanical engineering from Andhra University, obtained his Master's from IIT Kharagpur and MBA from JNTU.

He started his career with the Indian Air Force in 1988 and joined DRDO in 1995. In his 35-year aerospace career, he has worked on aircraft, helicopters and was a key member in the development of many missile systems. As the programme director (AD) at RCI, he was involved in the design, development and successful demonstration of ballistic missile defence system capabilities.

It was under his leadership that 'Mission Shakti', India's first anti-satellite missile test (A-SAT) was demonstrated successfully.

Babu is a recipient of several prestigious awards, including the 'Path-breaking research & outstanding technology development' award, Agni award, DRDO Scientist of the Year and Vigyan Pratibha Samman awards.

<https://www.deccanchronicle.com/nation/current-affairs/310523/ummalaneni-to-head-drdo-missiles-and-strategic-systems.html>

## **THE TIMES OF INDIA**

*Wed, 31 May 2023*

### **On Completing 25 years, BrahMos Aerospace CEO Reveals Future Plans**

The CEO and MD of BrahMos Aerospace Atul Rane revealed the future plans of the organisation on completing 25 years of the joint venture, while talking to ANI on May 31. "BrahMos Aerospace has decided not to stay and rest on the laurels which we have done till now. We have embarked on a new journey of modernising BrahMos that is reducing its size, in terms of weight and dimensions so that it can be carried on a light-combat aircraft. We expect to start production in another 3 to 4 years and start the test by the end of next year," he said.

<https://timesofindia.indiatimes.com/videos/news/on-completing-25-years-brahmos-aerospace-ceo-reveals-future-plans/videoshow/100654991.cms>

# DRDO on Twitter



**DRDO** ✓  
@DRDO\_India



Dr Samir V Kamat, Secretary DDR&D and Chairman DRDO and Shri S Somanath, Chairman ISRO inaugurated Roddam Narasimha Hypersonic Wind Tunnel facility at [@iiscbangalore](#)  
[@SpokespersonMoD](#)



2:58 pm · 31 May 2023 · **38.3K** Views

**112** Retweets **4** Quotes **788** Likes **8** Bookmarks



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[@iiscbangalore](#) has dedicated this facility to Prof. Roddam Narasimha a pioneer of experimental hypersonics in India. This 0.5 m diameter enclosed free-jet hypersonic wind tunnel is one of such hypersonic wind tunnel facility in India other two being at DRDO & ISRO

2

24

142

6,566



# THE TIMES OF INDIA

Wed, 31 May 2023

## **MH60R Helicopter Makes Maiden Landing on INS Vikrant**

In a significant milestone for the Indian Navy, an MH 60 'Romeo' (MH60R) helicopter, which is awaiting induction into the service, undertook maiden landing on the indigenously designed and constructed aircraft carrier, INS Vikrant on Wednesday. The helicopter from the naval air station INS Garuda Kochi landed on the aircraft carrier somewhere in the Arabian Sea.

The navy said that the integration of the helicopter with naval warships is a major boost to the navy's Anti-Submarine Warfare and Fleet Support capability. The integration would further strengthen the Navy's capability to counter underwater threats, monitor maritime activities and conduct surveillance operations.

Earlier on May 19, an MH 60R made its maiden at-sea landing on board indigenously designed and built naval destroyer, INS Kolkata in the Arabian Sea off Kochi.

MH60R helicopter is a versatile platform known for its exceptional Anti-Submarine Warfare (ASW), surveillance, anti-shipping and Search and Rescue capabilities. The ongoing modernisation of the air fleet of the Indian Navy will get a major boost with the induction of multirole helicopters procured from US defence major Lockheed Martin.

MH60 R, considered one of the most advanced maritime helicopters in the world, are designed to operate from frigates, destroyers, cruisers and aircraft carriers. It is an all-weather helicopter designed to support multiple missions with state of the art avionics/ sensors. The induction of these helicopters would further enhance the Indian Navy's three dimensional capabilities.

<https://timesofindia.indiatimes.com/india/mh60r-helicopter-makes-maiden-landing-on-ins-vikrant/articleshow/100657468.cms>

# THE ECONOMIC TIMES

Thu, 01 Jun 2023

## **Looking to have JVs like BrahMos; can't Produce Everything in India: CDS**

India is looking to establish joint ventures like BrahMos Aerospace and is seeking a collaborative approach to produce weapons as it is not possible to produce everything domestically, Chief of Defence Staff Gen Anil Chauhan has said. He said strategic autonomy that India seeks will come only through strategic capability and partnerships are the way ahead.

"Aatmanirbharta does not mean that we are going to produce everything in India. That is not possible for a developing country like ours. We are going to establish joint ventures and BrahMos Aerospace is one such venture. It has been a major success story," he said. Gen Chauhan was speaking at a BrahMos Aerospace user meet.

The CDS said BrahMos is the weapon of choice of the three armed forces and will promote jointness between them. He also noted the weapon is now being exported to the Philippines and several steps have been taken to produce several critical parts indigenously.

Army chief Gen Manoj Pande said that the system has given the armed forces not just deterrence capability but also the capability to respond to any threats "robustly when required".

"Due to our legacy issues of unsettled borders and related security challenges, possession of strategic deterrence instruments in our case is essential," he said.

IAF chief said work has already started on a next generation version of the missile that will be smaller in size - BrahMos NG.

### **Rafales Indian Ocean Exercise**

IAF demonstrated its capability to carry out long-range strikes with an exercise involving four Rafale fighter jets that simulated a mission over the Indian Ocean Region. The jets flew for over six hours.

<https://m.economictimes.com/news/defence/looking-to-have-jvs-like-brahmos-cant-produce-everything-in-india-cds/articleshow/100659468.cms>

# THE ECONOMIC TIMES

*Wed, 31 May 2023*

## **Rafale Jets Carry out Long-range Mission in Indian Ocean Region**

Four Rafale fighter aircraft of the Indian Air Force carried out a "strategic" mission over the Indian Ocean region for over six hours, in a significant demonstration of their long-range combat capabilities, people familiar with the operation said on Wednesday. The jets took off from the Hasimara Air Force station in the eastern sector, carried out the mission involving various manoeuvres and simulated operations and returned to the base after meeting the desired results, they said.

The Indian Air Force (IAF) carried out the mission at a time China has been ramping up its presence in the Indian Ocean region, which is largely considered as the backyard of the Indian Navy.

The people cited said the mission by the four Rafale jets demonstrated their operational capabilities and readiness in dealing with various challenging situations.

Without divulging the day of the operation, the people cited above said it was carried out very recently.

The IAF also tweeted about the mission.

"Four IAF Rafales flew a long range mission for over six hours into the IOR. The aircraft 'fought' their way through a large force engagement en route to their Weapon Release Point. Pickle on time, weapon on target-the IAF way!" it said.

The IAF too did not divulge the day of the operation.

The Rafale jets are India's first major acquisition of fighter planes in 23 year after the Sukhoi jets were imported from Russia.

The Rafale jets are capable of carrying a range of potent weapons.

<https://economictimes.indiatimes.com/news/defence/rafale-jets-carry-out-long-range-mission-in-indian-ocean-region/articleshow/100644644.cms>

THE HINDU  
**BusinessLine**

*Wed, 31 May 2023*

## **IAF Chief Wants Smaller Version of BrahMos LCA, Miraj and MiG-29**

Indian Air Force Chief Air Chief Marshal VR Chaudhari on Wednesday suggested to BrahMos Aerospace, the Indian-Russian joint venture, to develop next generation smaller version of its supersonic cruise missile for enhancing fire powers of MiG-29, Mirage 2000 and the LCA Tejas like it has done to Sukhoi-30MKIs.

Speaking at the BrahMos User Meet 2023, Air Chief Marshal Chaudhari said the pairing of BrahMos missile, the most lethal air-combat asset, with the Su-30MKI has multiplied “deterrence value” of the IAF and will give strategic advantage even at northern borders.

“As the situation unfolded in northern borders three years ago, we realised that the potent weapon can be used very effectively for land attacks... In future, next-generation BrahMos or a small version that can be fitted onto smaller platforms like MiG-29, Mirage 2000 or even the LCA,” said the IAF Chief. Last year, the IAF had successfully tested extended range version of BrahMos, launched from SU-30MKI to hit a ship target 450 km away.

“The combination of BrahMos on the Sukhoi Su-30 has really given us tremendous capability that has enhanced our firepower. It has made the deterrence value of the IAF go up by leaps and bounds,” Chaudhari commented. He also stated the supersonic missile has really galvanised the way we will equip ourselves with precision firepower in the coming years. “Seeing the conflicts that are happening across the globe the importance of precision, long range firepower can’t be underscored,” IAF Chief stated.

Since 2014, the BrahMos, classified as the best in its category, is working to develop a smaller missile with low weight under Vision 2050 programme that can also be mounted on copters too to give forces strategic depth. The Indian Russian JV is also working to double the range of the supersonic missile and develop its hypersonic version as well.

Given the backdrop of China continuing to scale up its infrastructure and weaponising its troop deployed along the LAC, Indian Army Chief General Manoj Pande, who also spoke at the event, stated that India stood enabled for deterrence as well as for carrying out robust response, if needed.

“Due to our legacy issues of unsettled borders and related security challenges, possession of strategic deterrence instruments in our case is essential. And the three services of the defence forces as users of the Brahmos missile system, now stand enabled to not just stand deterrence but also to respond robustly when required,” General Pande told the gathering. He also stated the nation is at the cusp of a transformational changes and the country’s stature is growing globally leading to

higher expectations from the world community. "Our concurrent growth and development, and the rising aspirations of our people, all reflect the confident optimism of a rising nation," he observed.

<https://www.thehindubusinessline.com/news/national/iaf-chief-wants-smaller-version-of-brahmos-lca-miraj-and-mig-29/article66916061.ece>

## THE TIMES OF INDIA

Wed, 31 May 2023

### **BrahMos has Emerged as a Brahmastra: Defence Chiefs**

Faced with two long unsettled borders with China and Pakistan, it is essential for India to possess potent instruments of deterrence as well as robust response like the BrahMos supersonic cruise missiles that have long range and precision-strike capabilities, the country's military brass said on Wednesday.

"The lethal combination of BrahMos missiles, whose range has been extended to 450-km from the original 290-km, fitted on the Sukhoi-30MKI fighter jets has really given us a tremendous capability to enhance our firepower," said IAF chief Air Chief Marshal VR Chaudhari, at the silver jubilee celebrations of the India-Russia joint venture BrahMos Aerospace here.

"It has made the deterrence value of IAF go up by leaps and bounds... As the situation unfolded in the northern borders (with China) three years ago, we realised that the potent weapon can be used very effectively for land attacks," he said.

The next-generation BrahMos, a smaller and lighter version of the existing missile that flies almost three times the speed of sound at Mach 2.8, will also be fitted on to smaller fighters like the MiG-29s, Mirage-2000s and Tejas light combat aircraft. A 800-km range variant of the BrahMos has also undergone its maiden test, as was earlier reported by TOI.

"Due to our legacy issues of unsettled borders and related security challenges, possession of strategic deterrence instruments in our case is essential. And the three Services as users of the Brahmos missile systems now stand enabled for not just deterrence but also to respond robustly when required," Army chief General Manoj Pande said.

Describing BrahMos as a "Brahmastra" of armed forces, chief of defence staff General Anil Chauhan, in turn, said the ongoing drive for 'Aatmanirbharta' (self-reliance) did not mean that India alone will produce all weapon systems. "We are going to establish joint ventures (with foreign partners) in India and BrahMos Aerospace is one such venture. It has been a major success story."

<https://timesofindia.indiatimes.com/india/brahmos-has-emerged-as-a-brahmastra-defence-chiefs/articleshow/100659826.cms>

## ThePrint

Wed, 31 May 2023

### **Defence Forces Enabled not just for Deterrence, but also for Robust Response, says Army Chief**

Army Chief General Manoj Pande on Wednesday said that India stands enabled not just for deterrence but also to undertake robust response if required.



The Army Chief General and Indian Air Force Chief Marshal VR Chaudhari were speaking at the BrahMos User Meet 2023.

Addressing the event, Manoj Pande said, “Today the nation is at the cusp of transformational changes, we are witness to the growing stature of our country in the international environment and higher expectations from the world community. Our concurrent growth and development, and the rising aspirations of our people, all reflect the confident optimism of a rising nation”

“Due to our legacy issues of unsettled borders and related security challenges, possession of strategic deterrence instruments in our case is essential. And the three services of the defence forces as users of the Brahmos missile system, now stand enabled to not just stand deterrence but also to respond robustly when required,” he added.

Indian Air Force Chief Air Chief Marshal VR Chaudhari, during his address, highlighted the role of BrahMos supersonic missile and said that it has galvanized India’s firepower.

“As one of our most lethal air-combat assets, the BrahMos supersonic missile has really galvanized the way we will equip ourselves with precision firepower in the coming years. Seeing the conflicts that are happening across the globe the importance of precision, long-range firepower can’t be underscored,” he said.

He further added that the BrahMos missile has made the deterrence value of the IAF go up by leaps and bounds.

“The combination of BrahMos on the Sukhoi Su-30 has really given us a tremendous capability that has enhanced our firepower. It has made the deterrence value of the IAF go up by leaps and bounds,” he said.

The Air Force Chief added, “As the situation unfolded in Northern borders three years ago, we realised that the potent weapon can be used very effectively for land attacks. In future, next-generation BrahMos or a small version that can be fitted onto smaller platforms like MiG-29, Mirage 2000 or even the LCA”.

<https://theprint.in/india/india-stands-enabled-not-just-for-deterrence-but-also-for-robust-response-army-chief-manoj-pande/1604335/>



*Thu, 01 Jun 2023*

## **Additional Joint Logistics Nodes on the Cards for Army, Navy, Air Force**

The armed forces are planning to set up additional joint logistics nodes across the country to boost integration in their logistical needs and streamline their supply chains, senior officials familiar with the matter told The Indian Express.

So far, India had three joint logistics nodes which were made operational in 2021 for logistics integration of the three services. The Joint Operations Division under the Headquarters Integrated Defence Staff has been responsible for establishing the nodes.

While the last joint logistics node was operationalised in Mumbai in April 2021 by former Chief of Defence Staff (CDS) Gen Bipin Rawat, the ones in Guwahati and Tri-Services, Andaman and Nicobar Command, Port Blair were operationalised in January 2021.

As per officials, there are now plans to establish three more joint logistics nodes which are likely to be established at Leh, West Bengal and Tamil Nadu soon.

These nodes will provide integrated logistics cover to the armed forces for their small arms ammunition, rations, fuel, general stores, civil hired transport, aviation clothing, spares and engineering support, thus integrating their operational efforts, especially during a conflict or a war.

A senior official privy to the development said the locations were selected keeping in mind their proximity to rail and air infrastructure while ensuring that adequate space is available for the stores to be spread out in case of any contingency.

“Every node will cater to troops deployed across a vast geographical area,” the official said.

The stocking policy for these nodes would be drafted keeping in mind the number of troops deployed in the region, as well as any increase that may need to be carried out especially in the mountains. It would also look at weather and other challenges leading to certain areas getting cut off thus affecting resupply. The policy will take into account the timely turnover of ammunition so as to ensure they are used within their specified shelf life.

A second official said that a robust infrastructure would be created and will comprise specialised storage and maintenance shelters as per the equipment profile in them. Over a period, officers of all three services would be posted there to ensure complete integration. Each node will come under either of the three services.

While the creation of the integrated theatre commands is likely to take some time, efforts are underway towards greater integration in training and logistics among the services.

<https://indianexpress.com/article/india/additional-joint-logistics-nodes-on-the-cards-for-army-navy-air-force-8639554/>



*Wed, 31 May 2023*

## **GE will Produce Engines for LCA Mk2 soon – Know more about F414-INS6 Engine**

In what is expected to give a major boost to India’s defence manufacturing sector, in the forthcoming visit of Prime Minister Narendra Modi to the US, a deal for the local manufacturing of the GE F414-INS6 engine for the Mk-2 Tejas fighter jet with transfer of technology (ToT) is expected to be approved.

The US based General Electric has sent an application to the American Congress seeking approval to jointly produce jet engines that could power jet aircraft and produced indigenously by India. At the end of talks between NSA Ajit Doval and his counterpart Jake Sullivan, a fact sheet issued by White House confirmed receiving the request and promised expeditious review of the application.

The company is expected to collaborate with Defence Research and Development Organisation to produce F414-INS6 engines for Tejas Mk2 which are expected to replace the ageing Mirage 2000, the MiG-29 fighters and Jaguar. If approved the engine manufacturer is expected to transfer technologies which will allow the production of critical components in India.

The GE-414 engine is a powerful and reliable engine that is currently used in a number of fighter jets, including the F/A-18 Super Hornet and the EA-18G Growler. It is expected to provide the MK-2 Tejas with the performance and capabilities it needs to meet the challenges of the 21st century battlefield. The deal for the local manufacturing of the GE F414 engine is part of a broader effort by India and the US to deepen their defence cooperation. The deal, once approved, is expected to create jobs and boost economic growth in India as the local manufacturing of the

engine will require the development of a new supply chain in India. After fulfilling India's requirement, the engines can be exported too.

The GE-414 engine deal is a major milestone in India's efforts to become self-reliant in defence manufacturing.

### **GE F414 Features**

The GE F414 is a high-performance, two-spool, axial-flow turbofan engine that is used to power a variety of military aircraft, including the F/A-18E/F Super Hornet, the JAS 39 Gripen, and the Tejas Mark II. The GE F414 is a derivative of the GE F404 engine, which was developed in the 1970s. The GE414 has a number of features that make it an attractive choice for military aircraft, including:

**High thrust:** The GE F414 produces up to 18,000 pounds of thrust, which gives it the power to operate a variety of aircraft in a variety of missions.

**High reliability:** The GE F414 has a proven track record of reliability, with over 10 million hours of flight time accumulated.

**Low maintenance:** This engine is designed for easy maintenance, which reduces the cost of ownership. **Environmentally friendly:** It meets all current environmental regulations, and is designed to be even more environmentally friendly in the future.

### **More about F414 engine:**

**Digital Engine Control (DEC):** The GE414 is the first fighter engine to use a full authority digital engine control (FADEC) system. FADEC provides precise control of the engine's performance, which improves fuel efficiency and reduces emissions.

**Integrated Electronic Engine Instrumentation (IEE):** Is the first fighter engine to use an integrated electronic engine instrumentation (IEE) system. IEE provides real-time data on the engine's performance, which helps pilots to make informed decisions about engine operation.

**Wide chord, high-pressure compressor (HPC):** Its wide chord, high-pressure compressor (HPC) provides greater efficiency and lower emissions than previous generation engines.

**Low-pressure turbine (LPT):** The engine's low-pressure turbine (LPT) is designed for high efficiency and durability.

### **Previously...**

In 2021, state-owned Hindustan Aeronautics Limited (HAL) placed an order for US\$716 million for 99 engines and support services with the US based GE Aviation. These engines will be used to power the 'Tejas' Light Combat Aircraft. The order was placed for the highest thrust variant of the GE-F404 family of engines — the F404-GE-IN20. Both HAL and GE have been in partnership for almost two decades. All the engines and support services are expected to be completed by 2029.

Financial Express Online had reported that cooperation between HAL and GE will be further enhanced when F414 engines are manufactured in India for the upcoming LCA Mk2 programme.

<https://www.financialexpress.com/business/defence-ge-will-produce-engines-for-lca-mk2-soon-know-more-about-f414-ins6-engine-3109367/>

## LAC: India, China Meet, Agree on Next Round of Military Talks soon

India and China on Wednesday held in-person diplomatic talks here and discussed proposals for disengagement in the remaining friction points along the Line of Actual Control (LAC) in eastern Ladakh in a “frank and open manner”.

The Ministry of External Affairs (MEA) said both sides agreed to hold the 19th round of high-level military talks at an early date for restoration of peace and tranquility in the border areas.

The meeting took place under the framework of the Working Mechanism for Consultation and Coordination on India-China Border Affairs (WMCC).

Indian and Chinese troops are locked in an over three-year confrontation in certain friction points in eastern Ladakh, even as the two sides completed disengagement from several areas following extensive diplomatic and military talks.

“The two sides reviewed the situation along the LAC in western sector of India-China border areas and discussed proposals for disengagement in remaining areas in a frank and open manner,” the MEA said. “Restoration of peace and tranquility will create conditions for normalising bilateral relations,” it said.

“In order to achieve this objective, in accordance with existing bilateral agreements and protocols, they agreed to hold the next (19th) round of senior commanders’ meeting at an early date,” the MEA statement said.

The MEA said the two sides agreed to continue discussions through military and diplomatic channels.

This was the 27th meeting of the WMCC. The previous WMCC meeting was held in Beijing on February 22.

The Joint Secretary (East Asia) from the MEA led the Indian delegation. The Chinese side was led by the Director General of the Boundary and Oceanic Affairs Department of the Chinese Ministry of Foreign Affairs.

The 18th round of high-level military talks between the two sides was held on April 23 during which they agreed to stay in close touch and work out a mutually acceptable solution to the remaining issues in eastern Ladakh at the earliest.

Days later, Chinese Defence Minister Li Shangfu visited India to attend a meeting of the Shanghai Cooperation Organisation (SCO). On the sidelines of the SCO meeting, Defence Minister Rajnath Singh held a nearly 45-minute bilateral meeting with Li.

In the talks, Singh told his Chinese counterpart that China’s violation of existing border agreements “eroded” the entire basis of ties between the two countries and that all issues relating to the frontier must be resolved in accordance with the existing pacts.

On May 4, External Affairs Minister S Jaishankar conveyed to his Chinese counterpart Qin Gang the importance of resolving the eastern Ladakh border row and ensuring peace and tranquillity along the LAC for development of bilateral ties.

A day after the talks, Jaishankar had said at a media briefing that the situation along the border in eastern Ladakh is “abnormal” and India-China relations cannot be normal if peace and tranquility in border areas is disturbed.

<https://indianexpress.com/article/india/lac-india-china-meet-agree-on-next-round-of-military-talks-soon-8639535/>



Thu, 01 Jun 2023

## **Latest Satellite Images Reveal how China is Scaling up its Air Power Along LAC**

*By Rezaul H Laskar*

China’s expansion of airfields along the Line of Actual Control (LAC) since 2020 has created capabilities for its military to conduct a wider range of operations, and to counter India’s comparative advantages in some areas, according to an analysis of satellite imagery.

The changes on the ground since the military standoff on the LAC began in May 2020 show that China has embarked on a massive expansion of airfields, helipads, railway facilities, missile bases, roads and bridges, both for the faster deployment of troops and to create a range of offensive capabilities.

An analysis of satellite images exclusively provided to Hindustan Times by Planet Labs of airfields at Hotan, Ngari Gunsa and Lhasa shows the Chinese side has either expanded these facilities by building new runways, hardened shelters designed to protect combat jets, and construction of new support and military operations buildings.

These three Chinese airfields were chosen for analysis because of their locations opposite strategic positions on the Indian side and use in current operations amid the standoff with India, which has taken bilateral relations to a six-decade low. A brutal clash at Galwan Valley in June 2020 killed 20 Indian soldiers and an unspecified number of Chinese troops – the first fatalities along the LAC in 45 years.

Indian officials declined to comment on the analysis. India has made it clear to China during bilateral interactions and meetings on margins of international forums this year that normalcy along the LAC is essential for normal bilateral relations.

Hotan airfield in southwestern Xinjiang is located about 400km, in a straight line, from Leh, capital of the Union territory of Ladakh. Hotan airfield was last expanded in 2002. A satellite image from June 2020 showed no construction or development in the area near the airfield, and an existing aircraft apron with combat jets.

A satellite image from May 2023 shows Hotan airfield has a new runway, new aircraft and military operations support buildings and a new apron. These upgrades are supported by the construction of additional munitions storage sites not far from the airfield. Recent satellite images of the airfield have shown unmanned aerial vehicles (UAVs) operating from Hotan, and the Chengdu J-20, a stealth fighter, has been deployed at this airfield amid the standoff.

Ngari Gunsa airfield in Tibet Autonomous Region is located 200km, in a straight line, from Pangong Lake, which has witnessed several skirmishes between Indian and Chinese forces and where the Chinese side is building a key bridge. The airfield started operations in 2010 and was expanded after the 2017 standoff at Doklam. At that time, combat jets were stationed at the airfield.

A satellite image from June 2020 showed only one aircraft apron with combat jets. An image from May this year shows a new taxiway and improvements to the runway. There are also at least 16 new hardened aircraft shelters and new aircraft and military operations support buildings. This airfield, too, shows the presence of UAVs. Ngari Gunsa has served as a key logistics hub for Chinese forces, acting as a node between areas south of Aksai Chin to deployments further within Tibet.

The airport at Lhasa, the administrative capital of Tibet Autonomous Region, has for long been a dual-use facility. Though it is not in the western sector of LAC, it is located less than 250km, in a straight line, from Tawang, which is at the centre of Chinese claims in the eastern sector.

A satellite image from May 2020 showed combat jets on an existing aircraft apron. An image from May this year showed a new runway and a new apron under construction, at least 30 new hardened aircraft shelters, and new support buildings.

Satellite imagery from recent years has shown the construction of underground facilities south of the Lhasa airfield, as well as a radar and electronic warfare unit and an air defence unit.

The developments observed at these three airfields and others along the border region clearly indicate “China’s strategic intention to bolster its military capabilities and offset India’s advantages in the area”, said Damien Symon, geo-intelligence researcher at The Intel Lab.

“The ongoing construction activities, along with significant and diverse deployments at these sites, including the use of UAVs and advanced aircraft, underscore China’s efforts to enhance its offensive capabilities, especially in light of the active border situation with India,” he said.

“It is crucial to recognise these developments fundamentally transform the dynamics of air warfare, extending China’s operational range and presenting challenges to India’s deterrence strategies,” Symon added.

Air Vice Marshal (retired) Manmohan Bahadur, an aviator who served in the Ladakh region, said the Chinese side has used the past three years to find ways to counter the Indian Air Force’s (IAF) comparative advantages in the region.

“The IAF could carry the war to them because of these advantages. Most of the Indian airbases are along the foothills and the aircraft could take off with larger [weapons] payload,” Bahadur said.

Lt Gen (retired) Rakesh Sharma, former commander of the Ladakh corps responsible for Kargil, Siachen glacier and eastern Ladakh, said many Chinese airfields across the LAC initially didn’t have hardened aircraft shelters, long runways or ammunition storage facilities.

“They have got over this problem. Their runways are longer, the aircraft are safe and can take off with heavier payloads,” Sharma said.

“This is all part of a planned move. There are reports that the Chinese side has positioned a substantial number of cruise missiles in this area that can be used against targets up to 2,000 km away,” he added.

Bahadur said China has created a large number of airfields along the LAC, from Ladakh to Arunachal Pradesh, plugging the gaps which existed between military airbases. “This also leads to an improvement in their redundancy factor,” he said, referring to the capability of having more airfields to take over in the event any airbase is knocked out in an enemy attack.

Both Bahadur and Sharma described the construction of hardened shelters as a significant development. “Earlier, the number of hardened shelters was literally zero. They have also set up radar and surface-to-air missiles systems, increasing the risks for the IAF to go [across],” Bahadur said.

Sim Tack, geo-intelligence analyst at Force Analysis, said hardened shelters at each airbase may impact India's efforts to deter or defend against Chinese air power. "Not only do these shelters provide survivability to Chinese aircraft deployed within range of disputed territories, increasing the complexity of strikes against them, but another important consequence is that they help obscure the actual presence of fighters. By storing fighter aircraft under cover, China is able to better conceal its deployments, or lack thereof, to these forward airbases," he said.

This can result in India expending additional resources to assess Chinese air power in the region, he added. The Indian side, Bahadur said, depended on "deterrence by punishment" and the new and expanded airfields and air defence capabilities would dilute this capability.

The Chinese facilities, Sharma said, have changed the character of air warfare in the region. "From Kashgar [in Xinjiang], Chinese jets can overfly Gilgit-Baltistan and Srinagar is in range. The airfields in Tibet Autonomous Region are a bonus that have taken away a portion of India's advantage," he added. India and China have been unable to resolve all friction points in Ladakh sector of the LAC despite more than two dozen rounds of military and diplomatic talks, and external affairs minister S Jaishankar has insisted that bilateral ties cannot be normalised without peace and tranquillity on the border.

<https://www.hindustantimes.com/india-news/indian-china-military-standoff-lac-china-scaling-up-air-power-across-lac-satellite-images-101685567730966.html>



Wed, 31 May 2023

## China's Military Diplomacy in Southeast Asia

By Anushka Saxena

The story so far: Due to its intensifying geopolitical competition with the U.S. and its own security interests in the region, China is expanding its military outreach to Southeast Asian countries. The Chinese People's Liberation Army (PLA)'s global activities and influence campaigns are part of its broader reform process initiated by Chinese President Xi Jinping in 2015, and form a fundamental element of China's overall foreign policy. In this light, the Association of Southeast Asian Nations (ASEAN) has become a priority target for the People's Liberation Army's military diplomacy.

### What is the People's Liberation Army (PLA) currently undertaking?

The PLA and the Laotian People's Armed Forces (LPAF) have recently concluded their bilateral military exercise, Friendship Shield 2023. The drills aim to foster interoperability to effectively "counter transnational armed criminal groups based in jungles and mountains." This week-long exercise comes on the heels of Laos' Foreign Affairs Minister Saleumxay Kommasith's visit to China last month. The PLA Southern Theatre Command (PLA STC) is leading a massive delegation to the LPAF's Kommadam Academy for the exercise.

This includes 200 troops from the 75th Group Army's combined-arms brigade, assault vehicles such as the 4x4 MRAP Dongfeng CSK141 (Mengshi), as well as equipment for maritime replenishment, mine clearance, explosive disposal, and epidemic prevention.

Before this, in 2023, the PLA STC conducted the 'Golden Dragon' drills with Cambodia from late March to early April. This too came on the heels of a high-level meeting held between Zhang Youxia, Vice-Chairman of the Chinese Central Military Commission (CMC) and the army commander of the Royal Cambodian Army, Hong Manai, in February this year. The drills saw the participation of over 200 troops from the PLA STC's Army, the Navy, and the Logistical Support

Force, who arrived in Cambodia aboard a Type 071 comprehensive landing vehicle, Jingtangshan. The exercise entailed joint anti-terrorism and humanitarian aid operations.

A few weeks later, in late April, the PLA STC conducted a joint exercise with the Singaporean Navy. Both sides deployed minesweepers (PLA Chibi and RSS Intrepid) and frigates (PLA Yulin and RSS Punggol) for shore and sea operations.

All of these joint military endeavours were preceded by a visit from a working group of the Chinese Ministry of National Defence to Laos, Vietnam and Brunei, where the two sides discussed “the relationship between the two militaries and regional security issues of common concern”.

These are a few of the many instances of China’s military diplomacy with Southeast Asian countries. And in the past couple of months, the frequency of Chinese military drills with its ASEAN partners appears to have increased for two primary reasons. Firstly, Xi Jinping has put excessive emphasis on defence diplomacy under his flagship Global Security Initiative (GSI).

Second, China’s threat perception of expanding the United States military engagement with countries in the Asia-Pacific region, especially those countries that China has disputes with in the South and East China Seas region.

### **How does the GSI challenge the ASEAN’s cohesiveness?**

The GSI invited varied responses from the ASEAN, which reflect the classic divergences in intra-association stances on bandwagoning and hedging between China and the U.S. First, in November 2022, during the ASEAN-China Summit in Cambodia, all parties cautiously agreed to “take note of the GSI proposed by China with core elements consistent with the principles and spirit of the Treaty of Amity,” and “looked forward to further details of the GSI.”

Over the past few months, the divergences have become visible. As per ISEAS’s ‘State of Southeast Asia Survey 2023’, on average, 27% of those surveyed in the 10 ASEAN place confidence in the GSI. However, of those surveyed in countries such as Cambodia and Brunei, nearly 50% are confident about the Initiative. On the other hand, of those surveyed in countries such as Indonesia, Philippines, Vietnam, Thailand and Myanmar, well over 50% place little to no confidence in it.

These figures, alone, however, are not enough to determine how ASEAN countries are responding to China’s expanding comprehensive national power. For example, China’s heavy Belt and Road investments have been welcomed by Indonesia. Moreover, despite tensions in the South China Sea, Indonesia has been proactively applauding Chinese support in the advancement of its vaccine programme and its high-speed rail network.

Similarly, despite Vietnam’s mistrust of the GSI, analysts suggest that it maintains a relatively neutral stance in its relations with China, which indicates that there is neither rapid progress nor significant deterioration in bilateral relations. This may be because a cautious Vietnam may not want to invite hostility from a significantly larger power in its neighbourhood. Additional factors may include shared socialist values between the central committees of the Communist Parties of Vietnam (CPV) and China (CPC), as well as the success of the Sino-Vietnamese ‘Two Corridors and One Economic Circle’ Belt and Road project.

On the other hand, in Myanmar, despite a majority of observers placing little to no confidence in the GSI, China is making political, military and economic inroads. Since the takeover of the junta, the development of the China-Myanmar Economic Corridor has only accelerated, while new satellite imagery is showing China building a surveillance military base on Great Coco Islands in Myanmar. This also impacts India because the Great Coco Islands lie just 55 km north of the Andaman and Nicobar Islands, and their militarisation by China poses a strategic threat to India’s national security.



## **Why is the Philippines' tilt to the U.S. worrisome for China?**

China continues to face competition from the U.S. in its bid to establish a sphere of influence over Southeast Asia. The increasing proximity of the U.S. with the Philippines, with whom China shares a disputed maritime border in the Luzon Strait in the South China Sea, is worrisome for China. What has perhaps recently irked China the most is the Philippines' decision to provide the U.S. with access to four military bases in addition to the five bases the U.S. already had access to, under the 2014 Enhanced Defence Cooperation Agreement between the two sides.

China has accordingly structured the message around its exercises with Cambodia, Singapore, and Laos as a warning to the Philippines, with a Chinese military commentator Fu Qinghao saying that these exercises "make a model for other countries in the region, including the Philippines, which has been leaning toward the U.S."

To add fuel to the fire, Philippine President Ferdinand Marcos Jr. said that "tensions across the Taiwan Straits seem to be continuing to increase, and so these EDCA sites will also prove to be useful for us should that terrible occurrence come about".

Of course, in tandem with other leaders hedging in the ASEAN, Marcos has since clarified that Washington "cannot use bases in his country for 'offensive action' against China in the event of a conflict over Taiwan." This does not, however, change the fact that the bases are advantageous for the U.S. during an offensive against China, as they help fulfil purposes such as refuel and resupply for warships, intelligence, reconnaissance and surveillance (ISR), and blocking Chinese trade through critical chokepoints in the South China Sea.

To defend its claims and interests in the region, China is likely to pursue both aggressive military posturing and diplomacy in Southeast Asia. In early May, for example, Chinese surveillance vessel Xiang Yang Hong 10, accompanied by a contingent of eight other maritime vessels, attempted to intimidate the navies of India and ASEAN countries engaged in the first edition of a multilateral naval drill in the South China Sea. Satellite intelligence also shows China preparing a new naval base in the Ream region of Cambodia.

However, despite China's military and economic inroads in the region, it needs to prove to ASEAN countries sitting on the fence that it has the capability to exercise restraint and act in accordance with the provisions of a Code of Conduct in the South China Sea (which is yet to come into force).

This is also essential for it to win the ASEAN's confidence for the GSI, which will otherwise, and for good reason, continue to cautiously hedge and balance between American and Chinese influence operations in the region.

<https://www.thehindu.com/opinion/op-ed/explained-chinas-military-diplomacy-in-southeast-asia/article66915433.ece>

# **ThePrint**

*Wed, 31 May 2023*

## **India, Vietnam Hold Third Maritime Security Dialogue in Delhi**

India and Vietnamese officials held the third Maritime Security Dialogue in New Delhi on Wednesday. Both sides discussed ways on how to maintain a maritime environment that is secure and supportive of inclusive growth for both nations.

“3rd India-Vietnam Maritime Security Dialogue held today in New Delhi. Senior officials from the respective Ministries and Services concerned with maritime affairs participated in the Dialogue,” the official spokesperson of the Ministry of External Affairs, Arindam Bagchi tweeted Wednesday.

The two sides discussed ways to sustain a secure maritime environment conducive to inclusive growth.

“Also reviewed maritime cooperation initiatives and avenues of reinforcing international and regional mechanisms for comprehensive maritime security,” Bagchi added.

Notably, the second India-Vietnam Maritime Security Dialogue was held in April 2021 in virtual format following the first round held in Hanoi in March 2019.

“India and Vietnam held their second maritime security dialogue in a virtual format on 6 April 2021. The consultations involved exchanges on developments in the domain of maritime security, regional cooperation activities and opportunities for cooperation between the two countries,” the MEA said in a statement.

Both India and Vietnam have always shared warm and cordial ties.

Recently at G7 Summit in Hiroshima in Japan, Prime Minister Narendra Modi held a bilateral meeting with his Vietnamese counterpart Pham Minh Chinh.

Both leaders discussed various aspects of the partnership of both nations including in defence.

“Prime Ministers @narendramodi and Pham Minh Chinh held talks in Hiroshima. They discussed different aspects of India-Vietnam friendship, particularly in areas like energy, technology, commerce and defence,” the Prime Minister’s Office tweeted.

<https://theprint.in/world/india-vietnam-hold-third-maritime-security-dialogue-in-delhi/1605194/>



*Thu, 01 Jun 2023*

## **North Korea’s Attempt to Launch its First Military Spy Satellite Ends in Failure**

AIR PICSNorth Korea’s attempt to launch its first military spy satellite ended in failure after the rocket’s second stage malfunctioned yesterday. North Korea said that an accident occurred as it planned to send up its first space satellite, causing it to crash into the sea. According to North Korean state media, the new satellite transport rocket Chollima-1 launch failed as it lost propulsion due to an abnormal startup of the engine on the second stage after the first stage was separated while flying normally. Authorities will analyze the cause of the accident and launch another rocket soon.

Earlier, North Korea had announced its plans to launch a satellite by 11 June to monitor US military activities. Meanwhile, the launch prompted emergency alerts and brief evacuation warnings in parts of South Korea and Japan. The notices were withdrawn with no danger or damage reported. Both the countries have sparked concerns and urged North Korea to abandon the plan, emphasizing that it would be considered a breach as it violates UN resolutions.

Japanese Prime Minister Fumio Kishida has said that North Korea appeared to have fired a ballistic missile and the government was analysing the details. He added that there were currently no reports

of damage following the launch. South Korea's military said the projectile might have broken up in mid-air or crashed after it vanished from radar and analysis was being conducted as per reports.

This was North Korea's sixth satellite launch attempt, and the first since 2016. It was supposed to put the nuclear-armed state's first spy satellite in orbit.

<https://newsonair.gov.in/News?title=North-Korea%E2%80%99s-attempt-to-launch-its-first-military-spy-satellite-ends-in-failure&id=461770>

## ARMY TECHNOLOGY

*Wed, 31 May 2023*

### **Israel's Missile Defence System Leads the Defence Market**

The budget has increased from \$19.3bn in 2019 to \$23.6bn in 2023, representing a compound annual growth rate (CAGR) of 5.2%.

Israel's thriving defence market presents an immense opportunity for defence companies, with the missiles and missile defence systems market predicted to be worth \$7.5bn between 2023 and 2028. Additionally, Israel's land and fixed-wing aircraft sectors are also expected to receive billions of dollars in investments during this period.

Meanwhile, its naval capabilities are similarly being enhanced with the introduction of Sa'ar-6 corvettes and advanced missile systems like the Barak-8, which is being co-developed in an innovative partnership between Israel Aerospace Industries and India's DRDO.

Israel, being the third largest defence market in the Middle East, following Saudi Arabia and the UAE, presents a highly profitable opportunity for defence companies. According to GlobalData's 'Israel Defense Market 2023-2028' report, the most attractive industries in Israel's defence sector are missiles and missile defence systems, military fixed-wing, and military land vehicles.

Further to GlobalData, the missiles and missile defence systems sector has emerged as the leading segment in the Israeli defence market. This includes the collaboration between Israel and the US on a range of Arrow missile defence systems, as well as the David's Sling missile defence system, and the Iron Dome missile defence system. This market is projected to amass a total worth of \$7.5bn between 2023 and 2028, with the platform-based missile defence systems sub-sector is projected to be the largest in the industry, with a value of \$857.4m over the same period.

Conventional land-attack missiles segment is expected to experience significant growth in the coming years, with projections for an increase from \$262m to \$332.8m by 2028. The contribution will be fuelled in part by investments in anti-tank guide missiles, representing \$308.8m of expenditure across 2023-2028 and anti-air missiles representing \$119.7m of expenditure across the same period.

Israel is currently undergoing the induction of approximately 39 F-35 multirole combat aircraft, with 36 of them having already been received. Israel reportedly plans to procure an extra multirole fighter, and is said to be weighing the option of acquiring the F-15EX Super Eagle instead of another F-35. According to recent reports, it is highly probable that Israel will procure another batch of the F-35I Adir, which is the customised version of the F-35A Lightning II aircraft.

The military fixed-wing aircraft sector has emerged as the second-largest sector in the Israeli defence market. A \$5.6bn investment is expected over the period of 2023-2028, with the multirole aircraft segment being the primary driver of the market, contributing a total of \$4.5m between 2023 and 2028.

The multirole aircraft segment is also expected to be the primary contributor to the expansion of the military fixed-wing aircraft industry in Israel. It is projected to increase from \$667.4m in 2023 to \$788.4m in 2028, with a compound annual growth rate (CAGR) of 3.4%.

With a cumulative investment of \$1.8bn over the next six years, the military land vehicles sector has secured its position as the third largest sector in the Israeli defence market. The armoured personnel carrier segment is expected to sustain the majority of the military land vehicles market, with a projected investment of \$1.3m over the forecast period. With a combined investment of \$495.1m, the infantry fighting vehicles and tactical trucks are anticipated to play a significant role in the expansion of the sector.

Israel's surface fleet is set to receive a significant boost with the addition of Sa'ar-6 corvettes and advanced missile systems. This move is expected to enhance the country's naval capabilities and strengthen its defence posture. The Israeli navy is currently in the midst of introducing four brand new Sa'ar-6 corvettes into their fleet. The Israeli navy's Sa'ar corvettes, which are derived from the German Braunschweig-class corvette, have undergone significant modifications to meet the specific needs of Israel.

The Israeli Sa'ar-6 vessels are currently undergoing integration with the Barak-8 Medium Range Surface to Air Missile (MRSAM) system. This system is being co-developed by Israel Aerospace Industries (IAI) and India's Defence Research and Development Organisation (DRDO). The Barak-8 system is anticipated to improve the Israeli navy's ability to safeguard its key assets from potential cruise missile assaults.

Israel is reportedly developing a new version of its Gabriel anti-ship cruise missile (ASCM) as for use in a densely populated littoral environment. The recently unveiled Gabriel V cruise missile system boasts state-of-the-art active multi-spectra seekers and has been designed to function effectively in a littoral setting.

<https://www.army-technology.com/news/israels-missile-defence-system-leads-the-defence-market/>



*Wed, 31 May 2023*

## **Canada to Set up Cyber Security Certification for Defence Contractors**

Canada will work with the United States to draft a cyber security certification framework for defence contractors that will be identical for both countries as incidents of malicious hacking increase, the defence minister said on Wednesday.

Russian President Vladimir "Putin's war on Ukraine has reminded all of us that the cyber domain is crucial to our national security," Canadian Defence Minister Anita Anand said at CANSEC, an annual defence trade show in Ottawa.

"Here at home, malicious cyber activities have targeted defence contractors and subcontractors across Canada, leaving classified information vulnerable," she said.

Without certification, which should be in place by the end of next year, Canadian suppliers risk being excluded from future international defence procurement opportunities, the defence ministry said in a statement.

The Canadian certification framework will be designed in collaboration with the United States so that defence contractors working in both countries will only need to be certified once, the ministry said.

<https://www.reuters.com/world/americas/canada-set-up-cyber-security-certification-defence-contractors-minister-2023-05-31/>

## Science & Technology News

### Business Standard

Wed, 31 May 2023

## India has Made Giant Leaps in Science, Tech & Space Research, Says Minister

The Union Minister of State (independent charge) for Science and Technology, Jitendra Singh addressed the 46th Induction Programme for new recruits at the ministry by sharing the significant scientific progress made by the country in the past nine years during Prime Minister Narendra Modi tenure. Here are some of the biggest accomplishments over the last decade.

### Vaccine development during Covid-19

During the Covid-19 pandemic, Indian pharmaceutical companies developed vaccines in a short time, effectively combating the spread of the virus. These vaccines were not only used domestically but also exported to the developed world and fulfilled World Health Organisation (WHO) commitments.

The Department of Biotechnology (DBT) played a key role in the 'Mission Covid-19 Suraksha' initiative, which resulted in the development of four vaccines: ZyCoV-D (DNA vaccine), CORBEVAX™ (protein subunit vaccine), GEMCOVAC-19 (mRNA vaccine), and iNCOVACC (intranasal Covid-19 vaccine). This was an estimated Rs 900 crore initiative, part of the Atmanirbhar Bharat 3.0 package.

### Improvement in global rankings

India's Global Innovation Index (GII) ranking significantly improved, moving from 81st in 2015 to 40th in 2022 among 130 economies worldwide.

India ranks ninth globally in terms of resident patent filings, and the participation of women in extramural research and development has doubled in the past nine years.

The country has made significant advancements in renewable energy, ranking fourth globally in renewable energy installed capacity, wind power capacity, and solar power capacity.

India also holds the third position globally in terms of the number of startups at 77,000 and unicorns at 107.

### Increase in research

The Gross Expenditure on Research and Development (GERD) in India has tripled over the past decade.

India's defence exports grew by 334 per cent in the last five years, reaching a record of Rs 13,000 crore in the financial year 2021-22. India is now exporting defence equipment to more than 75 countries.

### **New developments in sector**

The space sector reforms have led to the emergence of 102 startups engaged in cutting-edge areas such as space debris management, nano-satellites, launch vehicles, and ground systems.

India has also become a major contributor to global food production, particularly in food grain, horticulture, and livestock-poultry sectors thanks to the innovation done in these fields. Last year the Indian Council of Agricultural Research (ICAR) reportedly produced more than 339,000 qt. of seeds and 147.56 million saplings, seedlings, and livestock strains, made available for farmers.

The National Quantum Mission (NQM) was also recently approved by the union cabinet. This will aim to establish a vibrant and innovative ecosystem in quantum technology (QT). The mission includes the development of intermediate-scale quantum computers, secure quantum communications, and a multi-node Quantum network with quantum memories.

[https://www.business-standard.com/india-news/india-has-made-giant-leaps-in-science-tech-space-research-says-minister-123053100713\\_1.html](https://www.business-standard.com/india-news/india-has-made-giant-leaps-in-science-tech-space-research-says-minister-123053100713_1.html)



*Thu, 01 Jun 2023*

## **‘India Conducts Asia’s First Demo of Performance-based Navigation for Copters’**

India conducted Asia’s first demonstration of performance-based navigation for helicopters for a flight from Juhu in Mumbai to Pune using GAGAN satellite technology, civil aviation minister Jyotiraditya Scindia said on Wednesday.

Union minister Jyotiraditya Scindia said it is a fine example of the “Indian aviation sector blazing a trail in innovation!” (ANI)

GAGAN — GPS Aided GEO Augmented Navigation — is a state-of-the-art space-based augmentation system which adds more accuracy to output of GPS Navigation system by providing local geographical positioning for better accuracy of location of aircraft for more efficient traffic management.

The technology was jointly developed by the Indian Space Research Organisation (Isro) and the Airports Authority of India (AAI).

In a Twitter post on Wednesday, Scindia said it is a fine example of the “Indian aviation sector blazing a trail in innovation!”

He added, “India conducts Asia’s first demonstration for Performance-Based Navigation for helicopters. The flight from Juhu to Pune made use of the #GAGAN satellite technology that enhances accuracy, allowing for high quality air traffic management. Congratulations @AAI\_Official.”

The satellite technology helps aircraft/ helicopters with guided landing at airports that do not have instrument landing systems for low-visibility operations. All registered aircraft in India will have to comply with GAGAN — which was introduced in 2019 — by December 2025.

“The test flight operated between Mumbai and Pune was facilitated by the Juhu airport officials,” an AAI official told HT. “The outcomes, however, will be studied further.”

Experts termed the development “a big leap” for Indian aviation sector.

“Helicopters which fly at much lower levels are always at risk for locational inaccuracy specially in case of accidents for search and rescue operations. Now, they have successfully completed trials, which a big leap for Indian aviation sector,” said former defence pilot and aviation expert Vipul Saxena. “This will enhance better traffic management of both aircraft and helicopters in Indian air space.”

<https://www.hindustantimes.com/india-news/india-conducts-asia-s-first-performance-based-navigation-demo-using-gagan-satellite-technology-for-helicopters-101685559498946-amp.html>



*Thu, 01 Jun 2023*

## **Consuming Junk Food could Negatively Impact Quality of Deep Sleep: Research**

Uppsala University researchers examined how junk food impacts sleep in a new study. In random order, healthy volunteers consumed an unhealthy and a healthier diet. The quality of the participants' deep sleep had decreased after the unhealthy diet, compared to those who had followed the healthier diet. The findings of the study were published in the journal Obesity. Several epidemiological studies have found that what we eat influences how we sleep. However, few research have looked into how nutrition impacts sleep directly. One method is to have the same individual consume various diets in a random order.

"Both poor diet and poor sleep increase the risk of several public health conditions. As what we eat is so important for our health, we thought it would be interesting to investigate whether some of the health effects of different diets could involve changes to our sleep. In this context, so-called intervention studies have so far been lacking; studies designed to allow the mechanistic effect of different diets on sleep to be isolated," said Jonathan Cedernaes, Physician and Associate Professor in Medical Cell Biology at Uppsala University.

Previous epidemiological studies have shown that diets with greater sugar content, for example, are linked to poorer sleep. Yet sleep is an interplay of different physiological states, as Cedernaes explains:

"For example, deep sleep can be affected by what we eat. But no study had previously investigated what happens if we consume an unhealthy diet and then compared it to quality of sleep after that same person follows a healthy diet. What is exciting in this context is that sleep is very dynamic. Our sleep consists of different stages with different functions, such as deep sleep which regulates hormonal release, for example. Furthermore, each sleep stage is hallmarked by different types of electrical activity in the brain. This regulates aspects such as how restorative sleep is, and differs across different brain regions. But the depth or integrity of the sleep stages can also be negatively affected by factors such as insomnia and ageing. Previously, it has not been investigated whether similar changes in our sleep stages can occur after exposure to different diets."

Each study session involved several days of monitoring in a sleep laboratory. Therefore, only 15 individuals were included in the study. A total of 15 healthy normal-weight young men participated in two sessions. Participants were first screened for aspects such as their sleep habits, which had to

be normal and within the recommended range (an average of seven to nine hours of sleep per night).

In random order, the participants were given both a healthier diet and an unhealthier diet. The two diets contained the same number of calories, adjusted to each individual's daily requirements. Among other things, the unhealthier diet contained a higher content of sugar and saturated fat and more processed food items. The meals of each diet had to be consumed at individually adjusted times, which were matched across the two dietary conditions. Each diet was consumed for a week, while the participants' sleep, activity and meal schedules were monitored at an individual level.

After each diet, the participants were examined in a sleep laboratory. There, they were first allowed to sleep a normal night, while their brain activity was measured to monitor their sleep. The participants were then kept awake in the sleep laboratory, before being allowed to catch up on sleep. Their sleep was recorded in this case, too.

"What we saw was that the participants slept for the same amount of time when they consumed the two diets. This was the case both while they were following the diets, as well as after they had switched to another, identical diet. In addition, across the two diets, the participants spent the same amount of time in the different sleep stages. But we were particularly interested in investigating the properties of their deep sleep. Specifically, we looked at slow-wave activity, a measure that can reflect how restorative deep sleep is. Intriguingly, we saw that deep sleep exhibited less slow-wave activity when the participants had eaten junk food, compared with consumption of healthier food. This effect also lasted into a second night, once we had switched the participants to an identical diet. Essentially, the unhealthy diet resulted in shallower deep sleep. Of note, similar changes in sleep occur with ageing and in conditions such as insomnia. It can be hypothesised, from a sleep perspective, that greater importance should potentially be attached to diet in such conditions," explained Cedernaes.

The researchers do not currently know how long-lasting the sleep effects of the unhealthier diet may be. The study did not investigate whether the shallower deep sleep may alter functions that are regulated by deep sleep, for example.

"It would also be interesting to conduct functional tests, for example to see whether memory function can be affected. This is regulated to a large extent by sleep. And it would be equally interesting to understand how long-lasting the observed effects may be. Currently, we do not know which substances in the unhealthier diet worsened the depth of deep sleep. As in our case, unhealthy diets often contain both higher proportions of saturated fat and sugar and a lower proportion of dietary fibre. It would be interesting to investigate whether there is a particular molecular factor that plays a greater role. Our dietary intervention was also quite short, and both the sugar and fat content could have been higher. It is possible that an even unhealthier diet would have had more pronounced effects on sleep," noted Cedernaes.

<https://www.hindustantimes.com/lifestyle/health/consuming-junk-food-could-negatively-impact-quality-of-deep-sleep-research-101685528502773.html>



