

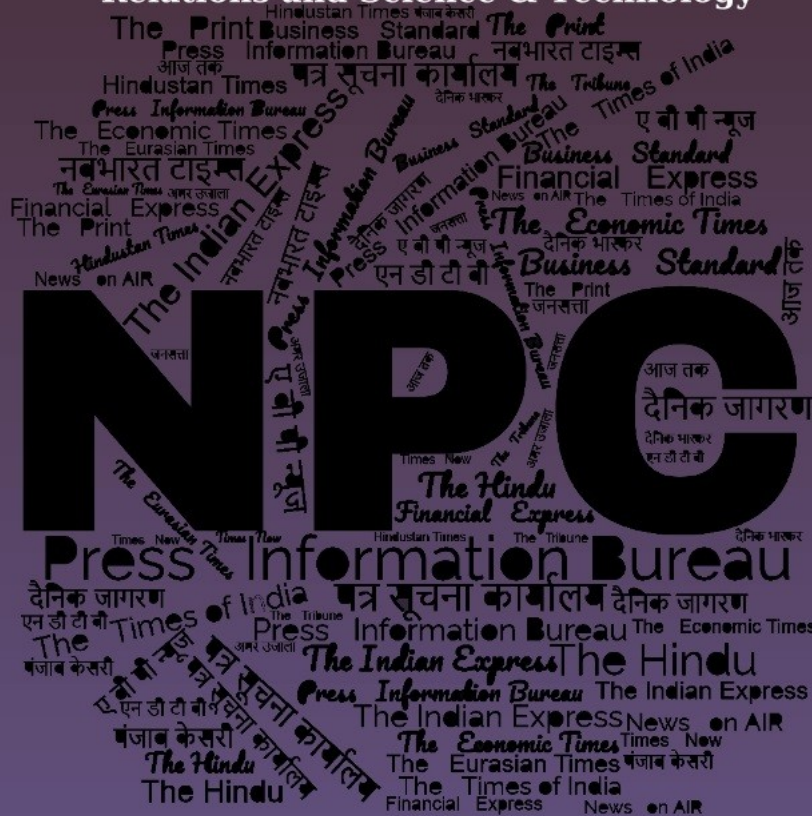
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# समाचार पत्रों से चयनित अंश Newspapers Clippings

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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# अमरउजाला

Thu, 25 July 2024

## DRDO: पाकिस्तान-चीन की मिसाइल नष्ट करेगा इंटरसेप्टर एडी-1; ओडिशा में सफल परीक्षण पर रक्षा मंत्री ने दी बधाई

रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) की इंटरसेप्टर मिसाइल एडी-1 पाकिस्तान या चीन की मिसाइल को पलक झपकते नष्ट कर देगी। डीआरडीओ ने बुधवार को एडी-1 का अपने तरह का अनोखा सफल परीक्षण किया। एडी-1 एक समुद्र आधारित एंडो-एटमोसफेरिक बीएमडी इंटरसेप्टर मिसाइल है।

ओडिशा के बालासोर जिले के अब्दुल कलाम आइलैंड में लॉन्च पैड-श्री से पहले पृथ्वी-2 न्यूक्लियर बैलिस्टिक मिसाइल को सुबह 4:25 बजे दागा गया। जैसे ही पृथ्वी-2 मिसाइल ने बंगाल की खाड़ी में प्रवेश किया तो इंटरसेप्टर मिसाइल एडी-1 ने इसे भेदकर मार गिराया। इस परीक्षण के लिए बालासोर जिला प्रशासन ने दस गांवों के 10,581 लोगों को अस्थाई तौर पर विस्थापित किया था। एडी-1 की मदद से भारत भविष्य में देश की तरफ आने वाली किसी भी मिसाइल को हवा में नष्ट कर देगी। इस मिसाइल के दो श्रेणी एडी-1 और एडी-2 है।

राजनाथ ने दी डीआरडीओ को बधाई

रक्षामंत्री राजनाथ सिंह ने सफल परीक्षण के लिए डीआरडीओ की सराहना की। उन्होंने कहा, बुधवार को फिर से डीआरडीओ ने बैलिस्टिक मिसाइल की रक्षा क्षमता का प्रदर्शन किया है। इसके लिए डीआरडीओ की टीम को बधाई। डीआरडीओ अध्यक्ष डॉक्टर समीर वी कामत ने भी पूरी टीम को बधाई दी।

**5000** किमी रेंज वाली मिसाइलों को मार गिराने में हैं सक्षम

एडी-1 व एडी-2 दोनों ही मिसाइलें दुश्मन की मध्यम दूरी की बैलिस्टिक मिसाइल (आईआरबीएम) को नष्ट कर सकती हैं। ये 5000 किमी रेंज तक वाली मिसाइलों को मार गिराने में सक्षम हैं। इनमें अमेरिका के टर्मिनल हाई एल्टीट्यूड एरिया डिफेंस (टीएचएएडी) मिसाइल जैसी रक्षा प्रणाली है। ये दुश्मन की मिसाइलों को आता देख फायर हो जाएंगी। ये अपनी जमीन से 1000 से 3000 किमी दूर पर ही उन्हें नष्ट कर देगी।

आईआरबीएम मिसाइलों की रेंज व्यापक

इंटरसेप्टर मिसाइल एडी-1 को मध्यम दूरी की बैलिस्टिक मिसाइलों (आईआरबीएम) को ध्वस्त करने के मकसद से बनाया गया है। आईआरबीएम मिसाइलों की रेंज 3 से 5 हजार किलोमीटर होती है। अगर चीन इतनी दूरी से मिसाइल दागता है तो भारतीय सेना या नौसेना उसे रास्ते में ही ध्वस्त कर देगी।

<https://www.amarujala.com/india-news/drdo-interceptor-ad-successful-test-balasore-odisha-defence-minister-best-wishes-2024-07-25>



## **DRDO successfully flight-tests Phase-II Ballistic Missile Defence System**

Defence Research & Development Organisation (DRDO) successfully flight-tested Phase-II Ballistic Missile Defence System on July 24, 2024. The Target Missile was launched from LC-IV Dhamra at 1620 hrs mimicking adversary Ballistic Missile, which was detected by weapon system radars deployed on land and sea and activated the AD Interceptor system.

The Phase-II AD Endo-atmospheric missile was launched from LC-III at ITR, Chandipur at 1624 hrs. The flight test fully met all the trial objectives validating complete network centric warfare weapon system consisting of Long Range Sensors, low latency communication system and MCC and Advance Interceptor missiles.

The test has demonstrated Nation's indigenous capability to defend against the Ballistic Missiles of 5000 km class. The performance of the missile was monitored from the flight data captured by Range tracking instruments like Electro-Optical Systems, Radar and Telemetry Stations deployed by ITR, Chandipur at various locations including on-board ship.

The Phase-II AD Endo-atmospheric missile is an indigenously developed Two Stage solid propelled ground launched missile system meant for neutralising many types of enemy ballistic missile threats in the altitude bracket of endo to low exo-atmospheric regions. A number of state-of-the-art indigenous technologies developed by various DRDO laboratories have been incorporated in the missile system.

Raksha Mantri Shri Rajnath Singh complimented DRDO for today's successful flight test and stated that it has again demonstrated the Ballistic Missiles Defence capability.

Secretary Department of Defence R&D and Chairman DRDO Dr Samir V Kamat congratulated entire DRDO team for their untiring effort and contribution culminating into today's successful flight test.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2036561>

**THE ECONOMIC TIMES**

*Wed, 24 July 2024*

## **Raksha Rajya Mantri visits DRDO, learns about collaborations with private sector and MSMEs**

Raksha Rajya Mantri Sanjay Seth visited the Defence Research and Development Organisation (DRDO) Bhawan in New Delhi on Wednesday, where he was informed about DRDO's collaborations with the private sector, MSMEs, and academia, with a focus on sectors like artificial intelligence, robotics, and cyber security.



Secretary Department of Defence R&D and Chairman DRDO Dr Samir V Kamat gave Seth a detailed presentation on the recent achievements, major ongoing projects and the future roadmap. Seth was also apprised about the DRDO-developed cutting-edge state-of-the-art technologies and systems being used by the Armed Forces and those under development, a press release by the Ministry of Defence said.

he Raksha Rajya Mantri was also briefed about the various collaborations of DRDO with private sector industry, MSMEs and academia to focus on deep tech areas like artificial intelligence, robotics, cyber security, unmanned systems, and advanced materials, including dual-use technology, where rapid innovation can significantly enhance defence capabilities.

He was further apprised about how the Technology Development Fund (TDF) scheme is encouraging the participation of private industries, especially startups and MSMEs, to create an ecosystem aimed at enhancing the capabilities in cutting-edge technology and promoting 'Aatmanirbharta' in defence, the release added further.

DRDO's initiatives to involve the industry, from the initial stages of system development to the availability of DRDO patents to the industry and support to academia through DRDO Industry Academia (Centres of Excellence), extramural research grants, etc were also explained.

Meanwhile, a week ago, the Defence Research and Development Organisation (DRDO) awarded seven new projects to industries under the Technology Development Fund scheme for various requirements of the Armed Forces and aerospace and defence sectors.

These project sanctions are a testimony to the continuing endeavour of DRDO in nurturing Industries, especially MSMEs and start-ups, in the defence and aerospace domains. The Indigenous development of these technologies will strengthen the military-industrial ecosystem. The

Indigenous Scenario and Sensor Simulation Toolkit project involves the development of an indigenous toolkit for simulator training of pilots in realistic scenarios.

This will help in full mission planning and large-force engagement. The project has been awarded to start-up, Oxygen 2 Innovation Pvt Ltd, Noida. The Underwater Launched Unmanned Aerial Vehicle project relates to versatile marine battlefield accessories that can be deployed in multiple combat roles. The objective is Intelligence, Surveillance and Reconnaissance (ISR) and Maritime Domain Awareness (MDA).

The project has been awarded to Sagar Defence Engineering Pvt Ltd Pune. Long-range Remotely Operated Vehicles for Detection and Neutralisation Vehicles are dual-use systems that will enable the detection, classification, localisation and neutralisation of underwater objects while keeping the key assets away from the suspected operational area. The project has been awarded to a start-up, IROV Technologies Pvt Limited, Kochi.

The development of the Ice Detection Sensor for Aircraft project aims to detect icing conditions in-flight, caused by supercooled water droplets that freeze after their impact against the aircraft's external surfaces and are utilised by the aircraft for turning on the aircraft Anti-icing mechanism. It has been awarded to Craftlogic Labs Pvt Ltd, Bengaluru.

The development of a Radar Signal Processor with an Active Antenna Array Simulator project will enable the deployment of multiple target systems for test and evaluation of multiple short-range aerial weapon systems. It serves as the basic building block for larger radar systems. The project has been sanctioned to Data Pattern (India) Limited, Chennai.

Development of the Indian Regional Navigation Satellite System-based Timing Acquisition and Dissemination System project has been sanctioned to Accord Software and Systems Pvt Ltd, Bengaluru. It aims to enable the indigenization of timing acquisition and dissemination system, the use of Indian Constellation for acquiring time and the development of a customised and flexible timing system as per range requirements.

Development of Graphene-Based Smart and E-textiles for Multifunctional Wearable Applications The start-up, Alohatech Private Limited, Coimbatore, has been sanctioned the project. It will develop conductive yarn and fabricmaking processes using graphene nanomaterials and conductive inks. The outcome will be advanced nanocomposite materials-based E-textiles utilising the inherent advantages for practical clothing applications.

<https://economictimes.indiatimes.com/news/defence/raksha-rajya-mantri-visits-drdo-learns-about-collaborations-with-private-sector-and-msmes/articleshow/111994406.cms>

## **Business Standard**

*Thu, 25 July 2024*

### **Dy Air Chief visits DRDO, HAL, TASL in Hyd, lauds indigenisation efforts**

Deputy Chief of Air Staff Air Marshal Ashutosh Dixit visited the Defence Research and Development Organisation (DRDO), Hindustan Aeronautics Limited (HAL) and TATA Advanced Systems Limited (TASL) in Telangana's Hyderabad in a two-day visit from July 23-24, an Indian Air Force (IAF) statement said on Wednesday.

During his visit, the Deputy Air Chief interacted with the Chief Executive of the Centre for Military Airworthiness and Certification (CEMILAC) APVS Prasad, the Director General of Missiles and Strategic Systems (MSS) U Raja Babu, and the team of Airbus and TASL.

During his interaction with the officials, Air Marshal Dixit lauded the indigenization efforts towards self-reliance by several organisations.

The highlights of the Deputy Chief's visit included granting production clearance for ASTRA missiles at the Defence Research and Development Laboratory (DRDL), reviewing avionics indigenization at HAL, and inspecting the C-295 aircraft production line at TASL.

ASTRA is a Beyond Visual Range (BVR) class of Air-to-Air Missile (AAM) system designed to be mounted on fighter aircraft. The missile is designed to engage and destroy highly manoeuvrable supersonic aircraft.

On July 24, DRDO successfully flight-tested Phase II of the Ballistic Missile Defence System. The Target Missile was launched from LC-IV Dhamra, mimicking an adversary Ballistic Missile, which was detected by weapon system radars deployed on land and sea and activated the AD Interceptor system.

The Phase-II AD Endo-atmospheric missile was launched from LC-III at the Integrated Test Range (ITR), Chandipur, Odisha.

[https://www.business-standard.com/external-affairs-defence-security/news/dy-air-chief-visits-drdo-hal-tasl-in-hyd-lauds-indigenisation-efforts-124072500102\\_1.html](https://www.business-standard.com/external-affairs-defence-security/news/dy-air-chief-visits-drdo-hal-tasl-in-hyd-lauds-indigenisation-efforts-124072500102_1.html)

## Defence News

## Defence Strategic: National/International



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

*Wed, 24 July 2024*

### **Launch Of 'Triput'**

#### **First Of Two Additional P1135.6 Follow On Ships**

The first of two Advanced Frigates under construction by Goa Shipyard Limited (GSL) for the Indian Navy, was launched on 23 Jul 24 at GSL, Goa. In keeping with maritime tradition, the ship was launched by Smt Rita Sreedharan to the invocation from Atharva Veda, in the presence of Shri P S Sreedharan Pillai, Hon'ble Governor of Goa. The ship has been named Triput, after the



mighty arrow, representing the indomitable spirit of Indian Navy and its ability to strike far and deep.

The contract for building two Tripud class Advance Frigates was signed between the Ministry of Defence and Goa Shipyard Limited on 25 Jan 19. The ship is designed for combat operations against enemy surface ships, submarines and air crafts. The Tripud class ships are 124.8 m long and 15.2 m wide, with a draught of 4.5 m. Their displacement is approx. 3600 tons and speed a maximum of 28 knots. The ships are equipped with stealth features, advanced weapon & sensors and platform management systems.

Being constructed at GSL, the Tripud class of ships are follow on ships of the Teg and Talwar class ships acquired from Russia. These frigates are being constructed for the first time indigenously by an Indian Shipyard. In line with the 'Aatmanirbhar Bharat' initiative, a large percentage of the equipment fit, including weapons & sensors is of indigenous origin, thereby ensuring that large scale defence production is executed by Indian manufacturing units, generating employment and capability enhancement within the country.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2036157>



**Press Information Bureau**  
**Government of India**

**Ministry of Defence**

**Wed, 24 July 2024**

## **Update On Incident Onboard INS Brahmaputra**

Following the unfortunate incident of INS Brahmaputra in Naval Dockyard Mumbai, Adm Dinesh K Tripathi, CNS visited Mumbai on 23 Jul 24. He reviewed the sequence of events leading to the accident and efforts undertaken to locate the missing sailor.

The CNS was briefed on the mitigating actions taken to limit the extent of the damage, plan to recover and undertake repairs to restore the ship's functionality at the earliest. The CNS directed that all actions by the Command and Naval Headquarters to make INS Brahmaputra seaworthy and combat ready are to be initiated immediately.

Interacting with the crew of INS Brahmaputra, CNS exhorted the crew to work towards early operationalisation of the ship in the true spirit of the Indian Navy.

The body of Sitendra Singh, Leading Seaman, has been found today after intensive diving operations.

Adm Dinesh K Tripathi, CNS and all personnel of Indian Navy extend their deepest condolences to the family of Sitendra Singh, Leading Seaman. The Indian Navy stands resolutely with the bereaved family in this hour of grief.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2036537>



**Press Information Bureau  
Government of India**

**Ministry of Defence**

*Wed, 24 July 2024*

## **Working Sub Group of Indian-Russian Intergovernmental Commission on Military and Military Technical Cooperation holds its 3rd Meeting in New Delhi**

The Working Sub Group on Planning of Military Cooperation of the India-Russia Intergovernmental Commission on Military and Military Technical Cooperation (IRIGC-M&MTC) held its 3rd Meeting on 23-24 July, 2024 at New Delhi. The discussions focused on strengthening the ongoing defence engagements between the two sides, pondering over new initiatives under the ambit of the existing bilateral defence cooperation mechanism.

The Working Sub Group Meeting is a forum established to carry forward defence cooperation between the countries through regular talks at the operational level between Headquarters, Integrated Defence Staff (HQIDS) and the Main Directorate of International Military Cooperation of the Ministry of Defence, Russian Federation.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2036312>



*Wed, 24 July 2024*

## **Can the Indian Navy warship INS Brahmaputra sail again? Here's what we know so far**

Navy Chief Admiral Dinesh K Tripathi visited the Naval Dockyard in Mumbai on Tuesday (July 23) to assess the situation after an on-board fire caused heavy damage to a naval warship.

The INS Brahmaputra guided missile frigate listed heavily towards its port side following the fire on Sunday (July 21) night, and could not be uprighted. The fire was put out by the crew of the warship with assistance from firefighters at the dockyard by Monday morning.

Here's what is known about the mishap and the significant concerns that it raises.

### **What kind of warship is the Brahmaputra?**

The INS Brahmaputra is the first of India's indigenously built Brahmaputra-class guided missile frigates. It was built by state-run Garden Reach Shipbuilders & Engineers Limited in Kolkata, and it was commissioned into the Navy in 2000. The INS Beas and INS Betwa are two other warships in this class.

The INS Brahmaputra has a length of 125 metres, beam (width) of 14.4 metres, and displacement of 5,300 tonnes, and is capable of speeds in excess of 27 knots (50 km/h).

The ship is manned by a crew of 40 officers and 330 sailors. She is fitted with medium-range, close-range and anti-aircraft guns, surface-to-surface and surface-to-air missiles, and torpedo launchers.

The ship has a wide array of sensors, and is capable of operating Seaking and Chetak helicopters, enabling it to perform a variety of roles including coastal and offshore patrolling, monitoring of sea lines of communication, maritime diplomacy, counter-terrorism and anti-piracy operations.

### **What was the warship doing at the Naval Dockyard in Mumbai?**

The warship was in Mumbai undergoing a refit.

All warships of the Navy undergo periodic refits, alongside their operational cycle, during which they undergo various upgrades, including on their sensors, weapon systems, and other critical systems and equipment on board.

### **So how did the fire on board break out?**

The specific cause of the fire on board the Brahmaputra will only be established by the inquiry that the Indian Navy has commissioned.

However, in general terms, a fire on a ship can be categorised into a general, an electrical, or an oil-based fire, for which there are separate dousing mechanisms — using seawater, foam, or carbon-dioxide fire extinguishers respectively.

The ship was in the dock for major retrofitting, so the fire could have been caused by ongoing welding work, or perhaps an electrical short circuit. The ship could also have caught fire after high temperatures ignited the vast amounts of oil on board.

### **Will the Brahmaputra sail again?**

Officials told The Indian Express that efforts would be made to repair the ship and make her seaworthy as soon as possible.

They said that while the extent of the damage was yet to be ascertained, it was likely to be less than an accident involving, say, a collision or a dry dock fall, which is often irreparable. (A dry dock is a small basin or enclosed space in a shipyard into which a vessel that is being built or is in need of repairs is emptied of water, so that the entire vessel can be worked on.)

The officials added that in all likelihood, attempts to douse the fire on board led to an accumulation of water in the upper compartment of the ship, which caused it to become unstable and to ultimately keel over to one side.

### **Has a damaged Indian warship been salvaged earlier?**

It is learnt that the INS Betwa, the second ship of the Brahmaputra class of frigates, had in fact, suffered greater damage after it tipped over to one side in 2016 while undocking in Mumbai, but it had been successfully salvaged by specialists.

An American firm called Resolve Marine, which describes itself as a “global leader in maritime response, recovery and compliance”, was contracted to salvage the warship. Resolve Marine states on its website that the 3,800-tonne Betwa “capsized on her port side due to a loss of stability while undocking”.

It says that Resolve Marine was “contracted to conduct an immediate dive survey, then to stabilize, block and support the vessel to allow the drydock to be fully dewatered”. Specialists from the company, “working alongside the Indian Navy... inspected all compartments of the vessel, then

proceeded to patch and repair all damages, and secure all openings”, Resolve Marine says on its website.

The salvage operation was concluded in less than two months with the help of “complex hydrodynamic calculations and the use of intricate measuring and monitoring systems”, the website says. “By systematically flooding and pumping compartments, the vessel was rolled upright and done so without the use of any external lifting force,” it says.

### **Are such accidents involving warships common?**

\* Three naval personnel died of injuries caused by an explosion on board Indian Navy’s destroyer ship INS Ranvir in 2022. Eleven other personnel were injured in the accident.

\* Two sailors were killed and 15 others were injured in the accident involving the INS Betwa in 2016.

\* In 2014, a fire in another Kilo Class submarine INS Sindhuratna resulted in the deaths of two sailors 50 nautical miles off Mumbai. Former Navy Chief Admiral D K Joshi had resigned taking responsibility for the incident.

\* In 2013, the conventional Kilo Class submarine INS Sindhurakshak sank at the Naval Dockyard after an explosion in the forward compartment of the vessel that was loaded with armaments. Eighteen crew members were killed in the mishap.

\* In 2011, the Nilgiri-class frigate INS Vindhyagiri collided with a German merchant vessel at the entrance to Mumbai harbour, leading to a fire on the ship. The Vindhyagiri subsequently sank.

<https://indianexpress.com/article/explained/can-ins-brahmaputra-sail-again-explained-9473475/>

# THE ECONOMIC TIMES

Thu, 25 July 2024

## **Indian Army contingent to participate in joint military Ex Khaan Quest 2024 in Mongolia**

The Indian Army contingent will participate in the 21st edition of the multinational joint military exercise Khaan Quest 2024, which is scheduled to be held in Mongolia later this week.

The joint military exercise will be held from July 27 to August 9. Khaan Quest 2024 will be aimed at enhancing the interoperability of the participating nations during peacekeeping missions in a multinational environment.

"Exercise # KhaanQuest 2024 #IndianArmy contingent will participate in 21st edition of Multinational Joint Military Exercise #KhaanQuest 2024, conducted in #Mongolia from 27 July to 09 August 2024. The exercise aims to enhance interoperability of the participating nations during peacekeeping missions in a multinational environment," the Indian Army stated in a post on X. Exercise # KhaanQuest 2024#IndianArmy contingent will participate in 21st edition of Multinational Joint Military Exercise #KhaanQuest 2024, conducted in #Mongolia from 27 July to 09 August 2024. The exercise aims to enhance interoperability of the participating nations during... pic.twitter.com/eUzZcyYS2t - ADG PI - INDIAN ARMY (@adgpi) July 24, 2024

Earlier this month, the 16th edition of the India-Mongolia Joint Military Exercise, Nomadic Elephant 2024, concluded on Tuesday, and the two sides engaged in a meaningful dialogue about

future joint operations, symbolising the deepened ties and mutual respect cultivated throughout the exercise.

The exercise, which started on July 3, concluded after an intense 14 days of training and collaboration. The closing ceremony took place at the Joint Training Node in Umroi, graced by Major Gen Ganbyamba Sunrev, Chief of General Staff of the Mongolian Armed Forces, and Lt Gen Zubin A Minwalla, AVSM, YSM, GOC of the Trishakti Corps.

This exchange further highlighted their unwavering commitment to fostering partnership in the realm of regional security. Following the ceremony, the Indian contingent showcased their advanced capabilities through a spectacular display of cutting-edge weapons and equipment.

<https://economictimes.indiatimes.com/news/defence/indian-army-contingent-to-participate-in-joint-military-ex-khaan-quest-2024-in-mongolia/articleshow/112001980.cms>



*Thu, 25 July 2024*

## **Two Russian stealth frigates for Indian Navy launched**

The first of two advanced frigates, which is under-construction by the Goa Shipyard Limited (GSL) with technology transfer from Russia for the Indian Navy, was launched into water on Wednesday. India had contracted four frigates from Russia in October 2016, two of them to be built in Russia and two at the GSL.

“In keeping with maritime tradition, the ship was launched by Rita Sreedharan, to the invocation from Atharva Veda, in the presence of P.S. Sreedharan Pillai, Governor of Goa. The ship has been named Triput, after the mighty arrow, representing the indomitable spirit of Indian Navy and its ability to strike far and deep,” the Navy said in a statement on the launch.

As reported by The Hindu earlier, the first ship, Tushil, from Russia is ready and is expected to be scheduled to the Indian Navy in September this year and the second ship Tamal by February 2025.

In November 2018, the GSL signed a \$500-million deal with Rosoboronexport of Russia for material, design and specialist assistance to locally manufacture the two frigates, and in January 2019, the contract was signed between the Indian Defence Ministry and GSL. The Triput class frigates are 125-metre long and 15-metre wide, with a displacement of approximately 3,600 tons and a maximum speed of 28 knots.

As per schedule, the GSL is scheduled to deliver the first ship to the Navy in 2026 and the second one six months later. The four frigates contracted are a follow on to the six Teg and Talwar class ships acquired from Russia. The delivery of the two ships being constructed in Russia has been delayed due to COVID-19, war in Ukraine and western sanctions.

<https://www.thehindu.com/news/national/two-russian-stealth-frigates-for-indian-navy-launched/article68442108.ece>

## **After PM's visit, Russia expedites supply of super long-range surface-to-Air missiles**

Close on the heels of PM Narendra Modi's Moscow trip for the annual summit, Russia is supplying 120 super long-range Surface-to-Air missiles to India that will give the country's military an edge over Pakistan.

The order was placed following the Balakot air strike when it was felt that India required such long-range missiles to have an edge over Pakistan. Subsequently, an order was placed with Russia for supplies of long range Surface-to-Air missiles, ET has reliably gathered.

The Balakot air strike happened on February 26, 2019. The Balakot air strike piloted Mirage 2000 fighter jets that crossed the Line of Control (LoC) and incinerated the Jaish-e-Mohammed terror camp in Balakot, Pakistan.

The air strike was piloted in response to the Pulwama attack. The supply of missiles may have been delayed till now for multiple factors, including the Covid pandemic and subsequently the Ukraine conflict.

The PM's Moscow visit gave the political push to certain pending defence supplies, including remaining two S-400 systems from Russia, it has been learnt. The Surface-to-Air missiles being supplied are considered among the best in the world and have a range of about 400 kms, sources told ET.

Russia has been responding to India's requests on defence requirements during critical junctures and requirement of this missile is crucial for maintaining an edge over Pakistan, an expert explained.

<https://economictimes.indiatimes.com/news/defence/after-pms-visit-russia-expedites-supply-of-super-long-range-surface-to-air-missiles/articleshow/111996545.cms>

## **Defence Budget 2024 Comparison: How India's defence allocation for armed forces stack up against China and Pakistan**

Defence Budget 2024 Comparison: The Government of India has announced a significant increase in its defence budget for the financial year 2024-25, allocating ₹6.21 lakh crore (approximately US \$75 billion). This marks a notable rise from the previous year's budget of ₹5.94 lakh crore. The enhanced allocation reflects India's strategic focus on upgrading its military capabilities and infrastructure in response to global and regional security challenges.

### **India's Defence Budget Allocation**

India's defence budget for FY 2024-25 has been increased by approximately ₹27,000 crore from the previous year, representing an 18.43% rise compared to FY 2022-23 and a 4.79% increase over FY 2023-24. Defence Minister Rajnath Singh stated that the capital outlay of ₹1,72,000 crore will "further strengthen the Armed Forces' capabilities."

### **Detailed Breakdown of India's Defence Budget**

- Domestic Capital Procurement: ₹1,05,518 crore has been allocated for domestic capital procurement.
- Border Infrastructure: ₹6,500 crore is earmarked for the Border Roads Organisation (BRO), a 30% increase from FY 2023-24 and 160% higher than FY 2021-22.
- Sustenance and Operational Readiness: ₹92,088 crore is designated for sustenance and operational readiness, reflecting a 48% increase from FY 2022-23.
- Defence Pension: The budget for defence pensions has risen to ₹1.41 lakh crore.
- Ex-Servicemen Contributory Health Scheme (ECHS): ₹6,968 crore is allocated for the ECHS.
- Indian Coast Guard: ₹7,651.80 crore is set aside for the Indian Coast Guard, marking a 6.31% increase from FY 2023-24.

### **Budget Allocation Percentages**

Capital Acquisitions: 27.66% of the budget is allocated for planned capital acquisitions, aimed at equipping the Armed Forces with advanced technology and weaponry.

Revenue Expenditure: 14.82% is allocated for revenue expenditure on sustenance and operational preparedness.

Pay and Allowances: 30.66% of the budget covers pay and allowances for personnel.

Defence Pensions: 22.70% is allocated for defence pensions.

Civil Organisations: 4.17% is dedicated to civil organisations under the Ministry of Defence.

### **Future Utilisation**

According to the Ministry of Defence, the enhanced budget will support various planned capital acquisitions, including state-of-the-art technology, lethal weapons, fighter aircraft, ships, submarines, unmanned aerial vehicles, drones, and specialist vehicles.

### **How does India's defence budget compare to other nations**

**China:** China's defence budget for 2024 has been set at \$231.36 billion, reflecting a 7.2% increase from the previous year. This marks nine consecutive years of budget increases since 2015, despite a slowing economy.

**Pakistan:** Pakistan's defence budget for FY 2024-25 is ₹2,122 billion, an increase of 17.6% from the previous year. This is the second-largest increase in six years. Major military acquisitions and funding for nuclear weapons and missile programs are reportedly financed through separate, classified budget lines, as reported by Dawn News.

Global conflicts and border skirmishes are driving governments to boost their defence budgets to procure advanced equipment and develop necessary infrastructure. India's increase in defence spending aligns with a broader trend among nations prioritising military readiness in uncertain times.

India's substantial boost in defence spending for FY 2024-25 underscores its commitment to enhancing military capabilities and infrastructure. Compared to China's and Pakistan's defence budgets, which also reflect significant increases, India's strategic investment aims to address evolving security threats and strengthen its defence posture.

<https://economictimes.indiatimes.com/news/defence/defence-budget-2024-how-indias-defence-allocation-for-armed-forces-stack-up-against-china-and-pakistan/articleshow/111986250.cms>

# THE ECONOMIC TIMES

Wed, 24 July 2024

## SCO countries hold anti-terror drills with member states in China

Security officials from the member states of the Shanghai Cooperation Organization (SCO) held a joint antiterrorism drill in China focussing on live drills and specialised operations such as the "eradication of terrorist groups," China's Ministry of Public Security has said. The 'Interaction2024' joint counter-terrorism exercises were held recently in northwest China's Xinjiang Uygur Autonomous Region, the Ministry said.

"The exercise marks the first time the relevant agencies from all SCO member states have participated in a joint counter-terrorism live drill," state-run Xinhua news agency reported on Tuesday.

A small Indian delegation took part in the drill.

Since terrorist threats often spill over to other countries and flow around the globe, the latest large-scale SCO exercise was held to enhance the member states' capabilities and interoperability in joint anti-terrorism operations, Global Times report said.

The latest exercise has established a new model for joint live drills by relevant agencies and enhanced the joint operational capabilities of the SCO member states' authorities, the Ministry of Public Security said, adding, in response to significant terrorist threats, the exercise included specialized operations such as "the eradication of terrorist groups."

Photos released by the state-run media showed that soldiers and police officers fully armed with assault rifles, pistols, and riot shields launching an assault - some via armoured and all-terrain vehicles and some via helicopter with aerial drones and robot dogs - also deployed in the exercise. Representatives from SCO member states, the SCO Secretariat, and the Executive Committee of the SCO Regional Anti-Terrorist Structure observed the exercise.

The Beijing-based SCO has emerged as one of the largest trans-regional international organisations focussing on deepening security-related cooperation with its Regional Anti-Terrorism Structure (RATS), which specifically deals with issues relating to security and defence.

Earlier this month, Belarus became the 10th official member state of the SCO that already has China, India, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Russia, Tajikistan and Uzbekistan. The SCO member states have a long history of effective cooperation in counter-terrorism. All the previously held anti-terrorism exercises were bilateral or multilateral but did not feature all member states, Li Wei, a research fellow and security expert from the China Institutes of Contemporary International Relations, told the Global Times.



The latest drill reflected that all SCO member states share a common understanding toward the threats posed by terrorism, Li said.

Countries in Central, South and West Asia are all facing terrorist threats of various sources, and Russia just suffered from a concert hall terrorist attack in Moscow in March, Li said, noting that China also faces potential terrorist threats, and a resurgence of terrorist activities have been observed also in other parts of the world such as Southeast Asia, Africa, Europe and Americas.

<https://economictimes.indiatimes.com/news/defence/sco-countries-hold-anti-terror-drills-with-member-states-in-china/articleshow/111991948.cms>



*Wed, 24 July 2024*

## **Meet Captain Supreetha CT, First Women Officer From Army Air Defence To Be Deployed At Siachen Glacier**

Captain Supreetha CT has made history by becoming the second Indian Army officer and the first from the Corps of Army Air Defence to be operationally deployed at Siachen. The Siachen Glacier, which is also known as the world's highest battlefield located in the Eastern Karakoram range in the Himalayas. It is the second-longest glacier in the world's non-polar areas and lies south of the drainage divide separating the Eurasian Plate.

In the post on X, the Indian Army announced about her deployment in Siachen, "Breaking Barriers... Conquering Challenges... Captain Supreetha C T joins the league of #SiachenWarriors. With her enduring strength & determination, she is now operationally deployed at the world's highest battlefield #Siachen," the Army said. Before her posting, Capt. Supreetha was put through a rigorous one-month training that included endurance training, ice wall climbing and survival drills at the Siachen Battle School.

Capt. Supreetha hails from Mysuru, Karnataka, with roots in Chamarajanagar district. She comes from a family with a background in public service. Her father, Thirumallesh, serves as a sub-inspector of police in Talkad near Mysuru. She completed her high school and pre-university course at Marimallappa's in Mysuru. Later, she earned her LLB degree from JSS Law College in Mysuru. Captain Supreetha embarked on her military career by joining the Indian Army as a Lieutenant in 2021. Her initial posting was in the Army Air Defence, following comprehensive training in Chennai.

Capt. Supreetha first made headlines across the country when she along with her husband Major Jerry Blaize from India's Madras Regiment participated in the Republic Day parade on Kartavya Path in Delhi on January 26, 2024. The couple marched down the Kartavya Path as members of two separate contingents, marking the first time a couple from Indian Army shared this honour. The two officers have known each other since their days in the National Cadets Corps (NCCC). Supreetha was part of the NCC contingent in the Republic Day parade in 2016.

Capt. Supreetha's achievement is indeed likely to inspire more women to consider careers in the armed forces. Her courage and determination serves as a powerful example of what women can achieve in traditionally male-dominated fields.

Before Capt. Supreetha, Shiva Chouhan was the first female officer to be deployed in Siachen. The Siachen Glacier is considered one of the most toughest battlefields in the world, owing to extreme altitudes and temperatures often dropping to -50°C.

<https://www.india.com/women/meet-captain-supreetha-ct-first-women-officer-from-army-air-defence-to-be-deployed-at-siachen-glacier-7109610/>

# THE ECONOMIC TIMES

Thu, 25 July 2024

## **China making inroads into key choke points in Indian Ocean: US Congresswoman**

China is making inroads into key choke points along the Indian Ocean and obstructing the right to freely navigate the waters, an influential American lawmaker has said, expressing concerns over increasing Chinese investment in South Asia.

Congresswoman Young Kim, who is chairman of the Subcommittee on Indo-Pacific in the House Foreign Affairs Committee, said South Asia holds immense significance for the US foreign policy and national security interests.

The region faces a dynamic geopolitical landscape that presents challenges for the US policy objectives. The Indian Ocean is a crucial channel for global trade, an estimated 80 per cent of maritime oil trade and 40 per cent of world trade passes through the Indian Ocean, she said.

"CCP is making inroads into key choke points along these routes and obstructing the right to freely navigate the waters. In recent years, we have seen Chinese ports in Pakistan and Sri Lanka, military installations in Djibouti and infrastructure investments in the Maldives which threaten the US national security and economic interests and those of our friends and allies in the region," Young said.

"Last month my subcommittee held a hearing on the Indo-Pacific budget and CCP aggression in the South China Sea and Taiwan Strait. We cannot forget the significance of Indo in the Indo Pacific. The CCP has sparked border conflicts along the Line of Control in India and its submarines and warships regularly sail in the Indian Ocean," she said during a Congressional hearing here on Tuesday.

"I'm particularly concerned about the Maldives, a key US security partner in the Indian Ocean and its growing relationship with the CCP. The Maldives, having received several large CCP investments including \$200 million for the China-Maldives Friendship Bridge, is \$1.4 billion in debt to the CCP. During the Maldives president's visit with Xi Jinping in January, the two countries signed an additional 20 bilateral agreements," she said.

"The CCP is a top trading partner for Bangladesh, Nepal, Sri Lanka, Pakistan and Afghanistan, which is around our strategic partner India. The PLA's presence is also intensifying both along the Indian border and in the Indian Ocean. Aid and cooperation play a pivotal role not only in advancing US interests in South Asia, but also in enhancing their prosperity and keeping the region free and open," Young said.

"Without greater US support, our allies and friends could be forced to accept further trade and investment from the CCP. As South Asia grapples with refugee crises that are the result of bitter

wars and coups, increasing CCP coalition coercion and debt trap, diplomacy tactics. And terrorism and criminal drug networks, strong and sustained US engagement is critical," she said.

Assistant Secretary of State for South and Central Asia Donald Lu said that military relationship between the Maldives and People's Republic of China is only now starting. "We have the opportunity to shape that relationship through competition if you're the Maldives," he said.

<https://economictimes.indiatimes.com/news/defence/china-making-inroads-into-key-choke-points-in-indian-ocean-us-congresswoman/articleshow/112001536.cms>

# THE ECONOMIC TIMES

Thu, 25 July 2024

## China's secretive spaceplane likely testing 'dual use' technology, experts say

. China's shadowy, uncrewed reusable spacecraft, which launches atop a rocket booster and lands at a secretive military airfield, is most likely testing technology but could also be used for manipulating or retrieving satellites, experts say.

The spacecraft, on its third mission, was in June observed releasing an object, moving several kilometres away and then manoeuvring back to within a few hundred metres of it. "It's obvious that it has a military application, including, for example, closely inspecting objects of the enemy or disabling them," said Marco Langbroek, a lecturer in optical space situational awareness at Delft University of Technology in the Netherlands.

"But it also has non-military applications. Gaining experience with this kind of grab and release is good if you want to for instance ... refuel your own satellites." As militaries worldwide develop complex satellite networks, a reusable spacecraft that can interfere with them could have immense value, Langbroek and three other experts said.

China has never disclosed what technologies the spacecraft has tested, nor has the spaceplane been publicly photographed since it began operating. The U.S. first launched its uncrewed Boeing X-37B spaceplane in 2010, while Russia has recently launched several satellites that U.S. officials suspect may be weapons, a charge Russia has denied.

China's spaceplane is most likely testing technology, much like the X-37B, said Victoria Samson, chief director of space security and stability at the Secure World Foundation thinktank in Washington, D.C.

"I don't think that either has a whole lot of military utility, to be honest," Samson said. "I am guessing that both are technology demonstrators." China's ministry of defence did not immediately respond to a request for comment. State media outlet Xinhua has noted the launches and landings of the spaceplane, which it refers to as a "reusable test spacecraft".

The current flight of the Chinese spaceplane began in December 2023. The previous mission, which also involved putting a separate object in space and retrieving it, launched in August 2022 and lasted 276 days, according to tracking data. Its first flight was in September 2020 and lasted two days.

"We see breathtaking advancements by the People's Republic of China in space," said General Stephen Whiting, commander of U.S. Space Command, noting that his organisation did not know

what objects the spaceplane had released. "Any space activity that they undertake, we assume has some dual use in the national security realm," Whiting said. "We're always interested in understanding what could that dual use be, and trying to make sure that we have a good knowledge of that."

### **Mystery Craft**

Little is known about China's spaceplane. Tracking data show it launches from Jiuquan, in north central China, and lands at an airfield in Lop Nur, in the country's Xinjiang region. The airfield is linked to a site once used for nuclear testing and is tightly controlled by the military, said Jonathan McDowell of the Harvard-Smithsonian Center for Astrophysics.

Data show it has changed its altitude from common orbits of roughly 350 kms (217 miles) to 600 kms and back, he said. It is thought to be roughly the same size and shape as the X-37B, which is about 30 feet (9.14 m) long and has spent as long as 908 days in orbit at altitudes of up to 38,000 km.

Given it has spent months in space, China's spaceplane is also assumed to be uncrewed, although it has flown atop China's only human-rated booster, the Long March 2F. The U.S. Space Shuttle, which operated from 1981 to 2011, was about the size of a 737 airliner and could carry a crew of seven but spent no longer than 17 days in orbit.

The Soviet Union developed a large crewed spaceplane called Buran, which made one automated orbital flight, a 3-hour journey in 1988. The Space Shuttle performed 10 classified missions out of 135 flights, leading the Soviet Union to consider it a military spaceplane and develop Buran, said Jeffrey Lewis, director of the East Asia Nonproliferation Program at the Center for Nonproliferation Studies.

"We don't want to look at this (Chinese) spaceplane the same way the Soviets looked at the Shuttle," he said. "A lot of these are just experiments rather than well-thought-out military platforms."

### **Military Uses**

The apparent experiments in orbit with releasing and retrieving objects mirror those of the United States' X-37B. The X-37B's missions have all been classified, but are described as taking experiments to space and back, and exploring "reusable vehicle technologies that support long-term space objectives", according to Boeing.

How well those experiments go could influence the duration of the mission.

Testing a cutting-edge sensor, for instance, could yield intelligence so useful that the government may want to keep it in space for longer before bringing it back to the lab, McDowell said. Inspecting or disabling an adversary's satellites is another potential military capability.

Some countries, including the U.S., China, India and Russia, already have ground-based anti-satellite missiles. Orbital weapons have long been taboo, and weapons of mass destruction in space are banned by the 1967 Outer Space Treaty. China in 2021 test flew a hypersonic glide vehicle as part of a Cold War-era concept known as a fractional orbital bombardment system, which launches a warhead partially into orbit, allowing it to strike with little warning from unusual trajectories. But attacking from orbit using a spaceplane offers little advantage over ballistic missiles or cruise missiles, Lewis said.

Two senior Indian military officers, speaking on condition of anonymity as they were not authorised to speak to the media, said that although the exact purpose of the Chinese spaceplane

was unclear, India was concerned. "The spacecraft in question is definitely alarming," said one of the officers. "Things like this can always have dual purposes. India is keenly watching."

<https://economictimes.indiatimes.com/news/defence/chinas-secretive-spaceplane-likely-testing-dual-use-technology-experts-say/articleshow/112002392.cms>



Wed, 03 July 2024

## **From Eurofighter To F-16 — How China Uses Pakistan To Gain ‘Critical Info’ On Western Aircraft Using Military Drills**

This collaboration has stirred significant concern in Washington, particularly regarding the potential for China to gather intelligence on Western aircraft through these drills.

In a recent development, satellite images have revealed that China has been conducting simulated strikes on US aircraft and aircraft carriers in the deserts of Xinjiang.

The images, dated May 29, depict a model aircraft carrier and over 20 replicas of jets resembling US stealth fighters. Military experts have indicated that Chinese PLA Air Force pilots are reportedly conducting air strike drills on replicas of American F-35 and F-22 aircraft.

### **UAE-China Military Drills: Falcon Shield**

China's Ministry of National Defense announced that the joint air exercise with the UAE is again being held in Xinjiang province.

The International Institute for Strategic Studies (IISS), a London-based think tank, notes that while the ministry did not specify the exact air base, satellite imagery suggests that Hotan Airport in Xinjiang is the exercise's location. This site also hosted the event in 2023.

According to the IISS, the 2023 and 2024 editions of Falcon Shield have featured the UAE deploying at least six Dassault Mirage 2000-9DAD/EAD ground-attack aircraft, supported by an Airbus MRTT tanker/transport aircraft. Additionally, two Boeing C-17A Globemaster heavy transports were briefly visible in satellite images after the 2023 exercise, likely used for transporting support equipment and personnel.

Falcon Shield 2024 has introduced a new element—a temporary shelter typically used for unmanned aerial vehicle (UAV) operations.

The UAE operates the French-made Mirage 2000 alongside the Lockheed Martin F-16E/F Block 60, a model developed by the US and four other NATO countries. However, the F-16E/F Block 60 has not been part of the Falcon Shield exercises.

Training exercises featuring both Western and modern Chinese combat aircraft are becoming increasingly frequent.

A notable aspect of the Falcon Shield exercise is its location in China and the direct involvement of the People's Liberation Army Air Force (PLAAF) against Western aircraft. This marks possibly the first time China has conducted a direct military exercise involving Western fighter jets.

However, this does not mean that Chinese and Western aircraft have never encountered each other. Chinese jets operated by Pakistan have faced Western aircraft in previous military exercises.

### **China-Pakistan Military Collaboration**

China's military exercises with Pakistan have also played a strategic role. With a mix of Chinese-made jets and American F-16s in its arsenal, Pakistan is unwittingly becoming China's eyes and ears on Western technology.

Pakistan, a significant defense partner for China, operates the Chengdu JF-17 and J-10C aircraft, which were developed by China.

Before the Falcon Shield exercise, China had engaged in joint military drills with Pakistan. In September 2023, the two allies conducted the Shaheen-X joint air exercise in Northwest China, with the Pakistan Air Force showcasing their J-10C and JF-17 fighter jets.

In June 2024, the US Air Force Central Command (AFCENT) and the Pakistan Air Force (PAF) held Falcon Talon 2024, a bilateral exercise featuring the deployment of Pakistani F-16s and JF-17 Thunder jets developed collaboratively by Pakistan and China.

Additionally, the Pakistan Air Force regularly participates in international exercises like Spears of Victory in Saudi Arabia and the Zelzal series with Qatar. Spears of Victory recently included participants from Bahrain, France, Greece, Oman, Pakistan, Qatar, Saudi Arabia, the UAE, the UK, and the US.

The Zelzal series, a bilateral event between Pakistan and Qatar, allows Western aircraft to train alongside Chinese jets. In January 2024, Pakistan's new J-10C fighters joined the 'Zilzal-II' exercise in Qatar with Eurofighter Typhoons, marking a significant test for the J-10C.

It should not be surprising that whatever little insights Pakistan got from the drills with Eurofighters would have been quickly shared with China. J-10 remains the frontline fighter for the PLAAF as well as the Pakistan Air Force.

“Military drills can expose a lot of information. Interacting with pilots often uncovers technical details about the aircraft, including its strengths and weaknesses, performance metrics, rate of climb, thrust-to-weight ratios, and overall ease of operation,” said Air Marshal Anil Chopra (Retd.), Former Director-General of the Centre for Air Power Studies.

“Additionally, flying the aircraft and observing various maneuvers, radar contexts, and missile lock-ons provides further insights. Modern aircraft equipped with computerized recording systems allow for comprehensive debriefs, where the entire flight path is reviewed and analyzed. So, Such exercises are one occasion to learn about adversity and aircraft,” added Chopra

### **UAE & China Relations**

The UAE, traditionally aligned with the West, is now flirting with the East.

The growing military ties between the UAE and China are significant. In early 2022, the UAE ordered a dozen Hongdu L-15A advanced jet trainers to replace the Aermacchi MB-339 for the Al Fursan display team. Deliveries began in late 2023.

The strengthening UAE-China relationship has raised concerns in Washington, especially after the UAE's 2019 decision to choose Chinese telecommunications giant Huawei for its 5G infrastructure. This decision impacted discussions with the U.S. over the UAE's planned acquisition of the Lockheed Martin F-35 Lightning II.

The Emirati Air Force also operates Chinese medium-altitude, long-endurance UAVs like the Wing Loong II. Whether Chinese personnel are involved in their maintenance remains unclear, but the introduction of the L-15A may require initial Chinese support.

### **Threats To Western Aircraft**

According to the IISS, China has the opportunity to deploy additional assets, either openly or discreetly, as the host nation.

For example, the PLAAF's airborne early warning (AEW) aircraft might be utilized to oversee the exercise, potentially gaining valuable insights into the capabilities of Chinese AEW radar in detecting Mirage 2000 aircraft.

Depending on the specifics of the joint exercise, it may also allow for an evaluation of Chinese fighter radars and the performance of electro-optical and radio-frequency missile seekers.

The effectiveness and detection range of the China Airborne Missile Academy PL-10 (CH-AA-9) imaging infrared short-range air-to-air missiles could be assessed during any dissimilar air-to-air combat scenarios.

While air exercises are controlled environments, they offer opportunities to simulate various combat scenarios.

### **Implications For Taiwan**

The inclusion of Mirage 2000s in China's Falcon Shield 2024 exercise has raised concerns for Taiwan, a flash point in US-China relations. China considers Taiwan as part of its territory, while Taiwan views itself as a separate entity.

Notably, Taiwan also operates the Mirage 2000, with 60 of these aircraft in its fleet, and understanding their performance and capabilities through dissimilar air-combat training would be valuable for the PLAAF.

Not only the Mirage 2000s, but China would have gained deep insights into the F-16 Fighting Falcons that Pakistan operates. Taiwan also operates the most advanced version of F-16s, which are its frontline fighters to counter China.

The potential threat is that the PLAAF may use its air operations in and around Taiwan's Air Defense Identification Zone, along with any Taiwanese Air Force responses, to evaluate radar and seeker performance.

Through shrewd diplomacy and strategic military exercises, China is methodically narrowing the technological gap with Western air forces, potentially transforming the landscape of aerial warfare.

Instead of direct confrontation, China is crafting a new playbook through a network of alliances and joint drills. This shift presents formidable challenges for the United States and its allies, highlighting the urgent need for Western nations to reevaluate their military partnerships and the sharing of sensitive technologies.

<https://www.eurasiantimes.com/from-eurofighter-to-f-16-how-china-uses/>

Thu, 25 July 2024

### **2 Indian astronauts to undergo training at NASA's Johnson Space Center**

Two Indian astronauts will undergo training at National Aeronautics and Space Administration (NASA)'s Johnson Space Center in the American state of Texas beginning in August, the Indian Space Research Organisation (ISRO) has said. President Joe Biden announced plans to send an Indian astronaut to the International Space Station (ISS) in June 2023 during Prime Minister Narendra Modi's visit to the US. One of the two astronauts, who earlier received basic training at Moscow's Yuri Gagarin Cosmonaut Training Center, would go on the India-US mission to the ISS. American private firms SpaceX and Axiom are expected to execute the mission by the end of 2024 and help Indian astronauts gain the necessary expertise.

Former ISRO chairman K Sivan said the mission will expose Indian astronauts to the new technology. "This is an extremely important step towards the Gaganyaan programme," he said, referring to the plan to send three astronauts to an orbit of 400 km for a short-duration mission on board an Indian launch vehicle. ISRO is developing new technologies in engineering and human-centric systems. The Astronaut Training Centre in Bengaluru offers training modules covering academic courses, Gaganyaan flight systems, micro-gravity familiarisation through parabolic flights, aero-medical training, recovery and survival training, mastering of flight procedures, and training on crew training simulators. Periodical flying practice and yoga are also included as part of the training, ISRO said.

The Gaganyaan mission is expected to happen by 2026. Group Captains Prashanth Nair, Ajit Krishnan, Angad Pratap, and Wing Commander Shubhanshu Shukla have been selected for it. Wing Commander Rakesh Sharma spent eight days in space aboard the Salyut 7 space station in 1984 as part of a collaboration between India and the Soviet Union.

<https://www.hindustantimes.com/india-news/mumbai-rain-news-live-heavy-rain-lashes-city-flight-operations-affected-101721886686965-amp.html>



Wed, 24 July 2024

### **ISRO's 'Hypersonic Test' Could Make It 1st Space Agency To Place A Satellite Using Scramjet-Powered Reusable Launch Stage**

On July 22, 2024, the Indian Space Research Organization (ISRO) carried out the third test of its Air Breathing Propulsion concept. I believe Indian mainstream media didn't adequately highlight the significance of the test.



In the following paragraphs, I will explain the concept of using air-breathing propulsion to launch spacecraft, dwell on the technical challenges involved, and recall ISRO's strides so far in pursuing the concept.

Conventional rockets need to carry both fuel and oxidizer on board for combustion in order to produce thrust. In contrast, scramjet engines carry only fuel. They obtain oxygen from the atmosphere by compressing the incoming air before combustion at supersonic speed.

Almost 80 percent of a launch vehicle's lift-off mass is attributable to the oxidizer. By eliminating the need to carry oxygen, the lift-off mass is considerably reduced, facilitating the carriage of additional payload. The scramjet engine can also liquefy the oxygen and store it on board for use post-atmospheric ascent. In brief, scramjets are more fuel efficient than rocket engines, reducing the cost of access to space.

### **Scramjet Limitations**

The limitations of using scramjets on launch vehicles are obvious – scramjets operate only while the launcher is ascending through the atmosphere. Also, they can light up only after the launcher crosses a speed of Mach 5.0. The light-up limitation can be overcome by using a rocket-engined first stage that accelerates the launcher to Mach 5. A scramjet-powered second stage can then take over and accelerate the launcher through the atmosphere.

The limitation, which is due to the need for atmospheric oxygen, can be overcome by storing oxygen during atmospheric ascent for use in space, as mentioned earlier, or by switching to a rocket-propelled third stage at the end of atmospheric ascent. ISRO is developing scramjet technology to reduce the size of launch vehicles and increase their payload capacity, facilitating cheaper access to outer space. It is also pursuing rocket technologies that eliminate atmospheric contamination.

### **ISRO's Scramjet Engine**

ISRO efforts are aimed at developing dual-mode ramjet engines and associated technologies. A Dual-Mode Ramjet (DMR) is a ramjet engine that can operate in both subsonic and supersonic combustion modes. Scramjet engines feature a simple design with few moving parts. However, maintaining combustion in supersonic conditions poses technical challenges because the fuel has to be ignited within milliseconds.

ISRO's Air Breathing Propulsion Program (ABPP) current focus is to develop and cost-effectively flight test a scramjet engine using an Advanced Technology Vehicle (ATV). The scramjet engine designed by ISRO uses Hydrogen as fuel and Oxygen from the atmospheric air as the oxidizer.

### **Advanced Technology Vehicle (ATV)**

ISRO is using a two-stage sounding rocket called Rohini-560 (Rh-560) to develop and test its scramjet engine. The rocket's 560mm diameter gives it the designation 560. The Rh-560 is ISRO's largest sounding rocket. It's capable of suborbital flight. The scramjet engines are symmetrically strapped to the second stage of the rocket for developmental flights. ISRO refers to the combination of the Rh-560 and the two scramjet engines as Advanced Technology Vehicle (ATV).

### **ATV Test Flights**

The most recent test of the ATV on July 22 was the third. The first test, referred to as ATV-D01, took place on March 3, 2010. The test did not involve powering up the scramjet engine. The ATV-D01 reached an altitude of 46 km in 120 seconds, and the entire flight duration was 240 seconds.

The booster accelerated the passive scramjet to Mach 6 and sustained Mach 6 +.05 and dynamic pressure (80 + 35 kPa) for seven seconds. These conditions are required for a stable ignition of an active scramjet engine. The second flight test, ATV-D02, on August 10, 2016, successfully demonstrated engine power up at Mach 6.0 and sustained operation for 5 secs.

The test successfully demonstrated critical technologies such as the ignition of air-breathing engines at supersonic speed, holding the flame at supersonic speed, air intake mechanism, and fuel injection systems. The ISRO press release for ATV-D03 on July 22 stated: The flight test achieved satisfactory performance of the Sounding Rocket along with successful ignition of the Air Breathing propulsion systems. Nearly 110 parameters were monitored during the flight to assess its performance. The flight data from the mission will be useful for the next phase of development of Air Breathing Propulsion systems. ISRO will review the flight data over the next few days to determine how well the scramjet met its performance objectives.

### **Conclusion**

The initial challenge for the ISRO is to demonstrate scramjet thrust greater than drag. When the ISRO scramjet lights up at Mach 6, the drag on it is already considerable. Unless the scramjet is able to develop good thrust value, it will not be able to accelerate and achieve its desired speed.

The long intervals between ATV tests—2010, 2016, and 2024—indicate the technical challenges involved in the program. ISRO is currently working with scaled-down scramjets. Once it masters the technology and moves on to full-scale scramjets, it could become the first space agency in the world to place a satellite in orbit using a scramjet-powered reusable launch stage.

Other companies worldwide are developing similar scramjet technology for satellite launch systems. One such company is the Australian company Hypersonix, which is developing both two-stage to orbit and three-stage to orbit launch systems using a scramjet-powered stage.

<https://www.eurasiantimes.com/isros-hypersonic-test-could-make-it-1st-space-agency-to-place-a-satellite-using-scramjet-powered-reusable-launch-stage/>

# **The Tribune**

*Thu, 25 July 2024*

## **R&D needs firm commitment from govt**

**-By Dinesh C. Sharma (Science Commentator)**

IN her 2024-25 Budget speech, Finance Minister Nirmala Sitharaman made a bunch of announcements relating to the future course of India's energy mix in the light of the need to move towards the target of achieving 'net zero' carbon emissions by 2070. While continuing the thrust on renewable sources of energy, the government wants to give a push to nuclear power as well. "Nuclear energy is expected to form a very significant part of the energy mix for Viksit Bharat," Sitharaman said. She did not elaborate on any time frame to make nuclear power a significant player in the energy mix but talked of some ideas to promote nuclear power: the setting up of small reactors — Bharat Small Reactors (BSRs); research and development to develop the Bharat Small Modular Reactor (BSMR); and a role for the private sector in this regard.

At present, nuclear power constitutes a minuscule part of India's energy mix. Per the data shared in the Economic Survey a day before the Budget, the total installed capacity of power in India stands at 494,000 MW (megawatt). Of this, nuclear power contributes a mere 6,800 MW, while renewable

sources of energy account for 125,000 MW (which is almost a quarter of the total installed capacity). The rest comes from hydro and thermal power. The production of nuclear power has remained stagnant since 2016. Not a single megawatt of nuclear power has been added to the grid for nearly a decade. The promise of massive additions to the installed capacity has eluded the Department of Atomic Energy since the 1980s when it first set the target of 20,000 MW by 2000.

The reasons for the return of nuclear energy on the table are many. The most obvious is the need for energy transition necessitated due to climate change. Nuclear power is considered a clean, carbon-free source of energy. A study on India's energy options towards 'net zero' done by the Indian Institute of Management (IIM-Ahmedabad) came up with some projections. While coal would continue as the backbone of the Indian energy system for the next two decades, renewable sources and nuclear power would be the predominant sources then on, according to the study. Countries are also realising that the energy transition requires certain critical technologies (battery storage, carbon capture, etc.) which are not readily available. China has become the main source of several critical materials and rare earths needed for batteries, electric vehicles, etc.

If Sitharaman wants nuclear energy to reach a 'very significant' level in the energy mix from the minuscule role it plays currently, a new policy direction and investment are necessary. The Budget does not provide any of this. Pinning all hopes on the private sector to achieve this is misplaced. The doors for non-government players in the nuclear sector have been open since the much-touted Indo-US nuclear deal. The deal promised a piece of the nuclear supplies pie for Indian companies. But not a rupee has been invested by any Indian or foreign investor nor have Indian companies got supply contracts from elsewhere, as hoped by then UPA government. The Atomic Energy Act, 1962, was amended to let the Nuclear Power Corporation form joint venture companies with other public sector entities like the National Thermal Power Corporation. Till recently, the Modi government has maintained that it does not propose to allow the private sector to enter the nuclear power domain. It is not clear if Sitharaman's statement about the collaboration with the private sector reverses this position.

Coming to technology, the Finance Minister has spoken about BSRs and BMSRs. The International Atomic Energy Agency defines reactors under 300 MW capacity as 'small' and those up to 700 MW as 'medium'. Most of the two dozen nuclear reactors in India are below 300 MW and so are small, the only exception being the two Kudankulam reactors which are 1,000 MW each and Kakrapar which has 700-MW reactors. The pressurised heavy water reactors operational in Tarapur (Maharashtra), Narora (UP), Rawatbhata (Rajasthan) and Kaiga (Karnataka) range between 160 MW and 220 MW. We don't know if the government wants BSRs to be even smaller than the internationally accepted definition of 'small' or if it is going to rechristen existing reactors as BSRs because they are already small.

The idea of modular nuclear reactors, too, has been around for some years now. A modular reactor refers to using modules fabricated in factories and already available parts to assemble a small nuclear plant (below 300 MW) to speed up construction. The idea is that many such reactors can be planned at one site, and manufacturers can achieve 'economies of scale'. However, nuclear suppliers have seen low demand for modular reactors because the regulatory requirements for design certification, construction and operation licences are similar to those for large reactors. The core issues of fuel availability, safety and nuclear waste disposal remain major challenges for nuclear power generation — be it through small, modular or large reactors.

The elephant in the room is R&D, be it any source of energy — nuclear, hydrogen, wind or solar. Unless we invest in developing critical technologies for each of these energy sources, the road to 'net zero' is going to be painful. Many technologies and critical materials needed for the energy transition are not available commercially or have to be sourced from monopoly suppliers. The Modi government has been stingy when it comes to spending on R&D. Sitharaman announced a

new funding mechanism for R&D — the National Research Fund (NRF) — in 2019. On Tuesday, she said: “We will operationalise” the NRF, but still did not commit when. Her Budget speeches in the past have talked about funding to the tune of Rs 50,000 crore over five years for NRF. No such funding has materialised. Now, she is talking of “a financing pool of Rs 1 lakh crore” for R&D. What India needs is a firm commitment from the government to R&D in general and critical areas like energy in particular.

<https://www.tribuneindia.com/news/comment/rd-needs-firm-commitment-from-govt-642923#>



**Press Information Bureau**  
**Government of India**

**Ministry of Science & Technology**

*Wed, 03 July 2024*

## **National Brain Research Centre Celebrates World Brain Day with Neuroscience Outreach Initiatives**

The National Brain Research Centre (NBRC) celebrated World Brain Day by hosting an event that brought together over 100 students and 15 teachers from various schools in Gurugram on 22nd July to foster an interest in neuroscience among young minds and provide them with an opportunity to engage with renowned scientists and researchers.

World Brain Day, observed annually on July 22nd and aims to raise awareness about brain health and promote neurological research. Established by the World Federation of Neurology, this day highlights the importance of brain health and the need for continued research and education to combat neurological disorders. It serves as an inspiration for young minds to delve into the complexities of the human brain and contribute to advancements in neuroscience.

The event at NBRC featured interactive sessions, including tours of the advanced neuroscience labs, allowing students to witness cutting-edge research and technology in action. During their lab visits, they had an opportunity to see a real human brain, 3D cultures of human neural stem cells, and cutting-edge tools for research and diagnosis of brain disorders, such as MRI, EEG etc

The research scholars of NBRC also engaged with the students and teachers to explain the current research at NBRC with the help of posters specially made for school students. The programme also included insightful talks on AI-empowered brain-computer interfaces for 21st-century challenges by eminent speaker Dr Tapan Gandhi from IIT Delhi.

Addressing the Gathering, Dr Arpan Banerjee, Scientist at NBRC, emphasized on the significance of World Brain Day in promoting brain health awareness and the vital role of educational outreach in inspiring the next generation of scientists. He encouraged the students to pursue careers in neuroscience and contribute to the ongoing efforts in understanding and treating brain-related disorders.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2036371>



## **Ladakh's rock varnish may help identify habitable environments in space**

Magnetofossils-- fossil remains of magnetic particles produced by magnetotactic bacteria have been spotted in rock varnish layers in Ladakh. The study suggesting biotic processes in the formation of rock varnish indicates how life can exist in extreme environments, providing valuable insights for astrobiology as well as for planning future space missions targeting to identify habitable environments in space.

Ladakh, known as the "cold desert of India," experiences extreme climatic conditions such as high UV radiation, significant temperature variations, and limited water availability, making it a suitable terrestrial analogue for Martian studies.

Researchers from Birbal Sahni Institute of Palaeosciences, Lucknow (BSIP), an autonomous institute of Department of science and Technology (DST) were inspired by the similarity between the rock varnish observed in Ladakh and that seen on Mars, particularly during the Perseverance rover operations.

They collected samples of rock varnish from the Ladakh region, chosen and employed XPS to analyse the surface chemistry of the rock varnish. The analysis conducted by the lead author Dr. Amritpal Singh Chaddha and Dr. Anupam Sharma at BSIP with its Sophisticated Analytical Instrumentation Facility (SAIF) established by DST, helped identify the nanochains of magnetofossils.

Additionally, higher concentrations of oxidized manganese (Mn<sup>4+</sup>) and carboxylic acid functionality on the varnish surface were identified, indicating organic signatures.

The study published in Planetary and Space Science showed that rock varnish from Ladakh, a potential Martian analogue site, contains enriched concentrations of magnetic minerals likely derived from biotic sources.

The findings highlighted the potential of rock varnish as an archive of ancient environmental records and as a geomaterial for astrobiological studies.

By identifying biotic signatures in rock varnish, scientists can better target potential biosignatures on Mars and other planetary bodies, aiding the search for extraterrestrial life. This information is crucial for planning future space missions by ISRO and other space agencies, including Mars exploration, where identifying habitable environments is a primary goal.

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