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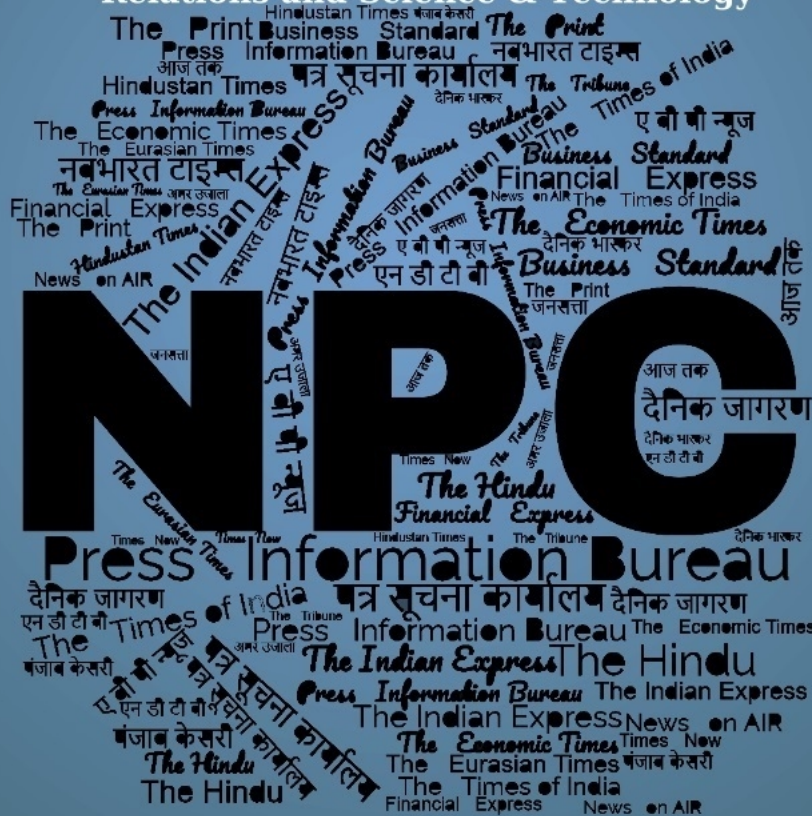
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# समाचार पत्रों से चयनित अंश Newspapers Clippings

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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*Fri, 07 Jun 2024*

### **Ahmedabad: Former DRDO Chief conferred with 'Honorary Lifetime Membership'**

The Space Society of Mechanical Engineers (SSME) has conferred 'Honorary Lifetime Membership' to Dr G Satheesh Reddy, the former Scientific Advisor to Defence Minister the former DRDO Chief and current President of Aeronautical Society of India (AeSI), on Thursday.

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The honour was presented in a ceremony organised by the Space Applications Centre (SAC), a unit of the Indian Research Space Organisation in Ahmedabad. The honour was presented in the presence of Shri S Somnath, the Chairman of ISRO and Dr DK Singh, the Associate Director of the Space Applications Centre of Indian Space Research Organisation (ISRO). The Space Society of Mechanical Engineers (SSME) came into existence on April 6, 1988, at the Space Applications Centre, a unit of Indian Space Research Organisation (ISRO) in Ahmedabad. It is a registered society under the government of Gujarat.

Space Application Centre (SAC) unit of ISRO focuses on the design of space-borne instruments for ISRO missions and the development and operationalisation of applications of space technology for societal benefits. Earlier, in February, the former Scientific Advisor to Defence Minister and former DRDO chief Dr G Satheesh Reddy said India has become self-sufficient in missile technology with a wide range of missiles in its arsenal and that global restriction regimes "helped" it achieve this self-reliance.

Dr Reddy said that the country has today developed a range of missiles that any country would like to have. In a podcast with ANI, the former DRDO chief said, "Indian missile programme has gone a long way and a number of missile systems have been developed. Varieties of missiles have been developed. Surface-to-surface missiles, surface-to-air missiles, air-to-air missiles, anti-tank missiles, and many other varieties of missiles have been developed in the country.

"The country has gained a lot of knowledge and has become, I say that, self-sufficient and self-reliant in missile technology today by developing all these varieties of missiles. Range of missiles

that any nation would like to have based on their necessities, the country has developed all these," he said.

<https://www.aninews.in/news/national/general-news/ahmedabad-former-drdo-chief-conferred-with-honorary-lifetime-membership20240607085318/>

## Defence News

## Defence Strategic: National/International



**Press Information Bureau  
Government of India**

**Ministry of Defence**

*Fri, 07 Jun 2024*

### **First Command and Control Compatibility Board meeting for 2024 between India & U.S. held in New Delhi**

The first Command and Control Compatibility Board (CCCB) meeting for 2024 between India and the U.S. was held at Manekshaw Centre, New Delhi from 04-07 June 2024. The meeting had participation of a 29 member United States delegation led by Mr Paul Nicholson, Executive Director, US INDOPACOM and a 38 member Indian delegation led by Brigadier Rahul Anand of Headquarters Integrated Defence Staff.

The CCCB is the Technical Expert Group formed under Article XI of the Communication Compatibility and Security Agreement (COMCASA) between India and USA, and is held twice a year. After signing of the historic agreement in September 2018, this is the seventh such meeting between both nations to calibrate, reinforce and achieve steady progress in the bilateral Defence partnership.

During this four day interaction, the Subject Matter Experts from both sides had several rounds of extensive discussions to understand interoperability scenarios and operational communications needs. Focused discussions with the US delegation were helpful in working out mutually agreed solutions for the current communications interoperability needs of the Indian Tri-Services. The successful outcome of this meeting is a true reflection of the strengthening relationship between the militaries of India and US.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2023502>

## **New government to decide on Army's integrated battle group plan**

Apart from the impending move to create unified triService theatre commands, the new govt will also take a call on the longpending restructuring of some Army formations into self-contained integrated battle groups (IBGs) that can mobilise fast and hit hard, sources said. The 12-lakh strong Army has already carved out two IBGs under the 9 'Pivot' Corps (headquarters in Yol) on western front with Pakistan under Phase-1 of the 'pilot project'.

Five IBGs, in turn, have been created in 17 'Mountain Strike' Corps (Panagarh) in eastern one with China in Phase-2. "These integrated all-arms IBGs have been successfully war-gamed and validated in multiple exercises. Army HQ had earlier submitted the report on Phase-1 of 'IBG-isation' to defence ministry. But MoD has also asked for Phase-2 report before official GSL (government sanction letter) can be issued," a source told TOI.

Army remains all gung-ho about the role of IBGs, which it believes will ensure a greater and swifter offensive punch. But it remains to be seen how exactly the IBG model dovetails into the three proposed theatre commands to be constituted for China, Pakistan and the Indian Ocean region. "Theatre commands constitute a strategic-level reform involving Army, IAF and Navy. IBG model is a tactical re-organisation within Army, which has already been delayed quite a bit. But since IBG-isation has some financial implications, a GSL is required," another source said.

As reported by TOI earlier, a composite IBG will have 5,000-6,000 soldiers and a varying mix of infantry, tanks, artillery, air defence, signals, engineers and other units permanently deployed together. As of now, these units come together only during exercises or actual combat. In effect, much more agile IBGs will be larger than brigades (3,000 soldiers each) but smaller than divisions (12,000 soldiers each) and will be headed by Major-Generals.

Each IBG is to be configured as per the threat perception, the type of terrain involved and the operational task to be executed. So, IBGs meant for China will revolve more around infantry, light artillery and light mechanised forces geared for mountain warfare, while those for Pakistan will be focused on main-battle tanks and heavy artillery due to the plains involved.

The original plan was to first carve out 8-10 IBGs, then wait for them to settle down, and finally create more over the years. Overall, the Army has 14 corps (40,000 to 70,000 troops in each), with four of them being 'strike' or offensive formations. While the 17 Corps was raised with China in mind, the 1 Corps (Mathura) was also "reoriented and equipped" for the northern borders after the military confrontation in eastern Ladakh erupted in May 2020.

The two Pakistan-specific strike corps are 2 Corps (Ambala) and 21 Corps (Bhopal).

<https://timesofindia.indiatimes.com/india/new-government-to-decide-on-armys-integrated-battle-group-plan/articleshow/110854869.cms>



*Mon, 10 Jun 2024*

## **Greek Defence Officials Expected, Looking For Closer Ties**

As another step towards working together in the defence sector, Michel Spinnelis, head of procurement, in the Greek ministry of defence, will be here on a four-day visit beginning July 1.

“This is the first visit at this level, and it is an effort to see what the two countries can do together, whether in terms of joint production or something even more,” a senior official said. The Indian and the Hellenic air forces have the Rafale, the top of the line fighter aircraft.

They are French and one idea doing the rounds is that if both countries jointly come up with a bid to procure more Rafales, or, spares, it may be cheaper. If India needs more spares for its Mirage2000 fighters, Greece can sell some of its older planes to be broken down for spares.

There can be a possibility of Greece buying Indian-made trucks and ammunition of making things together and sharing spares. Prime Minister Narendra Modi was in Athens last August and his counterpart, Kyriakos Mitsotakis, was in New Delhi last February. The national security advisors of the two countries have also been in touch.

The two countries have a strategic partnership and this has major strategic and economic consequences. The two air forces, particularly, have been working together and another exercise involving four Rafales of the Indian Air Force is happening very soon, in Greece.

<https://www.timesnownews.com/india/greek-defence-ministry-officials-4-day-delhi-visit-to-commence-on-july-1-article-110853391>



*Sun, 09 Jun 2024*

## **Indian Navy gets its first woman helicopter pilot**

Sub Lieutenant Anamika B. Rajeev became the Indian Navy’s first woman helicopter pilot during a passing out parade held in the naval air station INS Rajali at Arakkonam in Ranipet district last week.

A total of 21 officers were awarded the prestigious ‘Golden Wings’ by Vice Admiral Rajesh Pendharkar, Flag Officer Commanding-in-Chief, Eastern Naval Command. A passing out parade was held on June 7 to mark the graduation of the 102nd Helicopter Conversion Course.

The ceremony also marked the completion of Stage I training of the 4th Basic Helicopter Conversion Course in which three officers successfully completed their Stage – (I) training. Lieutenant Jamyang Tsewang became the first commissioned naval officer from the Union Territory of Ladakh, according to a Defence press release.

The trainees completed an intensive 22-week training programme encompassing rigorous flying and ground training at the Indian Naval Air Squadron 561, the alma mater of all helicopter pilots of the Indian Navy. Lieutenant Gurkirat Rajput received the FOC-in-C, Eastern Naval Command Rolling Trophy for the trainee pilot standing First in Order of Merit in flying.

Lt Nitin Sharan Chaturvedi received the Sub Lieutenant Kunte Memorial Book Prize for standing First in Order of Merit in ground subjects. Lieutenant Deepak Gupta received the Governor of Kerala Rolling Trophy for first in Overall Order of Merit.

The Helicopter Training School at Arakkonam has trained 849 pilots of the Indian Navy, Indian Coast Guard as well as friendly foreign nations.

<https://www.thehindu.com/news/national/indian-navy-gets-its-first-woman-helicopter-pilot/article68269845.ece>



*Sat, 08 Jun 2024*

## **Indian Navy's Project-75I: German Shipbuilder Says Stealthy AIP Submarines With Lithium-Ion Battery To Be 'Game Changer'**

The Indian Navy has been looking for six submarines under its Project-75I (I stands for India). These submarines will have Fuel Cell Air-Independent Propulsion (AIP) technology combined with a Lithium-ion battery, which will give them the capability to lurk in the ocean depths for a longer duration and, when required, race to their target at high speeds while not giving up their position.

The Indian Navy is not looking to maintain a competitive edge by being the biggest and fastest but rather by being the quietest and most lethal.

The German shipbuilder ThyssenKrupp, which is the frontrunner for bagging the Indian contract, has offered its 214-class submarines. These combine the advanced technological aspects of 212 CD submarines with the latest developments in AIP technology. The 212 CD class submarines are built exclusively for the Norwegian Navy and are tailored to their operating requirements in the Baltic Sea.

The 214 being offered to India will be tailored to the requirements of the Indian Navy. It will be a derivative of the 214 class of submarines, with the latest enhancements in AIP technology. It will be equipped with a Lithium-ion battery, have an advanced sensor and combat system, and not compromise on stealth features.

“In this, our big advantage is our unique AIP solution. The submarine design is a derivative of the well-established HDW Class 214 submarine, which is currently in service with several navies worldwide. It will be tailored to the Indian Navy's requirements and incorporate technological advancements. To summarise our Project-75I design: it is proven, it is advanced, and it is for



India,” Dr. Christian Frühling, the tkMS Program Head for Project-75I, told the EurAsian Times during an exclusive interview.

The combination of a fuel-cell-based AIP system and Lithium-Ion battery will bring a game-changing capability for the Indian Navy, which has a long area of responsibility straddling from the Gulf of Aden in the West to the Strait of Malacca in the East. In the face of the growing Chinese maritime capability, the Indian Navy requires a credible submarine force.

The Fuel-cell AIP gives the submarine long-range endurance at low speed, whereas the Lithium-ion battery allows it to cruise at a high speed to reach its desired destination. European countries do not use it, but Japan has been using it. And the tkMS will be integrating the two technologies for the Indian Navy if it bags the contract.

“The submarines can remain submerged longer and can also have high-speed performance. The combination makes sense,” Frühling added. In simpler words, the technology will help the Indian Navy the range to cover the entire Bay of Bengal while remaining submerged. A submarine is the most vulnerable when it is at periscope depth for snorting to take onboard oxygen to drive its electric batteries. The AIP technology means that it will have to surface less.

Also, the hydrogen-powered fuel cell-based AIP technology in the new 212 and 214 class submarines gives them the capability to remain submerged for three weeks at a time. The tkMS that makes these sea leviathans also owns the Howaldtswerke-Deutsche Werft (HDW), the company that made the world’s first wartime submarine.

The 212 or 214 class of submarine can operate silently without emitting exhaust heat, increasing its stealth. Fuel cells offer the lowest noise levels because almost no sound is produced by an electro-chemical reaction. It can launch torpedoes stealthily with a water ram expulsion system. It also comes with countermeasures against torpedoes like underwater effector jammers and has minimized acoustic, thermal, and magnetic signatures to provide more stealth.

AIP-enabled submarines have increased mobility. They can “bottom” or sit on the ocean floor with only critical systems running to preserve energy and extend the operational time while using passive sonar to detect targets. Since fuel cells operate with greater efficiency at lower loads, bottoming could extend the endurance of a particular mission.

As the EurAsian Times understands, efficient energy systems onboard have been one of the requirements of the Indian Navy.

The company tailors the propeller to meet the requirements of the customer navies, giving each one of them their unique signatures. During the visit to the manufacturing facility, the author saw one of the 214 under construction for an unnamed customer. The facility in Kiel is geared up for manufacturing 5-6 submarines.

The company can also conduct the submarines’ sea trials independently, as it has a full-fledged crew comprising seasoned military submariners. Its subsidiaries manufacture torpedoes, sensors, and combat management systems for the submarines. File Image: HDW Submarine.

### **Non-Nuclear AIP-Enabled Submarines**

As against the required 24 conventional submarines, the Indian submarine fleet has only 16 submarines, and apart from the six recently-built submarines, the rest are over 30 years old and approaching their decommissioning date. The project, therefore, is expected to be a high-priority project for the Indian Navy.

An AIP-based submarine is cheaper than a nuclear-powered submarine. Non-nuclear submarines are also less expensive to maintain and manage. Fuel cell systems are modular and can be replaced quickly and easily, and these submarines have crews of 25–35 people.

After its initial reluctance when the tender was floated three years ago, the German government has also thrown its weight behind the project. In March 2024, the German Navy provided its submarine for the Indian Navy to evaluate in the field. The Indian Navy team also went on a day-long diving trial in the 212-class German submarine to evaluate the AIP technology.

The tkMS is confident about the technology, as so far it is the only company with sea-proven fuel-cell-based AIP systems. The 214-class submarine is presently being operated by Greece, Portugal, Turkey, and South Korea. HDW Class 214 Submarine

### **Transfer Of Technology**

The Indian Navy already operates 209-class submarines. Two of them, INS Shishumar and INS Shankush, underwent a refurbishment that will extend their lives for another decade or so. The tkMS, in partnership with Mazagon Dockyard Limited (MDL), has been undertaking these repairs. The two companies jointly manufactured the four submarines for the Indian Navy.

The German firm has been working with MDL since the 1980s. The first two boats in the 209 class were built in Germany, and the remaining two were constructed at the MDL shipyard in India. The submarines have never been to Germany for repair or refurbishment; this has been done entirely by MDL.

Now, the two firms are coming together to bid for Project-75I. “It is worth noting that tkMS is unique amongst western submarine providers in having a history of enabling the creation of fully autonomous submarine industry in other countries,” Dr. Christian Frühling added.

In Project-75I, the submarines will be built in India from the first boat onwards. tkMS will supply the design and critical elements. MDL will be the bidding company for the project, with tkMS as the foreign collaborator. The first submarine will be built around seven years from the date of the contract; thereafter, one submarine can be expected every year.

“We have already begun the design work on the project in conjunction with the MDL,” informed Frühling.

The field evaluations are expected to be over by June this year. The other contender in the fray, Spain’s Navantia, does not have an operational AIP technology yet. In 2023, the factory acceptance tests of the AIP BEST (Bio-Ethanol Stealth Technology) system for the S-80 submarines.

So, it remains to be seen if the Indian Navy will choose proven technology or wait for Navantia to validate its technology. Given the Indian government’s recent foreign acquisitions, a government-to-government contract to build the submarines in India is a possibility.

The capability is urgent for India as China has been moving forward in building quieter and stealthier submarines and its submarines are becoming a frequent visitor in the Indian Ocean Region.

<https://www.eurasiantimes.com/exclusive-project-75i-the-indian-navy-is-looking/amp/>



*Sat, 08 Jun 2024*

## **India, Taiwan Hold Military Simulations Focusing On Indo-China Border, Taiwan Strait Amid Beijing's Muscle Flexing**

Think tanks from Taiwan and India recently concluded the military simulations, which focused on scenarios pertaining to the Taiwan Strait and the Sino-Indian border in 2035.

The collaborative effort marks a significant stride in bilateral relations between the two nations, signaling a growing synergy in strategic affairs.

According to Taiwan's Central News Agency (CNA), a delegation from Taiwan's Institute for National Defense and Security Research (INDSR) visited the United Service Institution of India (USI) last month.

The simulations, described as tabletop exercises, were led by India, in contrast to previous such events, which typically saw leadership from the United States.

The report said that for the first time, the military simulations were hosted by the Indian side, attracting scholars from diverse backgrounds, including the United States and Taiwan's National Defense Academy.

The exercise also involved retired Indian lieutenant generals and ambassadors, alongside representatives from various sectors.

Shen Ming-Shih, head of the INDSR delegation, noted that the participation of seven retired generals and seven former diplomats from India provided valuable insights into perspectives from various regions, including the Association of Southeast Asian Nations (ASEAN), Central Asia, West Asia, and Russia.

Shen expressed optimism about leveraging this collaborative effort for future cooperation between India and Taiwan in conducting multi-party joint military exercises.

The discussions centered around potential developments in the Indo-Pacific security landscape in 2035, with a keen focus on the evolving situations in the Taiwan Strait and the Sino-Indian border.

The simulations were structured to explore potential actions and reactions of involved parties, including the United States, West Asia, Southeast Asia, Central Asia, and Europe, among others. Key areas of deduction included geopolitical developments in the Indo-Pacific by 2035 and

comprehensive discussions on the Chinese Communist Party's approach toward resolving the Taiwan issue.

Shen further added that during the concluding phase of discussions, B K Sharma, Director at United Service Institution of India, facilitated an in-depth exchange of views among Indian participants regarding India's prospective role and the responses of various nations in the event of a conflict in the Taiwan Strait.

Participants deliberated on positions, policies, and interests from diverse perspectives, contributing to a comprehensive understanding of potential scenarios.

### **India-Taiwan Ties Stir Discontent in China**

While Shen has not disclosed the outcome of the military simulations, the exercise underscores a burgeoning collaboration between India and Taiwan in strategic domains.

This initiative follows a precedent set in August 2023 when three former top Indian military officials participated in a security dialogue organized by Taiwanese authorities in Taipei. At the time, China vehemently opposed any official exchanges between Taiwan and nations maintaining diplomatic ties with Beijing.

Similarly, following the conclusion of India's recent general election and the triumph of the ruling Bharatiya Janata Party (BJP), Taiwan's President Lai Ching-Te extended felicitations via the social media platform X. In response, Indian Prime Minister Narendra Modi personally expressed his readiness to foster closer relations.

In response, during a routine press briefing, Chinese Foreign Ministry spokeswoman Mao Ning urged India to reject what she termed as the "political schemes" of Taiwan authorities, disclosing that opposition had been made to India regarding the matter.

Meanwhile, Shen Ming-Shih, head of the INDSR delegation, remarked that China's predictable reaction was expected, but he emphasized that Modi's mention of willingness to bolster ties is crucial for the advancement of Taiwan-India relations. [File: Clash between India and Chinese soldiers.](#)

He forecasted that following the general election, key cabinet members such as Foreign Minister S Jaishankar and Defense Minister Rajnath Singh are anticipated to retain their positions, suggesting continuity in India's foreign and defense policies.

Presently, bilateral relations between India and China are strained, exacerbated by the ongoing military standoff along the Line of Actual Control (LAC) that originated in May 2020.

On the other hand, Taiwan and India have been forging ahead in technological, financial, and interpersonal exchanges. Despite India's official adherence to the 'One China' policy, its stance has evolved over time in response to shifting geopolitical and strategic interests.

Given the complex nature of India-China relations and efforts to manage this complex dynamic, New Delhi is endeavoring to strike a delicate equilibrium between engagement with Taipei and its adversarial ties with Beijing. Currently, India is prioritizing the augmentation of traditional areas of collaboration with Taiwan.

A pivotal juncture in the trajectory of India's Taiwan policy unfolded early this year with the inking of a labor agreement between the India-Taipei Association and the Taipei Economic and Cultural Centre.

<https://www.eurasiantimes.com/india-taiwan-hold-military-simulations-focusing/amp/>



*Sat, 08 Jun 2024*

## **Rafale in Alaska: How 'Red Flag 24' is good international exposure to Indian Air Force**

**-By Air Marshal Anil Chopra**

The Indian Air Force (IAF) contingent has just reached Alaska for the US Air Force's (USAF)-led two-week advanced combat training, multi-nation military exercise, "Red Flag 24". It aims to offer realistic air-combat training for military pilots and other flight crew from the United States and allied countries.

The exercise also serves as a platform for building stronger partnerships and increasing interoperability between participating air forces. The professional interactions between planning teams, aircrew, and support staff foster mutual understanding and respect. Some of these relationships get carried forward into the senior ranks.

Eight IAF Rafale fighters were supported by IL-78 flight refuelling aircraft (FRA) and the C-17 "Globemaster" transport aircraft. The transatlantic flight from India was staged through Greece and Portugal.

### **Overview**

The origin of Red Flag was the unacceptable performance of USAF fighter pilots and weapon systems officers (WSO) in air-to-air combat during the Vietnam War in comparison to previous wars. A USAF analysis known as Project Red Baron II showed that a pilot's chances of survival in combat dramatically increased after he had completed ten combat missions. As a result, Red Flag was created in 1975 to offer USAF pilots and WSOs the opportunity to fly ten realistically simulated combat missions in a safe training environment with measurable results.

An "aggressor squadron" is created with some of the best USAF pilots, who fly as opponents to those undergoing training. These pilots are trained to operate according to the tactical doctrines of likely adversaries at the time. Suitably painted F-5 Tiger II would simulate the Soviet MiG 21, the F-16 Fighting Falcon as MiG-29, and the F-15 Eagle as the Russian Su-27/30 variants.

Since the first time in November 1975, each year, three to six 'Red Flag' exercises are held at Nellis Air Force Base, Nevada, while up to four more, dubbed 'Red Flag Alaska', are held at Eielson Air Force Base, Alaska. These exercises bring together aircrew from the USAF, United

States Navy (USN), United States Marine Corps (USMC), United States Army (USA), and numerous NATO and some other friendly nations' air forces.

The exercise area has now increased to close to 93,000 sq. km of airspace in the Joint Pacific Alaska Range Complex, which is the largest combat training range in the world. A larger area is required to cater for training with fifth-generation fighter aircraft, which use longer-range manoeuvres and weapons than previous fighters. Beyond-Visual Range (BVR) combat is simulated, and also factored in is the Surface-to-Air Missile (SAM) threat. Also involved are space-based sensors and electronic attack aircraft.

India pilots and controllers had been going as observers for some earlier years. Physical aircraft participation took place in 2008, 2016, and now in May 2024. Pakistan Air Force (PAF) participated in 2010 and 2016, not at the same time as the IAF.

Exercise Cope Thunder was a Pacific Air Forces (PACAF)-sponsored exercise initiated at Clark Air Base, the Philippines. Cope Thunder was moved to Eielson Air Force Base, Alaska, in 1992. Cope Thunder was re-designated as Red Flag-Alaska in 2006. By providing generic scenarios using common worldwide threats and simulated combat conditions, Red Flag-Alaska gives everyone an opportunity to make the tough calls combat often requires. 2018 marked the first time a RQ-4 Global Hawk had been integrated into a Red Flag-Alaska exercise. June 2019 saw the exercise debut of a MQ-9 Reaper. This exercise should not be confused with the "Cope India" exercise, which is a series of international Air Force exercises between the IAF and the USAF conducted on and over Indian soil.

The USN Strike Fighter Tactics Instructor Programme (SFTI Programme), more popularly known as "Top Gun" teaches air combat manoeuvring tactics and techniques to selected naval aviators and naval flight officers, who return to their operating units as surrogate instructors.

## **Red Flag 24**

The IAF's participation in the 16-day multi-nation "Red Flag 24" exercise from May 30 to June 14 reinforces the growing defence cooperation between India and the United States. It reflects the shared commitment of both nations to maintaining regional stability and security.

Approximately 3,100 service members are expected to fly, maintain, and support more than 100 aircraft from different nations during the exercise. The Rafale is a top-end aircraft in the IAF fighter fleet. It is of Western origin and shares some systems and procedures with NATO counterparts.

The Red Flag 24 exercise showcases the IAF's capability to be deployed thousands of kilometres away on the other side of the globe. Long-range air- transport is supported by its own FRA (IL-78 MKI) and large cargo (C-17) aircraft. The exercise will provide IAF crews with realistic simulations of air combat in large-force, complex, and dynamic combat scenarios. Over the course of two weeks, participants will engage in a series of challenging missions designed to test their skills, coordination, and adaptability. There will be air-to-air combat, air-to-surface strikes, and offensive and defensive counter-air operations. The exercise will have combinations of day and night missions, with scenarios that simulate high-threat environments.



IAF aircrew will get to operate and engage with the F-35, the USAF's latest and most advanced fifth-generation fighter. IAF personnel will gain invaluable exposure to and experience from engagements with different operational tactics and strategies. It will enhance their ability to operate effectively in multinational coalitions. IAF combat controllers and other support personnel will also be exposed and will work seamlessly as part of a larger team. It will also allow IAF crews to validate or appraise their own tactics, techniques, and procedures in a realistic combat environment. It will also help refine the IAF's operational doctrines and combat readiness.

### **IAF's Other Major Exercises**

IAF and USAF participate in the bilateral US Pacific Air Forces (PACAF)-sponsored Field Training Exercise (FTX) Cope India series, conducted in India. The first such exercise was conducted at the air force station in Gwalior in February 2004. The exercise was repeated in 2005, 2006, 2009, 2018, and 2023 (Kaliakunda).

The IAF and French Air and Space Force (FAF) have been holding a series of Garuda air exercises since the first in 2003 at Air Force Station Jodhpur, India. Subsequently, they were held in 2005, 2006, 2010, 2014, 2019, and 2022. Other locations for the exercise have included Istres and Mont-de-Marson in France and Kalakunda in India. France is 'one of India's strongest partners', with their relationship encompassing a number of critical sectors, including nuclear, defence, and space cooperation.

The 17-nation Multilateral Exercise 'Pitch Black' 2022 was held in Darwin, Australia, in August–September 2022. Exercise Pitch Black is a biennial warfare exercise hosted by the Royal Australian Air Force (RAAF), which has been held every alternate year since 2006, except for 2020 due to Covid-19. India began participating in 2018. Exercise traditionally consists of a 'red team' and a 'blue team' based at separate locations, with one attacking the other. As inferred from the name of the exercise, it takes place in low-light conditions. All Quad members and many from the Indo-Pacific were part of the exercise, which had over 100 aircraft and 2500 military personnel participating. It gives exposure to a very large cross-section of aircraft, including the F-35s.

Exercise 'Indradhanush' is a joint exercise conducted between the IAF and the Royal Air Force (RAF). The exercise started in 2006 and has held four editions so far, in 2006, 2007, 2010, and 2015. These were held in both India and the UK.

Desert Eagle is a bilateral exercise between the IAF and the United Arab Emirates Air Force (UAE AF). The first was held in 2008 at Al-Dhafra Airbase, UAE, and again in 2016. IAF also participated in the multilateral Exercise Desert Flag VI in the UAE in March 2021 and in 2023. Participants included Gulf nations, the USA, France, Saudi Arabia, and Bahrain, while Jordan, Greece, Qatar, Egypt, and South Korea participated as observer forces. IAF has also been participating in Exercise Eastern Bridge since 2009 with Oman. Eastern Bridge IV was held in 2022 in Jodhpur, India.

Blue Flag is a military aviation exercise held by the Israeli Air Force at Ovda Air Force Base in Israel. In 2017, the exercise hosted the air forces of the USA, Poland, Italy, and Greece, and for the first time, India, France, and Germany participated as well.

In July 2022, the IAF carried out a one-month-long engagement with the Egyptian Air Force (EAF) at the Egyptian Fighter Weapon School, located in Cairo West Air Force Base. This was a first-of-

its kind interaction for both the air forces, as it was conducted between their respective Fighter Weapon Schools. On behalf of the IAF, Tactics and Air Combat Development Establishment (TACDE) participated.

The Republic of Singapore Air Force (RSAF) and the IAF have been carrying out bilateral exercises, codenamed SINDEX. Beginning in 2004 at Gwalior, subsequent editions were held at Kalaikunda in West Bengal and also at Paya Lebar Air Base in Singapore.

The Japanese Air Self-Defence Force (JASDF) and IAF participated in bilateral air exercise SHINYUU Maitri-18 in 2018 at the IAF airbase in Agra. In March 2023, IAF participated in a similar exercise in Komatsu, Japan. IAF and JASDF also participated in joint air exercise 'Veer Guardian-2023' at Hyakuri Air Base in January 2023 that involved fighter aircraft engagements between Su-30 MKI and F-15s, among others.

IAF participated in Exercise Orion at the Mont-de-Marsan airbase in France and Exercise INIOCHOS at Andravida base in Greece, hosted by the Hellenic Air Force, both held in April–May 2023.

### **Pakistan-China 'Shaheen' Exercise Series**

Pakistan Air Force (PAF) and China's PLA Air Force (PLAAF) have participated in a series of exercises called Shaheen since 2011 to improve interoperability to respond to 'mutual threats'. The missions have included simulated air combat, surface attack missions, air-refuelling missions, and logistic support missions. Shaheen-I was held in Pakistan. Shaheen II was held in September 2013 in Hotan, Western China. Subsequent exercises have been held at different airbases in the two countries. The JF-17, J-10, and Sukhoi Su-27/Su-30MKK have participated. The USA has not allowed the PAF to field F-16s.

The exercises gave both the Air Forces an opportunity to improve specific skills and to practice Dissimilar Air Combat Training (DACT). It also allowed for training in different threat environments. It provided an opportunity to further enhance the interoperability of both air forces, improve the actual level of combat training, and strengthen practical cooperation between the two air forces.

These exercises were of special importance to PAF as they gave them exposure to fly against Chinese Sukhoi Su-27/Su-30MKK aircraft, which are similar to the IAF frontline SU-30 MKI aircraft, and helped them validate their tactics. The most recent Shaheen-X was held in August 2023 in Jiuquan, in China's Gansu Province, and Yinchuan, in China's Ningxia Hui Autonomous Region.

Pakistan also gets to participate in the Anatolian Eagle exercise hosted by the Turkish Air Force. They also take part in other exercises in the Middle East.

### **Complex Exercise Planning and Learning**

The large-force bilateral and multilateral air exercises between major professional air forces require months of planning and coordination. The planning has to factor in multiple aircraft flying in confined spaces at very high speeds and engaging in combat manoeuvring. The pace for the exercise is set by initially doing smaller packages and increasing the degree of difficulty in a graduated manner.

There is a need to de-conflict flight paths. The air engagements have to be closely controlled by ground-based and airborne radars. The radio procedures have to be coordinated. The mission commanders have to be designated. Flight safety and operational issues have to be managed. Each mission must have a clearly spelled-out aim and a detailed briefing. Air effort must draw lessons for all air and ground crews.

In addition to enhancing combat knowledge by imbibing the best practices of other air forces, it also improves interoperability. Young aircrew get exposure from flying aircraft of other air forces. Social and casual interactions help exchange ideas and imbibe knowledge. Special lectures are organised to educate the participants. These exercises are also a part of defence diplomacy. There are cultural events and exchanges.

### **Exercise Tarang Shakti**

IAF's mega-multilateral multi-nation exercise 'Tarang Shakti' is planned later this year. The air forces of nearly a dozen nations are likely to participate. It will be the biggest air exercise to be conducted in India. Invited air forces will participate with fighter and transport aircraft and other force multipliers. Initial indications are that the FASF, RAAF, USAF, and RAF are likely to participate. The location has not been announced, but it is likely to be in central India. There are likely to be large force engagements, long-range missions, and maybe joint exercises with elements of the Special Forces and maritime strikes. Also, they will look at "No War, No Peace" scenarios. Many air forces will send observers.

The IAF is fast transforming from a continental air force to one with global reach. It now has trans-domain operations capability, and prides itself on its reach, flexibility, versatility, responsiveness, and offensive lethality. In keeping with the evolutionary nature of air power and the need to stay relevant across the spectrum of conflict in an interconnected environment, there is a need for exercises and doctrinal reviews. Exercise Tarang Shakti will help understand the nuances of the capabilities and application of air power.

### **Exercise Exposure Advantage**

Unlike PLAAF, which exercises primarily with PAF and very few other major air forces, IAF benefits from exposure to air exercises with all the major air forces in the world. The frequency and number of air exercises have gone up in recent years. The saying, "More you sweat in peace, less you bleed in war," is best exemplified by these air exercises. India must be proud that all Western air forces have rated IAF aircrew as great professionals and very superior in their air combat capabilities.

### **Conclusion**

The role of the armed forces in supporting India's foreign policy has been very clear. A stronger military gives the political leadership greater options. Countries with a more powerful military get to sit on the global high table, such as the UN Security Council. The US, and now, to some extent, China, have been able to call the shots globally because of their military presence and power. While India believes in strategic autonomy, global partnerships are important.

India has a powerful military. It is a nuclear weapons power with credible missile and space programs. A key element of being a 'net security provider' is the ability to launch Humanitarian

Assistance and Disaster Relief (HADR) operations in the region. Indian armed forces played a globally acclaimed role during the 2004 Indian Ocean tsunami, the 2015 Nepal earthquake, the 2020 floods in Madagascar, the Covid-19 pandemic medical-relief operations, and the earthquake in Turkey.

The military-to-military contacts are at various levels, including senior-level visit exchanges, arms sales and purchases, military equipment training, joint military exercises, training staff courses, and the exchange of strategic and tactical appreciation literature. India has a significant presence in the UN peacekeeping missions. Defence wings in embassies play a huge role in facilitating all these activities. Also, military exercises are used for political-diplomatic messaging and muscle-flexing. These exercises also help integrate militaries and build relationships at the working level. All this is part of “defence diplomacy”.

<https://www.firstpost.com/opinion/rafale-in-alaska-how-red-flag-24-is-good-international-exposure-to-indian-air-force-13780203.html/amp>

## पंजाब केसरी

Sun, 09 Jun 2024

### भारतीय वायुसेना में शामिल हुए इजरायली मिसाइल रैंपेज, सुपरसोनिक गति से मार करने में सक्षम

भारत अपनी सैन्य क्षमता को मजबूत करने के लिए लगातार प्रयास कर रहा है। अपने लड़ाकू विमानों के बेड़े की मारक क्षमता को बढ़ाने के लिए भारतीय वायुसेना ने रैंपेज लंबी दूरी की सुपरसोनिक हवा से जमीन पर मार करने वाली मिसाइलों को शामिल किया है, जो लगभग 250 किलोमीटर की दूरी तक के लक्ष्यों को भेद सकती हैं। भारतीय वायुसेना में हाई-स्पीड लो ड्रैग-मार्क 2 मिसाइल के नाम से जानी जाने वाली इस मिसाइल का इस्तेमाल इजरायली वायुसेना ने हाल ही में ईरानी ठिकानों पर किए गए हमलों में बड़े पैमाने पर किया था।

रक्षा सूत्रों ने बताया कि भारतीय वायुसेना ने अपने रूसी विमान बेड़े में रैंपेज को शामिल किया है, जिसमें सुखोई-30 एमकेआई और मिग-29 लड़ाकू विमानों के साथ-साथ जगुआर लड़ाकू विमान भी शामिल हैं। स्वदेश में रक्षा उपकरण बनाने के साथ मित्र देशों से भी अत्याधुनिक मिसाइलें और सैन्य उपकरण खरीद कर भी लड़ाकू विमानों के बेड़े की मारक क्षमता बढ़ाई जा रही है। इसी सिलसिले में वायु रक्षा प्रणाली को चकमा देने वाली इजरायली रैंपेज मिसाइलों को भारतीय वायुसेना और नौसेना के बेड़े में शामिल किया गया है।

सुपरसोनिक या आवाज से अधिक गति वाली रैंपेज 250 किलोमीटर तक लक्ष्य को ध्वस्त करने में सक्षम है। वायुसेना ने सुखोई -30 एमकेआई और मिग -29, जगुआर लड़ाकू विमानों को रैंपेज मिसाइलों से लैस किया है। नौसेना ने मिग-29 के नौसैनिक लड़ाकू विमानों के लिए मिसाइलों को अपने बेड़े में भी शामिल किया है। वायुसेना अब इस बात पर भी विचार कर रही है कि क्या मेक इन इंडिया कार्यक्रम के तहत रैंपेज को बनाया जा सकता है।

हवा से जमीन पर मार करने वाली रैंपेज मिसाइलों के शामिल होने से भारतीय लड़ाकू विमानों की मारक क्षमता और बढ़ गई है। 2019 में बालाकोट हवाई हमले में इस्तेमाल की गई स्पाइस-2000 की तुलना में यह मिसाइल

अधिक दूरी तक मार कर सकती है। हाई-स्पीड लो ड्रैग-मार्क 2 मिसाइल के रूप में जानी जाने वाली रैम्पेज मिसाइल को इजरायल ने विकसित किया है।

<https://m.punjabkesari.in/national/news/indian-air-force-navy-fighter-aircraft-fleets-get-rampage-missile-1991012?amp>



*Fri, 07 Jun 2024*

## **Hyderabad-based Zen Tech offers a new layer of protection to Indian Defence**

Defence training solutions provider Zen Technologies has delivered an anti-drone system to the Army Air Defence College in Gopalpur, Odisha.

The product, Zen Anti-Drone System with Hard-Kill (Zen ADS HK), while building upon its proven soft kill anti-drone systems deployed by the Indian Air Force, offers a new layer of protection, the Hyderabad-based company said on Friday.

The advanced system integrates seamlessly with existing legacy defence infrastructure, featuring a state-of-the-art electro-optical tracking system (EOTS) designed and developed in-house. The EOTS combines a day camera, a thermal camera and a laser range finder (LRF) for effective all-weather auto-tracking.

The company's engineers designed a software interface that flawlessly integrates with the L-70 Air Defence Gun, a mainstay of the Indian Army and numerous other countries. The system boasts versatility, allowing integration with various cue-able automatic gun platforms for wider deployment. Zen takes pride in the entirely indigenous design, development and manufacturing of Zen ADS HK within India, the company said in a release.

Describing the development as a significant milestone in bolstering India's defence capabilities against drone threats, Zen Technologies said that the Army Air Defence College, tasked with training India's Air Defence Corps, had placed an order for Zen ADS HK 18 months ago.

While the order was based on preliminary successful trials in accurate cueing of the automatic gun platform, Zen's team designed, developed and delivered a system that surpasses expectations, following rigorous testing and trials. Zen ADS HK showcases compatibility with existing weaponry and adaptability to different gun platforms, making it more versatile for diverse deployments, it said.

<https://www.thehindu.com/news/cities/Hyderabad/hyderabad-based-zen-tech-offers-a-new-layer-of-protection-to-indian-defence/article68262842.ece/amp/>

## IAF chief flies sortie in Eurofighter aircraft at German airbase

Indian Air Force (IAF) Chief Air Chief Marshal V. R. Chaudhari flew a sortie in a Eurofighter aircraft at a German airbase on Friday, June 7, 2024 officials said.

Air Chief Marshal V.R. Chaudhari is currently on a visit to Germany. The IAF later also posted some pictures from his official visit.

"CAS Air Chief Marshal VR Chaudhari is on an official visit to Germany on invitation by his German counterpart Lt Gen Ingo Gerhartz, Commander of the German Air Force. During the tour, the CAS also visited the ILA 2024 and took to the German skies in a Eurofighter Typhoon fighter aircraft.

"IAF is looking forward to hosting @Team\_Luftwaffe in its first multinational Exercise Tarang Shakti 2024 in India, later this year. May the bonds of friendship and trust between the two countries continue to flourish," the IAF posted on X.

<https://www.thehindu.com/news/national/iaf-chief-flies-sortie-in-eurofighter-aircraft-at-german-airbase/article68264755.ece/amp/>



Fri, 07 Jun 2024

## Tarang Shakti 2024: Indian Air Force gears up for largest multinational exercise in Jodhpur

Indian Air Force (IAF) will be conducting its biggest-ever multinational exercise "Tarang Shakti 2024", wherein the fighter jets from some of the most advanced air forces across the globe scheduled to roar in Jodhpur skies in August.

"... IAF is looking forward to hosting German Air Force (@Team\_Luftwaffe) in its first multinational Exercise Tarang Shakti 2024 in India, later this year. May the bonds of friendship and trust between the two countries continue to flourish," Indian Air Force said in a post on X. It must be noted that IAF chief ACM VR Chaudhari is in German and visited International Aerospace Exhibition ILA Berlin and took a sorties in Eurofighter's Typhoon aircraft.

Of the 12 countries, six nations will be participating with their air assets, including their frontline fighter aircraft, transport aircraft, mid-air-refuellers while the other six will be joining as observers.

In a post on X, the German Air Force said that the Eurofighter aircraft will join the forces in Tarang Shakti exercise in India in August. The air assets from air forces like Quad nations --- Aus-



tralia, Japan and the United States, in addition to that of France and the United Kingdom, and Germany will be sending their assets for this wargame in Rajasthan sector.

It must be noted that the Exercise Tarang Shakti will witness a better professional interactions, enrich the employment philosophy of the participating forces and exchange valuable insight.

In 2023, ACM Chaudhari and his German counterpart Lieutenant General Ingo Gerhartz had discussed issues of mutual interest and the means to further enhance cooperation between the two Air Forces. It is pertinent to mention here that in 2006 the two countries inked the Bilateral Defence Cooperation Agreement and in 2007 they signed an Agreement on Mutual Protection of Classified Information which provides the framework for bilateral defence ties.

To further enhance the defence industry and defence cooperation between Germany and India, the Arrangement on Implementation of the Agreement of 2006 concerning Bilateral Defence Cooperation was signed in February 2019 in Berlin. In February 2024, Defence Secretary Giridhar Aramane co-chaired the India-Germany High Defence Committee (HDC) meeting in Berlin with the State Secretary, German Ministry of Defence Benedikt Zimmer and discussed a range of bilateral security and defence issues, with a focus on developing the defence cooperation as a key pillar of the Strategic Partnership between India and Germany.

Besides other things, they also discussed likely joint exercises with Germany in the Indo-Pacific, and deliberated on potential defence industrial projects and proposals.

<https://newsable.asianetnews.com/amp/india-defence/tarang-shakti-2024-indian-air-force-gears-up-for-largest-multinational-exercise-in-jodhpur-ajr-ser93s>

## THE TIMES OF INDIA

*Sat, 08 Jun 2024*

### **Emergence of Indian Navy as a reliable security provider in Indo-Pacific**

**- By Dr. Prashant Prabhakar Deshpande**

#### **Introduction**

Maritime trade routes have always been the vital areas of contestation between countries. The Indian Ocean connecting Africa and Asia with a vast expanse of Pacific waterways and ports, hosts at present around 100,000 commercial vessels per annum, along with one-third of the bulk cargo ships. The significant amount of oil flow from the Persian Gulf further underscores the strategic importance of the Indian Ocean Region (IOR). 2/3rds of the world's total oil shipments are reportedly carried out through the Indian Ocean, while, the value of trade volume carried through the Indian Ocean has risen rapidly to nearly one trillion dollars per annum.

#### **Evolution of India's Naval Strategy for IOR**

India is among the largest littoral states in IOR, a littoral state being a state with a coast. With Indo-China competition intensifying in the Region, India's defence focus in recent times has increasingly turned towards the Indian Ocean.

At the beginning of the millennium, India recognised the need for a dominant position in the maritime domain by building a modern navy, the need arising out of 3 key developments:

- To counterbalance China's growing naval influence in the Indian Ocean, a sphere traditionally seen as vital to Indian interests;
- To protect its burgeoning international trade; and;
- Deepening strategic partnership with partner nations, particularly the US, which views India as a pivotal partner in its Indo-Pacific strategy.

India's First Naval Strategy for the region was released in 2004, demonstrating a shift in India's approach to the IOR, underlining India's desire to become a Strong Regional Naval force to Counter China.

At the dawn of the 21<sup>st</sup> century, India recognised the importance of IOR as a crucial hub for global maritime trade. IOR was not perceived as an intensely contested geopolitical arena then, as it is known today.

The 2007 revision into the Freedom of Use of Seas: Indian Military Strategy, laid the groundwork for a more assertive maritime stance with an emphasis on force multipliers, quality of weapons, sensors, and networking of platforms.

The release of the new Indian Maritime Doctrine in 2009 articulated a more robust stance on the use of force, and clearly delineated the Indian Navy's areas of strategic interest.

The vision further matured in 2015 with the introduction of the updated Indian Maritime Doctrine emphasising the following 3 Core objectives:

- To establish India as the predominant naval power and principal security provider in the IOR;
- Broadening India's strategic focus areas from the 2009 doctrine, incorporating vital blockages, such as the Straits of Hormuz, Bab el Mandab, Malacca, Lombok, Sunda, and Ombai within its primary interest zones;
- Extending its secondary interest areas to include the Mediterranean Sea, Atlantic Ocean, South China Sea, and distant reaches of the Pacific.

The 2015 doctrine marked India's inaugural use of the term Indo-Pacific, signifying a strategic central point, and India's increasing prominence in Regional Geopolitics.

This shift from Asia-Pacific to Indo-Pacific reflects, not only India's growing influence, but also underscores its ambition to play a Central role in shaping the maritime security architecture of the region.

This coincided with Prime Minister Narendra Modi's SAGAR (Security and Growth for All in the Region) initiative, which emphasised a cooperative approach to maritime governance, based on trust, respect for international norms, peaceful dispute resolution, and enhanced maritime cooperation.

This holistic strategy, it is opined, illustrates India's evolving role as a central figure in not just regional, but global maritime security, aligning with its ongoing efforts to combat piracy and assert its influence in the IOR.

The Indian Navy's successful anti-piracy operations in the Western Indian Ocean, unequivocally signals India's emergence as a responsible global power showcasing India's readiness and capability to safeguard maritime commerce and deter piracy, thereby reinforcing India's stature on the global stage. This deployment is said to demonstrate, not only India's willingness to take a more active military role in the Indian Ocean, but also assures international actors of its strategic intentions and capabilities.

This robust display serves to reassure the US, which views India as a crucial partner in the Indo-Pacific security architecture.

Furthermore, these developments send a potent message to China, underscoring that the Indian Ocean remains under India's watchful eye, and any destabilising activities in this area will meet a formidable response.

Amidst escalating tensions with China, India has leveraged these operations to demonstrate its modern military prowess and readiness to maintain order in its maritime backyard. This show of force is particularly important in the face of China facing criticism for its perceived inaction against threats like the Houthi and Somali pirate attacks.

The deployment also reassures other Indian Ocean Rim nations of India's commitment to regional security. This is evidenced by India's recent military collaborations, including significant exercises with the Philippines, Samudra Shakti with Indonesia, and the inaugural exercise with ASEAN countries. These initiatives are part of a broader engagement strategy aimed at fostering cooperation among middle powers in the Indo-Pacific theatre.

The commissioning of INS Jatayu on March 6, 2024 by the Indian Navy at Minicoy-island in Lakshadweep further enhances India's ability to conduct sustained operations in the Indian Ocean.

## **Epilogue**

While India may not become a global naval superpower overnight, the success of operations like Sankalp are crucial milestones in the evolution of India's maritime capabilities. Such successes in counter-piracy operations not only provide valuable real-world experience for Indian Navy personnel, but also test their capacity for sustained long-term deployments beyond territorial waters.

Importantly, these actions help cultivate an image of India as a valuable contributor to global security and an increasingly competent force in the maritime domain, it is opined.

According to experts, in the present period of Maritime Century, the prosperity of open economies heavily depends on secure maritime connectivity, both physical and digital. Through its strategic initiatives and Naval deployments, India is well-positioned to ensure the safety of international trade routes, while advancing its broader strategic objectives, it has been observed.

<https://timesofindia.indiatimes.com/blogs/truth-lies-and-politics/emergence-of-indian-navy-as-a-reliable-security-provider-in-indo-pacific/?source=app&frmapp=yes>

## **Bloody Irony! Hezbollah Uses Israeli-Origin Missile To 'Knock Out' Iron Dome; Know About Almas ATGM**

After Lebanon-based militant group Hezbollah claimed the destruction of Israel's revered 'Iron Dome,' we now know which missile was used to knock out the Israeli air defense system. Hezbollah claimed on June 5 that it struck an Iron Dome air defense system launcher near the Ramot Naftali, or what Hezbollah refers to as the "northern occupied Palestine."

The claims were supported by a video from the group showing a guided missile hitting the launcher. On June 6, social media was flooded with photos of a destroyed Iron Dome battery, along with information that it was obliterated by the Iran-origin Almas missile. This missile could have been supplied by Tehran to the Lebanon-based Hezbollah militia group.

In the photograph (below) that has been published on social media, the Iron Dome battery appears to have incurred significant damage. Several military bloggers, dedicated open source intelligence accounts on X, and war trackers confirmed that Hezbollah used the 'Almas-3' ATGM (Anti-Tank Guided Missile) to carry out the attack.

Ironically, the Almas missile is based on Israel's famous 'Spike ATGM.'

The Israel Defense Forces (IDF) have not acknowledged the destruction till the time of filing this report. Several prominent pro-Israeli military bloggers said that the system in question could have been a decoy.

Some others noted that the system may not have been activated since there were no secondary explosions, which would have been the case had the launcher been fitted with Tamir interceptors. EurAsian Times could not independently verify the claims.

A Middle East-based veteran correspondent, Elijah J. Magnier, wrote on X: "Hezbollah has access to firepower and is not conserving its ammunition against Israel in support of Gaza. The message is clear: stop the war on Gaza, and the Lebanese front will stop immediately."

Some pro-Iranian netizens, opposed to Israel, expressed their jubilation by emphasizing the capability of Iranian weapons — from "shared to Almas." The Almas is believed to be an Iranian-made copy of Israel's Spike anti-tank loitering weapon, produced by Rafael.

As per claims, the missile has been created by reverse engineering the Spike missiles that Hezbollah captured during the 2006 war with Israel and then brought back to Iran for use. Hezbollah is alleged to be supplied by Iran and has been using a host of Iranian weapons to attack Israel since October last year.

The video published by Hezbollah of the attack on the Iron Dome shows the launcher sitting in a barrack with the Almas fast approaching. The munition then dives unaffected in the direction of the launcher.

This is not the first time that the Almas have been used against Israel. Hezbollah's initial footage of using the Almas was captured during a strike on an Israeli intelligence installation perched on a cliff in January. At the time, a video showed a missile being fired, climbing swiftly, and then heading toward an Israeli monitoring post perched on a cliff near the Lebanon border.

With the help of its man-in-the-loop control system, the Almas can precisely launch indirect attacks over a short distance by flying quickly in the direction of its target. For Israeli military and border infrastructure, this poses a serious threat because the Iranian-origin missiles that have been reverse-engineered from Israeli missiles have been hailed for their cutting-edge precision over the years.

The Spike has been used by the IDF in combat on multiple occasions and with a fairly high degree of success. This reputation makes Spike's presence and possession of Almas with Hezbollah even more dramatic, especially in the wake of the looming risk of escalation.

### **Almas Is Based On Spike And Is Its Nemesis**

The Almas, which means Diamond in Persian, is an anti-tank guided missile manufactured by Iran and delivered to Hezbollah. It is another high-precision weapon in the hands of Iran and is symbolic of the strong nexus between Iran and the militias operating out of Lebanon.

A robust and sophisticated Iranian missile technology infrastructure underpins the Almas, a major technological and engineering enhancement for the Iranian defense sector.

According to publicly available information, the missile has a range of about eight kilometers and carries a tandem warhead. The front warhead is located just behind the homing head in the missile's nose.

The Spike series, which dates back several decades, was revolutionary when it initially came out because the missiles enabled first-person control while in the air for the man-in-the-loop. This implies that they might also be fired, fly in the direction of a target, and then lock on to that target (launch-to-lock-on). This allows the missile to hit targets not even in its line of sight.

This technology has opened up new tactical opportunities, such as pinpointing a target's location after launch and homing in on concealed targets. It is even possible for the missile to be redirected mid-flight to another target. However, the Almas missile possessing the same capability is not good news for Israel.

Hezbollah's Kornet and TOW missiles were not equipped with the capabilities of the Israeli-made Spike missiles and, by extension, of the Almas. Since its unveiling in 2021, Almas has been produced in forms that may be launched by ground/surface vehicles, aircraft, and men.

It should not be shocking that Hezbollah has these weapons because Iran has given the terrorist organization based in Lebanon enormous amounts of sophisticated missiles and rockets.

Iran's capacity to copy Western ammunition is not new. It has copied many kinds of missiles, unmanned aerial vehicles, and other weaponry that it has acquired. A reasonably sophisticated state like Iran has repeatedly demonstrated its effective improvisational skills by replicating these systems very close to the original.

<https://www.eurasiantimes.com/bloody-irony-hezbollah-uses-israeli-origin-missile/amp/>

## **After ‘Robbing’ Stealth Tech, China Now Accused Of Stealing US, Western Fighter Pilots To Train Its Aviators**

China is reportedly recruiting active and retired Western military pilots and other service members to bolster its air force and learn about Western aviation strategies.

The ‘Five Eyes’ partners — the United States, the United Kingdom, Canada, Australia, and New Zealand — jointly released a bulletin, terming China’s recruitment operations as a “persistent” danger. The United States and its intelligence allies released the bulletin on June 5.

According to the bulletin, the People’s Liberation Army (PLA) of China is employing former fighter pilots from Canada, France, Germany, the United Kingdom, Australia, the United States, and other Western countries through private companies in South Africa and China to train cadet pilots in PLA Air Force (PLAAF) and the PLA Navy (PLAN).

According to Michael Casey, the head of the National Counterintelligence and Security Center, a division of the US intelligence agency, “To overcome their shortcomings, China’s People’s Liberation Army has been aggressively recruiting Western military talent to train their aviators.”

He also said, “Recent actions by Western governments have impacted these operations, but PLA recruitment efforts continue to evolve in response.”

When probed about the bulletin, Pentagon deputy press secretary Sabrina Singh said the Pentagon “always expect that our pilots will uphold the standards that they are trained under and that they keep their training specific to the United States.”

There is a growing perception that China is also looking to hire former Western pilots by paying them exorbitant fees to learn Western combat tactics that could be useful in a potential combat scenario. For instance, a US official said Chinese pilots may learn anything from air warfare tactics to landing on an aircraft carrier from pilots with Western training. They may also offer China a rare glimpse into how to thwart Western military strategies.

The bulletin said, “The PLA wants the skills and expertise of these individuals to make its military air operations more capable while gaining insight into Western air tactics, techniques, and procedures. The insight the PLA gains from Western military talent threatens the safety of the targeted recruits, their fellow service members, and U.S. and allied security.”

It warned that this “threat continues to evolve in response to Western government warnings to their military personnel and public, so this notice seeks to continue highlighting this persistent, adaptive threat.”

Beijing has employed private enterprises that frequently conceal their connections to the Chinese military to entice Western pilots. These companies reach out to potential pilots through headhunters or professional networking sites, promising them “lucrative contracts and the opportunity to fly



exotic aircraft.” The statement said that the most sought-after targets have been military pilots, flight engineers, and staff members of air operations centers.

These private businesses have established ostensibly independent operations in other nations, including Laos, Singapore, and South Africa. Dozens of former Western pilots are teaching Chinese military officials, who, in turn, send additional pilots back to China for training.

The intelligence partners’ warning coincides with increased anxiety over China’s military build-up and recent maneuvers around Taiwan, which Beijing has labeled as “punishment” following the island nation’s recent elections. China claims Taiwan is a part of its territory and has threatened to use force to annex the island.

It is no secret that China has been expanding its Air Force and Navy on a scale not seen in several years. This is evident from the power it frequently projects in the Taiwan Strait or the contested South China Sea. However, there is concern that while it has significantly expanded the number of fighter jets in its arsenal and developed a third aircraft carrier, it does not have many qualified fighter pilots to fly these aircraft with the proficiency seen in the West.

### **Growing Concerns**

There have been several reports in the last few years that have categorically noted that China is ensnaring Western fighter pilots — from the US, the UK, France, and Germany — to train its cadet pilots. However, that concern is growing as Beijing remains relentless in its poaching.

Since 2022, retired American, British, and German fighter pilots have been working with the Chinese Air Force and Navy, lending their expertise to enhance their training programs.

Daniel Duggan, a former US Marine pilot, was arrested in Australia in 2022 for training Chinese military pilots to land on aircraft carriers in violation of US arms control law. The crucial capability would be useful to the PLA Air Force in critical sea operations against Taiwan, the US, and its regional allies.

The most sought-after recruits are the NATO pilots, maintainers, air operations center personnel, and other technical experts from multiple occupations who could provide insights into US and NATO air tactics, techniques, and procedures. Pilot Daniel Duggan – a former US Marine Corps aviator – has been accused of breaking American arms control laws by training Chinese fighter pilots to land (via Platform X).

However, Western nations have been increasingly taking steps to counter Beijing’s campaign. For instance, in June 2023, the US government added dozens of businesses with alleged ties to the Chinese government to its list of organizations subject to trade restrictions. On this list were the Test Flying Academy of South Africa and Frontier Services Group, a Chinese state-owned corporation. Both corporations were linked to the recruitment.

The UK, for its part, announced in September 2023 that former members of its armed forces who trained Chinese pilots would be held legally responsible and even prosecuted for exchanging military strategies with an adversary nation.

In January this year, US and NATO officials convened a conference to discuss how to counter Chinese recruitment of alliance personnel.

Titled “The Securing Our Military Expertise from Adversaries,” the conference was the first such event with NATO participation aimed at tackling the People’s Republic of China’s moves targeting the US and NATO-trained military personnel for employment. Topics included discussing best practices, cross-targeting, and how to combat the emerging threat to US and NATO security.

As China seeks to challenge its Western counterparts, it has rattled them by breaking into their bastion and stealing its soldiers.

<https://www.eurasiantimes.com/sneaky-moves-to-poach-former-western-pilots/amp/>



*Sat, 08 Jun 2024*

## **UMPB D-30SN: Meet Russia’s ‘Unstoppable’ Glide Bombs That Are Propelling Its Advances In Ukraine**

On May 25th, Russian forces dropped two glide bombs on Kharkiv, Ukraine’s second-largest city. The first bomb struck a hypermarket building, where approximately 200 people were present at the time. The attack resulted in around 60 confirmed deaths and 40 injuries.

Immediately following this attack, the Russian military launched another strike on the city, this time hitting a residential area in central Kharkiv, injuring 14 people.

A few days prior to this incident, President Volodymyr Zelenskiy stated that Ukraine requires a defense system to counter Russia’s guided bombs. He reported that over 3,200 guided bombs were deployed against Ukrainian targets in April alone, describing them as Russia’s “main instrument” in its attacks.

These weapons are not completely new; instead, they are old weapons upgraded with new equipment.

A glide bomb is a conventional air-dropped bomb adapted to be launched remotely instead of directly over the target. Initially, these bombs are basic “dumb bombs,” later enhanced with wing kits and satellite navigation systems to improve accuracy, turning them into “smart” bombs. Unlike smart bombs, dumb bombs lack guidance systems and are dropped straight downward from a bomber onto a target below.

Born from the ashes of World War II, where the German Fritz X, pioneered by the Nazis, served as the inaugural model. Subsequently, the United States advanced the development and utilization of various glide bombs in conflicts, including the Vietnam War, the Iraq War, and the war in Afghanistan.

Russia has been revamping its old Soviet stockpiles by upgrading heavy FAB-500 and FAB-1500 bombs with a Unified Gliding and Correction Module. This upgrade includes fold-out wings and a satellite navigation system, transforming them into guided weapons.

These enhanced bombs, directed by a guidance system, offer significant destructive power and reduce risks to aircrews. Despite their simplicity and low cost, glide bombs have become one of Russia's most effective weapons in the ongoing war.

### **Russian UMPB D-30SN**

As per Ukrainian media, Russian forces utilized the new UMPB D-30SN glide bombs to strike the DIY hypermarket.

These weapons represent the most recent additions to Russia's military campaign in Ukraine. Technically, the UMPB D-30SN refers to a kit of additional equipment designed to be affixed to an existing Soviet-standard bomb, specifically intended for use with the FAB-250 high-explosive aviation bomb.

This kit converts a bomb in free fall into a glide bomb by deploying its wings, enabling it to glide towards its target. This feature permits aircraft to release the bombs from a secure distance, avoiding entry into enemy-controlled airspace.

Consequently, Russian pilots can conduct bombing missions without venturing into Ukrainian airspace, thus minimizing the risk of being shot down. The bomb is called UMPB D-30SN (Universal'nyy Mezhvidovoy Planiruyushchiy Boyepripas), which means Universal Interspecific Glide Ammunition.

According to media reports, the UMPB D-30SN boasts an operational range 20 to 30 km greater than its predecessor, the UMPK. When paired with the 500-kilogram FAB-500 bomb, the UMPK can autonomously fly for 60 to 65 km after being launched from high altitude by a carrier aircraft traveling at high speeds.

Due to their significant payload, these bombs cause extreme damage upon impact. Lacking the precision of guided missiles or artillery, they are ineffective against mobile targets. However, they excel at demolishing multi-story buildings and reinforced bunkers, often resulting in severe injuries, including brain trauma, for survivors.

### **Glide Bombs Propel Russia's Advances In Ukraine**

According to media reports, the widespread use of glide bombs has significantly contributed to Russia's territorial gains in Ukraine. These bombs have played a crucial role in Russia's recent offensive in Kharkiv Oblast, paving the way for ground troops.

A report from the Kyiv Independent warns that these glide bombs could pose an even greater threat to Ukraine, as the country currently lacks effective defenses against them. With Russia expected to continue the mass deployment of glide bombs to support further offensives, experts express concerns about the escalating danger they present.

### **Ukraine's Defensive Struggle**

On the other hand, Ukraine faces challenges with glide bombs against Russian jamming. Despite Ukraine's utilization of glide bombs supplied by the United States against Russia, Reuters reports that these weapons are facing hurdles against advanced Russian electronic jamming, prompting Ukraine to search for effective countermeasures.

The Ground-Launched Small Diameter Bomb, jointly developed by Boeing and Saab Group, represents a recent addition to the guided bomb arsenal, boasting a range of approximately 100 miles thanks to its innovative small wings. Mass production of this weapon commenced in 2023, with its inaugural combat use occurring in 2024 during Ukraine's defense against the Russian invasion.

Ukraine received these bombs in early February 2024. Despite marketing claims touting its navigation system's resilience to jamming, Reuters reveals that the bombs' guidance systems are being thwarted by Russian interference, leading to numerous missed targets. Air power expert Justin Bronk of the RUSI think tank succinctly captures the essence of Ukraine's predicament while talking to the Daily Mail.

“Unfortunately, effectively shielding against these glide bombs at the frontlines is a significant challenge for Ukraine. The Russians possess the capability to launch glide bombs from considerable distances. Despite Ukraine's occasional victories in intercepting these high-altitude glide bomb assaults by positioning Patriot launchers near the front lines and placing radar systems relatively close to them to strike at the opportune moment and swiftly engage the approaching Russian aircraft, operating from a perceived safe distance. However, Ukraine also experienced the loss of Patriot launchers to a UAV, which detected and guided a ballistic missile towards them.”

As the conflict persists, the airspace over Ukraine has evolved into a battleground of technological advancement, with the mastery of glide bomb superiority holding significant sway. In this aerial clash, the stakes have reached unprecedented heights, and the pursuit of dominance brooks no margin for error.

<https://www.eurasiantimes.com/umpb-d-30sn-meet-russias-unstoppable/amp/>



*Fri, 07 Jun 2024*

## **Dragon, Bear and Tiger: How India's response to growing China-Russia ties will determine geopolitics of Indo-Pacific**

The defence establishment in India is sounding an alarm, which is growing louder by the day. India can no longer ignore the Russia-China bonhomie. The Indian Minister of Foreign Affairs, S Jaishankar, has defended the India-Russia partnership as unaffected by the newly found Russia-China “friendship with no limits”.

On May 24, Swasti Rao, Associate Fellow at the Institute of Defence Studies and Analysis (IDSA), a think tank of the Indian Ministry of Defence, published an op-ed calling for India to de-risk itself from Russia. This was an institutional first, and Rao was attacked on social media by veteran Indian diplomats. This also brought to light the amount of influence the Kremlin continues to wield in Delhi.

On May 27, Rao's op-ed was followed by another piece, this time by retired Gen M M Narvane, India's former Chief of Army Staff, cautioning the Indian government to sharpen its act. Narvane warned that India could no longer take Russia's support for granted, especially in the Indo-Pacific, given Russia's increasing dependency on China.

The Russia-China bonhomie and India's balancing act between Moscow and Washington only reiterate what the 19th-century British statesman and Prime Minister Lord Palmerston apparently once said: "There are no permanent enemies and no permanent friends, only permanent interests," Narvane said, underscoring the need for India's new government to keep Moscow on notice.

This demand by the defence establishment for India to pivot away from Russia was addressed on May 30 by Antara Ghosal Singh of the ORF Foundation. Singh, offering a counterpoint, argued that in the triangular dynamics between China, Russia, and India, China has little option but to accept deeper India-Russia ties, face the risk of losing Russia to Indo-Pacific geopolitics, or have India slip further into the arms of the US.

The rare public difference of opinion between the two pillars of India's global outreach, its defence ministry and its ministry of external affairs, comes at a time when India is wrapping up its national elections and a Modi 3.0 government is expected to be declared on June 6. It also comes at a time when the world is distracted by the continuing war in Ukraine, the Israel-Hamas conflict, the political instability in Iran, which is a key belligerent in the Middle Eastern conflict, China's war games with Taiwan, and its aggression in the South China Sea against the Philippines.

This also comes at a time when President Putin is making forays into the Sea of Andaman, taking over the port at Dawei, and forming the Squad, a new US-led grouping in the South China Sea that does not include India.

In all these conflicts, what is ignored is the India-China standoff on the Line of Actual Control (LAC). The countries share a 3,400-km border between India and Tibet, which has never been accepted by China. China continues to claim several Indian territories as its own, and the border is one of the most militarised areas in the world. India and China have had repeated skirmishes since 2020, and in March, India freed up 10,000 soldiers and moved them to better guard the border with China.

Adding to the tension, satellite imagery has shown that on May 27, China moved six J-20 stealth aircraft to Shigatse airbase in Tibet. Shigatse, at an elevation of over 12,000 ft, is one of the world's highest altitude airports and is around 150 km from India's Sikkim border. It is also close to Doklam at the strategic Sikkim-Bhutan-Tibet trijunction.

While India's ministry of defence has not commented on the latest Chinese move, it has increased alert levels in New Delhi, given Shigatse is around 300 km from the Indian Air Force's (IAF) base in Hasimara, Bengal, which hosts the IAF's second squadron of 16 Rafale aircraft. China also continues to establish "Xiaokang" villages, adding to those already present. These prosperous villages, which mushroomed suddenly in contested Tibetan border areas with India, are dual-use with reinforced military infrastructure. They are probably watchpoints, but they also serve to back up the infrastructure along the India-China border to be used by armed forces in case of conflict.

As tensions rise, India continues to arm itself. India has begun negotiations with a French team from Dassault for the purchase of 26 Rafale Marine fighter jets to add strength to the INS Vikrant, India's second and more advanced aircraft carrier.

While both India and China have two aircraft carriers, China has started testing its third as India lags behind. China's spy vessels frequently sail close to India's coasts, even though China has not sailed an aircraft carrier in Indian seas so far.

China continues to grow its influence in the Indian Ocean, first through its base in Djibouti and its presence in Gwadar, Pakistan. India must catch up to maintain the security of its economic zones as well as its projection power from the Gulf of Aden to the Andaman and Nicobar Islands.

While the US, Quad, and Europe prepare for a conflict in the oceans and guard sea lines of communication, key to any war effort, India's war with China will be mostly fought inland. In these battlefields, India stands alone against China's might in some of the world's most treacherous terrain, where both countries are at a disadvantage. China is further weakened as it is seen as an occupying power in both Tibet and Xinjiang, regions oppressed by Beijing, where neighbouring India is viewed as a friend and China's Han majority as an oppressor.

New Delhi's new government has a tough battle ahead in not only countering China and standing up to it in a hostile neighbourhood but also in making tough decisions on its strong ally and old friend Russia, which seems to lose trust from India's defence establishment.

With an uncertain Europe that is divided over its China approach and a turbulent US election that will distract further along with the two wars the world is facing, it will be India alone. It will have to stand up to the aggression of the Chinese dragon. At the end of the day, the war in the Indo-Pacific begins at the McMahon line.

<https://www.firstpost.com/opinion/dragon-bear-and-tiger-how-indias-response-to-growing-china-russia-ties-will-determine-geopolitics-of-indo-pacific-13779969.html/amp>

## THE ECONOMIC TIMES

*Sun, 09 Jun 2024*

### **Amid run-ins with Philippines, China says US provoking arms race in South China Sea**

The US poses the largest security challenge in the South China Sea as its military deployment there is turning it into "the whirlpool of an arms race", Chinese Vice Foreign Minister Sun Weidong said in remarks published on Sunday.

Recent maritime run-ins between China and the Philippines, a US treaty ally, have made the strategic South China Sea a potential flashpoint between Washington and Beijing.

"At present, the biggest security challenge in the South China Sea comes from outside the region," Sun said in comments published by his ministry, after attending a meeting on East Asian cooperation in Laos.



un said US-led forces were "promoting military deployment and actions in the South China Sea, inciting and intensifying maritime disputes and contradictions, and damaging the legitimate rights and interests of coastal countries".

In April, the Philippines said during a meeting with US allies that it was determined to assert its sovereign rights in the South China Sea.

<https://economictimes.indiatimes.com/news/defence/amid-run-ins-with-philippines-china-says-us-provoking-arms-race-in-south-china-sea/articleshow/110853477.cms?from=mdr>

## Science & Technology News

THE  HINDU

Sat, 08 Jun 2024

### **ISRO all set for third reusable launch vehicle landing experiment**

Taking its Reusable Launch Vehicle (RLV) programme one more step closer to reality, the Indian Space Research Organisation (ISRO) is all set to carry out the third and final RLV landing experiment (RLV LEX).

Speaking to The Hindu about the upcoming test mission, S. Unnikrishnan Nair, Director, Vikram Sarabhai Space Centre (VSSC), said a Mission Readiness Review (MRR) held on Friday cleared the mission for the first half of June, subject to weather conditions, at the Aeronautical Test Range at Chitradurga, Karnataka.

"We are scaling up the difficulty level with the third and final mission," Dr. Unnikrishnan Nair said.

RLV-LEX missions involve taking an unmanned winged prototype, christened Pushpak, to a designated height and releasing it to land safely under varying conditions. In LEX-03, Pushpak will be carried to a height of 4.5 km and 500 metres to one side of the runway using an IAF Chinook helicopter and released.

In LEX-02, the second mission, the altitude was the same but the lateral distance from the runway was 150 metres. "It has to autonomously approach the runway, manoeuvre by making crossrange, downrange and altitude corrections to touch down on the runway," he said.

The LEX-03 mission will look at how the sink rate, or the rate of descent, can be cut down to reduce the impact load. It will also have on board a real-time kinematics (RTK) package. Yet another challenge before the upcoming mission is handling tailwind conditions. The VSSC at Thumba was responsible for the design and development of Pushpak. In the next stage of tests under the RLV-TD, the ISRO will use an unmanned Orbital Re-entry Vehicle (ORV).

The vehicle used will be 1.6 times the size of ‘Pushpak’ used for LEX. It will be placed in a 400 km orbit around earth using a modified Geosynchronous Satellite Launch Vehicle (GSLV). This mission is expected in two years time.

“Various experiments will be carried out in orbit. It will have, among other things, a thermal protection system for safe re-entry into the earth’s atmosphere and a retractable landing gear. The ISRO has started work on the ORV,” Dr. Unnikrishnan Nair said. The ISRO had successfully carried out the LEX-01 mission on April 2, 2023 and the LEX-02 on March 22, 2024.

<https://www.thehindu.com/news/national/kerala/isro-all-set-for-third-reusable-launch-vehicle-landing-experiment/article68266926.ece/amp/>

# ThePrint

*Fri, 07 Jun 2024*

## **Gaganyaan to Shukrayaan — new govt to continue focus on R&D, quantum tech & big-ticket missions**

Space, quantum technology, research and development (R&D), and strengthening work around the Anusandhan National Research Foundation (ANRF) will feature high on the new government’s agenda.

“We will get a better vision once the new government takes over, but some key science programmes and projects were sanctioned in the last year. Work will continue on those projects,” said an official from the ministry of science and technology.

Some of the key projects that had been sanctioned between 2023 and 2024 were the National Quantum Mission (NQM), and the National Mission on Interdisciplinary Cyber-Physical System and the ANRF.

### **Science and technology**

Last year, the ANRF was given the green light in the Parliament following the Union Cabinet’s approval of the Anusandhan National Research Foundation Bill. With an allocation of Rs 50,000 crore for the next five years, the ANRF is set to play a pivotal role in promoting research and development in the country. The idea behind setting up the ANRF is to engage with various levels of India’s research institutions, colleges and universities.

Several rounds of meetings were conducted early this year to finalise the ANRF’s governing and executive bodies. These bodies will firm up plans for partnering with industries, allocating funds to universities and institutes.

Another big-ticket project that the government had started work on is the National Quantum Mission. Launched last year at a total cost of Rs 6,003.65 crore for eight years, NQM’s aim is to scale up scientific and industrial research and development and create an ecosystem in quantum technology.

Officials from the department confirmed that as a long-term commitment, the mission will continue to be a focus of the new government.

The objective is to develop intermediate-scale quantum computers with 50-1,000 physical qubits in eight years across various platforms like superconducting and photonic technology. In the mission document for quantum technologies released in February, the ministry also said that in the coming years, satellite-based secure quantum communications between ground stations over a range of 2,000 km within India, long-distance secure quantum communications with other countries, inter-city quantum key distribution over 2,000 km, as well as multi-node quantum networks with quantum memories, will be set up.

“The National Quantum Mission is one of the biggest projects that India has taken up. It is also significant because we are also among the very few countries that have started work early in this direction,” said a senior official associated with the mission.

## **Space**

The biggest mission awaiting the incoming government’s nod is the Indian Space Research Organisation’s (ISRO) interplanetary mission to Venus, unofficially referred to as ‘Shukrayaan – 1’.

In a media interaction earlier last month, ISRO chairperson S. Somanath said that the plan for the mission is ready and awaiting approval from the government. Senior officials from the ministry, however, confirmed that the approval process was delayed because of the elections and is likely to be taken up by the new government.

The newly sworn-in government is also expected to oversee the upcoming trials for India’s first human spaceflight Gaganyaan. The first unmanned trial of the mission is scheduled to take flight by the end of 2024.

The Department of Space was the focus of the last government, with the Indian Space Policy being approved in 2022. The policy increased the role of private players in the Indian space sector, clearly defining the role of each stakeholder. The success of India’s third lunar mission — Chandrayaan-3 — also boosted the country’s space programme.

Last year, Prime Minister Narendra Modi met with top ISRO officials and set the target of building a home-grown space station by 2035. And by 2040, the first Indian will go to the Moon. “There are some big missions planned in the coming years, which should be mentioned in the new government’s priority list,” a senior ISRO official said.

According to officials, science, technology and space is likely to emerge as among the top areas where the government will be focusing in its upcoming tenure. With significant work already happening around the various scientific fields, it will be important to see how the new government enhances these ongoing projects while also making new announcements.

<https://theprint.in/science/gaganyaan-to-shukrayaan-new-govt-to-continue-focus-on-rd-quantum-tech-big-ticket-missions/2121401/>

## With bad news from Cassini, is dark matter's main rival theory dead?

One of the biggest mysteries in astrophysics today is that the forces in galaxies do not seem to add up. Galaxies rotate much faster than predicted by applying Newton's law of gravity to their visible matter, despite those laws working well everywhere in the Solar System. To prevent galaxies from flying apart, some additional gravity is needed.

This is why the idea of an invisible substance called dark matter was first proposed. But nobody has ever seen the stuff. And there are no particles in the hugely successful Standard Model of particle physics that could be the dark matter — it must be something quite exotic.

This has led to the rival idea that the galactic discrepancies are caused instead by a breakdown of Newton's laws. The most successful such idea is known as Milgromian dynamics or MOND, proposed by Israeli physicist Mordehai Milgrom in 1982. But our recent research shows this theory is in trouble.

The main postulate of MOND is that gravity starts behaving differently to what Newton expected when it becomes very weak, as at the edges of galaxies. MOND is quite successful at predicting galaxy rotation without any dark matter, and it has a few other successes. But many of these can also be explained with dark matter, preserving Newton's laws.

So how do we put MOND to a definitive test? We have been pursuing this for many years. The key is that MOND only changes the behaviour of gravity at low accelerations, not at a specific distance from an object. You'll feel lower acceleration on the outskirts of any celestial object – a planet, star or galaxy – than when you are close to it. But it is the amount of acceleration, rather than the distance, that predicts where gravity should be stronger.

This means that, although MOND effects would typically kick in several thousand light years away from a galaxy, if we look at an individual star, the effects would become highly significant at a tenth of a light year. That is only a few thousand times larger than an astronomical unit (AU) – the distance between the Earth and the Sun.

But weaker Mond effects should also be detectable at even smaller scales, such as in the outer Solar System. This brings us to the Cassini mission, which orbited Saturn between 2004 and its final fiery crash into the planet in 2017. Saturn orbits the Sun at 10 AU. Due to a quirk of MOND, the gravity from the rest of our galaxy should cause Saturn's orbit to deviate from the Newtonian expectation in a subtle way.

This can be tested by timing radio pulses between Earth and Cassini. Since Cassini was orbiting Saturn, this helped to measure the Earth-Saturn distance and allowed us to precisely track Saturn's orbit. But Cassini did not find any anomaly of the kind expected in MOND. Newton still works well for Saturn. One of us, Harry Desmond, recently published a study investigating the results in greater depth.

Perhaps MOND would fit the Cassini data if we tweaked how we calculate galaxy masses from their brightness? That would affect how much of a boost to gravity Mond has to provide to fit models of galaxy rotation, and thus what we should expect for Saturn's orbit. Another uncertainty is the gravity from surrounding galaxies, which has a minor effect. But the study showed that, given how MOND would have to work to fit with models for galaxy rotation, it cannot also fit the Cassini radio tracking results – no matter how we tweak the calculations.

With the standard assumptions considered most likely by astronomers and allowing for a wide range of uncertainties, the chance of MOND matching the Cassini results is the same as a flipped coin landing heads up 59 times in a row. This is more than twice the “5 sigma” gold standard for a discovery in science, which corresponds to about 21 coin flips in a row.

### **More bad news for MOND**

That's not the only bad news for MOND. Another test is provided by wide binary stars – two stars that orbit a shared centre several thousand AU apart. MOND predicted that such stars should orbit around each other 20% faster than expected with Newton's laws. But one of us, Indranil Banik, recently led a very detailed study that rules out this prediction.

The chance of Mond being right given these results is the same as a fair coin landing heads up 190 times in a row. Results from yet another team show that MOND also fails to explain small bodies in the distant outer Solar System. Comets coming in from out there have a much narrower distribution in energy than Mond predicts. These bodies also have orbits that are usually only slightly inclined to the plane that all the planets orbit close to. Mond would cause the inclinations to be much larger.

Newtonian gravity is strongly preferred over MOND on length scales below about a light year. But Mond also fails on scales larger than galaxies: it cannot explain the motions within galaxy clusters. Dark matter was first proposed by Fritz Zwicky in the 1930s to account for the random motions of galaxies within the Coma Cluster, which requires more gravity to hold it together than the visible mass can provide.

MOND cannot provide enough gravity either, at least in the central regions of galaxy clusters. But in their outskirts, MOND provides too much gravity. Assuming instead Newtonian gravity, with five times as much dark matter as normal matter, seems to provide a good fit to the data.

The standard dark matter model of cosmology isn't perfect, however. There are things it struggles to explain, from the universe's expansion rate to giant cosmic structures. So we may not yet have the perfect model. It seems dark matter is here to stay, but its nature may be different to what the Standard Model suggests. Or gravity may indeed be stronger than we think – but on very large scales only.

Ultimately though, MOND, as presently formulated, cannot be considered a viable alternative to dark matter any more. We may not like it, but the dark side still holds sway.

<https://www.thehindu.com/sci-tech/science/with-bad-news-from-cassini-is-dark-matter-main-rival-theory-dead/article68254867.ece>

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