April
2022

# समाचार पत्रों से चयित अंश
# Newspapers Clippings

**A Daily service to keep DRDO Fraternity abreast with DRDO Technologies, Defence Technologies, Defence Policies, International Relations and Science & Technology**


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DRDO News

DRDO Technology News

पत्र सूचना कार्यालय
भारत सरकार

**रक्षा मंत्रालय**

***Tue, 12 Apr 2022 2:27 PM***

# टैंक-रोधी निर्देशित मिसाइल 'हेलीना' के उच्च ऊंचाई वाली उड़ान का दूसरा सफल परीक्षण किया गया

चालू उपयोगकर्ता प्रमाणीकरण परीक्षणों के तहत स्वदेशी रूप से विकसित टैंक-रोधी निर्देशित मिसाइल 'हेलीना' का 12 अप्रैल, 2022 को उन्नत हल्के हेलीकॉप्टर से एक बार फिर सफलतापूर्वक उड़ान परीक्षण किया गया। रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) के साथ भारतीय वायु सेना और भारतीय सेना की टीमों ने इसका अधिक ऊंचाई परिक्षेत्र में इसका परीक्षण किया। यह लगातार दूसरा सफल उड़ान परीक्षण है। इससे पहले 11 अप्रैल, 2022 को पहला सफल उड़ान परीक्षण किया गया था। आज का परीक्षण अलग-अलग परिक्षेत्र और ऊंचाई के लिए किया गया। योजना के अनुरूप मिसाइल ने नकली टैंक लक्ष्य पर सफलतापूर्वक निशाना साधा। परीक्षण के दौरान सेना के वरिष्ठ कमांडर और डीआरडीओ के वैज्ञानिक उपस्थित थे। इस उड़ान-परीक्षण के साथ इमेजिंग इन्फ्रा-रेड सीकर सहित संपूर्ण प्रणाली का लगातार प्रदर्शन स्थापित किया गया है, जो सशस्त्र बलों में 'हेलीना' को शामिल करने में सक्षम होगा।

इससे पहले राजस्थान के पोखरण में 'हेलीना' का प्रमाणीकरण परीक्षण किया गया था, जिसने रेगिस्तानी परिक्षेत्र में मिसाइल की प्रभावशीलता को प्रमाणित किया। 'हेलीना' तीसरी पीढ़ी की दागकर और भूलने वाली टैंक-रोधी निर्देशित मिसाइल है, जो सीधे प्रहार मोड के साथ-साथ शीर्ष हमला मोड, दोनों में लक्ष्य को भेद सकता है। इस प्रणाली में हर एक मौसम में दिन और रात काम करने की क्षमता है और यह पारंपरिक बख्तरबंद और विस्फोटक प्रतिक्रियाशील बख्तरबंद के साथ युद्धक टैंकों को हरा सकता है।

*https://pib.gov.in/PressReleasePage.aspx?PRID=1816068*

The Indian EXPRESS

*Wed, 13 Apr 2022*

# HELINA missile test-fired again on day 2, this time from high-altitude regions

THE ANTI-Tank Guided Missile (ATGM) Helina, the helicopter-launched version of the Nag missile, was tested again on Tuesday, this time in the northern high altitude mountain regions after its successful test on Monday in the desert regions of Pokhran.The test was part of ongoing user validation trials of the third generation 'fire-and-forget' class missile developed by the Defence Research and Development Organisation (DRDO). As per the plan, the missile engaged the simulated tank target accurately.

The trials were witnessed by senior Army Commanders and scientists of DRDO. With the flight test, consistent performance of the complete system, including Imaging Infra-Red Seeker, has been established, which will enable the induction of the 'Helina' into the armed forces," said a press statement from the Ministry of Defence on Tuesday. DRDO has said that the Helina missile system has all weather day and night capability and can defeat battle tanks with conventional armour as well as explosive reactive armour. It has been developed for integration with choppers in both the Army and Air Force.

The Helina missile can engage targets both in direct hit mode as well as top attack mode. In the top attack mode, the missile is required to climb sharply after launch and travel at a certain altitude then plunge on the top of the target. In the direct hit mode, the missile travels at a lower altitude directly striking the target. The DRDO has designed and developed a range of anti-tank missile technologies that include the Nag, Helina MPATGM, SANT and Laser Guided ATGM for MBT Arjun.

*https://indianexpress.com/article/cities/pune/anti-tank-guided-missile-helina-successfully-flight-tested-again-drdo-7866192/*

oneindia hindi

*Tue, 12 Apr 2022*

# 'दुश्मन सेना के टैंकों को नष्ट करने की कमाल की तकनीकि', DRDO की ATGM हेलिना को दागो और भूल जाओ

राजस्थान के पोखरण में भारतीय रक्षा अनुसंधान एवं विकास संगठन ने एंटी टैंक गाइडेड मिसाइल हेलिना (Anti Tank Guided Missile HELINA) का सफल परीक्षण कर लिया है। हेलिना डीआरडीओ की द्वारा

विकसित तीसरी पीढ़ी की 'फायर एंड फॉरगेट' श्रेणी की मिसाइलों के प्रयोग परीक्षणों का हिस्सा था। हेलिना मिसाइल को एडवांस्ड लाइट हेलिकॉपटर सिस्टम (Advanced Light Helicopter-ALH) से लांच किया गया। एंटी टैंक गाइडेड मिसाइल हेलिना (ATGM HELINA ) ने सटीकता से टारगेट को नष्ट किया। भारतीय रक्षा अनुसंधान एवं विकास संगठन (DRDO) की अत्याधुनिक मिसाइल का उड़ान परीक्षण DRDO, सेना और वायु सेना की टीमों द्वारा किया गया। परीक्षण में भारत में विकसित एडवांस्ड लाइट हेलीकाप्टर (एएलएच) का प्रयोग किया गया। पोखरण रेगिस्तान श्रृंखला में एक नकली टैंक लक्ष्य को शामिल किया गया था। मिसाइल एक इन्फ्रारेड इमेजिंग सीकर (IIR) द्वारा निर्देशित है जो 'लॉन्च से पहले लॉक' मोड में काम कर रही है।

ATGM HELINA अपडेटेड मिसाइल एटीजीएम हेलिना के सफल परीक्षण के बाद भारतीय रक्षा अनुसंधान एवं विकास संगठन (DRDO) ने कहा कि हेलिना जिस स्वदेशी रूप से विकसित लाइट हेलीकॉप्टर से उड़ान परीक्षण किया गया था। यह दुनिया के सबसे अत्याधुनिक और अडेटेड टैंक रोधी हथियारों में से एक है। हेलिना की अधिकतम मारक क्षमता सीमा सात किलोमीटर है। इस मिसाइल को खासतौर पर ऊंचाई पर प्रभावी ढ़ग से HAL के हथियारयुक्त संस्करण पर एकीकरण के लिए डिजाइन और विकसित किया गया है। सभी मौसम में कार्य करने में सक्षम हेलिना को रक्षा अनुसंधान और विकास प्रयोगशाला (DRDL), हैदराबाद द्वारा DRDO के मिसाइल और सामरिक प्रणाली (MSS) क्लस्टर के तहत विकसित किया गया है। 2018 से मिसाइल का सफल उपयोगकर्ता परीक्षण किया गया है। आरडीओ के वैज्ञानिकों ने कहा कि हेलिना मिसाइल प्रणाली में सभी मौसम, दिन और रात की क्षमता है और यह पारंपरिक कवच के साथ-साथ विस्फोटक प्रतिक्रियाशील कवच के साथ युद्धक टैंकों को हरा सकती है। इसे सेना और वायु सेना दोनों में हेलिकॉप्टरों के साथ एकीकरण के लिए विकसित किया गया है।

**ATGM HELINA वायुसेना का मुख्य हथियार**

हेलिना के एयर फोर्स एडिशन को मुख्य हथियार के रूप में माना जाता है। हेलिना सीधे हिट मोड के साथ-साथ टॉप अटैक मोड दोनों में लक्ष्य को भेद सकती है। टॉप अटैक मोड में, मिसाइल को लॉन्च के बाद तेजी से चढ़ने और एक निश्चित ऊंचाई पर यात्रा करने और फिर लक्ष्य के शीर्ष पर उतरने की आवश्यकता होती है। सीधे हिट मोड में मिसाइल कम ऊंचाई पर यात्रा करती है, सीधे लक्ष्य को मारती है।

*https://hindi.oneindia.com/news/india/drdo-successful-flight-test-of-anti-tank-guided-missile-helina-in-pokhran-rajasthan-674545.html?story=3*

PUNEKAR NEWS

*Wed, 13 Apr 2022*

# Pune: DRDO establishment HEMRL displays Indigenous Defence products during exhibition

Pashan, 17th December 2021: High Energy Materials Research Laboratory (HEMRL), Pune, a premier DRDO establishment for the development of an entire range of explosives, propellants and pyrotechnics for powering defence systems like missiles, rockets, guns, grenades, bombs, etc. HEMRL is known for working towards self-reliance in the field of defence technology contributing significantly to the strategic and tactical system. Azadi Ka Amrit Mahotsav is an initiative of Govt of India to celebrate and commemorate the 75 years of progressive India and the glorious history of its people, culture and achievements. DRDO celebrated the Mahotsav by conducting various activities with a focus on the theme of "Atma Nirbhar Bharat".

On this occasion, HEMRL organized an exhibition and showed the contribution of HEMRL in defence-related products and systems. P K Mehta, DS & DG (ACE) inaugurated the function in the presence of Shri KPS Murthy, OS & Director, HEMRL, Pune & Sanjeev Gupta, General Manager of Ordance Factory Dehuroad. Indigenously developed products by the HEMRL was shown in the exhibition. Live demonstration of flares and door cutting explosive system were undertaken. The main attraction at the event was Agni, Ashtra, BrahMos, Pinnaka, MDS system, ERA Mark-II laden tank, Gravitational mixer, Smoke ammunition, IR Flares, Explosive detection kit, etc. there was more than 900 participants of the general public, defence enthusiasts, school and college students for the exhibition.

*https://punekarnews.in/pune-drdo-establishment-hemrl-displays-indigenous-defence-products-during-exhibition/*

THE HINDU

*Tue, 12 Apr 2022*

# Tata firm hands over indigenously developed infantry vehicles to Army Chief

**The IPMV is a co-development project with DRDO**

The Tata Advanced Systems Limited (TASL) on Tuesday handed over the first lot of the indigenously developed Infantry Protected Mobility Vehicles (IPMVs) to Chief of the Army Staff General Manoj Naravane at a ceremony in Pune on Tuesday, becoming the first private sector company in the country to produce and deliver wheeled armoured combat-ready vehicles for the armed forces, it said in a statement."In addition to supply, TASL will also provide 24x7 support to maintain the vehicles at the deployment locations," the company stated. The IPMV is a co-development project with Defence Research and Development Organisation (DRDO). The vehicles inducted include quick reaction fighting vehicle medium, infantry protected mobility

vehicle, ultra long range observation system developed by the TASL and monocoque hull multi-role mine protected armoured vehicle developed by Bharat Forge, the Army said in a statement. Gen Naravane, accompanied by Vice Chief of the Army Staff Lt. Gen. Manoj Pande is on a two-day visit to Pune.

**Stringent field trials**

The vehicles have undergone stringent field trials in deserts as well as high altitude areas by the Army, the statement noted. The IPMVs also include TASL's in-house designed and developed remote-controlled weapon station with thermal sights and external add-on armour protection panels developed by the Defence Metallurgical Research Laboratory of the DRDO. "The successful delivery of IPMVs is a major milestone for the TASL and the Indian defence manufacturing sector, as it marks the first commercial sale of a strategic platform that has been co-developed by the DRDO and a private player," Sukaran Singh, Managing Director and Chief Executive Officer, TASL, explained. The IPMVs have been developed and manufactured at the TASL's Pune facility. They have been built on the strategic 8x8 Wheeled Armoured Platform (WhAP), indigenously designed and developed by the TASL along with the Vehicles Research & Development Establishment (VRDE), a unit of the DRDO.

*https://www.thehindu.com/news/national/tata-firm-hands-over-indigenously-developed-infantry-vehicles-to-army-chief/article65315246.ece*

FINANCIAL EXPRESS
Read to Lead

***Tue, 12 Apr 2022***

# Indian Army gets combat ready vehicles from TASL

On Tuesday, the Indian Army received the first lot of Infantry Protected Vehicles (IPMVS) from a private sector company which has produced and delivered the four-wheeled armoured combat vehicles. Tata Advanced Systems Limited (TASL) handed over the vehicles, which have been jointly developed with Defence Research and Development Organisation (DRDO), to the Chief of the Indian Army Gen MM Naravane at a ceremony in Pune. The private sector company is also going to provide 24×7 support to maintain the vehicles at all the deployment locations.

**More about the Armoured Vehicles**

This is the first commercial sale of a strategic platform that has been co-developed by DRDO and a private player. These have been developed and manufactured at a facility in Pune and built on the strategic 8×8 Wheeled Armoured Platform (WhAP). Are indigenously designed and developed by TASL along with the Vehicles Research & Development Establishment (VRDE). They have undergone stringent field trials in different terrains including high altitude areas and desert areas by the Indian Army. These vehicles include TASL's in-house designed and developed Remote Controlled Weapon Station.

Have onboard thermal sights and external add-on armour protection panels which have been developed by Defence Metallurgical Research Laboratory of DRDO. Terming it as a major milestone for TASL, according to the company release, Sukaran Singh, Managing Director and

Chief Executive Officer, said, “This milestone has been achieved after withstanding the delays and challenges caused by the COVID-19 pandemic.” Making the achievement more remarkable for TASL, he said.

*https://www.financialexpress.com/defence/indian-army-gets-combat-ready-vehicles-from-tasl/2489821/lite/*

## DRDO On Twitter

# Defence News

## Defence Strategic: National/International

Press Information Bureau
Government of India

**Ministry of Defence**

***Tue, 12 Apr 2022 6:02 PM***

# IAF concludes rescue operations at Deoghar

The Indian Air Force (IAF), in close coordination with NDRF, local administration and Army, today completed the rescue of 35 stranded persons from the Trikut Hills Ropeway Service, in the Deoghar district of Jharkhand. IAF utilised two Mi-17V5, one Mi-17, one Advanced Light Helicopter (ALH) and one Cheetah to fly more than 26 hours towards this effort. Having inducted in the early hours on 11 April 2022, IAF carried out an initial recce for preparations towards an operation which presented unique challenges.

The contingent included five Garud commandos of the IAF, who had the daunting task of climbing onto the stranded trolleys of the cable cart, while being attached to the helicopter's winch cable, accessing it from outside, strapping up each survivor individually and getting them winched up and into the helicopter hovering overhead. Smaller children were carried up to the helicopter by the Garuds themselves. The helicopter crew was faced with their own challenges where they had to maintain a steady hover, with practically no visual reference, in conditions of strong winds in the hilly terrain. The crew went from one trolley to the next to carry out their task, which was as risky for the crew as it was for the survivors of the mishap.

The operation, spread over two days, also saw two unfortunate incidents wherein, despite best efforts, the survivors could not be rescued safely due to the inherently difficult nature of the rescue operation. The IAF deeply regrets the loss of lives of these two individuals and expresses its deepest condolences to their families. The IAF reaffirms its commitment to providing support, succour and relief to our citizens always and every time.

*https://pib.gov.in/PressReleasePage.aspx?PRID=1816092*

पत्र सूचना कार्यालय
भारत सरकार

**रक्षा मंत्रालय**

***Tue, 12 Apr 2022 5:47 PM***

# सेना प्रमुख ने स्वदेश में ही विकसित विशेष प्रकार के वाहनों को रक्षा सेवा में शामिल किया

थल सेनाध्यक्ष (सीओएएस) जनरल एम एम नरवणे, उप थल सेना प्रमुख लेफ्टिनेंट जनरल मनोज पांडे के साथ पुणे के दो दिवसीय दौरे पर हैं। बॉम्बे इंजीनियर ग्रुप एंड सेंटर में 12 अप्रैल 2022 को आयोजित एक समारोह के दौरान सेना प्रमुख ने स्वदेश में ही विकसित क्विक रिएक्शन फाइटिंग व्हीकल मीडियम (क्यूआरएफवी), इन्फैंट्री प्रोटेक्टेड मोबिलिटी व्हीकल (आईपीएमवी) और अल्ट्रा लॉन्ग रेंज ऑब्जर्वेशन के पहले सेट को सेवा में शामिल किया। जिसे टाटा एडवांस्ड सिस्टम लिमिटेड (टीएएसएल) द्वारा उन्नत प्रणाली से तैयार किया गया है और साथ ही भारत फोर्ज द्वारा विकसित मोनोकोक हल मल्टी रोल माइन प्रोटेक्टेड आर्मर्ड व्हीकल को भी उन्होंने सेवा में नियुक्त किया।

सेना प्रमुख ने भारत सरकार की "आत्मनिर्भर भारत" पहल को मजबूत करने और पिछले कई दशकों से भारतीय सेना के साथ निरंतर जुड़ाव के लिए टाटा तथा भारत फोर्ज की सराहना की। टीएएसएल और भारत फोर्ज द्वारा इन स्वदेशी रूप से विकसित रक्षा प्रणालियों को शामिल करने से भविष्य के युद्धों में भारतीय सेना की परिचालन क्षमताओं में काफी वृद्धि होगी। इस अवसर पर कई सेवानिवृत्त और सेवारत गणमान्य पदाधिकारी उपस्थित थे।

*https://pib.gov.in/PressReleasePage.aspx?PRID=1816128*

Press Information Bureau
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**Ministry of Defence**

***Tue, 12 Apr 2022 5:47 PM***

# Army chief inducts Indigenously developed specialist vehicles into service

General MM Naravane, Chief of Army Staff (COAS), accompanied by Lt Gen Manoj Pande, the Vice Chief of Army Staff is on a two day visit to Pune. At a function organised at the Bombay Engineer Group (BEG) and Centre on 12 April 2022, the Army Chief inducted the first set of

indigenously developed Quick Reaction Fighting Vehicle Medium (QRFV), Infantry Protected Mobility Vehicle (IPMV), Ultra Long Range Observation System developed by Tata Advanced System Limited (TASL) and Monocoque Hull Multi Role Mine Protected Armoured Vehicle developed by Bharat Forge.

The COAS appreciated TATA and Bharat Forge for their commitment in strengthening "Atmanirbhar Bharat" initiative of Government of India and continued engagement with the Indian Army for past decades. The induction of these indigenously developed Systems by TASL and Bharat Forge would greatly enhance the operational capabilities of Indian Army in future conflicts. A number of retired and serving dignitaries were present on the occasion.

*https://pib.gov.in/PressReleasePage.aspx?PRID=1816086*

IDN INDIAN DEFENCE NEWS
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***Wed, 13 Apr 2022***

# Future warfare is likely to be hybrid with weapons ranging from computer virus to hypersonic missiles, says IAF chief

The future warfare is likely to be hybrid in nature wherein weapons such as economic strangulation, information blackout, computer virus and hypersonic missiles would be used, IAF Chief Vivek Ram Chaudhari said on Tuesday. "Cyber and information" have become the modern tools for shaping the battlefield, Air Chief Marshal said in his speech at an event organised by All India Management Association (AIMA). A well created narrative in the information domain to adversely affect the enemy, can have devastating effects, he mentioned. As humans become more and more interconnected, a cyber-attack on our networks can cripple command and control structures, Chaudhari noted.

"What I am trying to get at is that in the next war, the enemy might not be a country or an organisation," he mentioned. India may never know the perpetrators of a "Distributed Denial of Services" attack and we will not know when and from where the attack will take place, he added. In the future, India could be attacked on all fronts, ranging from economic strangulation to diplomatic isolation and military standoffs to information black outs in the form of attacks by "Distributed Denial of Services", he mentioned. All this will happen well before the first bullet is fired or the first aircraft goes across the border, he noted. Future warfare is likely to be hybrid in nature and the spectrum of conflict will be spread across all domains spanning from conventional to sub-conventional, kinetic to non-kinetic and lethal to non-lethal, all under a nuclear overhang, he said.

"The weapons we are looking at would be ranging from a small computer virus to hypersonic missiles," he added. "There is a need for us to develop capabilities across the full spectrum of conflict and focus on multi-domain operations. Similarly, our doctrines, equipment, training and tactics will have to be flexible and able to adapt rapidly to these new challenges," he stressed.

*http://www.indiandefensenews.in/2022/04/future-warfare-is-likely-to-be-hybrid.html*

पत्र सूचना कार्यालय
भारत सरकार

**रक्षा मंत्रालय**

***Tue, 12 Apr 2022 9:42 AM***

# भारत-ऑस्ट्रेलिया समुद्री पेट्रोल टोही विमान (एमपीआरए) का समन्वित संचालन

भारतीय नौसेना का एक पी8I समुद्री पेट्रोल और टोही विमान ऑस्ट्रेलिया के डार्विन पहुंच गया है। विमान और उसके चालक दल डार्विन में एक समन्वित संचालन को अंजाम देंगे। अपने प्रवास के दौरान, भारतीय नौसेना की समुद्री पेट्रोल स्क्वाड्रन, अल्बाट्रॉस का दल और रॉयल ऑस्ट्रेलियाई वायु सेना के 92 विंग के अपने समकक्षों के साथ संचालन करेंगे। दोनों देशों के पी8 विमान, समुद्री क्षेत्र में जागरूकता बढ़ाने के लिए, पनडुब्बी रोधी युद्ध और सतह निगरानी के लिए एक साथ अभ्यास का संचालन करेंगे।

हाल के दिनों में, समुद्र में द्विपक्षीय और बहुपक्षीय अभ्यासों के माध्यम से दो समुद्री राष्ट्रों के बीच उत्तरोत्तर वृद्धि होते वार्तालाप ने अंतर-संचालन को बढ़ाया है और मित्रता के संबंधों को और मज़बूत बनाया है। पी8 विमान ने अपनी लंबी दूरी की पहुंच के साथ, मालाबार और एयूएसआईएनडीईएक्स श्रृंखला अभ्यासों के दौरान संयुक्त रूप से संचालन करते हुए अपनी क्षमता का शानदार प्रदर्शन किया हैं, और संचालन प्रक्रियाओं और सूचनाओं को साझा करने में एक समान भूमिका निभाई है। इंडोनेशिया और उत्तरी ऑस्ट्रेलिया के बीच समुद्री जलक्षेत्र दोनों देशों के लिए पारस्परिक हित का क्षेत्र है, और यह हिंद महासागर क्षेत्र का प्रवेश द्वार भी है। भारत और ऑस्ट्रेलिया दोनों ही सामरिक हितों को साझा करते हैं और इस क्षेत्र में एक स्वतंत्र और मुक्त भारत-प्रशांत क्षेत्र एवं नियम आधारित व्यवस्था को बढ़ावा देते हैं।

*https://pib.gov.in/PressReleasePage.aspx?PRID=1815864*

Press Information Bureau
Government of India

**Ministry of Defence**

***Tue, 12 Apr 2022 9:42 AM***

# India - Australia Maritime Patrol Reconnaissance Aircraft (MPRA) Coordinated Operations

A P8I Maritime Patrol and Reconnaissance Aircraft of the Indian Navy have arrived at Darwin, Australia. The aircraft and its crew would be undertaking an operational turnaround at Darwin.

During its stay, the team from the Indian Navy's maritime patrol squadron, Albatross, is scheduled to engage with its counterparts from the 92 Wing of the Royal Australian Air Force. P8 aircraft from both the countries, would be conducting coordinated operations in Anti-Submarine Warfare and surface surveillance, to enhance maritime domain awareness.

In recent times, increased interaction between the two maritime nations, through bilateral and multilateral exercises at sea, has enhanced inter-operability and fostered bridges of friendship. The P8 aircraft, with their demonstrated long reach, have operated jointly during Malabar and AUSINDEX series of exercises, and have a common understanding of operating procedures and information sharing.

The maritime waters between Indonesia and Northern Australia is an area of mutual interest to both countries, being a gateway into the Indian Ocean Region. Both India and Australia share strategic interests, promoting a free and open Indo- Pacific and rules based order in the region.

*https://pib.gov.in/PressReleasePage.aspx?PRID=1815846*

पत्र सूचना कार्यालय
भारत सरकार

**रक्षा मंत्रालय**

***Tue, 12 Apr 2022 9:17 AM***

# भारत-अमेरिका 2+2 मंत्रिस्तरीय वार्ता के बाद रक्षा मंत्री श्री राजनाथ सिंह का प्रेस वक्तव्य

"सेक्रेटरी ब्लिंकन, सेक्रेटरी ऑस्टिन, डॉ जयशंकर, प्रेस के सदस्य, देवियों और सज्जनों, मैं दोनो सेक्रेटरी, उनके प्रतिनिधिमंडल और उनके स्टाफ को उत्कृष्ट बातचीत और उनके गर्मजोशी भरे आतिथ्य के लिए धन्यवाद देता हूं। मैं द्विपक्षीय संबंधों के प्रति उनकी प्रतिबद्धता की मन से सराहना करता हूं।. आज हमारे बीच एक बहुत ही सार्थक और गहन चर्चा हुई है। इससे भारत-अमेरिका संबंधों की गति को बनाए रखने और हमारे काम को आगे बढ़ाने में मदद मिलेगी। हमारे दो महान राष्ट्रों के हित एक दूसरे के पूरक हैं और आपसी हितों के लक्ष्यों को प्राप्त करने के लिए एक साझा इच्छाशक्ति है।

हमने कई द्विपक्षीय, रक्षा और वैश्विक मुद्दों पर चर्चा की। यह जानकर खुशी हुई कि दुनिया के सबसे बड़े लोकतंत्रों के रूप में, इन मुद्दों में से अधिकांश पर हमारे विचार एक ही दिशा में हैं। भारत और अमेरिका दोनों हिंद -प्रशांत और हिंद महासागर क्षेत्र को लेकर एक मुक्त, खुली, समावेशी और नियम-आधारित एक समान सोच को साझा करते हैं। हिंद-प्रशांत और हिंद महासागर क्षेत्र में शांति, स्थिरता और समृद्धि के लिए हमारी साझेदारी महत्वपूर्ण है। बैठक के दौरान, हमने अपने पड़ोस और हिंद महासागर क्षेत्र की स्थिति के

बारे में अपना आकलन सामने रखा। भारत के विरुद्ध आतंकवाद का इस्तेमाल शासन करने के एक साधन के रूप में प्रयोग करने का मामला प्रमुखता से सामने आया।

हमारे व्यापक जुड़ाव के महत्वपूर्ण परिणाम मिले हैं। इनमें से कुछ में शामिल हैं, भारत के अंतरिक्ष विभाग और यूएसए के रक्षा विभाग के बीच एक स्पेस सिचुएशनल अवेयरनेस प्रोग्राम ; निकट भविष्य में रक्षा क्षेत्र और रक्षा आर्टिफिशियल इंटेलिजेंस पर बातचीत शुरू करना; चर्चा के तहत अन्य पहलों और समझौतों पर महत्वपूर्ण प्रगति; और हमारे सैन्य अभ्यासों के दायरे को बढ़ाने और उन्हें और जटिल बनाने की साझा इच्छा। महामारी से चुनौतियों के बावजूद दोनों देशों की सेनाओ के बीच की भागीदारी जारी है। हमें इस बात की भी खुशी है कि भारत बहरीन स्थित बहुपक्षीय संयुक्त समुद्री बल (सीएमएफ) में एक सहयोगी भागीदार के रूप में शामिल हुआ है। इससे पश्चिमी हिंद महासागर में क्षेत्रीय सुरक्षा में सहयोग मजबूत होगा। हम निश्चित रूप से कॉमकासा को प्रभावी ढंग से और बीईसीए को पूरी तरह से लागू करने की ओर बढ़ रहे हैं।

हम डिफेंस साइबर, विशेष बल के क्षेत्र में सहयोग को और बढ़ाने के अवसरों  का पता लगाने और एलईएमओए के तहत और संयुक्त अभ्यास के दौरान रसद सहयोग के दायरे का विस्तार करने पर सहमत हुए हैं। दोनों पक्षों ने उन्नत ,उभरती हुई और महत्वपूर्ण सैन्य प्रौद्योगिकियों पर संयुक्त परियोजनाओं के साथ डिफेंस टेक्नोलॉजी एंड ट्रेड इनीशिएटिव (डीटीटीआई) को पुनर्जीवित करने की आवश्यकता पर सहमति व्यक्त की है, जिसे शीघ्रता से पूरा किया जाना है। मैंने इस साझेदारी को अमेरिकी कंपनियों के साथ सह-विकास और सह-उत्पादन की दिशा में ले जाने की भारत की इच्छा को सामने रखा। हमने 'मेक इन इंडिया' कार्यक्रम के तहत भारत में अमेरिकी रक्षा कंपनियों द्वारा निवेश बढ़ाने का आह्वान किया। औद्योगिक सहयोग में अमेरिकी संस्थाओं की भागीदारी और अनुसंधान और विकास में साझेदारी भारत के 'आत्मनिर्भर भारत' अभियानों की सफलता के लिए महत्वपूर्ण होगी।

आज की 2 के साथ 2 की बैठक भारत और अमेरिका के बीच सामरिक रक्षा संबंधों को मजबूत करने में महत्वपूर्ण है और हमें पारस्परिक हित के कई क्षेत्रों में साथ काम करने में सक्षम बनाएगी। हमारे आपसी सहयोग में बढ़त शांति और सुरक्षा बनाए रखने और दुनिया भर के आम लोगों के लिये निर्बाध पहुंच सुनिश्चित करने के लिए महत्वपूर्ण होगा। मैं सेक्रेटरी ऑस्टिन और सेक्रेटरी ब्लिंकन को उनके आतिथ्य और भारत-अमेरिका साझेदारी को आगे बढ़ाने में उनके बहुमूल्य योगदान के लिए फिर से धन्यवाद देता हूं। हमने दोनों सेक्रेटरी को अगली 2 के साथ 2 की मंत्रिस्तरीय बैठक के लिए पारस्परिक रूप से सुविधाजनक समय पर भारत आमंत्रित किया है।"

*https://pib.gov.in/PressReleasePage.aspx?PRID=1815919*

Press Information Bureau
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**Ministry of Defence**

***Tue, 12 Apr 2022 9:17 AM***

# Press Statement by Raksha Mantri Shri Rajnath Singh after India-US 2+2 Ministerial Dialogue

"Secretary Blinken, Secretary Austin, Dr Jaishankar, Members of Press, ladies and gentlemen, I thank the Secretaries, their delegations, and their staff for excellent interaction and their warm hospitality. I deeply appreciate their commitment to our bilateral relations. Today, we have had a very meaningful and in-depth discussion. This will help in maintaining the momentum of India-US relationship and taking our work forward. Our two great nations have complementary interests and a shared will to achieve mutual goals.

We had discussions on a range of bilateral, defence and global issues. It was heartening to note that as world's largest democracies, we have convergence of views on most of them. Both India and US share a common vision of a free, open, inclusive and rules-based Indo-Pacific and Indian Ocean Region. Our partnership is of critical importance for peace, stability and prosperity in the Indo-Pacific and the Indian Ocean Region. During the meeting, we shared our assessments of the situation in our neighbourhood and the Indian Ocean Region. The use of terrorism as an instrument of statecraft against India came up prominently.

Our extensive engagement has yielded important results. Some of these include concluding a Space Situational Awareness Agreement between the Department of Space from India and Department of Defence of USA; commencing the defence space and defence Artificial Intelligence dialogues in near future; significant progress on other initiatives and agreements under discussion; and a shared desire to increase the scope and complexity of our military exercises. Our military-to-military engagements have continued in spite of challenges from the Pandemic. We are also glad that India has joined the multilateral Combined Maritime Force (CMF) based in Bahrain, as an Associate Partner. This will strengthen cooperation in regional security in the Western Indian Ocean. We are on course in effectively implementing COMCASA, and complete implementing of BECA.

We have agreed to explore further cooperation in the fields of Defence Cyber, Special Forces and expanding the scope of logistics cooperation under LEMOA and during joint exercises. Both sides have agreed on the need to revitalise the Defence Technology and Trade Initiative (DTTI) with joint projects on advanced and emerging and critical military technologies, to be executed quickly. I shared India's desire to take this partnership towards co-development and co-production with US companies. We called for increased investments by US defence companies in India under the 'Make in India' programme. Participation of US entities in Industrial collaboration and partnership in research and development will be critical for success of India's 'Aatmanirbhar Bharat' campaigns.

The 2+2 meeting today is important in strengthening the strategic defence engagement between India and US and will enable us to work alongside in number of areas of mutual interest. Our

increased cooperation will be critical to maintain peace and security, and to ensure free access to global commons. I thank Secretary Austin and Secretary Blinken again for their hospitality and their valuable contribution in furthering the India-US partnership. We have invited the two Secretaries to India at a mutually convenient time for the next 2+2 Ministerial meeting."

*https://pib.gov.in/PressReleasePage.aspx?PRID=1815838*

Press Information Bureau
Government of India

**Ministry of Defence**

***Tue, 13 Apr 2022 9:44 AM***

# Raksha Mantri Shri Rajnath Singh reaches Hawaii for a visit to US Indo-Pacific Command headquarters

Raksha Mantri Shri Rajnath Singh reached Hawaii on April 12, 2022 for a visit to the Headquarters of United States Indo-Pacific Command (USINDOPACOM). On his arrival from Washington DC, Shri Rajnath Singh was received by Commander, US INDOPACOM Admiral John Aquilino. The USINDOPACOM and Indian military have wide-ranging engagements, including a number of military exercises, training events and exchanges. The Raksha Mantri will visit the USINDOPACOM headquarters, Pacific Fleet and the training facilities in Hawaii on April 13, 2022, before returning to India. He is also expected to lay wreath at National Memorial Cemetery of the Pacific and visit Headquarters of US Army Pacific and Pacific Air Forces, during his brief stay in Hawaii.

In Washington DC, US President Mr Joe Biden held a virtual meeting with Prime Minister Shri Narendra Modi in the presence of Shri Rajnath Singh, External Affairs Minister Dr S Jaishankar, US Secretary of State Mr Antony Blinken and US Secretary of Defence Mr Lloyd Austin. Later, the Raksha Mantri and External Affairs Minister had co-chaired with their US counterparts the 4$^{th}$ India-US Ministerial 2+2 Dialogue on April 11, 2022. A Joint Statement was issued after the dialogue. Before the 2+2 Dialogue, Shri Rajnath Singh held a bilateral meeting with US Secretary of Defence separately in Pentagon.

*https://pib.gov.in/PressReleasePage.aspx?PRID=1816206*

INDIA TODAY

***Tue, 12 Apr 2022***

# Rajnath Singh, US counterpart Lloyd Austin review defence cooperation, regional security

Defence Minister Rajnath Singh, along with Defence Secretary Dr Ajay Kumar and a high-level delegation, on Monday held a meeting with Secretary of Defence of the United States Lloyd

Austin, accompanied by Chairman of the Joint Chiefs of Staff and other senior officials in Pentagon.m"Had a wonderful meeting with the US @SecDef, Mr Lloyd Austin at the Pentagon today. We reviewed the entire gamut of bilateral defence cooperation and the regional security situation," Rajnath Singh tweeted.

Had a wonderful meeting with the US @SecDef, Mr Lloyd Austin at the Pentagon today. We reviewed the entire gamut of bilateral defence cooperation and the regional security situation. The two defence ministers reviewed the entire gamut of bilateral defence cooperation and the regional security situation, read a statement from the Ministry of Defence. Both ministers acknowledged the salience of India-US defence partnership for peace, stability and prosperity in the Indo-Pacific and broader Indian Ocean Region.

They discussed ways to deepen Major Defence Partnership (MDP) and to work together to advance quality and scope in bilateral defence cooperation, according to the statement. They reviewed military-to-military engagements, information sharing, enhanced logistics cooperation, and ability of the Armed Forces to cooperate closely under compatible communication arrangements. In this context, closer cooperation of Special Operation Forces came up prominently

The two ministers also discussed ways for closer collaboration between Defence Industries. Rajnath Singh also underlined the need for co-development and co-production between India and US companies and invited US companies to India for manufacturing and maintenance of defence equipment.

*https://www.indiatoday.in/india/story/rajnath-singh-us-secretary-of-defence-review-defence-cooperation-regional-security-1936295-2022-04-12*

THE ECONOMIC TIMES

***Tue, 12 Apr 2022***

# India, US signed bilateral space situational awareness arrangement

India and the US have signed a bilateral space situational awareness arrangement, adding a new dimension to the growing defence relationship between the two countries, US Defence Secretary Lloyd Austin said. The agreement was signed on Monday by officials of the two countries on the sidelines of the India-US 2+2 ministerial here co-hosted by Austin along with the Secretary of State Tony Blinken. The Indian delegation was led by Defence Minister Rajnath Singh and the External Affairs Minister S Jaishankar.

"I'm pleased to announce that just a few moments ago, we signed a bilateral space situational awareness arrangement, and this will support greater information sharing and cooperation in space," Austin told reporters at the conclusion of the 2+2 ministerial. "We're also deepening our cooperation in cyberspace, including through training and exercises later this year. And we're expanding our information sharing partnership across all warfighting domains," he said. The two countries, he said have important commitments today that will drive technological innovation

and cooperation in emerging defence domains, including space and cyberspace. “For example, we're committed to launching new defence space exchanges later this year between .. “For example, we're committed to launching new defence space exchanges later this year between our Space Command and India's Defence Space Agency,” he said.

The Biden administration, he said, is working closely with India on a range of priorities to support India's security and its role as a net security provider.Meanwhile, the defence trade and technology cooperation continues to grow.“We recently concluded an agreement to work together on air-launched unmanned aerial vehicles through our Defence Technology and Trade Initiative. And today we agreed to launch new supply chain cooperation measures that will let us more swiftly support each other's priority defence requirements,” he said. “Indian continues to acquire key US defence platforms, and that is forging important new ties between our defence industrial bases. We're doing all of this because the US supports India as a defence industry leader in the Indo-Pacific and a net provider of security in the region,” he said.

Observing that China is seeking to refashion the region and the international system more broadly in ways that serve its interests, Austin said the two countries have identified new opportunities to extend the operational reach of their militaries and to coordinate more closely together across the expanse of the Indo-Pacific. “We welcome the Indian Navy's decision to join the combined maritime forces in Bahrain, and we've also committed to more high-end exercises together. Last summer, the Theodore Roosevelt Carrier Strike Group conducted the first-ever combined anti-submarine warfare and air exercise with the Indian Navy and Air Force,” he said.

“We're looking forward to more of this sort of cooperation as we expand the scope and the complexity of Tiger Triumph, which is our annual major tri-service exercise. And finally, we made commitments today to reinforce our ties with like-minded countries including Japan, Australia, and our European allies and partners,” he said.

“Take, for example, the Quad's newly launched Humanitarian Assistance and Disaster Relief Mechanism, which will bring together our defence and civil disaster -- and civilian disaster relief agencies to ensure that the Indo-Pacific is better prepared for future crises. Now, as two of the world's largest democracies, the United States and India are linked by more than our common interests,” Austin said. As we look at the future we want to make sure that we maintain the ability to operate together. So we look forward to those continued discussions. It also includes a range of options that would make our systems more affordable. This is work that will continue going forward and again look forward to continuing to have them as a strong and reliable partner,” said the Defence Secretary.

*https://economictimes.indiatimes.com/news/defence/india-us-finalize-signing-of-new-space-situational-awareness-arrangement/articleshow/90790353.cms?from=mdr*

The EurAsian Times

*Tue, 12 Apr 2022*

# Agni-5 Vs Shaheen-3 – How does Pakistan's longest-range nuke-capable missile fare against India's 'fire-breathing' ICBM?

This was the second time the missile was fired in the last two years, with the last test on 20 January 2021. While DG ISPR, Pakistan, said that the "test flight was aimed at the revalidating various design and technical parameters of the weapon system," the timing of the test raises questions.

**Shaheen-III Aimed At India's Northeast?**

The development phase of Shaheen-III began in the early 2000s after India first test-fired Agni-III, which was capable of hitting any target inside Pakistan. Shaheen-III is a nuclear-capable land-based surface-to-surface medium-range ballistic missile. The missile was first test-fired on 9 March 2015 and displayed during a military parade in March 2016. It is Pakistan's longest-range missile, with a range of 2,750 kilometers. The missile uses a two-stage, solid propellant propulsion system. The road-mobile missile was mounted on a Chinese transporter erector launcher. According to Lieutenant General (Retd), Khalid Kidwai, Shaheen-III was designed to target India's Northeast and island commands. In an interview at the Carnegie International Nuclear Policy Conference in 2015, the general said that "Shaheen-III is designed to reach Indian islands so that India cannot use them as "strategic bases" to establish "second-strike capability."

**Versatility Offered By Agni-V**

Given that Shaheen-III is Pakistan's most powerful missile, it is essential to see how it fares with India's most potent nuclear-capable missile — Agni-V. Agni-V is a nuclear-capable intercontinental ballistic missile (ICBM) developed by the Defense Research and Development Organization (DRDO). The missile has an operational range of 5,500-8,000 kilometers.

Agni-V uses a three-stage, solid propellant propulsion system and is transported by a truck and launched with a canister. Its maximum velocity during the terminal phase reaches Mach 24. It is guided by a highly accurate ring laser gyroscope inertial navigation system that can strike a target within 30 meters. However, Agni-V was developed primarily to enhance India's nuclear deterrence against China. With a range of more than 5,000 kilometers, Agni-V can reach China's eastern seaboard, where most of its economic output is concentrated. The missile was deployed by the Strategic Forces Command of India in 2018

**Shaheen-III More Close To Agni-III**

In hindsight, there is no comparison between Shaheen-III and Agni-V as the latter completely outguns Shaheen-III due to its superior navigation system, propulsion, range, and terminal phase velocity. On top of that, Agni-V is an ICBM, whereas Shaheen-III is a medium-range ballistic missile. A better Indian missile to compare with Shaheen-III will be Agni-III. Agni-III is an intermediate-range ballistic missile deployed into service in 2011 as a successor to Agni-II.

Agni-III has a range of 3,000-3,500 kilometers with the capacity to carry a payload of 1,500 kg. Like Shaheen-III, Agni-III also has two-staged, Solid propellant propulsion. Agni-III has an edge over Shaheen-III in mobility and launch versatility.

While Shaheen-III is only road-mobile, Agni-III is both rail and road-mobile. Agni-III also has a superior guidance system than Shaheen-3. Agni-III operates on a Ring Laser Gyroscope inertial navigation system (same as Agni-V) and is augmented by GPS satellite guidance. DRDO is also conducting night trials to enhance the missile's capability and develop readiness to handle the weapon during the night hours. With its enhanced range, Pakistan sees Shaheen-III as a credible deterrence against India's superior missile technology. Farrukh Salim, a Pakistani political scientist, stressed that "Pakistan seems to be aiming at competing with India and Pakistan's aims seem to revolve around creating a credible deterrence, and a credible deterrence is bound to strengthen strategic stability."

Pakistan thinks that the Shaheen-III can impede India's second-strike capability. However, it is essential to note here that India has a functioning nuclear triad, and a mere targeting of its land-based launching facilities will not disable India's second-strike capability. Pakistan has come a long way in creating credible deterrence with the induction of Shaheen-III. However, they are still way behind India in missile technology. They will take years to catch up, even with the help of China.

*https://eurasiantimes.com/pakistans-most-powerful-nuclear-capable-missile-compete-against-agni/*

# Science & Technology News

***Wed, 13 Apr 2022***

## अंतरिक्ष के क्षेत्र में बड़ी छलांग लगाएगा इसरो का नया प्रक्षेपण यान

भारतीय अंतरिक्ष अनुसंधान संस्थान इसरो (ISRO) पुनर्उपयोगी प्रक्षेपण यान (Reusable Launch Vehicle) के प्रदर्शन कार्यक्रम की तैयारी कर रहा है जो कई तरह की तकनीकों जैसे हाइपरसॉनिक ऊड़ान, स्वचालित लैंडिंग, वापासी उड़ान, स्क्रैमजैट प्रणोदन आदि में इस्तेमाल की जा सकेंगी. इससे हर अंतरिक्ष प्रक्षेपण और उड़ान का खर्चा बचने में मदद मिल सकेगी और भविष्य में अंतरिक्ष पर्यटन (Space Tourism) के लिए आधार मिल सकेगा. इस कार्यक्रम में पुनर्उपयोगी प्रक्षेपण यान को पृथ्वी की कक्षा में भी भेजे जाने की योजना है. अभी तक अंतरिक्ष प्रक्षेपण यान एक ही बार प्रयोग में लाए जा सकते थे. इससे अंतरिक्ष यान प्रक्षेपण बहुत ज्यादा खर्चीला काम हो जाता था. पर्यटन उद्योग की संभावनाओं के देखते हुए अंतरिक्ष के क्षेत्र में ( Space Tourism) प्रक्षेपण को सस्ता बनाने के प्रयास चल रहे हैं और इसके नतीजे भी

मिलने लगे हैं. अब दुनिया के कई अंतरिक्ष कंपनियों सहित कई देश भी पुनर्उपयोगी प्रक्षेपण यान (Reusable Launch Vehicle) पर काम कर रहे हैं और यह अब हकीकत भी बन चुके हैं. भारतीय अंतरिक्ष अनुसंधान संस्थान इसरो (Indian Space and Research Organisation) भी इस तकनीक पर काम कर रहा है. अब वह इसके लिए प्रदर्शन उड़ान और कक्षा के लिए प्रक्षेपण की योजना बना रहा है.

**व्यवसायिक अंतरिक्ष के क्षेत्र के लिए**

इसरो के इस कदम से साफ है वह अब दूसरे देशों और स्पेस एंजेसी से पीछे नहीं रहना चाहता है जिनसे उसकी प्रतिस्पर्धा चल रही है. इस प्रौद्योगिकी प्रदर्शन कार्यक्रम का मकसद व्यवसायिक अंतरिक्ष के क्षेत्र को साधना है. इसरो चीफ एस सोमनाथ ने कहा कि रीयूजेबपल व्हीकल केवल व्यवसायिक क्षेत्र के लिए ही नहीं बल्कि रणनीतिक क्षेत्र के लिए ज्यादा महत्वपूर्ण हैं. सोमनाथ ने बताया कि इससे भारत भी अंतरिक्ष में अपने पेलोड भेजकर वापस सुरक्षित ला सकेगा. जियोस्पेटियल वर्ल्ड से बात करते हुए उन्होंने बताया कि जल्दी ही लैंडिंग के लिए एक प्रदर्शन किया जाएगा. जो एक कक्षा प्रक्षेपण के प्रदर्शन के बाद किया जाएगा. उन्होंने कहा कि इसरो यह भी पड़ताल कर रहा है कि भविष्य में किस तरह के लॉन्च व्हीलकल बन सकते हैं और लॉन्चर की लागत को कैसे कम किया जा सकता है.

**इन तकनीकों में उपयोगी**

फिलहाल एक प्रक्षेपण की कीम 20 हजार डॉलर प्रति किलोग्राम है. इसे 5 हजार डॉलर तक लाने की जरूरत है. यह तभी संभव है जब हम राकेट में पुनर्उपयोगिता ला सकें. इसरो पंखयुक्त पुनर्उपयोगी प्रक्षेपण यान तकनीक विकसित कर रहा है जो हाइपरसॉनिक उड़ान, स्वायत्त लैंडिंग, संचालित क्रूज उड़ान और हाइपरसोनिक उड़ान वायुश्वसन प्रणोदन जैसी तकनीकों में काम आएगी.

**इन प्रयोगों का प्रदर्शन**

इसरो अपने तकनीक प्रदर्शन कार्यक्रम में कई तरह की प्रयोगात्मक उड़ानों पर की शृंखला चलाएगा जिसमें हाइपरसॉनिक उड़ान प्रयोग (HEX), लैंडिंग प्रयोग (LEX), वापसी उड़ान प्रयोग (REX) और स्क्रैमजेट प्रणोदन प्रयोग (SPEX) शामिल होंगे. पुनर्उपयोगी प्रक्षेपण यान प्रौद्योगिकी प्रदर्शन (RLV-TD) प्रौद्योगिकी प्रदर्शन अभियानों की शृंखला है. इन्हें दो चरण से कक्षा (TSTO) में पूरी तरह से फिर से पुनर्उपयोगी वाहन की दिशा शुरुआत के रूप में देखा जा रहा है.

**अवसरों पर करना होगा काम**

सोमनाथ ने कहा, "मान लीजिए कि हमें रीयूजेबल रॉकेट बनाते हैं और उसे साल में केवल एक या दो बार ही प्रक्षेपित करते हैं. ऐसे में यह किफायती नहीं रहेगा. वास्तव में यह और महंगा हो जाएगा. इसलिए हमें पहले इसके लिए पृष्ठभूमि तैयार करनी होगी जिसमें रीयूजेबल रॉकेट की जरूरत होगी. हमें इसके लिए व्यवसायिक और प्रक्षेपण के अवसरों पर काम करना होगा.

**अब तक दो तरह के प्रक्षेपण यान**

भारत लंबे समय से अपने पृथ्वी की निचली कक्षा में पोलर सैटेलाइट लॉन्च व्हीकल (PSLV) और जियोसिंक्रोनस सैटेलाइट लॉन्च व्हीकल (GSLV) पर अपने उपभोक्ता सैटेलाइट प्रक्षेपित करता आ रहा है. पिछले तीन सालों में इसरो ने निजी और अंतरराष्ट्रीय एजेंसियों के जरिए इनसे 351 करोड़ यानि 3.5 करोड़ डॉलर की आय अर्जित की है. अंतरिक्ष में प्रक्षेपण यान का उपयोग अब तक मुख्यतः सैटेलाइट भेजने के लिए ही किए जाते थे लेकिन अब ऐसा नहीं होगा. अंतरिक्ष पर्यटन एक बड़े उद्योग के रूप में विकसित हो रहा है और भारत अंतरिक्ष प्रक्षेपण पहले से ही एक बड़ा नाम है. पिछले तीन साल में इसरो ने केवल 45 अंतरराष्ट्रीय सैटेलाइट भेजे हैं. ऐसे में वह अंतरिक्ष पर्यटन उद्योग को भुनाने की क्षमता रखता है.

*https://hindi.news18.com/news/knowledge/isro-reusable-launch-vehicle-demo-orbital-flight-strategic-and-commercial-use-viks-4190137.html*

The Indian EXPRESS

***Wed, 13 Apr 2022***

# Hubble observes super hurricanes, rain of vapourised rocks on Jupiter-sized planets

NASA's Hubble Space Telescope is studying a class of ultra-hot bloated Jupiter-sized exoplanets that are so close to their parent star that they are at temperatures above 1600 degrees Celsius. According to NASA, that is hot enough to vapourise most metals, including Titanium. In two new papers, teams of Hubble astronomers are reporting on bizarre weather conditions on these scorching planets. On one planet, it is raining vapourised rock while another has its upper atmosphere getting hotter and hotter as you go upwards rather than cooler because it is being 'sunburned' by intense ultraviolet (UV) radiation from its star.

While it may seem like little more than quirky and interesting facts about planets in faraway galaxies, studying extreme weather gives scientists insights into the diversity, complexity and exotic chemistry of far-away worlds. "We still don't have a good understanding of weather in different planetary environments," said David Sing of the Johns Hopkins University in Baltimore, Maryland, co-author on the two studies being reported, in a press statement. "When you look at Earth, all our weather predictions are still finely tuned to what we can measure. But when you go to a distant exoplanet, you have limited predictive powers because you haven't built a general theory about how everything in an atmosphere goes together and responds to extreme conditions. Even though you know the basic chemistry and physics, you don't know how it's going to manifest in complex ways," explained Sing.

In a paper published in the journal Nature, astronomers documented Hubble observations of WASP-178b, a gas giant located 1,300 light years away from earth. On the side having daytime, the atmosphere is cloudless and enriched with silicon monoxide gas. Since one side of the planet permanently faces the star, its atmosphere whips around to the dark side at speeds exceeding 3200 kilometres per hour. On the nighttime side, the silicon monoxide gas cools enough to

condense into rocks that rain out of the sky. In another paper published in Astrophysical Journal Letters, Guangwei Fu of the University of Maryland reported a super-hot gas giant KELT-20b, which is located 400 light years away from our planet. On this planet, ultraviolet light from its parent star is creating a thermal layer in the atmosphere, similar to that in Earth's stratosphere

According to Fu, scientists didn't know how the host star affected a planet's atmosphere directly. Even though there have been lots of theories, Fu claims that this is the first time that researchers have observational data. Even though these Jupiter-like planets are inhabitable, this research helps pave the way to understanding the atmosphere of potentially inhabitable terrestrial planets, according to Josh Lothringer, assistant professor teaching astronomy at researching exoplanets at the Utah Valley University. "If we can't figure out what's happening on super-hot Jupiters where we have reliable solid observational data, we're not going to have a chance to figure out what's happening in weaker spectra from observing terrestrial exoplanets. This is a test of our techniques that allows us to build a general understanding of physical properties such as cloud formation and atmospheric structure," explained Lothringer, in a press statement.

*https://indianexpress.com/article/technology/science/hubble-observes-super-hurricanes-and-rain-of-vapourised-rocks-on-super-hot-gas-giants-7867112/*

***Tue, 12 Apr 2022***

# Quantum teleportation: The express lane for quantum data traffic

Teleportation may be a concept usually reserved for science fiction, but researchers have demonstrated that it can be used to avoid loss in communication channels on the quantum level. The team, including researchers from Griffith University's Centre for Quantum Dynamics, have highlighted the issues around inherent loss that occurs across every form of communication channel (for example, internet or phone) and discovered a mechanism that can reduce that loss. Professor Geoff Pryde, Dr. Sergei Slussarenko, Dr. Sacha Kocsis and Dr. Morgan Weston, along with researchers from The University of Queensland and the National Institute of Standards and Technology, say the finding is an important step towards implementing "quantum internet," which will bring unprecedented capabilities not accessible with today's web.

Dr. Slussarenko said this study was the first to demonstrate an error reduction method that improved the performance of a channel. "First, we looked at the raw data transmitted via our channel and could see a better signal with our method, than without it," he said. "In our experiment, we first sent a photon through the loss—this photon is not carrying any useful information so losing it was not a big problem. "We could then correct for the effects of loss via a device called noiseless linear amplifier developed at Griffith and the University of Queensland.

"It can recover the lost quantum state, but it cannot always succeed; sometimes it fails. "However, once the recovery succeeds, we then use another purely quantum protocol—called quantum state teleportation—to teleport the information we wanted to transmit into the now corrected carrier, avoiding all the loss on the channel." Quantum technologies promise

revolutionary changes in our information-based society, a quantum communication develops methods such as the one demonstrated in this study to transmit data in an extremely secure and safe way, so that it is impossible to access by a third party.

"Short-distance quantum encryption is already used commercially, however if we want to implement a global quantum network, photon loss becomes in issue because it is unavoidable," Dr. Slussarenko said. "Our work implements a so-called quantum relay, a key ingredient of this long-distance communication network. "The no cloning theorem forbids making copies of unknown quantum data, so if a photon that carries information is lost, the information it carried is gone forever. "A working long-distance quantum communication channel needs a mechanism to reduce this information loss, which is exactly what we did in our experiment." Dr. Slussarenko said the next step in this study would be to reduce the errors to a level where the team could implement long-distance quantum cryptography, and test the method using real-life optical infrastructure, such as those used for fiber-based internet.

*https://phys.org/news/2022-04-quantum-teleportation-lane-traffic.html*

***Tue, 12 Apr 2022***

# Climate change will reshuffle marine ecosystems in unexpected ways, study finds

Warming of the oceans due to climate change will mean fewer productive fish species to catch in the future, according to a new Rutgers study that found as temperatures warm, predator-prey interactions will prevent species from keeping up with the conditions where they could thrive. The new study, published in the journal *Proceedings of the Royal Society B*, presents a mixed picture of ocean health. Not only will large species and commercially important fisheries shift out of their historical ranges as climate warms, but they will likely not be as abundant even in their new geographic ranges. For instance, a cod fisherman in the Atlantic might still find fish 200 years from now but in significantly fewer numbers.

"What that suggests from a fisheries perspective is that while the species we fish today will be there tomorrow, they will not be there in the same abundance. In such a context, overfishing becomes easier because the population growth rates are low," said study coauthor Malin Pinsky, an associate professor in Rutgers' Department of Ecology, Evolution, and Natural Resources. "Warming coupled with food-web dynamics will be like putting marine biodiversity in a blender." Previous studies of shifting habitat ranges focused on the direct impacts of climate change on individual species. While these "one-at-a-time" species projections offer insights into the composition of ocean communities in a warming world, they have largely failed to consider how food-web interactions will affect the pace of change.

The new study looked at trophic interactions—the process of one species being nourished at the expense of another—and other food-web dynamics to determine how climate change affects species' ranges. Using sophisticated computer models, the researchers determined that predator-prey interactions cause many species, especially large predators, to shift their ranges more slowly

than climate. "The model suggests that over the next 200 years of warming, species are going to continually reshuffle and be in the process of shifting their ranges," said lead author E. W. Tekwa, a former Rutgers postdoc in ecology, evolution and natural resources now at the University of British Columbia. "Even after 200 years, marines species will still be lagging behind temperature shifts, and this is particularly true for those at the top of the food web."

As climate warms, millions of species are shifting poleward in a dramatic reorganization of life on earth. However, our understanding of these dynamics has largely ignored a key feature of life—animals and other organisms must eat. The researchers have filled this knowledge gap by examining how the basic need for nourishment affect species' movements. The researchers developed a "spatially explicit food-web model" that included parameters such as metabolism, body size and optimal temprature ranges. By accounting for climate change, their model revealed that dynamic trophic interactions hamper species' ability to react quickly to warming temperatures. They also found that larger-bodied top predators stay longer than smaller prey in historical habitats, in part because of the arrival of new food sources to their pre-warming ranges.

"These dynamics will not only be in one place but globally," Pinsky said. "That does not bode well for marine life, and this is not an effect that has been widely recognized."

*https://phys.org/news/2022-04-climate-reshuffle-marine-ecosystems-unexpected.html*