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अमरउजाला

Tue, 27 Aug 2024

Defence: एडवांस और मॉडर्न बनेंगे भारत के मुख्य युद्धक टैंक, यह स्मार्ट कवच रोकेगा मिसाइलों के हमले

भारत अपने मुख्य युद्धक टैंकों (मेन बैटल टैंक) टी-72 और टी-90 को एडवांस और मॉडर्न बनाने के लिए बड़ी तैयारी कर रहा है। इसे आर्मर्ड फोर्स के मॉडर्नाइज प्रोग्राम से भी जोड़ कर देखा जा रहा है। टी-72 और टी-90 मेन बैटल टैंकों को अपग्रेड करने की तैयारी डीआरडीओ को सौंपी गई है। डीआरडीओ ने इन दोनों टैंकों के लिए एक खास सिस्टम डेवलप कर रहा है, ताकि भविष्य के युद्धों में टैंकों पर होने वाले हमलों को रोका जा सके।

'एक्टिव' कवच से होंगे लैस

डिफेंस रिसर्च एंड डेवलपमेंट आर्गनाइजेशन (DRDO) देश के दो मुख्य युद्धक टैंकों टी-72 और टी-90 के लिए एक खास एडवांस 'कवच' सिस्टम बना रहा है। जिसका उद्देश्य टैंकों और आर्मर्ड पर्सनल कैरियर्स (APC) पर लगीं स्टील प्लेटों को नई तकनीक से बदला जाएगा। बता दें कि भारतीय सेना की 65 आर्मर्ड (बख्तरबंद) रेजिमेंटों के पास 3500 से ज्यादा स्वदेशी अर्जुन और रूसी डिजाइन वाले टी-72 और टी-90 टैंक हैं। डीआरडीओ इन टैंकों में 'एक्टिव' कवच से लैस करने की योजना बना रहा है।

मेक इन इंडिया पहल के तहत बनाई योजना

सूत्रों ने बताया कि रूस-यूक्रेन युद्ध में जिस तरह से टैंकों पर ड्रोन और एंटी-टैंक गाइडेड मिसाइलों (ATGM) से टैंकों को निशाना बनाया गया है, वह वाकई चिंताजनक है। जिसके बाद मुख्य युद्धक टैंकों को ऐसे हमलों से सुरक्षा प्रदान करने के लिए योजना बनाई गई। जिसकी जिम्मेदारी डीआरडीओ को दी गई है। खास बात यह होगी कि प्रधानमंत्री नरेंद्र मोदी की मेक इन इंडिया और आत्मनिर्भर भारत पहल के तहत इन्हें मॉडर्नाइज किया जाएगा। इस डीआरडीओ के स्वदेशी तकनीक को विकसित करने की वजह भारत की रक्षा क्षमताओं को मजबूत करने और आयात पर देश की निर्भरता कम करना है।

मिसाइल हमले को बेअसर करेगा सेंसर

सूत्रों ने बताया कि नए कवच पर काम शुरू हो चुका है। इस कवच में ऐसे सेंसर लगाए जाएंगे, जो हवा से या जमीन से मार करने वाली एंटी-टैंक मिसाइल का पता लगाएंगे। वहीं, जैसे ही सेंसर को खतरा नजर आएगा, वह प्रतिक्रिया करना शुरू कर देगा। एंटी-टैंक मिसाइल को बेअसर करने के लिए यह सेंसर हथियार लॉन्च करेगा। सूत्रों ने बताया कि यह सिस्टम टैंकों, एपीसी, और रूसी मूल की बीएमपी पर लगाया जा सकता है। इसके अलावा नए फ्यूचरिस्टिक इन्फैंट्री व्हीकल्स पर भी फिट किया जा सकता है। वहीं, इस सिस्टम के लगाए जाने से न केवल टैंकों की सुरक्षा मजबूत होगी,

बल्कि उनमें बैठे जवानों की जान की भी रक्षा होगी। हालांकि टैंकों में भी छोटे-मोटे हमलों को झेलने के लिए कई तरह के सिस्टम होते हैं, इनमें स्टील प्लेटें भी महत्वपूर्ण हैं। लेकिन यह इंटेलिजेंट कवच सिस्टम ज्यादा बेहतर तरीके से टैंकों की सुरक्षा करेगा।

टी-72 और टी-90 टैंकों को अपग्रेड करने की तैयारी

इससे पहले टी-72 को अपग्रेड करने के लिए 2300 करोड़ रुपये की योजना के तहत 1000 टैंकों में नए स्वदेशी रूप से विकसित 1000 एचपी के इंजन लगाने का फैसला किया गया था, जो मौजूदा 780 एचपी इंजनों से ज्यादा ताकतवर होंगे। इसके अलावा उनमें रात के समय युद्धक क्षमता बढ़ाने के लिए थर्मल साइट, फायर डिटेक्शन सिस्टम के साथ कम्यूनिकेशन एंड बैटलफील्ड मैनेजमेंट सिस्टम लगाने का फैसला किया गया था। जबकि टी-90 टैंकों में ऑटोमैटिक टारगेट ट्रैकर, फायरिंग एक्चूरेसी बढ़ाने के लिए डिजिटल बैलिस्टिक कंप्यूटर और कमांडर थर्मल इमेजर लगाने की बात कही गई थी।

<https://www.amarujala.com/india-news/drdo-indian-main-battle-tanks-will-become-advanced-and-modern-this-smart-armor-will-prevent-missile-attacks-2024-08-27>

Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Tue, 27 Aug 2024

Indian Naval Ship Tabar Reaches Malaga, Spain For A Two Day Visit

Indian Navy's frontline stealth frigate, INS Tabar commanded by Captain MR Harish arrived at Malaga, Spain on 25 Aug 24 for a two day visit to enhance the existing bilateral relations between India and Spain. Diplomatic relations between India and Spain were established in 1956 with the opening of the Spanish Embassy in New Delhi. India acknowledges the major onus of maritime security on Spain due to Spain's large coastline and has been engaging with Spain through various constructive and collaborative efforts. The visit by INS Tabar further aims to strengthen these bonds and also to explore newer avenues of bolstering the relationship in the maritime domain.

During the two days of stay at Malaga port, the ship's crew will undertake a number of professional interactions with the Spanish Navy. Later, upon departure from Malaga, Indian Naval Ship Tabar will also undertake a PASSEX at sea with Spanish Navy Ship Atalaya. These interactions seek to enhance interoperability between the two navies and will also offer an opportunity to both sides to observe and imbibe the 'Best Practices' from each other. The Indian Navy remains committed to fostering partnerships with navies across the world.

INS Tabar, is equipped with a versatile range of weapons and sensors and is among the earliest stealth frigates of the Indian Navy. The ship is part of the Indian Navy's Sword Arm Fleet which is based at Mumbai under the Western Naval Command.

<https://pib.gov.in/PressReleasePage.aspx?PRID=2049200>

THE ECONOMIC TIMES

Wed, 28 Aug 2024

India signs another deal for 73,000 assault rifles from the US

India has signed a new deal to import 73,000 additional SiG Sauer assault rifles from the US, supplementing the 72,400 rifles previously acquired for frontline Army personnel, as tensions with China in eastern Ladakh persist.

"The SiG-716 'Patrol' rifles, which are 7.62x51mm caliber guns with an effective 'kill' range of 500-metre, are meant for infantry battalions deployed along the borders with China and Pakistan. It is a repeat order valued at Rs 837 crore," a source told TOI on Tuesday.

The delay in the manufacture of Russian AK-203 Kalashnikov rifles in India had led to the import of the first lot of 72,400 SiG-716 rifles (66,400 for the Army, 4,000 IAF and 2,000 Navy) under a Rs 647 crore contract inked with US firm SiG Sauer under the fast-track procurement route in Feb 2019.

The Rajnath Singh-led Defence Acquisitions Council (DAC) had given the nod for the procurement for the additional 73,000 SiG-716 rifles in Dec last year. Parallely, the Army is also buying 40,949 light machine guns, which were cleared by the DAC in Aug 2023 at an estimated cost of Rs 2,165 crore.

On the assault rifles front, the first 35,000 Kalashnikov AK-203s were finally delivered to the Army earlier this year after being assembled at the Korwa ordnance factory in Amethi district of UP under the joint venture called IndoRussia Rifles Private Limited.

In all, six lakh AK-203 rifles have to be manufactured at the Korwa factory over 10 years. These 7.62x39 mm caliber rifles, with an effective range of 300-metre, are supposed to cater to the overall needs of the over 11-lakh strong Army as well as the IAF and Navy.

The AK-203 project was first announced in 2018 but was hit by huge delays due to costing, royalty, technology transfer, indigenisation level and other issues, as was earlier reported by TOI. The Army

in the past has dismissed reports of glitches in the SiG-716 rifles, stressing that the US-origin rifles have “longer effective range, more lethality and higher recoil” as compared to the indigenous INSAS (5.56x51 mm) or AK-47 rifles.

The Army says it has been using ammunition manufactured by Indian ordnance factories for the SiG-716 rifles. “The rifles are also fitted with Picatinny rails to facilitate mounting of various equipment and accessories, such as optical sights, UBGL (under-barrel grenade launchers), forehand grips, bipods and laser pointers, without any modifications,” an officer said.

<https://economictimes.indiatimes.com/news/defence/india-signs-another-deal-for-73000-assault-rifles-from-the-us/articleshow/112857429.cms>

THE ECONOMIC TIMES

Tue, 27 Aug 2024

Here's how the US Navy's AIM-174B missile aims to shift air supremacy away from China in the Indo-Pacific

The United States has introduced a new long-range air-to-air missile, the AIM-174B, into the Indo-Pacific region, potentially altering the balance of power amidst growing tensions with China. This missile, deployed on the US Navy's F-18 Super Hornet, boasts an operational range of approximately 400 kilometers.

It is an air-to-air version of the Raytheon SM-6 missile, a versatile weapon known for its roles in anti-air, anti-ballistic, and anti-surface warfare. The AIM-174B was first publicly observed during the Rim of the Pacific (RIMPAC) exercise, the world's largest naval exercise, highlighting its strategic significance.

Technical Specifications and Strategic Importance

The AIM-174B missile is built on the existing production line of the SM-6, but it is specifically designed for air-to-air combat. With a speed of Mach 3.5, it is capable of striking targets at significant distances, positioning it as a direct equivalent to Russia's Rh-37 Vypel and China's PL-15 and PL-17 missiles. The PL-17, reportedly deployed by the Chinese PLA Navy, also has a range of 400 kilometers, making it a formidable counterpart in the region.

The AIM-174B's deployment signals a shift in US military strategy, one that harkens back to the Cold War era when the US Navy relied on long-range missiles like the AIM-54 Phoenix to protect its carrier battle groups from Soviet air threats.

“The United States has waited more than three decades to field an entirely new type of long-range air-to-air missile,” reported Forbes, emphasizing the missile's significance. The Phoenix missile, which was retired along with the F-14 Tomcat in 2004, served a similar purpose during its time. The revival of such capabilities indicates the US's recognition of China as a major maritime threat, akin to the former Soviet Union.

The Rationale Behind Long-Range Missiles in Modern Combat

In today's era of stealth technology, the deployment of long-range air-to-air missiles might seem unnecessary. However, the development of China's PL-15 and PL-17 missiles, which can be deployed on stealth fighters like the J-20, has changed the calculus. A stealth aircraft equipped with a long-range missile can engage targets from afar without being detected, posing a significant threat to enemy forces.

According to a Reuters report, Kelly Grieco, a senior fellow at the Stimson Center, explained the danger: "If a Chinese fighter can outrange an American fighter, it means they can get the first shot. It's hard to outrun something that's traveling at Mach 4."

The AIM-174B was developed to counter this threat, allowing US fighter jets to strike Chinese military installations from a safe distance, reducing the risk of engagement and increasing the effectiveness of US operations in the region. As told to Reuters, Justin Bronk, an expert on airpower and technology at the Royal United Services Institute in London, pointed out that while China is rapidly developing long-range missiles, the effectiveness of these weapons is limited by the capabilities of their launching platforms.

"If you go too big and too heavy on missiles, then you end up trading off fuel," he noted. This tradeoff could potentially limit the operational range and endurance of Chinese fighter jets.

Geopolitical Background: The Island Chain Strategy

The deployment of the AIM-174B is part of a broader US strategy to maintain its influence in the Indo-Pacific, a region that has become increasingly important as tensions with China rise. The South China Sea, a critical maritime trade route, is central to this strategy.

China's territorial claims and military build-up in the region have heightened the risk of conflict, particularly over Taiwan, which China has threatened to invade. The US's commitment to defending Taiwan is enshrined in the Taiwan Relations Act, which mandates that the US provide Taiwan with arms of a defensive character.

Any military conflict involving Taiwan would likely take place within the First Island Chain, a string of islands stretching from Japan to Borneo that serves as a critical line of defense for the US. The Island Chain Strategy, first proposed by American statesman John Foster Dulles during the Cold War, aimed to contain Soviet and Chinese expansion by establishing military bases across the Western Pacific.

While the Soviet Union collapsed in 1991, China's rise as a global power has renewed the strategy's relevance. Today, the AIM-174B missile is a key component of this strategy, enabling the US to project power and defend its interests in the region.

India's Missile Development in Context

While the US and China are engaged in a high-stakes competition for military supremacy, India is also making strides in developing its air-to-air missile capabilities.

The Astra Mk1, India's beyond-visual-range air-to-air missile, is currently operational on the Su-30MKI fighter jet. With a speed of Mach 4.5 and a range of 100 kilometers, the Astra Mk1

represents a significant advancement for India, although it remains behind the cutting-edge technology of the AIM-174B and China's PL-17. India is also developing the Astra Mk2 and Mk3 missiles, which are still undergoing trials.

The primary long-range air-to-air missile in service with the Indian Air Force is the Meteor, mounted on Rafale fighter jets. The Meteor is widely regarded as one of the most advanced air-to-air missiles in the world, capable of engaging targets at long distances with high precision.

A New Phase in the Indo-Pacific Power Struggle

The introduction of the AIM-174B missile by the US Navy is a clear indication of the escalating power struggle in the Indo-Pacific region. As China continues to expand its military capabilities, the US is responding with advanced technology and a renewed focus on long-range air-to-air combat.

The AIM174B represents not just a technological advancement but also a strategic move to maintain US dominance in a region where the balance of power is constantly shifting. As tensions rise, the potential for conflict grows, making the deployment of such weapons increasingly significant.

<https://economictimes.indiatimes.com/news/defence/heres-how-the-us-navys-aim-174b-missile-aims-to-shift-air-supremacy-away-from-china-in-the-indo-pacific/articleshow/112836659.cms>

THE ECONOMIC TIMES

Tue, 27 Aug 2024

Indian Ocean Region sees fresh power play as Indian, Chinese warships dock at Colombo at same time

India and China have continued their strategic competition in the Indian Ocean Region (IOR), even as their troops remain in a standoff along their land borders, a ToI report said on August 27. On Monday, India's guided missile destroyer INS Mumbai arrived at Colombo, coinciding with the docking of three Chinese warships, stoking concerns over increasing Chinese naval presence in the region, the report (by Rajat Pandit) said.

According to an Indian defence official, "Chinese warships, including those part of its anti-piracy escort forces, are now staying in the IOR for a much longer time than earlier."

Such developments reflect China's growing interest in the IOR, aiming for additional logistical facilities, posing significant challenges for India. To counteract, the Indian Navy, with its 140-warship fleet, requires adequate force-levels to manage Pakistan and deter China in the IOR.

The Indian Navy has been closely monitoring the Chinese warships' movements in the region. The Chinese flotilla includes destroyer Hefei, and amphibious ships Wuzhishan and Qilianshan, totaling around 1,500 personnel. This observation continued until the ships docked at Colombo on Monday.

Sri Lanka welcomed INS Mumbai, led by Captain Sandeep Kumar with 410 sailors, and the Chinese warships in line with naval traditions. Both sets of warships are scheduled to conduct separate "passage exercises" with Sri Lankan naval vessels upon their departure on August 29.

India's concerns have intensified after losing ground to China in the Maldives, where the Mohamed Muizzu administration signed a defence cooperation pact with Beijing. This agreement led to the withdrawal of Indian military personnel operating a Dornier aircraft and two helicopters.

The docking of Chinese warships at Colombo has not been well-received in New Delhi, given past protests when Sri Lanka allowed Chinese warships, spy vessels, and submarines to dock at its ports. Attention is now on the upcoming Sri Lankan Presidential elections on September 21.

India favors the re-election of President Ranil Wickremesinghe over Anura Kumara Dissanayake of the National People's Power, a party perceived to be pro-China. China's naval expansion is marked by its world's largest navy, comprising over 360 warships and submarines.

China has been enhancing its "underwater domain awareness" in the IOR by deploying survey and research vessels to gather oceanographic and navigational data for submarine operations. Joint naval initiatives between China and Pakistan are raising additional concerns.

China is bolstering Pakistan's Navy by delivering four Type 054A/P multi-role frigates and planning to supply eight Yuan-class diesel-electric submarines. An Indian officer observed, "By 2028-29, Pakistan will have the same number of assets as India's Western Naval Command."

<https://economictimes.indiatimes.com/news/defence/indian-ocean-region-sees-fresh-power-play-as-indian-chinese-warships-dock-at-colombo-at-same-time/articleshow/112832508.cms>



Tue, 27 Aug 2024

India-Argentina relations at 75: Ambassador Mariano A Caucino highlights defence and economic cooperation

This year, India and Argentina celebrate the 75th anniversary of their diplomatic relations—a milestone that speaks to the enduring partnership and shared values between the two nations. Reflecting on this significant occasion, Mariano A. Caucino, the Argentine Ambassador to India, shares his insights on the journey so far and the promising future ahead.

“It is an immense privilege to serve as Argentina’s Ambassador to India during such a transformative period,” says Caucino. “India’s rapid ascent as a global power, particularly within the Indo-Pacific region, highlights its pivotal role in shaping the future. The country’s remarkable achievements—becoming the world’s fifth-largest economy and one of the fastest-growing democracies—are truly impressive.”

The ambassador emphasises the strong alignment between India and Argentina in terms of values. “We have great admiration for the high principles that India upholds—democracy, freedom, and respect for human dignity,” he notes. “These are values that Argentina shares deeply, and they form the bedrock of our bilateral relationship.”

The collaboration between India and Argentina has extended into various international platforms. “During India’s presidency of the G20 last year, our countries worked closely to address global challenges, such as terrorism, cybercrime, and poverty. These are issues that transcend borders and require global solutions,” explains Caucino. “Argentina is particularly thankful for India’s unwavering support on the ‘Malvinas Question’ at the United Nations. This solidarity underscores the deep mutual respect between our nations.”

Economic Relations

On the economic front, the ambassador highlights the significant growth in bilateral trade. “Our trade volume has reached an impressive \$4.6 billion, with Argentina becoming a key supplier of soybean and sunflower oil to India,” he says. “These commodities are vital for ensuring food security for Indian consumers. Additionally, 2023 marked a significant milestone with Indian mining companies starting operations in Argentina’s Catamarca province. They are not only exploring lithium but also showing interest in copper and gold—resources critical for India’s electric vehicle industry.”

Caucino is particularly pleased with the involvement of private sectors from both nations. “The presence of companies like the Argentine IT firm Globant in Pune and the UPL Group’s operations in Argentina highlights the depth of our economic ties. These collaborations are essential as we continue to build a multifaceted partnership,” he remarks.

Cultural exchanges also play a crucial role in the relationship between India and Argentina. “Our cultural ties run deep and even predate our diplomatic relations,” says the ambassador. “Rabindranath Tagore’s visit to Argentina in 1924 is a historic example of this bond. The friendship between Tagore and Victoria Ocampo is celebrated in the film ‘Thinking About Him,’ a joint India-Argentina production that has been showcased at various international film festivals.”

In addition to cultural connections, shared interests in sports and wellness further unite the two countries. “Tango has found enthusiastic followers in India, while Yoga has become a significant cultural phenomenon in Argentina, celebrated massively on International Yoga Day,” Caucino points out, who has previously served as ambassador to Costa Rica and to Israel.

Defence Cooperation

Defence cooperation is another area where the relationship has strengthened. “Our armed forces have a long history of collaboration, based on shared expertise and mutual support. This

cooperation is a model of international military partnership, rooted in trust, respect, and a shared vision for global security,” says the ambassador.

Looking ahead, Ambassador Caucino, a lawyer and the author of a number of books and essays on Foreign Affairs and Contemporary History, is optimistic about the future of India-Argentina relations. “As we celebrate 75 years of diplomatic ties, it’s clear that our partnership is not just enduring but also poised for further growth. The shared history, values, and mutual respect that underpin this relationship ensure that our two nations will continue to work closely together, shaping a future defined by peace, prosperity, and shared progress.”

<https://www.financialexpress.com/business/defence-india-argentina-relations-at-75-ambassador-mariano-a-caucino-highlights-defence-and-economic-cooperation-3593908/>



Wed, 28 Aug 2024

चीन-पाक की हर चाल को मात देगी ‘अरिघात’, जानें क्या है इसकी खासियत

चीन और पाकिस्तान की हर चाल को मात देने के लिए भारतीय नौसेना हिंद महासागर में INS अरिघात उतारेगी. 29 अगस्त को यह घातक परमाणु पनडुब्बी भारतीय नौसेना के बेड़े में शामिल हो सकती है. INS अरिघात भारतीय नौसेना की अरिहंत क्लास की दूसरी सबमरीन है. अरिहंत संस्कृत का शब्द है, जिसका अर्थ है ‘दुश्मन का विनाशक’. भारतीय नौसेना 28 अगस्त को अपने हथियारों के जखीरे में आईएनएस अरिघात को शामिल करेगी.

यह भारत की दूसरी न्यूक्लियर पनडुब्बी है, जिसे पूरी तरह से अपने ही देश में बनाया गया है. यह पनडुब्बी रक्षा मंत्री राजनाथ सिंह की मौजूदगी में नौसेना में शामिल होगी. आईएनएस अरिघात हमारी वॉटर सिक्योरिटी को यानी हिंद महासागर क्षेत्र में सुरक्षा प्रदान करेगी. साथ ही भारत की मेरीटाइम सुरक्षा को बढ़ाने के लिए एक घटक सुरक्षाघेरा बनाएगी. अरिघात उन इलाकों में भी पेट्रोलिंग करेगी, जिनमें भारत की रुचि है.

महीनों तक पानी में रह सकती है

परमाणु मिसाइलों से लैस पनडुब्बी आईएनएस अरिघात को विशाखापट्टनम के जहाज निर्माण केंद्र पर एडवांस्ड टेक्नोलॉजी वेसल ATV प्रोजेक्ट के तहत बनाया गया है. ये अरिहंत क्लास न्यूक्लियर पावर से लैस सबमरीन है. परमाणु रिएक्टर से चलने वाली यह सबमरीन आम सबमरीन से तेज चल सकती है. यहां तक कि यह सतह पर चलने वाले जहाजों की रफ्तार की बराबरी भी कर सकती हैं. आम पनडुब्बियां जहां सिर्फ कुछ घंटों तक ही पानी के नीचे रह पाती हैं, वहीं यह पनडुब्बियां महीनों तक पानी में रह सकती हैं.

दूसरी सबमरीन

भारत दूसरी न्यूक्लियर पनडुब्बी INS अरिघात को कमीशन करने जा रहा है. इसमें 750-किमी रेंज के K-15 मिसाइलें होंगी. यह चीन के समुद्री विस्तार पर लगाम लगाने के मद्देनजर बनाई गई हैं. भारत ने दो नए परमाणु पनडुब्बियों के निर्माण की योजना भी बनाई है, जो एक दशक में तैयार होंगी. भारत में दो और न्यूक्लियर पावर अटैक सबमरीन के निर्माण से प्रोजेक्ट को भी अंतिम मंजूरी मिलने वाली है.

INS अरिघात की खासियत

अरिहंत कैटेगरी की दूसरी मिसाइल सबमरीन आईएनएस अरिघात के ब्लेड प्रोपेलर जल रिएक्टर से संचालित होंगे. यह पनडुब्बी पानी की सतह पर 12-15 समुद्री मील यानी 22 से 28 किमी/घंटे से भी ज्यादा रफ्तार से चल सकती है और समुद्र की गहराई में 24 समुद्री मील यानी 44 किमी/घंटा की गति से चल सकती है. इस पनडुब्बी पर आठ लॉन्च ट्यूब होंगे. यह 750 किमी. रेंज वाली 24 K-15 सागरिका मिसाइलों या 3,500 किमी. की रेंज वाली 8 K-4 मिसाइल तक ले जा सकती है.

<https://www.tv9hindi.com/india/india-second-nuclear-submarine-ins-arighat-now-it-join-the-indian-navy-2804653.html>

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Machine learning helps predict crustal movements in Tibetan Plateau

Machine learning techniques used by scientists for modeling crustal deformations over the Tibetan Plateau have helped forecasting velocity vectors of such movements and enhancing the characterization of plate movements.

Typically, a dense network of Continuously Operating Reference Stations (CORS) is employed to continuously monitor crustal deformation. Campaign-mode GPS surveys are often used to densify the existing CORS network. Establishing a station in the desired location can be very challenging due to logistical problems and regional geographical considerations. Moreover, this process is expensive, and studies on crustal movement are often hampered by data gaps caused by logistical restrictions. Machine learning technique can come as succour in such situations to predict GPS site velocity for crustal deformation research.

To obtain velocity vectors at desired locations, scientist from Wadia Institute of Himalayan Geology, an autonomous Institute under the Department of Science and Technology (DST), Govt. of India, implemented machine learning techniques such as support vector machines, decision trees, and Gaussian process regression to accurately model crustal movement.

The scientists analysed data from 1,271 permanent continuous and campaign-mode GPS stations located on the Tibetan plateau and its surrounding areas. They used data from 892 stations for model training and data from 379 stations for testing.

The study published in Journal of Asian Earth Sciences demonstrates the effectiveness of these ML techniques in forecasting velocity vectors—eastward velocity (VE) and northward velocity (VN)—and enhancing the characterization of plate movements. The correlation between the predicted and actual velocity vectors was found to be highly satisfactory making these ML predictive models considerably reliable for estimating geodetic velocity vectors.

Based on the data-driven trends from the existing trained models, the scientists fed the locations of arbitrary GPS sites and predicted the VE and VN at those locations.

The predicted velocities showed similar patterns to those obtained from neighbouring GPS stations. The ML algorithm demonstrates a remarkable achievement in the field of geodetic studies in a cost-effective manner.

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<https://pib.gov.in/PressReleasePage.aspx?PRID=2049046>



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NASA's Mars explorer begins challenging journey to Crater summit

NASA's Perseverance rover has embarked on a challenging new mission on Mars, beginning its ascent to the rim of Jezero Crater after spending 3 1/2 years exploring its floor. The six-wheeled Perseverance rover, which has been operating on Mars since 2021, initiated its ascent on Tuesday, with the objective of reaching the summit of a 1,000-foot (305-meter) crater. During its exploration of the crater's floor, an area formerly submerged in water, the rover has collected 22 rock core samples.

These samples have the potential to provide crucial insights into Mars' ancient climate and possibly reveal evidence of past life on the planet. Currently, NASA is exploring methods to transport these samples back to Earth, as reported by AP. Steven Lee of NASA's Jet Propulsion Laboratory in California noted that the bedrock at the crater's rim could offer insights into the formation of rocky planets like Mars and Earth.

However, the journey is expected to be arduous, with the rover facing rocky terrain and slopes as steep as 23 degrees over the coming months.

"Perseverance has demonstrated remarkable resilience," Lee observed, noting the rover's impressive endurance as it has traversed approximately 29 kilometers throughout its mission, according to a report by the Associated Press.

The rock formations at the top of the crater may have originated from ancient hydrothermal vents, where heated water and dissolved minerals once emerged after circulating beneath the planet's

surface. On Earth, similar environments, such as those found in Yellowstone National Park, are considered potential cradles of life.

<https://indianexpress.com/article/technology/science/nasas-mars-explorer-begins-challenging-journey-to-crater-summit-9536768/>

