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# 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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Government of India

Ministry of Defence

Mon, 03 Jan 2021 6:04PM

### DRDO celebrates its foundation day

Defence Research and Development Organisation (DRDO) celebrated 64<sup>th</sup> DRDO Day on January 01, 2022. Secretary Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy addressed the DRDO fraternity in New Delhi on January 03, 2022. The DRDO is working on multiple cutting-edge military technology areas, which include aeronautics, armaments, combat vehicles, electronics, instrumentation, engineering systems, missiles, materials, naval systems, advanced computing, simulation, cyber, hypersonic technologies, quantum computing and communication, artificial intelligence, life sciences and other technologies for defence.

Secretary DDR&D and Chairman DRDO along with Director Generals and other Directors of DRDO Headquarters paid floral tributes at the bust of Dr A P J Abdul Kalam. Addressing the gathering, the DRDO chairman extended warm wishes to DRDO employees and their families. He said, DRDO has accomplished many successes through relentless zeal, perseverance and dedication of project teams, able leadership of project DGs, directors and lab directors. He acknowledged the support of all stakeholders like financial advisors, corporate teams, industry partners & government stakeholders in achieving the goals.

Secretary DDR&D brought out that 175 transfer of technology (ToT) licences were signed during 2021 and the production value of DRDO developed systems till today is over Rs 3 Lakh crore. He said that DRDO is ensuring the participation of industry as Development cum Production Partners (DcPP) and Production Agencies (PA) in the projects. DRDO test facilities have been opened up for industries and guidelines for GOCO (Government Owned and Company Operated) have been promulgated.

Dr G Satheesh Reddy also brought out that in 2021, DRDO achieved many milestones such as maiden flight of Akash-New Generation Surface to Air Missile (NG SAM), new generation surface-to-surface missile Pralay, indigenous air frames for BrahMos supersonic cruise missile, Vertical Launch Short Range SAM, Stand-off Anti-Tank (SANT) missile, supersonic missile assisted release of torpedo and many other systems. Its technology prowess is evident through multiple export opportunities emerging for systems like Akash Missile System, Brahmos, Weapon Locating Radar, Torpedoes, Sonars, etc.

Societal contribution of DRDO technologies during second wave of Covid were also highlighted. Nine hundred and thirty-one medical oxygen plants were installed at 869 sites across the country. Thirteen Covid hospitals with more than 7,400 beds were set up. All these were set up across the country with various central government departments & state government participation with DRDO. Anti-Covid drug in the form of therapeutic application of 2-deoxy-D-glucone (2DG) has been a crucial breakthrough during the pandemic.

While congratulating DRDO scientists and all other personnel who worked in close coordination with the Armed Forces for user trials, Secretary DDR&D set many targets for them. He stated that scientists need to accelerate development of state-of-the-art systems and technologies for realising

the goals of 'Make in India and Make for the World' set by Prime Minister Shri Narendra Modi. Dr G Satheesh Reddy emphasised the significant role being played by DRDO in promoting defence ecosphere within country comprising of industries, academic institutes and allied R&D organisations to work together on advanced and futuristic technologies to make India self-reliant in defence sector.

The efforts being made by DRDO to integrate youth with Defence R&D towards aligning young talent pool by promoting research aptitude in young students in niche complex defence technology was also highlighted. He said that this goal was achieved by Launching Dare to Dream contest, Regular MTech Programme in Defence Technologies in about 40 Universities through AICTE, introducing elective subjects in Defence Technologies for BTech courses, DRDO-MoE collaborative programme for PhD students and MoU with universities to focus on joint research activities, faculty and student exchange programme etc. DRDO through its TDF scheme has assigned 40 projects to nascent industries and MSME's. Many more in projects are in pipeline.

Four internal automation portals and two documents along with a monograph on Systems Engineering for self-reliance to mark the DRDO Day event were launched. Entire DRDO fraternity from across the country participated online through internal network in DRDO Day celebrations.

The DRDO was formed in 1958 from the amalgamation of the then already functioning Technical Development Establishment (TDEs) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO). DRDO was then a small organisation with 10 establishments or laboratories. Over the years, it has grown multi-directionally in terms of the variety of subject disciplines, number of laboratories, achievements and stature.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1787178>



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**Government of India**

**రక్షణ మంత్రిత్వ శాఖ**

*Mon, 03 Jan 2021 6:04PM*

## **వ్యవస్థాపక దినోత్సవం జరుపుకుంటున్న భారత రక్షణ పరిశోధన**

### **అభివృద్ధి సంస్థ-DRDO**

డిఫెన్స్ రీసెర్చ్ అండ్ డెవలప్‌మెంట్ ఆర్గనైజేషన్ (DRDO) జనవరి 01, 2022న 64వ DRDO దినోత్సవాన్ని జరుపుకుంది. రక్షణ శాఖ కార్యదర్శి R&D, చైర్మన్ DRDO డాక్టర్ జి. సతీష్ రెడ్డి జనవరి 03, 2022న న్యూఢిల్లీలో DRDO ఉద్యోగులను ఉద్దేశించి ప్రసంగించారు. DRDO దేశం కోసం కీలకమైన భూమిక నిర్వహిస్తోంది. ఏరోనాటిక్స్, ఆయుధాలు, పోరాట వాహనాలు, ఎలక్ట్రానిక్స్, ఇన్స్ట్రుమెంటేషన్, ఇంజనీరింగ్ సిస్టమ్స్, క్షిపణులు, మెటీరియల్స్, నావికా వ్యవస్థలు, అధునాతన కంప్యూటింగ్, సిమ్యులేషన్, సైబర్, హైపర్ సోనిక్ టెక్నాలజీస్, క్వాంటం కంప్యూటింగ్, కమ్యూనికేషన్, ఆర్టిఫిషియల్ ఇంటెలిజెన్స్, లైఫ్ సైన్సెస్ తోపాటు రక్షణ కోసం ఉపయోగించే ఆధునిక సాంకేతికతలు.

సెక్రటరీ డిడిఆర్ అండ్ డి, డిఆర్డిఓతో పాటు డిఆర్డిఓ ప్రధాన కార్యాలయ డైరెక్టర్ జనరల్స్, ఇతర డైరెక్టర్లు డాక్టర్ ఎపిజె అబ్దుల్ కలాం విగ్రహం వద్ద పూలమాలలు వేసి నివాళులర్పించారు. సభను ఉద్దేశించి DRDO చైర్మన్ ప్రసంగిస్తూ DRDO ఉద్యోగులకు, వారి కుటుంబాలకు హృదయపూర్వక శుభాకాంక్షలు తెలిపారు. ప్రాజెక్ట్ బృందాల

ఉత్సాహం, పట్టుదల మరియు అంకితభావం, సమర్థ నాయకత్వం ద్వారా డిఆర్డిఓ అనేక విజయాలు సాధించిందని ఆయన అన్నారు. లక్ష్యాలను సాధించడంలో ఆర్థిక సలహాదారులు, కార్పొరేట్ బృందాలు, పరిశ్రమ భాగస్వాములు, ప్రభుత్వ వాటాదారులు వంటి వారి కృషి వల్ల ఇది సాధ్యమైంది అని ప్రస్తావించారు..

సెక్టరీ DDR&D 2021లో 175 ట్రాన్స్ఫర్ ఆఫ్ టెక్నాలజీ (ToT) లైసెన్స్ పై సంతకం చేశామని, DRDO అభివృద్ధి చేసిన వ్యవస్థల ఉత్పత్తి విలువ ఇప్పటివరకు రూ. 3 లక్షల కోట్లకు పైగా ఉందని వెల్లడించారు. ప్రాజెక్ట్లలో అభివృద్ధి ఉత్పత్తుల భాగస్వామిగా (డిసిపిపి), ఉత్పాదక సంస్థల (పిఎ) పరిశ్రమల భాగస్వామ్యాన్ని డిఆర్డిఓ నిర్ధరిస్తున్నదని ఆయన అన్నారు. పరిశ్రమల కోసం DRDO పరీక్షా సౌకర్యాలను తెరిచారు. GOCO (ప్రభుత్వ యాజమాన్యం-కంపెనీ నిర్వహణ) కోసం మార్గదర్శకాలు ప్రకటించారు.

డాక్టర్ జి సతీష్ రెడ్డి పేర్కొన్న అంశాలలో 2021లో కొత్తతరం ఓపణి భూమి నుంచి ఆకాశంలోని లక్ష్యాన్ని చేదించే -ఆకాష్ (NG SAM), భూమి నుంచి భూమ్మీద లక్ష్యాన్ని గురిచూసే కొత్త తరం ఓపణి -ప్రళయ్, బ్రహ్మాస్ సూపర్ సోనిక్ విమానం, స్వదేశీ ఎయిర్ ఫ్రీమ్ల వంటి DRDO సాధించిన అనేక మైలురాళ్లను ప్రస్తావించారు. ఓపణి, వర్టికల్ లాండ్ షాట్ రేంజ్ SAM, స్టాండ్-ఆఫ్ యాంటీ-ట్యాంక్ (SANT) ఓపణి, టార్పెడోలను విడుదల చేసే సూపర్ సోనిక్ ఓపణి అనేక ఇతర వ్యవస్థలు కూడా ఉన్నాయి. ఆకాష్ ఓపణి వ్యవస్థ, బ్రహ్మాస్, ఆయుధ స్త్రావరాలను గుర్తించే రాడార్, టార్పెడోలు, సోనార్లు మొదలైన వ్యవస్థలకు భారత రక్షణ పరిశోధన అభివృద్ధి సంస్థ అందించిన సాంకేతిక నైపుణ్యం ఎంతో విశిష్టమైనది.

కోవిడ్ రెండవ వేవ్ సమయంలో DRDO సాంకేతికత యొక్క సామాజిక సహకారం కూడా ఎన్నడగినది. దేశవ్యాప్తంగా 869 ప్రాంతాల్లో తొమ్మిది వందల ముప్పై ఒక్క మెడికల్ ఆక్సిజన్ ప్లాంట్లు ఏర్పాటు అయ్యాయి. 7,400 కంటే ఎక్కువ పడకలతో 13 కోవిడ్ ఆసుపత్రులు ఏర్పాటు చేశారు. ఇవన్నీ దేశవ్యాప్తంగా DRDO సహకారంతో వివిధ కేంద్ర ప్రభుత్వ విభాగాలు, రాష్ట్ర ప్రభుత్వ భాగస్వామ్యంతో ఏర్పాటు అయ్యాయి. మహమ్మారి సమయంలో 2-డియోక్సి-డి-గ్లూకోస్ (2డిజి) చికిత్సా అప్లికేషన్ రూపంలో యాంటీ కోవిడ్ ఔషధ అభివృద్ధిలో కీలకమైన పురోగతి సాధ్యం అయ్యింది.

యూజర్ ట్రయల్స్ సమయంలో సాయుధ దళాలతో సన్నిహిత సమన్వయంతో పనిచేసిన DRDO శాస్త్రవేత్తలు ఇతర సిబ్బందిని అభినందిస్తూ, కార్యదర్శి DDR&D వారికి అనేక లక్ష్యాలను నిర్దేశించారు. ప్రధాన మంత్రి శ్రీ నరేంద్ర మోదీ నిర్దేశించిన 'మేక్ ఇన్ ఇండియా అండ్ మేక్ ఫర్ ద వరల్డ్' లక్ష్యాల సాధన కోసం శాస్త్రవేత్తలు అత్యాధునిక వ్యవస్థలు సాంకేతికతల అభివృద్ధిని వేగవంతం చేయాల్సిన అవసరం ఉందని ఆయన పేర్కొన్నారు. రక్షణ రంగంలో భారతదేశాన్ని స్వావలంబనగా మార్చడానికి అధునాతన భవిష్యత్తు సాంకేతికతలపై కలిసి పనిచేయడానికి పరిశ్రమలు, విద్యా సంస్థలు, పరిశోధన, అభివృద్ధి సంస్థలతో కూడిన దేశంలో రక్షణ పర్యావరణాన్ని ప్రోత్సహించడంలో DRDO పోషిస్తున్న ముఖ్యమైన పాత్రను డాక్టర్ జి సతీష్ రెడ్డి నొక్కి చెప్పారు.

DRDO డి ఈవెంట్ను పురస్కరించుకుని సిస్టమ్స్ ఇంజనీరింగ్పై మోనోగ్రాఫ్తో పాటు నాలుగు అంతర్గత ఆటోమేషన్ పోర్టల్లు మరియు రెండు పత్రాలు ప్రారంభించారు. DRDO దినోత్సవ వేడుకల్లో దేశవ్యాప్తంగా ఉన్న మొత్తం DRDO సోదరులు అంతర్గత నెట్వర్క్ ద్వారా ఆన్లైన్లో పాల్గొన్నారు.

DRDO 1958లో డిఫెన్స్ సైన్స్ ఆర్గనైజేషన్ (DSO)తో ఇండియన్ ఆర్మీకి చెందిన అప్పటి ఇప్పటికే పనిచేస్తున్న టెక్నికల్ డెవలప్ మెంట్ ఎస్టాబ్లిష్ మెంట్ (TDEలు), డైరెక్టరేట్ ఆఫ్ టెక్నికల్ డెవలప్ మెంట్ & ప్రొడక్షన్ (DTDP) కలయికతో ఏర్పడింది. DRDO అప్పుడు 10 సంస్థలు లేదా ప్రయోగశాలలతో కూడిన ఒక చిన్న సంస్థ. సంవత్సరాలుగా, వివిధ రకాల సబ్స్టెక్ట్ విభాగాలు, ప్రయోగశాలల సంఖ్య, విజయాలను బట్టి ఇది అనేక దిశలలో పెరిగింది.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1787283>

## Visakhapatnam: NSTL celebrates DRDO Day-2022

### Highlights

**Naval Science and Technological Laboratory (NSTL), the premiere naval research laboratory of Defence Research and Development Organisation (DRDO), celebrated 'DRDO Day-2022' on Monday at Mohapatra Manasi Auditorium of NSTL**

Visakhapatnam: Naval Science and Technological Laboratory (NSTL), the premiere naval research laboratory of Defence Research and Development Organisation (DRDO), celebrated 'DRDO Day-2022' on Monday at Mohapatra Manasi Auditorium of NSTL.

Addressing the gathering, Secretary DD R&D (Department of Defence Research & Development) & chairman of DRDO Dr G Satheesh Reddy congratulated the DRDO fraternity who worked hard in the tough period of the pandemic.

He listed out the achievements of DRDO in the year of 2021 and hoped that scientists, officers and staff commit towards delivering efficient, advanced technological and first-of-its-kind systems within stipulated timelines.

Dr Kamat said the NSTL should become a global leader in the areas of warship technology and hydrodynamic research with more zeal and dedication.

Speaking on the occasion, NSTL director Y Sreenivas Rao said various directorates of NSTL will be strengthened in the coming year and the existing test facilities will be upgraded. Further, he announced that NSTL is going to celebrate this year's National Science Day in a grand manner for about 15 days in the month of February.

As part of the celebrations, a two-day open house exhibition of NSTL products for school and engineering students in and around Visakhapatnam will be organised and various events for school students will be conducted to create awareness on science and technology.

Later, distinguished scientist and director general (Naval Systems & Materials) Dr Samir V Kamat and Dr Y Sreenivas Rao unveiled NSTL's e-brochure.

The celebration concluded with the distribution of cash awards and certificates to the students of Ramanath Secondary School who won in quiz and poster competitions of 'Kaushal-2021' organised by Bharatiya Vignana Mandali. Scientists, officers, staff of NSTL and members of Civil Employees Union and Works Committee participated in the programme.

<https://www.thehansindia.com/news/cities/visakhapatnam/visakhapatnam-nstl-celebrates-drdo-day-2022-723046?infinitescroll=1>



Dr Samir V Kamat along with Dr Y Sreenivas Rao and J Srinivasa Rao, Ramanath Secondary School principal presenting prizes to the winners in Visakhapatnam on Monday



## In a bid to boost defence export market, India likely to sell BrahMos missiles to Vietnam, Philippines

### Story highlights

*The procurement is expected to signal a major upswing in India's ties with both nations which have been focusing on ramping up their naval prowess in the face of their lingering friction with China in the South China Sea*

New Delhi: India is likely to sell its BrahMos cruise missiles to Vietnam and the Philippines to boost its defence export market and have an edge over China.

The procurement is expected to signal a major upswing in India's ties with both nations which have been focusing on ramping up their naval prowess in the face of their lingering friction with China in the South China Sea.

China lays claim to most of the waters within a so-called Nine-Dash Line, which is also contested by Brunei, Malaysia, the Philippines, Taiwan, and Vietnam.

Indian Defence Minister Rajnath Singh is going to visit Vietnam in the second week of this month for the celebration of the golden jubilee of the establishment of diplomatic ties between New Delhi Ho Chi Minh City.

On the top of his agenda are a defence and joint collaboration including training and maintenance of defence equipment. This is Rajnath Singh's first visit to South East Asia amid growing Chinese aggression in the Association of Southeast Asian Nations (ASEAN).

BrahMos Aerospace, an India-Russian joint venture, produces supersonic cruise missiles that can be launched from submarines, ships, aircraft, or land platforms.

The missile fires at a speed of 2.8 Mach or almost three times the speed of sound. It has a range of approximately 290 kilometres.

Manila has recently allocated 2.8 billion pesos (\$55.5 million) for initial funding for the weapon system.

India and the Philippines have signed an "implementing agreement" that dictates the terms and sets the foundation for government-to-government contracts.

Two "special allotment release orders" worth 1.3 billion pesos and 1.535 billion pesos were issued on December 27 to cover the initial funding requirements for the "Shore-Based Anti-Ship Missile System Acquisition Project" of the Philippine Navy as per the website of the Philippines' department of budget management.

India aims to touch the target of five billion dollars worth of defence exports by 2025.

<https://www.wionews.com/india-news/in-a-bid-to-boost-defence-export-market-india-likely-to-sell-brahmos-missiles-to-vietnam-philippines-442067>



In this file photo, BrahMos cruise missile can be seen during a parade Photograph:( Zee News Network )

## चीनी बॉर्डर पर बर्फीली ठंड में भारतीय सैनिक कैसे फटाफट बनाते हैं स्वादिष्ट खाना

इन दिनों कड़ाके की ठंड पड़ रही है। भारत-चीन सीमा, सियाचिन या बर्फीले सीमाई इलाकों में रहना और वहां खाना बनाना दोनों बहुत मुश्किल है। भारतीय सेना के जवान वहां कठिन हालात में रहते जरूर हैं लेकिन उनके लिए डीआरडीओ ने कुछ ऐसे यमी फूड तैयार किये हैं, जो केवल दो मिनट में तैयार हो जाते हैं। इसमें इडली, चिकन, बिरयानी, पावभाजी और तमाम लजीज जायके वाले व्यंजन हैं

1. अगर आपको चपाती बनानी है तो पहले आटा गूथेंगे। फिर आटे की लोई से रोटी बेलेंगे और फिर इसे तवे पर सेंककर खाने लायक रोटी बना पाएंगे। लेकिन आप हैरान हो सकते हैं कि भारत के सैन्य क्षेत्र में अपने इनोवेशन के लिए प्रसिद्ध डीआरडीओ ने खाने के क्षेत्र में भी गजब का काम किया है। हालांकि खाने के लिए तैयार व्यंजनों का जिम्मा डीआरडीओ की सहयोगी संस्था डीएफआरएल यानी डिफेंस फूड रिसर्च लैबोरेटरी संभालती है। इसके तहत दुर्गम क्षेत्रों में तैनात सैनिकों को पैकेट में बंद करके ऐसे खाद्य पदार्थ भेजे जाते हैं, जो रेडी टू ईट होते हैं। बस इन्हें निकालकर गर्म करना होता है। और ऐसे व्यंजनों की फेहरिस्त बहुत लंबी है। ये प्रिजर्व चपाती कम से कम 15 से 30 दिनों तक खाने योग्य रह सकती है।



2. ये दो मिनट में तैयार होने वाली चना मसाला सब्जी है। जिसे काफी रिसर्च के बाद डीएफआरएल ने बनाया है। इसका जायका तो उम्दा होता ही है साथ ही इसमें पर्याप्त प्रोटीन और मिनरल्स भी होते हैं। इन्हें ऐसे स्टर्लाइज्ड प्रोसेस पैकेट्स में बंद किया जाता है जो महीनों तक सुरक्षित रह सकता है। ये रेडी टू ईट (खाने के लिए तैयार) होता है।

3. ये रेडी टू ईट फ्रायड चिकन लेग पीस है। जब सेना के जवान दुर्गम पहाड़ी क्षेत्रों और सूदूर इलाकों में तैनात होते हैं तो उनकी सबसे बड़ी परेशानी बेहतर खाना होता है। ऐसे में डीएफआरएल द्वारा बनाई गई डिशज उनके लिए काफी उपयोगी होती हैं। ये खाना उन तक पहुंचाने में भी समय लगता है, ऐसे में उसकी क्वालिटी, सेफ्टी, रिच प्रोटीन और वो पैकेज खोलने पर तैयार मिले, इस पर पूरा ध्यान दिया जाता है। फ्रायड लेग पीस को खासतौर पर इसी तरह तैयार किया गया है। इसे पैकेट से निकाल गर्म करके सीधे खाया जा सकता है।

4. ये पालक की स्वादिष्ट दाल है, जो पॉलिमेरिक फिल्मस के पैकेट में बंद करके सप्लाई की जाती है। ये दाल पालक के साथ पकाकर इस तरह प्रिजर्व की जाती है कि ये पैकेट में कई दिनों तक सुरक्षित रहे। ये भी रेडी टू ईट स्थिति में सैनिकों के पास भेजी जाती है। जिसे खोलकर उन्हें बस गर्म करना होता है।

5. इस पैकेट में पाव के साथ भाजी मिक्स होता है। उसमें बस गर्म पानी मिलाना होता है और ये स्वादिष्ट व्यंजन खाने के लिए तैयार मिलता है

6. डीएफआरएल ऐसे फाइबर रिच चावल और नॉन वेज पुलाव तैयार करती है कि इसमें गर्म पानी मिलाते ही ये तैयार हो जाता है। इस स्वादिष्ट डिश को तुरंत खाया जा सकता है।



7. आजकल बाजार में तरह तरह के पैकेज्ड पराठे उपलब्ध हैं लेकिन ये काम सबसे पहले डीआरडीओ से जुड़ी इस संस्था ने ही किया था। जिसने आलू के मसालेदार पराठे के साथ कई तरह के पराठे तैयार किए। इसे बस खाने से पहले गर्म करने की जरूरत होती है।

8. डीएफआरएल कर्नाटक के मैसूर में है। ये लगातार ऐसे खाने के रिसर्च में लगी रहती है कि न केवल उन्हें पैकेट्स के जरिए लंबे समय तक सुरक्षित रखा जा सके बल्कि फटाफट पकाया भी जा सके। उन्हें विज्ञान की मदद से लंबे समय तक टिकने वाला बनाया जाता है। डीआरडीओ की स्थापना अगर एक जनवरी 1958 को हुई तो उससे जुड़ी इस संस्था ने 28 दिसंबर 1961 में काम करना शुरू किया। सेना और अर्धसैन्य बलों के तरह तरह के खाने को रेडी टू ईट तकनीक में उपलब्ध कराने की जिम्मेदारी इसी की है। हर डिश को लेकर लंबी रिसर्च होती है। जिसमें ये देखा जाता है कि कैसे इसे लंबे समय तक ना केवल पैकेट्स में सुरक्षित रखा जा सके बल्कि उसकी पौष्टिकता भी बनी रहे।

9. आइए जरा देखते हैं कि डीएफआरएल के बड़े मेनू के खास व्यंजन क्या-क्या हैं। इसमें फ्लेवर्ड चपाती, शार्ट टर्म प्रिजर्व्ड चपाती, पाउच प्रोसेस्ड फूड, आलू छोले, सूजी हलवा, फिश करी, दाल, रेडी टू ईट सोया चंक्स, पालक करी, चटनी, सोया श्रीखंड, इडली सांबर, उपमा मिक्स, चिकन व मटन के व्यंजनों के अलावा कई तरह के ड्रिंक्स उपलब्ध हैं।

10. आमतौर पर डिफेंस फूड पर काम करने वाली ये संस्था किसी भी डिश को पेश करने से पहले और उसके बाद उसके कई पहलुओं पर काम करती है, जिसमें फूड साइंस और टेक्नॉलॉजी पर काम, सुविधाजनक खाने को विकसित करना, संरक्षण, फूड सेफ्टी, फूड पैकेजिंग, प्रोसेस्ड फूड की सुरक्षा पर अध्ययन के साथ सैन्य बलों और कई तरह के राष्ट्रीय अभियान दलों के लिए सीमित मात्रा में खाद्य उत्पादन और सप्लाई आदि शामिल है।

<https://hindi.news18.com/photogallery/knowledge/how-siachen-army-personals-prepare-delicious-foods-only-in-02-minutes-in-minus-temperature-3933210-page-7.html>

## DRDO on Twitter



3, January 2022



## Defence News

## Defence Strategic: National/International

TIMESNOWNEWS.COM

Tue, 04 Jan 2022

# Heron UAVs to carry missiles. Cabinet Committee on Security clearance awaited

*The Heron UAVs with the Indian Army and Indian Air Force have been used for years for intelligence work-- they carry cameras and powerful sensors.*

*By Srinjoy Chowdhury*

New Delhi: An ambitious project to put missiles on the Heron unmanned aerial vehicles or UAVs is now before the Cabinet Committee on Security headed by Prime Minister Narendra Modi.

The Herons can be in the air for about 40- 50 hours and have a range of 500 km and their "weaponisation" will ensure the Indian armed forces have additional capability even before the Predators arrive.

- The "weaponisation" will mean placing between two to four air-to-ground missiles on the 48 Herons. These can be anti-tank or for other suitable targets. Despite having weapons on them, the range of the Herons will be almost the same.
- Along with the weaponisation, there will be improved satellite communication ability on 32 of them.
- Engine upgrades of these Israeli drones are also on the cards.



The Heron TP (Image courtesy: Israel Aerospace Industries website) [Representational Image]

The Heron UAVs with the Indian Army and Indian Air Force have been used for years for intelligence work-- they carry cameras and powerful sensors. Placing air-to-ground missiles on them will enable additional strike ability, particularly against targets even 200 km inside enemy territory. The process has been delayed because of differences of opinion between the services and the proposal is finally in place.

<https://www.timesnownews.com/india/article/heron-uavs-to-carry-missiles-cabinet-committee-on-security-clearance-awaited/846017>



Tue, 04 Jan 2022

## Third Arihant class submarine quietly launched in November

*Sea trials and weapon trials pending, says senior naval officer*  
*By Sumit Bhattacharjee*

Visakhapatnam: The third of the Arihant-class SSBN (Sub Surface Ballistic Nuclear) submarine code-named S4, was quietly launched some time in the last week of November in Visakhapatnam.

Though this was not officially confirmed by the Ministry of Defence or the Indian Navy so far, sources in the navy and Ship Building Centre (SBC) in Visakhapatnam, where India's nuclear submarines are being built, have confirmed it. The soft launch of S4 was first reported by UK-based Janes Defence Weekly, citing satellite imagery sources.

The construction, commissioning, testing and status of the SSBNs are directly under the Strategic Forces Command (SFC) or the Strategic Nuclear Command (SNC), which is under the control of the PMO (Prime Minister's Office). Confirming the launch, a senior naval officer said that the launch of a submarine is nothing more than getting the outer hull floated in water. It was in the dry dock area till now and it is now in the water. It is still a long way for sea trials, weapon trials and commissioning, he said.

The first of the SSBN pack, INS Arihant (code name S2) was launched amidst much fanfare, when it was launched on July 26, 2009, with Gursharan Kaur, wife of then Prime Minister Manmohan Singh, breaking a coconut on the hull, to mark its launch in Visakhapatnam.

### **S3 undergoing sea trials**

But it took almost five years, since its launch to undergo its first sea trials some time in December 2014. INS Arihant was finally commissioned by Prime Minister Narendra Modi in August 2016.

As per sources, the second in the pack, S3 or INS Arighat is ready and is undergoing advanced sea trials. To complete the nuclear triad (nuclear weapon operability from air, land and sea) India

aims to have at least four SSBNs. It is learnt that S4 is bigger in size, tonnage and capability compared to S2 and S3.

Sources say unlike S2 and S3, which can carry four K-4 or 12 K-15 SLBMs (submarine launched ballistic missiles), S4 is being built to accommodate eight K-4 or 24 K-15 SLBMs.

The missiles can be launched through vertical tubes, when the submarines are in submerged state.

The K-4, developed by DRDO, is tested and cleared for production, is variant of land-based ballistic missile Agni – III, and has a range of about 3,500 km.

On the other hand, K-15 is the variant of Shaurya and has a range of 750 to 1,500 km, depending on the size of the warhead.

<https://www.thehindu.com/news/national/andhra-pradesh/third-arihant-class-submarine-quietly-launched-in-november/article38103275.ece>

## Telangana Today

Tue, 04 Jan 2022

### Opinion: S-400 can put India in pole position

By Amitava Mukherjee

The last visit of Russian President Vladimir Putin and his defence and foreign ministers to India has outlined the Russian presence vis-à-vis Indo-US relations.

Three areas have been identified where the US and Russia might clash with each other over their respective bilateral relations with India — the Indo-Pacific, Afghanistan and the delivery of the Russian S-400 missile system to India. It will be interesting to watch whether the US invokes the Countering America's Adversaries Through Sanctions Act (CAATSA) in matters of its relations with India if New Delhi decides to go the whole hog over the acquisition of the S-400 missiles.

#### Striking Features

But what is the S-400 really whose delivery to India is under way? It is an integrated air defence system that can simultaneously track, identify and destroy numerous incoming objects, including aircraft, missiles and electronic warfare mechanisms. It can hit ground objects in enemy territories too.

The most important feature of the system is that its radars can pick up a particular object as far as 1,000 kilometres away. The command post then distributes the responsibility of taking care of each object to separate manned anti-aircraft missile system, which is known for ensuring a high degree of success rates for destruction of those item which are likely to be destroyed at a distance of 400 km.



The system operates at a radius of a few hundred kilometres, can move at a remarkable speed and is effective at a height ranging from 5 metres to 30 km. S-400 has raised consternation among military strategists of the US and western Europe as most of the weapons used by these countries like the cruise and ballistic missiles, including the Tomahawk and fighter bombers like the F-16 and F-22, are now threatened.

#### Geostrategic Balance

Can the acquisition of S-400 by India tilt the geostrategic balance in South Asia in favour of New Delhi? Well, China is aware of the possibility and, therefore, it has also fallen for the same armament. It is difficult for any military strategist to gloss over the fundamental change that S-400 has brought about in the war scenario in the Middle East and the Eastern Mediterranean.

The glaring example that comes to mind is the survival of and then consolidation by Bashar-al-Assad, the President of Syria. The shift in his once battered fortune started taking place when he



began using the S-300 Russian missile system, an earlier version of S-400 while recapturing the lost areas of East Aleppo, East Ghouta and Deraa. Even the powerful Israeli airforce failed to cut much ice in favour of various Syrian rebel armies in the face of Bashar-al-Assad possessing such a lethal group of armaments.

Or take the case of Turkey whose bellicosity to Moscow was too well known in the middle of the last decade. In 2015, Turkey brought down a Russian jet over the Syrian sky and that brought the S-400 into the Middle Eastern war scenario. There was a quick change in Bashar-al-Assad's fortune. Turkey got frightened and was pushed out of the Syrian war. Ankara decided to make peace with Russia in spite of being a NATO member. Turkey has purchased the S-400 system and in its wake, the US has reportedly decided not to include Ankara in its overall scheme of development and sale of the F-35 fighter bomber aircraft.

### **Advantages for New Delhi**

Where does India stand in this situation? Advantages for New Delhi are clear. Most of Pakistan comes under the range of S-400 and it can debilitate the Pakistani air force.

Almost similar is the situation in regard to Afghanistan. The Taliban will have to think twice before it decides to send mercenaries into Kashmir. China is known to have installed missiles in Tibet but S-400 will certainly give India bargaining strength.

The US is aware of all these possibilities. Mike Pompeo, former US defence secretary, had once tried to wean New Delhi away from the S-400 purchase, only to be rebuffed by S Jaishankar, India's Foreign Minister. The US is afraid that a change in security scenario in South Asia may affect the status quo in the Middle East where there are off and on reports of Iraqi intention to buy the S-400 system.

Western strategic experts are afraid that with an annual budget hovering around \$5.05 billion, Iraq might be a proxy buyer for Iran. If this spectre materialises and the S-400 system is stationed in Iraq's Anbar province, then Saudi Arabia, Jordan and Israel will come under the striking range of the Russian missiles.

The acquisition of the S-400 has given India not only a lethal weapon but a high-value bargaining tool as well. Observers will watch how India uses it in the Afghan scenario.

<https://telanganatoday.com/opinion-s-400-can-put-india-in-pole-position>



*Tue, 04 Jan 2022*

## **China is constructing a new bridge on Pangong Tso lake, satellite imagery shows development: Reports**

### *Story highlights*

***Apart from the media reports, satellite imagery accessed by geo-intelligence expert indicates that China is constructing a bridge across Pangong Tso lake in eastern Ladakh***

New Delhi: China is reportedly constructing a new bridge across Pangong Tso lake in eastern Ladakh. However, it is being constructed across a part of the lake that falls within Chinese territory, as per the reports.

The bridge will help China's People's Liberation Army (PLA) to deploy troops closer to the Line of Actual Control (LAC). Also, the movement of troops is expected to be faster between the north and south banks of the lake.

The Indian Express reported citing sources that the bridge is being constructed more than 20km east of Finger 8 on the lake's north bank. Important to note here that India says Finger 8 denotes the LAC. Apart from the media reports, satellite imagery accessed by geo-intelligence expert Damien Symon indicates the same development in eastern Ladakh.

## Indian infrastructure

Recently, the Indian Defence Minister Rajnath Singh inaugurated 24 bridges and three roads constructed by the Border Roads Organisation (BRO) in four States and two Union Territories of the country.

These bridges and roads are constructed with an aim to ensure the swift movement of troops at borders with China and Pakistan. It is understood that the Flag Hill-Dokla road will reduce the travel time for Indian troops to reach the Dokla area near the Doklam plateau where a stand-off took place between Indian and Chinese armies in 2017.



As per reports the bridge is being constructed more than 20km east of Finger 8 on the lake's north bank. Photograph:( Others )

## India-China standoff

The ties between India and China deteriorated after in June 2020, 20 Indian soldiers were killed in action in a violent faceoff in the Galwan river area.

Meanwhile, India said China suffered more than 40 casualties but China reiterates says four of its soldiers were killed.

After over a year later in July last year, India and China agreed to mutually withdraw 2km from the clash site.

On the other hand, a latest report an India-based news agency ANI, citing sources, stated that China has deployed around 60,000 troops opposite the Indian territory in Ladakh.

In May last year, the Indian Defence Ministry in its Year-End review had stated that unilateral and provocative actions by the Chinese to change the status quo by force, in more than one area on the LAC, has been responded to as an adequate measure.

As per the ANI report, to resolve the issue, the militaries of the two countries have been engaged in dialogue at various levels. After sustained joint efforts, disengagement was carried out at many locations.

<https://www.wionews.com/india-news/china-is-constructing-a-new-bridge-on-pangong-tso-lake-satellite-imagery-shows-development-reports-442061>

# THE ECONOMIC TIMES

Tue, 04 Jan 2022

## A powerful Chinese navy is ready to flex its muscles

### Synopsis

*The sheer quantity and diversity of modern ships in the PLAN are imbuing it with growing confidence, bolstered by nationalism fanned by an increasingly martial communist party.*

Last year was a phenomenal one for China's navy - the People's Liberation Army Navy (PLAN) - with approximately 170,000 tonnes' worth of new ships commissioned in 2021.

Armed with such an influx of vessels every year, the PLAN has become one of the most modern and capable navies in the world, far eclipsing any other Asian navy.

The year's haul included one Type 094A ballistic missile submarine (SSBN), two Type 075 helicopter landing docks (LHD), three Type 055 cruisers, seven Type 052D destroyers, six Type 056A corvettes, six Type 082II mine countermeasure vessels, one cable-laying ship and three Type 927 surveillance ships.

The sheer quantity and diversity of modern ships in the PLAN are imbuing it with growing confidence, bolstered by nationalism fanned by an increasingly martial communist party.



China is not only looking to dominate waters close to its coast but to break out beyond those-called First Island Chain and to influence the narrative and fly a flag in distant oceans.

Indeed, 2022 will mark the 14th year of a continuous Chinese naval presence in the Gulf of Aden, supported by a PLA base in Djibouti.

The largest of the aforementioned list of ships completed in 2021 is the Type 075 LHD, which looks similar to an aircraft carrier thanks to its flat deck. An LHD carries a large number of helicopters (up to 28 in the case of China's Type 075), plus it accommodates landing craft and hovercraft in an internal well deck for amphibious operations. Up to 1,000 marines and their amphibious assault vehicles can be carried too.



Representative Image

The PLAN's first Type 075 christened Hainan of approximately 36,000-tonne displacement was commissioned into the South Sea Fleet at Sanya, Hainan Island on 23 April 2021, whilst the second formally entered service on 26 December as a belated "Christmas present".(Ironically, China's paranoia means religious festivals such as Christmas are outlawed by new laws, even though an estimated 5 per cent of the Chinese population are Christians).

The second LHD, commissioned at Zhoushan Naval Base as Guangxi, was assigned to the East Sea Fleet focuses especially on operations against Taiwan. Interestingly, the East Sea Fleet had hitherto not received either aircraft carriers or LHDs.

Guangxi had been launched on 22 April 2020 and commenced sea trials in December that year. As well as its helicopter and amphibious capabilities, the LHD lends itself to employment as a logistics and command platform for any contingency operations against Taiwan. Aircraft carriers meanwhile could be used to dissuade any intervention by the USA and allies in any future Chinese attack on Taiwan.

More LHDs are on the way too, because a third Type 075 was launched by the Hudong Zhonghua Shipyard in Shanghai on 29 January 2021, and it commenced sea trials on 25 November 2021.

China is maintaining an impressive ship-building rate, with one LHD launched every six months so far. Indeed, no other country can match the record pace of shipbuilding achieved by China. For the first-of-class Type 075, it took 340 days from launch to maiden journey. By the time of the second LHD, this milestone had reduced to 245 days, despite the impact of COVID-19.

As another example of shipbuilding productivity, the same Hudong Zonghua facility launched two Type 054A frigates and a Type 071E landing platform dock (LPD) amphibious ship (the latter is being built for Thailand) on the same day. The same yard has been building Type 054A/P frigates for Pakistan too.

Type 075s give the PLA far better amphibious and helicopter lift capacity than what its current fleet of eight Type 071 LPDs can. It is unclear how many Type 075s China will build, but it is likely to be at least six, some even claiming eight. These LHDs could be supplemented in the future by the larger Type 076.

Periodic updates of satellite imagery over Jiangnan Changxingdao shipyard in Shanghai show that progress is being made on the PLAN's third aircraft carrier as well. Called the Type 003, this carrier is quite different to the preceding two since it is larger and dispenses with a ski-jump ramp on the bow to assist aircraft launches.

Instead, the Type 003 will use a catapult launch system, just as the US Navy (USN) does. However, China made the technological leap straight to an electromagnetic aircraft launch system (EMALS) instead of adopting a steam-powered catapult system first. All modern American carriers used steam catapults up until the arrival of the first EMALS-equipped Ford-class carrier.

The EMALS is evident in satellite imagery of the Type 003 carrier, with two launch systems on the bow and one in a waist position. The same imagery suggests the vessel is about 316m long and

71.3m wide. Two elevators to raise and lower aircraft from/to the hangar deck are some 21m wide, these positioned on the starboard side of the ship.

EMALS is important to the PLAN, for it will allow more heavily armed and fueled fighters to take off from the Type 003 than is possible from Type 001 and 002 carriers. This also means different aircraft such as the developmental KJ-600 airborne early warning aircraft can operate from the Type 003, something impossible on preceding carriers.

Incidentally, a massive new dry dock in Sanya has been constructed, one large enough to accommodate the Type 003 carrier. This suggests it will join the South Sea Fleet. Sanya has grown into a major naval base the equal of the three existing fleet headquarters bases in Qingdao, Ningbo and Zhanjiang.

The PLAN is a powerful force, and questions need to be asked why it is being prioritized by Chairman Xi Jinping. Predictions by the US Congressional Research Service are that by 2025, China will have six SSBNs, ten nuclear-powered attack submarines, 47 diesel-electric submarines, three aircraft carriers, 52 cruisers/destroyers, 120 frigates/corvettes, four LHDs, ten LPDs and 24 landing ship tanks (LST).

Dennis Blasko, a former US defence attaché in Beijing and Hong Kong in the 1990s, told that the primary purpose of modernization in the Eastern Theater Command is to deter Taiwan. "In order to deter, you have to have a credible force. And they are building that credible force. Again, by the theory of deterrence, you have to display the determination to use that force. And you do that through statements, you do that through exercises."

However, Blasko assessed that the PLA does not yet have the confidence level to invade Taiwan, and certainly it does not have the sealift to do it. "...At this point, I think they'd consider having to go to war as a failure of their national strategy. They would much rather get everything they want through negotiations or other forms of pressure."

Even though the PLAN has large vessels like Type 071 LPDs and 075 LHDs, numbers of shorter-range amphibious vessels like LSTs for an over-the-beach invasion has largely stayed static.

A full-scale invasion of Taiwan would be militarily and politically risky for Xi, but this calculus does not apply so much for a lesser action such as seizing Taiwanese islands such as Pratas Island or Itu Aba in the South China Sea. For such an action, LHDs would be an ideal platform.

With all these new vessels, which are about as sophisticated as anything the USN has, the PLAN is prepared to throw its weight around not only in coastal waters but increasingly farther afield. China has been bellicose in its treatment of others in the South China Sea, not only with its navy but also by the China Coast Guard (CCG) and People's Armed Forces Maritime Militia (PAFMM). Each of the latter two is the largest force of their type in the world.

In a new report entitled "Hold the Line through 2035", published by Rice University's Baker Institute for Public Policy, authors Gabriel Collins and Andrew Erickson argue that the USA must stand up strongly to Beijing's antics attempting to change the status quo and to trample on international law.

The two American academics noted: "China is arguably pushing toward...an inflexion point with its increasingly aggressive actions in the East Asian littoral, including violations of Japanese-administered air- and sea-space, construction and subsequent militarization of disputed reefs in the South China Sea, harassment of oil and gas exploration operations by companies from neighbouring states, and frequent use of maritime forces to harass neighbouring nations' fishermen."

The PLAN, CCG and PAFMM indeed form the obvious frontline of Chinese military aggression, as they benefit from heavy investment and modernization. China is using new domestic regulations such as the Coast Guard Law to assert territorial jurisdiction as well, even though these have no international weight.

Collins and Erickson continued: "Each of these individual challenges tests the boundaries of the status quo, and barring a sufficient international response, emboldens further actions to expand

Chinese claims and undermine the American-led regional security architecture that has helped ensure peace for three-quarters of a century. The response to China's revisionist actions must ultimately be multilateral, but American action is the indispensable catalyst for initiating the process and sustaining the early stages when blowback from a not-fully-slowed People's Republic of China (PRC) will likely be the most intense."

The year 2021 saw warships from countries like France, Japan, Germany and the UK plying the South China Sea. This reflected greater international alarm, even from distant European powers, about China's bullying behaviour. However, most Southeast Asian nations are overawed and overmatched by the might of the PLA, and only a couple like Indonesia or Vietnam is willing to stand up to Chinese intimidation.

Collins and Erickson made a recommendation, however. "Washington should take the lead in helping allies and partner countries (to the extent they invite US assistance) positively assert their maritime rights. One prong would entail US freedom of navigation operations that in most cases are unilateral activities, but that may increasingly involve allies and partner states.

US naval forces conducted seven freedom of navigation operations vis-a-vis China in 2019. Maintaining or exceeding this pace would be a 'demonstrative' action to show Washington's resolve in the face of excessive PRC maritime claims ... The US Navy and Coast Guard should also begin engaging in 'definitive' actions that affirm a readiness to go 'hands on' in challenging PRC activities in the South and East China Seas that violate international and local law."

With the PLAN keen to test the mettle of its crews flush with an influx of new warships, and with the USA and others more intent on defying China's illegal maritime claims, the stage is set for increasing tensions in South China and East China Seas. The question is, will Chinese hubris lead to an unintended confrontation at sea this year?

Chinese actions will not be limited to these aforementioned maritime areas either, as the PLAN sails ever farther from the Chinese coast. The Indian Navy, for example, will be required to respond to a heavier presence by the PLAN in the Indian Ocean in the year ahead too.

<https://economictimes.indiatimes.com/news/defence/a-powerful-chinese-navy-is-ready-to-flex-its-muscles/articleshow/88661655.cms>



Tue, 04 Jan 2022

## चीनी नौसेना के बेड़े में शामिल हुए कई शक्तिशाली

### जहाज... क्या है 'ड्रैगन' का प्लान?

*चीनी नौसेना लगातार मजबूत हो रही है। हर साल चीनी नौसेना अपने बेड़े में अत्याधुनिक जहाज शामिल करती है। बीता साल भी चीनी नौसेना के लिए अभूतपूर्व रहा। चीनी नौसेना दुनिया की सबसे आधुनिक और सक्षम नौसेनाओं में से एक बन गई है।*

*By Manish Negi*

हांकांग: चीन अपनी नौसेना की ताकत को लगातार बढ़ा रहा है। बीता साल चीनी नौसेना के लिए अभूतपूर्व था। पीपुल्स लिबरेशन आर्मी नेवी (PLAN) ने बीते साल 1,70,000 टन जहाजों को अपने बेड़े में शामिल किया था। चीनी नौसेना हर साल अपने बेड़े में इस तरह के जहाजों को शामिल करती है। इस तरह चीनी नौसेना दुनिया की सबसे आधुनिक और सक्षम नौसेनाओं में से एक बन गई है। इस तरह चीन ने एशियाई नौसेना को पीछे छोड़ दिया है।

## 2021 में और मजबूत हुई चीनी नौसेना

चीनी नौसेना के लिए 2021 शानदार साल रहा। इसने अपने बेड़े में 094A बैलिस्टिक मिसाइल पनडुब्बी (SSBN), दो तरह के 075 हेलिकाप्टर लैंडिंग डॉक (LHD), तीन प्रकार के 055 क्रूजर, सात प्रकार 052D विध्वंसक, छह तरह के 056A कोरवेट, छह तरह के 082II खदान काउंटर मेयर पोत, केबल बिछाने वाला एक जहाज और तीन प्रकार के निगरानी जहाजों को शामिल किया था। चीनी नौसेना के बेड़े में अत्याधुनिक जहाज शामिल होने के बाद उसका आत्मविश्वास बढ़ा है।

चीन न केवल अपने तट के पास समुद्र पर हावी होना चाहता है बल्कि तथाकथित प्रथम द्वीप श्रृंखला से बाहर निकलने और दूर के महासागरों में झंडा फहराने की कोशिश कर रहा है। वास्तव में चीन 2022 में अदन की खाड़ी में अपनी उपस्थिति की 14वीं वर्षगांठ मना रहा होगा।



### कई जहाजों का निर्माण किया

साल 2021 में चीन ने कई जहाजों का निर्माण किया है। चीनी सेना ने अपने बेड़े में टाइप 075 एलएचडी को शामिल किया है, जो अपने फ्लैट डेक के लिए एक विमान वाहक के समान दिखता है। एलएचडी में बड़ी संख्या में हेलिकाप्टर को रखा जा सकता है। साथ ही इस जहाज पर एक साथ हजार सैनिकों और उनके हमले वाले वाहनों को भी ले जाया जा सकता है। इस जहाज को 23 अप्रैल 2021 को हैनान द्वीप पर दक्षिण सागर बेड़े में शामिल किया गया था।

<https://www.jagran.com/world/china-a-powerful-chinese-navy-is-ready-to-flex-its-muscles-22349432.html>

### **Packed '22 for ISRO with Disha, Trishna, Venus missions; work on Gaganyaan will continue**

Bengaluru: ISRO, which has had two lean years, has ahead of it what appears to be a packed 2022 with work on multiple high-profile missions, including the Gaganyaan and Chandrayaan-3 programmes, expected to progress. Aside from the human space (Gaganyaan) and lunar (Chandrayaan-3) missions, the space agency also has its eyes set on three key missions: Disha, a twin-satellite system that will study Earth's aeronomy, the uppermost layer of Earth's atmosphere. Trishna, a joint mission with CNES, the French space agency, meant for accurate mapping of land surface temperatures. And a mission to Venus.

While Trishna is scheduled for a 2024 launch, no immediate timeline is available for Disha and the Venus mission. Besides, some work is expected to happen on the NISAR and Xposat missions too. However, in terms of launch missions, Isro may only manage an uncrewed Gaganyaan mission and Chandrayaan-3 other than the regular earth observations, SSLV and commercial satellite missions.

According to scientists from Isro, Disha will be implemented by the Physical Research Laboratory. Short for "Disturbed and quiet-type System at High Altitude", it'll involve twin satellites orbiting Earth at an altitude of 450km. "...Three new space science missions are in the pipeline: Disha, the Venus mission and the Isro-CNES joint mission Trishna. Trishna is meant for accurate mapping of land surface temperatures and will be the benchmark for temperature data at best resolution and repeatability globally," Sivan said in his New Year address.

#### **Farming, Water Mgt & Land Planning**

According to CNES, Trishna — Thermal infraRed Imaging Satellite for High-resolution Natural resource Assessment — will acquire imagery of Earth's surface in the thermal infrared with a resolution and revisit frequency never seen before.

"Trishna is designed to observe Earth's surface in the thermal infrared domain. Temperature is an indicator of the energy budget of land surfaces — croplands, pastures, forests, urban areas, snow and ice — and yields a wealth of information such as plant water stress and evapotranspiration," CNES' description of Trishna, reads. Today, temperature measurements from space can only be obtained monthly at a resolution of about 100 metres, and daily global measurements are only available at a resolution of one kilometre, CNES said.

#### **Gaganyaan, Chandrayaan-3 & Aditya**

As reported earlier by TOI, Sivan reiterated that Gaganyaan has completed the design phase and entered the testing phase. "Tests are in progress for human-rated L-110 Vikas engine, Cryogenic stage, Crew escape system motors and service module propulsion system. The S200 motor has been realised for ground testing too. Main parachute drop test has also commenced. Astronauts have completed the generic spaceflight training abroad," he said.

<https://timesofindia.indiatimes.com/city/bengaluru/packed-22-for-isro-with-disha-trishna-venus-missions-work-on-gaganyaan-will-continue/articleshow/88676145.cms>

