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Implications of India's Nirbhay Missile test - Pak writer

India has always exhibited hegemonic tendencies and sought to dominate the South Asian region. It also entertains ambitions to become one of the major powers in the region and beyond. Driven by its designs for regional and global hegemony, India has set up several missile development programmes. On April 15, it carried out a successful test of its indigenously developed long range subsonic stealth cruise missile Nirbhay which is capable of reaching its target with a speed of 864.36 kilometres per hour flying at an altitude of 100 metres.

The Nirbhay has been developed by the Defence Research and Development Organization of India. Its operational range is 1,000 kilometres and it is guided by an indigenously developed advanced inertial navigation system. The INS allows Nirbhay to be fairly accurate.

The missile is designed to carry nuclear or conventional warheads of 300 kilogram to 400 kilogram. According to the Indian Ministry of Defence, the test was conducted to prove the repeatability of both the boost phase and the cruise phase using way point navigation at very low altitudes.

It was reported to have hit the designated target following 42 minutes and 23 seconds in flight. Nirbhay can be launched from diverse platforms including aircraft, ground-based vehicles or launchers, ships and submarines. The DRDO is on course to test an air-launched version of Nirbhay in 2 to 3 years.

Nirbhay missiles can fly at various altitudes, mostly ranging from 500 metres to 4 kilometres above the ground. The low altitude flight reduces the chances of detection by the adversary radar system. The cruise missile comes with a loitering ability which means that it can go around a target and perform several maneuvers before re-engaging the target. In other words, once the missile is above the target and put on a 'loiter' pattern, the launch in charge can decide to strike or allow it to self-destruct.

The missile has the capability to enter deep into adversary territory area and engage targets with high precision. The April test is the second successful flight of Nirbhay since November 2017. India started the Nirbhay programme in 2004. It was initially meant to be completed in 2016 but some technological issues (flight control software and navigation system) delayed the project. Before the 2017 test, there were four unsuccessful trials. India can use Nirbhay to target military targets in enemy territory with little collateral damage.

An important aspect of the test is its timing. The trial comes in an environment of high tensions between India and Pakistan. Polling in the general elections is already under way. Preemption is a core element of Indian joint armed forces doctrine of 2017 and land warfare doctrine of 2018. The Nirbhay missile allows for the possibility of a limited war with Pakistan. Pakistan's subsonic cruise missile, Babur, is compatible with Nirbhay.

The test has aggravated the crisis between the two nuclear armed states. It is the latest in a series of weapon development projects including anti-satellite ballistic missile, Electronic Management Intelligence Satellite and the Dhanush artillery gun. These developments point to an Indian bid to further escalate the military tensions with Pakistan.

Meanwhile the Indian political elite led by Prime Minister Modi is trying to exploit hatred against Pakistan for electoral gain. The test also indicates that India is trying to enhance its first strike capability vis-à-vis Pakistan thus abandoning the 'no first use' policy.

In the South Asian context, the rivalry between India and Pakistan has played a crucial role in shaping security dynamics of the region. Pakistan's major security threats emerge from India.

Its nuclear weapons and missile programmes are meant to provide deterrence against India. Nirbhay can destabilize the strategic equilibrium in South Asia and be a hurdle to any peace initiative in the region. Such developments can trigger a cruise missiles race between India and Pakistan.

<http://www.defencenews.in/article/Implications-of-India%E2%80%99s-Nirbhay-Missile-Test---Pak-Writer-584814>

THE ECONOMIC TIMES

Wed, 22 May 2019

As India focuses on defence exports, GRSE looks to engage customers

*GRSE, which recently delivered the 100th warship to be constructed here,
has constituted special teams for its overseas efforts*

By Manu Pubby

Kolkata: As India is focusing on stepping up defence exports, premier defence shipyard Garden Reach Shipbuilders and Engineers GRSE is looking to engage customers in the region and has been in conversation with nations such as the Philippines for major potential orders in the near future.

GRSE, which recently delivered the 100th warship to be constructed here, has constituted special teams for its overseas efforts and is pursuing an order for two new corvettes that are required by the Philippines as part of a competitive selection process. “There is a lot of thrust on exports and we are approaching friendly foreign countries in the South East region, in west Asia and Latin American countries. Discussions are on and our teams have been going to meet customers,” GRSE's CMD Rear Admiral Vipin Kumar Saxena (Retd) told ET. The yard, which constructed the first ever warship exported by India, the MCG Barracuda to Mauritius, says that it will be competitive with global players as it has the experience of delivering different classes of ships to the Indian Navy and coast guard and has won domestic orders in competitive bidding.

“Our aspiration is to be a global player. We have the capability and the experience. At the same time, there is huge potential here when it comes to the Navy and coast guard. The maritime perspective plan for 2027 aspires for a potent blue water force and a fleet that will grow to 200-odd ships,” the CMD says.

The shipyard’s plans are in line with renewed efforts of the government to increase exports by effective utilisation of the defence lines of credit extended to friendly foreign countries. In April, the ministry finalised the standing operation procedure to enhance the pace of utilisation of the lines of credit to boost exports. India has announced lines of credit to nations like Vietnam and Myanmar in the recent past. For starters, the SOPs have been laid down for defence public sector units but will later be extended to the private sector as well that are looking at the export market.

On the domestic front, GRSE, which went public late last year, is on a strong footing, with as many as eight warships delivered in a span of 22 months. Its order book remains strong with the recent anti-

Big Plans

GRSE, has constituted special teams for its overseas efforts

GRSE is pursuing an order for two new special corvettes for Philippines as part of a competitive selection process

Our aspiration is to be a global player. We have the capability and the experience. At the same time, there is huge potential here when it comes to the Navy and Coast Guard. The maritime perspective plan for 2027 aspires for a potent blue water force

Rear Admiral Vipin Kumar Saxena (Retd), GRSE CMD

submarine warfare shallow water craft deal signed with the navy for Rs 6311 crore. The order was won on a competitive basis against the private sector yards.

GRSE says that it managed to underbid more modern private yards due to its experience in cost determination. “In 34 months, we would have delivered almost 15 ships, that is the speed we are looking at. Our biggest thrust has been to come out of the earlier mindset – in terms of build time and more and we have come a long way,” Rear Admiral Saxena says.

The yard currently has six ongoing projects and believes it is strongly placed for upcoming orders such as the Next Generation Missile Vessels requirement of the Indian Navy.

<https://economictimes.indiatimes.com/news/defence/as-india-focuses-on-defence-exports-grse-looks-to-engage-customers/articleshow/69437281.cms>



Wed, 22 May 2019

Exclusive: 12 seconds after launch, IAF missile destroyed its own Chopper

Indian Air Force sources have said there was never any doubt on the outcome of the launch of a SPYDER missile on February 27 from the Srinagar air base

By Vishnu Som

New Delhi: The Indian Air Force's inquiry into the accidental shoot down of its own Mi-17 chopper on February 27 will be over within 20 days. The summary of evidence will be presented immediately afterwards and those responsible for the death of 6 IAF personnel onboard the chopper and a civilian on the ground may be charged with culpable homicide not amounting to murder as specified by military law under the Air Force Act 1950.

Sources in the Indian Air Force have told NDTV that there was never any doubt on the outcome of the launch of an Israeli-made SPYDER surface-to-air missile on February 27 from the Srinagar air base. The investigation has taken time because the IAF is determined to apportion blame for this incident.

IAF sources have indicated to NDTV that the entire shoot-down sequence from the moment the missile was launched to the moment of impact lasted approximately 12 seconds. The Mi-17 helicopter had no means of knowing it was under attack.

NDTV has also learned of the likely sequence of events which resulted in an incorrect decision to launch the surface-to-air missile.

Between 10 and 10:30 am on the morning of February 27, eight Indian Air Force fighters were vectored to intercept upto 24 Pakistan Air Force fighters including a group of F-16s which crossed the Line of Control and fired weapons in the direction of Indian Army positions along the Line of Control in Jammu and Kashmir.

With an active air battle raging on the West, air defences across Kashmir were on the highest state of alert with surface-to-air missile units on alert and ready to engage any Pakistani aircraft which made an incursion.

HIGHLIGHTS

- 1 Air Force inquiry into shoot-down of its chopper will be over in 20 days
- 2 An Israeli-made SPYDER surface-to-air missile was launched
- 3 Final order to fire likely given after failing to identify the chopper

It was at this same time that air defence radars at Srinagar airport picked up a low flying aircraft on their screens. The senior officer manning the post of Terminal Weapons Director (TWD) at the time was likely the Chief Operations Officer of the Air Base.

This officer may have given the final order to fire after the helicopter, designated a slow flying target, could not be identified through a critical system called the Identification, Friend or Foe (IFF) transponder.

IFF systems onboard an aircraft listen for an "interrogation signal" from the ground and then respond with a unique signal which identifies it as a "friendly." The system is specifically designed to ensure that friendly-fire incidents are avoided during the heat of battle. It is unclear if the IAF helicopter's IFF was switched off or was not functioning at the time when it was shot down.

Sources have indicated to NDTV that a series of additional steps may not have been followed in the moments prior to the launch of the Spyder surface-to-air missile. The role of the Indian Air Force's Air Traffic Control at Srinagar airbase is also being looked at very closely by the Court of Inquiry. ATC maintains a flight plan of all aircraft that have taken off or are expected at the air base.

It is unclear whether the Terminal Weapons Director inquired and was told by the ATC that no friendly aircraft were flying in the area. It is equally unclear why details of the movement of the Mi-17 helicopter were not available with the officer in the first place.

Moments later, the order to launch was passed on to the SPYDER surface-to-air missile unit. Described as a short and medium range mobile air defence system, the system is among the newest and most advanced in the Indian Air Force's arsenal. The single missile which was launched would have quickly accelerated to Mach 4, four times the speed of sound as it sped to its target. Destruction of the slow flying helicopter, was almost guaranteed.

Senior IAF officers have denied reports that the Court of Inquiry is considering video of the shoot down of the Mi-17. According to sources, video showing the missile streaking towards the helicopter exists and is a part of the body of evidence which has been presented. 'The helicopter was 6-7 kilometres away. There is no way that a camera was present to zoom into the point of impact at that range' say senior IAF officers.

<https://www.ndtv.com/india-news/exclusive-12-seconds-after-launch-iaf-missile-destroyed-its-own-chopper-2040762>



Wed, 22 May 2019

Challenges for the new government: Emerging threats and modernisation, say experts

Also, National security architecture- CDS as given in the 2014 manifesto; strengthen peace and tranquillity along the Line of Actual Control (LAC) with China

By Huma Siddiqui

From an effective Pakistan policy to keep terrorism below subcritical levels, five years committed "Roll on defence budget", Kashmir strategy, modernisation of the armed forces are some of the critical issues that will need to be addressed on an urgent basis by the new government.

Experts sharing their views with the Financial Express Online to deal with new challenges in the neighbourhood as well geo-politically, there should be a full-time defence minister as that will further streamline decision making which will be related to critical procurements of state-of-the-art equipment as well as emerging security challenges armed forces face.

According to Lt Gen Vinod Bhatia (retd), former DGMO and Colonel of the Parachute Regiment, the priority agenda for new government in the security domain includes a cogent and mid to long term

Kashmir strategy to include the '4Es': Education, employment generation, economic development and empathy for the people." Also, National security architecture- CDS as given in the 2014 manifesto; strengthen peace and tranquillity along the Line of Actual Control (LAC) with China.

Modernisation of the armed forces a continuous process needs impetus.

Bhatia suggests inclusive defence reforms to revamp structures and organisations like Defence Research and Development Organisation (DRDO), Ordnance Factory Board (OFB), Directorate General Quality Assurance (DGQA) and others with the aim of achieving self-reliance in defence manufacturing and cut down imports.

Says Air Marshal Nirdosh Tyagi (ret'd), former Deputy Chief of Air Staff, "Issues including the defence budget, indigenisation, modernisation and procurement for the armed forces need to be addressed on urgent basis. The defence budget will need to have a re-look as the interim budget reduced defence budget in real terms. New govt will need time to get going. This means half year lost for modernization. Modernization budget should be enhanced adequately so that new schemes can be contracted after meeting committed liabilities."

Make in India: Due to the changing security situations in the region, modernisation and indigenisation are critical for the armed forces who despite the fast-tracking of certain systems continue to wait for the state-of-the-art weapons system. While concerted effort is required for Make in India to make an impact in the defence sector, large value weapon systems will have to be inducted through import route in foreseeable future.

"Capability to produce defence equipment in India is an important strategic requirement. It results in cost savings, employment generation and reduces the possibility of sanctions or denial by the supplier nations," points out Tyagi.

However, according to him, the budget is not the appropriate tool to encourage this. Services require suitable equipment to be ready to meet any operational contingency. Fulfilment of such requirements cannot be deferred to accommodate equipment which is still in the design and development stage with an uncertain outcome. There have been many success stories in the recent past, mainly due to the effort of DRDO. The Aakash surface to air missile has been inducted in large numbers by the Air Force and the Army. An ecosystem has been created wherein many MSMEs participate actively.

The Indo-Russia joint venture of BrahMos missile system has been indigenised much beyond the level of 50%. Astra Beyond-Visual-Range air to air missile is another success story. A large number of ground-based radars have been designed and manufactured in India. AEW&C, Light Combat Aircraft 'Tejas' Advanced Light Helicopter 'Dhruv' and Light Combat Helicopter deserve mention here' and in the Indian Navy, most of the ships are manufactured in India. Still, a large number of systems on the ships are imported. Same is the case with LCA, ALH and LCH. "India has a long way to go in self reliance because we do not manufacture wide range components and devices for electronic systems," he points out.

According to Tyagi, "Materials are another weak area. The design capability for aviation systems is also not very strong. Hindustan Aeronautics Limited (HAL) has not been able to design and produce Intermediate Jet Trainer despite making claims to this effect over 10 years back. They are also struggling with Basic Trainer aircraft." he public sector has failed to progress beyond licensed production. Private sector participation needs to be encouraged much more than what has been done so far. He adds, "Most pressing issue for the IAF is dwindling fighter strength. Tender for 114 fighters must be released on priority. The government must encourage private sector participation by finalizing Strategic Partners for various sectors.

<https://www.financialexpress.com/defence/challenges-for-the-new-government-emerging-threats-and-modernisation-say-experts/1584832/>

Months after Balakot strike, India launches 'Cloud-Proof' Spy Satellite

India launched a new "spy satellite" capable of keeping a lookout from space even in cloudy conditions, leaving no room for doubt the next time its armed forces conduct an operation such as the Balakot air strike earlier this year.

The Indian Space Research Organisation (ISRO) used its Polar Satellite Launch Vehicle to launch the 615-kg RISAT-2B satellite - capable of clear viewing during the day, night and even under adverse weather conditions - at 5:30 am on Wednesday. The special radar-enabled satellite will be placed at a low earth 557-kilometre orbit, a suitable level for detecting hostile installations as well as monitoring agriculture, forestry and possible disaster zones. The space agency is yet to release details or photographs of the satellite, considering that it is meant for strategic needs.

The Indian Air Force (IAF) had sent Mirage 2000 fighter jets to strike a military training camp in Balakot, deep inside Pakistan territory, on the morning of February 26. Some experts have speculated that heavy cloud cover at the time could have blinded Indian satellites, resulting in no images or videos of the operation being released so far. The lack of "proof" even spurred some opposition leaders to question the actual impact of the air strike.

Now, with a new set of radar-enabled satellites at its disposal, the space agency hopes to provide India's armed forces with the ability to keep track of activities across its eastern and western borders. Although the country also has high-resolution optical imaging CartoSAT satellites, they get blinded by dense cloud cover. Moreover, their imaging resolution was possibly not good enough to make an accurate damage assessment after the IAF strike in Balakot.

The RISAT-2B, a satellite created at the Space Applications Centre in Ahmedabad, is equipped with a special X-band radar capable of providing much better images. This is the first time India is launching indigenous technology of the kind into space.

Two previous radar-enabled satellites launched by India into space were the RISAT-1 and RISAT-2, the latter being an acquisition from Israel. The RISAT-1, a C-band radar imaging satellite, was not available for recording the impact of the Balakot strikes because it was declared dead in 2017. However, there is no clarity on why images from the RISAT-2 - a tiny 300 kg satellite with an X-band radar launched in the wake of the 2008 Mumbai attacks - have not been released.

Incidentally, Pakistan had launched the PAKTES-1A satellite - also supposed to be an X-band radar-enabled satellite - using a Chinese Long March rocket on July 9 last year.

The RISAT-2B has a mission life of five years, and if all goes well, two clones (RISAT-BR1 and RISAT-2BR2) will be launched in the coming months. Some of these launches have been advanced by as many as 18 months, reliable sources in the ISRO confirmed.

<http://www.defencenews.in/article/Months-After-Balakot-Strike,-India-Launches-Cloud-Proof-Spy-Satellite-584807>

The world's fastest Cruise Missile is on sale!

For years, India has bought weapons from other nations. In fact, by one estimate, it was the world's biggest arms importer between 1950 and 2017.

But while it may be a morally dubious honor, it is a sign of India's growing strength that it may become an arms exporter. And not of low-tech weapons like rifles, but sophisticated guided missiles.

An Indian defense official said India may begin exporting BrahMos cruise missile to several Asian and Middle Eastern nations later this year, according to Economic Times.

"A number of South East Asian countries are ready to buy our missiles," Commodore S K Iyer, a manager at BrahMos Aerospace, said at the IMDEX Asia 2019 defense trade show. "It will be our first export and we have received increasing interest in the missiles from the Gulf countries."

There have been reports for several years that Vietnam was interested in the BrahMos, according to India's Economic Times. "Apart from Vietnam, several other Southeast Asian countries, including Malaysia, Singapore, and Indonesia have evinced interest in purchasing BrahMos missiles."

BrahMos is an Indian missile...sort of. It's actually a joint venture between India and Russia, with the latter having far more experience in missile design ("Brahmos" is actually a melding of the names of India's Brahmaputra River and Russia's Moskva River). It is derived from the shorter-ranged Russian P-800 supersonic cruise missile.

BrahMos is a supersonic, Mach 3 weapon that is considered the world's fastest cruise missile. It can be launched from land-based launchers and surface ships. In 2013, it was test-fired from a submarine. In 2018, India launched a BrahMos from a Su-30 fighter, with more tests planned for later this year. However, plans for an improved BrahMos II appear to have stalled.

BrahMos has a range of 200 to 250 miles, though there are plans to boost the range to 300 miles. The missile can skim low above the ground or water, using inertial and GPS guidance to navigate to, and home in on, its target.

Still, there are several questions about BrahMos exports and about the missile itself. "Last year, Indian Defense Minister Nirmala Sitharaman had stated a number of crucial issues required to be addressed before exporting what has been touted as the world's deadliest missile system," noted the Economic Times.

In addition, there are fiscal considerations with potential buyers. "It is believed that cost negotiation has been taking time as slower economic growths have put budgetary constraints on acquiring viable, cost-effective defense equipment to these nations," the Economic Times said.

A more interesting question is endemic to any multinational joint venture: Who decides which countries to export, and more importantly, who not to export to? The Indian official who announced the BrahMos exports "did not clarify if Russia agreed to export the missile to south Asian nations like Vietnam, considered a rival to China."

However, Russia's Sputnik News took care to note that another Indian official told India's Financial Times that Russia had no objection to exporting BrahMos to friendly nations. Vietnam has been a Russian friend since the Cold War, and a Chinese enemy since a Sino-Vietnamese border war in 1979. India and China are also rivals, while Moscow and Beijing have put aside their Cold War quarrels – for now – and have economic and defense ties. Which still leaves the question of whether Beijing could object to BrahMos in Vietnamese hands.

<http://www.defencenews.in/article/The-Worlds-Fastest-Cruise-Missile-is-on-SALE!--584803>

Wed, 22 May 2019

Tech Mahindra signs Rs 300 crore defence contract with Indian Navy

Tech Mahindra today announced its biggest defence order worth over Rs 300 crore with the Indian Navy. As part of the 'Armed Forces Secure Access Card' (AFSAC) Project, Tech Mahindra will implement RFID (Radio Frequency Identification) based Access Control System across all naval bases and ships.

The new AFSAC Card will replace the existing paper based Identity Card for all Navy personnel including dependents and ex-servicemen. Using the CMMI (Capability Maturity Model Integration) level 5 processes, Tech Mahindra will develop a secure application to manage the access control devices, network devices and the AFSAC Card through a data center. Scheduled to be implemented over the next two years, the project will ensure smooth issuance, handling, administration, management and life cycle support of AFSAC Cards on turnkey basis.

Sujit Bakshi, President, India Business & Corporate Affairs, Tech Mahindra, said, "Tech Mahindra has shown renewed focus in the India market with key wins in the recent past like - Coal India, India Ports Association, Kanpur Smart City, to name a few. This order further cements our role as one of the leading system integrators globally. With our proven expertise in tech enablement and digital transformation, we look forward to collaborating with the Indian Navy in ramping up the national security infrastructure."

Commodore Atul Kumar, Project Director, Indian Navy, said, "The security of Indian Naval establishments against unauthorized access, is a thrust area and the AFSAC Project will be an important step towards achieving this aim; with a combination of cutting edge technology and professional execution. We look forward to collaborating with Tech Mahindra in this path-breaking endeavour."

<http://www.defencenews.in/article/Tech-Mahindra-signs-Rs-300-crore-defence-contract-with-Indian-Navy-584802>

Wed, 22 May 2019

Indian Army in hunt for 12,000 telescopic sights for Assault Rifles

The Indian Army jawan on the Line of Control (LoC), constantly threatened by Pakistani sharpshooters, will now fight fire with fire. A proposal for the purchase of nearly 12,000 telescopic sights for new assault rifles is likely to be cleared by a high-level committee very shortly.

These telescopic sights will be fitted onto the new generation Sig Sauer assault rifles that India wants. A contract for 72,000 rifles have already been signed and the delivery is likely within a year. These 7.62 x 51mm sights will cost about Rs 170 crore.

The purchase of the sights comes in the wake of reports of Pakistani jihadis being given sniper training.

The new rifles and the telescopic sights are expected to be an effective counter. Besides the sights, 50 Field Artillery tractors are also likely to be bought, to add to the 100 already acquired and also, for the Indian Air Force (IAF) crypto modules for its Software Design Radios.

<http://www.defencenews.in/article/Indian-Army-in-hunt-for-12,000-telescopic-sights-for-assault-rifles-584801>

THE TIMES OF INDIA

Wed, 22 May 2019

PSLV-C46/Risat-2B mission a success, ISRO places radar imaging earth observation satellite in orbit

By Tejonmayam

Chennai: Eight years after launching the last satellite in the Risat series, the Indian Space Research Organisation (Isro) began the expansion of its radar imaging satellite fleet in space with the successful launch of Risat-2B onboard a Polar Satellite Launch Vehicle (PSLV) on Wednesday morning. Risat uses synthetic aperture radar to provide all-weather surveillance.

PSLV-C46 carrying Risat 2B -- which weighs 615kg -- lifted off from the first launch pad at Satish Dhawan Space Centre in Sriharikota at 5.30am, as scheduled. It was the 48th flight of PSLV and the 14th flight in 'core-alone' configuration where solid strap-on motors were not used. It was the third launch by Isro in 2019.

Around 15 minutes after the lift-off, the four-stage rocket successfully placed the satellite in a 555km circular orbit. Isro chairman K Sivan said, "PSLV-C46 placed Risat-2B in a precise orbit of 555km with a 37-degree inclination."

He said mission carried an indigenously made Vikram processor, made by Semi-Conductor Laboratory, and a low cost aided navigation system. Director of Vikram Sarabhai Space Centre S Somanath said the Vikram processor would become the workhorse for all computers in the future missions.

With a mission life of five years, the radar imaging earth observation satellite with its X-band radar, will provide services in the fields of agriculture, forestry and disaster management support.

It will have military applications, as well. Unlike the usual remote sensing and optical imaging satellites, a radar imaging satellite can penetrate through thick cloud cover and identify hidden objects on the ground. U R Rao Satellite Centre director P Kunhikrishnan said Risat-2B carried a 3.6-metre unfoldable and deployable radial rib antenna.

With this mission, PSLV also achieved a record of lofting 50 tonnes of payload into space by placing more than 350 satellites, Sivan said

Risat series: The first satellite in the Risat series -- Risat 2 --was launched on April 20, 2009. The 300kg satellite used an X-band synthetic aperture radar sensor made by Israel Aerospace Industries. Risat-1 launch was postponed to prioritise the launch of Risat-2 after the 2008 Mumbai terror attack. Risat-1, an indigenously developed radar imaging satellite, was launched on April 26, 2012. All these satellites had a five-year mission life.

<https://timesofindia.indiatimes.com/india/pslv-c46/risat-2b-mission-a-success-isro-places-radar-imaging-earth-observation-satellite-in-orbit/articleshow/69436939.cms>

HIGHLIGHTS

- Indian Space Research Organisation (Isro) began the expansion of its radar imaging satellite fleet in space with the successful launch of Risat-2B onboard a Polar Satellite Launch Vehicle (PSLV)
- PSLV-C46 carrying Risat 2B -- which weighs 615kg -- lifted off from the first launch pad at Satish Dhawan Space Centre in Sriharikota at 5.30am