

Thu, 28 Mar 2019

Shooting down live satellite, India enters strategic Space

While the test places India in a select group of countries with such strategic strength, this capability has never been used by any country against its enemy and the use of space for wars is deeply abhorred by the entire international community

By Amitabh Sinha, Johnson T A

Pune, Bangaluru: Making a surprise announcement shortly after noon Wednesday, Prime Minister Narendra Modi said India had successfully tested an anti-satellite missile, becoming a space power and only the fourth country after the US, Russia and China with the strategic capability to hit and destroy satellites.

A Ballistic Missile Defence (BMD) Interceptor developed by the Defence Research and Development Organisation (DRDO), similar to the ones that intercept and destroy incoming missiles, was fired Wednesday morning from the Dr A P J Abdul Kalam Island launch complex, off the Odisha coast and south of Balasore. It struck an Indian satellite in low earth orbit, about 300 km from the earth's surface.

ISRO sources said the DRDO missile knocked out a micro satellite called Microsat-R which was launched by ISRO into low earth orbit for the DRDO on January 24 this year. The satellite, sources said, would have been hurtling at a speed of more than 27,000 km per hour.

Given that satellites are critical infrastructure for any country, used as they are for navigation systems, communication, banking networks, stock markets, weather forecasting and a range of military and other civil applications, the ability to destroy enemy satellites is a potent capability that can cripple the enemy.

The entire operation, from the launch to the hit, took just three minutes, the Prime Minister told the nation in a special televised address, calling it “an unprecedented achievement”.

“Some time back (this morning), our scientists have hit a live satellite 300 km away in the low earth orbit. This was a pre-determined target which has been brought down by an anti-satellite missile. The operation was completed in three minutes. Mission Shakti was a very difficult operation in which very high quality technical capability was required,” Modi said.

In a tweet later, he said: “#MissionShakti is special for 2 reasons: (1) India is only the 4th country to acquire such a specialised & modern capability. (2) Entire effort is indigenous. India stands tall as a space power! It will make India stronger, even more secure and will further peace and harmony.”

A DRDO statement said the BMD Interceptor was a three-stage missile with two solid rocket boosters. As is mandatory for any missile test, the authorities had issued a Notice to Airmen (NOTAM), a pre-requisite information to be provided to airline authorities around the world that India was about to conduct a test. The NOTAM did not specify the type of test being conducted, but only the flight path and the areas affected.

“Tracking data from range sensors has confirmed that the mission met all its objectives. The test has demonstrated the nation's capability to defend its assets in outer space. It is a vindication of the strength and robust nature of DRDO's programmes,” the DRDO said.

While the test places India in a select group of countries with such strategic strength, this capability has never been used by any country against its enemy and the use of space for wars is deeply abhorred by the entire international community. Though the United States and the then Soviet Union both tested anti-satellite missiles way back in the 1970s and 1980s at the height of the Cold War, they never targeted each other's assets in space.

The Outer Space Treaty of 1967, to which India is a signatory, prohibits countries from placing into orbit around the earth "any objects carrying nuclear weapons or any other kinds of weapons of mass destruction". It also prohibits the stationing of such weapons on celestial bodies, like the moon, or in outer space.

The treaty does not, however, prohibit tests like the one carried out by India Wednesday morning, something that the Ministry of External Affairs pointed to while emphasising that the test had not violated any international law.

Modi too described the test as a "defensive" move, aimed at securing the country's space infrastructure, and stressed that it did not change India's strong opposition to weaponisation of space.

"Today, we are using space and satellites for all sorts of purposes, including agriculture, defence, disaster management, communication, entertainment, weather, navigation, education, medical uses, and other things. In such a situation, the security of these satellites is extremely important," he said.

"I want to assure the international community that our newly acquired capability is not targeted at anyone. This is a defence capability of an India which is progressing at a rapid pace. India has always been opposed to weaponisation of space, and today's test does not alter that position. Today's test does not violate any international law or treaty," he said.

<https://indianexpress.com/article/india/shooting-down-live-satellite-india-enters-strategic-space-5646177/>

The Tribune

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What is ASAT?

ASATs (Anti-Satellite Weapons) are aimed at destroying or disabling space assets, whether military or civilian, offensive or defensive, according to a document of the United Nations Institute for Disarmament Research (UNIDIR). They are generally of two types: kinetic and non-kinetic.

Kinetic ASATs: They must physically strike an object in order to destroy it. Examples of kinetic ASATs include ballistic missiles, drones that drag an object out of orbit or detonate explosives in proximity to the object, or any item launched to coincide with the passage of a target satellite. This means any space asset, even a communications satellite, could become an ASAT if it is used to physically destroy another space object.

Non-kinetic ASATs: A variety of nonphysical means can be used to disable or destroy a space object. These include frequency jamming, blinding lasers or cyberattacks. These methods can also render an object useless without causing the target to break up and fragment absent additional forces intervening. In 2018, the UNIDIR proposed three ASAT test guidelines. Under the 'No Debris' guideline, if an actor wishes to test ASAT capabilities, they should not create debris. — PTI

Rare, high-tech, and risky to test

ASAT is an anti-satellite weapon that can target enemy satellites — blinding them or disrupting communications — besides providing a technology base for intercepting ballistic missiles.

1959: The US performs first anti-satellite tests; Bold Orion, designed as N-tipped missile repurposed to attack satellites, launched from a bomber

1960s: The Soviet Union performs similar tests; tests a weapon that could be launched into orbit, approach enemy satellite and destroy it

1985: US tests ASM-135, launched from an F-15 jet, destroys US satellite; there were no tests for more than 20 years; in 2008, US uses ship-launched missile to destroy a defunct spy satellite \

2007: China enters anti-satellite arena by destroying an old weather satellite in a high, polar orbit. The test created the largest orbital debris cloud in history, with over 3,000 objects

PROBLEM OF DEBRIS

- Debris from anti-satellite tests can create problems for other satellites and spacecraft in orbit, as tiny bits of junk whiz through space many times faster than a rifle bullet
- The International Space Station, for example, regularly tweaks its orbit to avoid debris of all kinds
- China's test in 2007 is considered the most destructive
- Because the impact took place at an altitude of more than 800 km, many of the resulting scraps stayed in orbit
- The US test in 2008 did not create as much orbital debris, and because it was at a lower altitude, atmospheric drag caused much of it to fall toward Earth and burn up —
Reuters

<https://www.tribuneindia.com/news/nation/what-is-asat/749403.html>

The Tribune

Thu, 28 Mar 2019

Got clearance for project two years ago, says DRDO Chief

New Delhi: India's successful anti-satellite missile test on Wednesday showed that the country now possesses the capability to strike satellites in outer space with centimetre-level accuracy and precision, DRDO Chairman G Satheesh Reddy said Wednesday.

Reddy, who oversaw the top secret operation, said the government accorded clearance to the project around two years back with an aim to deter threats to the country's space assets.

In a major feat, a DRDO-developed missile destroyed a low-orbiting satellite in a critical test that catapulted India as a space power alongside the US, China and Russia.

"It is a great achievement for India as the technology used for the test has been completely developed indigenously," Reddy said.

"The test was a reflection of India's growing capability to develop critical technology and it will act as a good deterrence," he said adding India was the fourth country to go for an anti-satellite missile test after the United States, Russia and China. The Defence Research and Development Organisation (DRDO) said a Ballistic Missile Defence (BMD) Interceptor Missile successfully engaged an Indian orbiting target satellite in Low Earth Orbit (LEO) in a 'Hit to Kill' mode.

"The interceptor missile was a three-stage missile with two solid rocket boosters. Tracking data from range sensors has confirmed that the mission met all its objectives," it said.

The test was conducted, under 'Mission Shakti' operation, from the Dr APJ Abdul Kalam Island in Odisha.

The DRDO Chairman said the test has demonstrated India's capability to defend its assets in outer space and is a reflection of the country's growing capability to develop critical technology. "The shooting down of a satellite with a missile reflected that we have matured to develop technology which could achieve accuracy in terms of centimetres" said Reddy, adding clearance for the project was given over two years back.

The DRDO said the test has once again proven the capability of indigenous weapon systems. India is yet to have a comprehensive national security doctrine. However, a joint operational doctrine for the Army, the Navy and the Air Force, released in April 2017 had proposed to set up a 'Defence Space Agency' to deal with issues relating to outer space.

Meanwhile, the Ministry of External Affairs said the test was not directed against any country and that India has no intention of entering into an arms race in outer space.

"The test is not directed against any country. India's space capabilities do not threaten any country and nor are they directed against anyone," the MEA said in a 10-point explainer on the anti-satellite missile test. — PTI

'In 2007, we had expertise, but no will'

Hyderabad: Former ISRO chairman G Madhavan Nair said on Wednesday that India had the anti-satellite missile capability more than a decade ago but there was no political will at the time to demonstrate it. He said when China shot down an ageing weather satellite by launching a missile in 2007, India had the technology to undertake a similar mission. Asked if India could have demonstrated the anti-satellite missile capability in 2007 itself, Nair said "certainly", but it could not be done due to absence of "political decision".

'Technology used completely indigenous'

The project was implemented in the fastest way possible and it showed the DRDO's capability in doing such programmes. The technology used has been completely developed indigenously. —G Satheesh Reddy, DRDO Chairman

<https://www.tribuneindia.com/news/nation/got-clearance-for-project-two-years-ago-says-drdo-chief/749399.html>

hindustantimes

Thu, 28 Mar 2019

ASAT missile project went into 'mission mode' 6 months ago, says DRDO Chief

DRDO chief G Satheesh Reddy has said that preparation for anti-satellite missile project began years ago but Mission Shakti went into 'mission mode' only six months ago

After successfully conducting an A-SAT or anti-satellite missile test yesterday, the chairman of the DRDO (Defence Research and Development Organisation) revealed in an interview with ANI that the project to develop this rare missile capability was green-lit two years ago.

"The NSA (Ajit Doval) whom we report to on strategic matters gave the direction to go ahead with the test and he had the concurrence from the Prime Minister. The development started a few years back and we went into mission mode in the last 6 months," said DRDO's Chairman G Satheesh Reddy in an exclusive interview to ANI.

Reddy also added that in the last 6 months when the A-SAT missile programme entered "mission mode" level, about 100 scientists worked round-the-clock to reach the intended launch date target that was set.

The A-SAT missile was launched at approximately 11:16 AM on Tuesday from Odisha's Balasore and within three minutes of launch, it successfully hit the intended target, a decommissioned Indian satellite, in a "Low-Earth Orbit" at roughly 300 km from the Earth's surface.

"Some time ago, our scientists shot down a live satellite 300 kilometres away in space, in Low-Earth Orbit... It was conducted under Mission Shakti, which was completed in three minutes," PM Modi said in his 10-minute televised address.

When asked the reason behind choosing a 300 km-altitude range for the target, Reddy said that protecting nearby space assets had to be considered. "As a responsible nation we wanted to be sure all space assets were safe and all the debris decayed fast," added DRDO Chairman Reddy.

Shortly after PM Modi's televised address announcing the success of "Mission Shakti", India's Ministry of External Affairs released a detailed note informing the World that India's actions were only to augment its deterrence capabilities and did not intend to trigger an arms race in space.

The Chinese Foreign Ministry released a statement responding to India's A-SAT test which read, "We have noticed reports and hope that each country will uphold peace and tranquillity in outer space."

With the success of "Mission Shakti", India has now entered an elite club of three nations - United States, Russia and China, with similar missile technology. This sort of missile application enables a country to attack and disrupt enemy satellites, thereby affecting communication networks. India's A-SAT missile was an indigenous build.

"We have hit the target by 'Kinetic kill' - that means by directly hitting the satellite. This calls for many technologies which we have developed completely indigenously in the country and we have achieved accuracy within a few centimetres...a very high level of accuracy," said Reddy in an exclusive interview to ANI.

(This story has been published from a wire agency feed without modifications to the text. Only the headline has been changed.)

<https://www.hindustantimes.com/india-news/mission-shakti-asat-missile-project-went-into-mission-mode-6-months-ago-says-drdo-chief/story-oZROs7ULiJ9Zr6kL20j11M.html>

THE
WIRE

Thu, 28 Mar 2019

India's ASAT capability has been around for some time now

*ASAT weapons, while useful to knock out communications and
imaging satellites, are not all that effective against those flying at higher orbits*

By Manoj Joshi

Shortly after the first test of India's ballistic missile Agni V, Dr V.K. Saraswat told India Today in a wide-ranging interview that "India has all the building blocks for an anti-satellite system in place." But he said India would avoid a physical test "because of the risk of space debris affecting other satellites," and remain content to do the fine tuning electronically.

In another report, he was quoted as saying that India would field an ASAT weapon based on Agni and the AD-2 Ballistic Missile interceptor by 2014.

So it's clear that India has had the capacity to test an ASAT system for a while. Why it chose to do it a couple of weeks short of the general elections has been made obvious by the fact that Prime Minister Narendra Modi made a special address to the nation to announce it. Note, Modi did not make any such address in the more trying circumstances of the Pulwama attack, when 40 CRPF

jawans were killed by the Jaish-e-Mohammad. Note, too, that Saraswat is currently a political appointee in the NITI Aayog created by the Modi government.

Saraswat had himself explained what was needed – a Long Range Tracking Radar (LRTR) such as the one the DRDO had been using for its Ballistic Missile Defence (BMD) tests. Once you acquire a satellite, it is easy to figure out its trajectory and use a missile that lofts a “kill vehicle” that may or may not have an explosive warhead and is guided by infra-red and radar frequency seekers to reach the target and knock it out. All that is needed in the case of the satellite is a physical hit that will send it spinning off its chosen orbit.

Previous tests by China and the US

In 2007, when China tested an SC-19 missile to destroy a Feng Yun IC weather satellite in low earth orbit 865 km away, more than 3,000 pieces of trackable and 32,000 untrackable pieces of debris were created, threatening other satellites and the international space station. Most satellite activity and the space station are parked in the LEO. The resulting furore ensured that Beijing did not carry out any more destructive ASAT tests.

The US was the first to conduct a destructive test in 1985 of a satellite orbiting at 555 km. But later, its programme was cancelled, though it did knock off another satellite using a ship-based missile, shortly after the 2007 Chinese test, saying that the ‘target’ was malfunctioning.

In 2013, a UN Group of Governmental Experts on Outer Space CBMS recommended a number of new confidence-building measures. One of these stipulated that intentional orbital breakups that left a debris tail must be avoided. They did not say that ASAT tests should be banned. All they said was that the test should ideally leave no debris, or low debris (which can be achieved by a test on a target sufficiently low so that the debris is not long-lived). The third recommendation was that these tests should be notified to others so as to avoid mis-perceptions.

Of the three known destructive tests, the Indian target was the lowest at 300 km or so. As indicated above, the 1985 American target was 555 km above, and the 2007 Chinese one was at 865 km. So, the likelihood is that there will be no dangerous debris, but that is something we will have to wait and see.

India’s BMD capability

Hopefully, there will be other independent confirmation that the test did indeed take place. The DRDO’s claimed BMD tests were overstated considerably since they were done in highly controlled conditions and sometimes the targets were electronically simulated and acquired. The missile used as the target was the short-range Prithvi, rather than an actual Medium Range Ballistic Missile like the Agni, which would be the kind of missile India would have to defend itself against.

Over the years, India has built up a BMD capability though it is far from mature. But any country that has such a capability can easily re-deploy it for ASAT purposes. India had acquired the Israeli Green Pine radar, and possibly the technology for the interceptor missile and the kill vehicle from the Israelis. Tracking a missile is considerably more difficult than tracking a satellite.

The Chinese have systematically tested their SC-19 in 2005, 2006, 2010 and 2013 and 2014, though they termed these tests as being BMD tests aimed at missiles. They have used their Dong Neng 2 and 3 sounding rockets as kinetic kill vehicles which can be used for both satellites and missiles. In August 2010, a Shijian satellite bumped off another satellite from orbit and in 2016 an Aolong satellite with a robotic arm was tested, allegedly to deal with space debris, but could also have been a simulated ASAT test.

ASAT weapons, while useful to knock out communications and imaging satellites, are not all that effective against those flying at higher orbits. The US has a number of imaging satellites at Geosynchronous orbits 36,000 km away, out of the range of the missiles that can hit them. GPS satellites, too, are at ranges of 20,000-36,000 km.

(Manoj Joshi is a distinguished fellow, Observer Research Foundation)

<https://thewire.in/space/asat-test-india-narendra-modi>

Thu, 28 Mar 2019

India had capacity to build anti-sat missiles for long: DRDO Ex-Chief

Despite the existence of capacity to build anti-satellite missiles for over a decade, the missiles were finally built on account of policy decisions of the Narendra Modi government in the last couple of years, a former director of DRDO told The Indian Express

By Johnson TA

The DRDO's launch of an anti-satellite missile on Wednesday to destroy a micro-satellite launched by the ISRO earlier this year is a deterrent against attacks on India's space assets but does not change the country's traditional stance of using space only for peaceful purposes, according to two former officials of the Defence Research Development Organization (DRDO) associated with the missile programme.

The anti-satellite missile launch has put India in the league of the US, China and Russia — countries with ASAT missiles — and also transformed it from a country that opposed these missiles in 2007, and a country that acknowledged these capabilities in 2010, to a demonstrator.

Despite the existence of capacity to build anti-satellite missiles for over a decade, the missiles were finally built on account of policy decisions of the Narendra Modi government in the last couple of years, a former director of DRDO told The Indian Express.

“The programme was approved recently by this government but the capability has been there for a good time. The work of converting the capability into an interceptor was not carried out (earlier); this has been carried out very successfully now,” Dr Avinash Chander, DRDO chief from 2013 to 2015, said.

Since 2010, the DRDO has had the capacity to make an anti-satellite missile but the programme was not taken forward until recently, Chander said. “The programme picked up speed about a year ago. We earlier had all the elements — that means we could reach the distance in space and we had the capability to hit, which was demonstrated in the anti-ballistic missile. But to put them together needed work,” he said.

Explained: The ABC of ASAT

According to former DRDO scientist and vice-chancellor of Defence Institute of Advanced Technology, Dr Prahlada Rama Rao, a missile expert, ground work for the development of an anti-satellite missile was laid back in the 1990s, when Dr A P J Abdul Kalam was at the DRDO. “It was Dr Kalam's vision to have systems to protect space assets. When the air defence missile programme was upgraded to a high altitude of 200 km it was easy to upgrade to satellites but focus was on air defence and it was not possible to fulfil his vision,” he said.

“It is good to have the capability because someone should not knock off your satellites,” he said.

Chander said there was no existing DRDO programme during the UPA regime to develop the ASAT missile. “Just because you have all the elements did not mean we could hit a satellite. It required more development to convert because satellite speeds are much higher and now that has been achieved. It is a good effort. All components were available and we needed to put them together,” he said.

The former DRDO chief said technology used in anti-ballistic missiles and long-range rockets which propel the missile into space are the essential components of the ASAT missile.

Chander said: “The PM stated that India is committed to peaceful use of space, and India has constantly — in all forums — projected this stance. At the same time, India is also committed to protecting its interest in space and Indian capability in space is put under strong deterrence. The tests today have been a demonstration of that capability.”

The move to test the anti-satellite missile does not involve militarisation of space, Rama Rao argued. “The understanding among nations is that you must not keep missiles in space. This is not happening since these missiles are launched from the ground,” he said. “Space is still being used only for peaceful purposes like surveillance, mapping and communication.”

According to Rao, the anti-satellite missile programme picked up speed around 2011 at DRDO. “A separate facility was created and dedicated man power was allocated. It was a secretive, high alert program and there was demand to deliver faster,” he said.

India’s official position on anti-satellite missile programmes has been ambivalent in the past.

When a Chinese kinetic kill missile smashed its Fengyun satellite in space in January 2007 to demonstrate the country’s anti-satellite capabilities in the guise of destroying an aging satellite, India was one of the countries that protested.

<https://indianexpress.com/article/india/india-had-capacity-to-build-anti-sat-missiles-for-long-drdo-ex-chief-5646244/>

THE ECONOMIC TIMES

Thu, 28 Mar 2019

10 things you need to know about ASAT, India's new space slayer

The Anti-Satellite (ASAT) test has also raised a number of questions about its capabilities

New Delhi: Prime Minister Narendra Modi announced on Wednesday that India is now one of the few countries to take down satellites in space, after a DRDO missile tested off the Odisha coast successfully hit a low Earth orbit (LEO) satellite. The Anti-Satellite (ASAT) test has also raised a number of questions about its capabilities. Here is all you need to know about India's new space slayer.

What was the test?

On March 27, 2019 India conducted Mission Shakti, an anti-satellite missile test, from the Dr. A P J Abdul Kalam Island launch complex. This was a technological mission carried out by DRDO. The satellite used in the mission was one of India’s existing satellites operating in lower orbit. The test was fully successful and achieved all parameters and it required an extremely high degree of precision and technical capability.

The significance of the test is that India has tested and successfully demonstrated its capability to interdict and intercept a satellite in outer space based on complete indigenous technology. With this test, the country joins an exclusive group of space faring nations consisting of USA, Russia, and China.

Which satellite was used?

The satellite used was an Indian satellite. Which Missile/Interceptor was used? The DRDO’s Ballistic Missile Defence interceptor was used, which is part of the ongoing ballistic missile defence programme. There are other ways to demonstrate ASAT capabilities such as “fly-by tests” and jamming.

Why has India used the particular technology of Kinetic Kill?

This is a technology where India has developed capability. Space technologies are constantly evolving and India has used the technology that is appropriate to achieve the objectives set out in this mission.

Does the test create space debris?

The test was done in the lower atmosphere to ensure that there is no space debris. Whatever debris that is generated will decay and fall back onto the earth within weeks.

Why did India do the test?

India has a long standing and rapidly growing space programme. It has expanded rapidly in the last five years. The Mangalyaan Mission to Mars was successfully launched. Thereafter, the government sanctioned the Gaganyaan Mission which will take Indians to outer space.

India has also undertaken 102 spacecraft missions consisting of communication satellites, earth observation satellites, experimental satellites, navigation satellites, apart from satellites meant for scientific research and exploration, academic studies and other small satellites. India's space programme is a critical backbone of India's security, economic and social infrastructure.

The test was done to verify that India has the capability to safeguard our space assets.

Why was the test done now?

According to the government, the tests were done after the country had acquired the required degree of confidence to ensure its success, and reflects the intention of the Indian government to enhance India's national security. India has seen an accelerated space development programme since 2014.

Is India entering into an arms race in outer space?

The government has stated that it has no intention of entering into an arms race in outer space. The country has always maintained that space must be used only for peaceful purposes. The government has also stated that India is against the weaponization of Outer Space and support international efforts to reinforce the safety and security of space based assets.

India believes that Outer space is the common heritage of humankind and it is the responsibility of all space-faring nations to preserve and promote the benefits flowing from advances made in space technology and its applications for all.

India is also a party to all the major international treaties relating to Outer Space. India already implements a number of Transparency and Confidence Building Measures (TCBMs) – including registering space objects with the UN register, prelaunch notifications, measures in harmony with the UN Space Mitigation Guidelines, participation in Inter Agency Space Debris Coordination (IADC) activities with regard to space debris management, undertaking SOPA (Space Object Proximity Awareness and COLA (Collision Avoidance) Analysis and numerous international cooperation activities, including hosting the UN affiliated Centre for Space and Science Technology Education in Asia and Pacific. India has been participating in all sessions of the UN Committee on the Peaceful Uses of Outer Space.

India also supported UNGA resolution 69/32 on No First Placement of Weapons on Outer Space. Equally, India supports the substantive consideration of the issue of Prevention of an Arms Race in Outer Space (PAROS) in the Conference on Disarmament where it has been on the agenda since 1982.

What is the international law on weapons in outer space?

The principal international Treaty on space is the 1967 Outer Space Treaty. India is a signatory to this treaty, and ratified it in 1982. The Outer Space Treaty prohibits only weapons of mass destruction in outer space, not ordinary weapons.

India expects to play a role in the future in the drafting of international law on prevention of an arms race in outer space including inter alia on the prevention of the placement of weapons in outer space in its capacity as a major space faring nation with proven space technology.

India is not in violation of any international law or Treaty to which it is a Party or any national obligation.

Is the test directed against any country?

The test is not directed against any country. India's space capabilities do not threaten any country and nor are they directed against anyone.

At the same time, the government is committed to ensuring the country's national security interests and is alert to threats from emerging technologies. The capability achieved through the Anti-Satellite missile test provides credible deterrence against threats to our growing space-based assets from long range missiles, and proliferation in the types and numbers of missiles.

While India had previously stated that it did have the requisite building blocks for an anti-satellite weapon, today's public announcement by the Prime Minister confirms India's proven weapon capability.

<https://economictimes.indiatimes.com/news/defence/10-things-you-need-to-know-about-asat-indias-new-space-slayer/articleshow/68594835.cms?from=mdr>

The Tribune

Thu, 28 Mar 2019

Enemy can go 'deaf, blind'

ASAT test provides ability to target surveillance satellites

By Ajay Banerjee

New Delhi: India's Anti-Satellite (ASAT) test conducted and declared on Wednesday now provides the ability to render an enemy country 'deaf and blind' by targeting communication, military and surveillance satellites.

In case satellites are destroyed, it would be near impossible for the enemy to fire long-range missiles and UAVs; and even its routine communication can be stalled.

The significance of Wednesday's ASAT test is that India has successfully demonstrated its capability to interdict and intercept a satellite in outer space based on complete indigenous technology. The test was done using a ground-fired ballistic missile defence system to hit an Indian satellite. The test does not violate any existing international treaties and is not directed at any country.

The China angle

China has conducted three such tests since 2007, the latest being in February 2018. India despite being a 'missile power' and space power was reticent. The US Department of Defence, in its annual report to the Congress 'Military and Security Developments Involving the People's Republic of China 2018', says, "China is developing multiple counter-space capabilities to degrade and deny adversary use of space-based assets during a crisis or conflict."

The People's Liberation Army (PLA) is acquiring a range of technologies to improve China's counter-space capabilities. In addition to the development of directed energy weapons and satellite jammers, China is also developing direct-ascent and co-orbital kinetic kill capabilities and has probably made progress on the anti-satellite missile system it tested, the US report said.

India will be an insider now

Former DRDO chairman VK Saraswat had claimed in 2012 that India had ASAT capability. In October 2014—just five months into his tenure--Prime Minister Narendra Modi had advised top Indian military commanders about the criticality of controlling activities in space.

Addressing commanders of the three armed services, Modi had said: “Control of space may become as critical as that of land, air and sea.” As full-scale wars might become rare, force would remain an instrument of deterrence and influencing behaviour, and the duration of conflicts would be shorter,” Modi had said.

Time was running out for India to declare itself as an ASAT power to join the US, Russia and China. The United Nations Conference on Disarmament is discussing a new treaty banning militarisation of space. Once the treaty is done and had India not carried out the ASAT test it would put New Delhi at a serious disadvantage, as it would then only be able to negotiate on such a new treaty as an “outsider” rather than an “insider” with ASAT capability.

Types of ASAT options

A way to demonstrate the ASAT capability without causing debris would be to do a fly-by test, where the ground-based direct ascent missile will fly by the targeted satellite without destroying it. The other option is by jamming satellites using space-based lasers. This method falls under the category of “soft-kill” methods and does not create debris.

Status of banning ASAT

The ‘Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force Against Outer Space Objects’ and generally referred to as ‘PPWT’ is still being discussed. China and Russia had submitted an update to their original 2008 proposal in June. The US has objected to the lack of a verification mechanism and no restrictions on the development and stockpiling of ASAT weapons on the ground. That means, a nation could develop a readily deployable space-based weapons break-out capability.

The PPWT bans the placement of weapons in outer space; it does not ban “direct-ascent” ASATs launched from the ground. India used the same ground-to-space weapon.

Beijing guarded in its reaction

Beijing: China on Wednesday reacted guardedly to India’s anti-satellite missile test and expressed hope that all countries will uphold peace and tranquillity in the outer space. The Chinese Foreign Ministry, in a written response, said: “We have noticed reports and hope that each country will uphold peace and tranquillity in outer space.” PTI

Don’t militarise outer space: Pak

Islamabad: Pakistan said on Wednesday that it was against militarisation of outer space and took a swipe at India's announcement of shooting down a live satellite with a missile. “Space is the common heritage of mankind and every nation has the responsibility to avoid actions which can lead to the militarisation of this arena," Foreign Office spokesperson said. PTI

<https://www.tribuneindia.com/news/nation/enemy-can-go-deaf-blind/749191.html>

DRDO MISSILE HIT SATELLITE MOVING AT 10,000 KM/HOUR		
TIER	DISTANCE ABOVE EARTH	SATELLITES IT CARRIES
I	300-600 km	Spy and military satellites
II	800-1,200 km	Tracking satellites that study geo-spatial, marine life
III	20,000 km	Satellites that provide GPS signals
IV	36,000 km & above	Communication satellites

SO FAR, NO MISSILE FIRED FROM GROUND CAN TRAVEL BEYOND FIRST TWO TIERS AND NO MISSILE CAN BE FIRED FROM AN EXISTING SPACE-BASED PLATFORM)

Anti-Satellite technology will be deterrent in event of space war: Experts

By Prashant Rangnekar

New Delhi, Mar 27 (PTI): The anti-satellite missile capability demonstrated by India on Wednesday will be a deterrent in the event of a war where space may be the theatre of action with countries seeking to down enemy satellites, experts explained.

"The message goes strong and loud that if any of our satellites is harmed, we possess the capability of destroying yours (the adversary)," said Ajay Lele, senior fellow with the Institute for Defence Studies and Analyses (IDSA).

The former Air Force officer and other experts said India has possessed the anti-missile technology for several years but needed the political go-ahead to actually test it in live conditions. They said the Defence Research Development Organisation (DRDO) received the green signal to prepare for the test two years ago, which came to fruition on Wednesday.

In 2012, India conducted simulated tests, establishing the capability but the then Manmohan Singh-led UPA government had not given permission for a live test, likely over concerns that a destroyed satellite would result in debris that would damage satellites of other countries.

Daniel Porras, Space Security Fellow, United Nations Institute for Disarmament Research (UNIDIR), Geneva, said Wednesday's test destroyed a satellite at an altitude of 300 km.

"It was not a good sign for LEO (low earth orbit)... which has telecommunication and earth observation satellites and also the International Space Station", which cruises at a height of 400 km, he said.

"The test was done at 300 km, so pretty low, meaning most of the debris will slowly come down. However, lots of objects near that altitude... Not a good sign for all those LEO constellations. Also, if any debris damages other objects, India will be liable under the Liability Convention (if attribution is established)," Porras tweeted.

Former ISRO chairperson G Madhavan Nair, who was also secretary, Department of Space, from 2003 to 2009, said the DRDO had anti-missile technology, including the algorithms required for setting the trajectory to hit the moving target.

"Marrying the two technologies (of ISRO and DRDO) was required which happened over the last few years," Nair told PTI.

He said it would have taken about two years for scientists to perfect the missile launch once the go-ahead for the test was given by the government.

Prime Minister Narendra Modi on Wednesday announced that the test, named Mission Shakti, was not directed against any country and the disused Indian owned satellite was a pre-determined target.

In an address to the nation, Modi also said India has not breached any international law or treaty.

India is only the fourth country to acquire such a specialised and modern capability after the US, Russia and China. There has been no instance of a space war but the countries have demonstrated their capabilities by testing on their own satellites, like India did on Wednesday.

The UNIDIR defines ASAT (Anti-Satellite) as "any capabilities aimed at destroying or disabling space assets for any reason, whether military or civilian, offensive or defensive".

Lele of IDSA said India had already developed Intercontinental Ballistic Missiles (ICBM) technology and along with it came the know-how behind ASAT.

"Testing the Anti-Satellite missile at LEO at 300 kilometres was only to demonstrate capacity. This is also a deterrence mechanism in the event of a space war, similar to what India has developed in the nuclear domain," he said.

Lele added that a political decision was required as conducting anti-satellite missiles tests could attract international criticism over issues of adding to debris in space and accusations of militarising space.

In an era where defence forces rely on satellites for different aspects of security, including intelligence gathering, having ASAT missile capability sends a strong signal to adversaries, he said.

Rajeshwari Pillai Rajagopalan, senior fellow and head of the Nuclear and Space Initiative, Observer Researcher Foundation (ORF), said Wednesday's development reflects India's desire to not make the mistake it did in 1974 when it conducted its first nuclear test in Pokhran.

The tests were conducted four years after the Nuclear Proliferation Test (NPT) Treaty came into force in 1970. There is no similar international treaty for space.

"The successful test also acts as a deterrent in event of a space war. The technology was available, so it was high time India tested it. Political will was also needed behind taking the decision," Rajagopalan said, referring to the possibility of an international backlash.

In 2007, China destroyed its FengYun 1C weather satellite with an SC-19 missile, leaving behind space debris consisting of 3,280 pieces of trackable debris, as well as up to 32,000 pieces that are non-trackable.

The following year, during Operation Burnt Frost, the US destroyed its own satellite, USA-193, with an SM-3 interceptor creating 174 pieces of trackable debris, plus non-trackable shards.

<https://www.theweek.in/wire-updates/national/2019/03/27/del52-satellite-experts.html>

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Thu, 28 Mar 2019

US studying India anti-satellite weapons test, warns of space debris

Speaking to reporters in Florida during a visit to the U.S. military's Southern Command, Shanahan said the United States was still studying the outcome of a missile India said it launched at one of its own satellites

Acting US defence secretary Patrick Shanahan warned any nations contemplating anti-satellite (ASAT) weapons tests like the one India carried out on Wednesday that they risk making a "mess" in space because of debris fields they can leave behind.

Speaking to reporters in Florida during a visit to the US military's Southern Command, Shanahan said the United States was still studying the outcome of a missile India said it launched at one of its own satellites.

"My message would be: We all live in space, let's not make it a mess. Space should be a place where we can conduct business. Space is a place where people should have the freedom to operate," Shanahan said.

Experts say that anti-satellite weapons that shatter their targets pose a space hazard by creating a cloud of fragments that can collide with other objects, potentially setting off a chain reaction of projectiles through Earth orbit.

India's foreign ministry played down any risk of debris from its missile test on Wednesday, saying the impact occurred in low-Earth orbit and that the remnants would "decay and fall back on to the Earth within weeks."

In Washington, a senior U.S. military official told lawmakers that the United States was tracking about 270 objects from India's test, a number that would likely grow as the fragments spread out.

Lieutenant General David Thompson, vice commander of US Air Force Space Command, added the International Space Station was not at risk at this point.

NASA chief Jim Bridenstine said in testimony before the House Appropriations Committee on Wednesday that the consequences of anti-satellite weapons tests could be long-lasting.

"If we wreck space, we're not getting it back," he said, without mentioning India by name.

India would only be the fourth country to have used such an anti-satellite weapon after the United States, Russia and China, Prime Minister Narendra Modi said.

The United States ran the first anti-satellite test in 1959, when satellites themselves were rare and new.

Shanahan noted that given the increasing global reliance on space, it was important to create rules of the road for space.

"I think not having rules of engagement is worrisome. So, how people test and develop technologies is important," he said, adding: "I would expect anyone who tests does not put at risk anyone else's assets."

<https://www.hindustantimes.com/world-news/us-studying-india-anti-satellite-weapons-test-warns-of-space-debris/story-zgjex0p9tOGH7k2IzDTn9H.html>



Thu, 28 Mar 2019

2010 to 2019: India's journey from building ASAT weapon to becoming space power and DRDO's 'Mission Shakti'

With Mission Shakti, India on Wednesday joined the elite group of countries that have successfully tested the anti-satellite weapon (ASAT), a weapon that targets and destroys satellites in space.

Prime Minister Narendra Modi on Wednesday announced that India has become the fourth Elite Space Power after DRDO scientists successfully carried out Mission Shakti today. The Prime Minister announced that India's Anti-Satellite (A-SAT) Missile shot down a Low Earth Orbit (LEO) Satellite in Space. "I assure the international community that our capability won't be used against anyone, but is purely India's defence initiative for its security. We're against arms raised in space. This test won't breach any international law or treaties," PM Modi added. **India Becomes Elite Space Power With Successful 'Mission Shakti' Test, Indian A-SAT Missile Shoots Down Low Earth Orbit Live Satellite in Space.**

Not many know that there have been talks in India on bringing together such a missile for years and similar such test missions have been carried out earlier to display India's capability to intercept enemy missile with the help of anti-ballistic missile systems. **What is Low Earth Orbit and Anti-Satellite Weapon? Know About India's 'Mission Shakti' and List of Super Elite Space Power Countries.**

Has India been equipped with an ASAT system for years?

As per reports from the year 2010, the then DG of DRDO Dr VK Saraswat, who was also scientific advisor to then defence minister AK Antony had said that India had all the building blocks necessary to integrate an ASAT weapon. The reference to this statement also existed on a Wikipedia page called Anti-satellite weapon till Wednesday morning. However, the reference was

edited out and removed by users from the said Wikipedia page minutes after PM Narendra Modi addressed the country about Mission Shakti. Which LEO Satellite Did India's A-SAT Missile Shoot Down During Mission Shakti And Where?

In 2011, **India carried out a successful interceptor missile mission.** The interceptor boasted new technologies such as directional warhead, fibre-optic gyroscopes and a radio-frequency seeker that guided the interceptor to attack the incoming “enemy missile” at an altitude of 16 km above the Bay of Bengal. Saraswat had then said that India had “all the technologies and building blocks which can be used for anti-satellite missions” in the low-earth and polar orbits.

In 2012, the DRDO again stressed that it had all capability for ASAT missions after India tested the over 5,000km Agni V missile, which went up to 600km into space during its parabolic trajectory. The test added another feather in India's hat in its journey to becoming a Space power.

What was stopping India from carrying out ASAT mission?

While India has carried out such missions and has been stressing on being equipped with all systems to put together an ASAT missile, the country has all through had a 'No Space Militarisation' policy.

In 2018 too at a session of UN Disarmament Commission (UNDC), India had opposed “weaponisation” of outer space, saying it should not become an area of conflict while calling for collective efforts to strengthen safety and security of the space-based assets.

Today, after the successful test of India's ASAT mission, PM Narendra Modi assured the international community that "our capability won't be used against anyone, but is purely India's defence initiative for its security. We're against arms raised in space. This test won't breach any international law or treaties."

Which LEO satellite did India's ASAT missile shoot down?

According to an ANI report, the ASAT weapon was launched around 11:16 AM on Wednesday and targeted an Indian satellite which had been decommissioned and was orbiting on a 'Low Earth Orbit' at a height of 300 KM from the earth's surface. As per reports, it was launched by the ISRO on January 24 this year. The entire test, with confirmation of target elimination, took 3 minutes.

After carrying out the 'Mission Shakti' test, India has become the fourth nation to have become an elite Space Power after the United States, Russia and China.

<https://www.latestly.com/technology/science/2010-to-2019-indias-journey-to-building-asat-weapon-and-drDOS-mission-shakti-716680.html>

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Mission Shakti: How and when other countries conducted anti-satellite weapons

No country has so far used the weapon in conflict situation but nations have destroyed their own defunct or malfunctioning satellites to conduct tests

With Mission Shakti, India on Wednesday joined the elite group of countries that have successfully tested the anti-satellite weapon (ASAT), a weapon that targets and destroys satellites in space.

No country has so far used the weapon in conflict situation but nations have destroyed their own defunct or malfunctioning satellites to conduct tests. Here is a look at other successful tests:

China: On January 11, 2007, China successfully destroyed a defunct Chinese weather satellite, FY-1C. The destruction was reportedly carried out by an SC-19 ASAT missile. FY-1C was a weather satellite orbiting Earth in polar orbit at an altitude of about 865 km with a mass of about

750 kg. The missile was launched from a mobile Transporter-Erector-Launcher (TEL) vehicle at Xichang and the warhead destroyed the satellite in a head-on collision at an extremely high relative velocity.

United States: On February 20, 2008, the US announced that it had destroyed USA-193, an American reconnaissance satellite. According to the US government, the primary reason for destroying the satellite was the approximately 450 kg of toxic hydrazine fuel contained on board, which could pose health risks to persons in the immediate vicinity of the crash site should any significant amount survive the re-entry.

Russia: The country first successfully tested its anti-satellite missile, PL-19 Nudol, on November 18, 2015. In May 2016, Russia tested the anti-satellite weapon for the second time. It was launched from the Plesetsk cosmodrome test launch facility.

Three more launches were reportedly held in December 2016, in March 26, 2018 and in December 23, 2018.

<https://www.hindustantimes.com/india-news/india-in-elite-group-how-and-when-other-countries-conducted-anti-satellite-weapons/story-9djoz3ssTiUWUzfS5PDzcJ.html>



Thu, 28 Mar 2019

Strong message, deterrent': Experts react to ASAT missile test 'Mission Shakti'

Mission Shakti, which was led by the Defence Research and Development Organisation, was aimed at strengthening India's overall security, PM Modi said

Prime Minister Narendra Modi on Wednesday announced that India had demonstrated anti-satellite missile capability by shooting down a live satellite, describing it as a rare achievement that puts the country in an exclusive club of space super powers.

"In the journey of every nation there are moments that bring utmost pride and have a historic impact on generations to come. One such moment is today," he said in a broadcast to the nation on television, radio and social media.

He said the action was not directed against any country and the satellite was a pre-determined target orbiting at an altitude of 300 km.

Mission Shakti, which was led by the Defence Research and Development Organisation, was aimed at strengthening India's overall security, he said in his address that comes a fortnight before the start of the general election.

India is only the fourth country to acquire such a specialised and modern capability after the US, Russia and China. There has been no instance of a space war but the countries have demonstrated their capabilities by testing on their own satellites, like India did on Wednesday.

The United Nations Institute for Disarmament Research (UNIDIR) defines ASAT (Anti-Satellite) as "any capabilities aimed at destroying or disabling space assets for any reason, whether military or civilian, offensive or defensive".

Following the announcement, experts said the anti-satellite missile capability will be a deterrent in the event of a war where space may be the theatre of action with countries seeking to down enemy satellites.

Here is how experts reacted the ASAT test:

1. 'Message goes strong and loud'

"The message goes strong and loud that if any of our satellites is harmed, we possess the capability of destroying yours (the adversary)," said Ajay Lele, senior fellow with the Institute for Defence Studies and Analyses (IDSA).

Lele said India had already developed Intercontinental Ballistic Missiles (ICBM) technology and along with it came the know-how behind ASAT.

"Testing the Anti-Satellite missile at LEO at 300 kilometres was only to demonstrate capacity. This is also a deterrence mechanism in the event of a space war, similar to what India has developed in the nuclear domain," he said.

Lele added that a political decision was required as conducting anti-satellite missiles tests could attract international criticism over issues of adding to debris in space and accusations of militarising space.

In an era where defence forces rely on satellites for different aspects of security, including intelligence gathering, having ASAT missile capability sends a strong signal to adversaries, he said.

2. 'Not a good sign for low earth orbit'

Daniel Porras, Space Security Fellow, United Nations Institute for Disarmament Research (UNIDIR), Geneva, said Wednesday's test destroyed a satellite at an altitude of 300 km.

"It was not a good sign for LEO (low earth orbit)... which has telecommunication and earth observation satellites and also the International Space Station", which cruises at a height of 400 km, he said.

"The test was done at 300 km, so pretty low, meaning most of the debris will slowly come down. However, lots of objects near that altitude... Not a good sign for all those LEO constellations. Also, if any debris damages other objects, India will be liable under the Liability Convention (if attribution is established)," Porras tweeted.

3. Political go-ahead

Experts said India has possessed the anti-missile technology for several years but needed the political go-ahead to actually test it in live conditions. They said the Defence Research Development Organisation (DRDO) received the green signal to prepare for the test two years ago, which came to fruition on Wednesday.

In 2012, India conducted simulated tests, establishing the capability but the then Manmohan Singh-led UPA government had not given permission for a live test, likely over concerns that a destroyed satellite would result in debris that would damage satellites of other countries.

4. 'India had ASAT missile capability in 2007, but lacked political will'

Former ISRO Chairperson G Madhavan Nair, who was also secretary, Department of Space, from 2003 to 2009, said the DRDO had anti-missile technology, including the algorithms required for setting the trajectory to hit the moving target.

"Marrying the two technologies (of ISRO and DRDO) was required which happened over the last few years," Nair told PTI.

He said it would have taken about two years for scientists to perfect the missile launch once the go-ahead for the test was given by the government.

He said when China shot down an ageing weather satellite by launching a missile in 2007, India had the technology to undertake a similar mission.

"...now (Prime Minister Narendra) Modiji has taken the initiative and he had the political will and courage to say that we will do this. We have now demonstrated this to whole world," Nair told PTI.

He had headed the ISRO (Indian Space Research Organisation), Space Commission and was Secretary in the Department of Space from 2003 to 2009.

Asked if India could have demonstrated the anti-satellite missile capability in 2007 itself, Nair said "certainly", but it could not be done due to absence of "political decision" to go ahead with it at that time.

"Now, Modi has courageously taken the decision," he said.

5. 'Deterrent in event of a space war'

Rajeshwari Pillai Rajagopalan, senior fellow and head of the Nuclear and Space Initiative, Observer Research Foundation (ORF), said Wednesday's development reflects India's desire to not make the mistake it did in 1974 when it conducted its first nuclear test in Pokhran.

The tests were conducted four years after the Nuclear Proliferation Test (NPT) Treaty came into force in 1970. There is no similar international treaty for space.

"The successful test also acts as a deterrent in event of a space war. The technology was available, so it was high time India tested it. Political will was also needed behind taking the decision," Rajagopalan said, referring to the possibility of an international backlash.

6. Debris from China's test in 2007 still non-trackable

In 2007, China destroyed its FengYun 1C weather satellite with an SC-19 missile, leaving behind space debris consisting of 3,280 pieces of trackable debris, as well as up to 32,000 pieces that are non-trackable.

The following year, during Operation Burnt Frost, the US destroyed its own satellite, USA-193, with an SM-3 interceptor creating 174 pieces of trackable debris, plus non-trackable shards.

Now, the spectre of space war has spilled over from the realm of Hollywood fiction into Indian reality.

<https://www.dnaindia.com/india/photo-gallery-strong-message-deterrent-experts-react-to-asat-missile-test-mission-shakti-2733874>



Thu, 28 Mar 2019

Modi hails India as military space power after anti-satellite missile test

New Delhi (Reuters): India shot down one of its own satellites in low-Earth orbit with a ground-to-space missile on Wednesday, Prime Minister Narendra Modi said, hailing his country's first test of such weaponry as a breakthrough establishing it as a military space power.

India would be the fourth country to have used such an anti-satellite weapon after the United States, Russia and China, according to Modi, who heads into general elections next month.

"Our scientists shot down a live satellite 300 kilometres away in space, in low-Earth orbit," Modi said in a television broadcast.

"India has made an unprecedented achievement today," he added, speaking in Hindi. "India registered its name as a space power."

Anti-satellite weapons permit attacks on enemy satellites, blinding them or disrupting communications, as well as providing a technology base for intercepting ballistic missiles.

Such capabilities have raised fears of the weaponisation of space and setting off a race between rivals.

Acting U.S. Defence Secretary Patrick Shanahan warned that the use of anti-satellite (ASAT) weapons like the one India tested on Wednesday risk making a "mess" in space due to the debris fields the can leave behind.

The U.S. military's Strategic Command was tracking more than 250 pieces of debris from India's missile test and would issue "close-approach notifications as required until the debris enters the Earth's atmosphere," Pentagon spokesman Lieutenant Colonel Dave Eastburn said.

The New Delhi government and Washington, which have generally close relations, have been in talks regarding the event, and India publicly issued an aircraft safety advisory before the launch, Eastburn added.

Lieutenant General David Thompson, vice commander of U.S. Air Force Space Command, said the International Space Station was not at risk at this point.

China's foreign ministry said it hoped all countries "can earnestly protect lasting peace and tranquillity in space." Russia declined to make any immediate comment.

India's neighbour and arch-rival, Pakistan, said space is the "common heritage of mankind, and every nation has the responsibility to avoid actions which can lead to the militarization of this arena."

Tensions flared last month between the nuclear-armed foes after a militant attack in the disputed region of Kashmir.

India has had a space program for years, providing Earth-imaging satellites and launch capabilities as a cheaper alternative to Western space services. It sent a low-cost probe to Mars in 2014 and plans its first manned space mission by 2022. India also launched a lunar mission, Chandrayaan-1, in 2008 that included an orbiter and an impact probe.

The latest test, conducted from an island off India's east coast, was aimed at protecting the country's assets in space against foreign attacks, the government said.

A ballistic missile defence interceptor produced by the government's Defence Research and Development Organisation was used to shoot down the satellite, the foreign ministry said.

"The capability achieved ... provides credible deterrence against threats to our growing space-based assets from long-range missiles, and proliferation in the types and numbers of missiles," it said in a statement.

The three-minute test in the low-Earth orbit ensured there was no debris in space and the remnants would "decay and fall back on to the Earth within weeks," the ministry added.

But Jeffrey Lewis of the Middlebury Institute of International Studies at Monterey said the risk of fragments hitting other objects in space remained.

"One of the big risks of a hit-to-kill ASAT (anti-satellite weapon) is that it shatters the target, leaving a cloud of lethal debris that threatens other satellites. In an extreme scenario, there is even a risk of 'collisional cascading' in which one breakup triggers others in a chain reaction."

"While tests can be arranged to minimize this risk, any operational use of such a system in war poses a real threat to all satellites in orbit at similar altitude."

China destroyed a satellite in 2007, creating the largest orbital debris cloud in history, with more than 3,000 objects, according to the Secure World Foundation.

China's test spurred India to develop its anti-satellite capability, said Ajay Lele, a senior fellow of the government-funded Institute for Defence Studies and Analyses in New Delhi.

Indian defence scientists had sought political approval for live tests but successive governments had balked, fearing international condemnation, an Indian defence official said.

Brahma Chellaney, a security expert at New Delhi's Centre of Policy Research, said the United States, Russia and China were pursuing anti-satellite (ASAT) weapons.

"Space is being turned into a battlefield, making counter-space capabilities critical. In this light, India's successful 'kill' with an ASAT weapon is significant."

United States A Pioneer

The United States ran the first anti-satellite test in 1959, when satellites were rare and new.

In the 1960s and early 1970s, the Soviet Union tested a weapon that would be launched into orbit, approach enemy satellites and destroy them with an explosive charge, according to the Union of Concerned Scientists.

In 1985 the United States tested the ASM-135, launched from an F-15 fighter, destroying a U.S. satellite called Solwind P78-1.

There were no tests for more than 20 years, until China entered the anti-satellite arena in 2007.

The following year, the United States used a ship-launched SM-3 missile to destroy a defunct spy satellite in Operation Burnt Frost.

<https://in.reuters.com/article/india-satellite-mission-shakti/modi-says-india-tests-anti-satellite-weapon-in-major-breakthrough-idINKCN1R80I6>



Thu, 28 Mar 2019

Boycott Indian launchers? Reactions to India's anti-satellite weapon test

by Debra Werner

San Francisco: In the wake of the March 27 Indian anti-satellite test, Brian Weeden of the Secure World Foundation suggested companies consider boycotting India's Polar Satellite Launch Vehicle (PSLV).

Secondary payloads launching on PSLV generate significant income for Indian space programs. If India creates debris in low Earth orbit through anti-satellite testing that could harm the business models of PSLV's launch customers, Weeden tweeted. Many space industry startups also emphasize social responsibility in public statements and interviews.

"I wonder if any commercial space companies are willing to take a stand on this and boycott the PSLV to send a message to India? Corporate social responsibility anyone?" Weeden, Secure World Foundation technical advisor, tweeted March 27.

Small satellite companies declined to comment on the likelihood of a boycott of the India Space Research Organization's PSLV.

However, Planet condemned the anti-satellite test. "While Planet enjoys a great working partnership with agencies of India's government — like ISRO — we categorically condemn the anti-satellite missile intercept recently conducted by India's defense department," the San Francisco-based company tweeted March 27. "Space should be used for peaceful purposes, and destroying satellites on orbit severely threatens the long-term stability of the space environment for all space operators. Planet urges all space-capable nations to respect our orbital commons."

Planet sent 88 cubesats into orbit on a PSLV in February 2017 and launched 16 more on a November 2018 PSLV flight.

Weeden said by email he was not calling for a boycott, but saying "the commercial sector should be concerned about where the space arms race is heading and how it may impact their business, and they should have a voice in the debate. A boycott is one possible way they could do that, but there may be others."

While a single anti-satellite test is unlikely to cause significant debris, the Indian test is the latest sign "of the recent proliferation of anti-satellite and counterspace technologies," Weeden said. "Coupled with increased reliance on space for military purposes by many countries, it means there's a greater chance a future conflict may include attacks on satellites. And that could have devastating consequences for all, including commercialization and investment in space."

Nations have been largely unsuccessful in reining in anti-satellite testing. Commercial companies with their expanding role both in the space industry and in global economies “could use their dollars and customers to also influence how countries behave in space. Countries aren’t the only ones who can set and enforce norms of behavior.”

Terrestrial companies are taking stands on ethical and moral issues. Their positions influence where they operate and what countries they work with, Weeden said. “I wonder if we might start to see that happen in the space world as well,” he added.

Instead of focusing on India alone, companies “should probably consider the behavior of all countries pushing the space arms race,” Weeden said. “India is only the latest, but by no means the only one.”

Laura Grego of the Union of Concerned Scientists also expressed concern about the spread of anti-satellite weapons and their increasing sophistication. “That increases the risks of a crisis getting sparked or escalated because someone uses or threatens to destroy someone else’s critical national security satellite,” Grego, a senior scientist in the Union of Concerned Scientists Global Security Program, said by email.

Destroying a satellite with a ground-based missile as India, the United States and China have all done, “creates enormous amounts of space debris when used,” Grego said. India destroyed a satellite at an altitude of 300 kilometers, meaning the cloud of debris created will not be in orbit long. Using a similar weapon to target “a satellite in a more common orbit would create debris that lasts decades,” she said.

Multinational organizations including the Conference on Disarmament and the United Nations Group of Governmental Experts have failed to reach agreement on arms control treaties or voluntary codes of conduct for space activities, Union of Concerned Scientists said in a March 27 news release.

“The international effort to ensure space remains a peaceful and secure environment is not keeping up with the spread of these technologies, and India’s test makes it harder to see progress on that. In fact, it’s possible that India’s test encourages others to test, too,” Grego said.

<https://spacenews.com/reactions-to-indian-asat/>

The Indian EXPRESS

Thu, 28 Mar 2019

Passing ASAT

*But it is no substitute for the long overdue policy debate
on India’s security challenges in outer space*

The anti-satellite (ASAT) weapon test conducted by the Defence Research and Development Organisation (DRDO) on Wednesday is more about Delhi’s changing approach to space weapons than a great technological breakthrough. But the significance of this long overdue change in India’s space mindset was masked by the political pieties of the Foreign Office in explaining the ASAT test. Delhi’s urge to package consequential strategic actions in meaningless mantras goes back to May 1974 when India called its first nuclear test a “peaceful nuclear explosion”. Last month, the government described its attack on a terror training camp at Balakot in Pakistan as a “non-military pre-emptive action”. That verbal dissimulation did not impress Pakistan, which reacted shortly with an airstrike of its own on Indian military bases. India’s self-righteous rhetoric leads to self-deception and an underestimation of how the rest of the world — especially China and Pakistan — might respond to India’s strategic moves.

But first to the ASAT test. India may only be the fourth country testing an ASAT weapon. But it is a distant fourth to the US, Russia and China. The first ASAT tests by Washington and Moscow

go back to the 1960s. President Reagan's "Star Wars" programme announced in 1983 triggered a second wind to ASAT development. China tested its first ASAT weapon in 2007. All three have stepped up their work on space weapons since. Beijing and Moscow are said to be close to deploying space weapons. In the US, President Donald Trump has announced the intent to create a space force that can fight wars in the dark yonder. India has a long way to catch up. India's ASAT test — which targeted a satellite in a low earth orbit of 300 km — builds on its already demonstrated missile defence systems. Finance Minister Arun Jaitley conceded that India has had ASAT capabilities for long and claimed that the UPA government had denied permission to develop and test them.

One ASAT test based on modest technologies, however, is no substitute to the long overdue policy debate on India's security challenges in the outer space environment. Although space has become an arena for great power jousting and the technology to build space weapons has advanced rapidly, Delhi seemed happy arguing in international forums against the weaponisation of outer space. Despite the growing dependence of India's armed forces on communication and reconnaissance satellites, the civilian leadership has resisted the development of effective higher defence structures to manage the emerging space threats. Delhi's explicit demonstration of space weapon capabilities is welcome, but it must be part of a clearly articulated military space doctrine that identifies India's political objectives and technological goals in outer space and the strategy to realise them.

<https://indianexpress.com/article/opinion/editorials/narendra-modi-mission-shakti-asat-drdo-5646086/>

THE ECONOMIC TIMES

Thu, 28 Mar 2019

China reacts guardedly to India's ASAT missile test; hopes nations will uphold peace in space

Mission Shakti, which was led by the Defence Research and Development Organisation, was aimed at strengthening India's overall security, he said in his address that comes a fortnight before the start of the general election.

Beijing: China on Wednesday reacted guardedly to India's anti-satellite missile test and expressed hope that all countries will uphold peace and tranquillity in the outer space.

Prime Minister Narendra Modi on Wednesday announced that India successfully test-fired an anti-satellite missile by shooting down a live satellite, describing it as a rare achievement that puts the country in an exclusive club of space super powers.

The test makes India the fourth country in the world after the US, Russia and China to acquire the strategic capability to shoot down enemy satellites.

The Chinese Foreign Ministry, in a written response to a question from PTI on India successfully test-firing an anti-satellite missile, said: "We have noticed reports and hope that each country will uphold peace and tranquillity in outer space". China conducted such a test in January 2007 when its anti-satellite missile destroyed a defunct weather satellite.

Prime Minister Modi said in New Delhi that the action was not directed against any country and the satellite was a pre-determined target orbiting at an altitude of 300 km. He said India did not breach any international laws or treaties by testing the the anti-satellite missile.

Mission Shakti, which was led by the Defence Research and Development Organisation, was aimed at strengthening India's overall security, Modi said in his address that comes a fortnight before the start of the general election.

In New Delhi, the Ministry of External Affairs (MEA) said in a statement that India has no intention of entering into an arms race in outer space.

"We have always maintained that space must be used only for peaceful purposes. We are against the weaponisation of Outer Space and support international efforts to reinforce the safety and security of space based assets," the MEA said.

<https://economictimes.indiatimes.com/news/defence/china-reacts-guardedly-to-indias-asat-missile-test-hopes-nations-will-uphold-peace-in-space/articleshow/68598470.cms>

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China developing counter-space capabilities even as India test-fires ASAT

China also intends to have additional ASAT weapons that are capable of destroying satellites at Geosynchronous Earth Orbit (GEO) at altitudes of about 36,000 km

By Shaurya Karanbir Gurung

New Delhi: While India conducted its first Anti-Satellite (ASAT) test on Wednesday, China has been developing its counter-space capabilities by having formed military units that are training with ASAT missiles and by 2020 is likely to deploy a ground laser weapon to target space sensors.

China also intends to have additional ASAT weapons that are capable of destroying satellites at Geosynchronous Earth Orbit (GEO) at altitudes of about 36,000 km. It is already making progress in its ASAT missile system which it tested in July 2014.

In 2007 as well it had demonstrated an ASAT capability, which resulted in international disapproval. All this is a follow through of the PLA's emphasis on 'destroying, damaging and interfering with the enemy's reconnaissance and communication satellites'. The PLA also believes that such systems and navigation and early warning satellites could be the targets of an ASAT attack, meant to 'blind' the enemy. These developments were shared in recent reports of the US's Defense Intelligence Agency (DIA) on China.

For India, China's counter-space capabilities mean a threat to its satellites for communication, earth observation, navigation and scientific research. India's space programme is a 'critical backbone' of its security, economic and social infrastructure. It has already undertaken 102 spacecraft missions. On Wednesday, India entered an elite club of nations by conducting an ASAT missile test, which successfully hit a satellite in low earth orbit. Besides China, only Russia and the US have this capability.

Russia is pursuing ASAT missiles to strike low-earth orbit satellites, according to a 2017 report of the US's Director of National Intelligence. It is testing such a weapon for deployment and is also developing an aircraft-launched missile capable of destroying satellites. "Russia is developing an airborne laser weapon for use against US satellites," said the report.

Russia is also developing an air-borne ASAT laser weapon system to use against space-based missile defence sensors, according to a January DIA report. Before July 2018, Russia began delivering a laser weapon system to its Aerospace Forces, which is intended for an ASAT mission.

Another US government report states that Russian and Chinese 'destructive' ASAT weapons are likely to reach initial operational capability in the next few years. "China's PLA has formed military units and begun initial operational training with counter-space capabilities that it has been developing, such as ground-launched ASAT missiles...Both countries are also advancing directed-energy weapons technologies for the purpose of fielding ASAT weapons that could blind or damage

sensitive space-based optical sensors, such as those used for remote sensing or missile defense,” it said.

Even military reforms in the two countries over the past few years indicate an increased focus on establishing operational forces for attacks against space systems. “Russia and China continue to pursue ASAT weapons to reduce US and allied military effectiveness,” it said. The US had performed the first ASAT tests in 1959 when satellites were new. In 2008, US performed another test. Its ship-based SM-3 missile destroyed one of its satellite in a test called Operation Burnt Frost. Meanwhile, India had the technical capability to develop ASAT weapons since 2012, but agencies were not given the green signal.

<https://economictimes.indiatimes.com/news/defence/china-developing-counter-space-capabilities-even-as-india-test-fires-asat/articleshow/68607697.cms>

नवभारत टाइम्स

Thu, 28 Mar 2019

एंटी सैटेलाइट मिसाइल स्वदेशी प्रौद्योगिकी पर आधारित, भारतीय उपग्रह को निशाना बनाया : विदेश मंत्रालय

नयी दिल्ली, 27 मार्च भारत ने बुधवार को मिशन शक्ति के तहत अंतरिक्ष में एंटी :भाषा: सैटेलाइट मिसाइल से एक लाइव सैटेलाइट को मार गिराया। यह पूरी तरह से स्वदेशी प्रौद्योगिकी पर आधारित परीक्षण था जिसमें भारत के ही एक उपग्रह को निशाना बनाया गया। विदेश मंत्रालय ने अक्सर पूछे जाने वाले प्रश्नों की श्रृंखला के तहत यह जानकारी दी। मंत्रालय ने बताया कि यह रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) का प्रौद्योगिकी मिशन था और इस मिशन में उपयोग किया गया उपग्रह निचली कक्षा में मौजूद भारत के उपग्रहों में से एक था। इसमें बताया गया, “परीक्षण पूरी तरह से सफल रहा और योजना के तहत सभी मानदंडों को पूरा किया। यह पूरी तरह से स्वदेशी प्रौद्योगिकी पर आधारित था।” इसमें स्पष्ट किया गया है कि भारत का परीक्षण किसी देश को निशाना बनाकर नहीं किया गया है। यह परीक्षण क्यों किया गया, इस सवाल के जवाब में कहा गया है कि यह परीक्षण इसलिये किया गया ताकि भारत के अपने अंतरिक्ष संबंधी परिसम्पत्तियों की सुरक्षा की क्षमता की पुष्टि की जा सके। यह सरकार की जिम्मेदारी है कि हम बाहरी अंतरिक्ष में अपने देश के हितों की रक्षा कर सकें। मंत्रालय ने यह स्पष्ट किया कि भारत का इरादा बाहरी अंतरिक्ष में हथियारों की दौड़ में शामिल होना नहीं है और उसने हमेशा इस बात का पालन किया है कि अंतरिक्ष का केवल शांतिपूर्ण उद्देश्यों के लिये ही इस्तेमाल किया जाए। इसमें कहा गया है कि भारत बाहरी अंतरिक्ष के शस्त्रीकरण के खिलाफ है और अंतरिक्ष आधारित परिसम्पत्तियों की सुरक्षा के अंतरराष्ट्रीय प्रयासों का समर्थन करता है। क्या भारत बाहरी अंतरिक्ष

में हथियारों की दौड़ में प्रवेश कर रहा है, इस सवाल के जवाब में विदेश मंत्रालय ने कहा कि भारत मानता है कि बाहरी अंतरिक्ष मानवता की साझी धरोहर है और यह सभी राष्ट्रों की जिम्मेदारी है कि इसका संरक्षण किया जाए और अंतरराष्ट्रीय प्रौद्योगिकी में हुई उन्नति के लाभ को प्रोत्साहित किया जाए। मंत्रालय ने कहा कि भारत बाहरी अंतरिक्ष से जुड़ी सभी अंतरराष्ट्रीय संधियों का पक्षकार है। भारत ने इस क्षेत्र में पारदर्शिता एवं विश्वास बहाली के अनेक उपायों को लागू किया है। भारत बाहरी अंतरिक्ष में पहले हथियारों का प्रयोग नहीं करने के संयुक्त राष्ट्र महासभा के प्रस्ताव का समर्थन करता है। इसमें कहा गया है कि भारत भविष्य में बाहरी अंतरिक्ष में हथियारों की दौड़ को रोकने के लिये अंतरराष्ट्रीय कानून का मसौदा तैयार करने में भूमिका अदा करने की उम्मीद करता है। गौरतलब है कि प्रधानमंत्री नरेन्द्र मोदी ने आज ऐलान किया कि भारत ने एंटी सैटेलाइट मिसाइल से एक लाइव सैटेलाइट को मार गिराया और अपना नाम अंतरिक्ष महाशक्ति के तौर पर दर्ज कराया। वह ऐसी क्षमता हासिल करने वाला दुनिया का चौथा देश बन गया। अंतरिक्ष में 300 किमी दूर पृथ्वी की निचली कक्षा (एलईओ) में एक लाइव सैटेलाइट को मार गिराया है।

अमर उजाला

Thu, 28 Mar 2019

भारत के एंटी-सैटेलाइट मिसाइल परीक्षण पर क्या कहा विदेशी मीडिया ने

भारत बुधवार को ए-सैट परीक्षण करने वाला दुनिया का चौथा देश बन गया है। इस परीक्षण को मिशन शक्ति के तहत पूरा किया गया। इससे पहले केवल दुनिया के तीन ही देश ऐसे थे जो ए-सैट परीक्षण कर चुके हैं। ये देश अमेरिका, चीन और रूस हैं। भारत के इस परीक्षण से उसकी शक्ति अंतरिक्ष के मामले में काफी बढ़ गई है। यही वजह है कि भारत की इस बड़ी उपलब्धि से चीन और पाकिस्तान भी नाखुश हैं।

केवल इतना ही नहीं अमेरिका ने भी भारत का नाम लिए बिना कहा कि अंतरिक्ष में कुछ गलत ना करें। यहां मलबा ना फैलाएं। ऐसे में दुनियाभर की मीडिया की नजर भी भारत पर ही रही। भारत के अंतरिक्ष महाशक्ति बनने पर विदेशी मीडिया ने क्या कहा-

डॉन, पाकिस्तान

पाकिस्तान के डॉन अखबार का कहना है कि भारत द्वारा किया गया ए-सैट परीक्षण प्रधानमंत्री नरेंद्र मोदी का चुनावी दांव है। डॉन ने कहा है, "प्रधानमंत्री नरेंद्र मोदी का दावा है कि उनके देश ने अंतरिक्ष में सैटेलाइट मार गिराया गया है। ऐसा करने वाला भारत दुनिया का चौथा देश बन गया है। यह खबर तब आई है, जब भारत में कुछ हफ्तों बाद चुनाव होने वाले हैं।"

వౌషింగటన్ పోస్ట్, అమెరికా

అమెరికా కే వాషింగటన్ పోస్ట్ నే భారత్ కే ఎ-సేట్ పరీక్షణ పర్ కహా హే, స్పేస్ మే నई एंट्री, "भारत अब दुनिया का सबसे अहम स्पेस क्लब का सदस्य बन गया है। इस स्पेस क्लब में पहले से अमेरिका, रूस और चीन हैं। प्रधानमंत्री नरेंद्र मोदी ने देश के एंटी सैटेलाइट मिशन को शक्ति और शांति का प्रतीक बताया है।"

शिन्हुआ, चीन

चीन कें शिन्हुआ मीडिया का कहना है कि नरेंद्र मोदी ने फिर चौंका दिया है। "भारतीय प्रधानमंत्री नरेंद्र मोदी ने एक बार फिर चौंका दिया है। उन्होंने दावा किया है कि भारत ने अंतरिक्ष में सैटेलाइट को मार गिराया है। अब भारत स्पेस रेस में शामिल हो गया है। मोदी ने इस देश की सुरक्षा के लिए जरूरी बताया है।"

क्या कहना है पड़ोसी देशों का

पाकिस्तान- भारत की इस बड़ी उपलब्धि पर पड़ोसी देश पाकिस्तान के प्रधानमंत्री इमरान खान ने कहा है, "मैं भारत में चुनाव होने से पहले डरा हुआ हूँ। आगे कुछ भी हो सकता है। पुलवामा के समय ऐसा लगा था कि मोदी सरकार युद्ध चाहती है।"

चीन- भारत की इस उपलब्धि पर चीन के विदेश मंत्रालय से बयान आया है, "हम ये उम्मीद करते हैं कि दुनिया के सभी देश अंतरिक्ष में शांति बनाए रखेंगे। हम हमेशा से ये कोशिश करते रहे हैं कि अंतरिक्ष का इस्तेमाल केवल शांति के लिए हो।"

<https://www.amarujala.com/india-news/foreign-media-and-neighbour-countries-of-india-asat-missile-test>



Thu, 28 Mar 2019

అంతరిక్షంలో అశాంతి వద్దు : భారత్ కు అమెరికా వార్నింగ్

US warns debris after India's ASAT test

అంతరిక్షంలో లైవ్ శాటిలైట్ ను కూల్చే వెపన్ ని సొంతం చేసుకోవడం ద్వారా భారత్ అంతరిక్ష శక్తిగా అవతరించింది. మిస్సైల్ ద్వారా శాటిలైట్ ను కూల్చే ప్రయోగాన్ని సక్సెస్ ఫుల్ గా చేసింది. ఇప్పటివరకు అమెరికా, రష్యా, చైనాకు మాత్రమే సాధ్యమైన ఈ ఘనతను ఇప్పుడు భారత్ కూడా సాధించింది. శత్రుదేశాల శాటిలైట్ల ఆటకట్టించే అత్యాధునిక టెక్నాలజీ భారత కు ఫ్లస్ కానుంది.

భూ ఉపరితలానికి 300 కిలోమీటర్ల ఎత్తులో ఉన్న లైవ్ శాటిలైట్ ను విజయవంతంగా కూల్చేయడం ద్వారా 'అంతరిక్ష యుద్ధం' చేయగల సత్తా ఉన్న అమెరికా, రష్యా, చైనాలతో సమానంగా భారత్ నిలిచిన వేళ.. అగ్రరాజ్యం అమెరికా అలర్ట్ అయ్యింది. మిషన్ శక్తి పట్ల ఆందోళన వ్యక్తం చేస్తూ భారత్ కు హెచ్చరికలు జారీ చేసింది. యాంటీ శాటిలైట్ వెపర్స్ తో అంతరిక్షంలో గందరగోళం సృష్టించొద్దని అమెరికా తాత్కాలిక రక్షణ మంత్రి పాట్రిక్ షనాహాన్

అన్నారు. తమ ఆందోళన అంతా అంతరిక్షంలో పేరుకుపోయే శకలాల గురించేనని చెప్పారు. ఈ పరీక్షను తాము అధ్యయనం చేస్తున్నామని, ఎవరికీ అంతరిక్షాన్ని అస్థిరపరిచే హక్కు లేదని చెప్పారు. యాంటీ శాటిలైట్ పరీక్షలతో శకలాల సమస్యను పెంచొద్దని కోరారు. ధ్వంసమైన శాటిలైట్ల శకలాల విషయమై మరింత జాగ్రత్తగా ఉండాల్సిన అవసరం ఉందన్నారు. అంతరిక్షం అనేది అందరూ కలిసి స్వేచ్ఛగా పని చేసుకునేదని, అశాంతిని సృష్టించకూడదని చెప్పారు. మనమంతా అంతరిక్షంలో భాగంగానే ఉన్నామన్న ఆయన దీన్ని సమర్థవంతంగా వినియోగించుకోవాలన్నారు.

మిషన్ శక్తి పై చైనా కూడా స్పందించింది. అంతరిక్షంలో ఎలాంటి ఉద్రిక్తతలకు తావివ్వకుండా వ్యవహరించాల్సిన బాధ్యత ప్రపంచ దేశాలపై ఉందని ఆ దేశ విదేశాంగ మంత్రిత్వశాఖ తెలిపింది. ఈ విషయంలో భారత్ మాత్రమే కాకుండా.. క్షిపణి ద్వారా ఉపగ్రహాలను కూల్చివేయగల సామర్థ్యాన్ని సాధించిన అన్ని దేశాలు కూడా అంతరిక్షంలో శాంతిని కాపాడాల్సిన అవసరం ఉందని చెప్పారు.

<http://www.10tv.in/us-warns-debris-after-indias-asat-test-7462>



Thu, 28 Mar 2019

US tested 1st ASAT missile 60 years

అంతరిక్షం.. కదనరంగం!

- 1959లో తొలిసారి ఉపగ్రహ విధ్వంసక ఆయుధ పరీక్షలను నిర్వహించిన అమెరికా
- పోటీగా సోవియట్ యూనియన్ ప్రయోగాలు
- 2007లో చైనా రంగప్రవేశం

న్యూఢిల్లీ, మార్చి 27: ప్రపంచంలో తొలి ఉపగ్రహ విధ్వంసక పరీక్షలను అమెరికా 1959లో నిర్వహించింది. అప్పట్లో ఉపగ్రహాలు చాలా అరుదు, కొత్త. అప్పట్లో ఉపగ్రహాలపై దాడులు జరిపేందుకు అమెరికా బోల్ట్ ఓరియన్ అనే అణ్వాయుధ బాలిస్టిక్ క్షిపణిని రూపొందించింది. ఓ బాంబర్ (యుద్ధ విమానం) ద్వారా ప్రయోగించిన ఈ క్షిపణి ఎక్స్‌ప్లోరర్-6 అనే ఉపగ్రహానికి అత్యంత సమీపంగా దూసుకెళ్లింది. ఆ క్షిపణికి ఆయుధాన్ని అమర్చి ఉంటే ఆ ఉపగ్రహాన్ని ధ్వంసం చేసి ఉండేది. అమెరికాతోపాటు సోవియట్ యూనియన్ కూడా దాదాపు అదే సమయంలో (1960వ దశకం నుంచి 70వ దశకం తొలినాళ్లలో) ఇటువంటి పరీక్షలు నిర్వహించింది. పేలుడు పదార్థాలతో శత్రు దేశాల ఉపగ్రహాలను ధ్వంసంచేసే ఆయుధాన్ని అప్పట్లో సోవియట్ యూనియన్ పరీక్షించగా.. 1985లో అమెరికా ఏజీఎం-135 అనే ఆయుధాన్ని పరీక్షించింది. ఎఫ్-15 యుద్ధ విమానం ద్వారా ఈ ఆయుధాన్ని ప్రయోగించి

స్టోవిండ్ పీ78-1 అనే పేరున్న తమ దేశానికి చెందిన ఉపగ్రహాన్ని ధ్వంసం చేసింది. ఆ తర్వాత ప్రపంచంలో 20 ఏండ్లకుపైగా ఇటువంటి పరీక్షలు జరుగలేదు.

అయితే 2007లో చైనా.. పోలార్ ఆర్బిట్ (ధ్రువ కక్ష్య)లోని పురాతన వాతావరణ ఉపగ్రహాన్ని ధ్వంసం చేయడం ద్వారా ఉపగ్రహ విధ్వంసక ఆయుధ రంగంలోకి ప్రవేశించింది. ఈ పరీక్ష వల్ల ఖగోళ చరిత్రలోనే ఎన్నడూ లేనంత భారీ సంఖ్యలో 3 వేలకుపైగా శకలాలు ఇప్పటికీ అక్కడే పేరుకు పోయాయి. ఆ తదుపరి ఏడాది అమెరికా ఆపరేషన్ బ్రట్ ప్రాస్ట్ను నిర్వహించింది. ఈ ఆపరేషన్లో భాగంగా ఓ నౌక నుంచి ఎస్ఎం-3 అనే క్షిపణిని ప్రయోగించి పాడైపోయిన ఓ గూఢచార ఉపగ్రహాన్ని ధ్వంసం చేసింది. అయితే ఈ పరీక్ష దిగువ కక్ష్యలో జరుగడంతో శకలాలు భూమివైపు దూసుకొచ్చి వాతావరణంలోనే కాలిపోయాయి. దీంతో వ్యర్థాలు పెద్దగా పోగుపడలేదు. బుధవారం భారత్ నిర్వహించిన ఉపగ్రహ విధ్వంసక క్షిపణి పరీక్ష కూడా ఇదేవిధంగా సాగింది.

<https://www.ntnews.com/NationalNews-in-Telugu/us-tested-1st-asat-missile-60-years-ago-1-3-599065.html>



Thu, 28 Mar 2019

300 km to the earth's surface: a weapon that clears space jam! భూ ఉపరితలానికి 300 కి.మీ ఎత్తు:

స్పేస్ జామ్ ను క్లియర్ చేసే ఆయుధం!

By Chandrasekhar Rao

న్యూఢిల్లీ: ట్రాపిక్ జామ్ అనేది మనం రోజూ వినే పదం. మరి స్పేస్ జామ్ అంటే? ఇస్త్రో, నాసా సహా వివిధ దేశాలు ప్రయోగించిన ఉపగ్రహాలు కాలం తీరిపోయి, భూ కక్ష్యలోకి పరిభ్రమిస్తుంటాయి. ఇప్పటికే అలాంటి శక్తి విహీనమైన ఉపగ్రహాలు కనీసం అంటే 4000 వరకు ఉంటాయి. అలాంటి ఉపగ్రహాల వల్ల తరచూ స్పేస్ జామ్ తలెత్తుతుంటుంది. కొత్త ఉపగ్రహాలను భూ పరిభ్రమణ కక్ష్యలోకి ప్రవేశపెట్టాలంటే.. తరచూ ఇలాంటి శాటిలైట్ల నుంచి ఇబ్బందులు తలెత్తుతుంటాయి. రోడ్డు మీద వాహనాలు స్తంభించిపోతే.. దాన్ని క్లియర్ చేయడానికి ప్రత్యేకంగా ట్రాపిక్ పోలీసులు ఉంటారు. అంతరిక్షంలో ఎవరు ఉంటారు? అందుకే- విచ్చలవిడిగా కాలం చెల్లిన శాటిలైట్లు అటు, ఇటు తిరుగాడుతుంటాయి. వాటిని పేల్చేయడానికి భారత్ సరికొత్త ఆయుధాన్ని రూపొందించింది. అదే యాంటీ-శాటిలైట్ వెపన్. సింపుల్ గా ఏశాట్ అని పిలవొచ్చు. ఈ తరహా శాటిలైట్ ను కనుగొన్న నాలుగో దేశం మనది. మనకంటే

ముందు అమెరికా, ఒకప్పటి నోవియట్ రష్యా, చైనా ఈ ఘనతను సాధించాయి. ప్రస్తుతం మనదేశం వాటి సరసన చేరింది..సగర్వంగా!

లియో..లో ఎర్త్ ఆర్బిట్. క్షుణ్ణంగా చెప్పాలంటే- భూ ఉపరితలంపై నుంచి అతి తక్కువ ఎత్తులో ఉండే కక్ష్య. భూ ఉపరితలం పై నుంచి దీని ఎత్తు 1200 మైళ్లు. కిలోమీటర్లలో లెక్కెసుకుంటే 2000 కిలోమీటర్ల ఎత్తు వరకు ఉంటుంది ఈ కక్ష్య. భూమికి, కక్ష్య మధ్య ఈ ఎత్తులో ఉపగ్రహాలు ప్రతి రెండు గంటల ఏడు నిమిషాలకు ఒకసారి పరిభ్రమిస్తుంటాయి. వాటి సంఖ్య 84 వరకు ఉంటుంది. భూమిపై మనం ఉపయోగించే టెలికమ్యూనికేషన్లు, ఇంటర్నెట్ వ్యవస్థ పనిచేయాలంటే ఈ లియో కక్ష్యకు లోబడి పరిభ్రమించే ఉపగ్రహాలే అత్యంత కీలకమైనవి. మనం రోజూ వినియోగించే ఇ-మెయిళ్లు, వీడియో కాన్ఫరెన్సుల వంటి డేటా కమ్యూనికేషన్లు సమగ్రంగా, సమర్థవంతంగా పనిచేయడంలో లియో పరిధిలో పరిభ్రమణం చెందే ఉపగ్రహాలు ప్రధాన పాత్ర పోషిస్తాయి. భూమితో ఎలాంటి అనుసంధానం లేకుండా ఇవి పనిచేస్తాయి. దీని వేగాన్ని లెక్కించడం సాధ్యం కాని పని. అత్యంత వేగంగా ఈ ఉపగ్రహాలు పరిభ్రమిస్తాయి. మనదేశ అంతరిక్ష పరిశోధన కేంద్రం గానీ, నాసా గానీ ఇప్పటిదాకా అంతరిక్షంలో పంపించిన ఉపగ్రహాలతో పోల్చుకుంటే.. లియో పరిధిలో తిరిగే ఉపగ్రహాల పరిభ్రమణం అత్యంత వేగంగా ఉంటుంది.

అంతరిక్షంలో `స్పేస్ జామ్` లియో కక్ష్యలో

తిరిగే ఉపగ్రహాల సంఖ్య వేలల్లో ఉంటోంది. ఇప్పటిదాకా 4000 ఉపగ్రహాలు లియో పరిధిలో ఉన్నాయి. ఇస్త్రో, నాసా సహా వివిధ దేశాల ప్రభుత్వ, ప్రభుత్వేతర, ప్రైవేటు సంస్థలు పంపించిన ఉపగ్రహాలే అవన్నీ. కేంద్ర ప్రభుత్వం తాజాగా ప్రయోగించిన షాట్ డౌన్ శాటిలైట్.. వాటన్నింటి కంటే భిన్నమైనది. పనితీరులోనూ వైవిధ్యాన్ని కనపరిచేదని శాస్త్రవేత్తలు చెబుతున్నారు. భూమితో అనుసంధానం కోల్పోయి, అనాధగా పరిభ్రమించేవి, శక్తి విహీనమైనవి, కాలం చెల్లిన ఉపగ్రహాలు వేలల్లో లియో కక్ష్య పరిధిలో పరిభ్రమిస్తున్నాయి. వాటినే శాస్త్రవేత్తలు `స్పేస్ జామ్`గా పరిగణిస్తుంటారు.

శక్తివిహీనమైన ఉపగ్రహాలను పేల్చేయడానికి సరికొత్త ఆయుధం

అలాంటి ఉపగ్రహాలను శాస్త్రవేత్తలు పేల్చేస్తుంటారు. దీనికోసం ప్రత్యేకంగా ఓ ఆయుధాన్ని తయారు చేశారు. అదే యాంటీ-శాటిలైట్ వెపన్. ఏదైనా ఉపగ్రహాన్ని ఇది పేల్చేసిందంటే.. అనంతరం ఏర్పడే పరిస్థితులను ఇట్టే అదుపు చేయగల, మసి చేయగల సామర్థ్యం దీనికి ఉంది. పేలుడు అనంతరం వెలువడే శకలాలు గానీ, శిథిలాలు గానీ భూ కక్ష్యలోకి ప్రవేశించక ముందే బూడిద చేసే సామర్థ్యం షాట్ డౌన్ శాటిలైట్ కు ఉందని శాస్త్రవేత్తలు అంటున్నారు. ఈ తరహా ఉపగ్రహాన్ని చైనా ఇదివరకే ప్రయోగించింది.

చైనాకు కూడా సాధ్యం కానిది..

భూమి ఉపరితలం మీది నుంచి 700 కిలోమీటర్ల ఎత్తులో షాట్ డౌన్ శాటిలైట్ ను ప్రయోగించింది. అంత ఎత్తులో భూమ్యాకర్షణ శక్తి ఏ మాత్రం పనిచేయదు. వాతావరణం అసలే ఉండదు. శబ్ద తరంగాలు ప్రయాణించలేవు. చైనా పేల్చేసిన ఉపగ్రహానికి సంబంధించిన శిథిలాలు గానీ, శకలాలు గానీ ఇప్పటికీ.. అంతరిక్షంలో, లియో కక్ష్యలో

తిరుగాడుతున్నాయి. దీనికి కారణం- భూమ్యాకర్షణ శక్తి లేకపోవడమే. దీనికి భిన్నంగా మనదేశం సరికొత్త మైలురాయిని అందుకుంది. చైనాకు కూడా సాధ్యం కాని ఘనతను సాధించింది. అంతరిక్ష పరిశోధనల్లో ఎంతో ముందు ఉండే చైనాకు కూడా సాధ్యం కాని మైలురాయిని భారత్ అలవోకగా అందుకుంది.

300 కిలోమీటర్ల ఎత్తులో పేల్చేసే సామర్థ్యం..

భూ ఉపరితలానికి కేవలం 300 కిలోమీటర్ల ఎత్తులోనే ఉపగ్రహాలను పేల్చివేసిన ఘనతను అందుకుంది. 300 కిలోమీటర్ల ఎత్తు అంటే భూమ్యాకర్షణ శక్తి పని చేస్తుంది. అయినప్పటికీ- ఉపగ్రహాలను పేల్చివేసిన అనంతరం దాని శకలాలు, శిథిలాలు భూమి మీద పడవు. ఎందుకంటే- భూ వాతావరణంలోనికి ప్రవేశించడానికి ముందే అవి మాడి, మసైపోతాయి. అలాంటి శక్తి సామర్థ్యాలను భారత్ సొంతం చేసుకుంది. భారత్ తాజాగా ఏ ఉపగ్రహాన్ని పేల్చివేసిందనేది వేచి చూడాల్సిందే. కాలం తీరిన ఉపగ్రహాన్ని పేల్చివేసందా? లేక కొత్తగా ప్రయోగించిన ఉపగ్రహాన్ని ఏమైనా పేల్చివేసిందనేది ఇంకా తేలాల్సి ఉంది.

మిషన్ శక్తి.. పేరుకు తగ్గట్టే

మిషన్ శక్తిలో భాగంగా- ఈ శక్తిమంతమైన ఆయుధాన్ని రూపొందించినట్లు ప్రధానమంత్రి నరేంద్రమోడీ బుధవారం వెల్లడించారు. ఇప్పటిదాకా అమెరికా, చైనా, రష్యాలు మాత్రమే ఈ ఘనతను సాధించాయి. తాజాగా భారత్ కూడా ఆయా దేశాల సరసన చేరింది. సగర్వంగా నిల్చుంది. ఈ తరహా ఆయుధాన్ని తయారు చేసిన నాలుగో దేశంగా భారత్ ఆవిర్భవించింది. 1958లో అమెరికా తొలిసారిగా యాంటీ శాటిలైట్ వెపన్ ను ప్రయోగించింది. ఘన విజయాన్ని అందుకుంది. 1964లో అప్పటి సోవియట్ రష్యా ఈ మార్క్ ను అందుకుంది. 2007లో చైనా, 2015లో రష్యా ఈ తరహా చయాంటీ శాటిలైట్ వెపన్ ను రూపొందించి, ప్రయోగించాయి. సత్ఫలితాలను సాధించాయి. తాజాగా భారత్ ఈ ఘనతను అందుకుంది. 1958లో అమెరికా.. తొలిసారిగా ఈ తరహా ఆయుధాన్ని అంతరిక్షంలోకి ప్రవేశించిన సమయంలో పెద్ద ఎత్తున విమర్శలు చెలరేగాయి. వాటిని పెద్దగా ఖాతరు చేయలేదు అగ్రరాజ్యం అమెరికా.

<https://telugu.oneindia.com/news/india/what-is-mission-shakti-asat-know-all-about-asat/articlecontent-pf213362-241617.html>

'Cobra ball' surveillance on India భారత్పై 'కోబ్రా బాల్' నిఘా..!

ఇంటర్నెట్ డెన్స్: భారత్పై అమెరికా నిఘాపెట్టిందా..? ఏశాట్ ప్రయోగ అనుపానులను గుర్తించేందుకు ప్రయత్నాలు ప్రారంభించిందా..? పరిస్థితులన్నీ అవుననే అంటున్నాయి. భారత్ నిన్న యాంటీ శాటిలైట్ ప్రయోగాన్ని విజయవంతంగా పూర్తి చేసింది. దీంతో ప్రపంచంలో ఈ సత్తా ఉన్న నాలుగో దేశంగా అవతరించింది. ఈ నేపథ్యంలో ప్రపంచ దేశాలు దీనిపై పెద్దగా ఎటువంటి అభ్యంతారాలు వెల్లడించలేదు.

నిన్న రాత్రి 11.30 సమయంలో బంగాళాఖాతంలోకి ఆర్సీ-135ఎస్ కోబ్రా బాల్ అనే అమెరికాకు చెందిన ఒక ప్రత్యేకమైన నిఘా విమానం వచ్చివెళ్లింది. భారత్ పరీక్షలు నిర్వహించిన తర్వాత కొన్ని గంటలకే ఇది బంగాళాఖాతం ప్రాంతంలోకి ప్రవేశించడం విశేషం. సాధారణంగా ఏదైనా పేలుళ్లు, ప్రయోగాలు జరిగినప్పుడు లభించే బాలిస్టిక్ డేటాను ఆర్ సీ135ఎస్ సమీకరిస్తుంది. అమెరికా వద్ద 55వేళ్ల క్రితం విమానాలు ఇలాంటివి మూడు ఉన్నాయి.



వీటిల్లో ఒకదానిని హిందూ మహాసముద్రంలోని డిగోగార్పియా సైనిక స్థావరంలో మోహరించింది. సాధారణంగా ఇరాన్, ఉత్తరకొరియాలు ఆయుధ పరీక్షలు నిర్వహించినప్పుడు ఈ విమానం వెళ్లి వివరాలను సమీకరిస్తుంది. ఈ విమానంలో సేకరించిన సమాచారం మొత్తం నేరుగా అమెరికా ఎన్ఎస్ఏ, డిఫెన్స్ సెక్టరీకి చేరతాయి. ఈ ఘటనపై అమెరికా స్పందించలేదు. అగ్రరాజ్యం సొంతగానే వివరాలు సేకరిస్తోందని మాత్రం అర్థమవుతోంది.

ఈ ప్రయోగానికి ఎందుకంత ప్రాధాన్యం..

అంతరిక్షంలో ఉన్న ఉపగ్రహాన్ని భారత్ కూల్చేసిన ప్రయోగానికి ప్రపంచవ్యాప్తంగా ప్రాధాన్యం లభించడానికి కారణాలు ఉన్నాయి. 2017 లెక్కల ప్రకారమే భూకక్ష్యలో దాదాపు ఐదువేలకు పైగా ఉపగ్రహాలు, రాకెట్ శకలాలు, ఇతర వ్యర్థాలు తిరుగుతున్నాయి. వీటిల్లో 95 శాతం పనికిరాని చెత్తే ఉంది. పైగా అవి ఏమాత్రం నిదానంగా తిరగవు.. గంటకు 17,500 మైళ్లవేగంతో అవి ప్రయాణిస్తుంటాయి. వీటిల్లో గ్రహశకలాలు కూడా ఉంటాయి. ఈ

నేపథ్యంలో భారత్ కు చెందిన యాంటీ శాటిలైట్ కచ్చితంగా అనుకున్న లక్ష్యాన్ని తొలిప్రయత్నంలోనే ఛేదించడం విశేషం. ప్రయోగంలో ఏమాత్రం చిన్న తేడా వచ్చినా అది మరో దేశ ఉపగ్రహాన్ని తాకడమో.. లేక మన దేశానికే చెందిన పనిచేసే ఉపగ్రహాన్ని కూల్చడమో చేస్తుంది. అంత సున్నితమైన ఈ ప్రయోగాన్ని భారత్ ఎంతో ఆత్మవిశ్వాసంతో పూర్తి చేసింది.

దౌత్య విజయమా..?

భారత్ ఏశాట్ ప్రయోగం పూర్తి చేశాక ప్రపంచ దేశాలు పెద్దగా వ్యతిరేకత వ్యక్తం చేయలేదు. ఒక్క పాకిస్తాన్ మాత్రమే అంతరిక్ష భద్రతపై ఆందోళన వ్యక్తం చేసింది. అమెరికా మాత్రం అంతరిక్ష వ్యర్థాలు పెరిగిపోతాయని ఆందోళన వ్యక్తం చేసింది. అంతకు మించి అభ్యంతరాలు ఎక్కడా వినిపించలేదు. గతంలో చైనా ఈ పరీక్ష నిర్వహించినప్పుడు ప్రపంచ దేశాలు తీవ్ర అభ్యంతరాలు వ్యక్తం చేశాయి. అంతరిక్షంలో కూడా సైనికీకరణ చేస్తోందనే విమర్శలను చైనా ఎదుర్కోవాల్సి వచ్చింది.

ఉపగ్రహ వ్యర్థాలు ప్రమాదకరమా..?

1996లో ఫ్రాన్స్ కు చెందిన ఉపగ్రహాన్ని కొన్ని వ్యర్థశకలాలు ఢీకొన్నాయి. దీంతో ఆది పూర్తిగా దెబ్బతింది. 2007లో చైనా యాంటీశాటిలైట్ ప్రయోగం చేసినప్పుడు దాదాపు 3వేల శకలాలు వెలువడ్డాయి. 2009లో రష్యాకు చెందిన నిరుపయోగకరమైన ఉపగ్రహం అమెరికాకు చెందిన ఇరిడియం వాణిజ్య శాటిలైట్ ను ఢీకొంది. దీంతో దాదాపు 2,000 శకలాలు ఏర్పడ్డాయి.

వ్యర్థాలను తొలగించడానికి తీసుకుంటున్న చర్యలు..

అంతరిక్ష వ్యర్థాలను తొలగించడానికి ప్రపంచంలోని కీలక దేశాలు చర్యలు తీసుకొంటున్నాయి. దీనికి సంబంధించి ఇంటర్ ఏజెన్సీ స్పేస్ డెబ్రిస్ కోఆర్డినేషన్ కమిటీ అంతరిక్ష శకలాలను తగ్గించడానికి మార్గదర్శకాలను వెల్లడించింది. భారత్ కూడా ఈ కమిటీలో ఒక సభ్యదేశమే.

<https://www.eenadu.net/nationalinternational/newsdetails/7/2019/03/28/74265/USAF-sends-Missile-Sniffer-Aircraft-After-Indias-ASAT-Missile-Test>

