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"Air Power has a unique capability not only to deter or defend but also to punish adversary when required. It will contribute largely in pursuit of national objectives and will always remain the first responder."

-Air Chief Marshal VR Chaudhari PVSM AVSM VM ADC
Chief of the Air Staff, Indian Air Force.

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Ready, Resurgent and Relevant Indian Armed Forces

Air Vice Marshal Anil Golani (Retd)
Additional Director General, Centre for Air Power Studies | 21 Apr 2023

Source: Bharat Shakti | https://bharatshakti.in/ready-resurgent-and-relevant-indian-armed-forces/

There is no gainsaying in the fact that integration and joint efforts result in a greater bang for the buck. More so when the 'buck' has to literally contend with competing demands for growth, development, employment and poverty alleviation. However, according to a veteran Lieutenant General of the Indian Army, in an article in The Tribune, dated 03 April 23, "Theatre Commands will help Optimise Resources," to say that "given the commitments on the borders necessitating the primacy of operations by the Army, with units and formations being deployed round the year, unified command structures have to be viewed in terms of our current challenges rather than through the seductive prism of a superpower with expeditionary forces," would amount to a less than the optimal understanding of the character of war, which continues to change while its nature remains constant.

According to Prussian General Carl von Clausewitz, the enduring elements of the nature of war are its violent character, a clash of wills between two opponents, and political primacy. The character of the war, on the other hand, is related to how a war will be fought, and this depends upon military capabilities, economy, technology, political considerations, and the opponent's aim and strategy. At no stage is there a mention of the preponderance of the army or navy by Clausewitz, who lived before the advent of aeroplanes and air power.

It is essential to understand the context, and vilifying one service over the other would only ensure that we remain where we are instead of progress, which is felt necessary in the national interest. The Indian Army deployed across 3,488 km of the Line of Actual Control (LAC) with China, and the 740 Km Line of Control (LoC) with Pakistan is undoubtedly doing yeoman service to protect the nation's borders, prevent infiltration and ensure peace and tranquillity. It, however, does not take away the efforts of the other services to deter aggression by inimical interests as also the contribution of the state and civil administration and the citizens of the country.

The recently concluded 'Combined Commanders Conference' held in Bhopal from 30 March to 1 April was titled "Ready, Resurgent and Relevant." With an increasing focus on Atmanirbharta, the coming year's defence budget has allocated more than 75 per cent of the capital procurement to the Indigenously, Designed, Developed and Made (IDDM) category. The competing demands of an increasing revenue budget would have to be curtailed innovatively for the armed forces to remain relevant.

Integrated warfighting is the need of the hour for which the creation/ establishment of theatre commands is a process that is inevitable and has to be followed. The discourse, however, invariably shifts to placing the workforce and assets of the services under a single theatre commander from any service. The logic or rationale of unsettled land borders with our adversaries is often quoted to justify the primacy of the army for establishing theatre commands. The author of the article in 'The Tribune' quotes the primacy of operations by the army because of our current challenges rather than the seductive prism of a superpower with expeditionary forces. Calling India neither expansionist nor a nation that covets foreign territory does not imply that theatre commands serve the purpose of expeditionary forces like those of the United States of America.

While the jury is still out on the Russia-Ukraine, the conflict between the primacy of the Army and the achievement of objectives by the armoured columns of the Russian Army leaves much to be desired. Joint planning and execution and economisation of effort and resources is the key to winning future wars and staying relevant for the armed forces. The debate needs to shift focus from the number of single service commands and placing resources and assets under a single theatre commander to joint planning, unity of effort instead of unity of command and reduction of common resources and manpower that only add to infructuous expenditure. The debate on the number of fighter squadrons, aircraft carriers and attack helicopters are irrelevant if it is not matched with the forecast threats and the capabilities required to deter the same.

Future wars would be fought across the land, sea, air, space, cyber and information warfare domains. These are akin to five fingers of the hand wherein the fist gives a greater punch than one or two fingers. Cyber and space domains transcend the traditional land, maritime and air power forces which could be rendered ineffective unless the effort encompasses all the five fingers to deliver the coup de grace. Future reorganisation or restructuring of the armed forces needs to be deliberated upon and carefully planned so as to ensure unity of effort that incorporates joint planning and execution across all the five domains of warfare. While it is important to learn from history, one must also not lose sight of the fact that the last war has already been fought. There is a need to innovate, think out of the box, use asymmetry as an offensive tool, and combine efforts to plan and execute without thinking of which service gets to command. What if the armed forces have to remain 'Ready, Resurgent and Relevant'.

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Modern Wars through a Doctrinal Prism

Gp Capt Sartaj Sehgal | 13 Apr 2023

Source: VIF India | https://www.vifindia.org/article/2023/april/13/modern-wars-through-a-doctrinal-prism

There have been numerous attempts to study the ongoing Russo Ukraine war and draw lessons through the prisms of doctrines, strategy and tactics for our armed forces. Rightly so, as doctrines are ever evolving and need to be in sync with the changing character of warfare and serve as a guiding beacon for the services. The IAF has come out with a revised doctrine recently and has been a subject of intense scrutiny by our adversaries, and even more by our own countrymen. It addresses challenges across the spectrum of warfare and has been revised considering the evolving nature of threats facing the country. It also addresses what the IAF needs to do to help achieve the national objectives jointly with the sister services. A recent article written by an eminent scholar warrior has brought some issues to fore that need to be debated. The larger environment needs to benefit from the lessons that emanate. The incisive article has touched upon vexing issues that need to be understood in our context. While we may draw parallels with other conflicts to learn lessons at the tactical and operational levels, the need to challenge existing doctrines based on years of experience may need further deliberation. An attempt will be made to study some of the issues highlighted in the article.

Modern Warfare and Unity of Command and Effort

In the quest for unity of command, we should not lose sight of unity of effort. The focus should be on achieving unity of effort at the point of decision. However, in the haste to seek a unified command structure, we should not end up compromising and diluting the core war fighting doctrinal precepts of the services. This would only serve to reduce the power brought to bear at the point of decision. We need to get our command structure right, that addresses both concerns in the first attempt.

Are Single Service Doctrines Really 'Stand-Alone'?

A single service doctrine does draw essence from the Joint Doctrine. The latest version of the IAF doctrine has done it extensively. Any service doctrine would have to be service specific to an extent, in order to give guidance to its rank and file on war fighting while exercising its core capabilities in operations; limited to a specific domain that requires particular specialities. Never has any service doctrine steered a path that is at variance with the national objective. If a service has to execute its mission within an integrated structure, it would only be successful with a robust and a well rounded service specific doctrine that defines its own raison d'être′ to its rank and file. It provides a way forward in ensuring that the service war fighting TTPs (tactics, techniques and procedures), serve as building blocks to an effective joint operational plan to achieve national objectives.

Is There a Need for Reconsideration of Service Specific Doctrines?

The services do take up periodic revisions

of their doctrines as is the case with the Indian Navy (Indian Maritime Doctrine 2004, 2009 and revised in 2015). The Navy has also published the Indian Maritime Security Strategy, IMSS 2007 and revised it in 2015. Similarly the Indian Army has the Indian Army Doctrine versions 2004, 2010 and had released the Land Warfare Doctrine in 2018. The IAF has been reviewing its doctrine in step with the changing character of warfare and has come out with the latest version in light of the threats facing India across the spectrum of conflict. Airpower is the most sensitive to technology. The effects of rapid changes in technology in the past hundred years have impacted the aviation sector and especially military aviation the most. A small, incremental enhancement in platform or weapon technology has a huge impact on the way the air forces fight. Hence the reason for air power doctrines to keep pace and embrace these changes that directly impact war fighting. The author in his piece rightly brings about the point about conjoint combat power and not three combat forces. The IAF doctrine in all its avatars has never drifted from its joint flavour, succinctly stating its joint air land and maritime campaigns to enable the other two services to achieve their objectives. The latest version also draws inspiration from the Joint Doctrine of the Armed Forces. While the other doctrines are exhaustive in what they need to do to achieve their specific objectives, the IAF doctrine explains in detail the Air Land or Maritime Air Campaign, in addition to the other campaigns it prosecutes. In reality the IAF is structurally the most integrated in action and in doctrinal thought with the other two services. Service specific doctrines are the foundation on which the edifice of a joint theatre command will stand in whatever shape it takes. It needs a robust troika of service doctrines that aim to fight jointly, while retaining their core competencies specific to the domain they operate in. Any joint structure must give the latitude to exercise these competencies freely.

The Russo Ukraine War and Doctrinal Upheaval

Are the lessons that emerge at strategic, operational and tactical levels valuable for us? We could wager to say yes. Is there a need to seriously question our doctrinal precepts? That needs study for some time after the war has long ended, to derive correct doctrinal lessons. The failure- if it is termed as one; of the air land battle needs to be looked at in the correct context. Any Western air force would have gone in with counter air operations (CAO) with suppression of enemy air defence (SEAD) that is the building block of successful air land operations. The latest IAF Doctrine clearly enunciates the need for coordinated air operations with the sister services for the furtherance of their objectives that comprise of Air Land operations and Maritime Air operations (referred to as counter surface force operations – CSFO, in earlier versions of the Doctrine). Success of coordinated air operations with the other services hinge upon well executed counter air operations. The preponderance of Soviet armour in the Cold War era had prompted the West to invest in airpower to counter it. However to be able to successfully attrite it, the air force would need to tackle the enemy air force and the surface to air missile(SAM) envelope at the same time. Russian ground forces got mauled by high mobility artillery rocket systems (HIMARS). This was partly because of the absence of a focussed campaign to control the sky and then take out these launchers from medium/high levels using precision weapons and accurately delivered iron bombs after getting precise intel with well planned ISR missions. The Russians got mired

in a running armour and artillery battle in built up areas fighting street by street that nullified the advantages of mobility and firepower. This was further complicated by weather that restricted the Russians' mobilisation to roads and highways, allowing Ukrainian ground forces to cause heavy attrition. The Ukrainian ground air defence units had a formidable low level capability. A hurried attempt to support the faultily planned ground offensive, forced the Russians to fly into the envelope of MANPADS, causing attrition and also giving Ukraine the handle to win the narrative war by shooting down some aircraft. The Russians followed a classical Soviet era methodology of air primarily supporting the ground, without taking care of the objective to win the skies alongside. The long drawn battle for Bakhmut is now a fight reminiscent of the battles in WW II for the control of cities. Here, the capabilities of both the air and land forces are seriously debilitated, bringing to fore the question – what is the best way to plan air land operations that allows the accrued advantages of modern air and ground forces to play out with freedom. It is a question that probably challenges even the USA.

A Mirror for Us?

A similar sequence of events could also play out in our context in the plains sector, where the density of population and built up areas along the border will force a funneling effect on ingressing ground forces. Counter Surface Forces Operation (CSFO) in such a scenario is a difficult task that even the US found out to its discomfort, while flying Apache attack helicopters at low levels over the insurgent held cities of Iraq. That too when they had absolutely no threat of any enemy air interference. The central idea being that while CSFO is extremely important, it will succeed only if it is supporting a well planned and phased out ground campaign, and not as a last ditch effort to pull the ground forces' chestnuts out of the fire. CSFO serves to speed up the progress of ground operations. It is an enabler that needs a good ground plan in the first place. To be effective in interdiction and close support, it needs a degree of freedom to operate in its chosen height envelope and still be effective. That freedom is provided by Counter Air Operations (CAO). For the above to unfold as desired, we first need to accept the fact that a defensive line based on built up areas along with natural and manmade obstacles, with little space for our mechanized forces to manoeuver and bypass will bog us down due to terrain friction. Despite the long thrust lines we make on the maps in our war games, it is improbable that we would be able to penetrate deep enough. Conversely, we also need defences to prevent shallow thrusts of enemy mechanised forces, since losing territory of any manner is anathema in our lexicon. This is a repeat of what is happening in Ukraine - fixed, nearly frozen frontlines reminiscent of World War I.

Hot Disputed Borders and a Surface Centric Narrative

In the predominantly surface centric narrative that is generally spoken of, we need a plan that allows a speedy victory and denying the enemy an opportunity to grab significant portions of our territory. Taking the terrain friction and force ratio into account, neither will we be able to take much territory, nor will we be able to deny the oft repeated 'Notion of Victory' to the adversary by preventing any loss of territory. Is the dominant thought in the hierarchy of the military that of total denial of any territory to the enemy? Would we be able to hold on to every inch of land? We probably need to go back to the drawing board and think on what exactly is territorial integrity.

What would be the ends we seek and the strategy to achieve them?

The IAF is probably best suited to break this deadlock by hitting the enemy deeper inside and addressing targets of all variety that would complement the overall war effort. This would force the adversary to rethink his strategy as he faces punishment in other areas that constitute national power, apart from his fielded forces. By reducing the narrative to just 'hot disputed borders', hence the narrow focus on only what lies in front will be a disservice to the urgent need to expand our thinking and responses beyond the traditional surface centric. It is here that we need a serious doctrinal review by all services.

Taking the current emphasis on revising our doctrines and keeping the ongoing Russo Ukraine conflict in mind the Armed forces need to ponder over the following issues at this juncture, which are restricted to just one of our adversaries to keep the scope of the article limited:-

- What is the capability of our mechanised forces to penetrate the heavily populated and built up areas with multiple obstacles such as mine fields, rivers, canals and obstacles the adversary has constructed?

- What is the depth we need to penetrate to ensure we achieve our objectives?

- If that be the case, what are the chances of the thrust lines getting stuck on multiple obstacles and then being pounded by the enemy air and ground forces?

- If we are sure that this is a difficult scenario and one most likely to play out, what is expected of the IAF to keep the enemy air force out of the equation? - If the IAF does manage to keep the enemy air force's interference down to acceptable levels, how would the Army still tackle the ground defences of the adversary?

- Do we even have sufficient forces which give us an option of having a potent offensive formation free to exploit gaps in defences after the rebalancing of forces on both fronts?

- Hence the way we fight probably needs to change and we need to think beyond only surface centric, value objective based plans to capture certain towns or geographical features. What are these value objectives? Are we even capable of reaching them in a scenario of near parity? Hence, alongside these plans, we also need to target the enemy with concentrated Strategic Air operations that hit him in his soft underbelly – his economy and will to fight. The IAF can hit targets deep inside along with the CAO and CSFO running concurrently. This could be ably supported by the long range vectors of the Navy and Army.

- The way we plan to capture value territory that usually is a population or infrastructure centre, we would get embroiled in an attrition battle with the enemy in built up areas, which are difficult to support for both the artillery and airpower. We may flatten towns like the Russians are doing with artillery; however is that the way to fight is still a moot point considering the effort and resources required. The plains of North India and the mountains allow very less manoeuver space to the ground forces. So how should the ground campaign be planned and executed to ensure complete victory? After all going into a war without that sole aim is a very costly endeavour for little territorial gains for bartering later.

- Coming back to Russia and Ukraine and the ongoing war as a case study, the very fact that the Russian and Ukrainian armies are slugging it out in a war with nearly fixed frontlines, lays bare

the theory of manoeuver warfare that we learn at our training institutions. Are we practicing tenets of manoeuver warfare in reality? By keeping the debate land centric, are we missing out on manoeuver from the sea, air or even in the enemy's mind?

- The war has now been reduced to a war of wills. Ukraine cannot surrender as they would cease to exist. Russia cannot stop fighting and accept a stalemate because that will finish Putin. The West has smartly engaged Russia and will not allow it to disengage. It supports Ukraine just enough for it to fight another day. It points to a plan that has been reduced to a hard grind and attrition. The failure of the air land campaign may also be partly because of the lack of freedom to another combat force to do its job freely and ensuring that objectives are achieved by shaping the battlefield.

- A stalemate in the air may also be an acceptable outcome if complete victory in the air is not achievable. There is no major threat of the Ukrainian air force hitting the Russians, even though the Russian air force is also supposedly underperforming at the same time. This leaves the supposedly superior army of Russia to deal with the Ukrainian army without an air threat apart from drone attacks. Hence, does it point towards poor ground strategy and a failure of the Russian army to conduct operations? If both air forces are ineffective due to a stalemate, then the Russian army should be able to defeat the weaker Ukrainian army with little to worry of threats from the air.

- The lesson we need to learn is that it is no longer about just an air land campaign. It is about a whole of nation approach by first defining achievable objectives, the time frames required to achieve them and then addressing a system of targets spanning from the fielded forces, to political hierarchy, physical and electronic infrastructure, economy and whatever else it takes to ensure the enemy succumbs to our will. Airpower can address all of these, as can sister services to an extent. Resilience to attrition and logistical stamina is the key to long drawn wars.

- Just like the armies struggle to find answers to weapons like HIMARS that hit their artillery and armour, so is the question about credibility to tackle modern SAM threats for the air forces. However, TTPs and weapons combined will need to be refined to keep attrition to an acceptable figure while pressing home the attack. Resilience to attrition and logistical stamina is the key to long drawn wars.

Control of Air and Counter Surface Force Operations

This is a debate that will take some time and convincing to settle. A counter air campaign is a desirable campaign to commence the war with. However, that does not preclude the commencement and prioritisation for coordinated air operations in the form of CSFO if the situation so demands. A perverse fallacy exists that the IAF is desirous of fighting a private battle against the enemy air force, whereas facts and history speak otherwise. In 1965, the IAF prevented Pak armour to break through in the Fazilka sector, where our army was under extreme pressure. Maximum effort was put into CSFO, choking the Pak offensive. Similarly the Pak offensive in Chhamb in 1971 was countered by the IAF without adequately suppressing enemy air opposition. Despite the attrition suffered, it continued to carry out CSFO in support of the army, preventing the severing of the valuable highway. This fallacy

attempts to challenge one of the basic dictums of airpower doctrine of any country – that air power can simultaneously address and execute multiple campaigns. While control of air is certainly a primary objective, the IAF is sanguine that CSFO has to be provided adequately if the situation demands, even if control of the air is not yet established. However, it is also important to understand that a successful CSFO campaign hinges on a requisite degree of control of the air.

Ideally Conjoint

Taking the argument further into the maritime domain, the navy would be able to carry out its operations with greater freedom if the CAO campaign of the IAF is able to degrade the enemy airfields closer to the coast. This allows the navy to come closer to enemy shores and launch attacks on shore based targets. This is what we need to do, when we speak of a conjoint campaign in which the strengths of one service are harnessed to allow the other service to exercise its strengths. This comes by understanding the core doctrinal precepts of that service which are never to be compromised. Else, it is reduced to just rhetorical questioning that has no answers.

The Question of Air Dominance and Air Denial

In the IAF doctrinal lexicon air supremacy (instead of air dominance) as the highest degree of control of air is always to be aspired for. However we would be pragmatic in saying a favourable air situation, limited in time and space is a more achievable immediate objective for the initial part of the war. Multiple forays achieving specific objectives with a favourable air situation will gradually allow the air force to achieve higher degrees of air control. In our context it would not be a quick affair as was the case with the Israeli air force catching the Egyptians off guard in the Six Day War.

Air power is essentially offensive in nature. Air denial may keep the enemy air at bay for a while over a certain area, but not for the duration of the war and certainly not everywhere. Air denial will not win us the war, as it is a defensive strategy that at best can be successful for a while. It will not destroy the enemy air force and he will always exploit gaps in defences. A denial strategy for the ground forces will have to be carefully tailored in time and space to allow freedom to own air force to target enemy air and ground forces in the depth. It cannot be at the cost of freedom of operations for our own air force in the same volume of airspace. The Egyptians had success with limited air denial over an area for a while in the Yom Kippur war, but the Israelis quickly found a way to penetrate the ground air defence (AD). Similarly the Americans in Vietnam gave birth to the Wild Weasel tactics to defeat a formidable Vietnamese AD. Seeing a faulty air land campaign in the current conflict should not push us to be quick in questioning time tested concepts of aerial warfare. Some blame can be placed at the foot of the Soviet doctrine of air land battle that tied the air force to the immediate ground war, giving it little freedom to exercise its full spectrum of capabilities. While air denial is certainly a part of the overall concept of operations, control of the air would always be desirable at the outset. These go hand in hand and cannot be separated. The IAF is essentially an offensive force and doctrinally believes that control of the air achieved by offensive action is the best way to achieve joint objectives. It has the wherewithal to prosecute simultaneous offensive and air defence operations. The capability of the IAF to carry out operations on a large scale was demonstrated in Exercise Gagan Shakti in

2018. The scale of the exercise was impressive. 11,000 sorties were carried out of which 9,000 were by fighter aircraft. It was conducted over land and sea covering the entire Western and Northern Borders. An important element of this Exercise was to conduct joint operations with the Indian Navy and the Indian Army as per the joint military doctrine announced last year. What is of interest in this statistic is the huge volume of sorties carried out towards CAO, with a focussed effort for SEAD, and support to surface forces simultaneously in an offensive posture.

A Maritime Parallel

In maritime terms a similar parallel can be drawn for sea control and sea denial. The Doctrine of the Navy explains that sea control is a situation that is for a limited time and defined sea area for the immediate objective at hand, while denying the enemy its use. Having achieved the objective the naval force would move away, akin to a favourable air situation. Command of the Sea unqualified by time and space is closer to air dominance and the situation may be rarely, if ever achievable. Sea denial on the other hand is done to prevent the enemy using a sea area for a certain time, when it is not in use by own forces. Air denial can be done for time periods when our own air force is not in the vicinity, and it can never be a perpetual state.

In the absence of a National Security Strategy, the services derive objectives as spelt out by the higher directives depending on the threats faced. The former Army Chief, Gen Naravane has gone on record saying it is time for publishing such a document to serve as a guide to planning the defence of our country that would provide guidance to any changes in the defence structure. It must be remembered that service specific doctrines lay the foundation for that service to be an effective fighting force. Core competencies of any service should not be compromised at the outset to fit forcibly into a rigid joint structure which does not allow freedom to operate effectively. It is most important to be integrated and joint, but by harnessing the strengths of each service and addressing their core concerns in a healthy and fair debate. Writing doctrines that supersede established service doctrines, before even the conceptualisation of a theatre structure, would be putting the cart before the horse and would be counterproductive..

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Air Power

IAF Aircraft Rescues 121 Indians in A 'Daring Night Operation' in Conflict-Torn Sudan

Rajat Pandit | 29 Apr23

Source: Times of India | https://timesofindia.indiatimes.com/india/iaf-aircraft-rescues-121-indians-in-a-daring-night-operation-in-conflict-torn-sudan/articleshow/99853135.cms

NEW DELHI: In a “daring night operation”, a C-130J 'Super Hercules' aircraft of the Indian Air Force rescued 121 Indians from a small airstrip at Wadi Seyidna airport, which is about 40-km north of Khartoum in Sudan, on the intervening night between Thursday and Friday.

“The passengers included medical cases,

including a pregnant lady, besides those who had no means to reach Port Sudan," IAF spokesperson Wing Commander Ashish Moghe said on Friday night.

The convoy to the airstrip, where a Turkish evacuation plane had come under fire from one of the warring factions, was led by the Indian defence attaché who was in continuous touch with IAF authorities all along till they reached the airstrip at Wadi Seyidna, as part of the ongoing Operation Kaveri to evacuate Indian nationals from conflict-torn Sudan.

"The airstrip had a degraded surface with no navigational approach aids or fuel and most critically landing lights, which are required to guide an aircraft landing at night," Wing Commander Moghe said.

The Indian C-130J aircraft used electro-optical and infrared sensors to ensure that the runway was free from any obstructions and no inimical forces were in the vicinity while approaching the airstrip.

"The C-130J aircrew carried out a tactical approach on night-vision goggles (NVGs) on a practically dark night. Upon landing, the aircraft engines were kept running while eight IAF Garud commandos secured the passengers and their luggage into the aircraft. As with the landing, the take-off from the unlit runway was also carried out using NVGs," the IAF spokesperson said.

"This approximately two and a half hour operation between Wadi Seyidna and Jeddah will go down in the annals of IAF history for its sheer audacity and flawless execution, akin to that carried out in Kabul," he added.

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Japan Orders SDF to Prepare to Shoot Down North Korean Rockets

Jesse Johnson | 22 Apr 2023

Source: Japan Times | https://www.japantimes.co.jp/news/2023/04/22/national/japan-shoot-down-north-korea-satellite/

A Self-Defense Forces soldier takes part in a drill to mobilize the Patriot Advanced Capability-3 (PAC-3) missile unit in response to a missile launch by North Korea, at the U.S. Air Force's Yokota Air Base in Fussa, Tokyo, in August 2017. | REUTERS

Defense Minister Yasukazu Hamada on Saturday ordered the Self-Defense Forces to be ready to shoot down a North Korean rocket or spy satellite should it appear likely to fall on Japanese territory.

North Korean leader Kim Jong Un's recent order for the launch of the country's first military spy satellite, without giving a time frame, state-run media reported. But Kim said the satellite had already been built and ordered officials to speed up preparations for its launch, a hint that it could come soon.

Hamada ordered the SDF to make needed preparations ahead of any possible "order for the destruction of ballistic missiles" or other objects, the Japanese Defense Ministry said in a statement.

In order to "limit the damage, should a ballistic missile or other object" look set to fall on Japanese territory, the preparations include sending Patriot Advanced Capability-3 (PAC-3)

ground-based missile-defense batteries to parts of Okinawa Prefecture, as well as deploying Maritime Self-Defense Force's Aegis destroyers, which are equipped with SM-3 interceptors, to waters around Japan.

No country has ever attempted to shoot down a North Korean rocket or ballistic missile, despite Pyongyang's history of provocative launches, including lobbing weapons over Japan — something that last occurred in October. The Defense Ministry said it did not take steps to destroy that missile since it had judged that it would not fall within Japanese territory.

Japan possesses or utilizes through its alliance with the U.S. a wide array of space-, sea- and ground-based radars and other sensors that are capable of quickly detecting and determining the general trajectory of most North Korean missile launches.

Its SM-3-equipped Aegis destroyers are designed to shoot down ballistic missiles in the early stages of flight, while the PAC-3 systems — which have a range of 30 kilometers — are used to intercept missiles that evade the SM-3 layer and are seen as the last line of defense.

Observers say that attempting to shoot down a North Korean missile or rocket carrying a satellite could open up the possibility of escalation. Such an attempt would also potentially reveal Japan's hand, showing off Tokyo's detection and interception capabilities to eager watchers in Pyongyang.

Aside from the obvious issue of damage, if an interceptor were to miss its target, it would also throw into question these capabilities, stoking concern not just in Tokyo, but with Washington and its allies and partners, who also have American-made defense systems such as the SM-3 and PAC-3.

Nuclear-armed North Korea has fired off a spate of missiles this year, a diverse mix that includes powerful intercontinental ballistic missiles and defense-evading shorter-range weapons.

The country last launched a satellite in February 2016, with Japan labeling that a thinly veiled test of ICBM technology and ordering Aegis destroyers and PAC-3 units to shoot it down should projections show components falling in Japanese territory.

In a possible sign of the reaction from Pyongyang should any intercept attempt be made, Kim Yo Jong, the North Korean leader's sister, warned in March that any move by the U.S. or others to shoot down one of its "strategic weapons" over international waters would be regarded as "a clear declaration of war.".

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China Says Conducted Mid-Course Missile Interception Test

15 Apr 2023

Source: ABC News | https://abcnews.go.com/International/wireStory/china-conducted-mid-missile-interception-test-98603053

BEIJING -- China says it carried out a successful ground-based mid-course missile interception test in an apparent sign of progress in its ability to bring down weapons incoming from space.

The Defense Ministry says the operation was carried out late Friday night within Chinese territory and achieved "the desired test objective."

The test was "defensive in nature and not targeted against any country," the ministry said, giving no other details such as whether it actually struck an object, how many interceptors were fired and where they landed.

Such systems, which consist of ground-based interceptor missiles and a huge array of radars and fire control systems, aim to bring down ballistic missiles, including ICBMs carrying nuclear or other warheads, while they are flying in space midcourse on the way to their targets.

Referred to by the U.S. as ground-based mid-course defense, or GMD, such systems are hugely complex and expensive to build, test and maintain, and China's capabilities in the field are not well known.

Previously, the Defense Ministry issued a near-identical statement announcing it had conducted just such a test on Feb. 4, 2021, which it said had also met its goals. Another Chinese test reportedly took place in 2018.

Such "kinetic-kill" interceptors can also be used as anti-satellite weapons, and China sparked considerable criticism when it used such a missile to destroy a defunct Chinese weather observation satellite in early 2007. China did not announce the operation and the explosion left a massive debris field that continues to imperil objects in orbit, including China's own space station, Tiangong.

China's military-run space program and missile development efforts are intimately linked and it is believed to have used satellite launch centers to conduct missile tests.

China already has one of the world's largest arsenals of all types of missiles and is believed to be expanding it rapidly. A Pentagon report released last year said China currently has about 400 nuclear warheads and that number could grow to 1,500 by 2035.

GMD forms a major component of missile defense for the U.S. military, which has put it through additional testing in response to North Korea's increasing number of missile tests.

The U.S. has 44 interceptors deployed at Fort Greely, Alaska and Vandenberg Air Force Base, California intended to cover the entire American homeland, according to the U.S. Department of Defense's Missile Defense Agency.

That's enough to counter a rogue attack from a country such as North Korea, which is developing missiles that could strike the continental United States, but would be easily overwhelmed by a large-scale attack from Russia or China.

North Korea said Friday it flight-tested a solid-fuel intercontinental ballistic missile for the first time, a possible breakthrough in its efforts to acquire a more powerful, harder-to-detect weapon targeting the continental United States.

U.S. tests have shown such systems are far from infallible and that roughly three interceptors must be fired to bring down one incoming missile.

The U.S. also operates the Patriot and THAAD anti-missile systems that cover a smaller geographic area.

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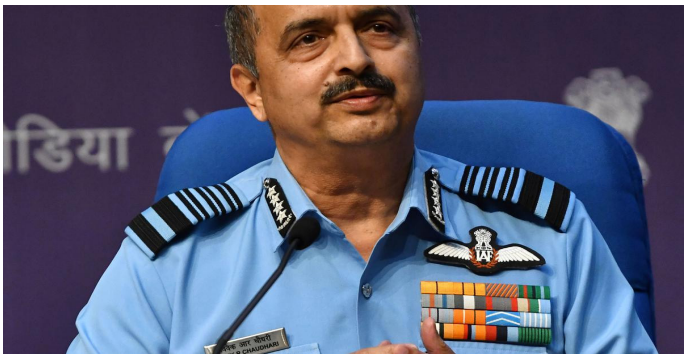
Citing Balakot Air Strike, Air Chief Says Air Power has Opened Up Response Options for the Leadership

Dinakar Peri | 18 Apr 2023

Source: The Hindu | https://www.thehindu.com/news/national/balakot-has-demonstrated-air-power-can-be-effectively-used-in-no-war-no-peace-situation-air-chief-marshal-chaudhari/article66750388.ece



Air Chief Marshal V. R. Chaudhari. File | Photo Credit: The Hindu

Operations such as Balakot have also demonstrated that given the political will, air power can be effectively used in 'no war no peace situation' under the nuclear overhang without escalating into a full-blown conflict and has opened up options for the leadership, said Indian Air Force (IAF) Chief Air Chief Marshal (ACM) V. R. Chaudhari on Tuesday while stating that to see first and see clearly, to reach first and reach farthest and to strike first and strike with precision will be the mantra for fighting modern wars.

"This is very important due to the nature of our adversaries. The response options available to the leadership have suddenly increased and increasingly air power has become an option of choice due to inherent flexibility and unmatched precision strike capability. Aerospace control and dominance will become a crucial factor in future battlespace operations," ACM Chaudhari said speaking at the Marshal of the IAF Arjan Singh seminar organised by the Centre for Air Power Studies.

Further he said that India's security concerns necessitate that it puts in place adequate military power that has the ability to "achieve deterrence, ensure information dominance, coerce when needed and provide multiple response options."

The foremost lesson that can be drawn from the 20th century and the early 21st century is that no war can be successfully prosecuted without aerospace power, the Air Chief stated. "Attributes of aerospace power enable the leadership to formulate an appropriate strategy with due cognizance given to the desired end state, conflict termination criteria and escalation matrix."

If the world is becoming increasingly volatile, uncertain, complex and ambiguous, we must build counter, ACM Chaudhari said while noting that it must be acknowledged that wars of the future will be fought differently. Adversaries will use both lethal as well as non-lethal weapons and wars will be fought across multiple domains and will not distinguish combatants and non-combatants, he stated.

"Future battlespace will be very complex with very high dependence on technology, asymmetric nature of threats, expanded battle spaces, high tempo of operations, enhanced lethality, compressed sensor to shooter cycles, and of course media scrutiny."

The right lessons from Pulwama and Balakot

In this regard, he elaborated on what air power brings to the table. "Attributes of high speed, reduced response time, long reach, increased mobility, technological intensity, reduced response time, Precision firepower, shock effect, ability to operate across domains and network centric operations make air power have made aerospace power formidable component of a nation's military might," the Air Chief noted.

The seminar is an ode to late Marshal of the IAF Arjan Singh who was the Air Chief when the IAF saw action in 1965. He was only 44 when entrusted with the responsibility of leading the force. He was made Marshal of the IAF in 2002.

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Space

China Plans Full Reusability for its Super Heavy Long March 9 Rocket

Andrew Jones | 27 Apr 2023

Source: Space News | https://spacenews.com/china-plans-full-reusability-for-its-super-heavy-long-march-9-rocket/

New models of the Long March 9 (center) and Long March 5G crew launcher (left) at the Zhuhai Airshow 2022. Credit: OurSpace

HELSINKI — China is planning to make a fully reusable version of a rocket designed to launch infrastructure and deep space missions.

Presentations at events marking China's national space day in the city of Hefei, Anhui province this week reveal that plans for the Long March 9 rocket include developing an apparently Starship-inspired fully reusable version.

China is now targeting 2033 for first flights of a three-stage Long March rocket powered by numerous full flow staged combustion methane engines on the first stage, capable of carrying 50 tons to lunar transfer orbit, or 35 tons when the first stage is recovered.

The rocket is being developed by the China Academy of Launch Vehicle Technology (CALT). The initial version will be 114 meters long, have a mass at liftoff of 4,400 tons and generate 6,100 tons of thrust.

This will be followed by a two-stage variant

capable of carrying 150 tons of payload to low Earth orbit (LEO), or 100 tons when landing the first stage. A fully reusable, 80 tons to LEO variant will be the ultimate objective, expected to fly in the 2040s.

The presentations followed just days after the first integrated launch of SpaceX's Starship, which ended with the flight being terminated minutes later. Engineers from CALT yesterday published a preliminary analysis of that flight.

China had previously aimed to debut an expendable Long March 9 rocket using 500-ton-thrust kerosene-liquid oxygen engines around 2028-2030.

However the Long March 9 project has evolved in the last couple of years from an initial expendable, more traditional Long March-style rocket kerosene-fueled rocket featuring a 10-meter-diameter core and four 5-meter-diameter boosters presented in the early 2010s, to a single stick versions powered variously by kerosene or methane engines.

CALT announced late last year that plans for an expendable version had been scrapped and that the structural design had been finalized.

Now, CALT appears to be sticking with methane-liquid oxygen propellant, with two and three-stage variants, with the ultimate goal being a Starship-like fully reusable version in the 2040s.

The change in direction means delays in acquiring the rocket's capabilities, which could delay the country's planned International Lunar Research Station (ILRS) project.

China is also developing the Long March 10 which could have a first flight around 2027 and could, with a pair of launches, be able to send a crew to the lunar surface before the end of the decade.

The Shanghai Academy of Spaceflight Technology (SAST), the other rocket-designing arm of China's main space contractor, CASC, has also pitched large, reusable methane-powered rocket designs.

The future Long March 9 has been touted as useful for launching components for a space-based solar power station in geostationary orbit. Reusable super heavy-lift rockets could make the related launch costs much more manageable, while still needing to solve a range of technical, engineering and financial issues surrounding such a venture.

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Russia Commits to ISS Extension to 2028

Jeff Foust | 27 Apr2023

Source: Space News | https://spacenews.com/russia-commits-to-iss-extension-to-2028/

The International Space Station as seen from a Crew Dragon spacecraft in 2021. Credit: NASA

WASHINGTON — The Russian government has agreed to continue participation in the International Space Station to at least 2028, the last partner to agree to an extension of the station's operations.

NASA said April 27 that Russia had confirmed it will support the station through 2028. The other partners — NASA, the Canadian Space Agency,

European Space Agency and Japan Aerospace Exploration Agency — had previously agreed to keep the station going beyond 2024 to 2030.

Roscosmos announced April 25 that Yuri Borisov, head of the agency, had sent letters to the leaders of the other space agencies involved in ISS, informing that that the Russian government had agreed to an extension.

"The ISS program is the largest and most successful international project in the field of space, and I am glad that such a unique laboratory will continue its work and will contribute to the realization of the most daring ideas of mankind in space exploration," he said in translated remarks published by Roscosmos on social media.

"The International Space Station is an incredible partnership with a common goal to advance science and exploration," said Robyn Gatens, director of the ISS division at NASA Headquarters, in a NASA statement. "Extending our time aboard this amazing platform allows us to reap the benefits of more than two decades of experiments and technology demonstrations, as well as continue to materialize even greater discovery to come."

Russia's future on the station had been uncertain as Roscosmos discussed plans to develop its own national space station in the latter half of the 2020s. Borisov, shortly after being named head of Roscosmos in July 2022, said that Russia would leave the partnership "after 2024," which many interpreted to mean immediately after 2024.

Borisov soon softened those remarks, saying that Russia would leave at some time after 2024. He, though, was skeptical that Russia would be involved through 2030, the date set by NASA and accepted by other partners, citing a lack of research it needed to perform on the station and the health of some of the station's aging modules.

Others at Roscosmos offered similar remarks. "After 2024' could mean 2025, 2028 or 2030," said Sergei Krikalev, executive director of human space flight programs at Roscosmos, at a NASA briefing in August. "The decision about the termination of the program will be based on the technical condition of the station and assessment of outcomes."

NASA Administrator Bill Nelson did not mention the Russian statement in testimony before the House Science Committee April 27 about the agency's fiscal year 2024 budget request, but did emphasize, as he has repeatedly done since Russia's February 2022 invasion of Ukraine, that a good working relationship continues with Roscosmos.

"We built it together and we have to operate it together," he said of the U.S.-Russian partnership on the station. "That goes on today without a hitch."

The partnership continues, he said later in the hearing, despite technical issues such as coolant leaks on Soyuz and Progress spacecraft while docked to the station. "We think they are on top of it," he said. "I can't tell you if that's a design issue or if it was a production issue." He added that NASA, working with Roscosmos, "had pretty well ruled out" that it was caused by a micrometeoroid impact, Russia's initial explanation for the Soyuz leak in December.

"There has not been a problem of transparency between the two of us," he said of the space station relationship. "We built the station together. We operate it together. Both the astronauts and the

cosmonauts know we have to continue to work together for the safety of the crew."

The cooperation, he said, requires an extension of a long-standing waiver to sanctions imposed by the Iran, North Korea, and Syria Nonproliferation Act (INKSNA) so that NASA can provide funding to Russia. That waiver was initially linked to payments for Soyuz seats NASA purchased from Roscosmos, but today seats between the agencies are bartered with commercial crew vehicles now in operation.

Nelson did not directly address a question about the need for another INKSNA extension posed by Rep. Brian Babin (R-Texas) at the hearing, but again emphasized the need for integrated crews on Soyuz and commercial crew vehicles so that NASA and Roscosmos are guaranteed a presence on the station.

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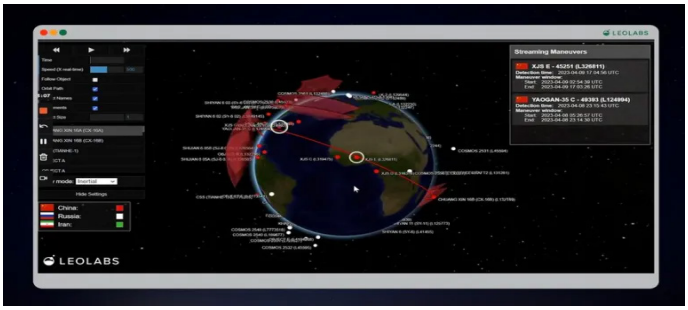
Leolabs Highlights On-Orbit Maneuvers

Debra Werner | 21 Apr 2023

Source: Space News | https://spacenews.com/leolabs-highlights-on-orbit-maneuvers/



The LeoLabs dashboard shown offers alerts when Chinese, Iranian or Russian spacecraft maneuver in low Earth orbit. Credit: LeoLabs

COLORADO SPRINGS – A LeoLabs maneuver-detection dashboard displayed at the 38th Space Symposium tracked the location of about 30 Chinese, Iranian and Russian spacecraft in low-Earth orbit.

The dashboard showed, for example, an experimental Chinese spaceplane that had lowered its altitude in the last two weeks from about 600 kilometers to about 300 kilometers.

"We believe this spacecraft is getting ready to reenter," Kohei Fujimoto, director of LeoLabs Japan, told SpaceNews.

Detecting Maneuvers

Whenever one of the Chinese, Iranian or Russian spacecraft maneuvered and then passed over one of LeoLabs' six radar sites around the world, the dashboard highlighted the move, estimated its timing and displayed the spacecrat's new orbital parameters.

"If you're unaware of maneuvers, they can catch you by surprise," said Dan Ceperley, LeoLabs CEO and co-founder. "But most of them are routine. If you get out in advance of it and you're not surprised, that's where we can drive sustainability and deterrence. If there are no surprises, that takes down the likelihood of conflict and debris-generating activities in space."

LeoLabs tracks objects in low-Earth orbit with phased array radars in Alaska, Australia, Portugal's Azores archipelago, New Zealand, Texas and Costa Rica. An additional radar in Argentina is scheduled to come online this year.

Software Layers

In addition, LeoLabs has developed software to sifts through the radar data to map low-Earth orbit and provide, what Ceperley calls, "space behavior awareness at scale."

The population of operational satellites in low-Earth orbit is growing rapidly.

"Now, there's close to 7,000 and we should hit that 10,000-satellite mark this year," Ceperley said. To prevent on-orbit collisions, "everything has to scale, including space domain awareness and space traffic management," he added.

LeoLabs processes the radar data quickly thanks in part to cloud computing.

"You can process the data at scale because we're working in the cloud," Ceperley said. "It's very straightforward to scale up as the number of satellites grows."

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Ukraine's Lessons for Military Space

Debra Werner | 19 Apr 2023

Source: Space News| https://spacenews.com/ukraines-lessons-for-military-space/

The 2023 Space Symposium international military panel discussion included: U.S. Air Force Lt. Gen. David Julazadeh, deputy chief of staff for capability development for NATO's Supreme Allied Commander; Air Vice-Marshal Paul Godfrey, commander of the United Kingdom Space Command; and Lt. Gen. DeAnna Burt, U.S. Space Force deputy chief of space operations for operations, cyber and nuclear. Credit: Tom Kimmell Photography

COLORADO SPRINGS – Ongoing fighting in Ukraine continues to underscore the importance of combining military, civil and commercial space capabilities, international military space leaders said April 18 at the Space Symposium.

Ukraine has been able to fend off Russian forces with the help of space-based weather data, communications, GPS, intelligence, surveillance and reconnaissance, said Lt. Gen. Eric Kenny, Royal Canadian Air Force commander. Even the surface-to-air missiles Canada donated to Ukraine depend on space systems like GPS and satellite communications, he added.

At the outset of the war, commercial satellite imagery played a critical role in helping Ukraine and its allies counter Russian propaganda, said Air Vice-Marshal Paul Godfrey, commander of the U.K. Space Command.

When Russia claimed that Ukrainians killed their fellow civilians in the town of Bucha, Maxar Technologies' unclassified time-stamped satellite imagery appeared on the front pages of newspapers around the world in April 2022 to prove the claim wrong.

"We were able to fend off that false narrative," Godfrey said. "Do not underestimate the deterrent effect that that had on the Russians."

Protecting Commercial Assets

The war in Ukraine showed that commercial "entities can provide cost-effective and scalable solutions that meet some of NATO's intelligence requirements," said U.S. Air Force Lt. Gen. David Julazadeh, deputy chief of staff for capability development in NATO's Allied Command Transformation headquarters.

Because those contributions are so apparent, the war also "reinforced our need to protect and defend" commercial space assets, said Kelli Seybolt, U.S. Air Force deputy undersecretary for international affairs.

At the outset of the war, Russian forces targeted Ukraine's communications

infrastructure with missiles and cyberattacks on Viasat's KA-SAT and SpaceX's Starlink networks.

"So, it was significant for us to see how a proliferated LEO constellation could bring communications back," said Godfrey. "One of the more interesting things here, and it's well documented on Twitter by Elon himself, is the cyber-jamming attacks against Starlink throughout this and how resilient they have been as well. That is really something that we're looking at and trying to understand."

The U.S. Space Force, meanwhile, is focused on the cybersecurity of its own networks as well as working "with our allies and partners to defend our shared networks as we go forward in a coalition engagement," said Lt. Gen. DeAnna Burt, Space Force deputy chief of space operations for operations, cyber and nuclear.

For example, the Space Force is considering "how are we sharing cyber threat information across the coalition and the partnership so that we're all looking at ways to creatively exploit the capabilities that we have to defend against cyber," Burt said. Potential solutions include jointly buying or building unique cyber-defense systems," she added.

Close Relationships

Panelists cited specific civil and commercial space systems that have proven valuable in supporting Ukraine.

The Canadian government worked with MDA to supply data from the Canadian Space Agency's three-satellite Radarsat Constellation Mission "to show the Ukrainians where the Russians were advancing and to help with their targeting," Kenny said. Another Canadian company, Telesat, provided critical communications, he added.

"It shows the close relationship we need to have with industry as we move forward," Kenny said.

Gen. Hiroaki Uchikura, Japan Air Self-Defense Force chief of staff, said one of Japan's takeaways from the war is the need to "promote the utilization of private and commercial satellites by strengthening government-private cooperation."

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Ukraine Attempts to 'Hack' Russian Satellites With Help from 'Foreign Countries'

Atul Tripathi | 08 Apr 2023

Source: World Defence | https://world-defence.com/ukraine-attempts-to-hack-russian-satellites-with-help-from-foreign-countries/

Russian Satellite

On April 5, the Russian foreign ministry issued a statement highlighting Ukraine's alleged endeavor to interfere with Russia's civilian communication satellites, reported TASS.

"The Kyiv regime, with the participation of specialists from several foreign countries, is attempting to influence Russian civilian communication satellites," the foreign ministry said.

The ministry noted that such an act is a severe breach of international law, and Russia has the authority to respond suitably. Furthermore, Moscow highlighted that they have all the

required resources at their disposal to take action.

Satellites have played a significant role in the ongoing conflict between the two warring countries. Russia has greater capabilities in outer space compared to Ukraine

Based on what space experts have told EurAsian Times, there could be a possibility that Ukraine, with the help of Western countries, might interfere with data flow between Russian satellites and ground stations.

For example, in 2008, a ground station in Norway was subject to a cyberattack that caused 12 minutes of interference with NASA's Landsat satellites. Later that year, hackers took control of NASA's Terra Earth observation satellite and had complete access to it, with the exception of being able to give commands.

The Russian foreign minister has alleged that Ukraine is attempting to interfere with Russian communication satellites with the help of foreign experts.

Analysts believe that if the statement made by the Russian foreign minister is true, hackers may have the ability to deactivate the Russian satellite's communication, rendering it inoperable.

Alternatively, they could cause irreversible damage by depleting all of their fuel or directing their imaging equipment toward the sun to burn it out.

Russia has a long history of space exploration and has developed a range of advanced space technologies, including launch vehicles, satellites, and manned spacecraft. In contrast, Ukraine heavily relies on commercial satellite communication services primarily supplied by the US.

Reports suggest Russia has trouble launching pinpoint missile attacks during the ongoing confrontation with Ukraine. This is believed to be due to the underperformance of their military and communication satellite systems.

Also, the United States has accused a Chinese firm of assisting Russia's activities in Ukraine. Washington also urges the European Union and other partners to blacklist a Chinese satellite company for allegedly helping Russia's military actions in Ukraine.

The prospects for Russia's space industry appear gloomy as resources are fast depleting. Due to the conflict in Ukraine and disagreements with NATO. Roscosmos, the Russian space agency, has experienced a reduction in funding in recent years and is navigating tensions with other nations with significant space capabilities.

The sanctions currently in place restrict Russia's ability to import technology. Moscow has lost several launch agreements at its Baikonur Cosmodrome spaceport located in Kazakhstan.

Russia has also experienced a decline in business with the United States. NASA and its partners can now transport astronauts to the International Space Station (ISS) via SpaceX and Boeing spacecraft instead of using a Soyuz rocket.

Furthermore, the European Space Agency has severed ties with Roscosmos, particularly concerning the ExoMars mission.

Space, A Key Element In Russia-Ukraine War

The ongoing conflict between Russia and Ukraine is not considered the "world's first space war." This title was given to the Gulf War three decades ago. Since then, space technology has

become a routine aspect of modern warfare.

However, in recent years, there has been a trend towards outsourcing a significant part of space-related tasks to private companies due to their specialized expertise and ability to develop and implement certain types of space technology more efficiently.

This has led to an increase in the use of private satellites for both military and civilian purposes, allowing a single satellite to serve multiple functions simultaneously. Ukraine is currently utilizing commercial satellite services provided by the US-based company SpaceX.

Starlink, a satellite-based internet service provided by SpaceX, has become a crucial resource for the Ukrainian military, offering connectivity to troops deployed on the front lines of the conflict where traditional communication methods are unavailable.

Ukrainian officials have lauded the system, citing instances where Starlink was able to re-establish connections following the destruction of infrastructure by cruise missile attacks.

But, in February 2023, the US-based company said that it had taken some measures to prevent its Starlink satellite communication service from being used to operate drones, which are critical to Kyiv's military in fending off Russian aggression.

The announcement sparked outrage in Ukraine, with some accusing Elon Musk, the founder of SpaceX, of aligning with the Russians.

Russia alleged that the events in Ukraine had highlighted an extremely dangerous trend beyond the peaceful employment of space technologies.

Moscow frequently said that if American commercial satellites are used to support Ukraine, it could strike them, escalating its threats of retaliation to a new front that might affect American interests more directly.

SpaceX CEO Elon Musk has already mentioned that Starlink satellites have encountered sabotage attempts by Russia. This service enables users with a company terminal to receive internet connections through an expanding fleet of satellites in Low Earth Orbit.

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Global Aerospace Industry

Lockheed Wins Australia's Biggest Ever Space Contract, Worth Estimated $4B AUD

Colin Clark | 03 Apr 2023

Source: Breaking Defence | https://breakingdefense.com/2023/04/lockheed-wins-australias-biggest-ever-space-contract-worth-estimated-4b-aud/

This Lockheed satellite station near Armadale, NSW, is used for tracking, telemetry and control for a range of customers.

SYDNEY — Lockheed Martin has won Australia's largest-ever defense space contract, to build a satellite and ground station architecture for a program known as JP 9102, the Australian government announced late Monday.

The previous government had planned to downselect from five to two companies at this stage, but the Defense Department here, in an

unusual move, announced that Lockheed had been directly awarded the contract for what is expected to be a $4 billion AUD ($2.86 billon) commitment to Australia's first sovereign military satellite program.

"Currently across Defence there is up to 89 capabilities which depend on satellite communications," the head of Australia's air defense and space systems division, Air Vice-Marshal David Scheul, said in the statement announcing the award. "Once delivered, the new system will increase the resilience, agility and flexibility of Defence's military satellite capability."

The Department of Defense release said the new system will include:

- New Defence Department controlled and operated geo-stationary communications satellites
- Multiple ground stations across Australia
- Integrated Satellite Communications Management System
- Two new satellite communications operations centers.

The last point is particularly notable, as until today, it had not been clear if ground systems would be included in the final contract.

The Australian Defence Force does have other defense satellite communication options today, but they are not robust. It owns a communications payload aboard an Optus C-1 satellite, which it is nearing the end of its projected operational life; the military also bought access to 20 channels on Intelsat IS-22, a deal that runs out in 2024. (It does have access to the Boeing-built WGS defense constellation, having paid to build one of the satellites, but getting access to the constellation in a timely manner has been problematic.)

Lockheed has experience as the prime for the AEHF secure satellite communications network, which the Australian Defence Force currently has access to thanks to an international agreement. Their solution has been optimized for data throughput, geographic coverage and survivability against counterspace threats.

"We are bringing to bear all of Lockheed Martin's companywide capabilities as well as our commitment to supporting allied nations to provide an operationally proven system that meets mission needs in terms of coverage, capacity, resilience and extensibility of the constellation," Robert Lightfoot, executive vice president for Lockheed Martin Space, said in a statement.

The American defense giant is teamed locally with a number of Australian companies for JP9102. Those include Inovor Technologies, EM Solutions, AV-Comm, Linfox, Shoal Group, Ronson Gears, Calytrix Technologies, Conscia, Clearbox Systems, DXC and Blacktree Technology to deliver ground and control segments and beyond for JP9102.

Blacktree Technology, an Australian owned communications solutions specialist, "will primarily support the Lockheed Martin Australia narrowband MILSATCOM ground segment," as Breaking Defense reported earlier. Meanwhile, DXC Technology, a leading global IT services company, will handle "development of ground and control segment cybersecurity architectures, including interfaces with existing hardware and external software elements."

Lockheed Martin has also partnered with the

Victorian Government to establish the state of Victoria as the engineering and technical hub for the company's JP9102 work. The company says that will create more than 200 advanced space industry jobs in the state.

Airbus, Boeing Australia, Northrop Grumman Australia and Optus (best known here as a mobile phone carrier, but it also is Australia's largest satellite operator) all were competing for the contract against Lockheed.

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Bharat Thinks Big on Military Exports to Africa: Tejas Jets, Akash Missiles, Combat Helicopters on Radar

03 May 2023

Source: Hindu Post | https://hindupost.in/business-economy/bharat-thinks-big-on-military-exports-to-africa-tejas-jets-akash-missiles-combat-helicopters-on-radar/

Bharat has introduced a holistic approach to push military exports to Africa, combining pitch for weapon sales with finance, training, infra development and soft-power.

The new initiative also calls for synergy between Bharat's development efforts and strategic outreach through Line of Credit (LoC) in 42 African Union countries. Bharat would be assisting in building IT & technical training institutes, schools, health centres, roads, railways and ports, etc., paving the way for supplying Made-in-India armaments.

Bharat has already messaged African Union members that its locally built armaments are far superior in quality and durability compared with Chinese armaments and much cheaper than Western defence systems.

To endorse Bharat's development and strategic outreach efforts External Affairs Minister Subramanyam Jaishankar visited Uganda and the Republic of Mozambique from April 10-15. He also made a brief stopover in Addis Ababa, Ethiopia on April 13.

The visit witnessed the opening of the India-assisted National Forensic Sciences University (NFSU) in Jinja, Uganda, the first imitative of its kind in Africa. The EAM also reviewed development projects related to railways, roads and bridge infrastructure projects and a pharmaceutical manufacturing facility in Mozambique.

The high-mobility military vehicles were also gifted to the Uganda Peoples' Defence Forces.

Peacekeeping has been a vital element of the India-Africa partnership since 1960. Over 6,000 Bharatiyas currently serve in peacekeeping operations in African countries. Bharat's decision to open 18 new diplomatic missions in Africa in the next few years, which will take the total number to 47, reflects its new Afro-centric approach.

To enhance defence exports and capacity-building efforts, Bharat hosted top military commanders and service chiefs from 31 member countries of the African Union to participate in the first India-Africa Army Chiefs' Conclave on 28 March in Pune. The Ministry of Defence said: "The Conclave focussed on joint training

and defence cooperation amongst the nations to evolve an institutionalised framework to enhance collaboration in the fields of joint military training, execution of peacekeeping operations; besides promoting Indian defence industries."

Additionally, the 2nd Africa-India Joint Exercise 'AFINDEX' was also held at Foreign Training Node, Aundh in Pune from March 16 to 29, 2023 with 124 participants from 25 African countries including Ethiopia, Egypt, Kenya, Morocco, Nigeria, Rwanda, and South Africa. On the sidelines of the exercise an 'Equipment Display' was organised in which 75 indigenous defence products from 32 domestic companies were showcased.

Currently, several African Union member countries regularly buy 'Made in India' armaments. The main buyers are Botswana, Burkina Faso, Egypt, Ethiopia, Mozambique, Mauritius, Namibia, Seychelles, Somalia, and South Africa. In some cases, Bharat has even gifted armaments and military equipment to Mauritius and Seychelles.

Several defence public undertakings regularly export defence equipment to Algeria, Egypt, Ethiopia, Ghana, Honduras, Kenya, Libya, Malawi, Mauritius, Myanmar, Namibia, Nigeria, South Africa, Sudan, Surinam, Tanzania, Tunisia, Uganda and Zimbabwe.

The government has also nominated a few Defence Public Sector Undertakings (DPSUs) as export promotion agencies for selected African Union member countries to promote defence exports. "Subject to strategic considerations, domestically manufactured defence products will be promoted through Government-to-Government agreements and Lines of Credit/ Funding," MoD adds.

Bharat is offering its key home-built weapons and platforms including Tejas fighters, light combat & utility helicopters, Akash missile batteries, artillery guns, Pinaka rockets launchers, besides, armoured vehicles, mobility vehicles, drones, loitering munitions, small arms, offshore patrol vessels, interceptor crafts, communication and surveillance equipment, etc for export to key African Union member allies.

Bharat has set an armaments exports target of $5 billion by 2025 to achieve self-reliance in developing and building weapons & platforms. While Bharat achieved $1.75 billion in defence exports in 2022 and is targeting $2.37 billion in 2023. The majority of armament exports will be executed by private defence companies.

One of the key MEA policy initiatives is to engage India Exim Bank to extend soft Lines of Credit (LoC) to Mauritius, Mozambique and Seychelles for the export of Bharat-built weapons & platforms. The Exim Bank branches spread across Africa are exploring facilitating need-based LoC for the export of aerospace, defence, and maritime equipment with other African countries as well. Bharat plans to export armaments and provide medical training to the armies of Botswana, Egypt, Kenya, Lesotho, Morocco, Namibia, Rwanda, Tanzania, Uganda and Zambia.

Interestingly, Nigeria will be the first country to buy unspecified numbers of indigenously built Light Combat Helicopters from state-run Hindustan Aeronautics Ltd through soft credit. Six officers from the Nigerian Army have already completed training on Chetak and Dhruv light helicopters at HAL's Rotary Wing Academy in Bangalore.

Besides promoting defence exports, Bharat is also focusing on capability building in agriculture and agro-processing, health and pharmaceuticals and disaster management and disaster management.

Bharatiya private companies mainly work in Africa under the Indian LoC projects through the Exim Bank of India. However, very few private companies want to invest their own money in Africa and instead, they want to pursue projects through grants only. For Bharatiya private companies, Africa has not fully emerged as a favourable destination..

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Indian Aerospace Industry

Indian Navy Partners With Raman Research Institute to Develop Secure Maritime Communications Using Quantum Technology

12 Apr 2023

Source: Swaraj Yamag | https://swarajyamag.com/defence/indian-navy-partners-with-raman-research-institute-to-develop-secure-maritime-communications-using-quantum-technology

Indian Navy warships (Pic Via Wikipedia)

The Indian Navy has partnered with the Bengaluru-based Raman Research Institute (RRI) to develop secure maritime communications using quantum technology.

The RRI, which is an autonomous institute of the Department of Science and Technology (DST), and the Weapons and Electronics Systems Engineering Establishment (WESEE), the R&D establishment of the Indian Navy, recently signed a Memorandum of Understanding (MoU) for a period of five years to work together on this project.

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Cabinet Approves Indian Space Policy 2023, Further Opens Up Sector to Private Players

Rajeev Singh | 06 Apr 2023

Source: India Today | https://www.indiatoday.in/science/story/cabinet-approves-indian-space-policy-2023-further-opens-up-sector-to-private-players-2356748-2023-04-06

The entry of the private sector in the space sector would enable the ISRO to channelise its focus on research and development. (Photo Credit: ISRO

By India Today Science Desk: The Central government approved the Indian Space Policy 2023 on Thursday. The policy seeks to institutionalise private sector participation in the space sector.

The entry of the private sector in the space sector would enable the ISRO to channelise its focus on research and development of advanced space technologies.

The Indian Space Policy was approved by the Cabinet Committee on Security chaired by Prime Minister Narendra Modi.

The policy also delineated the roles and responsibilities of ISRO, space sector PSU NewSpace India Limited (NSIL) and the Indian National Space Promotion and Authorization Center (IN-SPACe).

Talking to reporters Union Minister Jitendra Singh said, "In brief, the Indian Space Policy will offer clarity in the role of the components set up (in the recent past)."

Singh said the policy will allow the private sector to take part in end-to-end space activities that include building satellites, rockets and launch vehicles, data collection and dissemination.

The union minister also said strategic activities related to the space sector will be carried out by NSIL, a public sector undertaking under the Department of Space, which will work in a demand-driven mode.

When contacted, ISRO Chairman S Somanath told PTI that the focus of the Space Policy would be to increase the participation of the private players in the space sector.

The INSPACe, created recently, will be the interface between Indian Space Research Organisation and non-governmental entities, said Somanath.

The ISRO chairman said the policy also spells out the framework for the private sector to use ISRO facilities for a small charge and also encourages them to invest in creating new infrastructure for the sector.

He said ISRO will not do any operational and production work for the space sector and focus its energies on developing new technologies, new systems and research and development.

"This is a historic moment as the cabinet today approved the Indian Space Policy 2023. It will pave the way forward with much-required clarity in space reforms and augment private industry participation to drive the space economy opportunity for the country," said Lt. Gen. AK Bhatt (retd.), Director General, Indian Space Association.

"We have been waiting for it for quite some time, and today's announcement has come as a pleasant surprise. We keenly await and look

forward to going through the details of the policy. We would like to thank the prime minister for his visionary leadership with a special focus on long-due reforms in the Indian space sector," he added.

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Expedite Production of Tejas Mark-1A Fighter Jets, IAF Tells HAL

Ajay Banerjee | 02 May 2023

Source: Tribure India | https://www.tribuneindia.com/news/nation/expedite-production-of-tejas-mark-1a-fighter-jets-iaf-tells-hal-504178

Facing a shortage, the IAF wants Hindustan Aeronautics Limited (HAL) to speed up the production of Tejas fighter jets to meet the contractual obligation of producing 16 aircraft each year.

The IAF, HAL and the Department of Defence Production of the Ministry of Defence were part of a high-level review meet last month. The IAF wants HAL to produce a minimum of 16 jets each year to meet the contractual obligation of making 83 Tejas Mark-1A, sources said. Deliveries for the Tejas Mark-1A are to commence in February next year. HAL, with last month's capacity addition at Nashik, can now make 24 jets per annum.

In the past, a delay in the manufacturing of the first batch of 40 Tejas jets had left an erroneous impression. The IAF ordered 20 planes under a Rs 2,813-crore contract in 2006 and another 20 planes under a Rs 5,989-crore contract in December 2010. All 40 were to be delivered by December 2016. However, the deliveries were completed this February — seven years behind the schedule. The IAF has told HAL that the pace of making 16 jets has to be sustained. It presently has 31 squadrons (16-18 planes each) of fighter jets against a mandated need of 42 to tackle a collusive two-front threat from Pakistan and China.

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Indian Defence Needs Self-Reliance And Deeper Research To Ensure Strategic Autonomy

Vincent Fernandes | 04 May 2023

Source: Bizzbuzz News | https://www.bizzbuzz.news/eco-buzz/indian-defence-needs-self-reliance-and-deeper-research-to-ensure-strategic-autonomy-1215921?infinitescroll=1

Indian defence needs self-reliance and deeper research to ensure strategic autonomy

Elaborating on the global geopolitical turmoil, he pointed out that Japan, the UK, Russia, China, Germany, Poland, South Korea, among others, are significantly increasing their defence budgets. This could lead to a huge disruption in the global supply chains of military hardware. However, the situation provides a wonderful opportunity for Indian defence manufacturers to seize the initiative. Moreover, there is a huge demand for military equipment and hardware not only in Asia but also across Europe.

India's economic growth, democratic and inclusive governance, and the ability to stand up to coercion and intimidation to defend its territory are among the factors contributing to the rise of its comprehensive national power, said Chief of Defence Staff General Anil Chauhan. In an address at a think-tank, he pointed that achieving self-reliance in the defence sector and reducing import dependency for military hardware is important for the country to maintain its strategic autonomy and shoulder new responsibilities commensurate with its emerging stature.

The 2023-24 Budget has been silent on indigenization whereas last year the Union Finance Minister had announced that 68% of defence procurement will henceforth be from indigenous manufacturers.

Now speaking in Bengaluru on February 15, she said that the Centre will earmark 75% of defence procurement budget for the domestic industry. The move will throw open Rs one lakh crore in defence contracts for Indian private and public sector defence companies in the new fiscal. However, for this to happen, the production capacity of domestic industry (DPSUs and private sector) has to increase significantly.

In order to deeply entrench the indigenization drive of weapon systems and equipment, the focus on R&D in defence also has to improve. In the last six years, expenditure on R&D by DRDO, the primary research agency for defence, has remained between 0.08% and 0.09% of GDP. This is too low as noted by the Standing Committee on Defence (2021) and way below what developed countries spend. The total national spend on R&D has to go up to at least 1% of the GDP, for the success of indigenization policy in defence. Innovation has to be given a further boost through start-ups eco system, IDEX and DTIS schemes and collaboration with academia.

It has been noted that budget allocation for defence falls short of the resource projection every year. For the current financial year 2023-24, out of the defence budget allocation of Rs 5.94 lakh crore, revenue expenditure on salaries, operational maintenance of forces (stores, spares and repairs) along with pensions is Rs 4.08 lakh crore, which is 68.7% of the defence budget. Capital outlay of Rs 1,62,600 crore forms just 27.4% of the defence budget. The remaining allocation is towards border roads, research and administrative expenses. It is the capital outlay which is relevant for modernisation of forces and a cause of concern as evident from the figure below.

The Standing Committee on Defence (2018) had noted that modern armed forces should have one-third of its equipment in the vintage category, one-third in the current category, and one-third in the state-of-the-art category. However, Indian army had 68% of its equipment in the vintage category, 24% in the current category and 8% in the state-of-the-art category. The committee also noted that over the years, the army has accumulated a substantial deficiency of weapons, stores and ammunition. It found that adequate attention has been lacking with respect to both policy and budget for modernising the near-obsolete armoury.

The armed forces depend heavily on foreign OEMs (original equipment makers) for military hardware and such a situation is not sustainable

in the emerging geo-political environment," Gen. Chauhan said.

Elaborating on the global geopolitical turmoil, he pointed out that Japan, the UK, Russia, China, Germany, Poland, South Korea, among others, are significantly increasing their defence budgets. The situation could lead to a huge disruption in the global supply chains of military hardware. However, this situation provides a wonderful opportunity for Indian defence manufacturers to seize the initiative. Moreover, there is a huge demand for military equipment and hardware not only in Asia but also across Europe. In such a situation, indigenous defence ecosystem is the safest bet as it guarantees assured supplies.

The space domain will percolate and have its effects across all other domains of warfare," A.C.M. Chaudhari said, dwelling upon how the Indian armed forces transitioned from depending on the high-altitude MiG-25 "Foxbat" aircraft for "strategic reconnaissance" in the 1980s and 1990s to space-based assets like satellites now.

Similarly, citing the examples of the US and French air forces, he said the IAF will also have to transform from "air-power" to "aerospace power" in the years ahead.

"In the future, the IAF will be called upon to take part in space situational awareness, space denial exercises or space control exercises," he said.

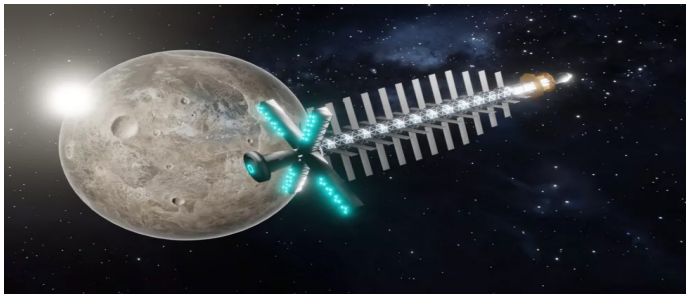
The US, too, has a full-fledged space force as a distinct branch of its armed forces. In contrast, India still does not have an Aerospace Command, having created just a small tri-service Defence Space Agency in 2019 after much dithering.

Technology Development

Europe Wants to Build A Nuclear Rocket for Deep Space Exploration

Dinakar Peri | 03 May 2023

Source: Sapce.com | https://www.space.com/european-space-agency-nuclear-propulsion



Artist's concept of a nuclear-powered spacecraft soaring past the moon. (Image credit: ESA)

The European Space Agency (ESA) is funding several studies that will explore the use of nuclear propulsion for deep space exploration.

Propulsion in space currently is conducted using a storage chemical propellant or using electric or solar power. The issue facing space agencies is these propulsion methods are reaching their respective physical limits. A nuclear-based electric propulsion (NEP) could potentially overcome these limitations and launch space missions into a new age, enabling humanity to reach farther into space than ever before.

One of studies ESA is funding, preliminary European reckon on nuclear electric propulsion for space applications (RocketRoll) is being led by scientists from the University of Prague, the University of Stuttgart and engineers from OHB Czechspace and OHB System in Bremen.

"Nuclear propulsion can be more efficient than the most efficient chemical propulsion or overcome solar-limited electric propulsion, enabling exploration of places no other technology

can reach," said Jan Frýbort, principal nuclear technology investigator at Czech Technical University in Prague, in a statement.(opens in new tab) "This is a big challenge for future space missions beyond our solar system, for example."

New methods of power and propulsion are particularly important as humanity works its way toward more sustainable space missions and even habitats and bases on the moon and beyond. This will require the delivery of equipment and supplies to the lunar surface and to Mars.

"The main advantage over chemical reaction is the efficiency of the engines," OHB Czechspace wrote in the statement. "The advantage over solar electric power input is the larger power output and independence of exposure to direct sunlight, especially enabler for transporting heavy cargo with long time constraints and for exploration beyond Mars orbit."

Scientists and engineers funded under this program will have the next 11 months to develop feasibility studies as part of the ESA Future Launchers Preparatory Program (FLIPP) and determine the advantages of using a NEP tug over classical propulsion systems for demanding missions.

"The aim of the study is to explore the possibilities of using nuclear fuel for demanding space logistics and exploration missions," OHB Czechspace's head of Project Management, Jakub Sevecek, said in the statement.

Sevecek added that RocketRoll will deliver an overview of existing European experience, technology, and industrial capabilities for the development of a nuclear-propelled spacecraft. Additionally, the study will provide a conceptual design of a nuclear electric propulsion engine. The team says it will consider the safety constraints of a NEP system from the early stages of the design.

"The use of nuclear-based electric propulsion for demanding space missions has been addressed in a number of studies in the past," Frýbort, said. "Thanks to the current technologies, this topic is once again relevant within Europe."

When the results of RocketRoll are delivered next year, they could form the basis of further ESA programs that look at the feasibility of NEP spacecraft that could be operational by 2035, if all goes according to plan.

NASA has opened its own program to study the use of nuclear rockets. The agency is partnering with the Pentagon's Defense Advanced Research Projects Agency (DARPA) to develop a nuclear thermal engine and fly in an in-space demonstration as early as 2027.

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Commentary

1. IAF's Squadron Strength: Crystal Gazing at the Next Two Decades - http://www.indiandefencereview.com/news/iafs-squadron-strength-crystal-gazing-at-the-next-two-decades/

Further Reading

1. Russia Says its New EW System can 'Kill' Satellites at an Altitude of 36,000 Km; Military Expert Decodes the Claims - https://eurasiantimes.com/russia-says-its-new-ew-system-can-kill-satellites-at-an-altitude-of-36000-km-military-expert-decodes-the-claims/

2. SpaceLogistics to service Intelsat Satellite after Optus life-extending mission. - https://spacenews.com/spacelogistics-robot-to-service-intelsat-satellite-after-optus-life-extending-mission/

3. Modern Wars through a Doctrinal Prism - https://swarajyamag.com/defence/indian-navy-partners-with-raman-research-institute-to-develop-secure-maritime-communications-using-quantum-technology

4. German Army Launches its Space Command Centre With Darth Vader at the Helm - https://interstellar.news/german-army-launches-its-space-command-centre-with-darth-vader-at-the-helm/

"The term 'Aerospace' was introduced in 1958 by the USAF Chief of Staff, General Thomas D White, as a new construct that depicted air and space as a seamless continuum stretching from the Earth's surface to infinity."

The Centre for Air Power Studies (CAPS) is an independent, non-profit think tank that undertakes and promotes policy-related research, study and discussion on defence and military issues, trends and developments in air power and space for civil and military purposes, as also related issues of national security. The Centre is headed by Air Marshal Anil Chopra, PVSM AVSM VM VSM (Retd).

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