




CHPM exploratory note No. 1

Operation Sindoor

The India-Pakistan Air War (7-10 May 2025)

Adrien Fontanellaz

CHPM
Centre d'Histoire et de Prospective Militaires

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[1] Geneva Centre for Security Policy; Democratic Control of Armed Forces (renamed DCAF - Geneva Centre for Security Sector Governance); Geneva International Centre for Huminatarian Demining.

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Abstract

For several decades, radical Islamist insurgent movements have been using Pakistan as a rear base to launch attacks against India, with the more or less implicit consent of the Pakistani military. Indian responses have become increasingly resolute, despite the risk posed by the relative uncertainty inherent to Pakistan's nuclear doctrine. A first Indian raid over Pakistan's territory thus occurred in 2016, followed in 2019 by an air strike which resulted in several air-to-air engagements. May 2025 was marked by even more intense and complex confrontations between the Indian and Pakistani air forces, which lasted 88 hours. The loss of at least one Indian Rafale fighter jet on the night of 7 May 2025, can be seen as the tip of the iceberg as this event, above all, made a strong impression in the West and attracted significant media attention. However, this sequence saw a large-scale confrontation between two competent air forces, equipped with small fleets of state-of-the-art aircraft designs, such as the J-10C and the Rafale, supported by substantial fleets of fourth-generation combat aircraft as well as sophisticated integrated air defence networks and force multipliers. Both also field long-range weapons. Besides, they've also integrated multiple drones of various types into their operations, which offers a relatively rare glimpse into what a fight between two premiers, similarly equipped air forces may look like nowadays.

This clash between the Pakistan and Indian air forces initially saw the former achieve a clear tactical victory by shooting down several enemy fighters, then largely fail in its conduct of strikes over Indian territory, as those were countered by an integrated air defence system whose effectiveness was one of the surprises of the conflict. Conversely, the Indian Air Force managed to significantly degrade the enemy's air defence system, then concluded the conflict by carrying out a series of spectacular strikes against Pakistan's principal Air Force stations. Thus, by achieving clear air superiority, India coerced Islamabad into requesting a ceasefire. This episode provides valuable lessons on the tactical and operational plans, particularly because it illustrates the strong interpenetration between the military and communication lines of operation, as well as a paradigm that has been consistently confirmed over the years, namely the crucial role of long-range strikes. On the strategic plane, Operation Sindoor has led to conventional military clashes of considerable magnitude between two *de facto* nuclear-weapon states with differing doctrines regarding the use of nuclear weapons, which made the situation very tricky to handle, with a high risk of escalation and potentially catastrophic consequences.

Finally, the operation led to a drastic change in India's counter-terrorism doctrine, which now provides, in the event of renewed attacks, for retaliation against both the movements responsible and the institutions supporting them, whereas previously only the former had been targeted at the outbreak of hostilities. Any new serious incident originating from a terrorist movement based in Pakistan will be considered by India as inseparable from Pakistan's military apparatus and will now likely begin at a higher level of escalation than in 2016, 2019 and 2025.

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Glossary

AESA:	Active Electronically Scanned Array. Active antenna radar composed of several hundred transmitter-receiver modules that operate autonomously to shape a resulting synthetic radar beam, which may be electronically pointed and shaped at will with no moving parts. This offers much greater operational flexibility, performance and reliability than previous technologies.
AIM-120C:	American medium-range (~100 kilometres), active radar guided air-to-air missile, i.e. capable of steering itself towards the intended target during its final phase of flight.
Akash:	“Sky”. A medium-range anti-aircraft missile system designed and manufactured in India. Its various versions are in service with the Indian Air Force and Indian Army.
Akashteer:	The Indian Army’s Integrated air defence system.
AEW&C:	Airborne Early Warning and Control. Aircraft equipped with a powerful onboard radar and communication systems enabling it to coordinate the activity of different aircraft types.
BrahMos:	Long-range, supersonic (Mach 2+) cruise missile, co-developed by India and Russia. Its name is a contraction of the names of the Brahmaputra and Moskva rivers. Its air-to-ground variant has a range of at least 450 kilometres.
CM-400AKG:	Chinese supersonic air-to-ground missile with an estimated range of 250 kilometres.
ELINT:	Electronic intelligence.
HAL:	Hindustan Aeronautics Limited. India's main government-owned aeronautical company.
HQ:	Chinese abbreviation for “Red Banner”, this acronym designates anti-aircraft missile systems, like the HQ-9B and HQ-16 acquired by Pakistan.
IACCCS:	Integrated Air Command, Control and Communication System. The Indian Air Force’s integrated command, control and communication system.
IAF:	Indian Air Force.
INS:	Indian Naval Ship.
ISI:	Inter-Services Intelligence. Pakistan’s foreign intelligence agency.

JeM:	Jaish-e-Mohammed, or “Army of Mohammed”, is a designated terrorist organisation. Based in Pakistan, it regularly carries out attacks inside Indian territory.
LeT:	Lashkar-e-Taiba, or “Army of the pious”, is a designated terrorist organisation. Based in Pakistan, it regularly carries out attacks inside Indian territory.
MALE:	Medium Altitude Long Endurance. Refers to drones capable of long endurance and medium altitude operation, such as the Turkish TB2 or the Israeli Hermes 900 and Heron TP.
Meteor:	European long-range (over 150 kilometres), active radar guided air-to-air missile.
OSINT:	Open-source intelligence.
PAF:	Pakistan Air Force.
PL-15:	Chinese long-range (approximately 200 kilometres), active radar guided air-to-air missile.
QRSAM:	Quick Reaction Surface to Air Missile. Air defence system designed and manufactured in India.
R-27:	Soviet-era medium-range air-to-air missile, available in infrared guided (T and ET) or semi-active radar guided (R and ER) variants.
R-73:	Soviet-era short-range, infrared-guided air-to-air missile.
R-77:	Russian medium-range, active radar guided air-to-air missile.
SCALP-EG:	French-British long range (approximately 500 kilometres) general purpose cruise missile.
S-125:	Soviet-era medium-range anti-aircraft missile system, now largely obsolete.
S-400:	Russian anti-aircraft system capable of firing several distinct types of missiles and engaging targets, including ballistic missiles, up to a theoretical maximum range of 400 kilometres.

Introduction

Since independence in 1947, India and Pakistan have been locked in a bitter dispute over the fate of Kashmir. Formerly an autonomous princely state within the British Raj, Kashmir was partitioned between the two countries in 1949 following the First India-Pakistan War. It subsequently triggered a second war in 1965, during which Islamabad unsuccessfully attempted to seize the entire territory. A third war, initiated by New Delhi, resulted in Pakistan losing its eastern wing, which became Bangladesh. No further interstate conflict arose during the decades that followed the 1971 war despite repeated spikes in tension, notably in 1984 when Indian and Pakistani forces clashed for control of the Siachen glacier.

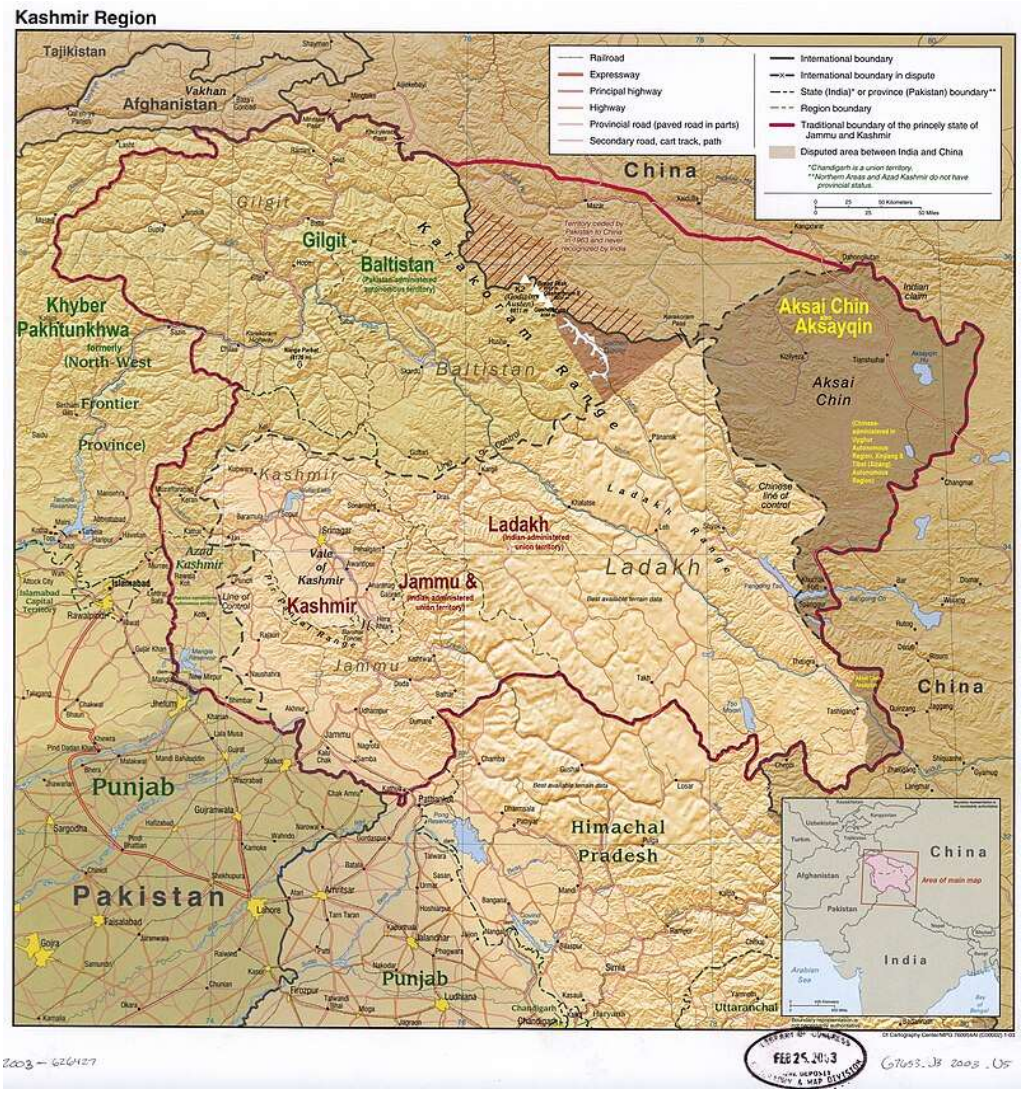

Figure 1 Map of Kashmir (Credit: CIA via wikicommons)

In 1986, the Brasstacks exercises conducted by the Indian Army raised serious alarm in Islamabad, which feared that they might constitute the prelude to an Indian invasion, given their unprecedented scale.[2] Although both armed forces share a common origin in the British Indian armed forces, India's forces are in fact, substantially larger. Indeed, in particular since the 1962 Sino-Indian War, New Delhi has been compelled to scale its military instrument to guard itself from the threat of war against both Pakistan and the People's Republic of China, with Beijing furthermore providing substantial military aid to Islamabad since the late 1960s.

Jihadism as an instrument of foreign policy

During the 1980s, the Pakistani military, which exercises effective control over both the country's foreign and security policies, increasingly resorted to radical Islamist groups, through its foreign intelligence agency Inter-Services Intelligence (ISI), as instruments to pursue its strategic objectives – namely, the conquest of all of Kashmir and the weakening of India, perceived as an existential threat.[3] That is how, from 1989 onwards, Pakistan backed an armed insurgency that had erupted shortly beforehand in Indian-administered Kashmir.

This insurgency led to a bloody and lengthy counter-insurgency campaign, even though the intensity of fighting gradually declined from the early 2000s onwards. New Delhi nonetheless had to deploy up to 400,000 troops to fight the insurgents and to hold the Line of Control (LoC) that separates India-administered and Pakistan-administered Kashmir. The dominant force within the insurgency was initially the Jammu and Kashmir Liberation Front, whose agenda was nationalistic, but its influence eventually waned in favour of radical Islamist groups, such as Lashkar-e-Taiba ("Army of the pious"; LeT) and Jaish-e-Mohammed (Army of Mohammed"; JeM), which benefited from substantial ISI support in the form of weapons, training, logistical assistance and rear bases inside Pakistani territory.[4]

Nuclearisation of the Subcontinent

From the moment of independence, India showed an interest in nuclear technology, initially for civilian purposes. The ensuing programme benefited from American and Canadian assistance and technology transfers. India's crushing defeat by China in

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[2] Frédéric Grare, "Les ambitions internationales de l'Inde à l'épreuve de la relation indo-pakistanaise", *Les Études du CERI*, no. 83 –February 2022.

[3] Ahmed Rashid, *Pakistan on the Brink. The Future of America, Pakistan and Afghanistan*. New York, Penguin Books, 2012, 26-27.

[4] Dilip Hero, *Apocalypse Realm. Jihadists in South Asia*, New Haven, Yale University Press, 2012, 86, 93-94, 97-103 ; Ahmed Rashid, *op.cit*. 35, 46-48, 56.

1962, followed by Beijing's acquisition of nuclear weapons in 1964, led to the addition of a military component to the programme, which resulted in an underground nuclear test, conducted in 1974, with an 8 to 12 kilotons yield. The programme thereafter continued discreetly, with New Delhi developing and stockpiling a limited nuclear arsenal. These weapons only became operationally deployable in May 1994, following successful delivery trials using Mirage 2000H fighters acquired from France a few years earlier. In May 1998, India formalised its status as a *de facto* nuclear-weapons state by detonating three devices, while subsequently adopting a non-first use doctrine [5]which stipulated that nuclear weapons will be used against an adversary only if nuclear weapons are first used against India and its forces.[6] The Indian tests prompted a particularly firm response from Islamabad, which had been pursuing its own covert military nuclear programme for a long time. A series of underground tests were executed within days of the detonation of the Indian devices. The nuclear employment doctrine adopted by Pakistan appears significantly more permissive than India's, as it would authorise first use in the event of an invasion of national territory, major defeats suffered by its armed forces, a political destabilisation operation conducted by a third party, or attempts at economic strangulation of the country.[7]

Since then, both countries have continued to expand their respective nuclear arsenals, notably by seeking to establish triads incorporating naval, land-based and airborne delivery vehicles, as well as a credible second-strike capability. Islamabad's arsenal is all the more a source of concern for the international community that Pakistani society has long been undermined by powerful radical Islamist political currents[8]. Should these forces come to power and succeed in establishing control over the military, they would immediately gain access to nuclear weapons.

The battle of Kargil

In April 1999, the Pakistani Army launched Operation Badr. Four battalions of its Northern Light Infantry Regiment, alongside fighters drawn from various Islamist movements – whose presence allowed Islamabad to deny any direct involvement – crossed the Line of Control in small detachments and seized a series of positions left vacant by the Indian Army during the winter. By capturing these positions, located on

[5] For instance, the "Draft Report of National Security Advisory Board on Indian Nuclear Doctrine" available at: https://www.legal-tools.org/doc/70efe4/pdf

[6] Sanjay Badri-Maharaj, Nuclear India. From Reluctance to Triad, Warwick, Helion and Company, 2021, 4-7, 9, 16; Arthur Lusenti, "The Indo-Pakistani Conflict in light of the Islamic Bomb", Geneva Papers 36/25, Geneva Centre for Security Policy, June 2025.

[7] Bruno Tertrais, "Pakistan's nuclear programme: a net assessment", *Fondation pour la Recherche Stratégique, recherches & documents* no 4/2012, 13 June 2012, 7-8 ; Sanjay Badri-Maharaj and Everton Pedroza, *Terror and Response. The India-Pakistan Proxy War 2008-2019*. Warwick, Helion and Company, 2023, 61.

[8] Zunaira Khan, "Escalating Radicalisation in Pakistan: Underlying Factors and Emerging Concerns" *in* Discourse 2023/5, Pakistan Institute of Development Economics.

heights overlooking National Highway 1A, they were subsequently able to sever the route by directing artillery fire onto it.

Figure 2 Kargil (Credit: Atlas of the World, Comprehensive Edition 2003 via wikicommons)

The Indian response proved more forceful than Pakistani planners had anticipated, and substantial reinforcements were rapidly deployed to the region. Seven infantry, mountain and parachute brigades, supported by 19 artillery regiments – over 300 guns in total – and by the air force, which conducted 7,631 air support and transport sorties during the conflict, succeeded in recapturing the most important positions over the following two and a half months, albeit at the cost of 499 military fatalities. These heavy losses were largely attributable to the need to storm entrenched positions located on sometimes precipitous high ground. For fear of nuclear escalation, however, the Indian Air Force abstained from crossing the Line of Control to strike Pakistani rear areas and artillery positions. Pakistani fighter aircraft flew intensive combat air patrols over the sector but did not attempt to engage Indian aircraft bombing forces that had crossed the LoC. The conflict came to an end in mid-July 1999, when the last Pakistani forces withdrew from the Indian side of the Line of Control under US mediation.[9]

[9] Sanjay Badri-Maharaj, *Kargil 1999. South Asia's First Post-Nuclear Conflict*. Warwick, Helion and Company, 2020, 38-40, 47-48, 66-76.

From New Delhi to Uri

The Kargil episode had thus established a new paradigm, consistent with the stability–instability paradox identified by Charles Glaser, whereby a player who benefits from the protection afforded by nuclear deterrence may be more inclined to undertake armed actions than it otherwise would have been, particularly through indirect, hybrid or conventional courses of action, albeit constrained in scale and geographic footprint. By virtue of Pakistan possessing nuclear weapons, its territory was *de facto* sanctuarised against the threat of large-scale Indian conventional retaliation, even if Islamabad launched direct or semi-clandestine operations against India. Thus, and this clearly illustrates the paradox, Pakistan, despite being conventionally weaker than India, was able to attempt seizing territorial gains at the expense of the latter.[10]

This observation would be repeated consistently over the following two decades. India attributed responsibility for the attack on the Indian Parliament in New Delhi, carried out on 13 December 2001, to Islamabad. Five LeT militants were killed by security forces before reaching their objective, but not before having gunned down nine people, including eight unarmed guards. This attack had triggered the mobilisation of substantial Indian mechanised forces along the border, but tensions had quickly subsided. Thereafter, on 26 November 2008, ten more LeT militants of Pakistani origin infiltrated central Mumbai by sea from the Pakistani coast. Over three days, they wreaked havoc by carrying out a series of coordinated terror attacks that killed 166 people, while remaining in contact with a Pakistan-based handler via satellite phone. Despite the profound shock caused by the scale of the attack, the Indian government refrained from striking LeT bases in Pakistan. Pakistan-based jihadist groups subsequently continued to conduct operations in India and in Indian-administered Kashmir, yet without triggering a large-scale crisis, until a particularly high-profile attack provoked a shift in India's posture eight years later. On 18 September 2016 four JeM militants who had infiltrated Indian territory from Pakistan attacked an Army base at Uri, killing 17 soldiers. This time, New Delhi responded by clearing a raid against JeM forward posts located near the Line of Control. On the night of 28–29 September 2016, several small special forces detachments infiltrated Pakistani territory, struck their targets, and exfiltrated after killing between a dozen and thirty militants. Islamabad's response was limited to diplomatic protests.[11]

[10] Arthur Lusenti, *op. cit.*

[11] Sanjay Badri-Maharaj and Everton Pedroza, *op. cit.* 15-16, 23-24, 36, 44, 53-56.

The Pakistan Air Force, between Washington and Beijing

Both the Indian Air Force (IAF) and the Pakistan Air Force (PAF) enjoy a reputation for professionalism and regularly participate in international exercises, notably alongside air forces from NATO, foremost among them the United States. Both are partly equipped with modern Western-designed combat aircraft, which they operate proficiently, and each maintains a limited fleet of force multipliers in the form of airborne early warning and control (AEW&C) platforms, electronic warfare aircraft and aerial refuelling tankers. They have also acquired MALE (Medium Altitude Long Endurance) UAVs as well as long-range loitering munitions. Both air forces can rely on a domestic defence industrial base capable of meeting part of their requirements, including the production of indigenous combat aircraft. While these observations alone justify close scrutiny of the operations conducted by both air forces, a closer examination reveals that the balance of capabilities between the two remains fragile and that India benefits from multiple structural advantages, notably greater mass and depth.

The Vulnerabilities of a Challenger

The PAF is constrained by two major factors. The first is geographical: Pakistan lacks strategic depth, meaning that most of its air bases lie within reach of Indian tactical aviation. The second is the chronic morass that plagues Pakistan's economy, while that of the Indian neighbour, already larger in scale, has experienced faster growth since the early 1990s. While this economic constraint has placed Pakistan in a position of dependence on its creditors, it has simultaneously compelled an air force operating under tight budgetary ceilings to support the development of a local aerospace industry capable of delivering cost-effective solutions to parts of its requirements. This gamble resulted in the notable success of the JF-17 fighter's development and upgrade, but it did not eliminate the need to turn abroad for the acquisition of extremely expensive advanced systems.[12] During its early decades, the PAF benefited from a privileged relationship between Islamabad and Washington, which translated into substantial transfers of aircraft and expertise. From the second half of the 1960s onwards, however, the relationship has become significantly more volatile, without ever fully breaking down, as periods of close cooperation alternated with phases of estrangement. In the mid-1980s, the PAF nevertheless received forty state-of-the-art F-16A and B fighters, at a time when Pakistan represented a key bulwark against Afghanistan, then occupied by a Soviet expeditionary force.

[12] David Saw, "Pakistan"s road to defence-industrial self-reliance" *in European Security & Defence*, 18 November 2024.

The supply of new equipment was subsequently frozen during the 1990s owing to Washington's concerns regarding Pakistan's nuclear programme. This situation shifted again during the 2000s, as Islamabad regained the status of an indispensable ally in the Global War on Terror launched by the George W. Bush administration. This paved the way for the delivery of fourteen second-hand F-16A aircraft and eighteen new F-16 Block 50 and 52 fighters between 2008 and 2010, as well as the US-authorised transfer of thirteen additional F-16s from Jordan in 2014. The United States accepted to deliver a sophisticated weapons package alongside the F-16, which included AIM-120C AMRAAM medium-range active radar-guided air-to-air missiles in addition to various air-to-ground precision munitions[13]. Thus, while the United States indeed proved to be a key provider in terms of advanced technologies as well as training, professional development and exercise opportunities for Pakistani personnel, this support proved both insufficient in scale and too undependable for the PAF to base its own long-term force development plans upon it.

Surely, the PAF also strengthened itself through the acquisition of dozens of second-hand Mirage III and V aircraft at very low cost from countries such as Australia and Libya, subsequently modernising their weapons systems domestically. This, however, was a temporary solution, specific to the post-Cold War context, when it was still possible to acquire surplus yet capable aircraft with significant remaining service life.

The indispensable ally

The delivery of F-6 fighters by the People's Republic of China in the late 1960s marked the beginning of a relationship that would eventually become vital for the PAF. The F-6s were soon followed by A-5Cs and then by over 200 F-7MP, P and PG aircraft. The PAF was closely associated with the development of the latter aircraft, its technicians and test pilots, who were familiar with recent Western technologies, providing valuable support to Chinese industrial players who were just emerging from almost three decades of isolation, during which they had accumulated a significant technological lag, and who were striving to catch up by first integrating Western and later Russian technologies.[14] Moreover, thanks to this close cooperation, the Chinese were able to gain access to the lessons learned from an air force with extensive operational experience.

This military-industrial cooperation subsequently intensified with the joint development of the K-8 trainer aircraft and, above all, with that of the JF-17 fighter, which first examples were delivered to the PAF in 2007. Meanwhile, development continued with the entry into service of two successive iterations, the latest of which, having

[13] SIPRI arms transfers database, retrieved on 13 September 2025.
[14] Holger Müller, *China's Fighter for the World. The F-7/FT-7 family: Volume 1: Origins, Evolution and Variants*. Warwick, Helion and Company, 2025, 21, 23, 27.

conducted its maiden flight in December 2019, is equipped with an AESA radar and a reinforced airframe.[15]

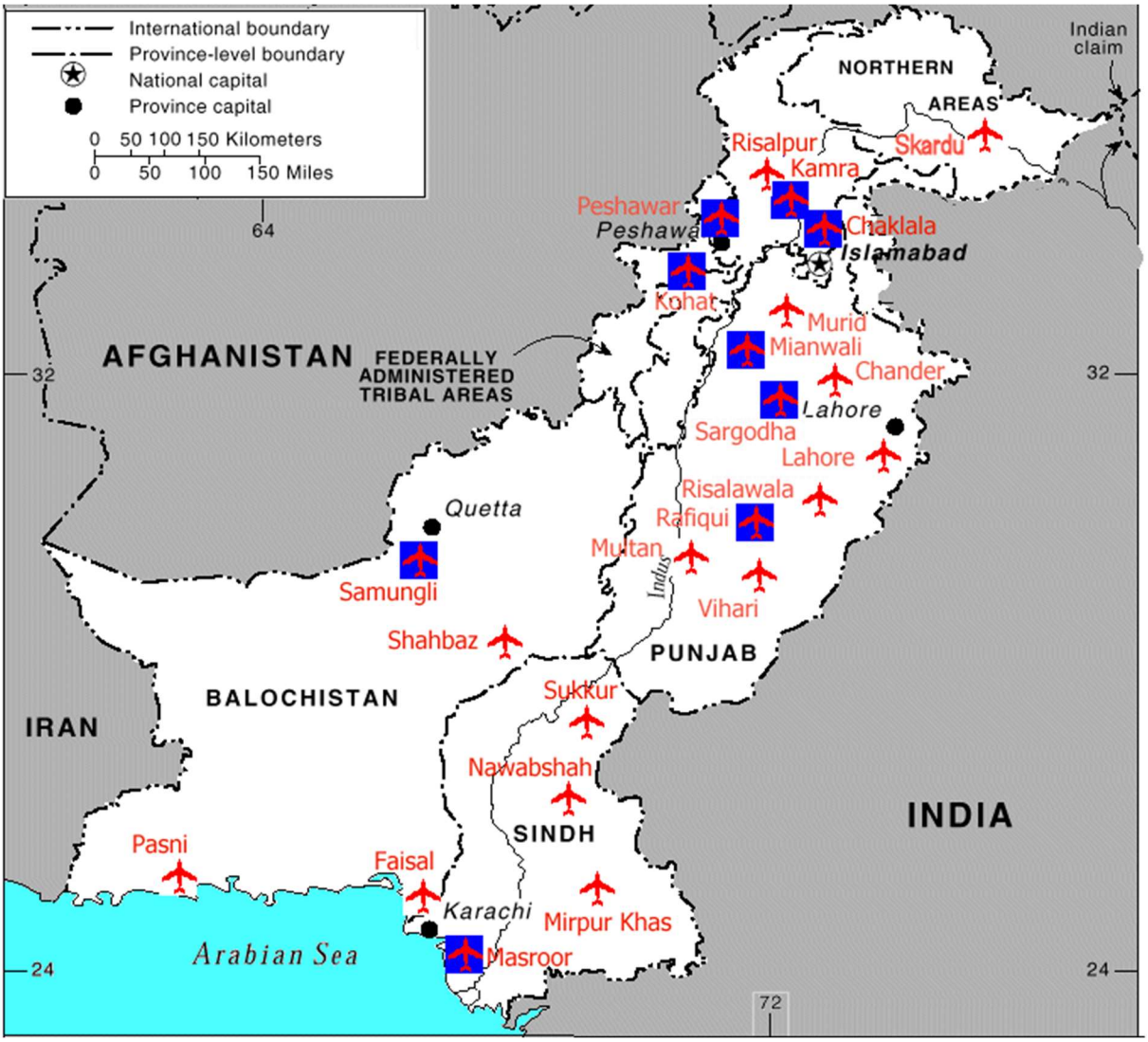

Figure 3 Pakistanl air bases at the beginning of the 2000s (Credit: globalsecurity.org)

Indeed, the meteoric rise of the Chinese defence industry completely transformed Beijing's role. Initially limited to that of a supplier of obsolete yet upgraded designs, which provided a degree of mass alongside more sophisticated, but also more onerous and therefore scarcer Western aircraft, it subsequently evolved into a provider of cutting-edge capabilities that were difficult to access otherwise for political or financial reasons. Deliveries from 2021 onward of J-10C fighters, long-range PL-15 air-to-air missiles, CM-400AKG aero-ballistic missiles, as well as HQ-16 medium-range and

[15] Sqn. Ldr Fahad Masood, "Roar of the Thunder" *in Air Forces Monthly*, February 2022; Thibaut Fournol and Tom Abram, "Inde-Pakistan : implications stratégiques de l''usage d''armements conventionnels chinois lors de l'affrontement de mai 2025", *Défense & Industrie* n° 21, FRS, 31 July 2025.

HQ-9B long-range surface-to-air missile systems are testimony to this evolution.[16] This trajectory was however not without pitfalls as the performance of the four ZDK-03 airborne early warning and control aircraft delivered between 2011 and 2014 proved to fall well short of the PAF's expectations, even though they had been developed specifically to meet its requirements.[17]

The PAF in 2025

At the beginning of 2025, the PAF fielded a most respectable combat aircraft fleet comprising 20 J-10C, 75 F-16s, at least 150 JF-17s, approximately 85 Mirage III and Mirage V upgraded to the ROSE standard, as well as around sixty F-7PG and F-7P fighters. The bulk of this fleet was operated by fourteen squadrons, including two air superiority squadrons, nine multirole squadrons and four dedicated strike units. These aircraft were supported by a limited force-multiplier fleet consisting, in addition to the four ZDK-03, of six Saab 2000 Erieye AEW&C aircraft, a handful of business jets converted into electronic warfare aircraft, as well as four Il-78 aerial refuelling tankers. At the turn of the 2020s, the PAF acquired several mobile command centres capable of fusing data from its various sensors, such as radars, electronic intelligence (ELINT) systems, cyber warfare units and satellites, while implementing a dedicated data link, Link-17, purportedly developed domestically but with Chinese support, which allowed to interface these systems with combat aircraft. The PAF had also invested heavily in MALE drones, some of them armed, procuring platforms from China (a dozen Wing Loong II and CH-4) and Turkey (over ten TB2 and Akinci), while simultaneously developing indigenous models (Burraq, Shapar I and II). These efforts also extended to the acquisition and production of long-range loitering munitions.[18]

The poor relation

The PAF operates from approximately twenty air bases. Some benefit from extensive infrastructure and host the bulk of peacetime activity. They're notably equipped with large numbers of hardened aircraft shelters and, in some cases, extensive fortified underground facilities. Others serve a dispersal role, allowing squadrons to redeploy

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[16] SIPRI Arms Transfer Database, retrieved on 14 September 2025.

[17] Swapnanil Chatterjee, "Pakistan to retire its entire Chinese ZDK-03 AEW&C fleet after just 12 years of service" in *Republic*, 2 January 2024.

[18] Philippe Langloit, "Les capacités aérobalistiques pakistanaises" *in Défense et Sécurité Internationale*, no 174, November-December 2024 ; Babak Taghvaee, "A close call" *in Air Forces Monthly* no 448, July 2025 ; Alan Warnes, "Exclusive : Full article. Understanding the Rafale kills" Key Aero Publishing, 19 September 2025; Tom Cooper, Ravi Rikhye, Sanjay Badri-Maharaj, Mangesh Sawant, *88 Hours war. The India-Pakistan War of May 2025*, Warwick, Helion and Company, 2025 (manuscript, yet to be published, forwarded by the author, 2 November 2025).

in wartime. Finally, around ten minimally equipped runways dedicated solely to emergency landings complete this basing network.[19]

While considerable effort has been devoted to passive defence, the ground-based air defence – which is placed in part under the responsibility of the Army Air Defence Corps – has stood out as the poor relation in the past decades. As a consequence, at the beginning of 2025 it rested, beyond a large inventory of anti-aircraft artillery and very short-range systems, on approximately ten short-range Crotale and HQ-7 batteries as well as ten medium-range Spada 2000 batteries, reinforced since 2017 by around ten HQ-16 and HQ-9B long-range batteries, which were purported to possess a ballistic missile interception capability.

[19] "Pakistan Air Force Bases" *in* GlobalSecurity.org, retrieved on 14 September 2025.

The Indian Air Force, a giant in the making

The Indian Air Force (IAF) is presently the world's fourth-largest air force in terms of size. It reached its peak in the late 1980s, with a total of 42 fighter, strike and reconnaissance squadrons, as well as 38 surface-to-air missile squadrons. A significant portion of its aircraft inventory was, however, nearing obsolescence, as nineteen squadrons were equipped with different MiG-21 variants, three with Ajeet aircraft and one with Hunters. Replacing this fleet on a one-for-one basis has proven particularly challenging for two reasons: first, the unit cost of military equipment increases sharply from one generation to the next; second, Indian defence procurement processes are notoriously slow. While this sluggishness partly stems from bureaucratic practices, it is above all the result of a deliberate indigenisation policy. Indeed, New Delhi systematically uses major acquisitions to foster the development and consolidation of its domestic defence industry. Thus, by seeking to assemble part of the aircraft acquired by the IAF domestically while gradually increasing the proportion of locally manufactured components, India has achieved a measure of success. The indigenisation rate of platforms such as the Su-30MKI and the Hawk eventually exceeded 70 per cent, despite the recurrent difficulties encountered by Hindustan Aeronautics Limited (HAL), the country's principal aerospace manufacturer.[20] By contrast, the development of a fully indigenous fourth-generation combat aircraft—the Tejas Light Combat Aircraft—proved exceptionally arduous, taking decades before the first series-production aircraft, corresponding to a relatively modest standard, were delivered to the IAF in 2015. Six years later, only two squadrons were equipped with the type.

A broad range of partners

Unlike its Pakistani rival, India has, since the end of the Cold War, enjoyed access to the products and services offered by all major military-technological powers. Close cooperation with Russia, a legacy of past relations with the Soviet Union, has endured, giving rise to the development and licensed production of the Su-30MKI and the BrahMos supersonic cruise missile, the modernisation of MiG-21Bis and MiG-29 fleets, and, more recently, the acquisition of S-400 surface-to-air missile systems. This industrial and military partnership with Moscow has nonetheless lost some of its lustre following the failure of the joint PAK-FA fifth-generation fighter project. Its inability to meet Indian requirements had become evident to the IAF, even as Indian engineers had undertaken the integration of the BrahMos missile onto the Su-30MKI themselves, owing to excessive costs and delays quoted by the Russian partners.[21]

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[20] Bruno Etchenic, "L'épopée du Rafale en Inde*" in Planète Aéro* no 15, September-November 2025.

[21] Philippe Langloit, *"La force aérienne indienne, Une transformation en profondeur" in Défense et Sécurité Internationale*, no 150, November-December 2020 ; Sanjay Badri-Maharaj, *90 Years of the Indian Air Force*,

Equally crucial has been the close cooperation between New Delhi and Tel Aviv, which has resulted in numerous transfers of equipment, notably air-to-air missiles and precision-guided air-to-ground munitions, as well as the integration of Phalcon radars onto A-50 AEW&C platforms. This partnership also enabled the co-development of technologies such as the Barak-8 surface-to-air missile system. The IAF's sizeable UAV fleet is likewise largely composed of Israeli platforms, including the Searcher, Heron and Heron TP MALE drones, as well as Harop and Harpy loitering munitions. In addition, the IAF was able to acquire sophisticated equipment, often along with transfers of technology of varying depth, from countries such as the United Kingdom (Hawk trainer aircraft), France (Mirage 2000 upgrade and Rafale acquisition), and the United States (Harpoon anti-ship missiles, and C-130 and C-17 transport aircraft).[22]

These acquisitions and transfers have thus continued to support the expansion of India's defence industrial base. Beyond the BrahMos supersonic missiles, India has completed development of the Astra active radar-guided air-to-air missile, intended to replace the Russian R-27 and R-77 missiles whose performance proved disappointing against Pakistani AIM-120C missiles in 2019, as well as a range of precision-guided air-to-ground munitions. Besides, Indian engineers converted three Embraer 145 aircraft into AEW&C platforms, giving rise to the Netra system. At the turn of the 2020s, the IAF placed orders for 83 Tejas aircraft of the new, far more advanced Mark-1A variant, which notably incorporates an AESA radar. By 2022, the IAF had received at least sixteen Akash medium-range surface-to-air missile batteries, along with several types of early-warning radars. The Indian armed forces also rely on a limited constellation of communication and radar reconnaissance satellites.[23]

IACCCS

India's information technology sector, for its part, has played a critical role in the development and deployment of military command, control and communication networks. The IAF could thus field a particularly sophisticated air defence and airspace management network in the form of the Integrated Air Command, Control and Communication System (IACCCS). Its origins can be traced back to the shock experienced in India in 1995 after a cargo of weapons was airdropped by a transport aircraft that had managed to clandestinely penetrate national airspace. A defining feature of IACCCS is its full integration with Akashteer, the integrated air defence system of the Army Air Defence Corps, as well as with its naval counterpart. All three systems share a real-time recognised air picture by instantly integrating data from

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Warwick, Helion and Company, 2022, 7-9, 31 ; Air Marshal Narmdeshwar Tiwari address at the NDTV Defence Summit 2025 broadcast on 30 August 2025.

[22] Sanjay Badri-Maharaj, *90 Years of the Indian Air Force*, 25, 28.

[23] Sanjay Badri-Maharaj, *90 Years of the Indian Air Force*, 31, 42 ; Philippe Langloit, "La force aérienne indienne, Une transformation en profondeur".

their respective sensors. Redundant, hardened and decentralised, the system also incorporates a chain of visual observers trained to identify incoming aircraft and their flight level and heading, positioned along India's borders well forward of inland based early-warning radars. Indian air defence doctrine further provides for coordination of this central system with autonomous, multi-layered air defence zones protecting sensitive sites, such as air stations and nuclear facilities. These autonomous zones are structured in a similar manner but with a far higher density of detection and engagement systems.[24]

Both the Army and the Air Force have invested heavily in renewing their surface-to-air missile inventories, which had become largely obsolete by the turn of the millennium. In 2022, this effort materialised in the delivery of significant numbers of QRSAM short-range systems, Spyder short- and medium-range systems, as well as Akash and Barak-8 medium-range systems. At the beginning of 2025, the IAF also received three of the five long-range S-400 regiments ordered from Russia several years earlier. The induction of these systems allowed the withdrawal from service of part of the OSA-AKM and S-125 inventories, with the remainder being upgraded. In addition, both the Army and the IAF retained substantial stocks of Bofors L70, Shilka and ZU-23-2 anti-aircraft guns, upgraded with new electro-optical fire-control systems, while also acquiring a variety of ELINT and jamming systems.[25]

Towards homogeneity

At the end of 2022 the IAF was organised in five geographically defined operational commands (Central, Eastern, Southwestern, Western and Southern), two functional commands (Training and Maintenance), and controlled 31 fighter squadrons, roughly a quarter fewer than the force level deemed necessary to meet the requirements of a simultaneous conflict with China and Pakistan. Its fleet of approximately 650 combat aircraft had nevertheless undergone significant rejuvenation over the preceding two decades, with the induction of 262 Su-30MKI, around thirty Tejas and 36 Rafale fighters. The acquisition of the latter proved particularly decisive, owing to its ability to employ long-range Meteor air-to-air missiles as well as SCALP-EG cruise missiles. The IAF had also retired from service the MiG-23BN, MiG-25RB, MiG-27 and all MiG-21 variants, with the sole exception of the MiG-21 Bison, of which just under one hundred aircraft remained in service until autumn 2025. Furthermore, its 66 MiG-29, 49 Mirage 2000H and 114 Jaguar aircraft had been, or were in the process of being, upgraded to the UPG, Mirage 2000I (similar to the 2000-5 Mk2) and DARIN standards respectively. This combat fleet was supported by three A-50 Phalcon and three

[24] Sanjay Badri-Maharaj, *90 Years of the Indian Air Force*, 37-38, 40 ; Air Marshal Narmdeshwar Tiwari, 30 August 2025.
[25] Sanjay Badri-Maharaj, *90 Years of the Indian Air Force*, 41-44; Lieutenant General Sumer Ivan D'Cunha, address during the 299th episode of ANI Podcast with Smita Prakash no 299, 19 May 2025.

Netra airborne early warning and control aircraft, as well as six Il-78 aerial refuelling tankers.

The Indian Air Force had therefore achieved a series of major capability leaps by fielding a fighter fleet capable of employing active radar-guided air-to-air missiles (R-77, MICA, Derby and Meteor), long-range air-to-ground weapons (SCALP-EG, BrahMos and Rampage) and a powerful integrated air defence system, all supported by a limited but effective airborne early warning and control capability. The IAF could also rely on the Indian Navy's modest but capable Naval Air Arm, which operated around forty carrier-based MiG-29K fighters from its two aircraft carriers, as well as twelve P-8I Poseidon maritime patrol aircraft, which also constitute highly effective ELINT platforms.[26]

Equipment	Pakistan Air Force	Indian Air Force
Combat aircraft, 4+ generation	20 J-10C	36 Rafale
Combat aircraft, 4th generation	~ 150 JF-17 Block I/II/III 75 F-16 MLU, Block 50/52	240 + Su-30MKI ~ 100 MiG-29UPG/4 49 Mirage 2000I (~ 2000-5Mk2) ~ 30 Tejas Mk1
Combat aircraft, 3rd generation	85 Mirage III/V, ROSE standard ~ 60 F-7P/PG	114 Jaguar, DARIN standard ~ 100 MiG-21 Bison (2022)
AEW&C	6 SAAB 2000 Erieye 4 ZDK-03	3 A-50 Phalcon 3 Netra
Long range air-to-air missiles (active radar guided)	PL-15 (J-10C, JF-17 Block II/III)	Meteor (Rafale)
Medium range air-to-air missiles (active radar guided)	AIM-120C (F-16) PL-12 (JF-17 and J-10C)	R77, Derby, Mica (Mirage 2000 and Rafale), Astra
Long range air-to-ground missiles	CM-400AKG (JF-17)	BrahMos (Su-30MKI) SCALP-EG (Rafale) Rampage (Jaguar, Su-30MKI, MiG-29K)
MALE drones	Wing Loong II, CH-4, TB2, Akinci, Shapar I and II	Searcher, Heron, Heron TP
Long range surface-to-air systems	~ 10 HQ-9B and HQ-16	6 S400
Medium range surface-to-air systems	10 Spada 2000 batteries	S-125, Spider, Akash, Barak-8

Figure 4 The PAF and IAF as of early 2025

[26] Benjamin Gravisse, "L'Inde et les MiG-29" *in* redsamovar.com, 7 October 2019.

Operation Bandar

On 14 February 2019, Jaish-e-Mohammed (JeM) carried out a suicide car-bomb attack against an Indian police convoy operating in Indian-administered Kashmir, killing 40 law enforcement personnel. On this occasion, the Indian government opted for an air strike against the Balakot training camp in Pakistan, USED BY JeM. The camp had the advantage of being isolated, and Indian leadership assessed that such a target was unlikely to trigger an uncontrollable escalation between the two *de facto* nuclear-weapon states while simultaneously deterring the JeM from launching further operations.

The Balakot air strike, code name Operation Bandar, took place in the early hours of 26 February 2019 and involved six Mirage 2000s, then the Indian Air Force's (IAF) most versatile aircraft. Five carried Spice 2000 precision-guided bombs, while the sixth was armed with a Popeye missile. These were accompanied by six additional Mirage 2000s and ten Su-30MKIs in air-to-air configuration. Supported by one Netra and one A-50 Phalcon operating at standoff range, the 22 fighter aircraft assembled in three formations before heading towards the Pakistani border. Two of these formations executed a decoy tactic, pretending to threaten Lahore and Bahawalpur, where the JeM headquarters was located, in order to lure Pakistani fighters. The manoeuvre cleared the path for the six strike Mirage 2000s, which, masked by the mountainous terrain, crossed the Line of Control at low altitude before rapidly climbing and releasing their munitions at 03:28, then returning without giving the Pakistan Air Force (PAF) time to respond. While the penetration of Pakistani airspace was a success, the bombing itself was not: a malfunction prevented the launch of the sole Popeye missile, and only two of the five Spice 2000s hit their targets directly, with both Pakistan and the JeM subsequently denying any significant damage.

Swift Retort

Islamabad responded the very next morning, 26 February, by launching Operation Swift Retort. At 09:28, around thirty PAF F-16s, JF-17s and Mirage IIIs or Vs, flying in formations of four to eight aircraft, converged on Indian-administered Kashmir with the apparent intent of striking Indian Army positions. At the time, the sector was covered by only two combat air patrols, one comprising a pair of Mirage 2000s and the other a pair of Su-30MKIs. The IAF reacted by scrambling two MiG-29UPGs and two pairs of MiG-21 Bisons, with the MiG-29s arriving in time to take part in an initial engagement during which high-altitude PAF F-16s were caught in a pincer manoeuvre by a MiG-21 Bison and a Su-30MKI as they had just crossed the Line of Control.

The PAF pilots fired several AIM-120C AMRAAM missiles at maximum range against the two Indian aircraft, which successfully evaded them. The two Su-30MKIs subsequently faced the threat, albeit without achieving a firing position. Their offensive ma-

noeuvres, however, forced several Pakistani formations to abort their attack, for fear of being engaged. Almost simultaneously, another MiG-21 Bison evaded an AIM-120C missile, while the two Mirage 2000s confronted a formation of JF-17s, with no shots exchanged but there again forcing the bomb-laden PAF aircraft to turn back. Amid the confusion, a MiG-21 Bison flown by Wing Commander Abhinandan Varthaman was able to sneak into Pakistani airspace by exploiting the mountainous terrain and fired a short-range R-73 missile at an F-16, which sudden intrusion forced a formation of Mirage IIIs or Vs and JF-17s to jettison their air-to-ground ordnance and withdraw. However, another F-16, flown by Wing Commander Nauman Ali Khan, fired an AIM-120C at the MiG-21, which was shot down despite multiple evasive manoeuvres. The pilot ejected successfully and was captured shortly afterwards, before being repatriated to India a few days later. Furthermore, an Indian air-defence battery mistakenly shot down a Mi-17 helicopter on the same day.

The Balakot incident resulted in a mixed outcome for both sides. On the Indian side, the air strike itself was only a partial success, all the more so as the absence of adequate reconnaissance assets and the characteristics of the weapons employed (SPICE 2000 being penetration weapons, they leave only a very small entry hole) made it impossible to conclusively refute Islamabad's claims that the raid had failed. The air battle that ensued also saw Indian pilots hampered by highly effective Pakistani jamming, as well as by the inferior range of their R-77 missiles compared with that of the AIM-120C, while the longer-range R-27s, of an older generation, proved difficult to employ. Moreover, although sanctioned by the IAF, the victory claimed over the F-16 engaged by Wing Commander Abhinandan Varthaman could not be confirmed beyond doubt. On the Pakistani side, the destruction of an enemy fighter represented a major success, but the bombing operation itself had been thwarted by Indian fighter aircraft, even if some of the munitions released by Pakistani aircraft detonated in the vicinity of Indian Army positions. Above all, New Delhi had demonstrated its determination to strike terrorist infrastructure deep inside Pakistani territory, while Islamabad had made clear its willingness to conduct retaliatory strikes against Indian forces in such an event.[27]

[27] Sanjay Badri-Maharaj and Everton Pedroza, *Terror and Response. The India-Pakistan Proxy War 2008-2019*, 57, 59, 62-65, 67-70; Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025.

The air battle of 7 May 2025

On 22 April 2025, a small group of militants belonging to the Resistance Front, assessed by Indian intelligence services to be an offshoot of Lashkar-e-Taiba (LeT), attacked a group of tourists in Pahalgam, a popular hill resort in Jammu and Kashmir. Twenty-five Indian tourists and one Nepali national were killed in the attack. One of New Delhi's first responses was to suspend its participation in the Indus Waters Treaty, a move of critical importance for Pakistan.[28]

Sindoor: an accelerated gestation

On 23 and 24 April, the headquarters of India's three armed services, in coordination with the various intelligence agencies, developed several distinct response scenarios targeting the infrastructure of Pakistan-based jihadist organisations involved in attacks against India. Tactical planning began on 29 April, with the selection of targets – nine camps belonging to JeM and LeT – and the strike date being finalised on 5 May. In the meantime, the political leadership merely declared that the retaliatory operation had to be sufficiently spectacular to deter further terrorist attacks, while granting the armed forces complete freedom in operational planning and in managing any escalation that might follow in the event of a Pakistani military response, including the possibility of open conventional warfare.[29] Indian military planners not only relied on red-teaming and a series of wargames to refine their scenarios, but also conducted a series of counter-UAS defence exercises between 26 and 28 April.[30]

Seven of the nine selected camps were located close to the border and their destruction was assigned to the Indian Army. The remaining two were located deeper inside Pakistani territory and the IAF was therefore tasked with striking them. Accordingly, at around 01:00 on the morning of 7 May, Indian aircraft launched a series of long-range munitions against the complex that housed the JeM headquarters at Bahawalpur, roughly one hundred kilometres from the border. Five distinct buildings were targeted, at least one of which was destroyed in the attack. At the same time, another formation released a second salvo of guided munitions against the LeT headquarters at Muridke. As this site lay only around thirty kilometres from the border, it was kept under observation by a drone, allowing for a more accurate post-strike battle damage assessment: at least two of the targeted buildings were confirmed to have been

[28] Adv Anik Miu, "Kashmir Tourist Attack 2025: A Detailed Analysis", HR.org, retrieved on 22 September 2025, Sylvia Malinbaum, "La crise indo-pakistanaise du printemps 2025: reflet d'un conflit en mutation", *Briefings de l'Ifri*, Ifri, 23 July 2025.

[29] Air Marshal Narmdeshwar Tiwari, *op. cit*. 30 August 2025.

[30] Lt. Gen. Sumer Ivan D'Cunha, *op. cit.* 19 May 2025; Lt. Gen. Rajiv Ghai, "Director General of Military Operations, Lt Gen Rajiv Ghai's Address on Op Sindoor | Full Speech", *Republic World*, 14 October 2025.

hit by penetration warheads.[31] One of the two Indian strike formations, composed of Rafale or Mirage 2000I aircraft, penetrated Pakistani airspace at very low altitude before executing a pop-up manoeuvre to release precision-guided bombs, continuing to guide them until impact. In doing so, the aircraft deliberately exposed themselves to interception by Pakistani fighters and to engagement by ground-based air defence systems.[32]

Pakistani response

Pakistani ground-based radar and electronic listening stations, supported by an Erieye airborne early warning and control system, detected the approach of the IAF strike and diversion formations shortly after midnight. Over the following twenty minutes, they identified eight distinct groups of six to eight aircraft each, concentrated along four main axes, totalling 60 aircraft, including 14 Rafales, soon reinforced by a further dozen combat aircraft. The PAF, which initially ran three combat air patrols (two of four and one of two aircraft), scrambled 32 additional fighters (F-16s, JF-17s, and J-10Cs) on quick reaction alert, most of which concentrated in the east of Pakistan's airspace, from Lahore to east of Islamabad. The Erieye continued to orbit at the rear, over the Peshawar region, facing the two largest Indian concentrations. The PAF thus established a locally less unfavourable force ratio, with 24 Pakistani fighters confronting 28 Indian aircraft. Anticipating a potential engagement in this sector, Pakistani air traffic control ordered civilian traffic to divert from the area. Further west, however, only 8 further fighters opposed a total of 26 Indian aircraft.

One of the Indian formations subsequently released its air-to-ground ordnance. The Chief of Air Staff of the Pakistan Air Force immediately instructed pilots operating over the eastern sector to engage the Indian aircraft, aiming to shoot down as many as possible while minimising their own exposure to return fire. Several J-10C and JF-17 fighters fired at least one salvo of PL-15 long-range air-to-air missiles, while an HQ-9 or HQ-16 surface-to-air missile battery also engaged Indian fighters. Pakistani forces concentrated their fire on the Rafale, designated as a priority target due to their symbolic value. Islamabad subsequently claimed the destruction of six Indian aircraft over a one-hour long sequence, including three Rafale, one Su-30MKI, one MiG-29UPG and a large drone, all shot down inside Indian airspace at ranges reported between 13 and 98 kilometres from the border or the Line of Control. The PAF

[31] Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025; Air Marshal Narmdeshwar Tiwari, *op. cit*. 30 August 2025.

[32] DH Webdesk, "Operation Sindoor heroes among gallantry awardees named in Centre's gazette notification: Details" *in* Decan Herald, 22 October 2025; Tom Cooper, Ravi Rikhye, Sanjay Badri-Maharaj, Mangesh Sawant, *88 Hours war. The India-Pakistan War of May 2025*, Warwick, Helion and Company, 2025 (initial manuscript forwarded by the author, 2 November 2025).

attributed five of these victories to its fighters and the sixth to a surface-to-air missile battery.[33]

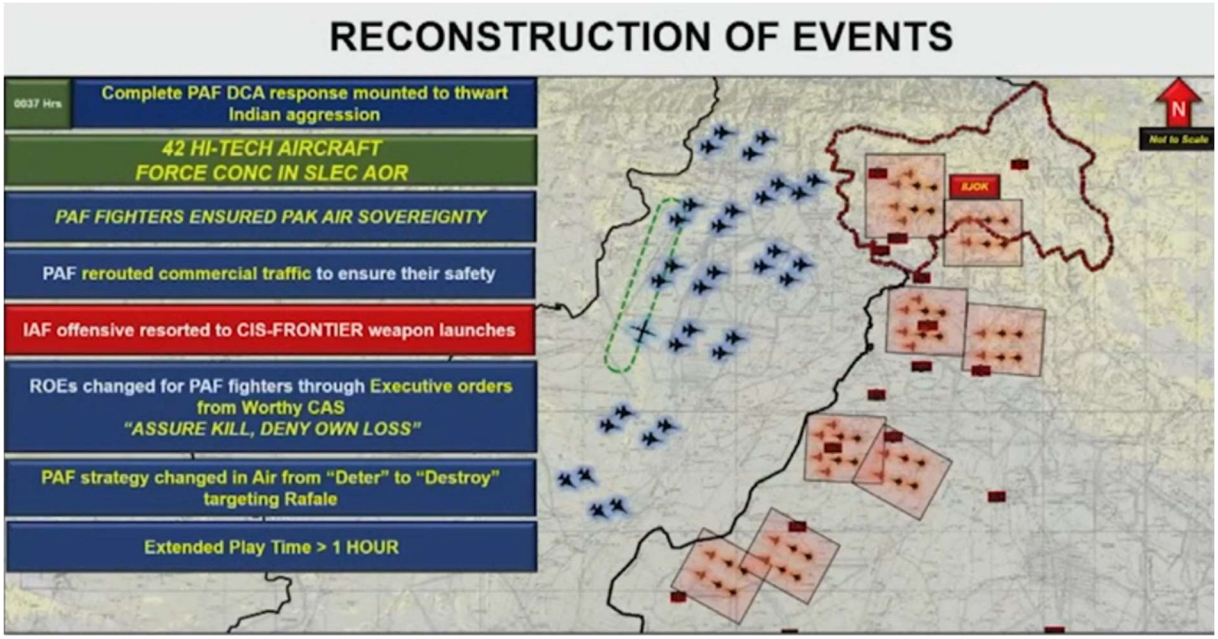

Figure 6 Reconstruction of the 7 May 2025 engagement as provided by the PAF (Credit: ISPR/PAF)

The Indian Air Force remained silent regarding its losses during the night as well as the return fire from its combat aircraft, merely stating that all pilots involved in the operation were safe. The subsequent circulation of images of wreckage fragments on social media and in Indian and Pakistani media, however, confirmed the loss of at least one Rafale (serial number BS001), one Mirage 2000 and either one MiG-29UPG or one Su-30MKI. The discovery of multiple PL-15 missile casings on Indian territory indicates that other IAF pilots successfully decoyed or evaded some of the missiles fired against them. The presence of an intact BrahMos on the ground further suggests that at least one pilot had to jettison his underwing stores to improve the effectiveness of evasive manoeuvres, demonstrating that, in addition to several aircraft losses, the Pakistanis achieved a mission kill, that is, forcing an adversary to abandon its mission before it could be carried out.[34]

[33] Inter Services Public Relations (ISPR), "Tri Services Joint Press Conference - 9 May 2025" ; Capitaine Malcolm Pinel, "*Analyse de l'emploi de la puissance aérospatiale dans l'engagement militaire entre l'Inde et le Pakistan*" *in La note du CESA, hors-série*, 07/25.
[34] Tom Cooper, "India-Pakistan, Additional Details, part 1", Sarcastosaurus, 15 May 2025; Capitaine Malcolm Pinel, *op. cit.*

A multifactorial setback

Although obtaining even a rough picture of the 7 May 2025 air engagement will remain impossible until the IAF provides its own account of the encounter, it seems clear that this has been one of the largest confrontations in decades, and that the IAF suffered a serious setback on that night. The loss of at least one Rafale provided the adversary with a key element to support its public relations line of operation, while the Indian narrative, which highlighted the success of the air strikes against JeM and LeT camps, which was the core objective of Operation Sindoor, remained comparatively inaudible to international media.

The root cause of the Indian setback appears to be multifactorial. First, the Pakistanis were likely not surprised by the Indian operation, which was very similar in design, albeit more ambitious to Operation Bandar in 2019. In fact, the PAF had already conducted the Zarb-e-Haideri air defence exercise on 27 April and redeployed a portion of its fighters to better cover the country's coasts, including Karachi, the nation's economic hub, offshore from which the Indian carrier battle group centred on INS Vikrant was operating, as well as the eastern sector of Pakistan.[35]

Second, the Indians appear to have assumed that the Pakistanis would continue adhering to their established practice of refraining from firing at aircraft outside Pakistani airspace. Indian pilots were therefore likely taken by surprise by long-range Pakistani fire while some were operating tens of kilometres from the border or the Line of Control.[36]

Third, on a more tactical level, some Pakistani fighters may have succeeded in remaining covert by switching off their electromagnetic emissions and by flying at low altitude in to order to conceal behind the mountainous terrain, despite at least one IAF AEW&C platform supported the attack. Furthermore, as in 2019, the Pakistanis did their best to disrupt adversary communications.

Fourth, Indian intelligence reportedly underestimated the threat posed by the PL-15 missile, assuming that the PAF possessed an export variant with a maximum range of 150 kilometres, well short of the 200 kilometres at which some missiles were actually fired, surprising Indian pilots. This misjudgement may have resulted from deliberate deception, as shortly before the operation, documents from the Chinese firm CATIC, allegedly leaked, suggested the delivery to Pakistan of a significantly downgraded export variant of the PL-15.

Finally, the PAF is believed to have used its Link 17 data link, capable of integrating Western and Chinese technologies, to conduct cooperative engagements. If this was the case, JF-17 and J-10C fighters may have had the option to keep their radars off and to fire PL-15 missiles with active radar guidance using targeting data transmitted

[35] Capitaine Malcolm Pinel, *op.cit.*
[36] Tom Cooper, "Illusions and Realities of Cross-Border Incidents, Part 1", Sarcastosaurus, 11 May 2025.

by the Erieye, which was orbiting well to the rear of the formation. The Erieye would then have relayed the mid-course targeting data updates to the missiles either through the fighter fire control system or directly to the missiles, enabling them to perform the necessary trajectory corrections towards their targets several tens of kilometres away. Only in the final phase of flight would the missiles' own radar seekers activate to guide them onto their assigned targets, thus leaving the pilots only a few seconds to react, as their onboard threat detection systems would not have considered the distant emissions from the Erieye as an imminent threat.[37]

[37] Saeed Shah and Shivam Patel, "How Pakistan shot down India's cutting-edge fighter using Chinese gear", Reuters, 2 August 2025; Alan Warnes**,** *op. cit.* 19 September 2025; Raghav Patel, "Leaked Document Shows Pakistan Received Range-capped PL-15E Missiles, Lacking Advanced Radar", Defence.in, 6 May 2025.

Operation Bunyanum Marsoos

Shortly after the strikes began, the Indians informed Islamabad that their objectives were limited to JeM and LeT camps and that New Delhi had no intention of targeting Pakistani armed forces, implying that the incident would be considered closed once the strikes were over.[38] Islamabad, however, chose to retaliate, as in 2019. As early as the morning of 7 May, Pakistani artillery targeted Indian Army positions along the Line of Control, to which their Indian counterparts immediately responded. Later on, at night, the PAF launched a massive attack involving over 300 drones and JF-17s firing multiple CM-400AKG missiles. The drones targeted Indian Army forward posts, brigade, division, and corps headquarters, logistics centres and air stations, but they were also intended to prompt Indian air-defence systems to activate, thereby making them detectable to Pakistani electronic intelligence (ELINT) assets. Songar drones, capable of delivering small offensive payloads, and much more sophisticated, Turkish-designed Yihaa-III suicide drones, operated within or behind decoy drone formations to allow rapid engagement of any targets unveiled as they engaged the decoys. In parallel with these kinetic actions, the PAF also conducted a series of cyberattacks against both military and civilian targets.

The manoeuvre did not catch the Indians off guard. Rather than covering all border areas, they had concentrated air-defence assets around the most critical sectors, air stations to start with as well as other high symbolic value targets. They had also deployed their anti-aircraft artillery, considered to be most effective, at the front of their defensive setup alongside jamming systems and half a dozen anti-drone lasers, to counter the drones, contrary to missile batteries which were left further to the rear. Over the four days of the conflict, anti-aircraft guns destroyed more than half the Pakistani drones, with jamming and spoofing systems playing a major role. Crucially, the integration of the Air Force's IACCCS and the Army's Akashteer network allowed the Indians forces to fuse data collected by optical and electromagnetic sensors operated by both services, by the few radars kept active, and by numerous reports from civilians. The resulting air picture proved sufficient to coordinate the engagement of air-defence systems, and, importantly, to trigger them only when targets were well within their firing envelope. This approach allowed the radars controlling missile batteries to be activated only for very short periods, making it extremely difficult for enemy operators to triangulate their positions.

As a result, the Pakistanis failed to accurately map the Indian electronic order of battle following this initial strike.[39]

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[38] Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025; Cooper *et al. op. cit.*

[39] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025; Lieutenant General Sumer Ivan D'Cunha *op.cit.* 19 May 2025; Alan Warnes, *op.cit.*19 September 2025; Lt. Gen. Rajiv Ghai, *op.cit.* 14 October 2025.

An impenetrable bubble?

During the night of 8–9 May, Pakistani forces repeated the manoeuvre, targeting key Indian positions located 100 to 150 kilometres from the border and the Line of Control, including air stations such as Adampur and Srinagar. Long-range S-400 surface-to-air missile batteries, deployed close to the air stations, were considered particularly high-priority targets. Indian Army positions were also engaged, while Indian authorities reported drones approaching the Golden Temple in Amritsar; which were shot down before they could reach the highly symbolic site. This second wave involved the launch of approximately 600 drones, once again combining low-cost devices intended to draw enemy fire with more sophisticated attack models, aiming to saturate Indian defences. In addition to Yihaa III drones, the PAF deployed Bayraktar TB2s and Akinci drones operating at higher altitude to engage targets with guided munitions, while the Pakistan Army fired several salvos of long-range Fatah I and II artillery rockets, as well as short-range Hatf II ballistic missiles. PAF combat aircraft also operated on the periphery of the Indian air-defence bubble, waiting for opportunities to fire air-to-ground ordnance at enemy targets. However, the Pakistani effort again failed to saturate Indian defences or reach critical enemy centres. Indeed, most incoming munitions were intercepted, while Indian surface-to-air missile battery positions couldn't be triangulated. Those were relocated whenever they risked detection.[40]

Then, on 9 May at 20:00, the Pakistanis launched a third wave of attacks, which continued until 01:30 a.m. on 10 May. This wave was even larger than the previous ones and focused exclusively on air stations and nearby S-400 batteries, with Adampur, Srinagar, and Kutch being particularly targeted. In addition to drones of various types and artillery rockets, air power was used much more intensively, including F-16s and JF-17s, tasked with delivering medium- and long-range air-to-ground munitions.[41] The PAF claimed to have achieve a major success that night by neutralising Indian air-defence systems through cyberattacks and electronic jamming. What is more, its kamikaze drones and long-range munitions delivered by fighter aircraft reportedly grounded Indian aircraft after striking 34 targets across Indian air stations. In particular, a JF-17, protected by intensive electronic jamming and extensive use of decoys, is said to have penetrated the firing envelope of the S-400 battery at Adampur before launching two CM-400AKG missiles against it. Designed for anti-ship operations, this supersonic weapon can detect radar emissions and home in on their source. The two missiles reportedly struck the battery's surveillance radar and fire-control radar, rendering it inoperative.[42]

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[40] Air Marshal Narmdeshwar Tiwari *op.cit* 30 August 2025; Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025; Lieutenant General Sumer Ivan D'Cunha *op.cit*. 19 May 2025; Lt. Gen. Rajiv Ghai, *op.cit.* 14 October 2025.

[41] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025,

[42] Alan Warnes, *op.cit.*19 September 2025,

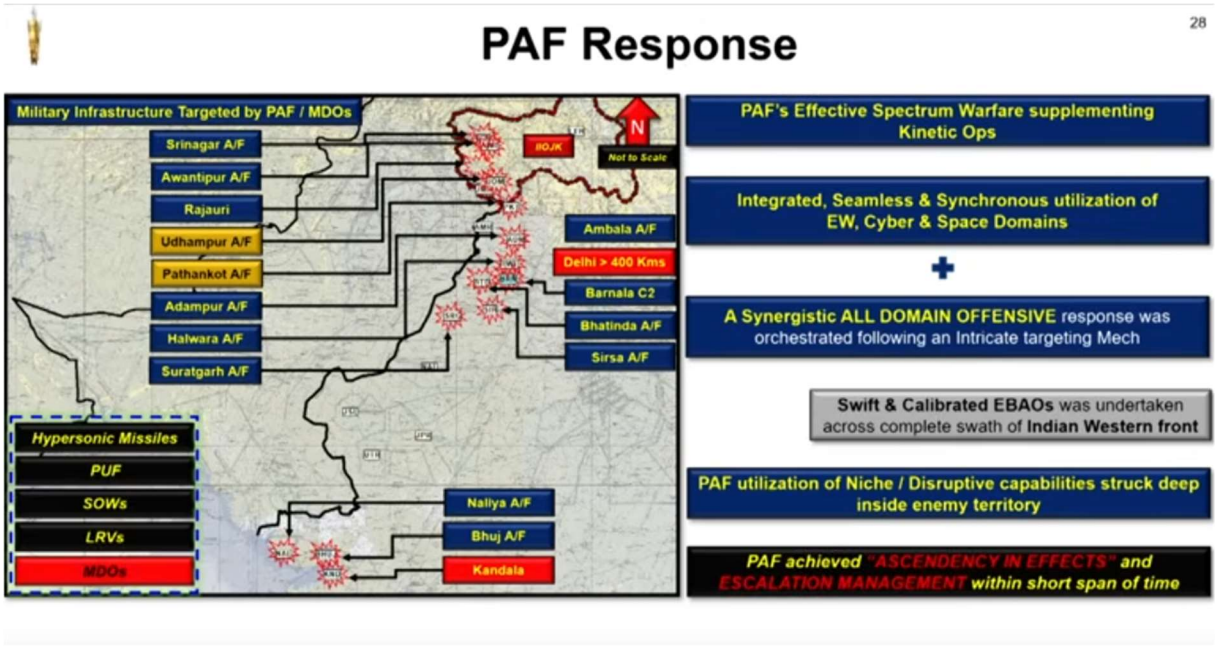

Figure 5 Air strikes during the night of 9-10 May 2025 claimed by Islamabad. (Credit: ISPR/PAF)

According to the IAF, however, this third wave proved as ineffective as the previous ones, with most drones shot down by anti-aircraft artillery or neutralised by jamming systems, and the remainder engaged by short- and medium-range surface-to-air missiles. The S-400 batteries reportedly continued to keep enemy fighters at a distance, with none able to enter the engagement envelope of the medium-range missile systems, and the two CM-400AKG missiles reportedly inflicted no significant damage on the Adampur S-400 battery. Furthermore, the S-400 systems not only restricted the freedom of action of the opposing air force but, still according to the IAF, also shot down five F-16 and JF-17 fighters between 7 and 10 May 2025, and this despite regional Pakistani civil air traffic continuing as normal, which considerably complicated Indian operations.[43]

[43] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025; Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025 ; Lieutenant General Sumer Ivan D'Cunha *op.cit*. 19 May 2025; Air Chief Marshal Amar Preet Singh "Briefing by Air Chief Marshal AP Singh on Air Force Day", 3 October 2025.

The Blitz of May 10th

The first wave of Pakistani attacks on the night of 7–8 May 2025 resulted in a second stage of Indian escalation, planned during the preparatory phase of Operation Sindoor. On 8 May, the IAF launched its own campaign of air interdiction and air strikes against Pakistani air-defences. This operation, focused on border surveillance radars and long-range surface-to-air missile batteries, carried on until the evening of 9 May. It was relatively discreet, with the Indians employing Israeli-origin Harop and Harpy loitering munitions. Eight air-defence sites were struck on 8 May, and a further four the following day, resulting in the visually documented neutralisation of at least two early-warning radars at Chunian and Pasrur.

Figure 6 Imagery of the radars hit by the Indian drone strikes. (Credit: IAF)

The IAF also claimed to have struck at least one HQ-9 battery, although the Pakistani side stated that their air-defence systems had shot down 25 drones on the morning of 9 May. Notably, one of the IAF's S-400 batteries reportedly surprised the PAF, likely by lying in ambush near the border, and engaged an Erieye or electronic warfare aircraft orbiting well beyond. The IAF claimed to have destroyed the enemy aircraft at a range close to 300 kilometres. The cumulative effect of these operations was a drastic reduction in both the extent and quality of Pakistani airspace coverage, as several radars that remained intact ceased emissions to avoid attracting enemy strikes, thereby facilitating the potential penetration of a further escalation stage by Indian aviation.[44]

[44] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025; Air Chief Marshal Amar Preet Singh, conference et the LM Katre Memorial, 9 August 2025; Lieutenant General Sumer Ivan D'Cunha *op.cit*. 19 May 2025; Air Chief Marshal Amar Preet Singh "Briefing by Air Chief Marshal AP Singh on Air Force Day", 3 October 2025; Soutik Biswas, "The first drone wars opens a new chapter in India-Pakistan Conflict", BBC, 9 May 2025.

Checkmate

The Indians detected preparations for the Pakistani attack scheduled on the evening of 9 May and opted for a quasi-immediate counterstrike. As soon as the Pakistani action had concluded, between 02:00 and 05:00 on 10 May, the IAF conducted a series of strikes using BrahMos, SCALP-EG and Rampage missiles launched from within Indian airspace by Su-30MKIs, Jaguars and Rafales. The missiles struck seven sites up to 200 kilometres inside Pakistani territory, including one surface-to-air missile battery and five air bases. In north Pakistan, Nur Khan Air Base, near Islamabad, was hit by at least one missile, which destroyed a PAF command-and-control centre, while Murid Air Base, the hub of Pakistan's MALE drone fleet, saw several hangars housing drones and a control centre struck. In central Pakistan, the small Rahim Yar Khan Air Base sustained several missile impacts on its runway, while the civilian airport terminal, which reportedly hosted a drone control centre, was also severely damaged. Rafiqi Air Base was also targeted, though the Indian side did not disclose specific objectives or damage inflicted. Finally, in the south, a hangar that housed drones and a radar at Sukkur Air Base were struck.

Figure 9. Satellite view of the destroyed hangar at Sukkur. (Credit: Damien Symon/Maxar)

After having detected preparations for a PAF counterstrike, the IAF launched a second wave of attacks at 10:00 on 10 May, which employed the same munitions and the same tactics, but this time extending their targeting to manned aircraft, whereas

the previous night's strikes had mostly been restricted to drones and their support infrastructure. In central Pakistan, Sargodha Air Base, home to multiple combat squadrons, was rendered inoperative by several missile impacts at the intersection of its runways. Indian strikes were even more destructive in the south. At Jacobabad Air Base, an F-16 maintenance hangar suffered a direct hit, while a radar was also damaged or destroyed, along with electrical and cooling facilities. At Bholari Air Base, another hangar housing one or more Erieye aircraft was severely damaged.[45]

In total, the IAF assessed that at least four or five F-16s, one Erieye, one C-130 transport aircraft, several MALE drones, two radars, two command-and-control centres and one surface-to-air missile battery had been destroyed on the ground, at the cost of roughly fifty long-range munitions.[46] The PAF, however, subsequently reported that the Erieye hit at Bholari was only lightly damaged and was quickly repaired, though five personnel were killed in the strike.[47] Nevertheless, by noon on 10 May, Pakistani military authorities requested a ceasefire from their Indian counterparts. This was quickly accepted, as the political objectives assigned to the military, namely to conduct spectacular retaliatory strikes to deter JeM and LeT while countering the Pakistan military's response, had been achieved. New Delhi thus claimed to have brought the conflict to a close, whereas other powers repeatedly get bogged down in the conflicts they initiate.[48]

[45] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025; Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025; Tom Cooper *et al. op.cit*.
[46] Air Marshal Narmdeshwar Tiwari, *op.cit* 30 August 2025; Air Chief Marshal Amar Preet Singh, *op.cit*. 3 October 2025.
[47] Alan Warnes, *op.cit.* 19 September 2025.
[48] Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025.

Figure 9. Summary and location of known Indian strikes from 7 to 10 May 2025. (Credit: Damien Symon)

Overclaim

The successive phases of this 88-hour conflict have not been reported consistently by the two belligerents, making any cross-referencing of their claims extremely difficult, if not impossible. Furthermore, even when covering the same time period, the two narratives can differ drastically. Each side also appears to have omitted crucial aspects of its operations, which are often likewise unreported by the adversary.

Thus, the Indian side provided a detailed account of the air strikes against Muridke and Bahawalpur but remained silent on the air combat that ensued as well as on the losses incurred on that occasion. Conversely, the Pakistani side presented a relatively detailed version of the response from their fighters during the night of 7 May 2025.[49] This account nevertheless leaves many questions unanswered, notably considering an OSINT study that indicates the PAF fighters didn't succeed in intercepting the Indian strike formations, but instead engaged, over the course of the following hour, several Indian combat air patrols orbiting behind the border, one after another.[50] Islamabad also remained silent on the combined attacks that took place between 7 and 9 May, the circumstances of which were detailed only by the Indian side, but did refer to the attack on 10 May, stating that it had been launched in retaliation to Indian strikes against its airfields and had the effect of grounding Indian aircraft deployed near the border, with some drones even managing to overfly New Delhi. The Pakistani military, however, were evasive regarding the extent of damage sustained and stated that it had succeeded in intercepting or jamming BrahMos missiles.[51] In contrast to the Indians, the Pakistanis couldn't support their claims with satellite imagery or open-source material.

Moreover, both sides appear to have effectively concurred to leave certain episodes in the shadows, as suggested by the possible discovery on Indian territory of the remains of a Pakistani Mirage III or V.[52] Most notably, Indian authorities made no mention—or even denied—the strikes conducted on 10 May 2025, despite satellite imagery confirming them, against the entrances to at least two underground complexes located in or near the PAF Murid and Sargodha Air Bases , the latter reputedly hosting part of Pakistan's nuclear warhead stockpile.[53]

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[49] Alan Warnes, *op.cit.* 19 September 2025 ; Inter Services Public Relations (ISPR), *op.cit*. 9 May 2025.
[50] Cooper *et al. op. cit*.
[51] Alan Warnes, *op.cit.* 19 September 2025 ; Inter Services Public Relations (ISPR), *op.cit*. 9 May 2025.
[52] Adhidev Jasrotia, "PAF Mirage vs. IAF's Su-30MKI: Aircraft Wreckage Creates Disputes Between India and Pakistan", SSBCrack, 12 May 2025.
[53] Damien Symon's X thread, 10 May and 15 June 2025 ; Surendra Singh, "Satellite imagery suggests India's missile hit Pakistan's nuclear-hub Kirana Hills" *in The Times of India*, 20 July 2025.

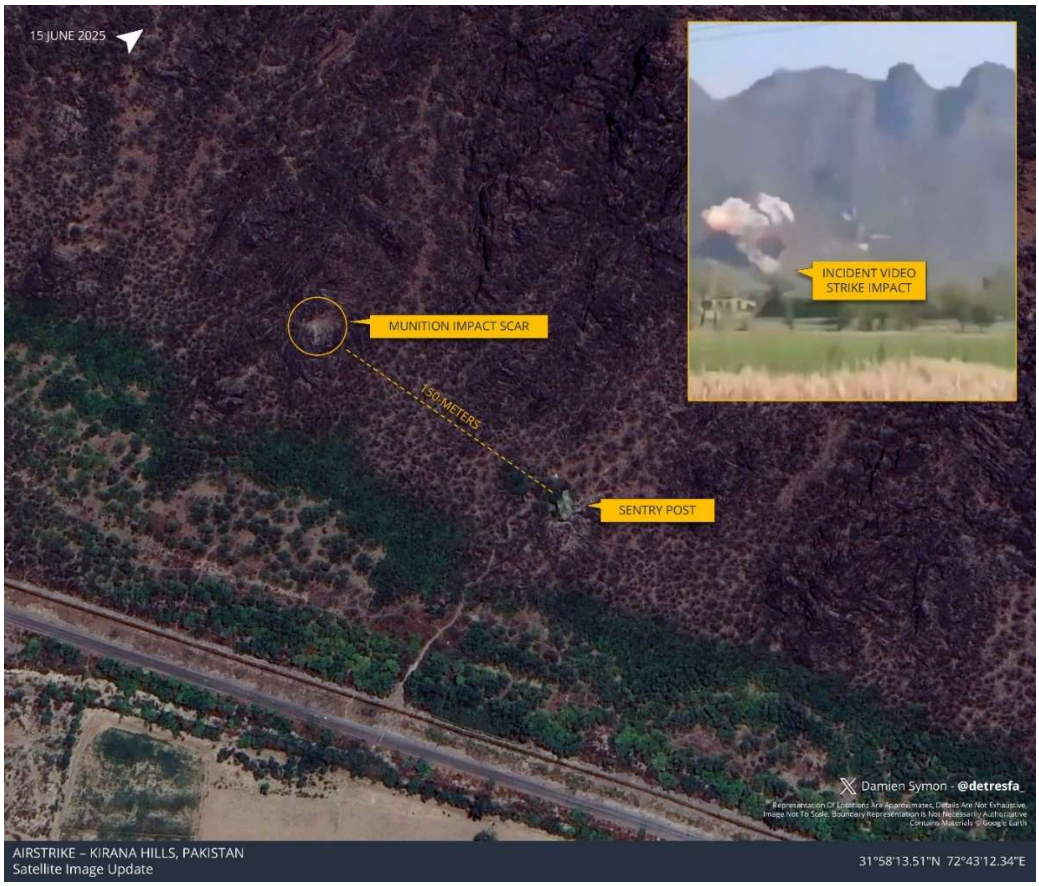

Figure 7 Impact marks on the Kirana Hills complex, adjacent to Sargodha Air Base and suspected of housing part of Pakistan's nuclear arsenal. (Credit: Damien Symon / Google Earth)

Claims difficult to verify

Overall, the Indian side estimated that, at the conclusion of this 88-hour aerial conflict, it had destroyed between nine and ten Pakistani combat aircraft, one Erieye, one more Erieye or one electronic warfare aircraft, and one C-130 transport, either through their S-400 batteries or during their air-to-ground strikes. Additionally, two surface-to-air missile batteries and at least six radars were also reportedly neutralised, some of these claims being supported by imagery.[54] On the Pakistani side, claims reached as many as eight aircraft, including four Rafales bearing the serial numbers BS001, BS021, BS022, and BS027, as well as one S-400 battery neutralised.[55]

Nevertheless, and for both sides, claims resulting from the long-range engagement of their surface-to-air missile batteries or fighter aircraft appear primarily to stem from information collected during the encounters by their radars and electronic warfare and electronic intelligence assets. While this method may at first sight seem entirely

[54] Air Chief Marshal Amar Preet Singh, *op.cit*. 3 October 2025.
[55] Alan Warnes, *op.cit.* 19 September 2025.

reliable, as it is based on technical and objective data, the reality is more complex. The sudden disappearance of a targeted aircraft from radar screens may have causes other than its destruction, such as abrupt evasive manoeuvres, particularly in mountainous terrain, or the effective employment of electronic countermeasures.

Losses in aircraft and long-range antiaircraft systems	Claimed by the adversary	Visually documented (as of October 31, 2025)
Pakistani losses	9 or 10 combat aircraft destroyed on ground or shot down 1 Erieye destroyed on ground 1 Erieye or ELINT Falcon 20 shot down 1 C-130 destroyed or damaged 2 HQ-9B or HQ-16 batteries neutralised	1 F-16 destroyed or damaged 1 Mirage III/V shot down 1 Erieye destroyed or damaged 1 C-130 destroyed or damaged
Indian losses	4 Rafale 1 Su-30MKI 1 MiG-29UPG 1 Mirage 2000I 1 S-400 battery neutralised	1 Rafale 1 Mirage 2000I 1 MiG-29UPG or Su-30MKI

Figure 8 Claims and confirmed losses

In any event, numerous recent air operations demonstrate that improvements in technical capabilities have not eliminated the phenomenon of overclaiming, which has been inherent to air warfare since its inception. This does not stem from a deliberate inflation of achieved successes in support of a particular narrative, but rather from the sincere claiming of victories by the players concerned. As such, a large proportion of the victory claims made by both Russian and Ukrainian forces since February 2022 couldn't be subjected to documented confirmation. Earlier still, even the United States Air Force erroneously confirmed several aerial victories during Operation Desert Storm in 1991, based on the sincere assessments of its pilots and data collected by its multiple sensors.

It will therefore most likely take years, as well as access to the testimony of the participants involved and to the archives of the units concerned, to obtain a genuinely satisfactory understanding of these events. Nevertheless, sufficient elements appear to indicate that, by the morning of 10 May 2025, the Indian Air Force had succeeded in achieving air superiority over a significant portion of Pakistan's airspace. This in turn enabled it to continue long-range strikes against enemy infrastructure at will, at least for as long as it retained sufficient stocks of munitions such as BrahMos or SCALP-EG. At the same time, the Pakistan Air Force had lost the ability to repeat the operations it had conducted so successfully on 7 May 2025, owing to the loss of its forward air-surveillance radars and the threat posed by S-400 systems to its AWACS standoff weapons delivery platforms, while its own strikes conducted between 7 and 10 May 2025 had been largely thwarted by Indian defences.

Conclusion

From a politico-strategic perspective, Operation Sindoor offers significant lessons, at a time when tensions keep rising in Europe and Moscow's declaratory strategy has repeatedly relied on the latent threat of its nuclear arsenal, successfully so as this has notably delayed or constrained the delivery of certain Western weapons systems to Ukraine. India faced a similar dynamic, as JeM and LeT bases located on Pakistani territory were effectively sanctuarised by the existence of Islamabad's nuclear arsenal, which furthermore denied that these bases were the launchpads for attacks as deadly as the 26/11 attack in Mumbai. While this note does not seek to analyse this aspect in depth, it is apparent that a more thorough study of the decision-making mechanisms at work in New Delhi, where actions gradually led the political leadership to dare undertake ever larger operations, from simple cross-border commando raids in 2016, to the bombing of a training camp in 2019, and then to strikes against two insurgent command centres in 2025, on the territory of a *de facto* nuclear-weapon state, represents a major strategic issue.

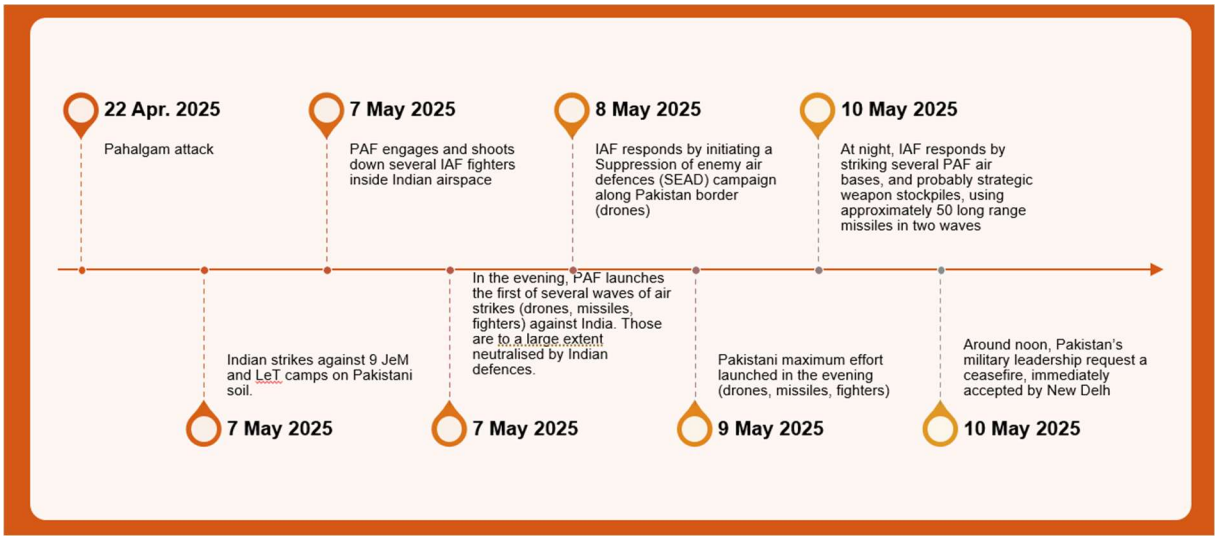

Figure 9 Main escalation stages of Operation Sindoor

Even more strikingly, the political level limited itself to setting overarching objectives and delegating their execution, including the management of potential escalation, to the military. In turn, the latter strictly adhered to this framework, immediately halting kinetic actions despite achieving superiority over the adversary, and managing escalation with relative prudence, each new escalation stage occurring only after that of the opponent. The IAF, for instance, did not react to its setbacks on 7 May, and countered Pakistani attacks on 7, 8, and 9 May with a relatively limited campaign that targeted enemy border air defences.

The major Pakistani attack during the night of 9–10 May represented the crossing of a further escalation stage, prompting a response aimed at enemy air bases, whose targeting appeared more demonstrative or declaratory than destructive. Concurrently,

Operation Sindoor marked a significant evolution in Indian counter-terrorism doctrine, which now equates a terrorist attack to an act of war warranting a decisive response. It also eliminates the distinction between terrorist groups and their state sponsors, with the latter automatically becoming legitimate targets in the event of a renewed attack. Finally, it reaffirms New Delhi's resolve, in such a case, not to be deterred by Islamabad's nuclear arsenal. The potential for escalation on the Indian subcontinent therefore remains higher than ever, while developments since 1999 have constantly illustrated the stability/instability paradox.

Operations and strategic communication

Meanwhile, Islamabad demonstrated its manifest superiority in strategic communication, which notably benefitted from support within Chinese, and to some extent Western, information spheres. The destruction of one or more Rafales, for example, effectively masked the defeat of the adversary air force, which had reportedly suffered at least equivalent losses but had also proven incapable of defending its most important air bases or of delivering comparable, documented strikes against its adversary.

Sindoor highlighted the symbolic significance that certain weapons systems can acquire in specific contexts. Prior to the case of one or more Indian Rafales being shot down during this confrontation, there had been the precedent of an American F-117 stealth aircraft downed by Serbian air defences during Operation Allied Force over Kosovo in 1999. The incident immediately made international headlines, despite minimal allied losses during the campaign.[56] It thus appears that the prestige associated with certain weapons systems, and the major commercial stakes involved, can disadvantage their operators, whenever their destruction may provide the adversary with a disproportionate communication advantage. The relatively high attention paid to an Israeli F-35 being forced to manoeuvre to avoid a surface-to-air missile from Ansar Allah defences over Yemen in March 2025 further supports this observation.[57] In this respect, repeated but erroneous Iranian claims regarding the destruction of Israeli F-35s during the Twelve-Day War in June 2025 suggest that such platforms had been identified as decisive due to their symbolic value, and their successful downing would indeed have undermined Israel's narrative of complete freedom of action over Iranian territory.

Another lesson learned regards the increasingly pressing need for belligerents to support their respective narratives with imagery of their successful strikes. Beyond their obvious military value, such images have become essential in the battle of per-

[56] In total, one F-117A, one F-16CG and approximately 20 drones by the end of the 78 day campaign. Bojan Dimitrijević et Lt-Gen. Jovica Draganić, *Operation Allied Force. Air War over Serbia 1999. Volume 2*. Warwick, Helion and Company, 2022, p. 67, 69, 70.
[57] Howard Altman, "F-35 Had to Maneuver To Evade Houthis Surface-to-Air Missile: U.S Official" in *The War Zone*, 13 May 2025.

ceptions. The Indians had learned the lesson, from their 2019 Balakot operation, that the absence of imagery demonstrating the results of their air strikes left them unable to counter Pakistani assertions.[58] Sindoor established a different paradigm, with Indian forces carefully corroborating their narratives with aerial imagery or material gathered from social media, whereas Pakistan was unable to demonstrate the veracity of its claimed strikes against Indian air stations. Nevertheless, the PAF remains highly adept in communication strategies, as demonstrated by a hastily convened press conference following the 7 May 2025 air engagements. Unlike the Indian briefings, it provided tactical details, including radar imagery of airspace and recordings of adversary radio communications, lending apparent credibility to its claims. Moreover, the PAF has long-standing links with part of the Anglo-Saxon specialised press, which facilitates the dissemination of key messages to a limited but influential segment of Western public opinion.[59]

The rise of long-range weapons

From a strictly military perspective, Sindoor confirmed a trend already observed in Ukraine and further underscored by the subsequent Twelve-Day War between Israel and Iran: the growing use of long-range air-to-ground weapons[60] . Missiles such as the Rampage, CM-400AKG, BrahMos and SCALP-EG, whose ranges vary from 250 to 600 kilometres, were the spearhead of both air forces' operations. Similarly, the same logic applies to air-to-air weapons: a fighter equipped with systems and missiles capable of engaging at distances far exceeding its opponent's enjoys a decisive advantage. The increased engagement ranges of air-to-surface and air-to-air platforms were, however, matched by those of long-range surface-to-air systems, capable of forming a first defensive layer several hundred kilometres from their targets. It must be stressed, however, that these systems are, in turn, already in part countered by another type of long-range munitions, namely kamikaze drones. Widely available thanks to its cheap cost, this technology can easily saturate long-range air-defence systems, which are inherently few due to their particularly high cost.

Therefore, these long-range surface-to-air systems cannot replace medium, short, and very short-range systems, all essential for protection against long-range threats, while the detection range of various types of sensors is also increasing. This growth in both range and complexity of sensors and effectors, which are fundamental to air operations in the broad sense, increasingly emphasises the importance of distributed communication and information infrastructure needed for their coordination. In effect,

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[58] Air Chief Marshal Amar Preet Singh, conference at the LM Katre Memorial, 9 August 2025.

[59] Alan Warnes, *op.cit.* 19 September 2025.

[60] Adrien Gorremans, with the participation of Jean-Christophe Noël, "L'avenir de la supériorité aérienne. Maîtriser le ciel en haute intensité", *Focus stratégique*, n° 122, Ifri, January 2025 ; Héloïse Fayet and Léo Péria-Peigné "La frappe dans la profondeur : un nouvel outil pour la compétition stratégique ?" *Focus stratégique*, n° 121, Ifri, November 2024.

as Operation Sindoor has demonstrated, air warfare has long been more than a contest between air forces, namely a contest between integrated joint systems comprising a wide variety of sensors and offensive and defensive effectors. In this instance, Indian forces there again demonstrated clear superiority over their adversary, proving that weapons previously considered obsolete, such as anti-aircraft artillery, can play a significant role within such an ecosystem, provided their fire-control systems are compatible with the overall integrated network.

This niche of anti-aircraft artillery will therefore remain an important indicator for assessing an adversary's or competitor's potential, while attention to stocks of long-range munitions, missiles or drones, or the characteristics of communications and control systems, will likely continue to grow.

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