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The Plight of Russia's Air Power in the Ukraine War:

Drone-Driven Innovations and Transformation of Traditional Air Force

Pavel BAEV

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Executive summary

Since the start of the Ukraine War, Russian strategic guidelines on the application of air power—seen as the decisive instrument for achieving success in modern wars—have proven to be outdated, irrelevant and even self-defeating. In the course of the continuously evolving 55-month-long war, Russian Aerospace Forces have adjusted to the operational environment, in which the goal of establishing dominance in the air has proven to be beyond reach, and accumulated valuable combat experience. The main change that the pre-war air doctrine had failed to anticipate is the massive use of drones, which is organized (but hardly conceptualized) by the newly created Unmanned Systems Forces command, a separate branch of the Russian Armed Forces. The heavy emphasis on the mass production and large-scale use of tactical and long-distance drones has inevitably curtailed the volume of resources allocated for modernization of Russian tactical and long-range aviation. The latter in particular has suffered irreplaceable losses and degradation of its fleet of planes, while the effectiveness of the strikes by cruise missiles has significantly diminished. The main new capability in tactical aviation is the experience in delivering strikes with glide bombs, but the ability to provide effective ground support remains limited. The drone-driven revolution in military affairs keeps unfolding, but as the United States-Israeli air assault on Iran has demonstrated, the role of the modern air forces remains pivotal. The parallel processes of modernization and degradation in the Russian Aerospace Forces make them a complex challenge to the European neighbors, which can be effectively countered by the ongoing build-up of capabilities in the North Atlantic Treaty Organization (NATO) member-states.

Résumé

Depuis le début de la guerre en Ukraine, les orientations stratégiques russes relatives à l'application de la puissance aérienne – considérée comme l'instrument décisif pour parvenir au succès dans les guerres modernes – se sont révélées obsolètes, non pertinentes et même contre-productives. Au cours des 55 mois d'une guerre en constante évolution, les Forces aérospatiales russes se sont adaptées à l'environnement opérationnel, dans lequel l'objectif d'établir une domination dans les airs s'est avéré hors de portée, et ont accumulé de précieuses expériences de combat. Le principal changement que la doctrine aérienne d'avant-guerre n'avait pas su anticiper est l'utilisation massive de drones, qui est organisée (mais à peine conceptualisée) par le commandement nouvellement créé des Forces des systèmes sans pilote, une branche distincte des Forces armées russes. L'accent marqué mis sur la production de masse et l'utilisation à grande échelle de drones tactiques et à longue portée a inévitablement réduit le volume des ressources allouées à la modernisation de l'aviation tactique et à long rayon d'action russe. Cette dernière, en particulier, a subi des pertes irremplaçables et une dégradation de sa flotte d'avions, tandis que l'efficacité des frappes par missiles de croisière a considérablement diminué. La principale nouvelle capacité de l'aviation tactique réside dans l'expérience acquise dans la réalisation de frappes avec des bombes planantes, mais la capacité à fournir un appui efficace au sol reste limitée. La révolution dans les affaires militaires induite par les drones continue de se déployer, mais comme l'assaut aérien américano-israélien contre l'Iran l'a démontré, le rôle des forces aériennes modernes reste essentiel. Les processus parallèles de modernisation et de dégradation au sein des Forces aérospatiales russes en font un défi complexe pour les voisins européens, qui peut être efficacement contré par le renforcement en cours des capacités dans les États membres de l'Organisation du traité de l'Atlantique nord (OTAN).

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Introduction

The devastating US-Israeli aerial attack on Iran launched on February 28, 2026 and sustained until the ceasefire agreement on April 8, with new strikes continuing in summer, demonstrated the colossal offensive capacity of modern airpower, something that Russia has been unable to produce in the long war against Ukraine launched on February 24, 2022. The Iran War has proven that airpower alone cannot ensure a victory against a determined adversary, but the Ukraine War has shown that large-scale ground operations cannot achieve decisive success without effective application of airpower. Russia's advantage over Ukraine in all elements of airpower in the initial phase of war was overwhelming; yet, the goal of establishing dominance in the air proved to be beyond reach. Four and a half years later, Russia still has superior numbers of air platforms and has learned many lessons; nevertheless, it cannot operate in the Ukrainian airspace or provide effective air support for the troops engaged in pitched battles along the 1,250 km front line. Russia's failure to turn its superiority in airpower into a decisive edge for an effective blitzkrieg was a surprise for many Western experts.[1] Further surprises were delivered by the massive use of drones, which necessitated rethinking the definition of airpower and reconceptualization of the application of its traditional and emerging elements.[2] Presently, the key issue is the capacity of the war-damaged but also modernized Russian Aerospace Forces (*Vozdushno-Kosmicheskie Sily*, VKS), its key branch Air Force (*Voenno-Vozdushnye Sily,* VVS) and the newly-created Unmanned System Forces (*Voiska Bespilotnyh System*, VBS) for generating threats to the most exposed NATO member-states in probable confrontations in the near future.[3]

What makes this issue hard to examine is not only the shortage of reliable data aggravated by the tightening censorship in Russia, but also the apparent differences in the development of various elements of airpower, so that modernization and degradation are combined in a fluid blend. There is no doubt, for that matter, that Russia has achieved impressive advances in the tactical use of drones in the "killzone" and in executing massive

1. See, for instance, R. Ichaso, "Russia's Air Force's performance in Ukraine: Air operations: The Fall of a Myth", *The Journal of the JAPCC*, February 2023, available at: www.japcc.org.
2. This rethinking is inevitably inconclusive; one notable example is D. Grazier, "The Future of American Airpower", Stimson Center Report, June 2, 2026, available at: www.stimson.org.
3. One useful update source on this issue is J. Bronk, "Four Years On: An Update on the Air War over Ukraine", *RUSI Commentary*, July 26, 2026, available at: www.rusi.org.

combined drone-missile attacks on Ukrainian cities.[4] It is also clear that these achievements fall short of granting Russian forces an effective superiority in ground attacks or in eroding the enemy's will to resist; in fact, by mid-2026, Ukraine has gained new advantages in projecting airpower.[5] What is less obvious is the negative impact on other VKS capabilities, because the heavy emphasis on expanding the production of tactical and long-distance drones has aggravated the shortcomings in modernization of the tactical aviation and resulted in a significant decline in strategic aviation.[6] Hard data on this underinvestment is scarce, but the deep crisis in the civilian aircraft industry provides an informative illustration.[7]

The experience of the protracted war requires serious changes in the strategic guidelines on the application of air power in combat operations as well as in the doctrinal propositions on the role and composition of air power in Russia's military posture.[8] Russian VKS have shown capacity for learning and also a remarkable ability not to learn, for which Crimea provides a perfect example. The vision of building a "Fortress Crimea" impenetrable to hostile encroachments was destroyed already in September 2023 by the Ukrainian missile strike on the Black Sea Fleet HQ in Sevastopol, which compelled the withdrawal of most Russian combat ships to the Novorossiysk base.[9] Russian command continues, nevertheless, to deploy valuable VKS assets to several airbases in Crimea, where those are repeatedly and successfully hit by well-targeted Ukrainian strikes.[10] Resistance in the vast Russian military bureaucracy to even the most necessary reforms remains strong, but the main reason for poor learning is the reluctance to admit mistakes, which is in line with the Kremlin's insistence on the rationale for and the inalterable goals of the "special

4. A noteworthy assessment of these advances by Indian experts is K. Bommakanti and M. Mustafa Ayez, "The Evolution of Russia's Drone Warfare in Ukraine", *ORF Raisina Debates*, December 4, 2025, available at: www.orfonline.org.

5. Analysis of Ukraine's capabilities is beyond the scope of this research; see D. Deptula, "Grow Ukraine's Airpower Impact by Integrating Manned/Unmanned Aircraft", *Forbes*, June 30, 2026, available at: www.forbes.com.

6. Both tactical and strategic aviation are subordinated to the Air Force Command (*Voenno-Vozdushnye Sily,* VVS), which constitutes the main part of the VKS. The former is organized into five regional air armies, one in each Military District, and the latter has a separate Long-Range Aviation Command.

7. On the production problems with the Sukhoi SJ-100 plane, see A. Spray, "With Troubled Engines, Russia Seeks to Extend Service Life of the Superjet 100", *Aerospace Global News*, May 8, 2026, available at: https://aerospaceglobalnews.com.

8. Changes in Russian strategic thinking after the initial period of war are expertly researched in D. Minic, "What Does the Russian Army Think about its War in Ukraine?", *Russie.Eurasie.Reports*, No. 44, Ifri, September 2023, available at: www.ifri.org.

9. That vision is evaluated in K. Åtland, "Redrawing Borders, Reshaping Orders: Russia's Quest for Dominance in the Black Sea Region", *European Security*, January 2021, available at: www.tandfonline.com. On the Ukrainian strike, see "For Russia, a Symbolic Loss in a Symbolic City: Its Black Sea Fleet Headquarters Is no more", RFE/RL, February 27? 2026, available at: www.rferl.org.

10. One example is V. Litnarovych, "SBU Hits Saky Airfield Again, Says at Least 7 Russian Aircraft Damaged or Destroyed", United 24 Media, July 3, 2026, available at: https://united24media.com.

military operation", so the political demand for innovative military thinking appears to be non-existent.

This report doesn't aspire to draw comprehensive lessons regarding the strength and weakness of the Russian VKS and VVS from the evolving war or to assess the scope of aerial threats to NATO in the foreseeable future.[11] The more limited aim here is to examine the most recent discrepancies between Russia's evolving perceptions on the application of air power and the ongoing reconfiguration of the Aerospace Forces.

The vast gap between strategic aims shaped by these perceptions and available capabilities determined the failure to achieve the initial war aims, and it has not been closed by the middle of its fifth year, though various adjustments are executed. Russia's aspirational claim for a "Great Power" status, which the Ukraine War is supposed to ascertain, necessarily translates into the desire to possess superior air power, but the capacity to fulfill this urge is significantly degraded.[12] Much the same way as the vision of "great-powerness" persists from the Soviet era, the perceptions of the potency of airpower are rooted in the Cold War era concepts, enriched by various modern experiences, including those gained in the Syrian intervention, and presently informed by vague impressions on the inconclusive Gulf War. The guidelines for development of own capabilities are typically dismissive of the limitations in available resources and deterioration of the industrial base, but their general orientation on a future contestation with the European NATO allies is unmistakable. The divergence between perceptions and capabilities, therefore, not only persists, but also gains new features, some of which, particularly pertaining to the development of the Space Forces or the strategic early warning system (both are parts of the VKS), are left outside the limited scope of this analysis.

11. Such assessments continue to be updated in many expert analyses; see, for instance, A. Palmer and K. Ward, "Air Superiority in the Twenty-first Century: Lessons from Iran and Ukraine", *CSIS Brief*, Center for Strategic and International Studies (CSIS), October 10, 2025, available at: www.csis.org; J. Bronk, "The Evolution of Russian and Chines Air Power Threats", *RUSI Insights Papers*, Royal United Services Institute (RUSI), January 8, 2026, available at: www.rusi.org.

12. A useful examination of this incompatibility is M. Hvizda, B. Frederick et al., "Dispersed, Disguised, and Degradable: The Implications of the Fighting in Ukraine for Future US-Involved Conflicts", *RAND Research Report*, RAND Corporation, May 22, 2025, available at: www.rand.org.

The Soviet tradition shaping pre-war ambitions

History lessons are not directly applicable to the fast-evolving Ukraine War, but they are useful for interpreting the unique combination of the ability to adapt and reluctance to learn in Russian strategic culture. The great desire to build unmatched air power emerged in the 1930s, in the course of Soviet industrialization and was cultivated by Josef Stalin, who particularly promoted the long-distance flights over the Arctic, intended to demonstrate the unique dynamics of the USSR.[13] That myth of Soviet excellence in the air was brutally shattered by the German invasion in June 1941, which began with a near-complete destruction of the Soviet Air Force, and it took two years to restore the capacity to deny the *Luftwaffe* dominance over key battlefields, primarily with the help of 13,200 aircraft supplied by the United States (US) through the "lend-lease" arrangement.[14] Nevertheless, already in November 1950, the first generation of Soviet-built MiG-15 jet fighters piloted by VVS officers engaged in tough dogfights with the US Air Force in the Korean War.[15] Further and generally successful engagements occurred during the Vietnam War, but the main direction for the Soviet projection of air power in different ways was the Middle East, where several tests confirmed that it was not quite on par with that of the US. In the battle over the Beqaa Valley in Lebanon in June 1982, the Israeli Air Force destroyed some 30 batteries of the Soviet-supplied SA-6 and SA-7 surface-to-air missiles and downed some 85 Soviet-supplied MiG-21 and MiG-23 fighters (Syrian pilots were trained in the USSR, and some missile batteries were operated by Soviet "advisers") with minimal losses.[16]

Russia has inherited from the USSR the bulk of both the Air Force and the Strategic Air Defense Force and all assets of the Long-Range Aviation (Ukraine returned eight Tu-160 and three Tu-95MS bombers in 1999 as payment for gas debt) and had to execute the necessary downsizing and reorganization, often with incoherent planning, so that the current

13. One still relevant source on that myth-building is K. E. Bailes, "Technology and Legitimacy: Soviet Aviation and Stalinism in the 1930s", *Technology and Culture*, Vol. 17, No. 1, January 1976, pp. 55-81, available at: www.jstor.org.

14. Further 4.500 aircraft were provided by the UK; see R. Coalson, "We Would Have Lost: Did US Lend-Lease Aid Tip the Balance in Soviet Fight Against Nazi Germany?" RFE/RL, May 7, 2020 available at: www.rferl.org.

15. S. Zaloga, "The Russians in MiG Alley", *Air & Space Forces Magazine*, February 1, 1991, available at: www.airandspaceforces.com.

16. M. Hurley, "The Bekaa Air Battle, June 1982: Lessons Mislearned?", *Air Power Journal*, Vol. 3, No. 4, Winter 1989, pp. 60-70.

structure of the Aerospace Forces (VKS) was established only in August 2015.[17] Underfunding aggravated many traditional problems, particularly the wide variety of types of fighter jets developed by the competing Mikoyan and Sukhoi design bureaus, merged into the United Aircraft Corporation in 2006, while many intra-corporate issues still persist.[18] Various projects for new combat planes were scrapped during the two decades essentially lost for aircraft technology development, and it was only in 2002 that the design for the "fifth generation" fighter (PAK FA) by the Sukhoi bureau was approved. The prototype Su-57 fighter made its first flight in 2010, but neither its engine nor its stealth characteristics met the definition of "Generation five", and its capacity for operating in the contested combat environment remains untested.[19] The organization of serial production at the Komsomolsk-on-Amur plant moved through so many supply-chain and technological hurdles that India canceled the plan for a joint venture, despite the offer for technology sharing, and China, after procuring two dozen Su-35 fighters in 2015, proceeded with its own *Chengdu* J-20 design.[20]

In the 1990s, technical degradation of the Air Force was accompanied by a doctrinal void, caused by the very limited usefulness of air power in multiple Russian interventions and peace-making operations in the former Soviet space and beyond, including the NATO-led SFOR in Bosnia-Herzegovina. The ten-week-long NATO air campaign against Yugoslavia in March-June 1999 delivered a powerful shock to Russian strategic perspectives, and in order to demonstrate the determination to revive the strength of the Air Force, President Vladimir Putin even made a trip to Grozny as a co-pilot of the Su-27 fighter.[21] The recognition of the need to upgrade air power wasn't followed through with the allocation of resources, so in the August 2008 war with Georgia, the Russian Air Force performed dismally, bombing Gori indiscriminately and taking half of the not

17. On the completion of reorganization, see R. McDermott, "Russia Reforms the Aerospace Defense Structures – Again", *Eurasia Daily Monitor*, August 11, 2015, available at: https://jamestown.org. On the 1999 deal, see E. Cook, "Rusia Using Tu-160 Bombers Transferred from Ukraine 25 Years Ago", *Newsweek*, November 27, 2024, available at: www.newsweek.com.

18. On the scale of Soviet-era problems and their mismanagement, see M. Verrier, "Overestimating Soviet Airpower: The Soviet Jet Fighter Gap", *RUSI Journal*, Vol. 168, No. 5, November 16, 2023, available at: www.rusi.org.

19. H. Kass, "Russia Is Facing Challenges with Its Fifth-Generation Fighter", *National Interest*, June 22, 2025, available at: https://nationalinterest.org.

20. On the Indian decision, see "India Slams the Door on Russia's Su-57 Stealth Fighter as Defence Secretary Confirms 'No New Sukhois'", *Defence Security Asia*, August 1, 2026, available at: https://defence.in; on the Chinese attitude, see P. Suciu, "Russia's Su-57 Fifth Generation Fighter Mocked on Chinese Social Media", *Forbes*, November 4, 2024, available at: www.forbes.com.

21. On that episode, see A. Louis, "Putin Flies Jet to Chechnya", *UPI Archives*, March 20, 2000, available at: www.upi.com. On the lasting impact of the Kosovo war, see M. Gessen, "How the Kosovo Air War Foreshadowed the Crisis in Ukraine", *The New Yorker*, February 15, 2022, available at: www.newyorker.com.

insignificant losses from "friendly fire".[22] The obvious underperformance spurred new reforms, in which numerical cuts were justified by expanded investments in new capabilities.[23] One small episode in that one-sided military contestation made, however, an outsized difference: On April 20, a Russian MiG-29 fighter shot down a Georgian reconnaissance drone (Israel-made *Elbit Hermes* 450 model) over Abkhazia.[24] That easy hit could have tipped the opinions in the Russian High Command against investing in unmanned aerial vehicle capabilities (similar, for instance, to the Turkish *Bayraktar* TB2 drone, first flight in August 2014), deemed too vulnerable to intercepts by fighter jets and performing tasks for which even the old Il-20M reconnaissance aircraft was better suited.

Russian air capabilities were involved only in minor supporting functions for the swift power-projecting operation that assured the annexation of Crimea in March 2014, and had an indirect/supporting role in the ensuing messy fighting in Donbas, partly because Moscow preferred to deny the fact of its intervention. The ensuing deployment of various air assets to Crimea was underpinned, nevertheless, by the strategic concept of "Fortress Crimea".[25] It envisaged a layered A2/AD architecture combining long-range air defence systems (S-300, S-400), coastal anti-ship missiles (*Bastion*, *Bal*), naval strike platforms (*Kalibr*-equipped submarines), tactical aviation (Su-27, Su-30, Su-24), electronic warfare capabilities (*Krasukha*, *Murmansk*-BN) and integrated ISR networks (*Nebo*-M and *Podlet*-1K air surveillance radars), and ground-based missiles (*Iskander*-M) – collectively designed to deny adversaries access and constrain freedom of manoeuvre across the Black Sea theatre. That strategic ambition was demonstrated by repeated aggressive intercepts of US reconnaissance planes, as well as British Royal Navy destroyer HMS *Defender*, but in fact, the capacity for combining effective multi-domain defense and long offensive reach was never obtained.[26] The tasks of coastal defense, air/missile defense and long-distance strikes were performed by assets controlled through different chains of command, and the ones controlled by the Navy were poorly compatible with those the VKS was responsible for. The mismatched grouping of forces in Crimea was never close to meeting

22. A. Lavrov's chapter on "Russian Air Losses" in the very useful book edited by Ruslan Pukhov (*The Tanks of August*, Moscow: CAST, 2010) is informative on this matter.
23. One useful source on the reforms associated with Defence Minister A. Serdyukov is R. McDermott, B. Nygren and C. V. Pallin, *The Russian Armed Forces in Transition*, London/New York: Routledge, 2012.
24. P. Felgengauer, "Russia Offers Georgia a Stick and a Carrot", *Eurasia Daily Monitor*, April 24, 2008, available at: https://jamestown.org.
25. My critical examination of this concept can be found in P. K. Baev, "New Perspectives on the Black Sea Theater in Russian Strategic Culture", *Security Insight*, Marshall Center, September 2019, available at: www.marshallcenter.org.
26. On these incidents, G. Ziezulewicz, "Russian Intercept Marks a Return to Cold War Behavior in European Skies", *Navy Times*, November 8, 2018, available at: www.navytimes.com; P. Dickinson, "British Warship Challenges Russian Claims to Crimea", *Ukraine Alert*, June 25, 2021, available at: www.atlanticcouncil.org.

the criteria for integrated operations central for the "anti-access/area denial" (A2/AD) concept.[27]

As the first phase of the Ukraine war was "frozen" by the Minsk Agreements in February 2015, a different opportunity for asserting Russia's global reach was found in Syria, and the military intervention, launched on September 30, 2015, marked a high point in Russia's projection of air power, even if it took place against relatively weak adversaries in a largely uncontested environment. This still-not-entirely-completed overseas expedition stands out in the track record of Russian combat operations because of the central role of the Air Force in the strategic plan for turning the course of a messy civil war.[28] President Putin took a serious risk with ordering several mixed squadrons to deploy to the Khmeimim base (in the north-western Latakia province, still partly operational) and expecting that most of the hard fighting on land would be done by the Syrian army and Iran-controlled militias. Up to the end of 2024, when the al-Assad regime spectacularly collapsed, he had had good reasons to believe that the gamble paid off nicely.[29] One crisis happened in the early phase of the intervention, when a Su-24 fighter-bomber was shot down by a Turkish F-16 fighter, and it took many months to sort out the loud quarrel between Moscow and Ankara.[30] After that, every possible measure was taken to "de-conflict" the Russian operation with the US activities in Syria, Turkish land operations and the Israeli strikes, so that only one sharp crisis occurred in September 2018, when a Syrian S-200 surface-to-air missile aimed at an Israeli F-16 fighter near Latakia hit the Russian Il-20M *Coot-A* reconnaissance plane instead, killing all 15 crewmembers.[31]

The Syrian operation was useful for combat testing many weapon systems, including the air-launched Kh-101 cruise missile, and granted many Russian pilots combat experience, albeit in a permissive—but not entirely uncontested—environment.[32] The newly reinforced confidence in the capacity for establishing dominance in the air was a key element in the strategic plan for invading Ukraine—and was proven to be one of the miscalculations that doomed that *Blitzkrieg* to failure.

27. See on this D. Barrie, "Anti-Access/Area Denial: Bursting the 'No-Go' Bubble?", *Military Balance Blog*, IISS, March 29, 2019, available at: www.iiss.org.
28. One sharp evaluation of the first stage of this operation is A. Lavrov, "The Russian Air Campaign in Syria: A Preliminary Analysis", *CNA Report*, June 18, 2018, available at: www.cna.org.
29. S. Shuster, "Putin's Syria Gamble", *Time*, October 15, 2015, available at: https://time.com; "Russia's Military Gamble in Syria Is Paying Off Handsomely", *The Economist*, May 16, 2019, available at: www.economist.com.
30. E. Ersen, "Evaluating the Fighter Jet Crisis in Turkish-Russian Relations", *Insight Turkey*, October 1, 2017, available at: www.insightturkey.com.
31. My examination of that episode is in P. Baev, "Four Setbacks and a Tragedy in Russia's Syrian Intervention", *Eurasia Daily Monitor*, September 24, 2018, available at: https://jamestown.org.
32. Comprehensive evaluation is M. Simpson, A. Grissom et al., "Road to Damascus: Russian Air Campaign in Syria, 2015-2018", *RAND Research Report*, RAND Corporation, May 11, 2022, available at: www.rand.org.

The plight of the long-range aviation

The capabilities for delivering high-precision long-range missile strikes were and still are perceived as one of the key Russia's advantages over Ukraine, and the assets of the Long-Range Aviation Command (*Komandovanie dal'nej aviacii*, KDA) constitute a major part of these capabilities. The data on the numerical strength had significant discrepancies even prior to the war, but it can be estimated that at the start of 2022, these assets included 50-55 Tu-95MS (*Bear*) strategic bombers, 11-16 Tu-160 (*Blackjack*) bombers, and 57-60 Tu-22M3 (*Backfire*) long-range bombers (the latter are not included in the strategic forces partly because of the arms control counting rules dating back to the 1979 SALT II treaty). The bombers were organized into two divisions (22nd and 326th), comprising seven regiments, located at four main bases: Engels (Saratov oblast), Shaykovka (Kaluga oblast), Ukrainka (Amur oblast), and Belaya (Irkutsk oblast); a separate training regiment (6 Tu-95MS and 6 Tu-22M3), and the regiment of Il-78M refueling planes were located at the Diagilevo base (Ryazan oblast). The normal pattern of operations of this force involved one long-distance patrol (in the Arctic-North-Atlantic or North Pacific direction) a month for deterrence and signaling purposes, so its efficiency in conventional operations was never seriously tested.

From the first weeks of the invasion, the KDA bombers started to perform combat missions, launching the Kh-101, Kh-55 and Kh-22 cruise missiles, targeting primarily airbases, and also dropping heavy FAB-1500 bombs on the resolutely defended *Azovstal* plant in Mariupol. The launch areas are typically far away from the zone of combat, sometimes over the Caspian Sea, so only one loss in the course of combat operations is recorded: on April 19, 2024, a Tu-22M3 bomber crashed in the Stavropol region, due either to a malfunction or to a Ukrainian missile strike.[33] Significant losses were, nevertheless, inflicted by Ukrainian drone strikes on the airbases, starting with the hits on the Shaykovka base on October 7, 2022, and on the Diagilevo and the Engels bases on December 5, 2022.[34] Further attacks followed, reaching as far as the Olenya airbase on the Kola Peninsula, so that most assets of the 22nd division had to be relocated from the most exposed Engels base, but it was the Ukrainian operation

33. T. Newdick and H. Altman, "Russian Tu-22M3 Backfire Shot Down with S-200 Missile", *The War Zone*, April 19, 2024, available at: www.twz.com.
34. V. Muhin, "Moscow and Kyiv Exchange Long-Distance Strikes", *Nezavisimaya gazeta* (in Russian), December 6, 2022, available at: www.ng.ru.

Spiderweb on June 1, 2025, that delivered the heaviest blow to the Russian Long-Range Aviation.[35]

The devastatingly effective Ukrainian drone strikes on five KDA bases (of which one—on Ukrainka—failed) exposed the scope and the depth of problems accumulated over the three and a half years of the war of attrition in the Russian Aerospace Forces.[36] Remarkable was the complete silence about that attack in the Russian official discourse and in the mainstream media; in contrast, the explosions on railway bridges on the same day were loudly decried as "terrorist attacks".[37] This denial goes deeper than just the wartime instruction to cover up the losses, even those that are actually impossible to hide because the videos of the burning bombers went viral on global social networks.[38] The political decision not to attempt any retaliatory strike very probably betrayed the strategic confusion regarding the deployment of airpower in the ongoing war, the KDA role in the larger confrontation with NATO, and the allocation of resources necessary for its build-up and modernization.

The exact number of destroyed bombers may be three times lower than the figure of 41 claimed by Ukraine, but even minor damage to planes, for which spare parts are no longer produced, is hard to repair, so the figure of a 20% cut to total capabilities may be close to the mark.[39] Modernization programs for the Tu-95MS and Tu-22M3 bombers into the Tu-95MSM and Tu-22M3M versions have progressed slowly, and they will likely be discontinued because the costs are too high given the low number of operational planes and their high intensity of use.[40] Efforts are narrowly concentrated on resuming the serial production of the Tu-160 bombers at

35. On the surprise hit on the Olenya base, see T. Nilsen, "Ukrainian Drone Hit Tu-22M3 Bomber at Olenya Airfield, Intel Report Claims", *Barents Observer*, July 2, 2024, available at: www.thebarentsobserver.com. On the relocation, see G. Jennings, ""Ukraine Conflict: Russia Relocates Bombers to the Far East as Ukraine Targets Western Bases", *Jane's Defence News*, January 2, 2023, available at: www.janes.com.

36. On the impact of the operation *Spiderweb*, see A. Stognei, F. Deprez and C. Miller, "An Epic Failure: Russia Reels from Surprise Ukrainian Attack on Bomber Fleet", *Financial Times*, June 3, 2025, available at: www.ft.com.

37. Russia engaged in hard diplomatic bargaining to ensure that the joint statement of the July 2025 BRICS summit contains a condemnation of those attacks. See "Supporting Efforts on Ukraine and Space Exploration – Key points of BRICS Declaration", TASS, July 6, 2025, available at: https://tass.com; S. Bandouil, "BRICS Summit Statement Condemns Attacks on Russian Railways, Avoids Urging Russia to Cease War Efforts in Ukraine", *Kyiv Independent*, July 7, 2025, available at: https://kyivindependent.com.

38. On the proliferation of memes, see "Adding Insult to Injury – Attack Of 'Spider's Web' Memes", *Kyiv Post*, June 2, 2025, available at: www.kyivpost.com; a revisiting on the first anniversary is O. Kryzhanivska, "Operation Spiderweb: One Year Later", *Ukraine's Arms Monitor*, June 2, 2026, available at: https://ukrainesarmsmonitor.substack.com.

39. For fact-checking, see J. Dempsey, "Operation Spiderweb: An Assessment of Russian Aerospace Forces Losses", *Military Balance Blog*, IISS, June 6, 2025, available at: www.iiss.org; T. Newdick, "Confirmed Losses of Russian Aircraft Mount after Ukrainian Drone Assault", *The War Zone*, June 4, 2025, available at: www.twz.com.

40. Well-documented Ukrainian assessment of these programs is D. Lutovich, "Stakes on the Sky: Russian Long-range Aviation Undergoes Large-Scale Update", *Focus.ua* (in Russian), May 21, 2025, available at: https://focus.ua.

the Kazan Aviation plant (KAPO), which is expanding its facilities.[41] The contract to build 10 new Tu-160M bombers was signed in 2018, and one plane was delivered to the 161st Heavy Bombers Regiment in 2023, but reports of further acquisitions are unreliable.[42] Defense Minister Andrey Belousov promised to set the tempo of production to four planes a year, but the impact of sanctions as well as continuing Ukrainian drone/missile strikes are undercutting these plans, so the figure of only 16 operational Tu-160 bombers is accepted by most experts.[43] The sanctions affect the manufacturing of NK-32 engines at the Kuznetsov engine plant in Samara particularly, and Ukraine targets aircraft production facilities involved in the supply chain, for instance the *Aviastar* plant in Ulyanovsk.[44] The long-advertised project for developing the next-generation PAK DA stealth bomber is currently postponed.[45]

The main weapon of the KDA bombers—the relatively modern Kh-101 cruise missile that entered service in 2012—has been used since the start of the war and gained infamy when it hit the *Okhmatdyt* children's hospital in Kyiv on July 8, 2024.[46] The low effectiveness of these strikes prompted the *Raduga* Design Bureau (Dubna, Moscow region) to introduce several modifications, including increasing the payload by reducing the range and changing the warhead into a cluster munition.[47] The volume of production increased only slightly (525 missiles were ordered in 2024, and 700 in 2025), so the intensity of use remained stable despite the reduction of operational bombers.[48] In massive attacks, 30-40 Kh-101 missiles are launched in combination with hundreds of drones and dozens of ballistic

41. On the problems in the KAPO production line, see B. Kole, "Russia Is Struggling to Build Warplanes", *Newsweek*, July 3, 2025, available at: www.newsweek.com.
42. One useful Russian outline is D. Kornev, "Role for the White Swan: What Tasks in the Global Deterrence Will the Tu-160 Perform", *Izvestiya* (in Russian), September 10, 2023, available at: https://iz.ru; the latest report is examined in T. Nicanci, "Russia Expand Long-range Strategic Capabilities with Delivery of two Tu-160M Bombers", *Army Recognition*, December 19, 2025, available at: www.armyrecognition.com.
43. B. Eastwood, "Russia's Tu-160 Bomber: Large, Mach 2 Fast and Now Obsolete", *National Security Journal*, April 2, 2025, available at: https://nationalsecurityjournal.org; "World's Only Intercontinental Range Bomber Program in Production Gets New Observer", *Military Watch Magazine*, January 25, 2026, available at: https://militarywatchmagazine.com.
44. See "Ukraine Strikes Russian Aircraft Plants in Ulyanovsk and Novgorod Regions", *Global Banking and Finance Review*, March 18, 2026, available at: www.globalbankingandfinance.com.
45. C. Orr, "Russia's New PAK DA Stealth Bomber Summed Up in Just 2 Words", *National Security Journal*, July 27, 2025, available at: https://nationalsecurityjournal.org.
46. That strike is investigated in M. Sheldon, G. Fiorella, Jake Godin, "Russian Missile Identified in Kyiv Children's Hospital Attack", Bellingcat, July 9, 2024, available at: www.bellingcat.com.
47. These modifications are presented in "Russia Modified Kh-101 Missiles Four Times to Strengthen Its Aerial Terror Campaign – Ukraine Still Intercepts 88%", Ministry of Defense of Ukraine, May 11, 2026, available at: https://mod.gov.ua. On the strike on Chernivtsi by a modified Kh-101 missile with a cluster warhead, see T. Newdick, "Cluster Warhead Version of Russian Kh-101 Cruise Missile Caught on Camera", *The War Zone*, July 14, 2025, available at: www.twz.com.
48. One detailed Ukrainian assessment is O. Yan, "From Kalibr to Kinzhal: How Much Do Russian Missiles Really Cost?", Militarnyi, October 23, 2025, available at: https://militarnyi.com.

missiles, but the effectiveness of intercepts remains above 80% despite the modifications and improved tactical coordination.[49]

The protracted overwork on combat missions and the inadequate maintenance on the repeatedly attacked air bases, particularly the key Engels base, degrade profoundly the capabilities of the KDA.[50] The Russian high command maintains nevertheless the pretence that it keeps going strong and incurs no wrath from the Kremlin. Lieutenant-General Sergei Kobylash, who had held the command of this force since September 2016, was in July 2024 promoted to the Commander of the Air Force, and his successor Major-General Sergei Kuvaldin was moved a step up from the position of the chief of staff of the KDA.[51] The names of new chief of staff and commanders of the two divisions are not publicly disclosed, while both Kobylash and Kuvaldin are prosecuted by the International Criminal Court for war crimes.

The KDA command delivers on the political order to sustain the pattern of regular patrols by a pair of Tu-95MS bombers over the Arctic and the Pacific, as the flights toward Alaska on July 22, 2025 and February 19, 2026, were supposed to confirm.[52] These patrols were performed from the Ukrainka airbase in the Amur region, which operation *Spiderweb* failed to hit, but the deployment of bombers to the Olenya airbase is irregular and its operational usefulness is in doubt.[53] Moscow may find it politically important to continue the regular joint air exercises with China, like the one on June 27, 2026.[54] It is more difficult, however, to replay demonstrative overseas deployments, like the visit of two Tu-160 bombers to Venezuela in December 2018, and the cancellation of a similar deployment to

49. For instance, in several mass attacks in February- March 2026, all Kh-101 missiles were reportedly intercepted; see S. Korshak, "Anatomy of the Friday the 13th Airstrike", *Kyiv Post*, March 24, 2026, available at: www.kyivpost.com. The total number of intercepted Kh-101 missiles from February 2022 to February 2026 is estimated at 2,459; see D. Malyasov, "Ukraine Confirms Interception of Over 140,000 Aerial Targets Since 2022", *Defence Blog*, February 24, 2026, available at: https://defence-blog.com.

50. A rare pessimistic and competent Russian assessment on this degradation (prompted by another crash of a Tu-22M3 bomber) is R. Skomorokhov, "What Is Happening with Russian Long-range Aviation?", *TopWar.ru* (in Russian), June 21, 2026, available at: https://topwar.ru. Many comments for this article are also quite useful.

51. Not one hint on the scale of accumulating problems can be found in the official narratives; see, for instance, Kuvaldin's long interview "Solid Wings of the Nuclear Triad", *AviaPort.ru* (in Russian), December 24, 2024, available at: www.aviaport.ru.

52. On the latest patrol, see D. Cenciotti, "Russian MoD shows US F-35, F-16 intercepting Tu-95MS and Su-35S off Alaska", *The Aviationist*, February 20, 2026, available at: https://theaviationist.com. See also T. Nilsen, "Burnt Out Bomber Flew with Missile under the Wing Outside Northern Norway in February", *Barents Observer*, June 11, 2025, available at: www.thebarentsobserver.com.

53. A. Staalsen, "Bombers from Kola Peninsula Brought Death to Ukrainian Towns", *Barents Observer*, July 30, 2026, available at: www.thebarentsobserver.com.

54. P. Satam, "US F-35As and Japanese F-15Js Intercept Massive Russian and Chinese Bomber Patrol", *The Aviationist*, June 28, 2026, available at: https://theaviationist.com.

South Africa in November 2024, which Major-General Kuvaldin had visited three months prior, is one piece of evidence of such setbacks.[55]

The value of the reduced fleet of seriously over-exploited bombers as a third (traditionally, the weakest) component of the strategic triad is significantly diminished by their extensive engagement and apparent underperformance in combat missions. Their unique ability to perform high-visibility long-distance strategic patrols is compromised by the proven inability to operate anywhere near the Ukrainian airspace. The protection of the key airbases in the European part of Russia is exposed as inadequate even against technologically unsophisticated long-range strikes. At the same time, the effectiveness of the use of these platforms in conventional operations is progressively curtailed, as the Ukrainian air defenses gain experience and capabilities for intercepting the Kh-101 cruise missiles.[56] Significantly greater allocation of material resources than what the current priorities allow is necessary for ensuring a meaningful existence of the Russian Long-Range Aviation.

55. On the Venezuela deployment, see W. Courtney, "In Venezuela, a Potential US-Russian Crisis?", *RAND Commentary*, January 8, 2019, available at: www.rand.org. On the South African setback, see S. Lesedi, "Failed Russian Deployment of Tu-160 Blackjack Bomber to South Africa", *Military Africa*, November 28, 2024, available at: www.military.africa.

56. One detailed examination is "A War of Attrition in the Skies: Russia Adapts Missile and Drone Strike Tactics, While Ukraine Attempts to disrupt Russian Missile Production", *Re: Russia Analytics*, April 22, 2026, available at: https://re-russia.net.

The declining Air Force performance

The command of the Russian Air Force (VVS) as well as the majority of pilots started the war with plenty of what they believed to be valuable combat experience gained in Syria (as described above), which, however, proved only marginally relevant in a much more contested combat environment. The Ukrainian Air Force was inferior in every aspect, and the air defense relied primarily on the Soviet-era Buk and S-300 surface-to-air missiles, but even this poorly organized resistance was enough to deny, in the matter of a couple of weeks, the Russian VVS dominance in the air over the theatre of operations.[57] In order to establish such dominance, competent planning and execution of complex air operations was necessary, and the heavy losses during the attempted air assault operation on the Hostomel airfield outside Kyiv proved that such feats of arms were beyond the ability of the Russian Air Force.[58] Later on, there have been no attempts to engage the F-16 fighters supplied by the European "aircraft coalition" (castigated by Russian officials as an "enormous risk"), except one episode in June 2025 and another one in July 2026, in both of which the Russian Su-35S fighters apparently failed to recognize the threat.[59]

Even short of establishing complete air dominance, the VVS needed to perform the more limited task of supporting operations of ground troops in key directions, but it also proved to be hard to deliver. Effective interaction between fixed-wing aircraft and helicopters is essential for providing close air support (CAS), yet coordination between them remains limited in Russian operations due to organizational and doctrinal constraints, and presently is even more confused because of the imperative to coordinate with the use of tactical drones. Bad coordination is one of the reasons for heavy losses of the old subsonic Su-25SM ground attack aircraft (some 40 planes have been lost) and modern Ka-52 helicopters (some 66 were lost by mid-2026, including

57. For a competent retrospective analysis see G. Allison, "Russia Failing to Achieve Air Superiority over Ukraine", *UK Defence Journal*, March 1, 2025, available at: https://ukdefencejournal.org.uk.
58. The instant reaction on that debacle is in J. Bronk, "Is the Russian Air Force Actually Incapable of Complex Air Operations?" *RUSI Defence Systems*, March 4, 2022, available at: www.rusi.org. More detailed research can be found in L. Collins, M. Kofman and J. Spencer, "The Battle of Hostomel Airport: A Key Moment in Russia's Defeat in Kyiv", *War on the Rocks*, August 10, 2023, available at: https://warontherocks.com.
59. On Russian threats, see B. Cole, "Russia Issues Warning to West over F-16 Jets: 'Escalation Scenario'", *Newsweek*, May 20, 2023, available at: www.newsweek.com. On the first incident, see D. Cenciotti, "Ukrainian Air Force Claims Shootdown of Russian Su-35S Fighter", *The Aviationist*, June 8, 2025, available at: https://theaviationist.com. On the second case, see E. Cook, "Ukrainian F-16 Shoots Down Russian Su-35 in Historic First", *Newsweek*, July 29, 2026, available at: www.newsweek.com.

one confirmed drone hit), mostly to Ukrainian MANPADs.[60] Besides organizational issues, airborne early warning and control platforms (A-50U and Il-22M) are seen in Russian planning as essential for such interaction and coordination with army units, but Russia has too few of these, and every loss is irreplaceable because of non-existent production.[61]

As the Ukrainian forces gained access to more sophisticated air defense weapons, including NASAMS and IRIS-T, Russian tactical aviation has been forced further away from the combat zone.[62] The Air Force command thought that a solution may be found in converting the gravity bombs into "glide bombs" by adding a few simple gadgets (the UMPK kit, used mostly for FAB-500 and FAB-1500 bombs), and in developing a purpose-built UMPB glide bomb (based on FAB-250).[63] Mass use of these bombs, mostly by the Su-34M fighter-bombers, reflected a rapid adaptation to operational constraints and granted Russian troops some tactical advantages in early 2025, even if the precision of such strikes was low. From mid-2025, however, the Ukrainian forces have succeeded in minimizing this advantage, primarily by jamming the crude guidance system, while the incidents of dropping the bombs on their own territory have increased.[64] Russian VVS still strives to increase the intensity of bombing, while Ukraine is on track to add to its middle-strike capabilities glide bombs of original design.[65]

The information on production of combat planes in Russia is so unreliable that it can hardly be described as data, and the best estimate is that the deliveries of the Su-30 multirole fighters are much lower than the

60. Helicopter brigades and regiments constitute the Army Aviation command, which was transferred to the VVS from the Ground Forces in 2002. The rationale for this reform remained open to criticism; one example is A. Khramchihin, "Army Aviation Must Be Returned to Ground Forces", *Nezavisimoe voennoe obozrenie* (in Russian), March 12, 2020, available at: https://nvo.ng.ru. On the losses of helicopters, see V. Litnarovych, "Ka-52 Alligator: The Nearly-Crushed Backbone of Russia's Attack Helicopter Fleet", *United 24 Media*, June 2, 2025, available at: https://united24media.com. On the drone hit, see R. Prihodko, "Russians Lose Second Ka-52 in 24 Hours, Casualties Reported", *Militarnyi*, March 21, 2026, available at: https://militarnyi.com.

61. E. Cook, "Russia Admits Prized A-50 Radar Plane Downed by Kyiv, Decries 'Terrorism'", *Newsweek*, June 18, 2024, available at: www.newsweek.com; Q. Pham, "Operation Spider's Web: Did Ukraine Destroy Two Russian A-50 Surveillance Planes?", *France 24 Observers*, June 10, 2025, available at: https://observers.france24.com.

62. G. D. Mizio, "Ukraine's Ground-Based Air Defence: Evolution, Resilience and Pressure", *Military Balance Blog*, IISS, February 24, 2025, available at: www.iiss.org.

63. Professional examination of this issue is G. Zanier and K. Anderson, "Countering Russia's Glide Bomb Warfare in Ukraine", *JAPCC Report*, November 2025, available at: www.japcc.org.

64. On the electronic countermeasures, see D. Axe, "Ukraine Is Jamming Russian Glide Bombs All Along the Front Line, Erasing One of Russia's Main Battlefield Advantages", *Forbes*, February 26, 2025, available at: www.forbes.com. On the incidents, see M. Loh, "Russia Repeatedly Bombing Itself with Glide Munitions Sows Crew Fatigue, Bad Training", *Business Insider*, June 4, 2026, available at: www.businessinsider.com.

65. On the volume of Russian bombing, see F. Farell, "Over 8.300 Glide Bombs Dropped by Russia on Ukraine in July in Record Figure Since Full-Scale Invasion, Military Says", *Kyiv Independent*, August 4, 2026, available at: https://kyivindependent.com. On the Ukrainian project, see J. Epstein and C. Panella, "Ukraine Built Its First Ever Guided Glide Bomb, Vyrivniuvach, as a Much Cheaper Home-grown Alternative to US-made JDAMs", *Business Insider*, May 18, 2026, available at: www.businessinsider.com.

confirmed losses, those of the Su-34 fighter-bombers are approximately on the level, and those of the Su-35 air superiority fighters are significantly above the losses.[66] The changes in composition of the tactical aviation are, therefore, quite profound, particularly since such "workhorses" as the Su-25, Su-24, or MiG-29 are no longer in production. One unique capability is the combination of the MiG-31 interceptor (also no longer in production) with the Kh-47M2 *Kinzhal* aero-ballistic missile, which gives this weapon system a range of 2,000 kilometers and high effectiveness because of the hypersonic speed of the warhead.[67] The production of these weapon systems at the Votkinsk plant is limited because priority is given to the 9M723 *Iskander*-M missile, so some 50 strikes were reported in 2025, and up to 40 in the first five months of 2026.[68] Russian propaganda puts heavy spin on these missiles, and the VVS command is eager to demonstrate them, including in the Far Eastern theatre.[69]

The key question is about the serial production of the Su-57 fighter, which, as mentioned above, is supposed to be the "fifth generation", but in its stealth features cannot compare with the F-35 fighter.[70] One Su-57 was reported as damaged on the ground in June 2024, another one was reportedly hit by "friendly fire" in July 2026, and the estimate of about 20 planes delivered to the Air Force by the end of 2025 appears realistic, but no credible reports on the combat performance of this much-advertised fighter have appeared so far.[71] Experiments with using the Su-57 in combination with the heavy drone S-70 *Okhotnik*-B have been unsuccessful, and its use as a drone-hunter makes a poor fit with its characteristics.[72] The project on developing a more advanced "fifth generation" Su-75 fighter is in limbo, as are the works on modern transport helicopters Mi-38 and Ka-60. The deliveries of the Ka-52M attack

66. Most of the losses have come from Ukrainian strikes on airbases; see "How Many Planes and Helicopters Are Produced in Russia?", *Technosphere Russia* (in Russian), February 21, 2025, available at: https://tehnoomsk.ru.
67. Only the MIM-104 *Patriot* surface-to-air missiles have proven capable of intercepting the *Kinzhal*; see "Ukraine Reports High Interception Rate Against Russian Iskander and Kinzhal Missiles", *Army Recognition*, November 25, 2025, available at: www.armyrecognition.com.
68. Most data on production doesn't distinguish between *Iskander* and *Kinzhal* missiles; for competent examinations, see F. Hoffman, "How Many Ballistic Missiles Is Russia Producing?", *Missile Matters*, May 31, 2026, available at: https://missilematters.substack.com.
69. These demonstrations are rare but attract attention; see P. Satam, "Russia Sends Mig-31s Armed with Kinzhal Hypersonic Missiles over Sea of Japan", *The Aviationist*, March 19, 2026, available at: https://theaviationist.com.
70. See on this A. Latham, "Russia's Su-57 Felon Will Never be the F-35 Fighter", 19FortyFive, January 30, 2025, available at: www.19fortyfive.com.
71. One critical evaluation is C. Orr, "Russia's Su-57 Felon Stealth Fighter Is a Total Failure", *National Security Journal*, July 10, 2025, available at: https://nationalsecurityjournal.org. On the recent crash, see "Rare Russian Su-57 Stealth Fighter Shot Down by Friendly Fire Incident Near Moscow", *Military Watch Magazine*, July 23, 2026, available at: https://militarywatchmagazine.com.
72. On the former, see D. Malyasov, "Russian Military Analysts Openly Challenge Putin's Su-57 Praise", *Defence Blog*, June 10, 2026, available at: https://defence-blog.com. On the latter, see A. Spray, "Russia Turns to A-50U and Su-57 Felon as Drone Hunters Amid Strained Air Defences", *Aerospace Global News*, July 12, 2026, available at: https://aerospaceglobalnews.com.

helicopters have likely compensated for heavy losses in 2022-2023, but their employment has shifted away from traditional CAS functions toward standoff strike missions and, at times, counter-drone roles.[73]

Seeking to minimize damage from Ukrainian strikes on airbases, the VVS command has moved the key assets further away from the frontline and has finally started building reinforced shelters on major bases.[74] Crimea has become a key theatre in the aerial contestation since autumn 2023, as the Dzhankoi, Gvardeiskoe, Kacha and Saki airbases have come within the reach of Ukrainian medium-range missiles, like the *Storm Shadow*/SCALP. The Russian command remained nevertheless reluctant to withdraw combat planes and helicopters from these bases (after withdrawing most of the Black Sea Fleet ships), and merely absorbed the losses.[75] Since the start of 2026, Ukraine has expanded the campaign of systematic strikes targeting particularly the air defense positions and radars, degrading airspace surveillance and also making flight communications unstable, which resulted in the crash of an An-26 military transport plane with the loss of 30 lives, including Lt-General Aleksandr Otroshchenko, commander of the Mixed Air Force Corps of the Northern Fleet, who apparently traveled far from his headquarters in Severomorsk.[76] By early summer 2026, the cumulative impact of Ukrainian attacks has effectively suppressed the Russian air defense system, making the deployment of all military assets in "Fortress Crimea" untenable.[77] Logistics and the delivery of supplies both across the Kerch Strait (the bridge is weakened by several hits) and through the Mariupol-Simferopol road are under such pressure that not only military activities but also the civilian economy of Crimea are nearly paralyzed.[78]

Except for the efforts aimed at minimizing the risks and exposure to the hostile impacts, it is unclear what lessons the VKS and the VVS commands has drawn from the extensive combat operations.[79] Army General Sergei Surovikin was, to all intents and purposes, only a nominal VKS commander (from November 2017 to August 2023), so his demotion

73. J. Hill, "Adapt or Die: Ka-52 Leads Russian Attack Helicopters in Ukraine", Army Technology, February 27, 2025, available at: www.army-technology.com.
74. J. Epstein, "Satellite Images Show Russia Built Shelters for Vulnerable Aircraft", *Business Insider*, July 30, 2025, available at: www.businessinsider.com.
75. One impact case is examined in D. Axe, "Ukrainian Drones & Missiles Have Blown Up Nearly All of Russia's Crimea Attack Jets", *Trench Art*, December 6, 2025, available at: www.trenchart.us.
76. Ukraine didn't claim any hit on this flight; see T. Safronov, "Russian Northern Fleet General Otroshchenko Killed in An-26 Crash in Crimea", Militarnyi, April 2, 2026, available at: https://militarnyi.com.
77. The tally of this ongoing campaign is presented in D. Mykhailenko, "Ukraine's 2026 Drone Campaign Hit 174 Russian Air Defence Systems, Costing Moscow $5.4B – So Far", United24 Media, June 5, 2026, available at: https://united24media.com.
78. An overview of this campaign is "Ukraine's Campaign to Isolate Crimea Enters a New Phase", Defence Matters, July 16, 2026, available at: https://defencematters.eu.
79. An expert assessment of this learning is J. Nesselhuf, "Meeting Expectations: Failure in Ukraine Will not Change Russian Aerospace Defense Force", *Military Review*, January-February 2025, available at: www.armyupress.army.mil.

after the Wagner Group mutiny was not followed by any cadre purges, and his deputy Colonel-General Viktor Afzalov in an entirely regular way took the command since August 2023. No explanation was given for his firing in May 2026 and the appointment of Colonel General Aleksandr Chaiko, whose only experience in air operations was gained from commanding the grouping of Russian forces in Syria, as the VKS commander.[80] Similarly, the replacement of Sergei Dronov (promoted to Colonel-General in September 2023) by Lieutenant-General Sergei Kobylash as the commander of the VVS in July 2024 was unexplained, and nothing is known about Dronov's or Afzalov's fate.

These limited reshuffles haven't brought any change in the performance of combat tasks or any notable attempts at reconceptualizing the application of air force in the evolving protracted war. Pilots of the tactical aviation have certainly accumulated a greater number of flying hours than they had prior to the war and gained useful experience, including some air-to-air engagements in the first half of 2022, when the R-37M missile granted a big advantage.[81] Coordination with the ground-based air defense systems has improved, but "friendly-fire" incidents keep occurring, like the hit on a Su-30SM fighter over Crimea on 17 October 2025.[82] Adaptations to the current conditions cannot fully prepare Russian forces for the challenges of the near future, when the Ukrainian Air Force will possess a unique mix of capabilities by deploying squadrons of F-16, *Gripen* C/D and E/F, and *Rafale* F4 fighters.[83] The VVS command capacity for planning large-scale air operations remains limited, particularly as the air defense system is steadily degraded, and it persists in its reluctance to delegate necessary authority to commanders of divisions and regiments. The effectiveness of the system of multiple combat communications has significantly improved compared with 2022, but its integrity is challenged by the poor compatibility of modern and outdated technological solutions, and its capacity for further adaptation to the fast pace of innovations is diminishing.

80. On Chaiko's ties with Gerasimov, see A. Horobets, "Chaiko Appointed New Commander of the Russian Aerospace Forces", *Eurasia Daily Monitor*, May 20, 2026, available at: https://jamestown.org. He survived the bomb blast targeting the party celebrating his 55th birthday at a posh Moscow restaurant on August 1, 2026; see "Big Fiasco of Russian Special Services", *Current Time* (in Russian), August 3, 2026, available at: www.currenttime.tv.

81. This edge has diminished as Russian fighters are driven further away from the Ukrainian airspace; see M. Mihajlovich, "Russia's R-37M BVR Missile's Effect on the Ukraine War", *Key Aero*, June 28, 2026, available at: www.key.aero.

82. The fighter was involved in countering a Ukrainian drone attack; see M. Fencl, "Friendly Fire Incident: Russian Su-30SM Jet Downed over Crimea amid Ukrainian drone barrage", *Defense Magazine*, October 29, 2025, available at: www.defensemagazine.com.

83. On the deal with Sweden, see R. Ruitenberg, "Ukraine Would Gain Advantage over Russian Glide Bombs with Gripen/Meteor Combo", *Defence News*, May 29, 2026, available at: www.defensenews.com; for the broader perspective on the balance of air capabilities, see M. Adel, "Ghosts, Vipers and Gripens – the Future of the Ukrainian Air Force", Royal Aeronautical Society, May 22, 2026, available at: www.aerosociety.com.

The drone-driven revolution

The notion of "military-technical revolution" was pioneered by Marshal Sergei Ogarkov in the late 1970s, when he articulated a vision of future warfare centered on precision strike systems and increasingly integrated command-and-control and intelligence capabilities. The Soviet war machine was never able to adapt to this vision, and the real "Revolution in Military Affairs" (RMA) was driven by the US military. The "AirLand Battle" concept was a major step in theorizing it, while the 1990-1991 Gulf War demonstrated its scope.[84] The massive use of drones in the Ukraine War possibly amounts to a new RMA, and while the Russian Armed Forces, and the Aerospace Forces in particular, were not ready for this break from many familiar patterns of warfare, they are striving to embrace it and have managed to gain proficiency in executing their own attacks, of tactical and operational scale.[85]

Two developments in the first few months of the war compelled the Russian high command to revise the pre-war assessments on the limited impact of drones on the course of the battles, which had been only marginally altered by the experiences from the 2020 Nagorno-Karabakh conflict.[86] The more general one followed from the failure to establish air dominance over the theatre of war, which strongly constrained the option of bombing targets of strategic importance in the depth of enemy territory. The immediate driver was the high efficiency of Ukrainian strikes with the Turkey-supplied *Bayraktar* TB2 drone on the over-extended columns of Russian assault troops.[87] Moscow needed a cheap mass-produced weapon that could augment long-distance missile strikes and add significantly to the attrition of Ukraine's war-supporting economy—and the solution was found in importing the *Shahed* 131/136 loitering munitions from Iran. Experiments with the use of these drones started in September 2022, and the decision to organize domestic production was taken within a matter of a few months, so the construction of the Yelabuga plant in Tatarstan went

84. One useful retrospect is S. King and D. Boykin, "Distinctly Different Doctrine: Why Multi-Domain Operations Isn't AirLand Battle 2.0", Association of the US Army, February 20, 2019, available at: www.ausa.org.

85. A broad perspective can be found in A. Salinas and J. Levay, "Military Revolutions from the Spanish Tercio to First Person View Drones", *War on the Rocks*, May 15, 2025, available at: https://warontherocks.com.

86. For in-depth research on that case, see E. Hecht, "Drones in the Nagorno-Karabakh War: Analyzing the Data", *Military Strategy Magazine*, Winter 2022, pp. 31-37, available at: www.militarystrategymagazine.com.

87. In the ensuing more static battles, that efficiency declined; see E. Cook, "Why Ukraine's Once Feared Bayraktar Drones Are Becoming Obsolete", *Newsweek*, November 2, 2023, available at: www.newsweek.com.

forward as a top priority project.[88] Expansion of production lines resulted in a steady increase of combat use: in September 2024, the weekly volume of drone attacks was increased to 350, and by the end of the year—to 500, and since March 2025—to 900, exceeding in some weeks the mark of 1,100.[89] Further steep increases were predicted by many observers; however, the numbers stabilized at slightly above 5,000 (including decoys) in autumn 2025, as the limit in production was reached.[90] This trend continued in Spring 2026, when one record-breaking day-long attack with 948 drones happened on March 24, but the total number of 6,462 was still lower than the 7,347 drones that Ukraine launched that month on targets deep in the Russian territory.[91] The new high mark of 8,161 drone launches was set in May 2026, but during summer, the volume of drone attacks has declined, and the main damage to Ukrainian cities is presently inflicted by ballistic missiles.[92]

Russia has invested much effort in the modernization of the crude Iranian technological design, so the engine and the navigation system of the *Geran*-2 drone are significantly enhanced, and it is possible that Moscow has shared these upgrades with Iran.[93] The jet-propelled *Geran*-3 model was combat tested in June 2025, and a heavier version, *Geran*-5, could have first appeared in January 2026; however, the start of serial production of these drones at the Izhevsk *Kupol* plant has not been confirmed, quite probably because of repeated hits by Ukrainian long-distance drones.[94] Despite all Russian efforts to increase the speed and protection against electronic countermeasures, Ukraine was able to increase the rate of intercept of drone attacks to 90% in spring-summer 2026, which makes a striking contrast with the low efficiency of the Russian air defense system.[95]

88. These early adaptations are examined in P. Luzin, "Russian Military Drones: Past, Present, and Future of the UAV Industry", *FPRI Report*, November 30, 2023, available at: www.fpri.org.
89. The data is gathered in B. Jensen and Y. Atalan, "Drone Saturation: Russia's Shahed Campaign", *CSIS Brief*, May 13, 2025, available at: www.csis.org.
90. For in-depth examination: I. Anokhin, "A Comprehensive Analytical Review of Russian Shaheed-type UAVs Deployment Against Ukraine in 2025", *ISIS Report*, January 22, 2026, available at: https://isis-online.org.
91. This was the first shift in the balance of reported long-distance drone applications; see K. Popilnichenko, "For the first time, Ukraine outguns Russia in long-range drone attacks", United24 Media, April 6, 2026, available at: https://united24media.com.
92. The dynamics of these attacks are monitored in I. Akokhin, "Monthly Analysis of Russian Shaheed 136 Deployment Against Ukraine", *ISIS Report*, July 7, 2026, available at: https://isis-online.org.
93. On the modernization; see Y. Akymova and L. Oleniak, "New Tech, New Threat: Inside Russia's Upgrades of Iranian Drones and Ukraine's Countermove", *RBC-Ukraine*, July 28, 2025, available at: https://newsukraine.rbc.ua. On the sharing of technology with Iran, see "Russia Supplies Enhanced Shahed Drones to Iran as Strikes on US Bases Continue", *Military Watch Magazine*, August 6, 2026, available at: https://militarywatchmagazine.com.
94. On the new models, see V. Mittal, "New Russian Geran Drones Are Fast. Can Ukrainian Interceptors Keep Up?" *Forbes*, March 7, 2026, available at: www.forbes.com. On the production disruptions, see "Ukrainian Drone Strike Hits Russian Defense Plant in Izhevsk, Killing 3", RFE/RL, July 1, 2025, available at: www.rferl.org.
95. Ukrainian daily reports on attacks and intercepts are more reliable than Russian information, in which only the number of intercepted drones is given; see "Ukraine's Air Defense Intercepts Nearly 92%

Another and potentially more impactful dimension of the drone-driven RMA is unfolding over the battlefields, transforming them so profoundly that the notion of "trench war" becomes obsolete, as trenches provide no protection against the new impact. The massive use of short- and medium-range drones has quickly progressed from a tactical innovation to a strategic breakthrough, and the continuing evolution of this phenomenon captures plenty of analytical attention, focused increasingly on the expected next steps in this extra-fast process shaped by the extensive use of unmanned ground vehicles (UGV) and the application of AI.[96] Important as the current development is, it can be only briefly examined here, because if the use of long-distance drones pertains directly to the operations and strategy-making in the VKS command, the transformation of the battlefield into a 100 kilometers deep "kill-zone" is primarily the challenge for the Ground Forces command and the General Staff.[97]

It can be mentioned that after the failure of the summer 2023 counter-offensive, Ukraine pioneered the massive use of first-person-view (FPV) drones seeking both to neutralize Russia's advantages in artillery and armor and to compensate for the shortage of airpower, which was identified as a major cause of the failure.[98] It took about a year for Russia to catch up, but it has not been able to develop the effective combination of glide-bomb strikes, gunfire from attack helicopters, and short-range FPV-drone hits (all executed through different command chains), so the territorial gains in 2024-25 were incremental and costly.[99] Ukraine was able to withstand Russian attacks already in 2025 because, in the drone-saturated combat environment, the skill of operators was of pivotal importance, as the attacking troops, even in small groups and sometimes on motorcycles, were more exposed to well-targeted drops of grenades or other explosives.[100]

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of Drones, over 53% of Missiles in May", *Interfax-Ukraine*, June 5, 2026, available at: https://en.interfax.com.ua. On Russia's problems, see D. Kirichenko, "Russia's Threadbare Air Defenses", CEPA Europe's Edge, June 3, 2026, available at: https://cepa.org.

96. One example of in-depth research is M. Cazalet, "Beyond the Drone Line: Lessons from the Drone War in Ukraine", European Security and Defence, June 9, 2025, available at: https://euro-sd.com. The edge to Ukraine granted by the experiments with deployment of UGVs is evaluated in the AI-driven next phase, as assessed in J. Rivero, "Networked for War: Lessons from Ukraine's Ground Robots", Modern War Institute, March 9, 2026, available at: https://mwi.westpoint.edu; T. Pultarova, "The Coming Drone-War Inflection in Ukraine", IEEE Spectrum, March 24, 2026, available at: https://spectrum.ieee.org.

97. The shifts in Russian conceptualization are examined in S. Aboulkheir, "Drone warfare in Ukraine: A Window into the Red Army's Doctrinal Concepts", *Small Wars Journal*, January 15, 2026, available at: https://smallwarsjournal.com.

98. An example of this wisdom of hindsight is J. Watling, O. Danylyuk and N. Reynolds, "Preliminary Lessons from Ukraine's Offensive Operations 2022-2023", *RUSI Report*, RUSI, July 18, 2024, available at: www.rusi.org.

99. On these shortcomings in Russian strategy, see O. Molloy, "Drone Warfare in Ukraine: From Myths to Operational Reality", Australian Army Research Centre, March 11, 2026, available at: https://researchcentre.army.gov.au.

100. J. Jajcay, "I Fought in Ukraine and Here's Why FPV Drones Kind of Suck", War on the Rocks, June 26, 2025, available at: https://warontherocks.com.

It can be noted that initially both Russia and Ukraine based the mass production of FPV drones on components imported from China, but Ukraine has made significant progress in developing domestic designs, while Russia's dependency upon China has deepened.[101] Both sides are deploying increasingly sophisticated means for jamming electronic communications, and Russia has assumed that a solution to this problem can be found in the use of fiber-optic lines.[102] By mid-2026, Ukraine has nevertheless gained a new edge by relying on the *Delta* AI-powered digital battle management system, while Russia is still struggling to integrate the increased use of tactical drones with attacks of the infantry "storm" troops (suffering heavy losses) and the operations of its tactical aviation.[103]

The role of drones in waging the war has expanded so fast that the rigid Russian military bureaucracy was predictably slow in adjusting the command structures accordingly and is still at a loss with conceptualizing the new character of combat operations.[104] Ukraine established the Unmanned System Forces as a separate branch of the Armed Forces in June 2024, but in Russia, the order of Defense Minister Andrey Belousov, who in August 2024 was barely three months in the job, to set up the *Rubicon* Center for Advanced Unmanned Technologies appeared far-fetched and incompatible with the chain of command.[105] The *Rubicon* proved, nevertheless, that business-style project management practices could deliver results, so Belousov proceeded with his proposals, and in June 2025, President Putin gave the plan for establishing the Unmanned System Forces (Voiska Bespilotnyh System, VBS) his full endorsement, dismissing reservations from the General Staff.[106]

The implementation of this plan has encountered serious problems, and the appointment of Yuri Vaganov, a businessman with no military background, as the commander with the rank of Lieutenant-General was subject to much controversy.[107] In August 2026, Putin appointed Colonel-General Denis Lyamin to command the VBS, while admitting that the

101. D. Hambling, "Ukraine Is Making FPV Drones Without Chinese Parts and at Lower Cost", *Forbes*, April 8, 2025, available at: www.forbes.com.
102. J. Roche, "A Revolution in Drone Warfare: As Russian Fiber-Optic Drones Flood the Battlefield, Ukraine Scrambles to Catch Up", *Moscow Times*, July 18, 2025, available at: www.themoscowtimes.com.
103. On this fluid balance of forces, see D. Kirichenko, "The Heart of War: Ukraine's Key Battlefield System", *CEPA Europe's Edge*, March 16, 2026, available at: https://cepa.org.
104. This gap between organizational changes and strategic thinking is examined in H. Parfonov, "Russia's Unmanned Systems Forces Become Wildcard in Moscow's Military Modernization", *Eurasia Daily Monitor*, April 2, 2026, available at: https://jamestown.org.
105. On the resistance to this innovation, see D. Hambling, "Russian Drones Could Win This War, If Entrenched Bureaucracy Lets Them", *Forbes*, August 13, 2024, available at: www.forbes.com.
106. On the rationale for that decision, see R. McDermott, "Russia's New Unmanned System Forces and the Strategic Role of DKO Weapons", Saratoga Foundation, June 20, 2025, available at: www.saratoga-foundation.org.
107. On these issues, see H. Parfonov, "Russia's Unmanned System Forces Become Wildcard in Moscow's Military Modernization", *Eurasia Daily Monitor*, February 4, 2026, available at: https://jamestown.org.

organization of this new branch of the Armed Forces wasn't completed.[108] It is hard to expect that Lyamin, a career Ground Forces commander, could form the VBS as an innovative, business-friendly model, apparently found to be prone to corruption.[109]

The composition of the VBS is still unclear, and the position of the *Rubicon* within this structure is uncertain.[110] Separate unmanned system battalions are being organized with each of the eleven combined arms armies engaged in operations on the Ukrainian theatre and with the airborne/air assault divisions.[111] The realistic assessments give the total strength of the VBS at about 15,000-30,000 in Summer 2026, while some Ukrainian sources give the tall figure of 80,000.[112] The outcome of the intense recruitment campaign in universities and technical colleges can hardly produce the desired force level, particularly as support for the war among the younger generations keeps shrinking, and the general effectiveness of the system of commercial recruitment has notably decreased since the start of 2026.[113]

One particular complexity in the accelerated build-up of Russian VBS Command is perfectly clear: the use of long-distance drones needs to be closely coordinated with the application of the air force, while the tactical drones are mainly employed in support of ground forces. The middle-strikes, in which Ukraine has gained significant advantage in spring-summer 2026, are even more challenging for the Russian command structure, since they need to be coordinated with both the tactical aviation and the divisions engaged in offensive operations.[114] The Navy is experimenting with its own designs for uncrewed boats and scored the first hit in August 2025, when the Ukrainian reconnaissance ship *Simferopol* was sunk in the Danube delta.[115] Ukraine still has effective superiority in the

108. Lyamin's career is outlined in E. Fursov, "Medals-awarded Tank General: Putin's Appointee to Command the VBS", AiF (in Russian), August 5, 2026, available at: https://aif.ru.
109. The failure of the project for a heavy drone resulted in arrests in business structures involved in its development; see A. Belaya, "Crashed by Drone: Why the Founder of EFCO Is Detained and What Is the Role of Moshkovich", *Forbes* (in Russian), July 30, 2026, available at: www.forbes.ru.
110. The performance of the Rubicon is often praised, but hard evidence is scarce; see Y. Lapaiev, "Crossing the Rubicon: Russia's Elite Drone Force and the Evolution of Unmanned Warfare in Ukraine", Saratoga Foundation, February 5, 2026, available at: www.saratoga-foundation.org.
111. I. DuPont, B. Vranian and B. Powers, "Red Skies Ahead: Russia Planning for Its Drone-driven Army of Tomorrow", *Military Review*, January-February 2026, available at: www.armyupress.army.mil.
112. The plan for 165,000 personnel by the end of 2026 is clearly unfeasible, and the ambition for 200,000 personnel is a stretch of imagination; see "Russia's Unmanned System Forces (VBS) and the Rubicon Center", *Drone Warfare*, March 2026, available at: https://drone-warfare.com.
113. On the targeting of students, see "Russia Turns to Students and Skilled Workers to reinforce Drone Warfare Capacity", Defence Matters, April 2, 2026, available at: https://defencematters.eu.
114. On the Ukrainian edge, see G. Barros and K. Stepanenko, "Ukraine's Intermediate-range Strike Campaign and New Mechanized Attacks Herald the Start of a New Phase of the War", *ISW Analysis*, Institute for the Study of War, May 25, 2026, available at: https://understandingwar.org.
115. On Russian naval drone development, see D. Kirichenko, "Copying Ukraine, Russia Has Begun Using Uncrewed Boats at Sea", *The Strategist*, March 2, 2026, available at: www.aspistrategist.org.au.

use of naval drones and made an important mark in the annals of drone warfare on May 2, 2025, when the newly modified *Magura* V7 drone shot down a Russian Su-30 fighter near Novorossiysk.[116] Another complexity in the VBS build-up is the growing need to develop anti-drone capabilities, which the Russian high command tried to address by calling up reservists and instructing big corporations to invest in protective measures.[117] The shortcomings in this incoherent strategy were exposed by the unprecedented damage to the air defense assets from Ukrainian strikes in spring-summer 2026.[118]

In the most general terms, the dynamics of the drone-driven RMA generate strong demand for innovative strategic thinking, flexible command and force structures, and high capacity for absorbing modern technologies—and none of these abilities is present in the Russian strategic culture and war machine. Russia proceeds with adaptations, but generally remains behind the Ukrainian advances because drone capabilities of various and dissimilar types and the experience in using them make a poor fit with the rigid organization of Russian Ground Forces and with the shifting balance of strength and weaknesses in Russian air power.

On the hit on the *Simferopol*, see "Ukraine: First Overwater Attack by a Russian Naval Drone", *Marine Forum*, September 1, 2025, available at: https://marineforum.online.

116. H. I. Sutton, "World First: Ukrainian Maritime Drone Shoots Down Russian Flanker Jet", *Naval News*, May 3, 2025, available at: www.navalnews.com.

117. On the plan for using reservists, see J. Hardie, "Russia Announces Plan to Muster Reservists to Combat Ukrainian Drones", *Long War Journal*, October 24, 2025, available at: www.longwarjournal.org. On making the corporations responsible for their own protection, see "Russia Lets Private Firms Buy Heavy Weapons to Defend Site from Drone Attacks", *Moscow Times*, May 28, 2026, available at: www.themoscowtimes.com.

118. On the targeting of Russian air defense positions in Spring 2026, see M. Liskpvych, "Blind Empire: Ukraine's Campaign to Degrade Russia's Air Defense Architecture", *UkrInform*, April 8, 2026, available at: www.ukrinform.net. On the follow-up campaign, see I. Khomenko, "Ukraine Blinds Russia's Air Defenses, Hitting Eight Radars and Missile Systems in One Sweep", United 24 Media, August 2, 2026, available at: https://united24media.com.

Conclusions

Since the start of the Ukraine War, Russian strategic guidelines on the application of air power—seen as the decisive instrument for achieving success in modern wars—have proven to be outdated, irrelevant and even self-defeating. Despite the clear superiority in all key components of air power, the desired dominance over the air theatre of operations has turned out to be impossible to establish.[119] The significantly depleted Long-Range Aviation wasn't able to perform mass attacks necessary for degrading the Ukrainian defense industry and the rear echelons, and its newly-gained experience in partaking in combined strikes with other stand-off weapon systems is still ineffectual for achieving this aim. The Kh-101 cruise missiles have been intercepted in the range above 80%, and the number of operational air platforms is probably only half of the pre-war fleet strength. The tactical aviation has been forced to operate at an increasing distance from the frontline and cannot deliver close air support to ground forces even with the newly acquired capabilities for using glide bombs. One unique capability that grants the VVS the ability to deliver impactful long-distance strikes is the MiG-31K fighter modified for carrying the *Kinzhal* hypersonic missile; however, the number of these platforms and the production of these missiles are limited, while the MIM-104 *Patriot* surface-to-air system has proven capacity for interception.

Modernization of the VVS assets is proceeding more by default than by design: the numerous old "workhorses", like the Su-25 and Su-24 tactical bombers and the Mi-24 attack helicopters, are disappearing, and the modern platforms, like the Su-57 fighter and Ka-52 helicopter, are being introduced, albeit in much smaller numbers. Western sanctions and lack of access to modern technologies have derailed the projects for developing the "next generation" long-range bomber (PAK DA) and multi-purpose stealth fighter (Su-75). The key issue with this war-driven transformation is the scope of the potential threat to European NATO member states, in the context of the broader question of the reconstitution of Russian military might.[120] This issue has different content for various elements of airpower, and, for instance, the sharply diminished capacity of the KDA cannot be reconstituted within a realistic time horizon. The tactical aviation has gained new capabilities, particularly in the use of glide bombs, and new combat experiences, which, however, do not include air-to-air combat.

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119. This failure is examined in D. Barrie and G. D. Mizio, "Moscow's Aerospace Forces: No Air of Superiority", *Military Balance Blog*, IISS, February 7, 2024, available at: www.iiss.org.
120. One competent answer to this question is M. Kofman, "The Next Russia Threat: Moscow's Military Power after Ukraine", *Foreign Affairs*, June 23, 2026, available at: www.foreignaffairs.com.

The majority opinion of Western experts is that the Russian VVS would present a significantly stronger challenge to NATO by the end of this decade than at the start of it.[121] This analysis concurs with the conclusion on the need to invest in countering this challenge, but also argues that the continuing losses, physical exhaustion of many assets and the sustained overload of logistics result in a more profound degradation of the Russian airpower than is usually presumed. The quality of technological solutions in the modernization of key elements of airpower remains inferior to Western standards, and the proposition of neutralizing this disadvantage by generating overwhelming quantity, inherent to Russian strategic culture, cannot be implemented.

Underestimating the importance of UAVs was a major blunder of strategic judgment at the start of the decade, which is still not fully corrected, as modernizations of the basically primitive design of the Shahed-136 one-way attack drone can enhance its effectiveness only so far. Russia has made impressive progress in developing and deploying drone capabilities so that now the unmanned systems are perceived by the reshuffled Defense Ministry as a central element of the air power (though perhaps less so by the VKS command). The ceiling in this remarkable growth is, nevertheless, set not only by the conservatism of the VBS command but also by Russia's structural inability to keep up with the global race in introducing fast-evolving communication and information technologies and AI. Russian long-range drones cannot be guided and targeted by an operator, while the tactical drones remain FPV-type, and the designs for increasing their range are unreliable, unlike in the Ukrainian USF. Every innovation makes the cost of a single drone much higher, so mass production (particularly of the *Geran*-5 model) becomes prohibitively expensive and the cost-effectiveness of combat use declines.[122] Russia has no technical capacity for making the next step in the evolution of drone warfare driven by the application of AI because it doesn't have the infrastructure, not even a single "compute power" hub, necessary for building cutting-edge AI. systems.[123]

President Putin was treated to a demonstration of airpower when a B-2 bomber passed over the red carpet laid for him at the US Elmendorf-

121. Bronk's conclusion that the VKS "would represent a greater threat than before to NATO forces" may be a case of steering the fact-based analysis to the side of caution; see J. Bronk, "The Evolution of Russian and Chinese Air Threats", FN 11.
122. This problem was identified already in early 2025; see N. Hollenbeck, B. Jensen, et al., "Calculating the Cost-effectiveness of Russian Drone Strikes", *CSIS Commentary*, CSIS, February 19, 2025, available at: www.csis.org.
123. Russia is absent from the mapping of the A.I. power; see A. Saturiano and P. Mozur, "The Global A.I. Divide: Where A.I. Data Centers Are Located", *New York Times*, July 21, 2025, available at: www.nytimes.com.

Richardson airbase.[124] That episode didn't have much influence on the outcome of the Alaska summit with President Trump on August 15, 2025, but it was a subtle reminder of the devastating air campaign executed by Israel and the US against Iran two months prior. What made a deeper and darker impression on Putin was the precision of the Israeli strike on Tehran on February 28, 2026, which killed many key figures in the Iranian leadership, including Ayatollah Ali Khamenei, so that the risks of a "decapitating" application of air power have been reassessed as alarmingly high, while Russia's ability to counter them is seen as inadequate.[125]

Revolutionary as the developments in drone warfare may be, they cannot diminish the crucial importance of the modern air force, and Russia has lost the numerical advantage and the technological edge *vis-à-vis* the potential adversaries in Europe it used to possess (and even more—to imagine) in the key elements of airpower.

124. On that messaging, see "Why a B-2 Stealth Bomber Flying over Alaska Just Sent Strong Show of Force at the Trump-Putin Summit", *Military Watch Magazine*, August 15, 2025, available at: https://militarywatchmagazine.com.

125. On Putin's obsession with personal safety, see M. Galeotti, "Paranoid Putin's Life in Crosshairs", *Daily Mail*, May 8, 2026, available at: www.dailymail.com. Even Russian commentators admit the impression from the Iranian case; see "F. Lukyanov: US Decapitation Strike Strengthens Russian Hardliners", *Russia in Global Affairs*, April 9, 2026, available at: https://eng.globalaffairs.ru.

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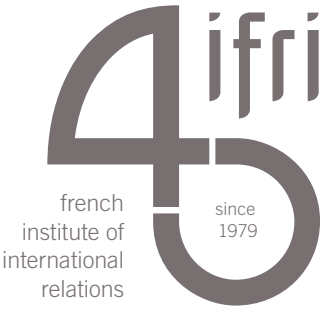

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