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Russian Concepts of Future Warfare Based on Lessons from the Ukraine War

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Abstract

This paper examines the evolution of Russian thinking about military strategy and conventional operations after three years of conflict in Ukraine. It assesses Russian elite military thought on combined arms operations, naval surface warfare, and air dominance operations and how the country's strategy and operational concepts should evolve to address changes in the character of armed conflict in future wars. Despite significant tactical and technological changes, Russian strategic and operational thinking remains largely unchanged from approaches adopted before the war. Thus, despite the Ground Forces' failure to conduct effective combined arms maneuver, military elites remain focused on restoring the conditions needed to wage future wars of maneuver. Similarly, despite the Russian Federation Navy's failure to maintain control of the Black Sea, Russian naval thinkers are looking for ways to offset the asymmetric strike capabilities that led to this outcome. Likewise, Russian air power theorists are looking to increase the force size and rely on advanced technology to restore the Aerospace Forces' ability to achieve air superiority and improve long-range precision strikes in future wars. Thus, as the Russian military reconstitutes its forces, it will likely do so with its existing strategic and operational concepts in mind and without substantial innovation. However, it would be unwise to discount the Russian military, which remains extremely capable and dangerous despite its many setbacks in Ukraine.

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Cover image: Briefing by General of the Army Valery Gerasimov, Dec. 18, 2024. Russian Ministry of Defense.

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Executive Summary

This report examines the evolution of Russian thinking about military strategy and conventional military operations after three years of conflict in Ukraine. It assesses Russian elite military thought on combined arms operations, naval surface warfare, and air dominance operations (including long-range precision strike). It probes the thinking of Russian military elites on how the country's military strategy and operational concepts should evolve to address emerging changes in the character of armed conflict in anticipation of future wars.

The study begins with an analysis of Russian strategic thought, which forms the foundation for Russian warfighting concepts. It then discusses three main operational areas: combined arms operations, naval surface warfare, and air dominance operations. In each of these areas, the Russian military has encountered major unexpected challenges during the war, including the inability to wage effective combined arms offensives, maintain control of the Black Sea, and achieve air dominance. The study team drew primarily from leading Russian military journals, such as *Voennaia Mysl' (Military Thought),* which are widely read by Russian political and military elites. We also consulted materials published by leading Russian think tanks and central newspapers providing expert coverage of Russian military affairs as well as Russian official doctrine.

Key findings

The report finds that despite significant technological advances, which in turn have led to major tactical changes in the character of armed conflict (especially widespread use of uncrewed systems), Russian strategic and operational thinking on conventional military operations remains largely unchanged from approaches adopted before the war. Instead, for most Russian military elites, the war appears to confirm prewar conclusions regarding the character of armed conflict, despite the unexpected setbacks incurred by Russian forces during the war. Consequently, Russian views on the character of armed conflict have evolved little since the war, and there are no signs of any fundamental shifts in Russian strategic concepts or operational doctrine.

Russian military elites have chosen to address emerging military challenges with a peculiar mixture of confirmation bias and technological fetishism. In essence, they argue that their concepts were correct all along and that the failure of the Russian military in Ukraine is mainly due to poor planning and operationalization of valid and long-standing concepts combined with massive and unforeseen Western support for Ukraine. Although poor training has also played a role, Russian military thinkers have offered little at the operational level of war to indicate that systemic improvements in training are needed to help resolve these failures. The solution to these challenges, they argue, lies in adopting advanced technology such as artificial intelligence, next-generation uncrewed systems, and appropriate tactical innovations. Few if any military experts make references to rethinking their wartime strategic or operational concepts.

Russian elite thinking about combined arms operations highlights this approach. Military thinkers readily acknowledge the inability of Russia's Ground Forces to conduct effective combined arms maneuver during the war, characterized by rapid breakthrough and exploitation operations led by tanks and motorized infantry. But they

tend to attribute this outcome to the emergence of ubiquitous intelligence, surveillance, and reconnaissance (ISR) and the proliferation of mass and precision fires. These conditions, they claim, have led to the emergence of a "transparent battlefield" in which Russian formations are unable to concentrate, maneuver, and conduct deep operations without being instantly detected and targeted by mass and precision fires with disabling effect. Yet, far from abandoning their prewar doctrine, Russian elites are focused mainly on restoring the army's ability to maneuver by increasing the force size and suppressing adversary ISR and strike capabilities in response to new battlefield conditions.

Likewise, Russian naval experts are grappling with the challenges encountered by Russia's Black Sea Fleet during the war and their implications for future conflicts at sea. These include the fleet's failure to maintain sea control and the loss of numerous Russian warships. Even though Ukraine lacks a traditional navy, its armed forces have succeeded in countering Russia's surface fleet using uncrewed surface vessels and precision missiles. Yet, despite the seeming intractability of these challenges, Russian military elites remain focused on restoring the fleet's ability to seize and maintain local sea control and fulfill key missions. To achieve this aim, they are advocating primarily for tactical and technological measures to enhance ship survivability, suppress adversary ISR, and counter adversary missile and drone strikes in lieu of serious revisions to operational art.

Likewise, the successes and failures of Russia's Aerospace Forces during the war have spurred much introspection among Russian air power theorists. Yet ideas about Russian air dominance operations have not fundamentally shifted away from pre-2022 themes either. Although Russian writers have identified strengths and weaknesses in the Aerospace Forces and proposed a variety of responses, they have yet to alter their general assessments on the character of air warfare, and they have not proposed fundamental changes in air strategy, doctrine, or concepts. Instead, to address the problems encountered in Ukraine for future conflicts, Russian air power theorists are focused on increasing the force size and relying on advanced technology, to include enhancements to Russia's ground-based air defenses and long-range strike capabilities. Yet Russian thinking about suppression and destruction of enemy air defenses operations remains moribund despite the air force's failure to seize air control over Ukraine, with all its attendant consequences.

Implications

Given Russia's lack of major doctrinal revisions at both the strategic and the operational levels, Russia continues to frame its strategic competition with the West in many of the same ways that it did before 2022. It is still preparing for war with the North Atlantic Treaty Organization with most of the same assumptions and ideas in mind. Its theory of victory still rests on setting conditions for success during the Threatening Period, deploying rapid and overwhelming force during the Initial Period, imposing costs via strategic defense and long-range strikes, maintaining escalation dominance, and undermining the adversary's will to fight.

The Ukraine war's protraction, the failure of Russia's strike campaign to break Ukrainian will, and Russia's loss of escalation credibility have had little impact on the Russian military's formulation of ideas. Combined arms warfare, the value of naval surface operations, the centrality of air dominance, and the fundamental war-winning importance of long-range precision strike have all proven to be surprisingly durable ideas given Russian failures in the war. As the Russian military begins to reconstitute over the next decade, it will likely do so with these concepts in mind.

Thus, Russian military elites have not embraced attritional warfare, nor have they abandoned or fundamentally altered naval surface war concepts. They continue to rely on long-range precision strike as a potentially war-winning capability, embrace ground-based air defense as an asymmetric advantage, and envision a combined arms maneuver force operating on a broken battlefield. Despite the armed forces' record in the war, the Russian military remains extremely capable and very dangerous.

The implications of these ideas for any potential adversary are significant. Russia's reliance on the Initial Period of War as a strategic linchpin means that nations must continue to develop advanced systems capable of providing strategic and tactical indications and warning. Operationally, the high likelihood of long-range precision attack against critical military, economic, and civilian targets means that states must take measures to ensure increased resilience in the Initial Period of War and beyond. Furthermore, Russian theorists are pushing for ground operations to be rapid and dynamic, so Western military planners should expect their adversary to seek to avoid grinding attrition warfare in a future conflict. In the maritime domain, Russian theorists argue for a combination of dense, active near-seas defense combined with long-endurance stealthy platforms for use in the far seas. These platforms will all be equipped with long-range precision strike for offensive and defensive cost imposition.

Consequently, given these projections and assuming more limited objectives in a different region (such as the Baltic), a Russian military that in five years looks and operates similarly to the one in 2025 may very well achieve its strategic military objectives in a future conflict.

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Introduction

This report focuses on the evolution of Russian thinking about military strategy and operations after three years of high-end conventional warfare in Ukraine. It features analysis of Russian elite military thought on combined arms operations, naval surface warfare, and air dominance operations (including long-range precision strike). The report asks, "How has the war in Ukraine affected Russian military elites' thinking on specific strategic and operational concepts? Will this thinking result in fundamental changes to Russian military strategy and operational concepts?" The report argues that despite significant technological advances that have led to major tactical changes in the character of armed conflict (especially widespread use of uncrewed systems), Russian strategic and operational thinking on conventional military operations is largely unchanged from approaches adopted before the war. For Russian writers, the Russia-Ukraine war confirms many of the conclusions made about military conflict over the previous two decades even though the war has generated unexpected setbacks and surprising outcomes.

These conclusions are important because the bulk of military analysis on Russia's operations in Ukraine has focused on the tactical level of war, in which there has been extraordinary dynamism and innovation. The use of uncrewed aerial vehicles (UAVs) for rapid intelligence, surveillance, and reconnaissance (ISR) and fire support and as loitering munitions and Ukraine's use of uncrewed surface vehicles (USVs) or UAVs to inflict major defeats on the Black Sea Fleet have been nothing short of revolutionary. But this tactical focus threatens to skew overall Russian military assessments by implying that dynamic innovation is the norm and the Russian military is rapidly becoming a new kind of force.

Shifting the focus from the tactical to the strategic and operational reveals that these important technical-tactical shifts are taking place within an intellectual framework that very closely resembles the one in place before the war. This matters because these higher-level considerations shape the fundamental approach that Russia will likely take in a potential regional or global conflict with the US or the North Atlantic Treaty Organization (NATO). In short, the nature and character of the conflict that Russia may fight with NATO is not as radically different from pre-Ukraine expectations as it may seem at first glance. Although Russia may be experiencing a tactical revolution, operational and strategic thinking is largely static. This study begins to fill this gap in understanding at the strategic and especially the operational level of war.

Despite major setbacks, Russian military elites view the war as having validated many strategic and operational assumptions, including the importance of preemption, maneuver, air power, and naval combat. Although they acknowledge either tacitly or directly that Russia's military has failed to perform in accordance with prewar expectations (and that the level of Western support for Ukraine was a surprise), they also explicitly argue that much of their prewar analysis has been proven correct. Any alterations to that analysis since 2022 have been marginal, and there have not been any fundamental shifts in operational doctrine or strategic concepts.

Russia's military challenges emerged early on. Ukrainian forces effectively countered Russian attempts to wage a multi-axis blitzkrieg campaign on the ground, in the air, and at sea designed to dislocate the Ukrainian military, decapitate Ukraine's leadership, and occupy large swathes of Ukrainian

territory. Ukrainian forces not only successfully resisted Russian attempts to capture Kyiv but also compelled the withdrawal of Russian forces from northern Ukraine altogether. Within months, Russian forces lost control of the Black Sea, and Russian territory fell under Ukrainian attack. Since then, the war has devolved into grinding attrition on the ground, long-range cost imposition in the air, and a maritime campaign that has left the Russian Federation Navy (RFN) badly damaged and searching for answers.

Russian military elites acknowledge these setbacks but address them with a peculiar mixture of confirmation bias and technological fetishism. In essence, they argue that they were correct all along and the failure of the Russian military in Ukraine is due to poor planning and operationalization of valid and long-standing concepts combined with massive and unforeseen Western support for Ukraine. The solution to these challenges, they argue, lies in adopting advanced technology such as artificial intelligence (AI) and expanding the use of advanced uncrewed systems. Few if any military elites make references to rethinking their wartime strategic or operational concepts, doctrine, or training.

Ultimately, Russian thinking on the Russia-Ukraine war and its impact on future conflict is characterized by the dual dynamic of rapid technological-tactical innovation and a more torpid, path-dependent state of operational and strategic thinking. For all the rapid fundamental change happening on the ground, the strategic and operational conclusions remain relatively static, with changes happening only on the periphery.

Scope, methodology, and sources

In June 2024, US European Command's Russia Strategic Initiative commissioned CNA to complete a study assessing the potential evolution of Russian strategic and operational thought resulting from the war in Ukraine. CNA was asked specifically to examine published views within Russian military circles about the potentially evolving character of modern warfare at the strategic and operational levels of war.

The study focuses primarily on conventional warfighting strategy and operational concepts.[1] Within this broad scope, the study team began with an analysis of strategic concepts within which Russian operational warfighting theories reside. These include evolution of Russian threat perceptions, conflict periodization, and conflict characterization since 2022. We used these categories to investigate Russian understanding of the character of war—how war is fought in a specific time and place—since 2022 and to frame the discussions occurring at the operational level of war.

We then chose three main operational areas—combined arms operations, naval surface warfare, and air dominance operations (including long-range strike)—based on availability of sources, broader interest to the community of military expertise, and being representative of different domains. These areas of operational focus and the discussions around them lie at the heart of the study. For each of these areas, the study team begins by briefly describing the state of prewar Russian thought. We then examine Russian-language sources to identify (1) Russian military elites' assessments of warfighting concepts in these areas after three years of war and

[1] In this study, we use the operational level of war as a level of analysis. The focus of this level of analysis is the application of operational art. We examine operational concepts that are shaped by operational art and inform operational campaign development within a strategic framework. For a definition of *strategic*, *operational*, *and tactical levels of war*, see Joint Publication JP-1, Aug. 27, 2023, *Joint Warfighting*.

(2) their prescriptions for how the Russian military should address demonstrated shortcomings in the future. We then provide the practical implications of future warfighting concepts for both Russia and its potential adversaries.

The study team collected insights from publicly available Russian-language sources, including leading professional military journals such as *Voennaia Mysl' (Military Thought)*, *Vestnik Akademii Voennykh Nauk (Journal of the Academy of Military Science)*, *Armeiskii Sbornik (Army Digest)*, *Morskoi Sbornik (Maritime Digest)*, *Arsenal Otechestva (Arsenal of the Fatherland)*, *and Vozdushno-Kosmicheskiye Sily: Teory I Praktika (Aerospace Forces: Theory and Practice)*. Military academic journals began showing the influence of the Russia-Ukraine war in roughly mid-2022, and that trend has accelerated through the beginning of 2025. We also consulted materials published by leading Russian think tanks and central newspapers providing expert coverage of Russian military affairs.

To the extent possible, we focused our analysis on articles published by Russia's leading military commanders and most influential military scholars. For example, we were able to draw on the writings of the two most recent commanders in chief of the RFN. Moreover, many of the authors consulted for this study have published frequently in the leading Russian military journals, are cited often, have acquired significant influence among the Russian military elite community, and are well known to Western experts.

To inform our selection of key themes to be covered in this report, we were aided significantly by our original selection of three operational areas: combined arms operations, naval surface warfare, and air dominance operations. These areas were intentionally selected because of the often-intractable problems encountered by Russia's armed forces in each of these areas during the war in Ukraine. As a result, our research was necessarily focused on how Russian elite military thinkers are assessing such problems, the extent to which they see them as enduring, and the solutions they are offering to address them in future wars. Although we were unable to cover every theme that has arisen in connection with such operations, this approach allowed us to focus on those problems that are seen as most central to the war as well as the main lines of thinking on how Russia should address them in anticipation of future conflicts.

There is a robust discussion among Russian military elites that reflects the experiences of the Russia-Ukraine war. As the Swedish Defense University's Krisztián Jójárt put it, "In a country where independent war reporting has been criminalized, Russian military thinking is thriving."[2] The discussion among these elites reflects a long tradition of open (if sometimes circumspect) debate about military issues in Russia and fundamentally shapes future strategy, doctrine, and operational concepts. The only area that is generally off-limits is direct criticism of Russian political and senior military officers. However, as this study shows, criticism, even if oblique, can and does appear on the pages of professional military journals. In addition, the writers presented in this study are generally the most influential thinkers in Russian military circles. They are senior active duty or retired officers now ensconced in various General Staff research institutions and military academies. In Russia, civilian writers are generally less influential, but the few chosen for this study are well known and either shape thought or capture critical ideas addressed by multiple writers.

[2] Krisztián Jójárt, "The War Against Ukraine Through the Prism of Russian Military Thought," *Journal of Strategic Studies* 47, no. 6–7 (2024), doi:10.1080/01402390.2024.2414079. Jójárt's work examines the "transparent battlefield" phenomenon and explores Russian thinking on efforts to break the stalemate in Ukraine and overcome challenges in future wars.

Official Russian documents, such as the 2022 Maritime Doctrine and Russia's official Military Encyclopedic Dictionary, were also crucial to this study. In select cases, Russian-language sources were supplemented by assessments drawn from reliable Western sources, including academic journals, think tank reports, and other media sources. The sources cited are broadly representative of the tenor and content of discussions in Russian military circles. We note those topics on which there is debate or consensus. However, given the limited timeframe in which publications, documents, and other sources on the war have appeared, most conclusions about the future of Russian warfare must be considered preliminary. As the conflict enters its fourth year and remains unsettled, the conclusions noted are subject to change.

Note that this report is not an examination of Russia's "lessons learned" from the Russia-Ukraine war. Although it is, of course, informed by the conflict, we focus on the implications for future war and do not provide a detailed retrospective of operations. In many cases, by describing operational shortcomings in the Russia-Ukraine war, Russian writers are simultaneously articulating a vision for future conflict, and we focus on this articulation. This study is also not an examination of the tactical level of war or its rapid innovation. This well-studied topic has been the focus of many reports published by CNA and elsewhere. The study also avoids deep discussion of nuclear debates in Russia, a topic that has similarly been well covered in the literature on Russian military thought. Finally, we make no claims to comprehensiveness. There are areas of Russian strategic and operational thought that we do not discuss in this report. Any effort to cover all these warfighting areas comprehensively is beyond the resources available to the study team.

Structure of the report

The report begins with an initial section that summarizes the state of Russian strategic thought since 2022. It provides a high-level overview of how Russian military elites are addressing the impact of the war in Ukraine at the strategic level of armed conflict. Specifically, this section identifies insights from Russian military experts regarding the character of armed conflict and its impact on Russia's overall military strategy for future conflicts. The section also examines the extent to which military elites consider it necessary for Russia to revise its overall military strategic thinking based on observations of the war in Ukraine.

The next three sections cover the three main operational areas that lie at the heart of the study: combined arms operations, naval surface warfare, and air dominance operations. In each of these sections, we assess Russian military elites' reactions to the war in Ukraine and whether they are making fundamental changes to operational thought based on their observations. Finally, we assess Russian military writers' proposed actions in terms of acquiring new capabilities, developing new doctrine, and enhancing tactics, techniques, and procedures (TTPs) to address these emerging challenges.

The study concludes with a section highlighting the key high-level findings of the report focusing on the key lessons learned by Russian military elites regarding the future of conventional conflict. This section also explores the implications of Russian thinking for the future direction of Russia's armed forces by summarizing the measures that Russian military elites are proposing to address the many problems encountered by the armed forces in Ukraine in preparation for future wars.

Strategic Military Concepts

The Russia-Ukraine war has validated and amplified prewar strategic conclusions about relations with the West, as well as the nature and forms of modern conflict, reached by Russian military theorists and many members of the military elite. Despite achieving tactical innovations on the battlefield, *Russia has continued to conceptualize war with NATO in much the same way it did before 2022*—with an emphasis on setting conditions for victory in the Threatening Period, deploying rapid and overwhelming force in the Initial Period, imposing costs via strategic defense and long-range strikes, and undermining the adversary's will to fight as the keys to victory. This section addresses the key aspects of Russian strategic military thought after three years of the Russia-Ukraine war and shows that prewar assumptions have proven to be surprisingly enduring.

Since 2022, strategic military thinking in Russia has exhibited strong continuity, with change limited to the peripheries of core ideas. Despite Russian failures in the war, the conflict has not spurred a wholesale upending of Russian strategic thought; rather, it has simply added some new elements to the preexisting interpretive framework articulated by Chief of the General Staff Valery Gerasimov more than a decade ago.[3] Indeed, for Russian writers, the war has proven the efficacy of his theoretical framework. They have framed Russia's "special military operation" (*special'naja voennaja operacija* or SVO) in Ukraine as a feature of a wider so-called hybrid Western campaign against Russia that may ultimately trigger a direct war with NATO. The fear of a shooting war with NATO has been the key driver of Russian strategic planning and remains unchanged in 2025.

Russian strategy writers view their nation as being locked in an existential conflict with the West that has intensified since at least 2022. They frequently argue that hybrid war tactics identified in the decades before the war are now being implemented with greater ferocity by their Western adversaries. This slight shift in Russian thinking reflects Russia's response not only to its experience in Ukraine but also to perceived shifts in the global strategic environment beyond Russia's relationship with the West. *As a result, the assumptions governing Russian strategy, warfighting doctrine, and escalation have remained largely unchanged* even though some Russian military thinkers have argued for limited revisions to existing doctrine and escalation management models that reflect observations from the current war.

The themes presented in the sources covered here are representative of common themes in Russian strategic thought since February 2022. Military academic journals began showing the influence of the Russia-Ukraine war in roughly mid-2022, and that trend has accelerated through 2025. Given this limited period, most conclusions about the future of Russian warfare must be considered preliminary. As the conflict enters its fourth year and remains unsettled, the conclusions noted are subject to change.

[3] Valery Gerasimov, "The Value of Science Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying Out Combat Operations," *Military-Industrial Kurier*, Feb. 27, 2013, trans. Robert Coalson, https://www.armyupress.army.mil/portals/7/militaryreview/archives/english/militaryreview_20160228_art008.pdf.

Strategic continuities

Background: prewar Russian military strategy

The post–Cold War era featured an intensive period of debate among Russian military elites about the nature and character of modern war. Over nearly two decades, Russian observers came to see the growth of long-range precision strike, network-centric warfare, and the use of nonmilitary means (especially informational and political tools) to achieve military objectives as characteristic of modern conflict. In response, they developed a military strategy that sought to exploit these areas asymmetrically against their adversaries. The ability to influence the adversary's political support and leadership decision-making in the cognitive domain became a particular focus of Russian strategy. The use of military force, especially "non-contact warfare" featuring rapid decision-making leading to standoff strikes against critical enemy targets, remained an essential means of doing so.[4]

Two key elements of Russian military thought before the full-scale invasion of Ukraine were "active defense" (otherwise known as preemption) and escalation control.[5] For Russian military elites, successfully executing both meant the continued development of a deep understanding of modern conflict typologies and periodization. In Russian thinking, properly defining the type of conflict in which a country finds itself (see Table 1) is crucial for the purposes of strategic deterrence. It allows military planners to determine the goals and scope of a given conflict and the proper application of state power to coerce the adversary while controlling escalation.[6]

Russia's understanding of conflict periodization is equally crucial. This understanding is based on assessments of the political-military situation and purportedly allows military leadership to forecast the onset of conflict, prepare forces accordingly, and, if necessary, conduct preemptive operations. Success in the so-called Initial Period of War, described in greater detail in the following section, is considered crucial to Russia's overall fortunes in conflict, especially because of Russia's self-assessed capacity shortages vis-à-vis NATO, its chief rival.[7]

Ultimately, Russian military elites, including Chief of the General Staff Gerasimov, came to believe in a theory of victory predicated on a combination of preemptive standoff precision strikes against critical targets, active undermining of leadership decision-making, and quick and decisive military operations, all while maintaining escalation dominance backstopped by credible nuclear threats.[8] These operations were conceived as asymmetric actions designed to exploit adversary weaknesses at the high end of conflict. The ideas underpinning them were almost certainly equally informed by Russian elites' assessments of US military actions in the post–Cold War era as well as acknowledgment of their own weaknesses vis-à-vis NATO.[9] These ideas were fundamental to Russian military strategy on the eve of Moscow's invasion in 2022.

[4] See Michael Kofman et al., *Russian Military Strategy: Core Tenets and Operational Concepts,* CNA, 2021.

[5] Both categories fall under the larger concept of "strategic deterrence," a topic that has received much attention in recent years and falls outside the scope of this study. See, for example, Dima Adamsky, *The Russian Way of Deterrence: Strategic Culture, Coercion, and War* (Palo Alto, CA: Stanford University Press, 2023).

[6] Kofman et al., *Russian Military Strategy.*

[7] Kofman et al., *Russian Military Strategy*, pp. 8–9. For focused discussion of the initial period in Ukraine, see especially Roger N. McDermott and Charles K. Bartles, *An Assessment of the Initial Period of War: The Russia-Ukraine War, Part I* (Fort Eustis, VA: US Army TRADOC, 2023).

[8] For further analysis of Russian warfighting and deterrence strategy, see Michael Kofman, Anya Fink, and Jeffrey Edmonds, *Russian Strategy for Escalation Management: Evolution of Key Concepts,* CNA, DRM-2019-U-022455-1Rev, Apr. 2020.

[9] Timothy Thomas, *Russian Military Thought: Concepts and Elements,* MITRE, 2019, pp. 5–10.

Table 1. Russian conflict typologies outlined in 2014

Conflict Type	Description
Military danger	State of interstate or intrastate relations characterized by the correlation of factors that could, under certain conditions, lead to the appearance of a military threat.
Military threat	State of interstate or intrastate relations characterized by the real possibility of an appearance of military conflict between opposing sides as well as a high degree of readiness of any state (or group of states) or separatist (terrorist) organizations to use military force (armed violence).
Armed conflict	Armed conflict of a limited scale between states (international armed conflict) or between opposing sides in the territory of one state (internal armed conflict).
Local war	War in which limited political-military goals are pursued, military actions are conducted within the borders of combating states, and the interests (e.g., territorial, economic, political) of just these states are primarily affected.
Regional war	War with the participation of several states from one region led by national or coalition armed forces during which the sides pursue important military-political goals.
Large-scale war	War between coalitions of states or the largest states of the global society in which the sides pursue radical political-military goals. Large-scale war could be the result of escalation of an armed conflict, local war, or regional war involving a significant number of states from various regions of the world. This war would demand mobilization of all available material resources and spiritual forces of the participant states.

Source: "Russian Federation Military Doctrine [Военная доктрина Российской Федерации]," printed in *Rossiyskaya Gazeta*, Dec. 30, 2014, https://rg.ru/2014/12/30/doktrina-dok.html.

Conflict typologies and hybrid warfare

After three years of war, Russian strategists have not changed their assumptions about the global security environment. Although Russian writers have acknowledged tactical lessons from the Russia-Ukraine war, the fundamentals of Russian strategy and doctrine remain largely unchanged by the conflict. The basic preexisting typologies of conflict outlined in the 2014 military doctrine (see Table 1) have not changed.

Likewise, fundamental threat perceptions and basic ideas about hybrid Western aggression remain unchanged. Before the Russia-Ukraine war, military theorists developed a definition of war that included the use of economic, informational, and diplomatic tools to produce instability in an adversary nation. These measures would also set conditions for the introduction of foreign militaries into countries that were deemed strategically important to Russia.[10] Since 2022, Russian thinking has remained centered on this perceived pattern of global multidomain hybrid aggression underwritten by the US and NATO, and Russian writers have frequently portrayed the war in Ukraine as an example of this idea and as confirmation of their earlier theories.

For example, in a late 2022 article on the importance of psychological resilience in war, Major General A. S. Korzhevskiy, who would go on to become lieutenant general and deputy chief of the General Staff Academy, noted the following:

> New spheres of confrontation (conflict resolution) have emerged, such as economic; informational, including scientific, educational and cybernetic spaces; conscious (mental, cognitive) and others, within which it is possible to inflict unacceptable damage (defeat) on the opposing side without the use of armed force.[11]

These ideas mirror prewar Russian thought. Despite the catastrophic bloodshed in Ukraine and Russia, the use of lethal force remains only one aspect of the concept of war in Russian thinking. War is viewed as an activity that encompasses the entirety of state action and demands a nation, if it is to be victorious, to retool itself fundamentally in all areas of confrontation noted by Korzhevskiy.[12]

Russian military thinkers assume that a direct relationship exists between hybrid war, the Russia-Ukraine war, and potential war with NATO. They claim that the SVO is an outgrowth of, not a departure from, this assumption. For example, in an echo of Chief of the General Staff Gerasimov's well-known 2013 article, "The Value of Science Is in Foresight," V. V. Selivanov and Yu. Ilyin argued that the US is working to destabilize states around Russia's borders and that "it is highly likely that any military conflict on post-Soviet territory could become a prelude to a large-scale military conflict between NATO and Russia. The armed conflict in Ukraine is, in fact, a test of the US (NATO) forces in the implementation

[10] Perhaps the most cited article in this subgenre of Russian strategic writing is S. G. Chekinov and S. A. Bogdanov, "Evolution of the Essence and Content of the Concept of 'War' in the 21st Century [Эволюция сущности и содержания понятия «война» в XXI столетии]," *Voennaia Mysl'* 1 (2017).

[11] A. S. Korzhevskiy and I. V. Solvyev, "Mental Confrontation and Problems of Forming a Holistic System of Offensive and Defensive Action Within It [Ментальное противоборство и проблемы формирования целостной системы наступательных и оборонительных действий в нем]," *Voennaia Mysl'* 11 (Nov. 2022).

[12] Korzhevskiy and Solvyev, "Mental Confrontation and Problems of Forming a Holistic System."

of this dual scenario."[13] This sentiment is common among Russian military theorists.

Finally, Russian strategists continue to advocate for a comprehensive approach to strategic deterrence, one that allows Russia to retain escalation dominance at all levels of conflict. Strategic and nonstrategic nuclear forces remain their escalation trump card. Military elites argue that the underlying purpose of these weapons is the application of psychological pressure on adversaries and the infliction of "unacceptable damage." They emphasize that the foundation of Russia's deterrence policy remains the capability to execute a retaliatory strike under any circumstances, even the most adverse, with devastating consequences for the aggressor.[14] In short, Russian intellectuals remain committed to their unique and evolving concept of "strategic deterrence."[15]

Conflict periodization

The war has also reinforced previous Russian conclusions regarding conflict periodization, especially the importance of the Threatening (or Threatened) Period and the Initial Period of War. As a result, Russian intellectuals have continued to emphasize the critical importance of these periods in determining the success or failure of conflict. The protracted nature of the Russia-Ukraine war has not fundamentally altered the importance ascribed to these periods.

Historically, the Threatening Period is broadly understood in Russia as the period of "extreme aggravation" before conflict. Russian intellectuals note that it could feature military deployments, diplomatic saber-rattling, malign information campaigns, and coercive economic measures.[16] As of 2024, the definition and importance of this period have remained unchanged. For example, Lieutenant General A. V. Serzhantov from the Military Academy of the General Staff of the Russian Federation, highlighted its importance, noting that "a special role is given to the period preceding the start of a military conflict." According to Serzhantov, this special role includes attempts to undermine the adversary's will and shape the battlespace for the onset of military operations.[17]

Likewise, the Initial Period of War has retained its paramount importance in Russian thinking. Poor Russian planning and performance during the Initial Period and the resulting protracted conflict in Ukraine appear to have led strategists to double down on the importance of this period—a subtle but clear critique of the war's execution. For example, an early 2023 article written by then–Major General A. G. Semenov, who was on the verge of being promoted to deputy commander of the Aerospace

[13] V. V. Selivanov and Yu. D. Ilyin, "Trends in the Development of Means of Armed Struggle in Modern Military Conflicts, Their Influence on the Development and Change of Generations of Weapons, Military and Special Equipment [Тенденции развития средств вооруженной борьбы в современных военных конфликтах, их влияние на развитие и смену поколений вооружения, военной и специальной техники]," *Voennaia Mysl'* 9 (Sept. 30, 2022).

[14] D. A. Palachyov, R. Q. Nogin, and S. V. Kornev, "Possible Approaches to the Development of a Set of Measures to Improve Combat Duty in the Strategic Missile Forces in the Current Military-Political Situation [Возможные подходы к разработке комплекса мероприятий по совершенствованию боевого дежурства в РВСН в современной военно-политической обстановке]," *Voennaia Mysl'* 3 (2024).

[15] For an extensive discussion of Russia's concept of escalation, see Kofman, Fink, and Edmonds, *Russian Strategy for Escalation Management;* Gabriela Iveliz Rosa-Hernandez, Anya Fink, and Cornell Overfield, *Moscow Does Not Believe in Tears: Russia's Political-Military Establishment Debates Credibility of Nuclear Threats and Potential Nuclear Employment,* CNA, DRM-2024-U-038138-1Rev, Sept. 2024, https://www.cna.org/reports/2024/09/moscow-does-not-believe-in-tears.

[16] "Threatened Period [Угрожаемы Период]," Russian Ministry of Defense Military Encyclopedic Dictionary, https://encyclopedia.mil.ru/encyclopedia/diconary/details.htm?id=10643@morfDiconary.

[17] A. V. Serzhantov, A. V. Smolovy, and I. A. Terentyev, "Transformation of the Contents of War: Contours of Military Conflicts of the Future [Трансформация содержания войны: контуры военных конфликтов будущего]," *Voennaia Mysl'* 6 (June 30, 2022).

Defense Forces, described the Initial Period as a "decisive phase not only within the aerospace campaign, but also the war as a whole." Semenov argued that the first stage of a large-scale conflict would be characterized by a strategically defensive aerospace campaign with the goal of denying NATO objectives. These objectives, according to Semenov, would include a strategic decapitation and disarming strike on Russia, including massive strikes at the operational level.[18]

Valentin Dybov, Yuriy Podgornykh, and Maxim Kolodko from the Military Academy of Aerospace Defense share Semenov's concerns. They wrote that "the position that the initial period of war should be correctly foreseen in peacetime and purposefully prepared for remains relevant." For them, the prospect of a surprise attack on Russia is not new, and they argued that Russian leadership should prioritize preparing to defend Russia from a massive aerospace attack via deceptive measures.[19]

D. S. Belenkov, A. S. Borisenko, and V. V. Sukhorutchenko argued for the following:

> The timely identification of a potential enemy's possible plan of action, the disclosure of the fact of its preparation for an immediate global or nuclear missile strike on our country by air and space attack means, both conventional and nuclear, as well as an assessment of the compliance of the actions of the Strategic Deterrence Forces with the developing situation.[20]

Belenkov and colleagues push for the development of new analytic tools that harness AI to assess conflict escalation dynamics and potential better.[21] This push for the use of advanced technology to solve pressing military strategic problems is a common theme among Russian military elites and one that is especially prominent at the operational level of war.

Perhaps unsurprisingly, the proposed solution to a rapid NATO surprise attack also remains the same. Nikolai Evmenov, the former commander in chief of the RFN, wrote in 2023 that the key to victory remains

[18] A. G. Semenov, Yu. V. Krinitsky, and V. G. Chekhovsky, "Armed Struggle in the Aerospace Theater of Military Operations [Вооруженная борьба на воздушно-космическом театре военных действий]," *Voennaia Mysl'* 1 (Jan. 2023).

[19] Valentin Dybov, Yuriy Podgornykh, and Maxim Kolodko, "Intelligence Reported: The Analysis Failed [Разведка доложила – анализ подкачал]," *Nezavisimoe Voennoe Obozrenie* 3 (2023), https://nvo.ng.ru/concepts/2023-03-02/1_1226_factor.html.

[20] D. S. Belenkov, A. S. Borisenko, and V. V. Sukhorutchenko, "Current Issues of Automation of Strategic Situation Assessment in Solving Strategic Deterrence Problems [Актуальные вопросы автоматизации оценки стратегической обстановки при решении задач стратегического сдерживани]," *Voennaia Mysl'* 8 (2024).

[21] Belenkov, Borisenko, and Sukhorutchenko, "Current Issues of Automation of Strategic Situation Assessment." The authors are from the 27th Central Research Institute of the Russian Ministry of Defense. The 27th Central Research Institute has traditionally paid considerable attention to the study of strategic deterrence issues. Its research in the 2000s made key contributions to the effort to develop automated strategic assessment systems for officials of the General Staff. This system was put on experimental combat duty in 2009.

"gaining operational initiative at the beginning of a military conflict by preempting the opposing side in making and implementing a decision."[22] These ideas regarding preemption and prevention were built into Russian doctrine well before the start of the war.[23]

The emphasis on decisive action to inflict "unacceptable damage" on the adversary in the Initial Period reflects the notion that punishing the adversary to undermine decision-making and the political will to fight is the key to victory.[24] Korzhevskiy went as far as to quote Gerasimov's aphorism: "In modern warfare, the winner is not the one who out-powers his opponent, but the one who changes his [opponent's] mind."[25] At the time, Korzhevskiy was probably unaware of the extent to which attrition warfare would feature in the Russia-Ukraine war, but the sentiment continues to be expressed by his fellow writers and is currently manifesting in continuous attacks on Ukraine's power grid and civilian infrastructure. These are cost imposition measures designed to convince Ukrainians to end the conflict on terms acceptable to Russia. Moscow's continuing campaign of punishment reflects the notion that its theory of victory in conflict remains largely unchanged.

Conflict typologies and hybrid war

Russian military thinkers have made limited changes to their established ideas since February 2022, and these changes fall within the preexisting strategic interpretive framework noted previously. They generally agree that the Russia-Ukraine war marks a shift in the realization of the theoretical world of Gerasimov's decade-old musings regarding conflict escalation, color revolutions, and hybrid war. Recent events, they argue, are the natural results of the threat that he articulated as early as 2013. For Russian intellectuals, the war's reality has largely substantiated his observations and offered opportunities for their further development.

For example, Colonel L. A. Prudnikov and Lieutenant General A. V. Kuzmenko wrote in *Military Thought* that "in recent years…there [has been] a diversification of the nature and content of military conflicts towards the creation and practical implementation of theories of network, conscious, geophysical, informational, hybrid and other wars." These writers contend that Gerasimov was correct, but they claim that the hard experience of war has shown that he may have *underestimated* the extent of the nonmilitary challenge. The solution, they suggest, "requires scientific substantiation of new approaches to [threat] neutralization through the use of economic, political, informational, spiritual

[22] Nikolai A. Evmenov, "Main Trends of Change: The Nature and Content of the Military Threats to the Russian Federation from Ocean and Sea Directions [Основные тенденции изменения характера и содержания военных угроз Российской Федерации с океанских и морских направлений]," *Voennaia Mysl'* 5 (2023).

[23] "Russian First Deputy Defense Minister Gerasimov: 'Our Response' Is Based on the 'Active Defense Strategy'; 'We Must Act Quickly' to 'Preempt the Enemy…Identify His Vulnerabilities, and Create Threats of Unacceptable Damage to It,'" MEMRI, Mar. 14, 2019, https://www.memri.org/reports/russian-firstdeputy-defense-minister-gerasimov-our-response-based-acve-defense-strategy.

[24] V. A. Kalganov, G. B. Ryzhov, and I. V. Solovyev, "Strategic Deterrence as a Factor in Ensuring National Security of the Russian Federation [Стратегическое сдерживание как фактор обеспечения национальной безопасности Российской Федерации]," *Voennaia Mysl'* 8 (Aug. 31, 2022). Russian military thinkers do not usually employ the term *center of gravity*, but it is adopted here as a shorthand to mean a key adversary characteristic whose destruction is key to defeating the adversary.

[25] Korzhevskiy and Solovyev, "Mental Confrontation and Problems of Forming a Holistic System."

and other nonmilitary measures."[26] For Prudnikov and Kuzmenko, the staggering cost of war may be preempted by more forceful and effective nonmilitary measures, presumably during the Threatening Period or Initial Period.

The Russia-Ukraine war has also spurred greater nuance, new ideas, and potentially important shifts of opinion within the accepted interpretive framework. Major General (Ret.) A. I. Malishev, a senior researcher at the Military Academy of the General Staff, was the lead author of a 2023 article arguing that Russia's military doctrine must be updated to reflect current aspects of international confrontation. In a clear reflection of the Ukraine experience, Malishev et al proposed expanding the conflict typology noted in Table 1. Among other ideas, they proposed adding the variable of "with foreign interference" or "without foreign interference" to the category of internal armed conflict (see Figure 1). The authors also proposed the new category of "armed confrontation on a limited scale," which they defined as military actions, armed incidents, border armed conflicts, and other armed clashes that might occur between full peace and high-end war. By implication, these additional categories would expand escalation possibilities for Russia and its adversaries during the Threatening Period before war.

Furthermore, the concept of hybrid warfare may be expanding. Retired Colonel Aleksandr Bartosh, a prolific and provocative contributor to Russian deterrence debates, has argued for the addition of proxy war (Прокси-война) to traditional Russian conflict typologies and escalation models, and he has attempted to build an escalation model for proxy war itself.[27] These models apply primarily to what Russians perceive the West to be doing to Russia, often citing Western support for Ukraine as a key example of the challenges that Russia now faces. Theoretically, these models could equally apply to what Russia could do to the West, but that has not been the main emphasis in Russian military writings on proxy war, although Russia's use of hybrid measures has been a frequent topic in discussions on future conflicts involving the West. Whether or not proxy war is adopted into accepted escalation modeling, it is almost certainly a future option for achieving Russia's geostrategic goals. Moscow's provision of targeting intelligence to the Houthis in 2024 is likely an outgrowth of this type of thinking.[28] Note that Bartosh himself has called for "retaliatory-counter strikes" against proxy warfare targets in Ukraine and in other countries that support Ukraine.[29]

There is consensus among Russian theorists that direct wars between nuclear powers are unlikely to be limited to conventional conflict. Consequently, they have reached conclusions similar to those drawn by Western thinkers during the Cold War, that proxy wars may serve the purpose of contesting the adversary's strategic military goals without bringing nuclear powers into direct conflict.[30] At first glance,

[26] L. A. Prudnikov and A. V. Kuzmenko, "Application of Non-Military Measures in the Interests of Ensuring Russia's Military Security [Применение невоенных мер в интересах обеспечения военной безопасности России]," *Voennaia Mysl'* 1 (2023), p. 7. At the time he wrote the article, Kuzmenko was on the faculty of the General Staff Academy and would go on to become the head of the "Vostok" group of forces in Ukraine.

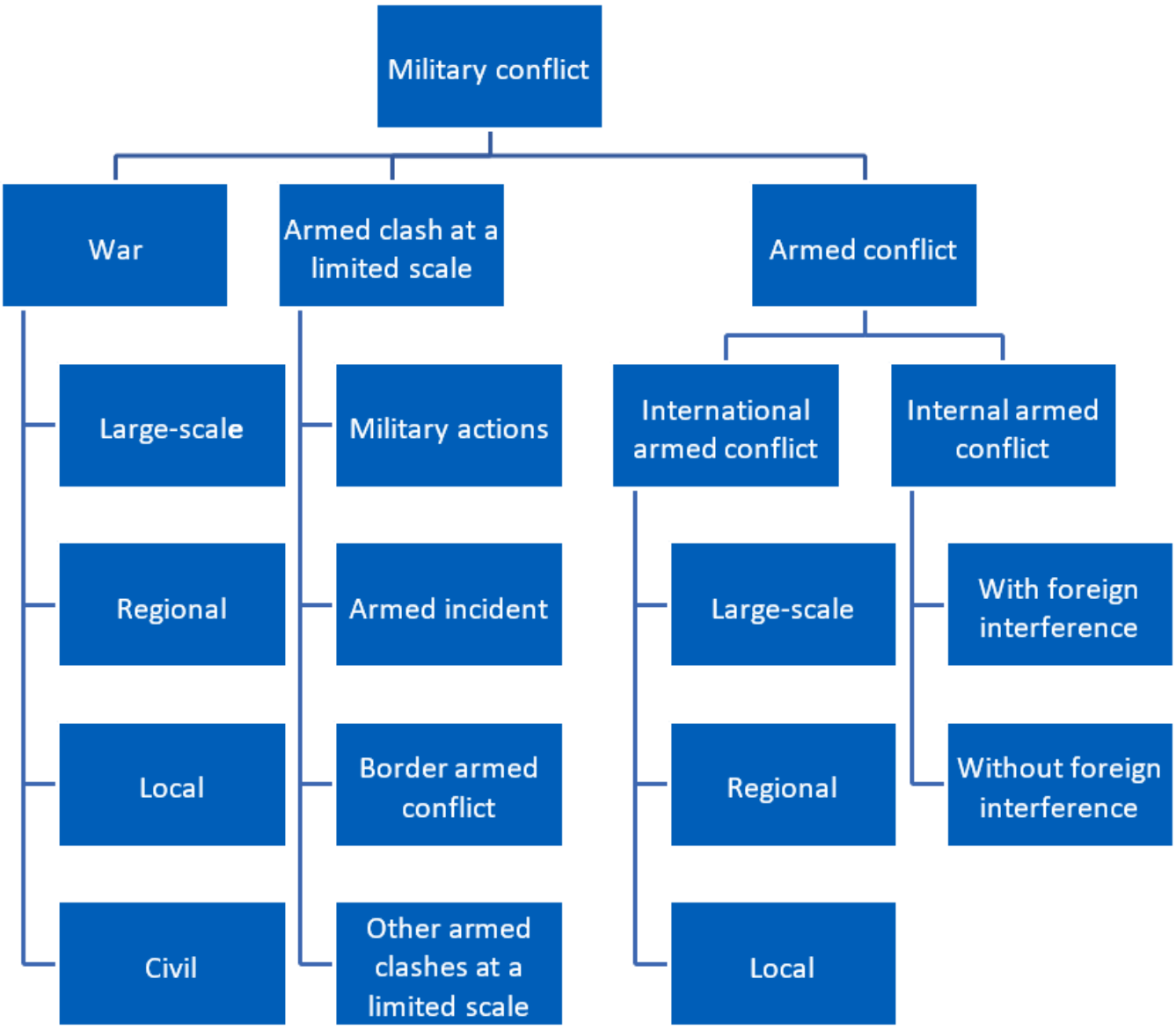
[27] Aleksandr A. Bartosh, "Proxy War as a Determining Factor of Military Conflicts in the XXI Century [Прокси-война как определяющий фактор военных конфликтов XXI века]," *Voennaia Mysl'* 5 (2023); Aleksandr A. Bartosh, "Escalation Models of Modern Military Conflicts [Модели эскалации современных военных конфликтов]," *Voennaia Mysl'* 1 (2024).

[28] Benoit Faucon and Thomas Grove, "Russia Provided Targeting Data for Houthi Assault on Global Shipping," *Wall Street Journal*, Oct. 24, 2024, https://www.wsj.com/world/russia-provided-targeng-data-for-houthi-assault-onglobal-shipping-eabc2c2b.

[29] Aleksandr Bartosh, "Factors of Surprise Yesterday and Today [Фактор внезапности вчера и сегодня]," *Nezavisimoe Voennoe Obozrenie* 2 (2023); Aleksandr Bartosh, "A Punishing Sword in the Hands of Russia [Карающий меч в руках России]," *Nezavisimoe Voennoe Obozrenie* 10 (2023).

[30] Semenov, Krinitsky, and Chekhovsky, "Armed Struggle in the Aerospace Theater."

Figure 1. Depiction of updated Russian conflict typologies



Source: A. I. Malishev, V. N. Marducin, and V. Yu. Khakhalev, "Analysis of the Transformation of the Main Categories of Military Conflictology in Doctrinal Foundations [Анализ трансформации основных категорий военной конфликтологии в доктринальных основах РФ]," *Voennaia Mysl'* (2023).

Russian strategic thinkers may seem to be revisiting lessons from the Cold War, which is partially accurate; however, they also argue that the contemporary difference is that Western leaders have "lost" the fear of nuclear war.[31] Consequently, they argue, Russia must relearn and update key concepts such as proxy war to defend itself while minimizing the chances of nuclear holocaust.

For example, building on Bartosh's work, M. A. Savushkina from the Mikhailovskaya Military Artillery Academy wrote the following in 2024:

> The legitimization of concepts of means and forms of unconventional wars at the legal level is an important step towards the creation of a set of measures to counter proxy war, and most importantly, it will contribute to the creation of a set of mechanisms that will allow Russia to defend from such an aggression….Obviously, Ukraine is not the only proxy-server [sic. "прокси-сервер"] of the West's plans to weaken Russia's might and the destruction of the sociocultural and historical foundations of Russian statehood. [32]

Importantly, Savushkina also argues that proxy war can be used as a preventive (or preemptive) measure against other nations.[33] However, Bartosh's own influence on the Russian General Staff may be limited, and there is not yet consensus regarding the emergence of the proxy war ideas in Russia.

In short, although some Russian military thinkers generally advocate for a revision to Russian doctrinal and planning documents, they do not argue for alterations in the basic assumptions of these documents. There is currently no strong consensus regarding these marginal changes. The discussion of possible alterations to conflict typology is an important and continuing debate in Russian strategic circles and will likely remain so for years. In the meantime, the basics of Russian strategy and doctrine will likely remain largely the same.

Implications

More than three years into the Russia-Ukraine war, there have been no major revisions to Russian strategic thought on the nature of modern war. The failure of the initial invasion, the grinding attrition of trench warfare, and the inability of Russia's strategic strike campaign to break Ukraine's will to fight have not, in Russia's eyes, exposed any fallacies in its prewar theorizing. Most Russian military intellectuals contend that the Russia-Ukraine war validates the concepts that they developed before Russia's full-scale invasion. In their view, nonmilitary aspects of Western hybrid warfare were drawing Ukraine deeper into NATO's orbit and posing a threat to Russian security that required intervention. They consider the war's protraction to be a result of poor planning and execution in the Initial Period and evidence of the importance of success during that period. Finally, they view Western involvement not as an effort to defend Ukraine but rather as a direct engagement in conflict with Russia.

Even though Russia has made tactical innovations during the Russia-Ukraine war, it continues to prepare for war with NATO in much the same way it did before the war. Its theory of victory rests on setting conditions for success in the Threatening Period, deploying rapid and overwhelming force in the Initial Period, imposing costs via strategic defense and long-range strikes, and undermining

[31] Rosa-Hernandez, Fink, and Overfield, *Moscow Does Not Believe in Tears.*

[32] M. A. Savushkina, "Proxy Warfare as a Phenomenon of Digital Society [Прокси-война как феномен цифрового общества]," *Voennaia Mysl'* 1 (2024).

[33] Savushkina, "Proxy Warfare as a Phenomenon of Digital Society."

the adversary's will to fight. There is no discussion of a fundamental doctrinal shift away from these previously established ideas, although these guiding concepts continue to evolve, and Russian intellectuals may yet build on them as debates continue in that strategic community.

The relative stasis of Russian strategic thinking has had a downstream effect on the development of operational concepts. As the following sections demonstrate, Russian intellectuals have not jettisoned their ideas on combined arms warfare, the value of surface naval operations, the criticality of air dominance, or the fundamental war-winning importance of long-range precision strike. Typically, they argue that their prewar operational theorizing—to the extent that it took place—was correct. In their view, the failures the Russian military has experienced during the Russia-Ukraine war were because of poor execution, technology that does not support the demands of modern conflict, or both of these factors.

Combined Arms Operations

Russia's Ground Forces (including the ground forces (the regular army; *Sukhopútnye Voyská),* airborne forces (*Vozdushno-Desantnye Voyska* or VDV), and naval infantry (*Morskaya pekhota*)) have had mixed success during ground operations in Ukraine. Except at the start of the war, they have failed to conduct effective offensive operations, especially combined arms maneuver characterized by rapid breakthrough and exploitation by tanks and motorized infantry supported by artillery. Instead, the Ground Forces have been largely relegated to conducting grinding offensive operations characterized by continuous frontal assaults against fortified Ukrainian positions, with incremental gains but high cost in terms of personnel and equipment. As a result, Russian forces have failed to achieve important strategic or operational objectives, such as the capture of Kyiv or the Donbas.

On the other hand, with some notable exceptions, the Ground Forces have had much greater success in conducting defensive operations, especially during the summer of 2023, when they effectively blunted Ukraine's large-scale counteroffensive in southern Ukraine. In doing so, they capitalized on effective use of fortified defensive positions, obstacles, and minefields and concerted use of artillery, air-launched weapons, and loitering munitions to thwart advancing Ukrainian army units. They also adroitly used mobile reserves to plug gaps in the line during Ukrainian breakthrough attempts.

Yet Russia's inability to engage in effective combined arms maneuver has been one of the most concerning issues for Russian military elites. The reasons for this failure have been the subject of considerable internal debate. Russian observers have tended to attribute the military's poor performance on the ground to emerging conditions in Ukraine that have dramatically constrained both sides' ability to engage in combined arms maneuver.

Many observers agree that Russia's lack of sufficient numerical superiority has contributed to the Ground Forces' inability to break through Ukrainian lines and conduct deep operations.[34] Yet Russian observers have given greater weight to conditions on the ground, including the emergence of ubiquitous battlefield surveillance and the proliferation of both old and new forms of mass and precision fires. These developments have led to the emergence of a "transparent battlefield" in which a broad array of reconnaissance strike assets can continuously detect, track, and target attacking ground forces. Collectively, the rise of these new capabilities has sharply curtailed the effectiveness of offensive ground operations while dramatically increasing the lethality of defensive operations.

Moreover, most Russian observers see these emerging challenges as not specific to the SVO in Ukraine. Instead, in their view, these challenges reflect more fundamental changes in the character of ground warfare based on the growing effectiveness of mass and precision strikes, including artillery, anti-tank guided missiles (ATGMs), UAVs, and electronic warfare, combined with airborne and space-based reconnaissance. According to one group of scholars, evolving conditions on the battlefield have made it "practically impossible to plan and conduct…classical

[34] See, for example, E. Sukalenko, A. Nagorskiy, and S. Dubchenko, "On the Question of Positional Deadlock – Part III [К Вопросу О Позиционном Тупике]," *Armeiskii Sbornik* 9 (2024), p. 191.

combined arms operations…in accordance with [long-standing] principles."[35] Instead, a general equilibrium has emerged based on rough parity in each side's forces, firepower, and technical means of armed combat, resulting in an enduring positional deadlock at the front despite Russia's ability to maintain fire superiority throughout much of the war.[36]

Russian military leaders and scholars continue to grapple with these developments. Most readily acknowledge the immense difficulties involved in restoring combined arms maneuver given emerging conditions on the modern battlefield, which have greatly strengthened defensive operations. Yet Russian military elites are, by and large, adhering to their existing operational concepts and prewar strategy, which emphasize blitzkrieg-style combined arms maneuver as essential for conducting successful ground combat operations. Thus, far from abandoning these concepts, Russian military thinkers are concentrating their efforts on finding solutions for Russia's failures to wage a war of maneuver in Ukraine to allow the restoration of such capabilities in future wars. A consensus approach has yet to emerge.

Russian ground operations in Ukraine

Russian concerns regarding the army's inability to wage effective combined arms operations in future wars have their roots in the Ground Forces' performance during the war in Ukraine. Except during the initial phase of the invasion, Russia's Ground Forces have struggled throughout the conflict to wage an effective war of maneuver. Instead, they have found themselves locked in a protracted war of attrition characterized by grinding offensive operations and defensive set-piece battles leading at best to limited gains, despite having held the initiative since September 2023 following the failure of Ukraine's summer counteroffensive. Although Russian forces are making steady albeit limited gains on the battlefield, they are doing so at great cost in terms of personnel and equipment.

During the first two months of the war, Russian forces were able to make rapid gains on several fronts, especially in southern Ukraine. Yet early Russian successes proved to be an anomaly driven largely by the speed and shock of Russian operations and the multi-axis nature of Russia's offensive. Ukrainian forces were still mobilizing and deploying during this period, leaving gaps in the front that Russian forces were able to exploit.[37] But as the war progressed and Ukrainian forces continued to mobilize, they were gradually able to halt Russia's offensive and stabilize the front. However, by then Russia had succeeded in creating a land bridge linking western Russia to Crimea. By contrast, in northern Ukraine at Kyiv and Sumy, Russian forces were compelled to withdraw, ceding occupied territory back to Ukraine.

Following the initial period of the invasion, Russia reconstituted its forces in eastern Ukraine and launched a fresh offensive intended to seize control of the Donbas. Despite modest gains at various points along the front, Russian forces failed to wage an effective war of maneuver. Instead, they were limited to frontal assaults across a broad front, incurring heavy losses in the process. As a result, Russia's Ground Forces were rapidly depleted, resulting in a further decline in offensive capability. Moreover, Russia's failure to mobilize additional combat troops led to a growing

[35] V. I. Orlyansky, V. P. Gerasimov, and S. N. Rudenko, "Problems of Maneuvering Troops Under Conditions of Use of Modern Intelligence Systems [Проблема маневра войсками в условиях применения противником овременных разведывательных систем]," *Voennaia Mysl'* 7 (2024), p. 37.

[36] E. Sukalenko, A. Nagorskiy, and S. Dubchenko, "On the Question of Positional Deadlock – Part I [К Вопросу О Позиционном Тупике]," *Armeiskii Sbornik* 7 (2024), p. 184.

[37] Michael Kofman, "The Russia-Ukraine War: Military Operations and Battlefield Dynamics," in *War in Ukraine: Conflict, Strategy, and the Return of a Fractured World,* ed. Hal Brands (Johns Hopkins University Press, 2024).

numerical mismatch with Ukraine, which was rapidly mobilizing additional combat personnel throughout this period. At the same time, Russian ground units incurred massive losses in tanks and armored vehicles during the first six months of the war, and their advantages in firepower steadily declined because of growing ammunition shortages and the provision of advanced Western artillery to Ukraine.

Taking advantage of this growing mismatch on the ground, the Ukrainian army launched twin counteroffensives at Kharkiv and Kherson in the late summer and fall of 2022, briefly converting the campaign into a war of maneuver and regaining substantial amounts of previously captured Ukrainian territory. These setbacks finally drove the Kremlin to order a partial mobilization of 300,000 Russian reservists in September 2022, which ultimately allowed Russia's Ground Forces to halt Ukraine's offensive and stabilize the front. At this point, the campaign reverted to a war of attrition.

During the winter of 2023, Russian forces shifted to the offensive once more but were unable to wage a successful campaign of maneuver. Instead, they were caught up in grinding offensive operations around Bakhmut leading to incremental gains, although they eventually succeeded in capturing the city at great cost. By February 2023, the offensive had effectively culminated. Ukraine, having reconstituted its forces, launched its long-anticipated counteroffensive in the south in June 2023. Russian defenses held, however, and Ukraine lost substantial personnel and equipment during the offensive. By September 2023, Ukraine's counteroffensive had run its course.

Following this failed effort, Russian forces once again regained the initiative and have held it ever since. Yet despite having restored fire superiority at the front, Russian forces have struggled to convert their operational advantages into substantial gains on the ground. Instead, Russian and Ukrainian forces have found themselves locked once again in prolonged battles of attrition, wearing each other down, even though the trends have been decidedly in Russia's favor. Nevertheless, both sides have found themselves trapped in a positional struggle bearing a strong resemblance to conditions on the Western front during World War I.

Russia's inability to maneuver

Russia's inability to conduct offensive ground operations and the circumstances that have limited them have been as much of a surprise for most Russian observers as they have been for those in the West. In a recent article published in the prestigious *Journal of the Academy of Military Science,* influential Russian military scholar Vladimir I. Orlyansky noted that it was unexpected to see the reemergence of trench warfare conditions in recent conflicts reminiscent of those that prevailed during World War I.[38] Moreover, this unanticipated development directly contradicts prevailing Russian theories of ground warfare, which historically rely on maintaining high maneuverability of combined arms units. As noted by some Russian scholars, this reversal of expectations is mainly due to the emergence of a transparent battlefield combined with qualitatively new means of destruction intended to counter maneuver forces, which have led to the stalemate on the battlefield.[39]

Conditions in Ukraine have also led some observers to call into question recent theoretical writings in Russian military journals regarding the emergence of new forms of ground warfare characterized by mobile dispersed forces, the absence of continuous fronts, high maneuverability, deep penetrations

[38] Vladimir I. Orlyansky, "Integrated Combat System: The Highest Form of Troop Organization [Интегрированная Боевая Система – Высшая Форма Организации Войск]," *Vestnik Akademii Voennykh Nauk* 3 (2024), p. 40.

[39] Orlyansky, "Integrated Combat System," p. 41; Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," p. 37.

by small, detached units, open flanks, bypassing of strongholds, and rapid encirclements. Yet, as Orlyansky has noted, such predictions have not held up in Ukraine because nothing approaching these conditions has been seen on the ground.[40]

Although Russian observers agree that conditions in Ukraine have prevented both sides from conducting effective combined arms maneuver, they do not necessarily agree on what Russian forces should do to restore maneuverability in future wars. Proposed solutions include increasing the force size, countering the defender's airborne and space-based ISR, and using overwhelming fire superiority to suppress the defender's artillery and other strike assets at the point of attack. Russian military elites have also proposed other measures to help prevent deadlock at the front in future conflicts, including changes in unit organization, enhanced command and control (C2), and use of airborne forces to bypass enemy defenses at the front. No clear consensus has yet emerged on what should be done.

Causes of the positional deadlock

The transparent battlefield

As noted previously, many Russian military elites view the Ground Forces' inability to maneuver in Ukraine as mainly due to a combination of persistent and ubiquitous ISR alongside the growing destructiveness of mass and precision fires. According to this view, the proliferation of space-based, airborne, and ground-based ISR platforms has led to the emergence of a transparent battlefield in which it is increasingly difficult for combined arms units to maneuver, concentrate for offensive ground operations, and conduct attacks without being quickly detected, tracked, and targeted by the other side.[41]

Combined with the proliferation of both new and existing forms of kinetic attack, the resulting reconnaissance strike networks available to the defender have made it possible to defeat typical ground targets on the battlefield in near-real-time conditions.[42] As one group of Russian military scholars has noted, the experience of using tanks in recent operations has demonstrated their high vulnerability in transparent battlefield conditions to numerous and varied means of destruction by the enemy, including mines, artillery, ATGMs, and UAV strikes. As a result, long-standing belief in the ability of tank formations to serve as the main striking component of combined arms operations has been seriously shaken by events in Ukraine.[43]

In one leading study, a group of influential Russian military scholars went into considerable detail on the problems likely to face Russian maneuver forces in future wars because of the persistent, layered ISR capabilities available to today's militaries.[44] As an example, they cited Ukraine's access to an unprecedented level of Western space-based reconnaissance support from more than 50 military and 300 commercial satellites. These assets have been able to provide near-continuous coverage of the battlespace, supplying Ukraine with a broad array of data on the location and composition of

[40] Orlyansky, "Integrated Combat System," p. 40.

[41] Orlyansky, "Integrated Combat System," p. 41; Farida Kurbangaleeva, "Could Ukraine Launch a New Counteroffensive? [Может Ли Украина Пойти На Новое Контрнаступление?]," *Republic (Slon),* Dec. 14, 2023.

[42] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," pp. 37–38.

[43] A. D. Gavrilov et al., "Two Years of a Special Military Operation: Preliminary Results and Potential Prospects [Два Года Специальной Военной Операции: Некоторые Итоги, Вероятные Перспективы]," *Vestnik Akademii Voennykh Nauk 87* (2024), p. 58; Vasily Mikhailovich Burenok, "On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation [О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции]," *Vooruzhenie i Ekonomika* 2 (2024), p. 6.

[44] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," p. 37.

Russian combined arms formations. Satellite ISR constellations are expected to increase even more rapidly in coming years. Moreover, space-based communications networks such as Starlink provide new means for the rapid distribution of satellite ISR data to forces on the ground. In Ukraine, data distributed by Starlink have reportedly been sufficient to support near-real-time kinetic strikes against Russian ground targets across the battlespace.[45]

The same article further contended that space-based surveillance is being supplemented by a wide range of airborne ISR platforms. In Ukraine these include a variety of sophisticated Western platforms, such as US RC-135 Rivet Joint aircraft operating along Ukraine's border. Such platforms have been used to collect substantial amounts of data continuously on Russian ground formations at distances of 300 kilometers or more inside Ukrainian (including Russian-controlled) territory. Western countries are investing heavily to expand their airborne ISR capabilities further in preparation for future conflicts.[46]

Going forward, Russian forces must also deal with the special challenges posed by UAVs, which can continuously collect and transmit data on Russian combined arms formations. Used in mass numbers, UAVs have now become a key source of real-time intelligence for Ukraine's armed forces, sharply reducing Russia's ability to concentrate forces, move to assembly points, and engage in active combat operations.[47] Moreover, most Russian military elites expect that ISR UAVs will play an even greater role in countering offensive ground force operations in future conflicts as the scale, speed, functionality, sophistication, autonomy, and intelligence of ISR UAVs continue to expand.[48]

Mass and precision strikes

The presence of ubiquitous ISR is only part of the story. Another part is the increasing integration of ISR into reconnaissance strike networks based on mass and precision strike weapons. Russian military elites emphasize that the proliferation of ISR and strike assets is responsible for effectively undermining combined arms maneuver. If reconnaissance strike networks are not effectively countered, their growing presence could further reinforce the trends toward positional deadlock at the front during future conflicts.

Veteran military scholars writing in *Armeiskii Sbornik,* one of Russia's leading publications on army operations, argued that the inability to suppress the enemy's firepower is the factor most responsible in modern wars for preventing the attacker from concentrating its forces, achieving surprise, and conducting breakthrough operations.[49] Thus, drawing on lessons from the Soviet era, the inability of either side to gain a sufficient advantage in fire superiority to suppress the other side's artillery and strike assets is what most accounts for the emergence of a positional deadlock.[50]

Russian observers note that the gradual evolution of precision weapons from remotely operated air-to-surface weapons and UAVs to ATGMs and precision artillery has given defenders an unprecedented ability to destroy the attackers' tanks and armored vehicles rapidly whenever they attempt to operate in the

[45] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," pp. 37–42.
[46] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," pp. 42–43.
[47] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," pp. 43–44.
[48] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions, p. 45.
[49] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part I," p. 184.
[50] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part I," p. 184.

open.[51] Moreover, unguided artillery has also acquired a high degree of precision because of widespread use of automated fire control systems and ISR UAVs, which are used to adjust fire.[52] Consequently, given roughly equivalent forces, when the defender's ground forces are sufficiently supported by artillery, there is virtually no option for the attacker to engage in effective combined arms maneuver.[53]

Thus, a broadly shared view has emerged among Russian military elites that the destructive power of precision strike weapons and the rise of ubiquitous ISR have now fundamentally altered the balance between offensive and defensive ground forces in favor of the defensive. Moreover, achieving the element of surprise has become hugely problematic.[54] Therefore, any attempt to break through the adversary's lines under prevailing conditions will likely result in the attacker being "leveled by fire strikes and the introduction of reserves," resulting in major losses of the attacker's equipment and personnel.[55]

Proposals for restoring the ability to maneuver

Russian military elites have proposed several potential solutions for restoring the army's ability to maneuver. These include achieving overwhelming superiority in personnel and equipment, countering enemy ISR, and suppressing enemy strike capabilities. Leaders have also proposed various complementary measures to improve combined arms operations, including enhancing airborne operations and improving C2 and force structure. Despite the formidable challenges involved in overcoming the emerging problems facing the Ground Forces both in Ukraine and in future wars, there are few signs that Russia is abandoning combined arms maneuver (versus, for example, an attrition strategy) as a central tenet of Russian military strategy. Instead, Russia appears to be doubling down on combined arms maneuver, as demonstrated by the many proposals offered by Russian military scholars to overcome current constraints.

Increased force size

Some Russian military scholars have argued that Russia's Ground Forces in Ukraine are too small and therefore insufficient to conduct effective combined arms maneuver. For example, in a seminal article discussing the persistent deadlock at the front, a 2024 article in *Armeiskii Sbornik* attributed the positional stalemate to Russian leadership's "strategy of exhausting the enemy using extremely limited forces without adopting the most effective means of armed struggle at its disposal."[56] Another article coauthored by Lieutenant General A. D. Gavrilov from the Mozhaisky Military Space Academy blamed the situation on prior military reforms, which led to a smaller ground force while essentially hollowing out the force.[57]

[51] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," pp. 188–189. This view is shared generally by many other Russian military leaders. According to another source, for example, "Over the past few decades, the capabilities for massive impact on the enemy with the help of high-precision weapons (HPW) of varying ranges have increased significantly." See Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions," p. 47.

[52] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," p. 191.

[53] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," pp. 188–189.

[54] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part I," p. 184; Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," p. 191.

[55] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," pp. 188, 191.

[56] E. Sukalenko, A. Nagorskiy, and S. Dubchenko, "On the Question of Positional Deadlock – Part III [К Вопросу О Позиционном Тупике]," *Armeiskii Sbornik* 9 (2024), p. 191.

[57] Gavrilov et al., "Two Years of a Special Military Operation," p. 56.

In response, some Russian military scholars have argued that a substantial increase in force size is needed to avoid positional deadlock at the front and restore the army's ability to maneuver in future wars. For example, looking back to the beginning of the Ukraine invasion, Gavrilov et al recently argued that "a large-scale frontal offensive operation involving three or four combined arms (tank) armies with the support of aviation and naval forces would have led to a more rapid (and undoubtedly successful) achievement of the goals of the special military operation and the end of hostilities."[58] These authors clearly view achieving overwhelming numerical superiority as a key prerequisite for effective combined arms maneuver in future wars. Other Russian experts have also argued for an increase in force size to restore the army's ability to maneuver. According to another recent article, achieving a crushing victory in future wars will require both serious efforts to adapt to new combat conditions and an inevitable increase in the size of the Ground Forces, especially artillery units.[59] There is little evidence, however, that these authors are advocating for Russia to achieve overall superiority in the correlation of forces against the West during a future conflict with NATO, a feat that is likely out of reach for Russia. These recommendations appear to be geared more to achieving numerical superiority at the designated point of attack during the Initial Period of War.

Counter-ISR

To address the challenge of ubiquitous surveillance, some Russian military elites are arguing for comprehensive measures to suppress the defender's ISR capabilities as a means to restore the army's ability to maneuver in future wars. According to one leading article, the aim of such operations should be to "maximally reduce the effectiveness" of the defender's ISR capabilities using a combination of both active and passive measures.[60] Given the proliferation of space-based, airborne, and ground-based sensors employed in Ukraine, Russian experts acknowledge the sheer magnitude of the task while recognizing the need for new capabilities, forms, and methods to reverse the growing battlefield transparency in future conflicts.

To this end, some Russian military elites are advocating for enhanced counterspace operations designed to blind, disrupt, and, if necessary, destroy enemy reconnaissance and communications satellites. These operations could be achieved in part through use of direct-ascent anti-satellite (ASAT) weapons, such as the A-35 ballistic missile defense system used to defend Moscow as well as orbital vehicles and other space-based ASAT weapons. Such measures could be supplemented by directed energy weapons, such as the Peresvet high-energy laser, to dazzle electro-optical or infrared sensors. Russian experts acknowledge, however, that effective counterspace operations will also require new forms and methods of kinetic, electronic, and optical-electronic suppression of enemy space communications and weapons control systems that have yet to be developed. In the interim, some Russian elites have advocated for the use of nuclear weapons against adversary satellite constellations under appropriate conditions.[61]

[58] Gavrilov et al., "Two Years of a Special Military Operation," p. 58.

[59] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," p. 192. In making such arguments, Russian military elites do not explain how Russia might equip an expanded force with sufficient tanks and ground combat systems to support such large-scale combined arms operations.

[60] V. I. Orlyansky, A. A. Gerasimov, and E. V. Bitner, "Problems of Maneuvering Troops Under Conditions of Use of Modern Intelligence Systems [Проблема маневра войсками в условиях применения противником овременных разведывательных систем]," *Voennaia Mysl'* 8 (2024), pp. 19–20.

[61] Orlyansky, Gerasimov, and Bitner, "Problems of Maneuvering Troops Under Conditions of Use," pp. 19–20.

Countering the defender's crewed and uncrewed airborne ISR platforms is deemed to be as important as restoring battlefield maneuver in future conflicts. For targeting crewed ISR aircraft and ISR UAVs of comparable dimensions (e.g., Switchblade, TB-2 Bayraktar), some have argued that the military should rely on improved versions of Russia's traditional air defense systems, such as the Pantsir and S-400. They acknowledge, however, that countering smaller multi-rotor ISR UAVs will be a far greater challenge in future conflicts because of their growing capabilities, their mass employment, and the relative ineffectiveness of traditional air defenses.[62]

To counter this threat, one recent article highlighted the advantages of small-caliber guns (ranging from 23 to 57 mm shells) to combat small multi-rotor UAVs. As the article noted, the advantage of small-caliber weapons over larger counterparts is the large quantities of low-cost ammunition that can be made available to bring down UAVs while avoiding depletion of advanced air defense weapons (see Figure 2).[63] Others have argued that countering smaller ISR UAVs will require developing more advanced electronic warfare and new kinds of kinetic weapons (e.g., artillery, loitering munitions) to target the defender's UAV forces.

Figure 2. ZAK-23E counter-UAV anti-aircraft system mounted on BTR-82

Source: "Smart Small Calibers in the New Paradigm of War."

[62] Orlyansky, Gerasimov, and Bitner, "Problems of Maneuvering Troops Under Conditions of Use," pp. 20–22.

[63] "Smart Small Calibers in the New Paradigm of War [Умные малые калибры в новой парадигме войны]," *Arsenal Otechestva,* Dec. 31, 2024.

New weapons and tactics must also be developed to counter ISR UAVs before launch by targeting enemy drone forces (i.e., shooting the archer rather than the arrow). Recent battlefield successes in Ukraine in striking Starlink ground stations were cited as a useful precedent. For combined arms maneuver, some advocated that it is necessary to mount counter-UAV systems on tanks and armored vehicles to provide greater force protection as they advance. The Saniya first-person view drone suppression system currently mounted on Russian tanks in Ukraine was cited as an example. Ultimately, however, Russian elites view directed energy weapons, including radio frequency weapons and high-energy lasers, which can achieve kinetic effects, as the key to combating smaller ISR UAVs in future wars, especially multi-rotor drones. According to this view, directed energy weapons have the potential to clear smaller ISR UAVs from the skies altogether.[64]

In addition to directly countering ISR platforms, some Russian military experts have advocated for enhanced use of electronic warfare capabilities to disrupt and paralyze enemy C2 systems and battlefield networks to disrupt effective use of ISR. Electronic warfare can assist not only in countering the technical means of control of enemy reconnaissance strike networks but also in protecting Russian command, control, computing, communications, cyber, intelligence, surveillance, reconnaissance, and targeting (C5ISRT) capabilities, creating conditions for effective use of Russian military formations.[65] In this respect, electronic warfare offers certain advantages over kinetic strike weapons because electronic warfare systems have a theoretically greater strike capacity subject to available power supply than artillery, which depends on ammunition resupply. Hence, according to this view, the role of electronic warfare systems in counter-C5ISRT operations is expected to grow rapidly as a percentage of total strike operations in future wars.[66]

Some Russian military experts have argued for increased use of passive measures such as camouflage and decoys as a complementary means to help offset the challenges of ubiquitous surveillance in future conflicts. A recent article went into detail on this topic, proposing a wide range of measures to camouflage Russian ground units, including disguising Russian tanks, armored vehicles, artillery, C2 nodes, and other fixed field positions (see Figure 3). The authors also proposed the use of decoys to deceive enemy ISR and draw enemy fires to help deplete ammunition. They further advocated for large-scale use of camouflage and decoys to support mobile weapons platforms during future combined arms offensives. They assume that this approach will provide greater force protection for mobile formations while disguising concentrations and restoring the element of surprise. The authors acknowledged, however, that adopting passive measures will require a major change in strategic culture among Russian military leaders, who are often disdainful of such measures, as reflected in the low levels of training and organization regarding their use. Rectifying these deficiencies will require continuous creative work by Russian command and staff forces.[67]

[64] Orlyansky, Gerasimov, and Bitner, "Problems of Maneuvering Troops Under Conditions of Use," pp. 21–22.

[65] Russian military leaders continue to view electronic warfare as an area of comparative advantage for their armed forces. This view is in part a legacy of the Soviet era, during which Russian military leaders invested heavily to develop capabilities and concepts for waging "radio-electronic battle" against NATO forces.

[66] Y. E. Donskov et al., "Systems Engineering Aspects of Raising the Status of Electronic Warfare Troops [Системно-технические аспекты повышения статуса войск радиоэлектронной борьбы]," *Voennaia Mysl'* 11 (2024), p. 31.

[67] Orlyansky, Gerasimov, and Bitner, "Problems of Maneuvering Troops Under Conditions of Use," pp. 22–31.

Figure 3. New methods of camouflage for tanks and armored vehicles

Source: Orlyansky, Gerasimov, and Bitner, "Problems of Maneuvering Troops Under Conditions of Use," p. 26.

Firepower suppression

Other Russian military scholars are advocating for concentrated use of artillery and reconnaissance strike to suppress enemy fires as an alternative (or complementary) means of restoring the army's ability to maneuver in future wars. According to this approach, achieving overwhelming fire superiority at the point of attack to suppress the enemy's firepower, destroy its frontline forces, and enable concentrated attack is the key to reestablishing combined arms maneuver. Suppressing the defender's firepower will in turn pave the way for Russian tank and motorized infantry formations to concentrate their forces, advance to the front, and conduct successful breakthrough operations with limited losses of personnel and equipment. Russian long-range artillery strikes are also necessary to support armored offensives into the enemy's rear areas while preventing the enemy from bringing up reserves to seal the breach.[68]

Harkening back to the Soviet era, one such article hinted that carrying out effective combined arms attacks might require the re-creation of a mass artillery force capable of providing concentrated artillery preparation of the battlefield and sustained supporting fires to destroy enemy strongpoints and fortifications. The authors stated the following:

[68] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part I," p. 184.

> [Having suppressed the defender's main fires, Russian] tanks and armored vehicles are capable of quickly leading infantry through a battlefield stuffed with machine guns without catastrophic losses….This in turn allows the artillery to concentrate its efforts on counter-battery combat and support [breakthrough operations] with a barrage of fire, [to] sharply accelerate their rate of advance.[69]

According to another report, such tactics must be further adjusted to account for the proliferation of new forms of defensive fire support, including ATGMs, UAVs, and precision artillery. As one potential option, the authors discussed returning to the Soviet-era concept of creating a "mobile fire zone," which entails maintaining a deep and continuing curtain of fire ahead of advancing battle formations during breakthrough operations. They claim that this approach would be effective in suppressing both ATGM units at the point of attack and battlefield drones.[70]

Another article promoted a return to Soviet-scale operations involving use of mass firepower far in excess of that being used in Ukraine "to suppress all living things in the direction of the offensive" as a means to pave the way for a victorious advance in future wars (see Figure 4).[71] Yet the authors recognized that creating a mass artillery force capable of carrying out such operations would be an enormous undertaking given the sheer scale of Soviet artillery forces and shell production. Mass artillery would also need to be supported by fundamentally new means of reconnaissance and the ability to strike dispersed enemy firing positions, using drones and loitering munitions, for example, as well as greater reliance on precision artillery comparable in accuracy and range with the most advanced Western models.[72]

Airborne operations and other measures

Russian military leaders have also advocated for complementary measures to restore the army's ability to maneuver. In this regard, a major recurring theme is the potential use of airborne forces (VDV) to help break the positional deadlock. For example, recent articles have focused on using VDV to complement Russian ground forces by bypassing enemy fortifications through air mobile operations or troop landings behind the enemy's frontline positions.[73]

Recognizing that VDV cannot break the positional deadlock on its own, Russian military leaders tend to view VDV assaults as a complementary means of supporting ground force operations.[74] As noted in one recent article, although airborne assault remains an important element of modern operations, currently VDV can only contribute to the accomplishment of a combat mission by the main elements of the ground forces concentrated at the

[69] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part I," pp. 187–189.

[70] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," pp. 189, 192.

[71] Gavrilov et al., "Two Years of a Special Military Operation," p. 58.

[72] Sukalenko, Nagorskiy, and Dubchenko, "On the Question of Positional Deadlock – Part III," pp. 189–192.

[73] N. G. Mikhailov and A. V. Savitsky, "Development of Military Art and Possible Ways of Further Improvement [Развитие военного искусства и возможные пути его дальнейшего совершенствования]," *Voennaia Mysl'* 2 (2023), p. 34; Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions of Use," p. 48.

[74] Although such notions may seem strange to a Western audience, it is important to recognize the central role of VDV in Russia's armed forces and its concept of operations, which has long envisioned using airborne operations to seize and hold key objectives in enemy territory, dislocate the enemy's C2 and logistics, and support a ground force breakthrough at the front indirectly. Such views also reflect the substantial investments made by Russian leadership to maintain the VDV as an independent service branch and as an elite combat force with some of Russia's best trained and most competent soldiers.

Figure 4. Russian multiple launch rocket system in action

Source: I. Ilyinskaya, "We Are Russians—God Is with Us [мы - русские! С нами бог!]," *Armeiskii Sborni*k 12 (2023), p. 64.

front.[75] They can contribute by disrupting enemy C2 and logistics operations while threatening the enemy's frontline forces by attacking them from the rear. Inserted VDV can also assist in the destruction of enemy force groupings while reducing fixed targets with support from long-range artillery fire and missile strikes.[76] Finally, VDV can set up defensive positions to protect the flanks of the main body of advancing troops while preventing enemy reserves from converging on the point of attack. Although there are a surprising number of articles on using VDV operations to restore maneuverability, Russian military experts concede the difficulties of conducting airborne operations in the face of powerful enemy air defenses such as those prevailing in Ukraine.[77]

[75] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions of Use," p. 48.

[76] V. A. Shamanov, V. V. Kulakov, and O. Y. Kashrina, "Directions for Improving Combat Use of the Armed Forces of the Russian Federation to Ensuring the Performance of Combat Missions of a Special Military Operation [Направления Совершенствования Боевого Применения Вооруженных Сил Российской Федерации По Обеспечению Выполнения Боевых Задач В Ходе Специальной Военной Операции]," *Izvestiia Rossiiskoi Akademii Raketnykh i Artilleriiskikh Nauk* (Feb. 2023), pp. 23–24.

[77] Orlyansky, Gerasimov, and Rudenko, "Problems of Maneuvering Troops Under Conditions of Use," p. 48; Shamanov, Kulakov, and Kashrina, "Directions for Improving Combat Use," p. 24.

Russian military experts have also discussed measures to improve C2 and the organization of ground force military formations as indirect means of helping to restore maneuverability on the battlefield in future wars. According to experts at the Military Institute of the General Staff, existing C2 is unable to keep up with the growing speed and complexity of combined arms operations because of the proliferation of new weapon systems and new forms and methods of using them in modern conflicts. C2's inability to keep pace, they contend, has been demonstrated in the SVO, in which lack of suitable C2 has made it difficult to coordinate the sequenced tactical actions involving a wide range of both traditional and new combat systems (e.g., UAVs, electronic warfare) effectively to break through enemy defensive positions. Addressing this problem will require creating a fully automated and unified C2 center.[78]

Similarly, some Russian military experts have argued for new kinds of combined arms formations based on a modular approach to match capabilities to mission better in future wars. For example, in a recent article in *Military Thought,* two Russian experts argued for new kinds of modular motorized rifle formations in which various combat support units (e.g., artillery, air defense) could be attached to a standard formation to carry out whatever missions are required at the time. This approach would represent a marked improvement over existing "static" formations, which the article held are not properly optimized for the full range of modern combat missions.[79]

Battalion tactical groups have proven to be too small and difficult to coordinate in modern battlefield conditions.[80] Such failings have contributed significantly to Russia's inability to maneuver in Ukraine because existing combat units were unprepared to respond to the full range of combat missions that they were required to carry out. Such innovations are necessary to address the evolving challenges that Russian forces will face on the modern battlefield in future wars.[81]

Waging wars of attrition

Although the writings of Russian military experts have concentrated primarily on restoring the army's ability to maneuver, as noted earlier, Russia's military leadership has focused instead on adapting to the realities in Ukraine by shifting to a strategy of attrition. Given the challenges that Russia's Ground Forces have encountered in Ukraine, including ubiquitous surveillance and mass firepower, this focus raises questions about whether Russian military leaders are preparing to adopt an attrition strategy for future wars, perhaps as a hedge against a failure to restore the Ground Forces' ability to maneuver. Yet very little information is available on this topic in Russian military journals, in part because Russian military elites have tended to focus more on novel operational concepts and tactical innovations than on fighting bloody and unglamorous wars of attrition.

Still, Russian military experts have occasionally addressed this topic indirectly, for example by writing on Russia's long-term plans to increase the force size, conduct more effective defensive operations, and improve small unit assault tactics. Consequently, in assessing how Russia's military leadership may

[78] S. I. Muzyakov and V. A. Ulitsky, "Troop Control: History of Development, Current Problems and Possible Ways to Solve Them [Управление Войсками: История Развития, Актуальные Проблемы И Возможные Пути Их Решения]," *Vestnik Akademii Voennykh Nauk* 4 (2024), p. 176.

[79] A. A. Pluzhnikov and O. B. Usachev, "Modern Requirements of Combined Arms Formations at the Tactical Level [Современные требования к общевойсковым формированиям тактического звена]," *Voennaia Mysl'* 5 (2022), pp. 79–80.

[80] Pluzhnikov and Usachev, "Modern Requirements of Combined Arms Formations."

[81] Pluzhnikov and Usachev, "Modern Requirements of Combined Arms Formations."

be thinking about a shift to a longer term attrition strategy, this section has had to rely more heavily on Russian military leaders' actions in Ukraine—as opposed to the writings of Russian military elites—to draw appropriate conclusions. To the extent available, however, such writings have been used to supplement the analysis.

The shift to an attrition strategy

In the fall of 2022, after Ukraine had launched successful counteroffensives at Kharkiv and Kherson, the Kremlin finally acknowledged the need to modify its approach to the war to halt further Ukrainian advances on the ground. The Kremlin first ordered a partial mobilization of 300,000 additional combat troops to shore up Russian combat forces in Ukraine. Moreover, in the face of repeated Russian failures to achieve breakthroughs in the Donbas region, including notable reverses at Bakhmut and Vulhedar, Russian forces gradually shifted to a strategy of attrition. Other factors also likely played into Moscow's decision, including systemic challenges in further increasing the force size, extensive losses of Russian tanks and armored vehicles, and the failure to achieve air superiority.

As one Russian observer recently noted, the main purpose of Russia's attrition strategy is not to cut the fronts and encircle and defeat the majority of the Ukrainian armed forces but rather to grind them down, maximize the destruction of Ukraine's weapons and ammunition, and keep Russian losses to a sustainable level. Once Ukrainian forces were sufficiently exhausted, conditions would develop to bring the war to a successful conclusion.[82] Moreover, as others have noted, a war of attrition favors Russia because it holds numerical advantages over Ukraine in both personnel and equipment.[83] Having adopted an attrition strategy, Russian forces have been able to conduct successful defensive operations and, more recently, continuous although costly offensive operations designed to wear down Ukrainian forces.

Doubling down on attrition?

Russia's shift to an attrition strategy during the war in Ukraine raises questions about whether Russian military leaders are preparing to adopt an attrition strategy for future wars. Notwithstanding the many proposals made by Russian military elites to restore the army's ability to maneuver (as highlighted in the previous section), achieving this objective is hardly a given considering the enormous challenges involved in suppressing a growing array of ISR systems and reconnaissance strike assets expected in future wars. Thus, it would be logical for Russian military leaders to consider alternative options in preparing for future wars, including a longer term strategy of attrition. At a minimum, such a strategy could serve as a hedge against the army's failure to restore its ability to maneuver.

Whether Russia's military leaders are considering a longer term attrition strategy, one extending beyond the conflict in Ukraine, is not yet clear, however. Much will depend on whether Russian military leaders judge that conditions in Ukraine reflect more fundamental changes in the character of ground warfare. At a deeper level, the question boils down to whether they regard the power balance on the battlefield as having shifted to the defensive side of the ledger. Thus far, very little has been written on this topic in Russian military journals. One recent

[82] Yaroslav Vyatkin, "Military-Political Forecast for 2024 [Военно-Политический Прогноз На 2024 Год]," *Argumenty Nedeli,* Jan. 10, 2024.

[83] Alexandr Golts, *Strategic Deadlock: Causes, Consequences, and Possible Ways Out, Stockholm Centre for Eastern European Studies,* Feb. 26, 2024, p. 2, https://sceeus.se/en/publications/strategic-deadlock-causes-consequences-and-possible-ways-out/.

article noted, however, that there is little evidence that current conditions on the battlefield are likely to change anytime soon.[84]

Yet there are some indications that Russia may be preparing for protracted conflicts over the longer term. For one, Russian leaders have already taken measures to place the country on a more sustainable war footing, including adopting a covert mobilization strategy centered on paying high salaries and benefits to attract a steady stream of fresh recruits for the battlefield.[85] Russia might maintain this approach during the postwar period, given its plans to increase the number of contract soldiers to 695,000 in total after the war.[86] At the same time, Russia has made great strides in ramping up defense production, including a major increase in production of artillery ammunition, which, together with North Korean imports, has enabled Russian forces to regain fire superiority in Ukraine, a key requirement in future wars of attrition.[87] The Russian defense industry has also expanded the number of tank refurbishment centers to allow Russian forces to continue drawing on their substantial reserves of tanks in storage.[88] Russia has also succeeded in radically increasing the production of UAVs and electronic warfare systems, which have proven critical for sustaining Russia's attrition strategy in Ukraine.[89] Collectively, these measures have allowed Russian forces to maintain continuous pressure on Ukraine while inflicting enormous damage on Ukrainian forces.[90]

In addition, Russia's Defense Ministry previously announced long-term plans to increase the size of the armed forces from a reported 900,000 total troops at the start of the war in 2022 to 1.5 million troops in total, which includes a substantial increase in the size of the Ground Forces.[91] The Ministry of Defense also announced plans to convert several brigades back to divisions and to form new divisions. According to Alexander Khramchikhin, deputy director at Russia's Institute for Political and Military Analysis, the latter move indicates a need to fight a larger war and presumably one with a long continuous front. Moreover, he noted that Russia plans to create five new artillery divisions and eight army aviation brigades but only three motorized rifle divisions and not a single new tank division—a sign of greater reliance on artillery, which would support a potential shift to positional warfare. Although an expanded force would also need to be fully equipped, Khramchikhin asserted that equipping an expanded force is more feasible now that the Kremlin has placed the defense industry on a sustained war footing.[92]

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[84] Gavrilov et al., "Two Years of a Special Military Operation," p. 62.

[85] Paul Schwartz and Dmitry Gorenburg, *Russian Military Mobilization During the Ukraine War,* CNA, DRM-2024-U-037996-Rev1, Oct. 2024.

[86] "Russian Military Announces Plan to Expand, Create New Units," AP News, Dec. 21, 2022, https://apnews.com/article/putin-finland-sergei-shoigu-ee953abf7f9bf217ccdaa61ec1b35ddd.

[87] Gavrilov et al., "Two Years of a Special Military Operation," p. 64; Yaroslav Vyatkin, "Russia Wins War of Attrition, but May Change Strategy [Россия Выигрывает Войну На Истощение, Но Может Изменить Стратегию]," *Argumenty Nedeli,* July 17, 2024. Maintaining fire superiority would also be necessary for other kinds of operations, including combined arms maneuver, so the fact that Russia has been pursuing this objective is not necessarily dispositive on whether Russia is shifting to a strategy of attrition.

[88] Golts, *Strategic Deadlock,* p. 5.

[89] Vyatkin, "Russia Wins War of Attrition;" Gavrilov et al., "Two Years of a Special Military Operation," pp. 59–60, 64; Pavel Denisov, "Production of Electronic Warfare Equipment Will Increase Several Times Over [Производство Средств Рэб Возрастет Кратно]," *Na Strazhe Rodiny,* Apr. 21, 2023.

[90] Vyatkin, "Russia Wins War of Attrition."

[91] International Institute for Strategic Studies, "Russia and Eurasia," in *The Military Balance* (Routledge, 2022), p. 193; "Expanded Meeting of Defense Ministry Board," Kremlin, Dec. 19, 2023, http://en.kremlin.ru/events/president/news/page/63.

[92] Alexander Khramchikhin, "Moscow Plans to Carry Out Military Reforms [Москва задумала провести военную реформу]," *Nezavisimoe Voennoe Obozrenie,* Jan. 20, 2023.

Moreover, Russia's Ground Forces have adopted measures to pursue a more effective positional defense strategy, as would be needed in future wars of attrition. In the summer of 2023, Russian forces shifted to a defensive posture to counter Ukraine's planned summer counteroffensive. In preparation, Russian military elites published several articles on waging an effective positional defense. For example, in 2023, former Russian Lieutenant General N. G. Mikhailov coauthored an influential article noting how Russia's use of positional defenses with multiple echelons had made it possible to defeat the German offensive at Kursk.[93] In a similar article, military experts at the Zhukov Military Academy, led by Colonel General A. V. Romanchuk, also recommended a positional defense for countering a high-tech numerically superior adversary, with Ukraine clearly in mind.[94]

According to this article, the keys to such operations include carefully prepared fortifications backed by a defense in depth and adroit use of minefields and artillery. A positional defense must be further supported by an active defense strategy with mobile reserves in the second echelon to counter enemy breakthrough attempts using short, sharp counterattacks. These would be supported by strikes from UAVs, ATGMs, artillery, rotary-wing aircraft, loitering munitions, and sabotage operations in the enemy's rear areas. The role of air defense was also cited as critical to such operations, preventing the attacker from providing close air support for breakthrough operations. In the summer of 2023, Russian defensive operations closely following this prescription proved decisive in blunting Ukraine's counteroffensive, inflicting heavy losses on Ukrainian forces in the process.[95]

Russian military experts have recently advocated for measures to enhance defensive operations even further in future wars. For instance, one recent article argued for the Ground Forces to invest more decisively in long-range precision artillery.[96] Such investment would enable Russia's Ground Forces to conduct dispersed operations while simultaneously engaging in more effective counter-battery fires.

Likewise, writing in the same *Military Thought* article cited above, Colonel General Romanchuk and colleague advocated for further advances in positional defense (see Figure 5).[97] In lieu of a continuous line of fixed fortifications, he and his coauthor argued that Russian forces should be distributed more unevenly across the front, concentrating at carefully hidden and protected strongpoints and transportation hubs. This strategy would require fewer troops while making them less vulnerable to being bypassed. Less defended sectors of the front should be covered instead by reconnaissance strike networks, autonomous robotic complexes, loitering munitions, and strike UAVs and supported by obstacles, barriers, and defensive minefields. To counter enemy breakthroughs, frontline forces should be further backed by highly mobile reserves used to conduct counterattacks, halt attempted breakthrough operations, and seal gaps.[98] Arguably, these approaches would be well suited for waging a campaign of attrition in future conflicts.

[93] Mikhailov and Savitsky, "Development of Military Art," p. 32.

[94] A. V. Romanchuk and A. V. Shigan, "Prospects for Increasing Efficiency of Army Defensive Operations [Перспективы повышения эффективности армейских оборонительных операций]," *Voennaia Mysl'* 4 (2023).

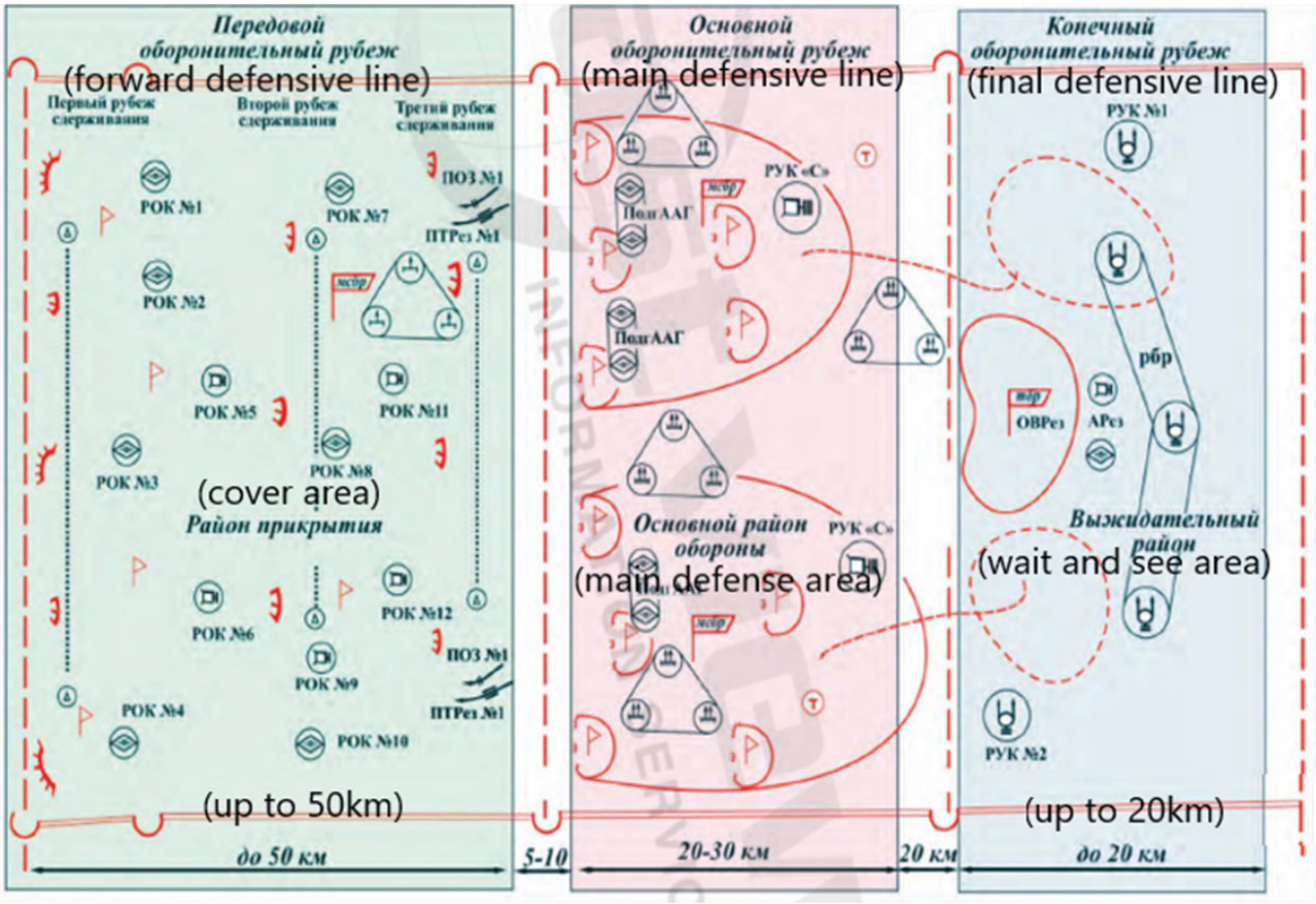
[95] Romanchuk and Shigan, "Prospects for Increasing Efficiency."

[96] Burenok, "On the Prospects for the Development of Weapons," p. 6.

[97] Romanchuk was directly involved in Russian efforts to counter Ukraine's summer 2023 counteroffensive. See "Top General Tells Putin How Russia Repelled Major Ukrainian Attack, Defence Ministry Says," Reuters, June 8, 2023, https://www.reuters.com/world/europe/top-general-tells-putin-how-russia-repelled-major-ukrainian-attack-defence-2023-06-08/.

[98] Romanchuk and Shigan, "Prospects for Increasing Efficiency."

Figure 5. Active layered defense approach for defending against future offensive operations



Source: Romanchuk and Shigan, "Prospects for Increasing Efficiency."

Alternative explanations

Despite these developments, it appears unlikely that Russia is committing to a long-term strategy of attrition for use in future wars, especially a high-end conflict with NATO. For one, Russian leaders have offered alternative explanations for current plans to expand the force size. For example, in December 2022, when Russia's then–Defense Minister Sergei Shoigu announced plans to increase the size of the armed forces to 1.5 million troops, he expressly cited the need to respond to NATO's planned expansion to include Finland and Sweden. At the same time, Shoigu announced plans to establish new military formations in western Russia, including an army corps to be deployed in Karelia near the border with Finland. Russian leaders have also highlighted the deployment of additional NATO troops to the Alliance's eastern borders as an increased threat that must be countered.[99] These are all strong indications that the expansion of Russian forces is more of an attempt to counterbalance the expanded force posture of the NATO alliance than a method to facilitate a strategy of attrition.

[99] "Russian Military Announces Plan to Expand."

Moreover, Russian defense intellectuals have shown no signs of altering their views regarding the nature of a potential high-end conflict with NATO. As noted in both the Strategic Military Concepts and Air Dominance Operations sections of this report, Russian military elites continue to assert that a conflict with NATO would be essentially decided during the Initial Period of War. They have also indicated on multiple occasions that Russian forces would likely escalate quickly in the event of such a conflict to deter US and NATO forces from conducting a mass aerospace attack against Russian territory and to avoid having to fight the vastly superior conventional forces of the combined NATO alliance.[100] In addition, maintaining a large conventional force equipped with heavy armor and mass firepower capable of combined arms maneuver is viewed as having an important deterrence value of its own. As noted by longtime Russia observer Dmitry Adamsky, "Russian experts believe that to restore Russia's credibility in the conventional realm, Russia must rebuild its capabilities to conduct large-scale combined-arms operations."[101]

For all these reasons, Russia appears unlikely to be preparing for a long-term war of attrition against NATO. Yet given the unexpected emergence of protracted conflict in Ukraine and the intractable challenges involved in breaking the current stalemate on the ground, Moscow's adoption of a longer term attrition strategy cannot be ruled out entirely. For example, the proposed expansion of force size is likely seen as a hedge against a future protracted conflict with NATO, which could emerge if the Initial Period of War fails to prove decisive. In that case, Russia can be expected to pursue the same asymmetric approaches used in Ukraine, as further developed, in a bid to offset NATO conventional military superiority and avoid strategic defeat. Such an approach will likely involve mass use of drones, ground-based air defenses, electronic attack, and counter-C5ISRT capabilities, all in an attempt to even the playing field. These are all common themes in recent Russian discourse on high-end conflicts, including many of the articles cited in this report.

Conclusion

Russian military elites are grappling with fundamental changes in the character of ground warfare as revealed during the war in Ukraine. Most published articles on the topic tend to attribute the army's problems with combined arms maneuver to the emergence of ubiquitous ISR leading to a transparent battlefield and the proliferation of mass and precision fires that have collectively undermined the army's ability to engage in blitzkrieg-style offensive operations. Yet, according to publicly available military journals at least, Russian military scholars appear to have prioritized restoring the army's ability to maneuver during future wars by overcoming the challenges encountered in Ukraine. By contrast, there is little thinking about alternative operational concepts in case the conditions that first emerged in Ukraine prove to be more enduring.

Moreover, Russian military elites are focusing primarily on tactical, technological, and organizational solutions for solving the army's problems with combined arms maneuver. They are advocating for ways to suppress the space-based and airborne ISR platforms that have been so widely used in Ukraine, despite the magnitude of the challenge. They are looking for means to suppress dispersed artillery and ATGMs and the proliferation of loitering munitions and attack drones, equally difficult challenges. They are also advocating for increasing the size of the country's ground forces and introducing new ground formations.

[100] Semenov, Krinitsky, and Chekhovsky, "Armed Struggle in the Aerospace Theater;" Evmenov, "Main Trends of Change."

[101] Dmitry Adamsky, "Quo Vadis, Russian Deterrence," *International Security* 49, no. 3 (2024), p. 61.

By contrast, there is little emphasis on developing new operational concepts for waging more effective combined arms operations in future wars, although some military elites are advocating for novel (or rediscovered Soviet-era) means of using concentrated artillery fires to support breakthrough operations through fortified defensive lines. There has been somewhat more progress on developing new operational concepts for engaging in defensive ground operations under conditions first encountered on the battlefields of Ukraine.[102] At the same time, little has been written about waging combined arms operations as part of an attrition strategy, despite Russia's shift to such a strategy during the ongoing war in Ukraine. Instead, Russian elites remain focused on restoring the army's ability to wage a war of maneuver in future conflicts.

[102] See, for example, Romanchuk and Shigan, "Prospects for Increasing Efficiency."

Naval Surface Warfare

The failures of Russia's surface forces during the war in the Black Sea have generated much discussion among Russian military elites. Much of the discourse is centered on the novel asymmetric challenges encountered by Russia's Black Sea Fleet in connection with Ukrainian sea denial efforts, including coastal defense cruise missiles (CDCMs), USVs and UAVs, and long-range land-attack missiles used collectively to strike Russian naval bases and warships. Russian naval experts are also grappling with the serious setbacks incurred by the Black Sea Fleet during the SVO, including substantial losses of Russian surface combatants and the fleet's inability to thwart Ukraine's effective sea denial campaign, which ultimately compelled the withdrawal of Russian surface forces to the eastern Black Sea.

Despite the RFN's many setbacks in Ukraine, Russian military elites have, by and large, continued to adhere to prewar concepts regarding the character of naval conflict and the nature, role, and importance of naval surface operations in Russia's overall military strategy. Despite the complex challenges that the Black Sea Fleet has faced in Ukraine, Russian military leaders have not questioned the continuing viability of surface fleets, whether in confined waters or beyond. Employing the surface fleet for local sea control, homeland defense, and blue-water naval operations remains a critical part of Russian strategic thinking. As former RFN Chief Admiral Evmenov recently put it, the experience of military conflicts of the 21st century shows that armed struggle at sea will continue to occupy a key place in future conflicts.[103]

Russian naval experts are focused on overcoming the kinds of asymmetric challenges that Russian surface forces have encountered during the Black Sea conflict. In the process, they are exploring various options for improving the surface fleet's performance in future conflicts, including expanding fleet capacity, countering adversary ISR, and developing defensive countermeasures to the many problems posed by precision missiles and robotic (i.e., uncrewed) platforms. Most of these options entail applying new tactical and technological solutions to the challenges posed by robotic systems. By contrast, Russian experts have written far less about how to incorporate these new capabilities into existing or new operational concepts to enhance future naval surface operations. There is also a growing consensus to incorporate uncrewed systems into the RFN's own operational concepts for both offensive and defensive naval warfare. Aside from these tactical and technical innovations, there is a strong degree of continuity between pre-2022 and current thinking about how Russian surface forces should operate during future conflicts. As an example, Russia's approach to maritime defense of the homeland continues to depend on the forward deployment of Russian surface ships in the near sea zone to hold US and NATO navy surface ships at risk of preemptive attack if they come within striking range of Russian territory.

The RFN's strategic concepts have been largely shaped by the potential for a high-end naval conflict with the United States and NATO. Since Desert Storm, Russian naval theorists have spent enormous energy in preparing for such a conflict. They have developed new concepts of operations to supplement the fleet's existing concepts, which have long prioritized Russian naval operations as an adjunct to the Ground Forces by projecting power ashore. Yet growing concerns

[103] Nikolai A. Evmenov, "The Nature of Armed Struggle at Sea and Its Development Trends [Характер вооруженной борьбы на море и тенденции ее развития]," *Voennaia Mysl'* 12 (2023), p. 7.

regarding US seaborne air and missile strikes, such as those conducted against Iraq in 1991, led Russian leadership to include homeland defense against attacks from the sea as a key navy mission. At the same time, RFN leadership has sought to replicate the US Navy's ability to carry out long-range strikes against high-value land targets to bolster Russia's own regional deterrence strategy against potential US or NATO aggression.[104]

In both cases, Russian naval leaders have pursued such objectives out of a clear sense of the overwhelming superiority of US and NATO naval forces compared to Russia's own naval forces. As current RFN Chief Admiral Alexander Moiseev recently put it, "the strategic course of our opponents to achieve overwhelming superiority of their naval forces…and military dominance in the World Ocean" remains a growing military danger for Russia. Such concerns are amplified by persistent worries about NATO encroachment in the maritime approaches to Russia due to an increased presence of US and NATO naval forces armed with high-precision weapons.[105] Such concerns have driven Russian naval thought to prioritize strategic defense.

To counter such threats, the RFN maintains an active defense strategy in which surface ships operate forward to provide a layered defense for the Russian homeland against long-range strikes from the sea. To supplement this strategy, the RFN has added new operational concepts for using surface combatants (and submarines) to conduct long-range strikes against adversary high-value targets on land to enhance regional deterrence. These new RFN missions operate alongside the RFN's traditional mission of supporting Russian ground operations.[106]

Yet all three missions depend on the continuing ability of Russia's surface fleets to operate in the near sea zone adjacent to Russian territory, which in turn requires the fleet to seize and maintain local sea control. Thus, overcoming the asymmetric challenges that Russia's Black Sea Fleet has encountered remains a top priority for the future of Russia's surface fleets, which is why so much of the attention in Russian discourse is focused on addressing these fundamental challenges.

At the same time, the RFN seeks to maintain its ability to conduct blue-water naval operations to protect Russia's global interests, vindicate claims to great power status, project power overseas, and bolster strategic deterrence. Russian naval elites are also grappling with the challenges of sustaining such operations given Russia's aging fleet of blue-water surface combatants and the overwhelming military superiority of US and NATO naval forces in the world's oceans.

The following sections examine in greater detail how Russian navy leaders and experts are thinking about the RFN's experiences during the war in Ukraine and what these experiences indicate about the character and viability of conducting surface operations in future conflicts. The first section describes how Russia's Black Sea Fleet has performed during the war, highlighting its initial successes and subsequent failures in maintaining sea control. The next three sections describe the lessons learned by Russian naval elites from the war and their conclusions regarding the direction of surface operations in future wars. These sections also highlight their various proposals for shoring up the fleet's combat capabilities and improving its survivability in the face of growing asymmetric challenges first encountered during the war.

[104] Russian Maritime Studies Institute, *Fundamentals of the State Policy of the Russian Federation in the Field of Naval Operations for the Period Until 2030,* trans. Anna Davis, 2017.

[105] Alexander A. Moiseev, "Strategic Requirements for the Development of the Navy Potential of Russia Taking into Account the Experience of the Special Military Operation in Ukraine [Стратегические требования к развитию военно-морского потенциала России с учетом опыта специальной военной операции на Украине]," *Voennaia Mysl'* 9 (2024), p. 9.

[106] Russian Maritime Studies Institute, *Fundamentals of the State Policy.*

The first such section examines Russian thinking on how to improve the fleet's ability to seize and maintain local sea control in future conflicts. The next section explores how Russian thinking is evolving regarding another key mission, defending the homeland against seaborne attacks. The third section examines Russian discourse regarding the future of blue-water naval operations, taking into account emerging capabilities and combat methods for distant operations in the world's oceans. A final section summarizes the chapter's key findings.

Russian surface operations in Ukraine

The RFN, and the Black Sea Fleet's surface forces in particular, has had a decidedly poor record in Ukraine, gradually losing its ability to maintain local sea control while incurring substantial losses of Russian warships. This was not initially the case, however. During the first two months of the war, Russian warships performed ably and according to long-standing RFN concepts of operations, seizing local sea control, projecting power ashore in support of the Ground Forces, and conducting deep strikes across Ukrainian territory in pursuit of Russia's larger strategic objectives.

Specifically, at the war's outset, Black Sea Fleet warships deployed forward, seized control of the Black Sea in its entirety quickly, conducted local and long-range fires ashore, and delivered logistics support for advancing Russian ground forces. At the same time, Russian amphibious forces rapidly seized Snake Island while carrying out an unopposed landing near Mariupol. The RFN's Kalibr-armed warships successfully carried out long-range strikes against a range of targets across Ukrainian territory. Thus, by March 2022, the RFN's control of the Black Sea and its ability to project power into Ukraine were at their peak.

Starting in April 2022, however, Ukraine's armed forces struck back, commencing with a series of successful CDCM strikes against Russian warships. One such strike led to the sinking of *Moskva,* a Russian Slava-class cruiser and the flagship of the Black Sea Fleet. As a result of these CDCM strikes, Ukrainian forces were able to carve out a sea denial zone in the northwestern Black Sea within which Russian surface forces were no longer able to operate freely. This was a major Ukrainian achievement and an early turning point in the war at sea. Over the next two years, Ukrainian forces succeeded in gradually extending this initial sea denial zone farther to the south through a series of USV strikes against Russian warships at sea and in port at their local naval bases in Crimea.

Ukrainian USV strikes were complemented by a series of UAV and land-attack missile strikes against Russian naval bases in Crimea, including warships in port, air defense systems, and other shore-based infrastructure. Over time, Ukraine's growing ability to hold Russian warships at risk both at sea and in port deprived them of their sanctuaries, ultimately compelling their withdrawal to the eastern Black Sea near Novorossiysk. This withdrawal, in turn, allowed Ukraine's armed forces to break Russia's coastal blockade of Ukrainian grain shipments. Over the course of the campaign, Russia's Black Sea Fleet lost nearly one-third of its total surface ships. Thus, aside from a brief period at the war's outset, Russian surface operations in Ukraine have been a decided failure.

By contrast, Russian Kalibr-armed warships have managed to maintain a successful long-range strike campaign against high-value targets across Ukraine. Kalibr strikes have been far less affected by the Black Sea Fleet's growing vulnerability to Ukrainian asymmetric strikes because Kalibr missiles can range Ukrainian territory when launched from any point in the Black Sea. These missiles have performed ably in striking their assigned targets. Yet despite this ability,

Russian Kalibr missile strikes have had only limited effect on the war's development. The RFN's long-range strike campaign has been hindered throughout by Russia's limited missile production capacity and Ukraine's surprising success in intercepting inbound Russian cruise missiles.[107] As a result, the RFN's long-range strike campaign has failed to achieve lasting or significant strategic or operational effects.

Russian observers are still coming to terms with the many setbacks incurred by Russian surface forces in Ukraine. According to one observer, "During the SVO, the brilliance and poverty of the Russian navy were clearly demonstrated." The RFN proved to be strong in the attack but weak in defense.[108] Yet most Russian observers have attributed such failures less to operational shortcomings than to more concrete problems such as capacity limitations, Western ISR support for Ukraine, and Ukraine's mass use of robotic platforms.

Seizing and maintaining local sea control

Russian military elites have spent considerable effort in thinking through the RFN's challenges in seizing and maintaining local sea control in the Black Sea. The RFN is responsible in general for seizing local sea control during local and regional conflicts. Securing local sea control is one of the RFN's primary missions, along with other key missions such as defense of the homeland and blue-water naval operations. In the RFN's current governing documents, the term *sea dominance* defines a condition in which the RFN's position in the operational zone or designated area excludes effective counteraction by the enemy. Sea dominance can also be limited to a particular area.[109]

The contours of the sea control mission vary, however, depending on the fleet involved. In the southeastern strategic direction, Russia's Black Sea Fleet has had the long-standing mission of seizing control of the Black Sea in its entirety during the early stages of conflict. Likewise, Russia's Baltic Fleet is notionally responsible for seizing control of the eastern Baltic Sea, including the sea lines of communication with Kaliningrad. Similarly, Russia's Northern Fleet is responsible for controlling the Barents Sea and other Arctic Sea zones to protect Russia's sub-surface ballistic nuclear (SSBN) submarine bastion and defend Russian territory against long-range strikes from American and British submarines. The Pacific Fleet is similarly tasked with controlling the maritime approaches to the Russian Far East and protecting Russia's SSBN bastion in the Sea of Okhotsk.[110]

In conducting local sea control operations, the RFN follows well-established principles and operating concepts. Many of these were summarized in a 2016 article by Evgeny Sukalenko, then–deputy head of the Department of Operational Art at the Military Scientific Center of the Navy. In this article, he emphasized that "naval art has developed over a long historical period [during which] knowledge of armed struggle at sea has been generalized and systematized based on the experience of waging

[107] Justin Bronk, Nick Reynolds, and Jack Watling, *The Russian Air War and Ukrainian Requirements for Air Defence,* Royal United Services Institute, Nov. 7, 2022, p. 29.

[108] Sergei Marzhetsky, "Future of the Russian Fleet [Будущее Российского Флота]," *Obozrenie Armii i Flota* 1 (2023), p. 74.

[109] E. Sukalenko, V. Kamarenko, and A. Pasko, "Conquering Sea Dominance as the Main Goal of Using the Navy in Peace and Wartime [Завоевание Господства На Море Как Главная Цель Применения Вмф В Мирное И Военное Время]," *Morskoi Sbornik* 10 (2024), p. 58.

[110] Vladimir S. Kryazhev, "Assessment of the Military-Political and Operational-Strategic Situation in the Russian Fleet Zones [Оценка Военно-Политической И Оперативно-Стратегической Ситуации В Зонах Флотов России]," *Morskoi Sbornik* 2 (2019), pp. 44–45.

wars and armed conflicts."[111] For successful sea control operations, prevailing doctrine cited in the article calls for the fleets to use a sufficiently powerful force grouping to conduct sudden, decisive, high-tempo offensive actions in the early phases of conflict, preempting the enemy to gain superiority in operationally important areas and seizing the initiative.[112] As outlined previously, at the outset of the war in Ukraine, Russian naval operations adhered generally to these principles. Yet the RFN was unable to maintain sea control in the face of asymmetric Ukrainian attacks, which led to an expanding sea denial zone in the Black Sea.

Despite the RFN's many setbacks in Ukraine, Russian naval elites remain largely committed to their prewar concepts of operation for sea control. Writing in 2023, for example, Admiral Nikolai Evmenov, then–commander in chief of the RFN, largely repeated what Sukalenko had written in 2016. Specifically, Evmenov wrote the following:

> Gaining operational initiative [during the Initial Period of War by] preempting the opposing side in making and implementing a decision, [combined with the] decisiveness of the actions of the naval forces…contributes to the formation of a favorable operational environment for the successful accomplishment of combat missions rendering the enemy's response actions ineffective. A rapid change in the situation as a result of the maneuver of the naval forces…achieving surprise in their actions when implementing measures to deceive them allows one to be one step ahead.[113]

Although Evmenov was also talking about the importance of preemption for other key RFN missions, including homeland defense, the similarity between his comments and Sukalenko's demonstrates a remarkable continuity in Russian operational thinking about sea control.

The RFN's challenges in maintaining sea control in the Black Sea have led some observers to call for new concepts. For example, there are calls in some quarters for greater attention to joint and multidomain operations and asymmetric measures and greater reliance on space-based networks in supporting naval operations in the near sea zone. In addition, some authorities have emphasized the growing importance of factors such as maneuverability, simultaneity of operations, speed, and surprise in creating conditions for seizing and exploiting local sea control.[114]

There are few indications in the literature that Russia is actually moving to integrate these ideas into existing Russian operational concepts, however. Plus, there are institutional barriers to doing so in some cases. For example, improving joint operations will be challenging given the military's recent decision, at the behest of Russian naval leadership, to remove the RFN from the joint strategic commands established during Anatoly Serdyukov's New Look reforms.

Russian military leaders are instead focusing on developing new means for the RFN to follow through on its existing concepts to achieve sea dominance. These include measures to counter USVs. As former Russian Pacific Fleet Commander Admiral Sergei Avakyants recently put it, "There have been no fundamental changes in the operational art of using the Navy [as a result of the war]. Instead, a new type of weapon has

[111] Evgeny Sukalenko, "Modern Principles of Conducting Armed Warfare at Sea [Современные Принципы Ведения Вооруженной Борьбы На Море]," *Morskoi Sbornik* 10 (2016), p. 33.

[112] Sukalenko, "Modern Principles of Conducting Armed Warfare at Sea," p. 36.

[113] Evmenov, "The Nature of Armed Struggle at Sea," p. 7.

[114] See, for example, Evmenov, "The Nature of Armed Struggle at Sea," p. 7.

appeared (sea drones), which is quite effective, and countering it will require new tactical measures."[115]

Increasing fleet capacity is another recurring theme in Russian discourse on addressing the kinds of challenges that Russia's Black Sea Fleet has faced during the war. According to one recent article by naval analyst Sergei Marzhetsky, the Black Sea Fleet was sorely lacking in the kinds of ships needed to achieve campaign objectives. He recommended, therefore, that the RFN follow through on existing plans to buy 29 Project 20380 Steregushchy-class corvettes for future near sea operations. These ships can be used to counter enemy ships and submarines, provide artillery support for amphibious assaults, and enforce naval blockades—precisely what was needed in Ukraine. Marzhetsky went on to recommend the purchase of ships of other classes to support Russian near sea zone naval operations.[116] It is doubtful, however, that the RFN can afford such a sharp increase in capacity.

The West's provision of ongoing ISR support for the Ukrainian armed forces is also cited as a key factor in the outcome of the naval contest in the Black Sea. As Admiral Moiseev wrote recently, "The countries of the North Atlantic Alliance have deployed their entire intelligence potential to service the Ukrainian Armed Forces."[117] Consequently, the Black Sea Fleet was compelled to operate under conditions in which Ukraine received continuous real-time data from Western air and space reconnaissance, allowing it to track all Black Sea Fleet warships and then target them for destruction. To address this problem in future wars, Moiseev advocated for increasing the fleet's electronic warfare capacity and using camouflage for naval platforms and port infrastructure.[118]

According to Admiral Evmenov, the RFN also needs to increase its ability to target elements of enemy reconnaissance systems, electronic intelligence (ELINT), and C2 to disrupt situational awareness of Russian naval assets and to ensure the required degree of information superiority to prevent recurrence of the fleet's struggles in the Black Sea. Evmenov did not elaborate, however, on how these missions should be carried out.[119] Another recent article called for countering adversary ISR through more promising methods such as frequent maneuvering of naval platforms combined with prompt redeployments after naval fire missions.[120]

Most important, Russian military elites have written extensively on countering the asymmetric capabilities used by Ukraine to target Russian bases and warships. Moiseev recently noted the following:

> [Ukrainian forces] relied on the use of high-tech robotic strike systems of NATO production. For the first time, our ships encountered the enemy's mass use of small and low-visibility unmanned boats [i.e., USVs], unmanned underwater vehicles (UUV) and unmanned aerial vehicles (UAV), which have demonstrated fairly high efficiency.[121]

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[115] Yuri Evstifeev, "A New Paradigm of War Has Come to the Sea [Новая парадигма войны пришла и на море]," *Arsenal Otechestva* 4 (2024), p. 65.

[116] Marzhetsky, "Future of the Russian Fleet."

[117] Moiseev, "Strategic Requirements for the Development of the Navy," p. 11.

[118] Moiseev, "Strategic Requirements for the Development of the Navy," p. 13. Although such measures might be useful for countering USVs, they would be of dubious value in countering US and NATO airborne and space-based ISR.

[119] Nikolai A. Evmenov, "Main Factors and Conditions of the Development of Naval Art [Основные факторы и условия развития военно-морского искусства]," *Voennaia Mysl'* 7 (2023), p. 20.

[120] Sukalenko, Kamarenko, and Pasko, "Conquering Sea Dominance as the Main Goal," p. 59.

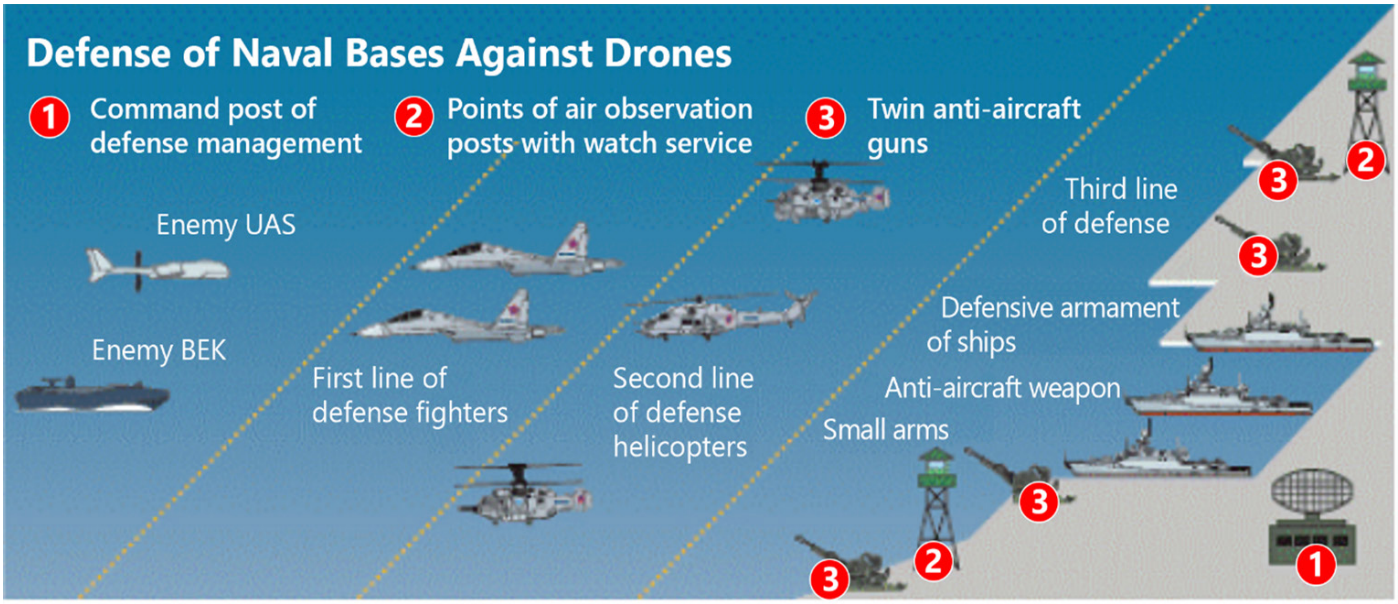
[121] Moiseev, "Strategic Requirements for the Development of the Navy," p. 13.

All these capabilities significantly complicated the fleet's ability to carry out its assigned tasks. According to Moiseev, addressing this challenge in future wars will require a significant increase in the defensive capabilities of ships operating at sea as well as fleet naval bases (see Figure 6).[122]

Specifically, Moiseev argued for concerted efforts to improve ships' ability to defend against UAV and USV strikes and anti-ship missiles, including hypersonic missiles. Moiseev also argued that the RFN needs a radical solution to the issue of creating a single information space to detect and track enemy inbound strikes. To achieve this goal, he claimed that it is necessary to accelerate the development of space-based communications and reconnaissance satellites. The need to create a single information space (in essence, a common operating picture (COP)) is a recurring theme in Russian military discourse, necessitating improvements in information management and C2 systems linking sensors with weapon systems.[123]

Moiseev also advocated for more intensive development of Russian robotic platforms capable of patrolling designated areas to counter enemy sea drones and other surface targets. To improve the defense of fleet bases in future conflicts, Moiseev argued for accelerated development of new equipment to combat enemy robotic complexes, including the "creation of stationary and mobile air, surface and underwater surveillance systems that allow for the timely detection, classification and tracking of air and sea robots, along with promising

Figure 6. Russian layered defense options to defend naval bases against UAV or USV attacks



Source: Russian Ministry of Defense.

[122] Moiseev, "Strategic Requirements for the Development of the Navy," p. 13.
[123] Moiseev, "Strategic Requirements for the Development of the Navy," p. 13.

low-risk methods of targeting such platforms."[124] It is worth emphasizing, however, that Moiseev was advocating mainly for technological solutions to the RFN's warfighting problems, rather than new operational concepts or changes in force design.

Some observers note that the fleets are already adopting new weapons and tactics to counter uncrewed platforms, with ships adding crewed machine guns, electronic warfare systems, specialized radar and sonar systems, and other terminal defense measures.[125] However, the RFN has yet to develop concepts of operations for countering mass use of uncrewed systems in future wars.

Russian military writers are clearly thinking about these problems, however. According to military expert Dmitry Boltenkov, countering uncrewed systems requires comprehensive measures targeting them at all stages of their life cycle. Uncrewed systems "must be destroyed at their production sites, [and] their delivery routes must be monitored" and targeted repeatedly. Next, aircraft and helicopters must be used to interdict UAVs and USVs as they transit to their targets. Ship self-defenses constitute the last line of defense.[126] These new concepts draw on Russia's experiences in Ukraine and are centered on tactics that have proven effective in that conflict.

Yet some Russian military thinkers are less sanguine about the prospects for effectively countering enemy robotic platforms, at least in the near sea zone. Former Vice Admiral Tengiz Borisov noted the following:

> There are now so many coastal missile launchers and aircraft capable of carrying anti-ship missiles along the shores of the Black and Baltic Seas that surface combat ships will soon be unable to carry out the tasks assigned to them. The seas are being shot through and blocked by missile launchers and aircraft. Thus, both surface ships and submarines are becoming an increasingly easy target for the enemy.[127]

However, by all indications, the RFN remains fully committed to operating crewed navy vessels in the near sea zone for the foreseeable future.

Defending the homeland from a sea attack

Events in Ukraine have also called into question the RFN's ability to fulfill another key navy mission: defending the Russian homeland against long-range strikes from the sea. In this respect, potential Tomahawk Land Attack Missile (TLAM) strikes launched from US Navy ships and submarines against the Russian homeland are often cited as among the greatest threats to Russia's national security.

Writing in 2017, for example, former Vice Admiral Vladimir Kyrazhev expressed concern about the potential for sudden and massive TLAM strikes from US Navy warships to achieve a disarming first strike during a crisis with Russia.[128] More recently, current

[124] Moiseev, "Strategic Requirements for the Development of the Navy," pp. 13–14.

[125] Roman Kretsul and Alexey Ramm, "Sea Swarm: How Russian Warships Will Defend Themselves Against Drones," *Defense & Security,* July 17, 2023.

[126] Evstifeev, "A New Paradigm of War," p. 65.

[127] Gennady Charodeev, "Vice-Admiral Borisov: Naval Drones Will Replace Submarines and Surface Ships [Вице-адмирал Борисов: «Морские дроны заменят подводные лодки и надводные корабли»]," *Novye Izvestia,* June 19, 2023.

[128] Vladimir S. Kryazhev, "Military Security Issues in Russia at the End of the 20th – Beginning of the 21st Century [вопросы военной безопасности россии в конце xx - начале xxi в.]," *Morskoi Sbornik* 8 (2017), p. 41.

RFN Chief Admiral Moiseev cited the permanent deployment of large groups of US and NATO naval forces equipped with long-range precision weapons (strategic non-nuclear sea-based systems) in the maritime spaces adjacent to Russian territory as one of the main dangers facing Russia.[129] Russia's 2017 Naval Doctrine also highlights potential naval strikes against the homeland as a persistent threat.[130]

To counter this threat, the Naval Doctrine provides for "maintaining naval capabilities at a level that guarantees deterrence of aggression against [Russia] from the oceans and the seas, [including] the ability to inflict unacceptable damage on any potential adversary."[131] To carry out this mission, the RFN has adopted an active defense strategy predicated on offshore deployments of Russian surface ships (and submarines) into the near sea zones to extend a defensive shield farther into the maritime approaches to protect Russian territory.[132]

These forward-deployed Russian warships are tasked with holding US and NATO warships at risk to compel them to operate sufficiently far from Russian territory to keep them out of TLAM range. In anticipation of such operations, current Russian doctrine calls for the RFN to maintain a peacetime presence of appropriate force groupings either in or adjacent to strategically important areas (including the near sea zone) to create an immediate threat of damage to a potential enemy to reduce the threat of armed aggression.[133] As an example, one observer cited Russia's 2013 naval deployments in anticipation of US seaborne attacks against Syria in retaliation for Assad's chemical weapon attacks. According to this author, the deployment of Russian warships near Syria's coastline bought time for the Russian Ministry of Foreign Affairs to work out an arrangement with the United States to head off the attacks in favor of a diplomatic solution.[134]

To give effect to this strategy, the RFN has developed concepts of operations guided by key principles highlighted by Sukalenko. These include "maintaining sufficient forces with a high degree of readiness in the probable areas of upcoming action aimed at specific enemy naval groupings" able to carry out strikes on Russia. During defensive operations, Russian force groupings must act decisively by "occupying the most favorable areas of action [and then] engaging carriers in fire damage before they reach the lines of their use of weapons." Moreover, such strikes must be delivered preemptively (or, if necessary, on a retaliatory basis) to create unfavorable conditions for the enemy to operate against Russia through massive use of its forces, means, and weapons.[135]

Yet Russian naval leaders recognize that the RFN must carry out such operations under conditions of substantial military inferiority with respect to US and NATO naval forces. As highlighted by Moiseev, the imbalance is present in all the principal operational areas of Russia's fleets. Moreover, Ukraine's success in creating an extended sea denial zone using USVs, CDCMs, and other forms of asymmetric attack poses a direct threat to Russia's maritime homeland

[129] Moiseev, "Strategic Requirements for the Development of the Navy," p. 9.

[130] Russian Maritime Studies Institute, *Fundamentals of the State Policy.*

[131] Russian Maritime Studies Institute, *Fundamentals of the State Policy.*

[132] Sukalenko, Kamarenko, and Pasko, "Conquering Sea Dominance as the Main Goal," p. 57.

[133] Nikolai Evmenov, "The Role and Place of the Navy in Wars and Armed Conflicts [Роль И Место Военно-Морского Флота В Войнах И Вооруженных Конфликтах]," *Morskoi Sbornik* 11 (2022), p. 5.

[134] Nikolai Evmenov, "The Presence of the Russian Navy in the World Oceans Is an Imperative of the Times, Ensuring the Military Security of the Russian Federation [Присутствие Российского Военно-Морского Флота В Мировом Океане - Императив Времени, Обеспечивающий Военную Безопасность Российской Федерации]," *Morskoi Sbornik* 9 (2021), p. 7.

[135] Sukalenko, "Modern Principles of Conducting Armed Warfare at Sea," pp. 36–37.

defense strategy, which entails deploying Russian warships into the near sea zone at the early stages of conflict to ward off US and NATO seaborne attacks. According to Moiseev, the methods pioneered by Ukraine will significantly complicate the fleet's ability to carry out its assigned tasks in future conflicts and will therefore require a significant increase in the defensive capabilities of Russian warships from uncrewed systems and missile strikes.[136]

Despite the increased risks to RFN warships, Russian naval leaders and military elites are largely adhering to their active defense strategy. In 2024, for example, Admiral Moiseev cited the need to increase the combat capabilities of the Pacific Fleet to make it able to inflict unacceptable damage on enemy naval groupings in the Asia-Pacific region. Likewise, in the Baltic, he urged the RFN to deploy surface ships equipped with high-precision warfare systems in the waters of Lake Ladoga near St. Petersburg, replicating in the Baltic the RFN's prior use of the Caspian Sea to conduct long-range strikes against Syria and Ukraine.[137] Thus, rather than modifying their existing strategy, RFN leaders are advocating for measures to make it more effective. For example, they have given no signs of shifting to alternative means for defending the homeland from seaborne attack, such as increased reliance on Russian naval air power or long-distance sea drones to hold adversary warships at risk.

Russian military observers are calling for an increase in naval warships intended for near sea zone operations. One option is to increase the number of frigates and corvettes available for near sea zone operations significantly to combat enemy surface ships and submarines. In addition to Marzhetsky's recommendation to purchase 29 Steregushchy-class corvettes, as previously mentioned, Vladimir Kryazhev has called for expanded construction of Karakurt-class small corvettes armed with Kalibr and Oniks anti-ship cruise missiles to help fill the need.

Marzhetsky further recommended that the RFN consider purchasing Chinese Type 56/56A anti-submarine warfare (ASW) corvettes, which he claimed have enabled the Chinese navy to close their near sea zone completely to enemy submarines. These ships also carry advanced anti-ship cruise missiles that can contribute to the maritime homeland defense mission. Acquisition of Chinese warships, he argued, would provide a rapid solution to the fleet's capacity limitations in the near sea zone because the Chinese can produce such ships far more rapidly than Russian shipyards. These Chinese ships, he argued, can help fill the void until the arrival of more powerful ships, such as modernized Gorshkov-class frigates, which will radically scale up the RFN's precision strike capability (see Figure 7).[138] The author did not explain, however, how these additional ships can better survive the kinds of asymmetric attacks carried out by Ukraine.

To address the problem of asymmetric threats, some Russian military writers are recommending enhancements to ISR to allow the early detection of naval threats in the near sea zone. For example, Admiral Moiseev recommended improvements in situational awareness of the underwater, surface, and air situation in the Barents Sea, Kara Sea, and other seas of the Arctic zone for early detection of approaching threats.[139] Another article advocated more generally for a major increase in the quality and capabilities of enemy detection and target designation systems, especially hydroacoustic and sonar, primarily for ship, aviation, space,

[136] Moiseev, "Strategic Requirements for the Development of the Navy," pp. 13, 15–16.
[137] Moiseev, "Strategic Requirements for the Development of the Navy," pp. 17–18.
[138] Marzhetsky, "Future of the Russian Fleet," p. 78.
[139] Moiseev, "Strategic Requirements for the Development of the Navy," p. 15.

and positional systems.[140] Others have proposed enhanced use of UAVs for aerial reconnaissance; these could be used to detect and track enemy UAVs as well as enemy warships approaching striking range of Russian territory. Yet as recently as 2019, noted naval expert Vladimir Kryazhev frankly admitted that the RFN needed to increase its ability to detect and target threatening enemy vessels several times over, a situation that surely persists.[141]

Other naval experts are advocating for improvements in long-range strike to hold approaching warships at risk at increasing ranges. For example, Evmenov recently argued that long-range anti-ship cruise missiles are changing the character of naval warfare by ensuring the navy's ability to destroy enemy warships using long-range multivector strikes as they approach the coast. To increase penetrating power, Evmenov argued for use of multichannel guidance systems based on radar, optical-electronic, passive ELINT, and other means to prevent jamming and other countermeasures. To facilitate such strikes, he called for greater reliance on space-based ISR and UAVs.[142] Other Russian military writers have been similarly calling for increasing the effectiveness of space-based reconnaissance of the maritime domain and enhanced target designation through deployment of new satellites, ground facilities, and communications

Figure 7. Project 22350 Admiral Gorshkov-class frigate

Source: "Russian Frigate Admiral Gorshkov," Reddit, accessed Mar. 1, 2025.

[140] Kryazhev, "Assessment of the Military-Political and Operational-Strategic Situation," p. 45.

[141] Kryazhev, "Assessment of the Military-Political and Operational-Strategic Situation," p. 45.

[142] Nikolai A. Evmenov, "Features of the Development of Naval Weapon Systems Taking into Account the Transformation of Armed Combat at Sea [Особенности Развития Систем Вооружения Вмф С Учетом Трансформации Вооруженной Борьбы На Море]," *Morskoi Sbornik* 11 (2024), p. 43.

networks.[143] At the same time, Evmenov foresees the fleet being able to form temporary or permanent dynamic reconnaissance strike complexes in real time to conduct concentrated strikes on adversary surface ships using dispersed forces.[144]

Russian military writers are also advocating for increased use of uncrewed systems for sea denial, drawing on the lessons learned in Ukraine. Although not expressly tied to defending against seaborne attacks, robotic platforms would provide an additional means to deny US and NATO warships access to the maritime approaches to Russia. For example, Moiseev argued for intensive development of robotic systems (UAVs, USVs, and others) to perform reconnaissance, strike, and defensive tasks, including electronic countermeasures for the RFN.[145]

Likewise, Evmenov argued recently that UAVs can be used to defeat enemy naval groupings while disrupting enemy ocean and sea transportation. He also stated that use of long-distance strike UAVs will provide enhanced reconnaissance in the near and far sea zones while allowing the destruction of enemy warships in both the open oceans and the coastal zone.[146] However, drone warfare is a complex and rapidly developing area in Russia, and the RFN is still grappling with the challenges of developing new concepts of operations for application to maritime homeland defense and other maritime threats. It is too early to tell, therefore, how many of these recommendations will actually be implemented. Yet given Russia's enduring naval deficiencies and extended coastlines, defending the homeland from seaborne long-range strikes will likely remain a formidable challenge for years to come.

Blue-water naval operations

Russian naval observers are also giving much thought to the future of Russian blue-water naval operations, although they are drawing only tangentially on the lessons learned in Ukraine. The RFN continues to maintain a substantial blue-water naval force and to deploy this force regularly into the world's oceans. Russia's fleet of blue-water surface combatants comprises a combination of modern frigates and corvettes operating alongside an older fleet of cruisers, destroyers, and auxiliary vessels dating back to the Soviet era, many of which have been previously refurbished to extend their operating life. The bulk of Russia's blue-water fleet is concentrated in the Northern and Pacific Fleets, although some ships from the Baltic Fleet have also conducted distant out-of-area deployments. Thus, aside from the loss of the Slava-class cruiser *Moskva* in the Black Sea in 2022, Russia's blue-water surface fleet has thus far emerged largely intact from the war in Ukraine.

The Kremlin has long viewed blue-water naval operations as an essential component of Russian naval strategy and a symbol of Russia's great power status. Russia's blue-water imperative is codified in the country's 2017 Naval Doctrine. Section 10 of that doctrine assigns the navy the task of maintaining a naval presence in the World Ocean to show the flag and coordinate military cooperation with foreign partners. Section 13 requires the navy to ensure the safety of Russian maritime activities globally while maintaining a naval presence in the World Ocean to show the flag and demonstrate Russia's military capabilities to the rest of the world. Section 24 tasks the navy with helping to manage the escalation of

[143] V. Bychkov and V. Sherkashin, "Maritime Space Reconnaissance and Target Designation System [система морской космической разведки и целеуказания]," *Morskoi Sbornik* 2 (2021).

[144] Evmenov, "The Nature of Armed Struggle at Sea," p. 9.

[145] Moiseev, "Strategic Requirements for the Development of the Navy," p. 13.

[146] Evmenov, "Features of the Development of Naval Weapon Systems," p. 43.

armed conflicts in territories of strategic importance for Russia across the world.[147]

Recent writings confirm that Russia has not given up on its global naval aspirations. For example, influential RFN Captain Aleksey Koryakovtsev recently highlighted the role of the navy as an instrument for global power projection. He noted that the navy has been used many times over the years to assert influence during regional crises, such as the Iran-Iraq war. Naval forces have also been used to secure Russia's commercial interests on the high seas and protect Russian trade shipments and offshore mineral rights.[148]

Russian blue-water missions include counterpiracy operations in the Indian Ocean, extended logistics support for the Assad regime in Syria, and joint naval exercises with Chinese warships. During crises or conflicts, Russia's blue-water ships have been used to reinforce the other fleets through the interfleet transfer of warships.[149] Russian leadership clearly sees the country as having a blue-water naval imperative.

Russian naval observers thus far have tended to discount the risks associated with asymmetric attacks of the kind used in Ukraine when it comes to blue-water operations. Some argue that the threat from sea drones and CDCMs is mainly a problem in the near sea zone or in closed-in seas, at least for now. For example, former Russian Pacific Fleet Commander Tengiz Borisov noted recently, "At the moment, USVs are limited in speed and seaworthiness, depend on weather conditions, and can be effectively used [only] in closed theaters of military operation."[150] Consequently, the country's political and military leaders have not bothered to alter their operational concepts in response to Ukraine regarding out-of-area naval deployments.

They are, however, considering the addition of new surface platforms to bolster their blue- water naval capability over the longer term, along with new long-range strike capabilities. For example, Marzhetsky recently recommended that the RFN acquire additional Gorshkov-class frigates to serve as the main workhorse for operations in the far sea zone and open oceans. These multirole ships already host the latest land-attack, anti-ship strike, air defense, and ASW capabilities. Marzhetsky has also argued for completing conversion of Russia's aging fleet of Udaloy-class ASW destroyers (two ships have already been converted) into multirole warships by adding long-range strike capability and modern ASW and air defense systems.[151]

To compensate for Russia's limited shipbuilding capability, Marzhetsky further proposed that the RFN consider purchasing 10 Chinese Type 54 guided missile frigates, which the People's Republic of China currently produces in large numbers. These ships, he claimed, would allow the RFN to close out both the near and far sea zones rapidly to potential enemies.[152] In another recent article, Russian naval experts advocated for building up the country's capacity to mobilize civilian vessels, including oceangoing ships, to provide distant sealift capacity in the event

[147] Russian Maritime Studies Institute, *Fundamentals of the State Policy.*

[148] Aleksey A. Koryakovtsev, "The Role of the Navy in Ensuring Security Interests of the Russian Federation [Роль Военно-Морского Флота в обеспечении безопасности национальных интересов Российской Федерации]," *Voennaia Mysl'* 12 (2023), pp. 11, 15.

[149] Evmenov, "The Nature of Armed Struggle at Sea," p. 8.

[150] Evstifeev, "A New Paradigm of War," p. 65.

[151] Marzhetsky, "Future of the Russian Fleet," pp. 76–77.

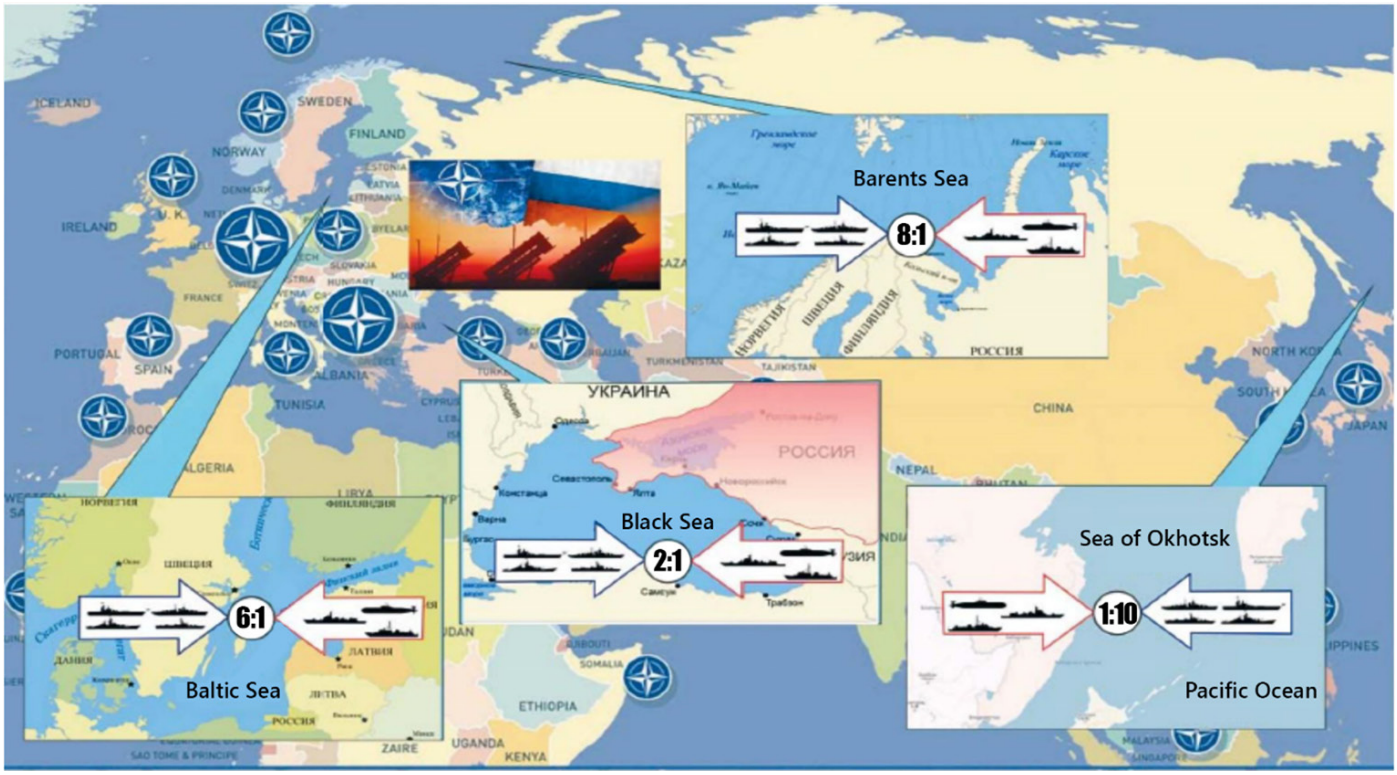
[152] Marzhetsky, "Future of the Russian Fleet," p. 78.

of future conflicts.[153] The topic of acquiring new basing to support Russian blue-water operations still surfaces occasionally in Russian military discourse. For example, Moiseev argued recently for the establishment of a Russian naval base in Southeast Asia given the importance of Russia's trade and energy exports with the region.[154]

Nevertheless, Russian military leaders understand that today the RFN's out-of-area deployments must be conducted under permissive conditions, either during peacetime or in remote conflicts, such as the war in Syria. Russian warships must be able to project power without high risk of counterattack because of the overwhelming superiority of US and NATO surface forces in nearly all strategic directions (see Figure 8).

By contrast, during a high-end conflict with a superior naval adversary, such as the US Navy, Russian fleet commanders will almost certainly keep their surface ships close to the Russian mainland where they can operate under protection of shore-based air defenses, layered naval minefields, and coastal

Figure 8. Ratios of Russian vs. US and Allied naval forces in key strategic directions



Source: Moiseev, "Strategic Requirements for the Development of the Navy," p. 16.

[153] Alesker I. Ismailov, Vladimir V. Puchnin, and Alexey Y. Sysuev, "Problems of Mobilization Support of the Russian Navy and Possible Ways to Resolve Them [Проблемы мобилизационного обеспечения российского Военно-Морского Флота и возможные пути их разрешения]," *Voennaia Mysl' 12 (2022)*.

[154] Moiseev, "Strategic Requirements for the Development of the Navy," p. 17.

missile systems.[155] Simply put, without significant changes to surface concepts of operations and ISR support, Russian naval leaders recognize that their surface combatants currently lack the survivability to operate in the world's oceans against a high-end adversary such as the US Navy. There is little evidence of any change in this thinking since 2022. Thus, during high-end conflicts, Russian naval leaders are likely to cede blue-water naval operations to their more survivable fleet of nuclear submarines.

Still, some Russian military leaders are projecting that Russia's surface forces will play a more active role during future conflicts in the world's oceans as their ability to project power using long-range missiles and uncrewed systems expands over time. In 2023, for example, former RFN Chief Admiral Evmenov identified an increase in the spatial coverage of high-precision long-range sea-based land-attack weapons against targets deep inside enemy territory as one of the main trends in the development of armed conflict at sea. In this regard, some observers have noted the addition of long-range hypersonic missiles to the Gorshkov frigate to provide extended strike capability during out-of-area deployments. According to President Vladimir Putin, the deployment of ships armed with the new Tsirkon missile will allow the RFN to respond with lightning speed to anyone encroaching on Russia's sovereignty from the near or far sea zones or the world's oceans.[156]

Others predict that naval drones will play an increasing role in blue-water naval operations as their technology develops. As Evmenov has noted, a key trend in armed conflicts at sea is the growing ability for the simultaneous complex use of marine robotic systems in all physical environments, leading to a significant boost in the capabilities of detection, control, and destruction systems.[157] More recently, he has argued for use of low-observable long-range UAVs that can be launched from either land or sea to find and target enemy warships in the open oceans.[158] If used en masse, such systems could provide the RFN with a more survivable power projection capability that could be used in the world's oceans during a high-end conflict. Another recent article suggested that long-range one-way attack drones, such as the Russian Geranium used in Ukraine, could be used effectively against ships in open oceans.[159] These drones would need to be provided with accurate targeting data, however, along with real-time updates.

Evmenov has also argued for autonomous underwater mine-laying systems for use in remote ocean areas.[160] According to another article, the development of large marine uncrewed underwater vehicles could offer a new means for conducting blue-water anti-surface warfare operations. The article cited as an example the emergence of ultra-large marine drones such as the US-based Orca, which weighs 80 tons and has a range of 6,500 nautical miles. The Orca is also a multirole combat system capable of laying mines, conducting anti-ship and ASW operations, and performing other missions in the world's oceans. For its part, Russia is reportedly developing the Surrogat, a 40-ton uncrewed underwater vehicle designed for

[155] Kryazhev, "Military Security Issues in Russia," p. 45.

[156] Maxim Kirpichnikov, "'Zircons' Have Entered the Work Ocean [Цирконы" Вышли В Мировой Океан]," *Na Strazhe Rodiny,* Jan. 13, 2023.

[157] Evmenov, "The Nature of Armed Struggle at Sea," p. 9.

[158] Evmenov, "Features of the Development of Naval Weapon Systems," p. 44.

[159] Evgeny A. Kovalenko, "The Use of Unmanned Aerial Vehicles in Armed Conflicts [Применение Беспилотных Летательных Аппаратов В Ходе Войн И Вооруженных Конфликтов]," *Morskoi Sbornik* 8 (2023), p. 2.

[160] Evmenov, "Features of the Development of Naval Weapon Systems," p. 46.

theater ASW operations.[161] However, platforms such as Surrogat have yet to enter serial production, and concepts of operations and employment for these systems are still in the early stages of development. Former Vice Admiral Borisov went even further, predicting that uncrewed systems will eventually replace traditional naval fleets for future missions in all areas of the world's oceans.[162]

Russian experts recognize, however, that long-range missile and drone attacks will need to be supported by enhanced over-the-horizon targeting to be effective. Some experts see an increased role for aerospace operations in support of the navy based on the expansion of orbital reconnaissance, navigation, communications, and electronic warfare for both the fleets and low-flying, ballistic, and hypersonic missiles.[163] Yet such systems either do not yet exist or have been deployed only in small numbers (e.g., the Liana satellite constellation). Moreover, as systems emerge, the RFN will still need to devise suitable concepts of operations and employment.

Admiral Moiseev recently raised a more ominous possibility to strengthen Russia's strategic deterrence capabilities in the world's oceans: equipping Russia's general-purpose naval forces with nonstrategic nuclear weapons. Such weapons could be used against large adversary naval groupings in the open oceans where the risk of collateral damage remains low, thereby making them ideal for limited use.[164] Despite such notions, over the short term at least, Russian blue- water operations will have to make do with continuing deployments under permissive conditions of Russia's aging Soviet-era blue-water fleet supplemented by a limited number of modern frigates. Moreover, given the recent shift to producing blue-water frigates and corvettes, it appears increasingly unlikely that Russia will invest heavily to upgrade its Soviet-era cruisers and destroyers further as they approach the end of their useful service lives.

Conclusion

Russian naval theorists are drawing important lessons from the Black Sea Fleet's experiences in Ukraine. They are also reaching preliminary conclusions regarding the implications of those experiences for future wars. They are grappling especially with the setbacks incurred by Russia's Black Sea Fleet due to Ukraine's successful sea denial campaign against Russian warships and naval bases using CDCMs, USVs, and land-attack missiles and how best to counter these asymmetric threats. Thus far, Russian naval theorists remain focused primarily on developing tactical and technological solutions to the many maritime challenges encountered during the war. These include devising measures to shore up ship-based defensive systems, adopting new tactics to increase survivability, improving drone surveillance and electronic countermeasures, and expanding airborne ISR and strike capabilities to interdict UAVs and USVs while in transit.

RFN leaders are also planning to accelerate incorporation of more advanced UAVs and USVs into the navy's existing order of battle as part of a long-term effort to create a hybrid fleet based on a mix of crewed and uncrewed systems. They are also looking to bolster the fleet's long-range strike capabilities by adding hypersonic weapons and enhanced over-the-horizon targeting. They are further advocating for development of robotic platforms for distant operations in the world's oceans.

[161] Evstifeev, "A New Paradigm of War," pp. 67, 69.

[162] Charodeev, "Vice-Admiral Borisov: Naval Drones Will Replace Submarines and Surface Ships."

[163] Evmenov, "The Nature of Armed Struggle at Sea," p. 9.

[164] Moiseev, "Strategic Requirements for the Development of the Navy," p. 20.

Yet at the operational level of war, Russian theorists have offered relatively few options to modify the RFN's existing strategic approaches and operational concepts. Rather, the RFN's main prewar combat missions remain largely unchanged. Moreover, aside from initial efforts to explore new concepts for employing or countering UAVs and USVs, the RFN's operational concepts for carrying out these missions have undergone relatively few modifications. Instead, as noted above, the fleets are focused on acquiring new frigates and corvettes, adopting new weapon systems, and devising TTPs to restore the fleet's ability to maintain local sea control, carry out the homeland defense mission, and bolster the fleet's blue-water naval capabilities.

Moreover, there is little evidence (in Russian military journals at least) that naval experts are considering alternative approaches for achieving these key navy missions in case emerging asymmetric capabilities prove more difficult to overcome and more enduring than currently envisioned. Aside from some preliminary discussions on new operational concepts for countering drones, Russian prewar concepts have remained largely unchanged. Given the foregoing, the RFN should be expected to operate largely as it has in the recent past, including in Ukraine, and in accordance with prewar operational concepts.

Air Dominance Operations

The successes and failures of Russia's Aerospace Forces (*Vozdushno-Kosmicheskiye Sily* or VKS) made up of the air force, air and missile defense forces, and space forces, in the Russia-Ukraine war have spurred much introspection among Russian air power theorists and advocates. Despite this recent ferment, the ideas circulating in discourse about Russian air dominance operations have not fundamentally shifted from pre-2022 themes. Although Russian writers have identified strengths and weaknesses in their own forces and proposed a variety of responses, they have not altered their general assessments on the character of air warfare, nor have they proposed fundamental changes in air

strategy, doctrine, or concepts. Their assessments in public literature remain tied to pre-2022 assumptions and conclusions. To address the problems identified in Ukraine, Russian air power theorists resort to arguments about increasing force size and relying on advanced technology to solve the air force's problems going forward. Therefore, despite some potential adjustments in force size and technological capability, the character of Russian air operations in a future theoretical NATO conflict is unlikely to be radically different from that of current air operations in Ukraine.

Air dominance operations have occupied a critical space in Russian military thinking since World War II. According to the Russian Defense Ministry, the term refers to the following:

> Such an air situation…in which the balance of forces of the opposing sides in the air and the conditions of operations of [armed forces'] aviation allow [aircraft] to successfully carry out assigned combat missions, and the troops (forces) of other types and branches of the Armed Forces—to carry out assigned tasks, without encountering effective counteraction from the enemy's air attack weapons and air defense systems.[165]

Air dominance operations include strike operations, integrated air defense, air-to-air combat, and suppression of enemy air defenses (SEAD) and destruction of enemy air defenses (DEAD).

For decades, modern Russian air dominance operations have been largely conceived in the context of US and NATO operations. First, Russian theorists presumed that they were preparing for a conflict with these rivals. They looked to the US and NATO experience in the Balkans, Iraq, and Afghanistan for insights regarding their rivals' preferred way of war and clues about how they might adopt the successful aspects of US operations. This analysis led them to prioritize acquisition and intellectual theorization that focused on the employment of ground-based air defense and long-range precision strike weapons. As a result, Russian Aerospace Forces have developed world-class ground-based air defense

[165] "Air Dominance [Господство В Воздухе]," Russian Ministry of Defense Military Encyclopedic Dictionary, https://xn--d1abichgllj9dyd8a.xn--90anlfbebar6i.xn--p1ai/encyclopedia/dictionary/details.htm?id=5512@morfDictionary.

and long-range precision strike weapons, but at the expense of rigorous theorizing on other aspects of air operations. Air-to-air operations, SEAD and DEAD, and air strikes at operational depths remain underdeveloped even after three years of war. Operational insights regarding air-to-air combat have received little attention in Russian military operational journals, perhaps because the war has featured mostly desultory long-distance (beyond visual range) air-to-air encounters by aircraft that prefer to avoid flying into the adversary's weapons engagement zone.[166]

To the extent that Russia's own experiences with air dominance operations informed concept development, they were largely measured against the standard set by Russia's rivals. Air operations in Chechnya and Georgia were largely considered unsophisticated and unprofessional by Western standards.[167] To many Russians (and some Western analysts), the Syria intervention beginning in 2015 seemed to announce Russian Aerospace Forces' ascension as a rival to Western air forces. However, operations there masked fundamental differences in the nature of the conflict between anti-regime forces and a potential conflict with NATO.[168]

Successes and failures in the Russia-Ukraine war, 2022–2025

Russia's Aerospace Forces have a highly mixed record in Ukraine. On one hand, their force of strike fighters has not lived up to expectations. Except for a short period at the beginning of the war, the Russian air force has failed to suppress or destroy Ukrainian air defenses, establish air superiority, and establish the ability to operate over Ukrainian-held territory. As a result, air-to-air engagements have also not yielded decisive results. Indeed, Russia has suffered significant losses, and the use of tactical aircraft in Ukraine can generally be considered a failure.[169]

On the other hand, ground-based air defenses have performed reasonably well in the face of unexpected challenges from the Ukrainians. Just as Russian tactical aircraft have struggled to operate successfully over Ukrainian territory, Ukrainian crewed aircraft have also failed to operate successfully in the skies above Russian-held territory. And although Ukraine has successfully executed attacks against critical strategic Russian targets, particularly with uncrewed systems, Russian integrated air defense has likewise been battle-tested, conducting numerous successful defensive operations. Ground-based air defenses have even made contributions in a land-attack role against high-value targets.[170]

[166] For example, the journal *Aerospace Forces: Theory and Practice* is the Air Force Academy's academic journal, but its articles mainly focus on highly theoretical modeling or more esoteric technological issues such as side-lobe radar reflections or determination of missile impact radii. Operational insights from air-to-air combat in Ukraine are virtually nonexistent on its pages.

[167] Anatoly Tsyganok, "The Use of Forces and Means of Electronic Warfare in Wars and Conflicts of the XXI Century [Применение сил и средств РЭБ в войнах и конфликтах XXI века]," *Nezavisimaya Gazeta*, Sept. 20, 2019.

[168] Michael Simpson et al., *Road to Damascus: The Russian Air Campaign in Syria,* 2015-2018, RAND, 2022.

[169] Justin Bronk, "Air Power and Aerial Platforms," in *Assessing Russian Plans for Military Regeneration: Modernization and Reconstitution Challenges for Moscow's War Machine* (Chatham House, 2024), p. 24.

[170] Michael Peck, "Russia's Fearsome S-400 Air-Defense Missiles Are Getting Unexpected Missions as Moscow Struggles in Ukraine," Business Insider, May 25, 2023, https://www.businessinsider.com/russia-using-s400-air-defense-missiles-to-attack-ground-targets-2023-5.

Finally, VKS bomber aircraft have made significant strategic contributions to Russia's war effort, striking energy-generation facilities, critical C2 nodes, and vital economic targets using standoff cruise missile strikes and conducting terrorizing attacks on civilian infrastructure such as apartments and office buildings. Accuracy challenges that emerged early in the war have been largely resolved. Conventional strikes by these strategic assets have generated tremendous stress on Ukrainian resilience and exacted enormous human and economic costs. Nonetheless, it is critical to note that all targets serviced by Russian bombers are fixed in place and immobile, a point that underlines a crucial operational challenge with dynamic targeting that Russian air power advocates have failed to resolve. In addition, Russian political and military leadership has not yet achieved its strategic goal of inflicting a level of punishment that forces Ukraine to end the war on terms acceptable to Russia.

The limited ability of the VKS to have a decisive strategic effect was not entirely unforeseen before the conflict. A February 2022 article by retired Colonel Mikhail Khodarenok, whose last post was in the General Staff's Main Operational Directorate, sounded a dire warning about air operations:

> Sometimes in the Russian expert community it is claimed (by fans of the Douhet doctrine) that since hypothetical military actions in Ukraine will take place under conditions of complete dominance of Russian aviation in the air, the war will be extremely short-lived and will end in the shortest possible time.
>
> At the same time, it is somehow forgotten that the armed formations of the Afghan opposition did not have a single aircraft or a single combat helicopter during the conflict of 1979–1989. And the war in that country lasted for 10 years. The Chechen fighters did not have a single aircraft either. And the fight against them lasted for several years and cost the federal forces a lot of blood and victims.[171]

[171] Giulio Douhet was an Italian general and one of the early 20th century's most important and vocal advocates of strategic air power. Mikhail Kodarenok, "Forecasts of Bloodthirsty Political Scientists [Прогнозы кровожадных политологов]," *Nezavisimoe Voennoe Obozrenie,* Feb. 3, 2022, https://nvo.ng.ru/realty/2022-02-03/3_1175_donbass.html. Khodarenok also tartly commented, "The armed conflict with Ukraine at the present time fundamentally does not meet the national interests of Russia. Therefore, some overexcited Russian experts would be better off forgetting about their self-indulgent fantasies. And in order to prevent further reputational losses, never remember them again."

Khodarenok's warning points to a history of air power failure, one in which the war in Ukraine may prove yet another chapter. But what explains Russia's performance in the air war? This question has received much attention, and productively so, by Western air operations specialists. Russian explanations tend to focus on tactical and technical issues rather than questions about Russian strategy, operational art, or concepts of operations.[172]

But according to Anatoly Sinikov, a retired air force colonel and professor at the General Staff Academy, there is a deeper problem that cannot be repaired by more training or better capabilities. He noted that most of the last three decades of Russian thought has been marked by an erosion of operational art in air combat operations. The result is a set of immature concepts of operation characterized by improper understanding of the value of coordinated joint air operations; underestimation of the complexities of modern command and control, intelligence, surveillance and reconnaissance (C2ISR); and insufficient planning leading to operational failure. "An analysis of theoretical provisions, as well as the results of modeling armed struggle in aerospace," Sinikov wrote, "indicates that there is currently no developed theory of operational art in this area."[173]

Sinikov's explanation sheds light on a crucial gap in Russian thinking on the use of air power at the operational level of war. Despite nearly two decades of military modernization and three years of high-intensity combat, the VKS lacks the foundation in operational art to develop sufficient concepts of operations or employment for much of the modern aircraft that it has built. Three years into the Russia-Ukraine war and more than two years after the publication of Sinikov's article, much of the thinking surrounding air dominance operations remains either stagnant or unable to proceed past the problem identification stage, and it relies on technological solutions to problems that might otherwise be addressed through concept development. As such, Russian operational thinking about the uses of air power has evolved little in response to outcomes in the Russia-Ukraine war.

The Initial Period of War in air operations

As noted in in the Strategic Military Concepts section, critical strategic concepts that were developed before the war and that frame the development of operational concepts largely remain in place. The most important of these regarding air dominance operations is the criticality of the Initial Period of War. Despite the Russia-Ukraine war's protraction, most Russian strategists still argue that wars are most likely to be won and lost in the Initial Period. This view is especially predominant among air power theorists. Moreover, the dominant operational focus of the Initial Period of War remains especially fixed on the aerospace domain, including aerospace combat power sourced from the maritime domain.[174] Yu. V. Krinitsky and V. G. Chekhovsky wrote the following:

[172] See, for example, Justin Bronk, *Russian Combat Air Strengths and Limitations: Lessons from Ukraine,* CNA, Apr. 2023, https://www.cna.org/reports/2023/05/russian-combat-air-strengths-and-limitations.

[173] Anatoly A. Sinikov, "Contribution of Scientists of the Military Academy of the General Staff to the Development of the Theory of Operational Art of the Aerospace Forces (on the 190th Anniversary of the Founding of the Military Academy of the General Staff of the Russian Armed Forces) [Вклад ученых Военной академии Генерального штаба в развитие теории оперативного искусства Воздушно-космических сил (к 190-летию со дня основания ВАГШ ВС РФ)]," *Voennaia Mysl'* 11 (Nov. 30, 2022), p. 134. Sinikov is a retired air force colonel, doctor of military science, and head of a research laboratory at the General Staff Academy.

[174] A. Ulanov, "The Face of Future War [Облик Войн Будущего]," *Armeiskii Sbornik* 11 (Nov. 30, 2022).

> The first and decisive phase of a large-scale military conflict is the aerospace phase. [By destroying enemy aerospace elements and infrastructure] the aerospace troops and forces will not provide for someone, but will do the main thing—create a turning point in the military conflict. At most, they will force the enemy to stop military actions and sit down at the negotiating table. At a minimum, they will create a "delta" of time sufficient to bring the extreme, nuclear argument into the war.[175]

Likewise, a 2023 *Military Thought* article noted the following:

> Preemptive massive air strike by the air force and air defense armies and the long-range air defense command with long-range precision weapons against state and military command and control facilities, zonal air defense and missile defense systems, fixed-position nuclear missile systems, airfields for strategic and tactical aircraft carriers, and enemy naval targets [are considered] new (promising) methods of using units and subdivisions armed with strike and multifunctional [aircraft].[176]

Prewar ideas surrounding the Initial Period of War have had remarkable staying power. Ideas focusing on massive preemptive air strikes by Russian Aerospace Forces are still centerpieces in Russian strategic thinking, and there is a general consensus among air power advocates that aviation formations armed with long-range precision weapons are the most effective force for delivering a first strike.

Conversely, Russian intellectuals have long observed US operations and understand that rapid, decisive air attack at the onset of war is also essential for their adversary's success and that defeating these attacks is crucial. The overriding concern for Russian theorists is the potential of a surprise attack from the aerospace domain. The goals of such an attack, according to Russian defense intellectuals, include massed decapitation strikes on national C2 and the strategic nuclear force carried out by group and single strikes at the tactical level (see Figure 9). "This is a decisive phase not only within the air-space campaign, but also the war as a whole," wrote then–Major General A. G. Semenov."[177] When he wrote this, Semenov was on the verge of being promoted and becoming deputy commander of the aerospace defense forces; his opinion has carried tremendous weight in that community.

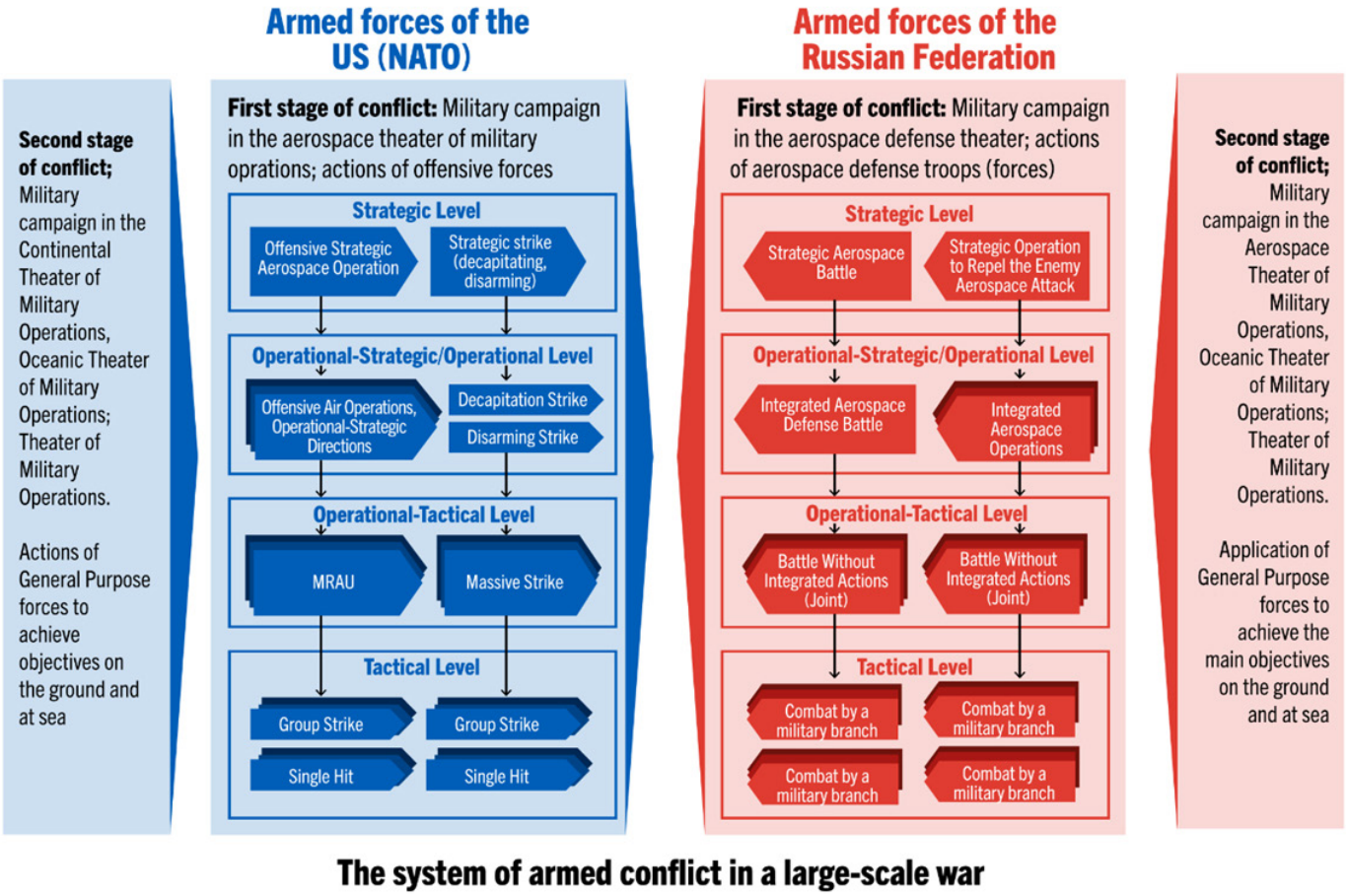
Concerns about the United States' Prompt Global Strike (PGS) capability have remained a significant driver in Russian thinking about the Initial Period of War. PGS is a US Defense Department–wide effort to develop conventional hypersonic boost-glide vehicles capable of precision strike anywhere on earth

[175] Yu. V. Krinitsky and V. G. Chekhovsky, "Spheres of Armed Struggle and Theaters of Military Operations [Сферы вооруженной борьбы и театры военных действий]," *Voennaia Mysl'* 9 (Sept. 30, 2022). Krinitsky has written extensively on aerospace operations and is one of Russia's most well-known authors on the topic. He and Chekhovsky have extensive contacts among senior officers in the Aerospace Forces.

[176] Oleg Yermolin, Nikolay Zubov, and Mikhail Fomin, "Use of Strike Aviation of the Aerospace Forces in Military Conflicts of the Future [Применение ударной авиации Воздушно-космических сил в военных конфликтах будущего]," *Voennaia Mysl'* 2 (2023), p. 21. At the time of the article, Yermolin was the director of the research institute at the Yuri Gagarin Air Force Academy and Zubov and Fomin were senior researchers in the institute.

[177] Semenov, Krinitsky, and Chekhovsky, "Armed Struggle in the Aerospace Theater," p. 20.

Figure 9. The system of armed struggle in a large-scale war



Source: Semenov, Krinitsky, and Chekhovsky, "Armed Struggle in the Aerospace Theater."

within an hour.[178] Given the rapidity of this capability, which is not yet fully developed in the United States, Russian writers view it as yet more confirmation that the United States seeks a rapid global strike weapon capable of preemptively destroying an adversary's ability to attack.

Indeed, PGS attacks for the purposes of "disarming" Russian nuclear forces have received much attention in Russian strategic and operational literature since 2022. For example, a 2024 issue of the General Staff journal *Armeiskii Sbornik* noted the following:

> Currently, the existing and prospective air and space attack weapons of the US and NATO in accordance with the concept of Prompt Global Strike are planned for rapid and sudden use in the first strike echelons to destroy command and control posts and launchers of the Strategic Missile Forces grouping in almost all their deployment areas.[179]

[178] Congressional Research Service, *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues*, July 16, 2021.

[179] A. Petrov and D. Stolyarov, "Neutralizing Prompt Global Strike [Нейтрализуя быстрый глобальный удар]," *Armeiskii Sbornik* 8 (Aug. 2024), p. 64.

These concerns are also widely held among senior military leaders beyond the VKS. For example, in 2023, then–Commander in Chief of the RFN Nikolai Evmenov called out the US Navy's development of Prompt Conventional Strike as a particularly concerning threat that required immediate attention.[180] Given this near-obsessive concern with a US preemptive attack, Russian leadership has continued to emphasize the requirement to blunt and defeat such attacks.

Ground-based air defense

Fears of preemptive attack continue to drive the bulk of Russian air power thinking into integrated air defense operations centered on ground-based air defense. Semenov argued that the first stage of a large-scale conflict with NATO would be characterized by a defensive aerospace campaign aimed at denying NATO objectives in the opening phase of conflict. "Repelling an aerospace attack in the initial period of a large-scale war," Semenov continued, "is an independent and primary strategic task."[181]

Thus, air defense operations occupy a central place in Russian thinking about air power. Russia has long relied primarily on the extensive ground-based component of its integrated air defense system (IADS) to control the air in any conflict with NATO forces. In this sense, the Russia-Ukraine war has both proven the value of this approach to air defense and highlighted areas requiring improvement, such as Identification of Friend or Foe aircraft.[182] But overall, Russian writers are generally positive in their assessments of the performance of ground-based air defense systems and largely approach improvements to these systems as a means of doubling down on a competitive advantage.

Fundamental conceptual changes are largely viewed as unnecessary. Indeed, for some Russian observers, ground-based air defense operations have proven to be so valuable that the very future of air combat may be driven by activities on the ground. One outcome of the war in Ukraine, they argue, is that air defense systems have triumphed over crewed aircraft, marking a reversal of a decades-long trend in favor of crewed aircraft over ground-based air defense. "It seems quite convincing," runs one typical argument, "to judge the end of a long historical period of unpunished dominance of manned aircraft over the battlefield, which, without a doubt, will require a radical revision of the very foundations of the use of the air force at the operational and tactical levels."[183] Put another way, Russian theorists contend that they have won an air power bet by placing their chips on ground-based air defense.

Finally, the major success enjoyed by ground-based air defenses in Ukraine has severely reduced the importance of air-to-air engagements both within the conflict itself and in recent Russian theory on air power (see Figure 10). Both sides are extremely reticent to cross into the ground-based weapons engagement zones, which makes air-to-air engagements comparatively rare, often inconclusive affairs. Writing on air-to-air engagements is similarly rare and inconclusive and tends to focus on highly theoretical or esoteric technical-tactical issues. Based on the comparative absence of articles relating to air-to-air combat, Russian air power thinking heavily biases in favor of ground-based air defense.

[180] See, for example, Nikolai Evmenov, "Prompt Conventional Strike Is the US Navy's Contribution to the Larger Joint Concept of Prompt Global Strike [Основные тенденции изменения характера и содержания военных угроз Российской Федерации с океанских и морских направлений]," *Voennaia Mysl'* 5 (May 2023).

[181] Semenov, Krinitsky, and Chekhovsky, "Armed Struggle in the Aerospace Theater," p. 21.

[182] N. N. Litvinov, "Promising Areas in Introduction of Artificial Intelligence in Air Defense Systems [Перспективные Напрвления Внедрения Искусственного интеллекта в Системах Иротивовоздушной Обороны]," *Vestnik Akademii Voyennykh Nauk* 4/89 (2024).

[183] Gavrilov et al., "Two Years of a Special Military Operation," p. 59.

Judging by results in the skies over Ukraine, these observations will likely be crucial in driving the future of Russian air technology and tactics.[184] Future Russian thinking will almost certainly continue to emphasize the criticality of ground-based air defense, which may have a salutary effect on strike operations by driving future tactical and technological thinking on uncrewed systems; continued cruise, hypersonic, and ballistic missile development; and penetrative technologies. There is little evidence that Russian intellectuals are addressing issues surrounding SEAD and DEAD.

There is another secondary effect of the presumed dominance of ground-based air defense over crewed aircraft. Russian thinking appears to be moving away from deep strikes using crewed aircraft and toward long-range precision weapons, including long-range UAVs. There are some indications that crewed aircraft may fulfill other roles, such as extending radar fields of view and filling gaps in ground-based defense.[185] Air strikes remain an important consideration in Russian military theory but mostly at the tactical level and subordinate to ground operations along the front line. Conceptual advances covering deep strikes by crewed aircraft are few, perhaps in part because of the acknowledged challenges presented by ground-based air defense. Instead, long-range systems are assuming a larger role in Russian thinking about deep strike operations.

Figure 10. BUK M3 surface-to-air missile system employed in Ukraine

Source: "The Buk-M3 SAM System Is the Central Link of the Echeloned Air Defense System [ЗРК «Бук-М3» – центральное звено эшелонированной ПВО]," National Defense, June 30, 2024.

[184] Hunter Stoll, John Hoehn, and William Courtney, "Air Defense Shapes War Fighting in Ukraine," Real Clear Defense, Feb. 22, 2024, https://www.realcleardefense.com/articles/2024/02/22/air_defense_shapes_warfighting_in_ukraine_1013615.html.

[185] V. G. Kazakov and A. N. Kiryushin, "Air Strike: Evolution of Structure in Light of Current Military-Technical Achievements [Авиационный удар: эволюция структуры в свете актуальных военно-технических достижений]," *Voennaia Mysl'* 6 (June 2023).

Long-range precision strike

Before the Russia-Ukraine war, the Russian Defense Ministry made herculean efforts to develop and field a multidomain system of long-range precision strike. This system includes a combination of ground-based ballistic and cruise missiles, air-launched cruise missiles (mounted on long-range, intermediate-range, and short-range strike aircraft), and sea-based land-attack cruise missiles. It was designed to fulfill doctrinal requirements to destroy critically important targets at standoff ranges for conducting decapitation strikes and for escalation management or as part of a cost-infliction strategy. These systems received extensive and successful battle-testing in Syria in 2015 and have been a cornerstone of Russia's campaign in Ukraine.

At the start of the war, Russia used these weapons against strategic air defense sites and critical infrastructure targets in Kyiv, Kharkiv, Kramatorsk, Odesa, and other cities. Boryspil, Kyiv's international airport, was the recipient of multiple strikes, for example. These strikes were all part of a purported effort to secure control of the skies, degrade and destroy Ukrainian C2, and decapitate the government in Kyiv.[186] When they failed, Russia's standoff strike strategy shifted to cost imposition and punishment. Power-generation infrastructure, hospitals, and other civilian targets fell under attack in an effort to convince Ukrainian citizens that continuing the war was not worth the cost.

Like much of Russia's performance in the war, long-range precision strikes have had a mixed record. From a technological perspective, Russian long-range strike assets (missiles and drones) have largely performed as expected (although there were evident targeting and accuracy challenges with some air-launched cruise missiles that were subsequently resolved). Kalibr land-attack cruise missiles, in particular, have proven their efficacy. Despite their generally good technological performance, precision missiles have failed to achieve the strategic goal of knocking Ukraine out of the war because of Ukraine's dogged determination and resilience and successful air defense operations, Russian production limitations, and the perceived need within Russia to conserve resources for the possibility of a NATO war, which diminished the stocks available to be launched against Ukraine.

Russian conclusions regarding the effectiveness and future potential of long-range precision strike are almost uniformly positive, especially regarding those strikes undertaken during the Initial Period of War. According to some estimates, more than 800 ground- and air-based ballistic and cruise missiles were used in the first two weeks of operation. Weapons employed included the full suite of multidomain long-range capabilities, including the Kinzhal air-launched ballistic missile, which had been experimental until that moment. Initial success "inspired reasonable optimism."[187] As a result, Air Force Commander in Chief Colonel General Sergey Dronov sees an increasingly important role for long-range precision weapons, "which [have] changed the nature of conducting air and missile defense."[188]

The course of the war has done nothing to alter this optimism, nor to shake the core assumption that long-range strike warfare will be essential to victory in future war. A team of authors led by V. V. Andreev argued the following:

[186] "Russia Attacks Wide Range of Targets in Ukraine," *Kyiv Independent,* Feb. 24, 2022, https://kyivindependent.com/russia-attacks-wide-range-of-targets-in-ukraine-live-updates/.

[187] Gavrilov et al., "Two Years of a Special Military Operation," p. 57.

[188] S. Dronov, "Features of Aviation Tactics in Modern Combat Operations and Ways to Improve Them [Особенности тактики авиации в современных боевых действиях и пути ее совершенствования]," *Voennaia Mysl'* 1 (2024), p. 21.

> To achieve political and strategic goals, the emphasis will be on "non-contact" warfare and the widespread use of various high-precision "smart" weapons systems of various purposes and locations. The "non-contact" nature of military action itself will involve the destruction or incapacitation of the enemy at long distances long before combat contact.[189]

A successful initial campaign might even mean preventing the adversary's ground troops from deploying to defensive positions.[190] This opinion, often nested within assumptions about the Initial Period of War, is widespread among Russian writers.

Standoff strike also occupies a central place in the continuing phase of war beyond the Initial Period. If a standoff strike campaign is required, Russian experts note that the prioritization of targets may shift. According to Serzhantov, one of Russia's most influential theorists of war, "The initial impact will be focused on the political leadership of the state, then on its life support systems, subsequently on the infrastructure, economy, population and, finally, armed forces."[191] Russian intellectuals generally agree that use of precision weapons will become more widespread in future conflicts and that these weapons' use against fixed ground targets will play a central role in resolving other challenges such as air dominance. "In the near future," said a 2023 article, "high-precision weapons of various classes will play a primary role in achieving air supremacy."[192] Given that Ukraine's ability to relocate its aircraft rapidly mitigated the damage of Russian strikes, the evidence for this assertion is unclear. Nevertheless, the emphasis on long-range strike may also be read as an admission that achieving air supremacy via air-to-air means alone is not achievable in the next decade.

An important and definitive technological evolution in Russian long-range precision strike has been the growing use of long-range UAVs. Before the conflict, most discussions of long-range strike centered on the use of cruise missiles or short-range ballistic missiles. The expansive prewar Russian literature on UAVs focused on their use for ISR and as communications relays. But the war has ultimately expanded Russian thinking on the topic. The purchase and production of Iranian Shahed drones has dramatically enhanced Russia's ability to carry out these strikes. At the same time, on the tactical level of war, loitering munitions such as Lancet and Kub drones have had a major impact on the battlefield. Denis Fedutinov, an uncrewed systems specialist at the think tank Caspian Institute for Strategic Studies, said, "We can say that a certain turning point has occurred in the attitude of the domestic military toward this type of weapon, and now we, albeit belatedly, are beginning to make up for lost time by using the positive properties inherent in these systems."[193] The evident effectiveness of UAV operations in long-range precision strike has led to calls to deploy them to strategically exposed regions such as Kaliningrad.[194]

[189] V. V. Andreev et al., "Features of the Use of Aviation Groups in Military Conflicts of the Future [Особенности применения группировок авиации в военных конфликтах будущего]," *Voennaia Mysl'* 6 (June 2022). The authors go on to write that enemy C2 nodes will have the highest targeting priority.

[190] Serzhantov, Smolovy, and Terentyev, "Transformation of the Contents of War," p. 29.

[191] Serzhantov, Smolovy, and Terentyev, "Transformation of the Contents of War," p. 29.

[192] Yermolin, Zubov, and Fomin, "Use of Strike Aviation of the Aerospace Forces," p. 25.

[193] "How a Special Operation in Ukraine Changed Russian Weapons and the Military-Industrial Complex [Как спецоперация на Украине изменила русское оружие и оборонно-промышленный комплекс]," TASS, Feb. 22, 2023, https://tass.ru/armiya-i-opk/17115401.

[194] Yu. M. Zverev, "Military Security of Kaliningrad Oblast and Strengthening the Role of the Exclave Region in Ensuring Russia's National Security [Военнаяа Безопаность Калинниградской Области И Уцилеие Роли Еxсклавного Региона В Обеспечении Национальной Безопасности России]," *Vestnik Akademii Voennikh Nauk* 4/89 (2024), p. 56.

In the end, the Russian experience in Ukraine has served to confirm the biases of many Russian air power theorists. However, there have been few attempts as of 2025 to grapple with evident holes in their existing theories. Mikhail Kodarenok's missive about the problems of relying solely on air power to win wars appears to have been largely ignored as Russian intellectuals double down on preexisting thought.

Suppression and destruction of enemy air defenses and operational deep strike

During the immediate lead up to the conflict in Ukraine, Russian ISR assets were able to accurately identify and map Ukrainian air defense systems, which made no effort to avoid detection. As a result, Russian missile strikes and electronic attacks against air defense sites were reasonably successful. According to a recent CNA study, Russian joint forces accurately engaged more than 75 percent of sites in the first days of the invasion. Standoff missile strikes were followed by tactical aviation, especially Su-34 fighter bombers, which were able to engage targets nearly 200 miles into Ukraine.[195] However, once the Initial Period passed and Russian assets were unable to conduct unchallenged ISR mapping, Russian efforts against enemy ground-based air defenses began cascading into failure.[196] Since then, the VKS has proven inadequate to the task, and SEAD and DEAD operations have largely failed over the course of the war.

The Russian air force approaches the question of SEAD and DEAD differently from the United States. Historically, threat perceptions in the Initial Period of War drove Russian air power theorists to put a higher priority on air defense than on SEAD and DEAD operations. Most theorists focused on denying their adversaries the ability to conduct air operations at tactical, operational, and strategic depths. They spent less time considering how best to roll back IADS as a precursor to a long-term strike campaign. As Russian airpower writers have noted, "It can be assumed that in the general concept of aerospace defense, the main semantic load still falls on the concept of 'defense.'"[197]

Historically, the result has been a cognitive bias that favors ground-based air defense over SEAD and DEAD. Moreover, until relatively recently, Russia lacked significant long-range precision strike capabilities—including modern penetrating strike aircraft—that might be required to destroy modern ground-based air defenses. In short, the urgent perceived need to defend against a NATO preemptive attack cast a long shadow over efforts to conduct SEAD and DEAD in support of offensive operations. Inability to suppress or destroy air defenses has had the knock-on effect of severely diminishing Russia's ability to conduct an air campaign at operational depths in Ukraine. "It is for this reason," wrote General Igor Semenchenko, "that Russian aviation cannot yet operate deep inside Ukrainian territory and provides support to Russian groups of units only on the battlefield and on a limited scale."[198]

To the extent that Russia has a developed SEAD doctrine, it hinges on the concept of "Overcoming Air Defense" ("Преодоление ПВО"). The Russian Defense Ministry defines this concept in part as "a

[195] Bronk, *Russian Combat Air Strengths and Limitations*, pp. 4–5.

[196] Frequent relocation of Ukrainian air defense has also played a major role in this outcome.

[197] Valentin Dybov and Yuri Podgornykh, "There Is No Comprehensively Developed Theory of Aerospace Defense Yet [Всесторонне проработанной теории ВКО пока нет]," *VKO* 6 (2015), http://www.vko.ru/oboronka/vsestoronne-prorabotannoy-teorii-vko-poka-net.

[198] Igor Semenchenko and Oleg Falichev, "Russian Aerospace Forces Have Gained Air Superiority, Not Dominance [ВКС России завладели превосходством, а не господством в воздухе]," *Nezavisimoye Voyennoye Obozreniye* 9 (Mar. 17, 2023), p. 10. Semenchenko was a major general of aviation and adviser to the Russian Federation Council Committee on Defense and Security.

set of measures and combat operations of aviation, electronic warfare systems and various weapons aimed at reducing the effectiveness of enemy air defense systems and ensuring the successful completion of missions by aviation."[199] A subcategory of Overcoming Air Defense is "Breakthrough" ("Прорыв"). In short, this is the effort to suppress or destroy IADS "*in designated flight strip(s)* and in the areas of action of strike (landing) groups by specially allocated aviation forces, as well as fire damage and electronic warfare means of interacting troops (forces)."[200]

The critical point in these definitions is that Russian thinking on SEAD focuses almost entirely on the point of attack—air defenses are suppressed and destroyed only in "strips" across the front line and at the local point of attack. Prominent military analyst Aleksander Timokhin noted that Ukraine's decentralized air defense system capitalizes on weaknesses in Russian SEAD theory by distributing sensors and shooters across wide swathes of territory, diluting the effectiveness of any focused efforts at the point of attack. This dilution, in turn, does not allow an operational deep strike campaign to unfold because it does not effectively eliminate ground-based air defense. Timokhin argued the following:

> The defeat of the enemy's air defense is carried out as a measure to support the air strike and only in the zone of this strike and the flight to the target and back….Aviation must carry out combat missions without defeating the entire enemy air defense, striking only those of its objects that interfere with a specific attack.[201]

Unlike in the United States, where joint forces are used to conduct SEAD and DEAD *systematically* theaterwide, in Russia, air power thinkers have historically focused almost entirely on tactical efforts at the point of attack, not systematic operations across the theater. The effect of this focus is twofold: strike aircraft tend to be subordinated to the immediate tactical needs of a ground operation and does not allow for a strike campaign to unfold because it is ineffective against disaggregated mobile IADS such as those in Ukraine.

Russian air power thinkers are also proposing structural changes to the Russian joint force to address this problem. For example, Timokhin argued that the problem is "unsolvable" short of fundamental reorganizational measures that allow the air force to conduct independent operations

[199] "Overcoming Air Defense [Преодоление ПВО]," Russian Ministry of Defense Military Encyclopedic Dictionary, https://encyclopedia.mil.ru/encyclopedia/dictionary/details.htm?id=9329@morfDictionary.

[200] "Breakthrough [Прорыв]," Russian Ministry of Defense Military Encyclopedic Dictionary, https://энциклопедия.минобороны.рф/encyclopedia/dictionary/details_rvsn.htm?id=9461@morfDictionary. Author's emphasis.

[201] Aleksander Timokhin, "Air Defense Suppression from World War II to Ukraine [Подавление ПВО: От Второй Мировой До Украины Аэрокосмическое обозрение]," *Aerokosmicheskoye Obozreniye* 4 (2023), p. 39.

that are not subordinated to the needs of ground troops.[202] There is currently no sign that any such reorganization is being planned for the post-Ukraine era. On the contrary, deepening integration of the VKS into joint operations is a common refrain.[203]

Indeed, despite increased attention, Russian thinking on SEAD and DEAD operations has made little progress in the war even in military circles. Dronov's survey of air operations in the war made only oblique mention of "suppressing (disrupting) the zonal-object air defense and missile defense system across the entire depth of the theater of operations." He offered few details or solutions for how to do so. He did note, however, the structural challenges identified by Timokhin:

> Against the background of the actions of the Ground Forces, strike aviation is assigned (for various objective and subjective reasons) an auxiliary role….Strike aviation practically does not perform tasks in the operational depth of enemy troops to destroy communication facilities (bridges, crossings, railway junctions, trains with troops and equipment).[204]

Given Dronov's seniority, this structural reform—removing the VKS from a joint construct that effectively subordinates it to the Ground Forces—may be a topic of debate in the future, but serious efforts at change do not appear to be afoot in early 2025.

The VKS is also seeking to solve modern SEAD challenges by falling back on advanced technology rather than updating operational concepts. Its approach to this problem in recent decades has largely been to use small packages of modern combat aircraft such as Su-35s and Su-34s with modular ELINT sensor and jamming pods to locate and possibly suppress local air defense radars.[205] The VKS has also made uneven attempts to develop specialized ELINT-gathering aircraft but with much less success. Since early 2022, there has been very little discussion of operational art and concepts of operations associated with SEAD and DEAD that do not rely on standard doctrine. In specialized domestic literature, the need for military aviation to conduct a targeted and systematic fight against enemy ground-based air defense throughout the entire theater of operations—a fundamentally different proposition from current Russian doctrine—has received almost no attention.

After three years of conflict, there remains a disconnect between operational requirements and the development of concepts and TTPs that would allow the air force to conduct SEAD and DEAD successfully. Without this thinking, training on new TTPs is also far in the future. Russian strike training remains rudimentary and focused largely on scripted exercises that do little more than reinforce traditional techniques that emphasize rigid tactical execution. The Russian air force also does not have an equivalent to the US Red Flag air combat exercise in which new concepts might be tested.[206] In short, the less effective concepts of Overcoming Air Defense and Breakthrough will likely remain in place in the near- and mid-term and will likely restrict Russia's ability to develop effective SEAD and DEAD.

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[202] Timokhin, "Air Defense Suppression from World War II to Ukraine," p. 39.

[203] Kazakov and Kiryushin, "Air Strike: Evolution of Structure."

[204] Dronov, "Features of Aviation Tactics in Modern Combat Operations," p. 21.

[205] Although Russia advertises these pods' ability to conduct electronic attack (jamming), there is some indication that the jamming pods are used only for self-protection of the aircraft, not electronic suppression of radars required for SEAD and DEAD. Piotr Butowski, *Russia's Warplanes: Russian-Made Military Aircraft and Helicopters Today* (Harpia Publishing, 2015), pp. 85–86.

[206] Bronk, *Russian Combat Air Strengths and Limitations.*

C2, ISR-T, dynamic targeting, and COPs

Across the spectrum of air dominance operations, from ground-based air defense to SEAD operations and long-range strike, Russian writers acknowledge the challenges of C2; intelligence, surveillance, reconnaissance, and targeting (ISR-T); and establishing a joint COP. In air operations, the end result is a fundamental inability to conduct dynamic targeting and battle damage assessment consistently and effectively. Although the problem is less pronounced at the tactical level because of the use of uncrewed systems to support artillery, it becomes far more significant at operational and strategic levels.

Indeed, Russia's vaunted "reconnaissance-strike complex," which has received so much attention from Western and Russian writers alike over the last decade, has shown itself to be decidedly lacking in the ability to conduct dynamic targeting and destroy targets when they are on the move. Although great strides have been made at the tactical level of war via the use of UAVs, Russia has not been able to mount large-scale air operations capable of combining effective ISR, rapid C2, and responsive, dynamic strike. In addition, although the use of UAVs has improved matters, effective battle damage assessment remains a significant challenge in large-scale air operations.

Russia's long-range reconnaissance-strike complex has been neither sensitive to emergent targeting requirements nor flexible enough to attack such targets when they appear.[207] All of the targets of Russia's standoff precision strike weapons have been fixed in position and frequently locatable on a map or a global positioning system. Although this is not a problem when targeting critical infrastructure, it badly diminishes Russia's ability to strike emerging high-value or high-priority targets that may fundamentally affect strategic outcomes.

That is, all of Russia's deep strikes are the result of deliberate, not dynamic, targeting. Deliberate targeting processes produce planned targets that are known to exist in the operational environment. Dynamic targeting focuses on targets of opportunity that are unplanned or unanticipated and requires robust ISR combined with agile C2.[208] The need for dynamic targeting can emerge from several sources. An adversary unit may suddenly pose a danger to friendly forces, or it may unexpectedly present a lucrative but fleeting opportunity for advantage. Identifying and striking these targets requires persistent and thoroughgoing ISR, rapid C2 mechanisms, and leadership decision-making flexibility.

Beyond the forward line of its own troops, Russian writers recognized even before the war that these traits are in short supply in their own reconnaissance-strike complex. A 2021 article published in *Military Thought* made the tacit admission that Russia is still lagging in the development of a wide variety of platforms, including "advanced fixed-wing and rotary, low-altitude and stratospheric, reconnaissance and reconnaissance-strike, fighter and jammer, and relay and radar surveillance and

[207] The odd case of the Ukrainian LST *Yuriy Olefirenko* proves the point. Early in the war, this lumbering Cold War–era ship bombarded Russian positions in Kherson from within sight of the coastline and then escaped without facing any counterattack. Later, a Russian aerial drone located the vessel, but with neither ships nor aircraft available to attack it, the Russian military resorted to an artillery bombardment from which the vessel escaped unscathed. A land-attack cruise missile finally destroyed it in port a year later. Michael Petersen, "Russian Navy and Naval Platforms," in *Assessing Russian Plans for Military Regeneration: Modernization and Reconstitution Challenges for Moscow's War Machine* (Chatham House, 2024), p. 34.

[208] Joint Publication 3-60, Sept. 28, 2018, *Joint Targeting, pp. ix–x.*

guidance UAVs."[209] In late 2022, Anatoly A. Sinikov, the outspoken critic of the state of Russian operational art, pointed out that one of Russia's fundamental problems with air operations is "underestimation of communications, intelligence and control issues in the preparation and implementation of operations, due to shortcomings in the development of the technical base of components of the theory and practice of military art."[210] Thus the problem is twofold: lack of technological development and a failure of operational art to comprehend the modern battlefield in the air. Despite the major—and largely successful—effort to recapitalize Russian military capabilities under President Putin, critical faults remain in ISR-T and C2.

Remedying this problem is a major focus area moving forward, with improved C2 receiving the most emphasis. Importantly, these discussions focus almost exclusively on technological solutions while ignoring human factors such as decision flexibility. For decades, VKS pilots have operated under the tight command of ground-control or air-control intercept personnel.[211] This situation shows no evidence of evolving because virtually all Russian analysis focuses on technological solutions to information flow challenges rather than retooling concepts of operations and employment.

For example, a typical argument in favor of better C2 holds that "without fast and highly organized data transmission systems, none of the projects for the development of weapons systems, forms and methods of using military and other formations in future wars is, in principle, possible."[212] Likewise, then–Defense Minister Sergei Shoigu argued in 2023, "We need to improve the management and communications system. For these purposes, we will actively use artificial intelligence technologies."[213] The widely accepted solution to C2ISR problems that hinder dynamic targeting is faster, more accurate information transmission. Comparatively, evidence of serious thought given to *concepts of operation* that enhance dynamic targeting capabilities is sparse.[214] If air power theorists in Russia are discussing decentralizing C2 and giving pilots more authority (and training) to engage targets dynamically, those conversations are not happening in public Russian military journals. There is little evident appetite for such decentralization.[215]

Future evolution: technology and innovation

Shoigu's notion of using AI to improve Russia's combat performance highlights a key point. There is clear reliance on technological innovation as the

[209] S. N. Kurilov, A. N. Kiryushin, and Yu. N. Moiseyev, "Current Problems of Air Forces Tactics and Ways to Solve Them [Современные проблемы тактики Военно-воздушных сил и пути их решения]," *Voennaia Mysl'* 6 (June 2021), p. 22.

[210] Sinikov, "Contribution of Scientists of the Military Academy of the General Staff," p. 134.

[211] Bronk, "Air Power and Aerial Platforms," p. 24.

[212] Gavrilov et al., "Two Years of a Special Military Operation," p. 61.

[213] "Shoigu: 'The Russian Armed Forces' Command and Communications System Will Be Improved Using AI Technologies [Шойгу: 'систему управления и связи ВС РФ усовершенствуют с применением технологий ИИ']," TASS, Jan. 10, 2023, https://tass.ru/armiya-i-opk/16766161.

[214] Aleksandr Ananyev, Kirill Ivannikov, and Artem Chernysh, "Efficiency of the Reconnaissance Aviation Complex [Эффективность разведывательного авиационного комплекса]," *Armeiskii Sbornik* 3 (2022).

[215] I. P. Churkin, "Development of the Combat Control System for Aviation in the Arctic Zone of Responsibility for Air Defense [Развитие системы боевого управления авиацией в Арктической зоне ответственности за противовоздушную оборону]," *Voennaia Mysl'* 4 (Apr. 2023).

solution to Russia's warfighting problems in dynamic long-range targeting, SEAD and DEAD, C2-ISR, and even ground-based air defense. Most Russian elites are largely ignoring solutions that might be found in operational art and concept development. This departure point is resulting in three overall trends in thinking about the future of air operations: (1) expanding acknowledgment of the increased importance of multimission aircraft, (2) expanding and accelerating Russia's reconnaissance-strike complex via the use of uncrewed systems, and (3) including the use of AI in analysis and C2. Of note, these public conclusions about the evolutionary direction of future air operations do not include discussions about reforming *how* the VKS fights. Indeed, instead of considering changes to concepts and doctrine, the force is leaning heavily into technological solutions that allow the VKS to execute existing concepts better.

A key trend in thinking about air operations is the move away from specialized combat aircraft and toward the development of future multimission combat aircraft.[216] Late Cold War Soviet combat aircraft development was characterized by narrow tactical combat aviation specialization into strike fighters, interceptors, air superiority fighters, and other mission-specific platforms. Contemporary Russian writers largely agree that modern aircraft such as the Su-35 multirole aircraft collapse these distinctions. A typical example of this thinking is found in a 2023 article in *Military Thought* by Colonel Oleg Yermolin, the director of the Russian Air Force Academy's Research Center. After describing the various roles performed by modern aircraft in Ukraine, he concluded, "It is highly likely that we can talk about the integration of attack and bomber aviation into one type—strike aviation."[217]

This increased emphasis on the development of multimission aircraft is widespread. It has led to calls, particularly from air force training and education institutions, for more intensive and longer training periods for pilots and senior air force leadership. However, Soviet and Russian air force training programs have consistently fallen short of providing their pilots with the ability to exploit fully the most advanced aircraft in the force since at least the early 1970s.[218] Training events remain heavily scripted affairs that offer few opportunities for experimentation even though there is no shortage of proposals for training that models tactical engagements.[219] As of 2025, there remains a significant gap between air power theorists' calls for more training and the force's willingness and ability to follow through.[220] The result is that even if the Aerospace Forces continue to transition to multirole

[216] E. A. Linnik, D. V. Mitrofanov, and V. I. Stuchinsky, "Patterns and Principles of Developing Operational Requirements for the Structure and Composition of Aviation Groupings in the Strategic (Operational) Direction [Закономерности и Принципы Разрботки Оперативных Трбований к Струтруктуре и Составу Группиировки Авиации на Стратегическом (Операцинном) Направлении]," *Vozdushno-Kosmicheskiye Sily: Teoriya I Praktika* 31 (Sept. 2024), p. 10.

[217] Yermolin, Zubov, and Fomin, "Use of Strike Aviation of the Aerospace Forces," p. 21. Some Soviet-era specialized ISR platforms have reportedly been considered for service in Ukraine, but there is no evidence that they have systematically appeared over the battlefield. Thomas Newdick, "Soviet-Era M-55 Spy Plane May Be Headed to Support the War in Ukraine," The War Zone, Nov. 21, 2023, https://www.twz.com/soviet-era-m-55-spy-plane-may-be-headed-to-war-in-ukraine.

[218] Central Intelligence Agency, *Soviet Air Defense Aviation: Training and Operations*, https://www.cia.gov/readingroom/docs/DOC_0000969825.pdf.

[219] S. I. Makarenko and I. E. Afonin, "Modeling of Combat Aviation Operations and Assessment of Their Effectiveness: Analysis of Works, Models, Current Research Directions [Моделирование боевых действий авиации и оценки их эффективности – анализ работ, моделей, актуальных направлений исследований]," *Vozdushno-Kosmicheskiye Sily: Teoriya I Praktika* 32 (2024).

[220] Linnick, Mitrofanov, and Stuchinsky, "Patterns and Principles of Developing Operational Requirements;" Bronk, *Russian Combat Air Strengths and Limitations*.

aircraft while concepts of operation and employment remain underdeveloped, training programs will almost certainly be inadequate to the task unless they are massively altered from their current form. Related skills required for long-range strike, dynamic targeting, and SEAD and DEAD will continue to languish even as fighter technology improves.

The war has also accelerated thinking about hybrid (crewed and uncrewed) air units. Before the war, Russian development in this regard focused on the "Okhotnik" ("Hunter") uncrewed combat aerial vehicle (UCAV) (see Figure 11). The intent was to deploy the UCAV either independently or with advanced fighter aircraft as a "loyal wingman." The Okhotnik has been deployed only twice in Ukraine, but the war has expanded thinking in Russia about the possible uses of uncrewed aerial systems (UASs), including for SEAD, reconnaissance, air-to-air combat, and strike operations.[221]

UAS platforms that were imagined solely as reconnaissance aircraft before the war are now broadly being considered for expanded lethal purposes. Russian strategists generally agree on the value of UASs as part of a hybrid (crewed and uncrewed) reconnaissance-strike complex. Yermolin argued in 2023 that to improve the effectiveness of strike operations, it is necessary to deploy specialized reconnaissance and strike UAVs across the air force:

Figure 11. The Okhotnik UCAV flies with a Russian Su-57 combat aircraft

Source: Screenshot captured from Russian Ministry of Defense website video.

[221] Thomas Newdick, "Russia's S-70 Hunter Drone Was Armed When Shot Down by Friendly Fighter Over Ukraine," The War Zone, Oct. 7, 2024, https://www.twz.com/air/russias-s-70-hunter-drone-was-armed-when-shot-down-by-friendly-fighter-over-ukraine.

> [These platforms should be] capable of operating both independently and as part of mixed tactical groups of manned and unmanned aircraft.... Already today, and especially in the future, reconnaissance aviation as a type of OTA [operational-tactical aviation] will organizationally transform into aviation formations of reconnaissance and strike aircraft in manned and unmanned versions, solving tasks at both operational and strategic levels.[222]

The central challenge of this hybrid force structure is that it risks overloading pilots with too much information and too many responsibilities. As retired air force Colonel Nikolay P. Zubov noted, "The use of AI in the interests of intelligent support of aircraft crews when they solve tactical tasks of UAV control is due to the fact that in a combat situation, they experience an information and intellectual load close to the limit of their physiological capabilities."[223] Specifically, Zubov advocated for the use of AI in six applications for hybrid formations:

- Air defense supported by UAVs
- Low-altitude flights to overcome air defense
- Air-to-air combat against enemy air defense fighters
- Search and targeting of specific objects
- Repeated approaches to targets and maneuvering to exit the combat area
- Continual scanning of the information space when flying along return routes

Tellingly, however, Zubov and other advocates propose the use of AI at the tactical level of war. Use of AI for developing concepts of operation for SEAD, strike, and other functions that reside at levels above the tactical does not appear in public professional literature. In any case, the net effect of the growth of multimission aircraft combined with uncrewed systems is a massively increased burden on human pilots. This burden is not being matched with improved training that might allow Russia to improve its chances of success in the air warfare areas noted above.

The war has also shown that Russia's attempts to develop a functional COP to improve its C2 of forces have fallen short. For example, the inability of ground-based air defenses to generate a COP that allows them to distinguish between friendly and enemy aircraft has led to several failures that have caught senior leaders' attention. Colonel General Dronov's survey of the war called out friendly fire as an "unfavorable factor" in Russian air operations. He noted a need for "improving the identification system in the Russian air force in order to eliminate the prerequisites for the loss of aircraft from 'friendly fire.'"[224] The clear implication here is that, despite the overall success of Russian ground-based air defense forces, they shot down enough friendly aircraft that the chief of the air force took notice and called it out in public. This has been an area of concern for the air force since at least 2008, when ground-based air defenses shot down as many as six friendly combat aircraft.[225] Russian ground-based air defenses, it

[222] Yermolin, Zubov, and Fomin, "Use of Strike Aviation of the Aerospace Forces," p. 20.

[223] Nikolay P. Zubov, "Possibilities of Using Artificial Intelligence in Tactical Tasks of Controlling Unmanned Aerial Vehicles by Crews of Aviation Complexes [Возможности применения искусственного интеллекта в тактических задачах управления беспилотными летательными аппаратами экипажами авиационных комплексов]," *Voennaia Mysl'* 4 (2022), p. 89.

[224] Dronov, "Features of Aviation Tactics in Modern Combat Operations," p. 21.

[225] "Russia 'Shot Down Its Own Planes,'" BBC, July 9, 2009, http://news.bbc.co.uk/2/hi/europe/8142999.stm.

might be said, are perhaps *too* successful at shooting down aircraft.

Similar to the challenge of hybrid force structure, the most common proposed solution to the Aerospace Forces' COP and C2ISR challenges is the integration of AI into operations. Russian military scientists have dedicated several studies to the use of AI in air operations to coordinate intelligence gathering, increase the pace of processing and analysis, and provide decision-makers with improved awareness, a greater variety of options, and faster decision timelines.[226] There have also been studies suggesting how AI might improve air defense. Suggested paths forward include sending the missile radar feed to an AI engine to generate a database that allows quicker target acquisition, identification, and engagement and using AI to scan the electronic environment for jamming, anticipate high-interference frequencies, and adjust away from them dynamically. In addition, Russian writers propose using AI to discern false targets from real ones in dense air strikes and to improve diagnostics and maintenance.[227]

Russian writers envision a future military that can use these tools to efficiently manage multiple streams of intelligence collection, rapidly fuse analysis, and then create a COP that is distributed throughout the force in near real time. (Note that this was the vision for the Russian National Defense Management Center, so the investments in the center have not paid off in ways envisioned by the Ministry of Defense.) Dronov articulated the massive scope of the challenge:

> The main areas of improvement of the control system are the creation and ensuring the effective functioning of a single intelligence and information space by ensuring the reliable functioning and widespread use of global satellite navigation and communication systems that form the combat control field in the theater of military operations (TVD); groupings of reconnaissance artificial earth satellites for conducting electronic, radar and imagery reconnaissance; ground (surface) and air reconnaissance forces and assets; air elements of reconnaissance and strike complexes (RUK), including the A-50 aircraft, airborne control posts and UAVs, combat control and communication signal repeaters; systems of automated control points in subdivisions, units, formations and associations of branches and arms of the armed forces; ground points for receiving and processing space and air reconnaissance information; automated planning systems for the use of precision weapons, development of combat and flight missions, located in headquarters and command posts for various purposes.[228]

[226] S. A. Antipova, V. V. Labets, and M. P. Filiyaev, "Conceptual Foundations for the Application of Artificial Intelligence Technologies in the Logistics System of the Armed Forces of the Russian Federation [Концептуальные основы применения технологий искусственного интеллекта в системе материально-технического обеспечения Вооруженных Сил Российской Федерации]," *Voennaia Mysl'* 7 (2023); A. Ulanov, "On Possible Areas of Application of Artificial Intelligence in Automation Systems of the Air Defense and Missile Defense Forces of the Russian Aerospace Forces [О возможных направлениях применения искусственного интеллекта в комплексах средств автоматизации войск ПВО-ПРО ВКС России]," *Armeiskii Sbornik* 2 (2022).

[227] Litvinov, "Promising Areas in Introduction of Artificial Intelligence in Air Defense Systems." Adaptive frequency hopping technology is well into development and has the potential to be adopted at scale more quickly than other technologies. See, for example, Pascal Thiele et al., "Machine Learning Based Prediction of Frequency Hopping Spread Spectrum Signals," 2023 IEEE 34th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Toronto, Ontario, Canada, 2023.

[228] SV Dronov, "Features of Aviation Tactics in Modern Combat Operations and Ways to Improve Them [Особенности тактики авиации в современных боевых действиях и пути ее совершенствования]." *Voennaia Mysl' 1 (2024).*

Russia's evident inability to achieve this via uncrewed means is notable, and the calls for the use of AI to do so will almost certainly increase. Senior Russian officials point out that AI is already being used in the conflict, but given Dronov's 2024 critique, it is not clear that the use of AI is bearing as much fruit as experts had hoped.[229]

Conclusion

Russian air power theorists are making clear observations about the Aerospace Forces' experience in Ukraine, but those observations are not being translated into doctrinal adjustments or new operational concepts for the future battlefield. In many cases, their observations regarding air power are largely serving to confirm prior assumptions about the character of war and reinforcing rather than challenging previous decades of air power thinking. The practical result is that there is almost no effort, at least in public writing, to reshape that doctrine—and therefore training and TTPs—in ways that might lead to more success in future wars. In short, Russian Aerospace Forces will likely operate in the future much as they are today.

Part of the reason is the parlous, even poor, state of Russian operational art regarding certain aspects of air power employment. As early as a decade ago, and perhaps earlier, Russian writers were noting shortcomings in conceptual thinking about complicated challenges such as dynamic targeting and SEAD. That thinking, which might have asked hard questions and forced discussions about operational innovation, does not appear to have matured even after more than three years of the Russia-Ukraine war.

Instead, Russian air power analysts almost uniformly tend to focus on technological solutions to challenges that might also be addressed by making changes in standing training and TTPs: information flows are sped up via automation while human initiative is downplayed, and aircraft are equipped with more sophisticated technologies but concepts for employing that technology remain undeveloped. As a result, although the Aerospace Forces may become more technologically advanced, *their ability to exploit the full benefits of that technology will likely remain limited*. This is consistent with prewar Russian analysis that tended to focus on technological advances but did not consider the necessary doctrinal and other changes necessary to exploit that technology.

There are modest indications that this situation may shift in the future, but it is too early to tell when this change may occur or how extensive it may be. Observers such as Commander of the Air Force Sergey Dronov, Anatoly Sinikov at the General Staff Academy, and Aleksander Timokhin, whose influence comes from his larger public presence and platform, have begun discussions regarding concept development and structural reform. By and large, however, Russian military scientists are emphasizing technological advancements to improve a set of fundamental assumptions about the nature and character of war that remain wedded to pre-2022 conclusions. Most writers within and outside the VKS are focused on learning lessons to improve tactics and weapon systems but do not see the need for major reforms of previous conclusions. As a result, the air power doctrine remains largely unchanged from early 2022. Russian intellectuals are doubling down on the importance of ground-based air defense and, despite its evident strategic failures, long-range precision strike.

[229] "Denis Manturov Held a Session on the Use of Artificial Intelligence to Enhance the Combat Capabilities of Weapons and Control Systems [Денис Мантуров провёл сессию по применению искусственного интеллекта для наращивания боевых возможностей вооружения и систем управления]," Government of Russia, Jan. 31, 2025, http://government.ru/news/54105/.

Implications

This study argues that despite the many setbacks incurred in Ukraine and the rapid pace of technological and tactical innovation, Russian military leaders are largely adhering to the country's prewar military strategic and operational concepts. Instead of revising or updating operational concepts in light of setbacks in the war with Ukraine, they are relying on advanced technology to apply existing ideas onto a 21st-century battlefield. Indeed, Russian military writers generally see the war in Ukraine as validating conclusions reached about the nature of armed conflict over the past two decades. They frequently (and often obliquely) imply that the failure of the military to achieve victory is essentially a failure to acknowledge and apply their ideas properly.

Russia continues to frame its strategic competition with the West in many of the same ways it did before 2022. Likewise, it is preparing for war with NATO with most of the same assumptions and ideas in mind. Its theory of victory still rests on setting conditions for success in the Threatening Period, deploying rapid and overwhelming force in the Initial Period, imposing costs via strategic defense and long-range strikes, maintaining escalation dominance, and undermining the adversary's will to fight. The Russia-Ukraine war's protraction, the failure of Russia's strike campaign to break Ukrainian will, and Russia's loss of escalation credibility seem to have had little impact on Russian military's formulation of ideas.

At the operational level of war, this relative stasis of strategic thinking is mirrored by the dogged resilience of important prewar operational concepts. Combined arms warfare, the value of naval surface operations, the centrality of air dominance, and the fundamental war-winning importance of long-range precision strike have all proven to be surprisingly durable ideas given Russian failures in the war. As the Russian military begins to reconstitute over the next decade, it will likely do so with these concepts in mind.

For all the transatlantic community's interest in the employment of uncrewed systems, the rebirth of attritional warfare, and nuclear saber-rattling, Russian thinkers have not jettisoned most of the ideas in place at the strategic and operational levels of war before 2022. Western policy-makers, military planners, and analysts would do well to bear in mind that the war in Ukraine, at least in 2025, has not changed Russia's basic military operational conclusions. Military elites have not embraced attritional warfare, nor have they abandoned or fundamentally altered naval surface war concepts. They continue to rely on long-range precision strike as a potentially war-winning capability, to embrace ground-based air defense as an asymmetric advantage, and to envision a combined arms maneuver force operating on a broken battlefield.

Despite the armed forces' mixed record in the war, the Russian military remains extremely capable and very dangerous. For example, Russia's ability to combine aerial uncrewed ISR with artillery strikes provides it with tremendous tactical fires flexibility. Given a more limited set of strategic objectives in a different geographical region (such as the Baltic), a military that in five years looks and operates similarly to the one in 2025 may very well achieve its strategic objectives in a future conflict.

The implications of these ideas for any potential adversary are significant. Russia's reliance on the Initial Period of War as a strategic linchpin means that

nations must continue to develop advanced systems capable of providing strategic and tactical indications and warning. The ability to quickly generate forces and keep them at a high state of readiness for prolonged periods will likewise be crucial if Russia believes it is sliding from the Threatening Period to wartime. Russia will also likely increase its use of proxies against Western targets and wage war with every instrument of state power, including informational, economic, and diplomatic means.

Operationally, the high likelihood of long-range precision attacks against critical military, economic, and civilian targets means that states must take measures to ensure increased resilience in the Initial Period of War and beyond. Furthermore, Russian theorists are pushing for ground operations to be rapid and dynamic, so Western military planners should expect Russia to seek ways to avoid grinding attrition warfare in a hypothetical future conflict. Notably, as Western militaries begin to plan for the prospect of protracted attritional war, Russian thinkers remain wedded to the idea of a short, sharp conflict.

In the maritime domain, Russian theorists argue for a combination of dense, active near-seas defense combined with long-endurance stealthy platforms for operations in far seas and off enemy coastal areas. All these platforms will be equipped with long-range precision strike for the purposes of offensive and defensive cost imposition. The former threaten European and Indo-Pacific allied homelands. Cracking these "bastions" will require exquisite ISR, penetration, and fires capabilities. The latter present a grave strategic threat to the US homeland. On the other hand, Russian challenges with closing an over-the-horizon dynamic targeting cycle, especially over great distances at sea, means that the RFN will likely struggle to successfully complete long-range engagements against mobile targets at sea.

Indeed, Russia's continued adherence to concepts that it has had trouble executing at the operational level of war presents its adversaries with opportunities. For example, because Russian strike planning at operational depth will likely remain heavily centralized, it will also likely lack the ability to conduct dynamic targeting consistently. Maneuver concepts such as the US Air Force's agile combat employment, the US Navy's distributed maritime operations, and the US Marine Corps' expeditionary advanced base operations will likely, at least in the medium term (roughly 10 years), exploit these Russian shortcomings if they are executed well.

By contrast, Russian ground-based air defenses will require Western planners to accept high levels of risk to suppress and destroy them. On the other hand, poor Russian SEAD and DEAD doctrine presents an opportunity for increased NATO investment in mobile surface-to-air missile systems such as National Advanced Surface-to-Air Missile Systems and various Marine Corps systems such as the Medium-Range Intercept Capability and Marine Air Defense Integrated System. Given Russian SEAD shortcomings, these systems may have a high survivability rate and free airborne platforms from defensive counter-air requirements.

The comparative lack of operational innovation and the persistence of established concepts in the military academies and research institutes may also be a sign of a deep chasm between frontline combat units and the Defense Ministry's military theorists. The furious tactical innovation at the front has not been matched by strategic or operational innovation in the military's centers of thought. Possible explanations range from innovation born of desperate necessity at the front lines to the mundane institutional failures of the Russian military to exploit the hard-won local lessons across a geographically dispersed military.

Of course, this lack of innovation does not mean that Russian intellectuals are avoiding hard questions about the war or that the Russian military is not a learning organization. Quite the opposite. Russian military leaders have not been afraid to criticize the conduct of the war, and the effort to "learn lessons" is vigorous and ongoing. It does imply, however, that there is a significant aspiration-capability gap in the Russian military. On the battlefield, this gap translates into serious operational shortcomings in critical warfighting areas. Because this gap goes beyond technological solutions and may require fundamental changes in how the Russian military executes military operations, it is unlikely to be settled soon.

Ultimately, among Russian military leaders who write about such things, neither theories of modern warfare nor the operational concepts designed to achieve success in modern war have fundamentally changed. Whether this lack of change is attributable to self-interest, selection bias, or other factors is beyond the scope of this study. But Western military planners and policy-makers would be wise to keep in mind that the tremendous attention paid during the war to tactical and technological innovation, although important, can obscure this fundamental point.

Figures

Abbreviations

AI	artificial intelligence
ASAT	anti-satellite
ASW	anti-submarine warfare
ATGM	anti-tank guided missile
C2	command and control
C2ISR	command and control, intelligence, surveillance and reconnaissance
C5ISRT	command, control, computing, communications, cyber, intelligence, surveillance, reconnaissance, and targeting
CDCM	coastal defense cruise missile
COP	common operating picture
DEAD	destruction of enemy air defenses
ELINT	electronic intelligence
IADS	integrated air defense system
ISR	intelligence, surveillance, and reconnaissance
ISR-T	intelligence, surveillance, reconnaissance, and targeting
NATO	North Atlantic Treaty Organization
PGS	Prompt Global Strike
RFN	Russian Federation Navy
SEAD	suppression of enemy air defenses
SSBN	sub-surface ballistic nuclear (submarine)
SVO	*special'naja voennaja operacija* (special military operation)
TLAM	Tomahawk Land Attack Missile
TTPs	tactics, techniques, and procedures
UAS	uncrewed aerial system
UAV	uncrewed aerial vehicle
UCAV	uncrewed combat aerial vehicle
USV	uncrewed surface vehicle
VDV	*Vozdushno-Desantnye Voyska* (Russian airborne forces)
VKS	*Vozdushno-Kosmicheskiye Sily* (Russian Aerospace Forces)

References

Adamsky, Dima. *The Russian Way of Deterrence: Strategic Culture, Coercion, and War.* Palo Alto, CA: Stanford University Press, 2023.

Adamsky, Dmitry. "Quo Vadis, Russian Deterrence." *International Security* 49, no. 3 (2024).

"Air Dominance (Господство В Воздухе)." Russian Ministry of Defense Military Encyclopedic Dictionary. https://xn--d1abichgllj9dyd8a.xn--90anlfbebar6i.xn--p1ai/encyclopedia/dictionary/details.htm?id=5512@morfDictionary.

Ananyev, Aleksandr, Kirill Ivannikov, and Artem Chernysh. "Efficiency of the Reconnaissance Aviation Complex [Эффективность разведывательного авиационного комплекса]." *Armeiskii Sbornik* 3 (2022).

Andreev, V. V., N. S. Kriventsov, D. P. Pahmelkin, and A. I. Antipov. "Features of the Use of Aviation Groups in Military Conflicts of the Future [Особенности применения группировок авиации в военных конфликтах будущего]." *Voennaia Mysl'* 6 (June 2022).

Antipova, S. A., V. V. Labets, and M. P. Filiyaev. "Conceptual Foundations for the Application of Artificial Intelligence Technologies in the Logistics System of the Armed Forces of the Russian Federation [Концептуальные основы применения технологий искусственного интеллекта в системе материально-технического обеспечения Вооруженных Сил Российской Федерации]." *Voennaia Mysl'* 7 (2023).

Bartosh, Aleksandr. "Factors of Surprise Yesterday and Today [Фактор внезапности вчера и сегодня]." *Nezavisimoe Voennoe Obozrenie,* no. 2 (2023).

Bartosh, Aleksander. "A Punishing Sword in the Hands of Russia [Карающий меч в руках России]." *Nezavisimoe Voennoe Obozrenie* 10 (2023).

Bartosh, Aleksandr A. "Escalation Models of Modern Military Conflicts [Модели эскалации современных военных конфликтов]." *Voennaia Mysl'* 1 (2024).

Bartosh, Aleksandr A. "Proxy War as a Determining Factor of Military Conflicts in the XXI Century [Прокси-война как определяющий фактор военных конфликтов XXI века]." *Voennaia Mysl'* 5 (2023).

Belenkov, D. S., A. S. Borisenko, and V. V. Sukhorutchenko. "Current Issues of Automation of Strategic Situation Assessment in Solving Strategic Deterrence Problems [Актуальные вопросы автоматизации оценки стратегической обстановки при решении задач стратегического сдерживани]." *Voennaia Mysl'* 8 (2024).

"Breakthrough [Прорыв]." Russian Ministry of Defense Military Encylopedic Dictionary. https://энциклопедия.минобороны.рф/encyclopedia/dictionary/details_rvsn.htm?id=9461@morfDictionary.

Bronk, Justin. "Air Power and Aerial Platforms," in *Assessing Russian Plans for Military Regeneration: Modernization and Reconstitution Challenges for Moscow's War Machine*. Chatham House, 2024, 23–28.

Bronk, Justin. *Russian Combat Air Strengths and Limitations: Lessons from Ukraine*. CNA. Apr. 2023. https://www.cna.org/reports/2023/04/Russian-Combat-Air-Strengths-and-Limitations.pdf.

Bronk, Justin, Nick Reynolds, and Jack Watling. *The Russian Air War and Ukrainian Requirements for Air Defence*. Royal United Services Institute. Nov. 7, 2022.

Burenok, Vasily Mikhailovich. "On the Prospects for the Development of Weapons, Military and Special Equipment Based on the Experience of a Special Military Operation [О перспективах развития вооружения, военной и специальной техники на основе опыта специальной военной операции]." *Vooruzhenie i Ekonomika* 2 (2024).

Butowski, Piotr. *Russia's Warplanes: Russian-Made Military Aircraft and Helicopters Today* (Harpia Publishing, 2015).

Bychkov, V., and V. Sherkashin. "Maritime Space Reconnaissance and Target Designation System [система морской космической разведки и целеуказания]." *Morskoi Sbornik* 2 (2021).

Central Intelligence Agency. *Soviet Air Defense Aviation: Training and Operations*. https://www.cia.gov/readingroom/docs/DOC_0000969825.pdf.

Charodeev, Gennady. "Vice-Admiral Borisov: Naval Drones Will Replace Submarines and Surface Ships [Вице-адмирал Борисов: 'Морские дроны заменят подводные лодки и надводные корабли']." *Novye Izvestia*. June 19, 2023.

Chekinov, S. G., and S. A. Bogdanov. "Evolution of the Essence and Content of the Concept of 'War' in the 21st Century [Эволюция сущности и содержания понятия «война» в XXI столетии]." *Voennaia Mysl'* 1 (2017): 29–43.

Churkin, I. P. "Development of the Combat Control System for Aviation in the Arctic Zone of Responsibility for Air Defense [Развитие системы боевого управления авиацией в Арктической зоне ответственности за противовоздушную оборону]." *Voennaia Mysl'* 4 (Apr. 2023).

Congressional Research Service. *Conventional Prompt Global Strike and Long-Range Ballistic Missiles: Background and Issues*. July 16, 2021.

"Denis Manturov Held a Session on the Use of Artificial Intelligence to Enhance the Combat Capabilities of Weapons and Control Systems [Денис Мантуров провёл сессию по применению искусственного интеллекта для наращивания боевых возможностей вооружения и систем управления]." Government of Russia. Jan. 31, 2025. http://government.ru/news/54105/.

Denisov, Pavel. "Production of Electronic Warfare Equipment Will Increase Several Times Over [Производство Средств Рэб Возрастет Кратно]." *Na Strazhe Rodiny.* Apr. 21, 2023.

Donskov, Y. E., R. S. Anosov, Yu. N. Yarigin, and D. M. Former. "Systems Engineering Aspects of Raising the Status of Electronic Warfare Troops [Системно-технические аспекты повышения статуса войск радиоэлектронной борьбы]." *Voennaia Mysl'* 11 (2024).

Dronov, S. "Features of Aviation Tactics in Modern Combat Operations and Ways to Improve Them [Особенности тактики авиации в современных боевых действиях и пути ее совершенствования]." *Voennaia Mysl'* 1 (2024).

Dybov, Valentin, and Yuriy Podgornykh. "There Is No Comprehensively Developed Theory of Aerospace Defense Yet [Всесторонне проработанной теории ВКО пока нет]." VKO 6 (2015). http://www.vko.ru/oboronka/vsestoronne-prorabotannoy-teorii-vko-poka-net.

Dybov, Valentin, Yuriy Podgornykh, and Maxim Kolodko. "Intelligence Reported: The Analysis Failed." *Nezavisimoe Voennoe Obozrenie* 3 (2023). https://nvo.ng.ru/concepts/2023-03-02/1_1226_factor.html.

Evmenov, Nikolai. "The Presence of the Russian Navy in the World Oceans Is an Imperative of the Times, Ensuring the Military Security of the Russian Federation [Присутствие Российского Военно-Морского Флота В Мировом Океане - Императив Времени, Обеспечивающий Военную Безопасность Российской Федерации]." *Morskoi Sbornik* 9 (2021).

Evmenov, Nikolai. "Prompt Conventional Strike Is the US Navy's Contribution to the Larger Joint Concept of Prompt Global Strike [Основные тенденции изменения характера и содержания военных угроз Российской Федерации с океанских и морских направлений]." *Voennaia Mysl'* 5 (May 2023).

Evmenov, Nikolai. "The Role and Place of the Navy in Wars and Armed Conflicts [Роль И Место Военно-Морского Флота В Войнах И Вооруженных Конфликтах]." *Morskoi Sbornik* 11 (2022)

Evmenov, Nikolai A. "Features of the Development of Naval Weapon Systems Taking into Account the Transformation of Armed Combat at Sea [Особенности Развития Систем Вооружения Вмф С Учетом Трансформации Вооруженной Борьбы На Море]." *Morskoi Sbornik* 11 (2024).

Evmenov, Nikolai A. "Main Factors and Conditions of the Development of Naval Art [Основные факторы и условия развития военно-морского искусства]." *Voennaia Mysl'* 7 (2023).

Evmenov, Nikolai A. "Main Trends of Change: The Nature and Content of the Military Threats to the Russian Federation from Ocean and Sea Directions [Основные тенденции изменения характера и содержания военных угроз Российской Федерации с океанских и морских направлений]." *Voennaia Mysl'* 5 (2023).

Evmenov, Nikolai A. "The Nature of Armed Struggle at Sea and Its Development Trends [Характер вооруженной борьбы на море и тенденции ее развития]." *Voennaia Mysl'* 12 (2023).

Evstifeev, Yuri. "A New Paradigm of War Has Come to the Sea [Новая парадигма войны пришла и на море]." *Arsenal Otechestva* 4 (2024).

"Expanded Meeting of Defense Ministry Board." Kremlin. Dec. 19, 2023. http://en.kremlin.ru/events/president/news/page/63.

Faucon, Benoit, and Thomas Grove. "Russia Provided Targeting Data for Houthi Assault on Global Shipping." *Wall Street Journal*. Oct. 24, 2024. https://www.wsj.com/world/russia-provided-targeng-data-for-houthi-assault-onglobal-shipping-eabc2c2b.

Gavrilov, A. D., I. V. Grudinin, D. G. Maiburov, and V. A. Novikov. "Two Years of a Special Military Operation: Preliminary Results and Potential Prospects [Два Года Специальной Военной Операции: Некоторые Итоги, Вероятные Перспективы]." *Vestnik Akademii Voennykh Nauk 87 (2024).*

Gerasimov, Valery. "The Value of Science Is in the Foresight: New Challenges Demand Rethinking the Forms and Methods of Carrying Out Combat Operations." Military-Industrial Kurier. Feb. 27, 2013. Translated by Robert Coalson. https://www.armyupress.army.mil/portals/7/militaryreview/archives/english/militaryreview_20160228_art008.pdf.

Golts, Alexandr. *Strategic Deadlock: Causes, Consequences, and Possible Ways Out.* Stockholm Centre for Eastern European Studies. Feb. 26, 2024. https://sceeus.se/en/publications/strategic-deadlock-causes-consequences-and-possible-ways-out/.

"How a Special Operation in Ukraine Changed Russian Weapons and the Military-Industrial Complex [Как спецоперация на Украине изменила русское оружие и оборонно-промышленный комплекс]." TASS. Feb. 22, 2023. https://tass.ru/armiya-i-opk/17115401.

International Institute for Strategic Studies. "Russia and Eurasia." In *The Military Balance*. Routledge, 2022.

Ismailov, Alesker I., Vladimir V. Puchnin, and Alexey Y. Sysuev. "Problems of Mobilization Support of the Russian Navy and Possible Ways to Resolve Them [Проблемы мобилизационного обеспечения российского Военно-Морского Флота и возможные пути их разрешения]." *Voennaia Mysl'* 12 (2022).

Joint Publication JP-1. Aug. 27, 2023. *Joint Warfighting*.

Joint Publication 3-60. Sept. 28, 2018. *Joint Targeting*.

Jójárt, Krisztián. "The War Against Ukraine Through the Prism of Russian Military Thought." *Journal of Strategic Studies* 47, no. 6–7 (2024): 801–831. doi:10.1080/01402390.2024.2414079.

Kalganov, V. A., G. B. Ryzhov, and I. V. Solovyev. "Strategic Deterrence as a Factor in Ensuring National Security of the Russian Federaon [Стратегическое сдерживание как фактор обеспечения национальной безопасности Российской Федерации]." *Voennaia Mysl'* 8 (Aug. 31, 2022).

Kazakov, V. G., and A. N. Kiryushin. "Air Strike: Evolution of Structure in Light of Current Military-Technical Achievements [Авиационный удар: эволюция структуры в свете актуальных военно-технических достижений]." *Voennaia Mysl'* 6 (June 2023).

Khramchikhin, Alexander. "Moscow Plans to Carry Out Military Reforms [Москва задумала провести военную реформу]." *Nezavisimoe Voennoe Obozrenie*. Jan. 20, 2023.

Kirpichnikov, Maxim. "'Zircons' Have Entered the Work Ocean [Цирконы" Вышли В Мировой Океан]." *Na Strazhe Rodiny*. Jan. 13, 2023.

Kodarenok, Mikhail. "Forecasts of Bloodthirsty Political Scientists [Прогнозы кровожадных политологов]." *Nezavisimoe Voennoe Obozrenie*. Feb. 3, 2022. https://nvo.ng.ru/realty/2022-02-03/3_1175_donbass.html.

Kofman, Michael. "The Russia-Ukraine War: Military Operations and Battlefield Dynamics." In *War in Ukraine: Conflict, Strategy, and the Return of a Fractured World*. Edited by Hal Brands. Johns Hopkins University Press, 2024, 99–120.

Kofman, Michael, Anya Fink, Dmitry Gorenburg, Mary Chesnut, Jeffrey Edmonds, and Julian Waller. *Russian Military Strategy: Core Tenets and Operational Concepts*. CNA. 2021.

Kofman, Michael, Anya Fink, and Jeffrey Edmonds. *Russian Strategy for Escalation Management: Evolution of Key Concepts*. CNA. DRM-2019-U-022455-1Rev. Apr. 2020.

Koryakovtsev, Aleksey A. "The Role of the Navy in Ensuring Security Interests of the Russian Federation [Роль Военно-Морского Флота в обеспечении безопасности национальных интересов Российской Федерации]." *Voennaia Mysl'* 12 (2023).

Korzhevskiy, A. S., and I. V. Solvyev. "Mental Confrontation and Problems of Forming a Holistic System of Offensive and Defensive Action Within It [Ментальное противоборство и проблемы формирования целостной системы наступательных и оборонительных действий в нем]." *Voennaia Mysl'* 11 (Nov. 2022): 32–42.

Kovalenko, Evgeny A. "The Use of Unmanned Aerial Vehicles in Armed Conflicts [Применение Беспилотных Летательных Аппаратов В Ходе Войн И Вооруженных Конфликтов]." *Morskoi Sbornik* 8 (2023).

Kretsul, Roman, and Alexey Ramm. "Sea Swarm: How Russian Warships Will Defend Themselves Against Drones." *Defense & Security*. July 17, 2023.

Krinitsky, Y. V., and V. G. Chekhovsky, "Spheres of Armed Struggle and Theaters of Military Operations [Сферы вооруженной борьбы и театры военных действий]." *Voennaia Mysl'* 9 (Sept. 30, 2022).

Kryazhev, Vladimir S. "Assessment of the Military-Political and Operational-Strategic Situation in the Russian Fleet Zones [Оценка Военно-Политической И Оперативно-Стратегической Ситуации В Зонах Флотов России]." *Morskoi Sbornik* 2 (2019).

Kryazhev, Vladimir S. "Military Security Issues in Russia at the End of the 20th – Beginning of the 21st Century [вопросы военной безопасности россии в конце xx - начале xxi в.]." *Morskoi Sbornik* 8 (2017).

Kurbangaleeva, Farida. "Could Ukraine Launch a New Counteroffensive? [Может Ли Украина Пойти На Новое Контрнаступление?]." *Republic (Slon).* Dec. 14, 2023.

Kurilov, S. N., A. N. Kiryushin, and Y. N. Moiseyev. "Current Problems of Air Forces Tactics and Ways to Solve Them [Современные проблемы тактики Военно-воздушных сил и пути их решения]." *Voennaia Mysl'* 6 (June 2021).

Linnik, E. A., D. V. Mitrofanov, and V. I. Stuchinsky. "Patterns and Principles of Developing Operational Requirements for the Structure and Composition of Aviation Groupings in the Strategic (Operational) Direction [Закономерности и Принципы Разрботки Оперативных Трбований к Струтруктуре и Составу Группиировки Авиации на Стратегическом (Операцинном) Направлении]." *Vozdushno-Kosmicheskiye Sily: Teoriya I Praktika* 31 (Sept. 2024).

Litvinov, N. N. "Promising Areas in Introduction of Artificial Intelligence in Air Defense Systems [Перспективные Напрвления Внедрения Искусственного интеллекта в Системах Иротивовоздушной Обороны]." *Vestnik Akademii Voyennykh Nauk* 4/89 (2024).

Makarenko, S. I., and I. E. Afonin. "Modeling of Combat Aviation Operations and Assessment of Their Effectiveness: Analysis of Works, Models, Current Research Directions [Моделирование боевых действий авиации и оценки их эффективности – анализ работ, моделей, актуальных направлений исследований]." *Vozdushno-Kosmicheskiye Sily: Teoriya I Praktika* 32 (2024).

Marzhetsky, Sergei. "Future of the Russian Fleet [Будущее Российского Флота]." *Obozrenie Armii i Flota* 1 (2023).

McDermott, Roger N., and Charles K. Bartles. *An Assessment of the Initial Period of War: The Russia-Ukraine War, Part I.* Fort Eustis, VA: US Army TRADOC, 2023.

Mikhailov, N. G., and A. V. Savitsky. "Development of Military Art and Possible Ways of Further Improvement [Развитие военного искусства и возможные пути его дальнейшего совершенствования]." *Voennaia Mysl'* 2 (2023).

Moiseev, Alexander A. "Strategic Requirements for the Development of the Navy Potential of Russia Taking Into Account the Experience of the Special Military Operation in Ukraine [Стратегические требования к развитию военно-морского потенциала России с учетом опыта специальной военной операции на Украине]." *Voennaia Mysl'* 9 (2024).

Muzyakov, S. I., and V. A. Ulitsky. "Troop Control: History of Development, Current Problems and Possible Ways to Solve Them [Управление Войсками: История Развития, Актуальные Проблемы И Возможные Пути Их Решения]." *Vestnik Akademii Voennykh Nauk* 4 (2024).

Newdick, Thomas. "Russia's S-70 Hunter Drone Was Armed When Shot Down by Friendly Fighter Over Ukraine." The War Zone. Oct. 7, 2024. https://www.twz.com/air/russias-s-70-hunter-drone-was-armed-when-shot-down-by-friendly-fighter-over-ukraine.

Newdick, Thomas. "Soviet-Era M-55 Spy Plane May Be Headed to Support the War in Ukraine." The War Zone. Nov. 21, 2023. https://www.twz.com/soviet-era-m-55-spy-plane-may-be-headed-to-war-in-ukraine.

Orlyansky, V. I., A. A. Gerasimov, and E. V. Bitner. "Problems of Maneuvering Troops Under Conditions of Use of Modern Intelligence Systems [Проблема маневра войсками в условиях применения противником овременных разведывательных систем]." *Voennaia Mysl'* 8 (2024).

Orlyansky, V. I., V. P. Gerasimov, and S. N. Rudenko. "Problems of Maneuvering Troops Under Conditions of Use of Modern Intelligence Systems [Проблема маневра войсками в условиях применения противником овременных разведывательных систем]." *Voennaia Mysl'* 7 (2024).

Orlyansky, Vladimir I. "Integrated Combat System: The Highest Form of Troop Organization [Интегрированная Боевая Система – Высшая Форма Организации Войск]." *Vestnik Akademii Voennykh Nauk* 3 (2024).

"Overcoming Air Defense [Преодоление ПВО]." Russian Ministry of Defense Military Encyclopedic Dictionary. https://encyclopedia.mil.ru/encyclopedia/dictionary/details.htm?id=9329@morfDictionary.

Palachyov, D. A., R. Q. Nogin, and S. V. Kornev. "Possible Approaches to the Development of a Set of Measures to Improve Combat Duty in the Strategic Missile Forces in the Current Military-Political Situation [Возможные подходы к разработке комплекса мероприятий по совершенствованию боевого дежурства в РВСН в современной военно-политической обстановке]." *Voennaia Mysl'* 3 (2024).

Peck, Michael. "Russia's Fearsome S-400 Air-Defense Missiles Are Getting Unexpected Missions as Moscow Struggles in Ukraine." Business Insider. May 25, 2023. https://www.businessinsider.com/russia-using-s400-air-defense-missiles-to-attack-ground-targets-2023-5.

Petersen, Michael. "Russian Navy and Naval Platforms." In *Assessing Russian Plans for Military Regeneration.* Chatham House, 2024, 29–35.

Petrov, A., and D. Stolyarov. "Neutralizing Prompt Global Strike [Нейтрализуя быстрый глобальный удар]." *Armeiskii Sbornik* 8 (Aug. 2024).

Pluzhnikov, A. A., and O. B. Usachev, "Modern Requirements of Combined Arms Formations at the Tactical Level [Современные требования к общевойсковым формированиям тактического звена]." *Voennaia Mysl'* 5 (2022).

Prudnikov, L. A., and A. V. Kuzmenko. "Application of Non-Military Measures in the Interests of Ensuring Russia's Military Security [Применение невоенных мер в интересах обеспечения военной безопасности России]." *Voennaia Mysl'* 1 (2023).

Romanchuk, A. V., and A. V. Shigan. "Prospects for Increasing Efficiency of Army Defensive Operations [Перспективы повышения эффективности армейских оборонительных операций]." *Voennaia Mysl'* 4 (2023): 23–26.

Rosa-Hernandez, Gabriela Iveliz, Anya Fink, and Cornell Overfield. *Moscow Does Not Believe in Tears: Russia's Political-Military Establishment Debates Credibility of Nuclear Threats and Potential Nuclear Employment*. CNA. DRM-2024-U-038138-1Rev. Sept. 2024. https://www.cna.org/reports/2024/09/moscow-does-not-believe-in-tears.

"Russia Attacks Wide Range of Targets in Ukraine." *Kyiv Independent*. Feb. 24, 2022. https://kyivindependent.com/russia-attacks-wide-range-of-targets-in-ukraine-live-updates/.

"Russia 'Shot Down Its Own Planes.'" BBC. July 9, 2009. http://news.bbc.co.uk/2/hi/europe/8142999.stm.

"Russian First Deputy Defense Minister Gerasimov: 'Our Response' Is Based on the 'Active Defense Strategy'; 'We Must Act Quickly' to 'Preempt the Enemy...Identify His Vulnerabilities, and Create Threats of Unacceptable Damage to It.'" MEMRI. *Mar. 14, 2019*. https://www.memri.org/reports/russian-firstdeputy-defense-minister-gerasimov-our-response-based-acve-defense-strategy.

Russian Maritime Studies Institute. *Fundamentals of the State Policy of the Russian Federation in the Field of Naval Operations for the Period Until 2030*. Translated by Anna Davis. 2017.

"Russian Military Announces Plan to Expand, Create New Units." AP News. Dec. 21, 2022. https://apnews.com/article/putin-finland-sergei-shoigu-ee953abf7f9bf217ccdaa61ec1b35ddd.

Savushkina, M. A. "Proxy Warfare as a Phenomenon of Digital Society [Прокси-война как феномен цифрового общества]." *Voennaia Mysl'* 1 (2024).

Schwartz, Paul, and Dmitry Gorenburg. *Russian Military Mobilization During the Ukraine War*. CNA. DRM-2024-U-037996-Rev1. Oct. 2024.

Selivanov, V. V., and Yu. D. Ilyin. "Trends in the Development of Means of Armed Struggle in Modern Military Conflicts, Their Influence on the Development and Change of Generations of Weapons, Military and Special Equipment [Тенденции развития средств вооруженной борьбы в современных военных конфликтах, их влияние на развитие и смену поколений вооружения, военной и специальной техники]." *Voennaia Mysl'* 9 (Sept. 30, 2022): 29–44.

Semenchenko, Igor, and Oleg Falichev. "Russian Aerospace Forces Have Gained Air Superiority, Not Dominance [ВКС России завладели превосходством, а не господством в воздухе]." *Nezavisimoye Voyennoye Obozreniye* 9 (Mar. 17, 2023).

Semenov, A. G., Yu. V. Krinitsky, and V. G. Chekhovsky. "Armed Struggle in the Aerospace Theater of Military Operaons [Вооруженная борьба на воздушно-космическом театре военных действий]." *Voennaia Mysl'* 1 (Jan. 2023): 19–27.

Serzhantov, A. V., A. V. Smolovy, and I. A. Terentyev. "Transformation of the Contents of War: Contours of Military Conflicts of the Future [Трансформация содержания войны: контуры военных конфликтов будущего]." *Voennaia Mysl'* 6 (June 30, 2022): 19–30.

Shamanov, V. A., V. V. Kulakov, and O. Y. Kashrina. "Directions for Improving Combat Use of the Armed Forces of the Russian Federation to Ensuring the Performance of Combat Missions of a Special Military Operation [Направления Совершенствования Боевого Применения Вооруженных Сил Российской Федерации По Обеспечению Выполнения Боевых Задач В Ходе Специальной Военной Операции]." *Izvestiia Rossiiskoi Akademii Raketnykh i Artilleriiskikh Nauk* (Feb. 2023).

"Shoigu: 'The Russian Armed Forces' Command and Communications System Will Be Improved Using AI Technologies [Шойгу: 'систему управления и связи ВС РФ усовершенствуют с применением технологий ИИ']." TASS. Jan. 10, 2023. https://tass.ru/armiya-i-opk/16766161.

Simpson, Michael, Adam Grissom, Christopher Mouton, John P. Hodges, and Russell Hanson. *Road to Damascus: The Russian Air Campaign in Syria,* 2015-2018. RAND. 2022.

Sinikov, Anatoly A. "Contribution of Scientists of the Military Academy of the General Staff to the Development of the Theory of Operational Art of the Aerospace Forces (on the 190th Anniversary of the Founding of the Military Academy of the General Staff of the Russian Armed Forces) [Вклад ученых Военной академии Генерального штаба в развитие теории оперативного искусства Воздушно-космических сил (к 190-летию со дня основания ВАГШ ВС РФ)]." *Voennaia Mysl'* 11 (Nov. 30, 2022).

"Smart Small Calibers in the New Paradigm of War [Умные малые калибры в новой парадигме войны]." *Arsenal Otechestva.* Dec. 31, 2024.

Stoll, Hunter, John Hoehn, and William Courtney. "Air Defense Shapes War Fighting in Ukraine." Real Clear Defense. Feb. 22, 2024. https://www.realcleardefense.com/articles/2024/02/22/air_defense_shapes_warfighting_in_ukraine_1013615.html.

Sukalenko, E., A. Nagorskiy, and S. Dubchenko. "On the Question of Positional Deadlock – Part I [К Вопросу О Позиционном Тупике]." *Armeiskii Sbornik* 7 (2024).

Sukalenko, E., A. Nagorskiy, and S. Dubchenko. "On the Question of Positional Deadlock – Part III [К Вопросу О Позиционном Тупике]." *Armeiskii Sbornik* 9 (2024).

Sukalenko, E., V. Kamarenko, and A. Pasko. "Conquering Sea Dominance as the Main Goal of Using the Navy in Peace and Wartime [Завоевание Господства На Море Как Главная Цель Применения Вмф В Мирное И Военное Время]." *Morskoi Sbornik* 10 (2024).

Sukalenko, Evgeny. "Modern Principles of Conducting Armed Warfare at Sea [Современные Принципы Ведения Вооруженной Борьбы На Море]." *Morskoi Sbornik* 10 (2016).

Thiele, Pascal, Laura Bernadó, David Löschenbrand, Benjamin Rainer, Christoph Sulzbachner, and Maria Leitner. "Machine Learning Based Prediction of Frequency Hopping Spread Spectrum Signals." 2023 IEEE 34th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Toronto, Ontario, Canada, 2023, 1–6.

Thomas, Timothy. *Russian Military Thought: Concepts and Elements.* MITRE. 2019.

"Threatened Period [Угрожаемы Период]." Russian Ministry of Defense Military Encyclopedic Dictionary. https://encyclopedia.mil.ru/encyclopedia/diconary/details.htm?id=10643@morfDiconary.

*Timokhin, Aleksander. "Air Defense Suppression from World War II to Ukraine [*Подавление ПВО: От Второй Мировой До Украины Аэрокосмическое обозрение]." *Aerokosmicheskoye obozreniye* 4 (2023).

"Top General Tells Putin How Russia Repelled Major Ukrainian Attack, Defence Ministry Says." Reuters. June 8, 2023. https://www.reuters.com/world/europe/top-general-tells-putin-how-russia-repelled-major-ukrainian-attack-defence-2023-06-08/.

Tsyganok, Anatoly. "The Use of Forces and Means of Electronic Warfare in Wars and Conflicts of the XXI Century ["Применение сил и средств РЭБ в войнах и конфликтах XXI века]." *Nezavisimaya Gazeta.* Sept. 20, 2019.

Ulanov, A. "The Face of Future War [Облик Войн Будущего]." *Armeiskii Sbornik* 11 (Nov. 30, 2022).

Ulanov, A. "On Possible Areas of Application of Artificial Intelligence in Automation Systems of the Air Defense and Missile Defense Forces of the Russian Aerospace Forces [О возможных направлениях применения искусственного интеллекта в комплексах средств автоматизации войск ПВО-ПРО ВКС России]." *Armeiskii Sbornik* 2 (2022).

Vyatkin, Yaroslav. "Military-Political Forecast for 2024 [Военно-Политический Прогноз На 2024 Год]." *Argumenty Nedeli.* Jan. 10, 2024.

Vyatkin, Yaroslav. "Russia Wins War of Attrition, but May Change Strategy [Россия Выигрывает Войну На Истощение, Но Может Изменить Стратегию]." *Argumenty Nedeli.* July 17, 2024.

Yermolin, Oleg, Nikolay Zubov, and Mikhail Fomin. "Use of Strike Aviation of the Aerospace Forces in Military Conflicts of the Future [Применение ударной авиации Воздушно-космических сил в военных конфликтах будущего]." *Voennaia Mysl'* 2 (2023).

Zubov, Nikolay P. "Possibilities of Using Artificial Intelligence in Tactical Tasks of Controlling Unmanned Aerial Vehicles by Crews of Aviation Complexes [Возможности применения искусственного интеллекта в тактических задачах управления беспилотными летательными аппаратами экипажами авиационных комплексов]." *Voennaia Mysl'* 4 (2022).

Zverev, Yu. M. "Military Security of Kaliningrad Oblast and Strengthening the Role of the Exclave Region in Ensuring Russia's National Security [Военнаяа Безопаность Калинниградской Области И Уциление Роли Eксклавного Региона В Обеспечении Национальной Безопасности России]." *Vestnik Akademii Voennikh Nauk* 4/89 (2024).

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