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**INFOFLASH**



**RETHINKING THE CONCEPT OF  
AIR SUPERIORITY: FROM SINE  
QUA NON TOWARDS  
INTEROPERABILITY**

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## I. Introduction

For decades, gaining and maintaining air superiority has been a linchpin for the Western perception of military power. In contrast, due to geopolitical and technological factors, Russia has historically relied on air power as a supplementary tool for achieving victory on the ground (Grimshaw, 2017). Developments of the 21st century, especially within the technological realm, have, however, proven both of these doctrines to be incapable of reflecting modern battlefield challenges. The evolution of air defences, massive deployment of unmanned aerial vehicles (UAVs) and modernized electronic warfare (EW) tools are making the third domain more complex and restricted than ever.

The ongoing Russia-Ukraine war has proven that uncontested dominance of the skies is neither guaranteed nor a sustainable task. Lethal air defence, a subdomain of air littoral consisting of thousands of drones and limited air sorties, have forced both sides to rethink the concept of air dominance and its role within the conflict. While the definition of air superiority remains clear, the necessity of achieving this objective as the sine qua non is diminishing as a new subdomain of the air littoral dominated by UAVs is emerging. Thus, rather than fully controlling and freely manoeuvring within the air domain, both sides pursue so-called 'windows of opportunity' (Gunzinger, 2024).

This paper argues that the traditional view of air supremacy, central to Western military thinking, is no longer an adequate strategy against the peer or predominant opponent. The failure of the Russian Air Force (VVS) to establish air superiority on the first day of aggression was surprising and gave valuable lessons for military strategists. This conflict underlines the challenges in achieving total air dominance in the face of advanced air defence, UAV proliferation and EW capabilities. Thus, there is an essential need to rethink the air power concept, arguing for focusing on limited air superiority in times and places of choosing. In this context, Suppression and Destruction of Enemy Air Defences operations appear to be a crucial strategy. Finally, this paper underlines the implications for Western military thinking regarding air power theory, which is needed to operate within growingly contested airspace. In the face of the modern operational environment, emphasis on joint operations and interoperability in executing successful air campaigns is crucial.

## II. Failure of the Russian Air Force to Establish Air Superiority in Ukraine

The surprising failure of the VVS at the beginning of the Russian invasion in 2022 stems from its doctrinal perception of the role of the air domain (Polcikiewicz, 2023). The role of the VVS

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is primarily to support land forces, the command is centralised and decisions on the engagement of targets are shifted to command and control (C2) centres. In contrast, U.S. Air Force (USAF) and Royal Air Force (RAF) doctrines view air power more independently, seeing its primary role as achieving air superiority (Francis, 2020). Yet the Russian approach is understandable, geopolitical and economic factors predetermined the fate of its air force, which for a long time was only auxiliary (Ichaso, 2023). Moreover, Russia's involvement in the Chechen conflict and the war in Georgia demonstrated the structural deficiencies of its air forces in training, tactics, and equipment. In addition to failing to achieve more than temporary air superiority, the Russians were also unable to secure the necessary air support for land forces in the conflicts mentioned above (Pallin and Westerlund, 2009).

At the same time, the VVS has long lacked the necessary funding within the Russian military budget, which, under the influence of Western sanctions against Russia, has led to more significant economic and technological shortfalls (Grimshaw, 2017). Quality took precedence over quantity, aligning with the traditional Soviet philosophy.

The origins of the VSS's failure to achieve air superiority at the beginning of the war in Ukraine lay behind the factors mentioned above, in particular the perception of the role of air forces as predominantly auxiliary to the offensive of ground forces (Clodfelter, 2022). This miscalculation was, of course, also influenced by the failure of Russian intelligence services, which misjudged the level of Ukrainian resistance. This resulted in inadequate protection of the nearly 56km long column of Russian troops, armour and supplies advancing towards Kyiv in the early stages of the conflict (Borogan et al., 2023). Paradoxically, had the VSS persisted in the air offensive and not switched to supporting the land forces, they could have gained air superiority at the beginning of the conflict and significantly curtailed Ukraine's chances. Although Russians couldn't operate behind the forward line of troops (FLOT), the pilots lacked the necessary training and real-time reconnaissance intel (Deptula and Bowie, 2024). As a result, while nearly 75% of Ukrainian stationary air defence platforms were engaged, Ukrainians still maintained most of their mobile ground-based air defence (GBAD) capabilities (Zabrodskyi et al., 2022). Over time, the usage of thousands of UAVs and Western air defence systems has made it almost impossible for Russia to achieve air superiority in Ukraine.

### **III. Air Littoral: A New Subdomain Challenging the Feasibility of Air Dominance**

Air Superiority, according to U.S. Joint Chiefs of Staff Joint Publication 3-01, constitutes a degree of dominance in air battle, which further permits the conduct of operations at a given time and place without prohibitive interference from air and missile threats (U.S. JCS, 2017). Military doctrines distinguish four levels of airspace control, with air superiority being a third level of significant degradation of the opponent's aerial assets. Total dominance in the air

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domain – air supremacy – is mostly achievable within asymmetric conflict against opponents with no sufficient technological and material capacities to counter air operations. In contrast, in the case of peer or balanced contestation, the situation in the air domain could feature either air parity (no one can overcome the enemy) or a favourable air situation (Piatkowski & Goździewicz, 2024). This is the current status quo in the war in Ukraine, with both sides able to achieve a “window of opportunity” for a favourable air situation.

At the same time, the drone revolution is bringing a whole new dimension to the modern battlefield that is changing the doctrinal perception of both airpower and land forces. Masses of unmanned devices are creating a new subdomain of the air littoral zone, stretching from the ground to 10,000 feet above it (Bremer & Grieco, 2021). The implications of this shift present a significant challenge to achieving air dominance. In addition, increasingly greater EW capabilities, especially jamming, also pose a challenge to control of the skies.

At the same time, the air littoral domain converges the activities of air and land forces that are fundamentally created for entirely different tasks. However, this new operational environment poses challenges for both domains and emphasises the need for joint operations, aligned with the multi-domain approach philosophy (USAF, 2020). Interoperability between air and ground forces is thus a key enabler for achieving advantage in the modern air littoral operational environment.

Technological advancements and capabilities (such as AI, low cost of basic drones and global internet) now enable non-great powers to operate in this new subdomain, making it a highly contested operational zone (Kesteloo, 2024). The example of recent and ongoing conflicts (Nagorno-Karabakh conflict, War in Ukraine, War in Gaza) as well as previous asymmetric wars fought by non-state actors (Hezbollah, Islamic State, Taliban) shows that the "democratisation of the air littoral subdomain" brings a set of challenges even for the most powerful militaries in the world (Shaikh, S., & Rumbaugh, W. 2020; Clodfelter, 2022). In doing so, the need to comprehensively address these challenges may not only provide opportunities for the Ukrainian side in the current war but also significant capacity building for the future of waging conflicts as such. To address these challenges, it's essential to change the approach not only in terms of technology but also in terms of doctrine.

In this regard, the cruciality of drones is exploited by both sides in Ukraine, with President Zelenskyy now on the hunt for more than two million of these game-changers (Fornusek, 2023). However, the technological edge (Pomerleau, 2024) would not be a sufficient determinant of the military objectives alone without a complex doctrinal update on the Ukrainian side, particularly in rethinking the role of air power within the conflict.

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#### **IV. Windows of Opportunity: Overcoming Air Domain Stalemate in Ukraine**

Yet, the situation in Ukraine within the third domain represents a state of parity. Both sides have the capacity of air denial against the other, controlling the sky over the part of the front they currently hold (Di Mizio & Barrie, 2024). As long as the state of balance in the air theatre persists, the role of the third domain will be significantly less than initially expected (Zabrotskyi et al., 2022). The key to breaking this condition will be to exploit the air littoral subdomain, integrate the role of air power in coordination with military objectives on the ground and prepare for a comprehensive multi-domain joint operation under unified C2 structures.

An inherent condition in breaking the current parity appears to be uplifting the U.S. veto over the use of its weapons for attacks deep into Russian territory. This would allow Ukrainians to partially suppress Russian air sorties (Brown, 2024). The strategic goal on the Ukrainian side is not to achieve air supremacy, but temporary air superiority at the locations and times of their choosing (Porkka & Rantanen, 2024). Achieving “windows of opportunity” requires a comprehensive joint operation of air and ground forces that would consist of the effective deployment of a wide range of capabilities (aviation in coordination with ground forces, ground-based air defence, long-range attack drones, EW tools, special forces and other assets). To build momentum, SEAD/DEAD capabilities should be deployed, including F-16CJ/DJ fighters to attack ground forces or counterattack surface-to-air missiles (SAMs) (IISS, 2020).

#### **V. Implications for Western Military Thinking on Air Power in Future Conflicts**

While the U.S. and its allies have so far dominated the air domain in previous conflicts, this may not be the case in the future given the domain’s developments (Bremer & Grieco, 2021). The increasing lethality of air defences, the growingly contested air littoral and the enhanced penetration capabilities of EW make achieving air supremacy highly unlikely (CRFS, 2024). For instance, although NATO's combat aircraft inventory far exceeds Russia's (Hoyle, 2020), it comprises various platforms at different readiness levels (Young, 2023). Moreover, NATO needs to incentivise a multi-domain approach and centralised C2 centres to conduct an effective SEAD/DEAD campaign (Bronk, 2022). Conducting such a campaign against Russia would require targeting its highest-priority assets, which contradicts NATO's doctrinal manoeuvrist approach that emphasises engaging enemy weaknesses rather than strengths.

As the air littoral now merges the domains of land and air, strategists must reconsider the concept of air superiority and its feasibility on the modern battlefield. Control of the air

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domain is no longer limited to fighting over the blue skies. The air littoral, decoupled from traditional airspace, presents challenges such as vertical and temporal compression, congestion and the convergence of theatre and operational-level planning (U.S. JCS, 2017). Consequently, the notion of air superiority must shift towards achieving air control at specific times, in defined lateral spaces, and at varying altitudes.

The ongoing conflict in Ukraine provides several important lessons for Europe, particularly highlighting the need for interoperability between ground and air forces. A joint, multi-domain approach is crucial for future deployments (Cánovas, 2019). In this context, centralised C2 structures for SEAD/DEAD campaigns, joint exercises and training and enhanced EW and UAV capacities are essential. Nevertheless, we still face a major challenge in effectively implementing these goals in a way that is both sustainable and cost-efficient, as maintaining and acquiring combat aircraft is extremely expensive (Echevarria II, 2021). Therefore, instead of viewing air superiority solely as control of the skies, verticality and interoperability are crucial determinants. The goal should be a balanced mix of capabilities to effectively provide temporary air dominance and carry out SEAD/DEAD operations.

## **VI. Conclusions**

The evolving nature of the air domain, demonstrated by the war in Ukraine (Zabrodskyi et al., 2022), requires the rethinking of the doctrinal perception of air supremacy. The lethality of air defences, UAVs and EW capabilities has made total air domination increasingly challenging. As the centre of gravity shifts from traditional blue-sky operations to littoral air environments (Barno & Bensahel, 2024), major powers are dealing with a wide array of asymmetric threats in the air domain. Thus, the notion of 'windows of opportunity,' highlighting temporary air superiority in specific locations and times, is gaining traction as a more practical approach.

To achieve limited air superiority, Western militaries must prioritise joint operations and interoperability between air and ground forces (Grieco & Siegel, 2023). In addition to the centralisation of C2 and interoperability, this requires the necessary capacity building that will enhance both resilience and deterrence. Centralised C2 structures along with enhanced SEAD/DEAD capabilities are therefore two of the necessities to conduct effective air campaigns in contested environments (Bronk, 2022).

Furthermore, Western militaries must continue to invest in technologies such as advanced air defences, long-range precision strike capabilities, and robust EW systems. These

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investments will enable them to counter evolving threats and maintain a competitive edge in the air domain (Barrie & Wiright, 2024; CRFS, 2024; USAF, 2020).

In conclusion, the idea of air superiority being the key to success in warfare is outdated. A much more flexible and more interoperable strategy of 'windows of opportunity' is required to cope with the challenges of the modern battlefield.

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