Article

The Strategic Value of Air Defence

By Luke Botting

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Abstract: After decades of divesting from air defence relative to the Cold War, NATO and its members are beginning to reinvest in this critical capability in response to Russian doctrine, concepts and aggression. This article examines the implications of Russian thought on long-range precision strike as well as its practical application in the war in Ukraine to identify implications for NATO's understanding of air defence. It concludes that current NATO and national doctrine overemphasises the tactical and operational aspects of air defence, neglecting its strategic impact as a tool of non-nuclear deterrence.

Introduction

Since the attacks of September 11th 2001, air defence has primarily contributed to the counter-terror task while retaining a more traditional homeland defence role against Russian long-range aviation. The gradual change in the UK's and NATO's focus towards state-based peer threats requires a reconceptualisation of air defence as a form of non-nuclear strategic deterrence. The term 'non-nuclear strategic deterrence' refers to 'a category of non-nuclear weapon systems that, used on their own or in conjunction with other weapon systems, and under certain circumstances, can achieve decisive strategic outcomes in a conflict'[1] and which can therefore prevent armed aggression from being launched against NATO in the first place.[2] The idea is that a credible air defence capability would undermine a potential aggressor's confidence in any operational concepts relying on the use of aerial strike platforms, forcing them to alter their cost-benefit calculations on the use of force such that the utility and likelihood of success of armed aggression would be deemed to be minimal.

This perspective is especially relevant to Russia, whose material and conceptual development of long-range precision-strike capabilities now presents not only a military threat to NATO territory and forces in Europe, but also a strategic risk insofar as it constrains the Alliance's freedom of action and ability to make its own security decisions – in other words, it is a deterrent to NATO action. NATO countries have recognised this vulnerability and are now investing in more advanced air defence systems designed to defeat peer adversaries. The Russian invasion of Ukraine in 2022 shows the operational and tactical utility of doing so; it has exposed the limitations of Russia's once-vaunted air and missile systems both through their own shortcomings and through their vulnerability to well-utilised air defence systems. But given Russia's doctrinal emphasis on such strikes, their surprising failures in Ukraine also reveal the strategic impact of effective air defence in undermining Russia's non-nuclear strategic deterrent. The implications of these lessons from Ukraine are important for NATO. If it can reconceptualise air defence as a vital tool of strategic deterrence against current Russian doctrine and combine this with credible capabilities, then it can expand its peacetime freedom of action in the face of Russian threats as well as achieving positive strategic outcomes in the event of potential conflict.

This article advances such an argument. It is split into four sections. The first section discusses the Russian air threat to NATO, which consists of a strategic deterrent element and which is especially visible in Russia's 'bastion defence' concept, as well as operational and tactical elements visible in the 'reconnaissance-strike system' and 'reconnaissance-fire system'. The second section assesses the recent developments and current limitations in NATO's air defence capabilities. The third section discusses the impact of the Russian invasion of Ukraine on understandings of Russia's doctrine and capabilities, focusing on how the practice of long-range precision strikes by Russia differs from the theory previously referenced in the first section. Finally, the fourth section makes the argument that the Russian invasion of Ukraine necessitates a reconceptualisation of air defence as a tool of non-nuclear strategic deterrence.

The Russian Air Threat

Understanding Russia's air threat begins with understanding how Russia sees the international order and its security situation within that order. Russian national security documents, the rhetoric of Russian decision-makers, and Russian actions all suggest that NATO is a threat to be defended against. The westward threat has been an understandable preoccupation of decision-makers, from Tsarist Russia, through the Soviet Union and to today's Putin regime. It stems in large part from the country's need to assert its status as a great power with a *right* to determine the architecture of the international order in general and, in particular, the European security order. With regards to Eastern Europe, this requires that Russia be permitted by NATO and its individual members to intervene in its near abroad, not necessarily for security reasons (though throughout history this has been a greater or lesser motivating factor) so much as by right. There is, therefore, a territorial aspect to Russia's perception of its security and threats against it, but it is heavily qualified by social understandings of status as well as sometimes emotional and cultural impulses which are harder to trace.[3]

From this very brief overview of Russia's understanding of international order, we can explore its strategic outlook. Russia pursues a strategy of 'active defence'. This strategy applies in peacetime and wartime and is designed to manage escalation by retaining the initiative throughout a period of escalating tensions. Russia achieves this through a combination of military and non-military preventive measures.[4] Though deterrence is an aspect of active defence, the concept is not limited to it. Russia simultaneously employs tools of constraint and coercion as well, aiming to alter an opponent's cost-benefit calculations about escalating a conflict by demonstrating or inflicting actual harm without crossing the opponent's 'red line' of unacceptable action.[5] Ven Bruusgaard defines the approach as 'using all means available to deter *or dominate* conflict,' with the domination aspect reflecting the shift away from traditional deterrence.[6] The credible demonstration of will and capability to do so is described in Russian writings as deterrence or containment through 'intimidation'.[7] Intimidation is not limited to Russia's nuclear deterrent forces. The country also possesses non-nuclear deterrent forces, both offensive and defensive. Offensively, non-nuclear deterrence is based on the increasing lethality of long-range precision-strike weapons which, when launched in co-ordinated attacks against an opponent's command and control nodes, high-value military and civilian assets, or critical infrastructure, could have effects comparable, in recent Russian thinking, to a tactical nuclear strike. Long-range precision strike weapons are best employed in conjunction with electronic warfare, offensive cyber, and special operations forces.[8] Defensively, non-nuclear deterrent forces include long-range air defence systems and missile defence systems, which increase the survivability of offensive nuclear and non-nuclear deterrent forces.[9]

Russian strategy and its understanding of strategic deterrence in both nuclear and non-nuclear (as well as offensive and defensive) forms is directed principally towards a high-intensity conflict in Europe against NATO. Based on their reading of US and NATO conceptual developments and material capabilities – particularly multi-domain operations – Russia

believes that such a war would open with an 'integrated massed air strike' by NATO at the operational level combined with a 'prompt global strike' at the strategic level against Russia's nuclear and non-nuclear deterrent forces.[10] Such a perspective has been partly informed by NATO's air campaigns over Iraq and Serbia in the 1990s, and since Eastern European colour revolutions and the Arab Spring, Russia has also speculated that NATO could engage in non-military subversion within Russia to disrupt its ability to wage war.[11] Given that this is the threat as perceived by Russia, the most effective way to manage any pre-war escalation and the opening phases of a potential war is to pre-emptively and rapidly strike high-value NATO targets which represent a strategic threat. Therein lies the value of Russia's non-nuclear strategic deterrent forces: as part of a broader co-ordinated effort, they can neuter the strike potential of an opponent's forces, thus deterring prior to the outbreak of hostilities and dominating after the outbreak, without inherently escalating to a nuclear exchange.[12] Given that these forces comprise long-range precision strike weapons and sophisticated air defence systems which are primarily directed against NATO, Russia's non-nuclear strategic deterrent forces represent a strategic air threat to the Alliance.

This point is illustrated by a particular aspect of Russia's active defence strategy: its 'bastion defence' in the Arctic. Russia's Arctic bastion is designed to defend its sea-based strategic nuclear deterrent loaded on the Northern Fleet's ballistic missile submarines. The bastion covers an area from the Kola Peninsula, west to the Greenland-Iceland-UK gap, and south to the Long Forties. This essentially covers the Norwegian and Barents Seas, as well as the

Figure 1: The Russian Arctic bastion, inner and outer defensive areas
Source: J. Black et al. *Enhancing Deterrence and Defence on NATO's Northern Flank* (RAND Europe, 2020), p.vi

northern reaches of the North Sea, which comprises the patrolling area of Russia's strategic missile submarines. Within the bastion is an inner defensive area from the Kola Peninsula to Bear Gap (between Svalbard and mainland Norway), and an outer defensive area which covers the rest of the bastion (see Figure 1). In the inner defensive area, Russia seeks to achieve sea control by employing its long-range precision strike weapons and air and missile defence systems, as well as air and sea patrols by its conventional forces. In the outer defence area it seeks sea denial by maintaining freedom of action against NATO air and naval forces. As well as defending Russia's strategic nuclear deterrent, the Arctic bastion serves three additional strategic purposes which are deemed vital to Russia's interests: first, it enhances Russia's defence of the likely routes of US inter-continental ballistic missiles fired towards Russia from North America and the North Atlantic; second, it enhances Russia's defence of the Northern Sea Route and the country's significant economic interests in the Arctic; and, third, it provides a base in wartime from which Russian air and naval forces could threaten NATO's sea lines of communication and prevent the US from reinforcing Europe. Though not a stated purpose of the Arctic bastion, it is speculated that Russia could also seek to block access to the Baltic Sea, in conjunction with forces operating out of Kaliningrad, and thereby support a regional conflict in the Baltic states.

As an illustrative example of the broader Russian active defence strategy, the Arctic bastion presents five main air threats to NATO. The first is long-range aviation patrols flying through the bastion to NATO's northern airspace. These patrols frequently include nuclear-capable Tu-22 bombers, which are employed as tools of deterrence in peacetime as well as being a clear wartime threat. Second, Russian maritime patrol aircraft and anti-ship weapons pose a risk in wartime to NATO surface ships and submarines. Third, ground-, sea- and air-launched long-range precision strike weapons have the potential to reach far into NATO territory and the territory of NATO partner Sweden, credibly bolstering the Russian threat to engage in pre-emptive strikes against strategic targets. Fourth, conventional Russian air assets using unguided and short-range munitions continue to create military risk. And finally, Russian air defence systems – especially the S-400 Triumf – threaten NATO aircraft within NATO territory and reduce the possibility that Russia's other assets in the bastion can be countered in wartime. This has the additional effect of bolstering the deterrent impact of Russia's strategic non-nuclear forces. It should be noted that, as part of the active defence strategy, Russia has demonstrated these threats in peacetime through the regular use of long-range aviation patrols, harassing NATO ships with jamming and low fly-bys, simulated air attacks against Norwegian military installations and Swedish cities, and tests of advanced weapon systems.

Russia's Arctic bastion therefore visibly demonstrates its active defence strategy during peacetime, its use of both nuclear and non-nuclear strategic deterrent forces, and the air threat posed to NATO forces by this strategy. Its impacts on NATO's behaviour and threat to the Alliance's freedom of action are also evident. The former is clear in the anti-access area-denial capabilities afforded by Russia's weapons in support of their strategy. In a hypothetical war

between Russia and NATO, Russia's ability to contest or control airspace in the Norwegian Sea and – if it can link up with its forces in Kaliningrad – the Baltic Sea would severely constrain NATO's air and maritime freedom of action in those areas.[13] Combined with the logic that Russia would need to control the territory of northern Norway to effectively secure its Arctic bastion in wartime, the Russian strategy limits NATO's ability to defend its northern flank and, potentially, to reinforce the Baltic states by sea. In peacetime, the strategic priority Russia affords to the Arctic bastion means that its calculations on the use of force in this region are more likely to result in escalatory threats or actions. In deterrent terms, this is why Russia responded to Swedish and Finnish applications for NATO membership with immediate threats of 'military consequences,'[14] made the day after the February 2022 invasion of Ukraine, and of implicit placement of more Russian nuclear weapons in the Nordic-Baltic region on April 14th 2022.[15] Given the scale of the Ukraine invasion and the performance of the Russian military in the war, these warnings, though stark, have not decisively shifted Swedish, Finnish or NATO calculations on Alliance membership, though they do demonstrate the escalatory steps Russia is willing to take within its strategic outlook. The long-term deterrent impact of Russia's Arctic bastion and its implied strategic air threat on NATO members can instead be seen in Norway's policy towards Russia before 2022. The Norwegian approach has carefully balanced the country's own defence needs to deter a Russian attack with a desire to 'reassure' Russia that Norway does not present a threat to it, manifest in a lack of permanent NATO bases in Norway and a commitment to a 'low-tension' Arctic despite recent Russian militarisation of the region.[16]

A strategy of active defence relies on ways and means to operationalise it, and these ways and means must present credible threats to any opponents if they are to contribute to nuclear and non-nuclear strategic deterrence as part of that strategy. One way in which Russia operationalises its strategic outlook is the reconnaissance-strike system (RUS in its Russian initialism). This is not the only Russian operational concept, but it has become an increasingly important and well-developed one in Russian thought and is particularly relevant to the peacetime and warfighting aspects of Russia's non-nuclear strategic deterrent forces. Moreover, different discussions in Russian and English-language literature emphasise different aspects of the RUS, use subtly different names, or embed the RUS within a broader range of reconnaissance and engagement concepts. This article treats the RUS as an operational-strategic concept designed to have impacts up to 500 km in depth and which is comprised of tactical-level 'reconnaissance-fire systems' (ROS, in the Russian initialism) attached to brigades and divisions.[17] As noted, other subdivisions may also be included within this definition depending on the literature, but for the purposes of this article the RUS and ROS are indicative examples of how Russia operationalises its active defence strategy and thereby presents a credible air threat to NATO forces.

The RUS is similar to the US concept of network-centric warfare married with a reliance on long-range fires in support of pre-emptive strikes against an opponent. The threat of such force, as already noted, plays a strategic deterrent role during peacetime, allows Russia to

manage escalation in times of heightened tension, and theoretically provides it with a decisive advantage against an attempted 'integrated massed air strike' by NATO in the opening phases of a hypothetical war between the two. The RUS integrates networked reconnaissance and fires elements into an informational battlespace which facilitates near real-time intelligence gathering, decision-making and engagement at long ranges. To that end, unlike the ROS which employs shorter range fires, the RUS uses long-range precision strike weapons. The aim of the RUS is to destroy high-value strategic and operational targets, including but not limited to command, control and communication nodes, critical civilian and military infrastructure, or psychologically important civilian targets. To disrupt the mobilisation of enemy forces, the RUS can also target large force concentrations.[18] Its strikes, in keeping with the pre-emptive emphasis in Russian strategy, are theoretically rapid, with the gap between reconnaissance and engagement being as short as ten seconds.[19] The ROS, though using shorter range fires, employs the same integrated network to facilitate the manoeuvre of ground forces and use artillery to 'take ground' by destroying enemy forces in either massed conventional or precision strikes. Both the ROS and RUS use electronic warfare, cyber operations, psychological operations and special forces alongside artillery as part of the long-range strike element while the long ranges of Russian air defence systems also allow them to be used offensively over NATO territory as well as performing their defensive role in preserving Russia's offensive forces.[20]

Given the emphasis on artillery, and especially long-range precision strike weapons, in the RUS in conjunction with layered air defences, the Russian air threat is an important aspect of the operational and tactical levels, as well as the strategic. This is particularly evident when exploring Russia's emphasis on developing such systems, either from scratch or as modernised versions of legacy Soviet equipment. Again, in line with Russia's active defence strategy and the escalatory assumptions therein, these weapons are often dual-capable – that is, they can be armed with either nuclear or conventional payloads. They are not, therefore, considered to be either nuclear or non-nuclear weapons, but can be placed under the single category of strategic deterrence weapons when that is their intended outcome, though they revert to being general purpose weapons when deployed in support of warfighting operations.[21] Such weapons include but are not limited to:

- Ground-launched missiles including the dual-capable 9M723 Iskander ballistic missile with a range of up to 500km (though possibly longer), the 9M728 and 9M729 Iskander cruise missiles with ranges of 500 km and 2,500 km, and the Hermes or Klevok-D2 shorter range hypersonic missile which is reportedly in development.
- Sea-launched missiles including the dual-capable 3M54 Kalibr anti-ship cruise missile with a range of up to 300 km, the 91R Kalibr anti-submarine cruise missile, the 3M14 Kalibr land-attack cruise missile with a range of up to 2,500 km, and the 3M22 Zirkon hypersonic cruise missile with a range of up to 1,000 km and still under testing.
- Air-launched missiles including the Kh-101 stealth cruise missile with a range between 2,500 km and 4,500 km, the Kh-102 nuclear-armed variant of the Kh-101, the dual-capable 9-S-7760 Kinzhal semi-hypersonic ballistic missile with a range of up to 2,000 km

and fired from a modified MiG-31, the dual-capable Kh-32 anti-ship missile with a range of up to 1,000 km, as well as a future hypersonic missile known as the Gremlin or GZUR.
- An integrated air defence system including multiple variants of the long-range S-200, S-300, S-400 and the future S-500, which combined can create a layered air defence 'bubble' of reportedly up to 800 km in diameter. Within this bubble sits medium-range systems, such as variants of the 9K37 Buk which provides greater radar coverage and a more ready supply of missiles. Finally, point-defence of high-value targets is provided by short-range systems such as the 9K33 Osa and S-125 Neva, and the long-range systems themselves can be defended from air attack by the Tor or Pantsyr S-1. The medium- and short-range systems can also be attached to mobile ground forces.
- Airbourne electronic warfare systems including the Khibiny pod mounted on the Su-34 and the Il-22PP Porubshchik for jamming air and missile defence radars, unmanned aerial vehicles and airbourne early-warning aircraft radars.
- The so-called 'superweapons' such as the Burevestnik nuclear-powered cruise missile with practically unlimited range and therefore capable of flying at much lower altitudes avoid enemy air defences.[22]

Though the capabilities of many of these systems are still under debate, some have underperformed during the war in Ukraine, and others have not yet completed development, it is clear that Russia's active defence strategy and its RUS operational concept involve a significant Russian commitment to presenting NATO with a credible air threat. Unlike the past three decades in which NATO operations have occurred in relatively uncontested airspace, a potential conflict with Russia would involve a highly complex air threat and, consequently, contestation. This means that NATO's ability to rely on the threat or use of force against Russian actions is reduced, constraining the Alliance's freedom of action and decision-making ability, while ceding the strategic initiative to Russia in periods of escalation during peacetime.[23] In the words of Russia's Chief of the General Staff, Valery Gerasimov, in 2018, Russia has applied the logic that 'to answer a threat, we need to create a threat.'[24]

The Russian air threat is therefore well-developed across the strategic, operational and tactical levels, and is matched with material developments which demonstrate the importance Russia attaches to their own ability to conduct an 'integrated massed air strike' against NATO in case of a potential war. Combined, these aspects of Russian military thought and practice provide credibility to the Russian air threat and so enhance its strategic deterrent impact, both nuclear and non-nuclear. This is evident in the Arctic bastion, which integrates these elements together and achieves the strategic outcome of deterring NATO responses to Russian militarisation and constraining its freedom of action. This is not to say that the Russian air threat is undefeatable – the article will later discuss Russia's shortcomings which have been exposed by the invasion of Ukraine. However, the point is to demonstrate that Russian air power impacts NATO calculations far beyond the tactical and operational levels, and that Russia is highly conscious of this when it includes air threats within its strategic non-nuclear forces. At present, NATO's response fails to do so too.

The NATO Response

NATO's biggest threat now stems from Russian aggression in Eastern Europe and the Nordic-Baltic region. Part of this threat is a far more complex air environment than NATO has faced in the past three decades. As noted at the beginning of this article, NATO's air defence has developed in support of counter-terror operations, low-intensity conflicts far from Europe, and an assumed state of air superiority within Europe itself (an assumption which is carried over from the Cold War, when NATO planned to maintain air superiority over Warsaw Pact forces).[25] As a result, the Alliance's air defence systems are both materially and conceptually underdeveloped. That is not to say that deficiencies are not being rectified. Indeed, modern air defence systems have been procured or developed in the past decade. But the pace of procurement and integration of new air defence systems is slow and numbers are not sufficient to respond to the new threat environment.[26] Moreover, because of the relatively small number of platforms, their strategic value has not been fully appreciated. This not only limits the Alliance's ability to respond to the strategic air threat from Russia, it also increases the likelihood of otherwise avoidable strategic blunders which damage NATO's political cohesion and military capabilities.

NATO is belatedly recognising the air threat from peer rivals, especially Russia, and consequently increasing investment in air defence capabilities. NATO's *2022 Strategic Concept* notes the need for 'strengthened integrated air and missile defence,'[27] and national documents and behaviour demonstrate a concerted effort to improve air defence systems. The UK's *Defence Command Paper*, published in 2021 immediately after the *Integrated Review* but before Russia's invasion of Ukraine, is indicative of the shifting mood. It notes that 'the development of long-range precision strike capabilities, combined with increasingly capable early warning radar and integrated air defence systems, will enable states to contest and even dominate airspace in many areas where the UK will need to dominate [. . .] Russia has the capability to conduct precision strikes at range and to deny freedom of action to the UK and our allies through a highly capable integrated air defence system.'[28] In support of this assessment, the UK has invested in advanced short-range air defence, such as the Starstreak system (which proved highly successful when donated to Ukraine), and is developing the Common Anti-air Modular Missile (CAMM) family of missiles which will augment this with ground-, sea- and air-launched capabilities. It also already operates the Sea Viper theatre ballistic missile and air defence system aboard its Type 45 destroyers for medium-range air defence, a variant of the PAAMS system aboard French and Italian ships. Other NATO members and partners are procuring short-range (NASAMS II[29] and RBS 98[30], for example) and medium-range (Patriot Configuration 3+ and SAMP/T[31]) systems. However, as one assessment notes: 'Although these newer systems are likely more able to counter modern threats, they are being acquired in relatively small numbers. Integrating them into a network that still includes many disparate legacy platforms of varied origin will pose a challenge.'[32]

Combined with the limitations in employing these new air defence systems, NATO members have not integrated the air defence concept into a broader strategic vision. Both UK and NATO

doctrine conceptualise air defence under the broader category of defensive counter air (DCA). The purpose of DCA is to 'protect friendly forces and vital interests from adversary air and missile attacks' by conducting 'active and passive air defence operations to detect, identify, intercept and destroy or negate adversary air and missile forces attempting to attack or penetrate friendly battlespace, or to nullify or reduce the effectiveness of such attacks should they escape destruction.'[33] UK doctrine recognises that this is 'generally reactive in nature' as its focus is on providing tactical, and at most operational, cover for ground, sea and air forces.[34] Consequently, whereas Russia conceptualises air defence based on its outcomes – either contributing to strategic deterrence or to ground forces support both during peacetime and in war – NATO doctrine treats air defence as 'synonymous with'[35] DCA and therefore prioritises its tactical and operational force enabling capabilities in wartime. This does not necessarily negate the strategic impact that NATO air defence systems can have on altering Russia's calculations, but it does limit NATO's ability to manipulate this outcome as an explicit policy tool during peacetime and therefore cedes the strategic initiative to Russia.

Closely tied to this conceptual limitation is the separation in NATO doctrine of DCA from Offensive Counter Air (OCA) which, in the context of Russia's RUS, is an increasingly difficult distinction to sustain. OCA involves 'offensive operations to destroy, disrupt or degrade adversary air and missile capabilities' and may consist of 'surface attack operations, air-to-air missions and suppression of enemy air defences.'[36] UK doctrine characterises OCA as 'generally proactive in nature and seek[ing] to dominate an adversary's airspace.'[37] This definition does two things. Firstly, it reinforces the tactical and operational focus of NATO thinking insofar as both concepts are defined by the means used rather than the outcomes achieved. For example, OCA is characterised by strike operations, and DCA by interception, artificially siloing each from the potential strategic effects they can have in peace and war.[38] And secondly, it neglects the offensive capability which air defence systems possess, which is also recognised in Russian strategic thinking. For example, an air defence mission can be treated as a form of offence if its *effect* is to deter Russian aggression by reducing the likelihood of Russia's long-range precision strike weapons causing decisive damage to high-value NATO targets. This is, in a sense, how Russia conceives of air defence systems when it places them within its non-nuclear strategic deterrent forces in the Arctic bastion, while retaining their ability to conduct more traditional defensive missions when it places them alongside its general-purpose forces. The converse is also evident in the Russian strategy of active defence and the RUS operational concept, insofar as offensive means are used to achieve a defensive strategic outcome.[39] For NATO, then, the present distinction between DCA and OCA conceptually limits the conscious manipulation of air defence systems' strategic effect, undermining Alliance responses to Russian strategic deterrence and preventing NATO from implementing its own deterrent posture as effectively.

The effect of NATO's conceptual approach to air defence has strategic impacts within and beyond the Alliance. NATO members are not unaware of the strategic importance of air defence beyond its DCA role: the US frequently deploys Patriot batteries to demonstrate political will and reassurance, and Germany places one of its air defence groups under Dutch

command. Both examples, as well as having obvious tactical and operational effects in providing DCA, also strategically strengthen NATO by improving Alliance cohesion and thereby increasing the risk for Russia of escalating across an unacceptable 'red line' for the Alliance. This impact is limited, though, in that its strategic effect is largely psychological – akin to placing the 'tripwire forces' of the Enhanced Forward Presence (EFP) in the Baltic states following Russia's 2014 annexation of Crimea and invasion of eastern Ukraine. In other words, the current strategic employment of air defence systems by NATO members does not significantly reduce the air threat posed by Russian strategy and operational concepts, and consequently does not decisively alter the Russian cost-benefit calculations in itself (rather, those calculations may be altered by shortcomings inherent to the Russian approach, as discussed in the next section). This is partly because, as noted, the number of new air defence systems in Europe is small, and they are therefore unable to credibly defend the sheer number of high-value targets within NATO territory against the stated capabilities of Russia's air threat. But it also appears that because of a conceptual predilection for placing air defence systems within a DCA role, the possible strategic impacts of air defence are under-appreciated within NATO and so the attention afforded to them is more limited than it needs to be to counter the strategic Russian air threat.

Worse, a lack of strategic thought when approaching air defence in NATO can lead to major setbacks. In 2019, Turkey decided to purchase the Russian-made S-400 air defence system, which would also require Russian assistance for training, maintenance, and operational support. This decision caused a political rift in NATO, with the US in particular fearing that the Turkish systems would gather targeting data on NATO aircraft – especially the sensitive F-35 – which would then be available to Russian intelligence services. It therefore cut Turkey from the F-35 programme.[40] The US had only bad options to choose between: preserve the utility of the F-35 but expose political divisions within NATO or downplay internal divisions while sacrificing the advantages of the F-35. Turkey's choice was easier; it had been offered the US Patriot or European SAMP/T air defence systems instead of the S-400 and received no domestic production rights over the S-400, which had ironically been one of the reasons it rejected the Patriot system. Whatever the multifaceted calculations were when both countries approached the problem, though, the importance of a NATO-wide strategy towards air defence evidently was not valued as highly as other concerns. It is impossible to argue a counterfactual, but given the above discussion it seems possible that if air defence was treated by NATO members as being a vital tool of the Alliance's non-nuclear strategic deterrence capability, then both the US and Turkey would have approached their decision-making calculus differently. Instead, Russia's deterrent and coercive capabilities were enhanced as NATO's perception of the Russian air threat increased while Russia gained a vector through which it could weaken NATO cohesion and thereby seize the strategic initiative in a period of escalating tension.

NATO's response to the Russian air threat is still underdeveloped, despite material investments since the end of the Cold War. At the most basic level, there are simply not enough NATO air

defence systems in place to counter the quantity of long-range precision strike weapons Russia could bring to bear in the event of a potential conflict in Europe. This problem is exacerbated by difficulties in integrating multiple diverse systems into an integrated air defence system and the need to exclude some members – notably Turkey – completely. At a deeper level, NATO's conceptualisation of air defence is geared too much towards DCA which consigns it largely to the tactical and operational levels. NATO must respond to the enemy as they actually act, rather than as doctrine would like them to act; consequently, NATO must better integrate air defence into its strategic approach to Russia and effectively operationalise its use through deterrent concepts. Only then will air defence adequately contribute to countering Russia's active defence and RUS.

The Lessons of Ukraine

Russia's 2022 invasion of Ukraine has demonstrated that NATO is not the only major military player in Europe to suffer from material and conceptual limitations in its approach to air power in general and air defence in particular. Russia's lacklustre performance has deflated the myth that its advanced long-range precision strike weapons, acting through the RUS, can cripple potential enemies before an effective defence can be mounted. And this, in turn, has severely undermined the deterrent impact of Russia's strategic non-nuclear forces. In the opening day of the invasion, Russia did indeed strike many high-value targets in Ukraine with its long-range precision weapons, including Ukrainian air defence radars, many runways, and some less mobile Ukrainian S-300P air defence systems.[41] However, subsequent failures in tactics, operations and strategy have, as Jack Watling puts it, 'laid bare just how wide the theory-praxis gap is.'[42]

Beginning from the material issues Russia has faced, their long-range precision strike weapons have not lived up to expectations and, at any rate, are not available in large enough quantities to provide a decisive first strike capability in a potential conflict with NATO. The US intelligence community claims that Russian ground-, sea- and air-launched missiles are either 'failing to launch, or they're failing to hit the target, or they're failing to explode on contact.'[43] Despite launching around 100 cruise and ballistic missiles and deploying 75 bomber aircraft on the first night of the invasion, Russia's long-range precision strike weapons did not have the decisive strategic impact predicted in the RUS concept.[44] Similarly, Russia's modernised communications – the sixth-generation Azart and fifth-generation Akveduk family of radios – have not been able to maintain secure communications among Russian units or transfer the data required to co-ordinate long-range fires.[45] This suggests that the stated capabilities of such systems have either been misunderstood or misrepresented by the Russian military. Furthermore, such systems are hampered by inefficient supply – likely exacerbated by corruption – and the limited capacity of Russia's domestic industry to produce the quantities required for the RUS to credibly threaten an 'integrated massed air strike' against as large an adversary as NATO.[46] As noted before the Russian invasion: 'to be truly effective, conventional strategic deterrence must rely on a massive arsenal of weapons […] Russia is unlikely to be in possession of enough such weapons at the moment and is unlikely to possess enough soon.'[47]

With stockpiles of long-range precision strike weapons depleted after operational use in Syria and Ukraine, as well as international sanctions exacerbating the high production costs of such weapons, and their underwhelming military effects, the material basis of Russia's strategic non-nuclear deterrent is compromised.

Other potential causes for the failure of Russia's air threat to materialise as expected lie in the performance of its troops and planners. The Russian Air Force, for example, did not follow up its limited successful strikes on the first night of the invasion with meaningful OCA targeting surviving Ukrainian air and air defence capabilities,[48] exposing its failure over the past 14 years of modernisation to develop an effective Suppression of Enemy Air Defences (SEAD) force to complement long-range fires.[49] Nor did Russia concentrate its long-range precision strike weapons to achieve decisive strategic effects. Again, potentially due to the limited stockpile of these weapons, Russia did not launch as large a strike as the RUS concept would dictate at the beginning of the invasion, nor did it complement such strikes with large-scale non-kinetic effects such as electronic warfare or cyber-attacks.[50] As the war continued, the theory-praxis gap only widened, with Russia launching many of its scarce long-range precision strike assets as part of a terror campaign against non-critical civilian targets. At the broader level, a lack of co-ordination and concentration of forces has been evidenced in the lack of a joint command to lead Russia's three main axes of advance (in the south, the east and, at the beginning of the invasion at least, in the north). All of this means that long-range strikes have not been employed in a dense or targeted enough manner, with critical Ukrainian infrastructure and command and control nodes remaining either untargeted or unharmed by attempted Russian attacks, while significant Russian effort has gone into destroying urban areas of little military value according to the RUS.[51] The implication is that the Russian air threat is not as potent as once believed by both Russia and NATO.

As part of this integrated air threat, Russia's air defence systems have also failed to meet expectations. Their limitations have been speculated before the invasion of Ukraine. The S-400's stated range of up to 400 km, for example, has been questioned as the only Russian missile capable of reaching this distance is the 40N6E, which is available in limited numbers. Other missiles have a range of up to 250 km, and even the 40N6E may be restricted by the reach of the S-400's radar.[52] Operationally, the S-400 has also failed in its deterrent mission. A Russian-crewed S-400 system deployed to Syria in 2017 conspicuously chose not to intercept any of the Tomahawk land-attack cruise missiles launched by the US in a strike on the Syrian Air Force base at Shayrat, despite advanced warning of the attack and the relatively easy target presented by the ageing missiles. Justin Bronk speculates that this Russian decision was due to the limited stock of air defence missiles available in theatre and concerns that the maturing S-400 system would not be able to achieve a hit-to-kill ratio sufficient to thwart the attack, especially given that upwards of 60 Tomahawks were launched.[53] This is not to say that the S-400 is an incapable system – it does present a viable threat, especially in Russia itself where it is integrated into a broader network of medium- and short-range air defences. But, like Russia's long-range precision strike weapons which it helps to defend, the S-400 is not undefeatable

and possesses practical limitations which curtail its theoretical potential. This is especially so in terms of the strategic deterrence potential of Russia's air defence systems, as Bronk notes that within Syria the S-400 ceased to deter or constrain US and coalition air activity.[54]

More worryingly for Russia, the invasion of Ukraine may expose significant conceptual flaws in their strategy and operational concepts. The RUS, for example, is already compromised by the shortcomings of its long-range precision strike weapons as detailed above, but it also relies on integrating such weapons with tools of political subversion and the use of proxy forces.[55] When viewed from this broader perspective, Russia might use political subversion to weaken an adversary's domestic resilience and political cohesion, and then employ long-range strikes against critical targets 'across the depth of [the adversary's] society' in order to completely paralyse that country's ability to mount effective resistance.[56] The long-running Russian subversion of Ukrainian society prior to the invasion in 2022 is evidence of such an approach. However, as Cranny-Evans and Kaushal note, the assumptions behind this concept are flawed. They are based on Russia misreading NATO's experiences in Iraq and Serbia in the 1990s when air campaigns failed to totally paralyse enemy forces and, in the case of Iraq, necessitated a ground campaign. Russia also fails to appreciate the difficulty of integrating inherently unpredictable non-kinetic effects from political subversion with the timely impact of long-range strikes and fails to appreciate that the actual use of such strikes may counteract the effects of long-running political campaigns. In the case of Ukraine, it is notable that the Russian invasion cohered Ukrainian society around the legitimate government of President Volodomyr Zelensky, contrary to Russian intelligence assessments and activities.[57] In short, the air threat encapsulated in the RUS does not have the decisive strategic impact expected in Russian thought.

The limitations of Russia's air threat and operational concepts on their active defence strategy are significant. Without a viable operational concept, a strategy which relies on a pre-emptive 'integrated massed air strike' as a decisive escalatory step is fatally weakened insofar as its deterrent effect is nullified. This shifts the strategic initiative from Russia to NATO, allowing the Alliance to control the escalation cycle. Regarding the credibility of a pre-emptive Russian strike, the significant shortcomings of both long-range precision strike weapons and the RUS operational concept will shift Russia's future calculations on when it can reliably resort to force along the escalatory ladder, likely raising this threshold by diminishing the expected utility of employing force. Conversely, NATO will perceive less of a threat from Russia and experience greater freedom of action and decision-making. This is already evident in policy announcements following the Russian invasion, including significant increases in defence spending amongst NATO and non-NATO states in Europe, and the decision of Sweden and Finland to apply for NATO membership. More immediately, NATO is now emboldened to station EFP forces in Romania, Bulgaria, Hungary and Slovakia, and to discuss increasing such forces in Poland and the Baltic states and making their deployments permanent. In other words, the tactical and operational failures Russia has experienced in Ukraine have allowed NATO to 'call its bluff' regarding strategic deterrent forces and act in a way that increases the

threat to Russia's interests as outlined in its active defence strategy. This is visibly playing out in the Nordic-Baltic region, where Russia's Arctic bastion is now increasingly threatened by the above-mentioned developments and the previously permissive idea of a 'low tension' Arctic has been compromised.[58]

The Implications for Air Defence

This article has consistently argued that air defence plays a strategic role as a non-nuclear deterrent, a role which is especially relevant to the relationship between Russia and NATO. Indeed, Russia's active defence strategy and its highly visible manifestation in the Arctic bastion already treat air defence systems as part of a strategic deterrence force, providing both defensive protection for long-range precision strike and nuclear weapons and offensive capabilities which allow it to dominate airspace well into NATO territory in case of war. This, combined with long-range precision strike weapons integrated under the RUS operational concept, allows Russia in peacetime to deter NATO threats in Russia's near abroad and vital strategic areas, and to constrain the Alliance's decision-making on defence and security matters. In wartime, it represents a significant constraint on NATO's freedom of action. By contrast, NATO's conceptualisation of air defence as a tactical-operational capability within DCA disperses the relatively small number of air defence systems across Alliance territory such that their offensive potential and strategic deterrent impact is lessened. This conceptualisation also underestimates the strategic role played by Russia's air defence systems and so fails to appreciate the concomitant strategic role played by SEAD; in this context, the consistent under-investment in SEAD capabilities in NATO air forces both enhances Russia's deterrent capabilities and undermines NATO's.[59]

The strategic use of air defence systems – for example, concentrating them against vital adversary interests in an offensive posture – is especially important against Russia because its strategy relies on the simultaneous deterrent and coercive effect of long-range precision strike weapons integrated under the RUS. This approach provides roles for Russia's non-nuclear strategic deterrent forces in peacetime and wartime, and is designed to give Russia the initiative in a period of escalation as well as permitting a massive pre-emptive strike at the outbreak of hostilities. In that sense, effective air defence can undermine the credibility of advanced Russian weapons – on which Russia places an 'excessive faith'[60] – disrupt the already flawed logic of the RUS operational concept and seize the strategic initiative from Russia in peacetime and in the early phases of a potential conflict. In other words, the strategic use of air defence systems can increase NATO freedom of action against Russian coercive threats and reduce Russia's deterrent effect by positively altering NATO cost-benefit calculations and negatively altering Russian calculations.

The Russian invasion of Ukraine has made the strategic value of air defence more evident. It has already done some of the work insofar as it has exposed the shortcomings of Russian long-range precision strike weapons, the flaws of the RUS concept, and the diminished deterrent effect Russia's non-nuclear forces can have on both NATO and non-NATO countries

in Russia's near abroad. The invasion has also galvanised NATO into action, providing a window of opportunity in which previous conceptualisations can be revisited and material investments increased. The strategic initiative has been presented to NATO, but the Alliance must now seize it. One way of doing so is, as argued here, by adopting a strategic conceptualisation of air defence which takes advantage of Russia's overreliance on the air threat and the flaws in its military thinking, but which simultaneously takes that air threat seriously. Indeed, the invasion of Ukraine has also taught NATO that even relatively small and outdated air defence networks can have strategic effects. Continued Ukrainian ground- and air-based air defence has helped to thwart the Russian invasion and thereby alter Russian plans to conquer the entire country. In Ukrainian terms, this is a strategic success insofar as the country has warded off the gravest strategic threat of all: ceasing to exist as a sovereign state.

The War in Ukraine is, of course, not yet over. Russia may adapt its approach in response to its previous failings. Indeed, as the campaign's focus has shifted from northern Ukraine and the Battle of Kyiv towards eastern Ukraine and the Donbass, the tempo and size of Russian OCA sweeps has increased slightly, placing greater strain on Ukraine's air defences. This, though, is why air defence must be taken seriously as a strategically vital tool in NATO's inventory: the Russian air threat cannot be assumed away based on its initial failings in Ukraine. Despite those shortcomings, it is still potent and can still inflict enough damage on potential adversaries – including NATO – to shift cost-benefit calculations. It therefore remains a deterrent threat, albeit a diminished one. The greater NATO's air defence capabilities, the less that deterrent threat can be, especially against non-nuclear long-range precision strike weapons. Taken one step further, by treating air defence strategically and removing it from its conceptual silo within DCA, it can be an effective tool with which to deter Russian aggression in peacetime and war, and thereby allow NATO to hold onto the strategic initiative.

Notes

[1] F. Hoffman and W. Alberque, *Non-Nuclear Weapons with Strategic Effect: New Tools of Warfare?* (IISS, 2022), p. 3.

[2] This definition assumes the military nature of strategic deterrence. For a discussion of the breadth of the term's boundaries, especially in Russian military thinking, see: V. Akimenko, *Russia and Strategic Non-Nuclear Deterrence: Capabilities, Limitations and Challenges* (Chatham House, 2021), p. 1-4.

[3] Regarding emotional and cultural impulses, the Russian invasion of Georgia in 2008 has been explained through the cultural attachment of Russian elites to the country, which otherwise presented no viable security threat to Russia. See L.A. Mitchell, *The Colour Revolutions* (Philadelphia, 2012), p. 94-5. For other drivers of Russian perceptions of international order, see: K. Giles, *What Deters Russia: Enduring Principles for Responding to Moscow* (Chatham House, 2021); E. Kropatcheva, 'Russian Foreign Policy in the Realm of European Security Through the Lens of Neoclassical Realism' in *Journal of Eurasian Studies* (2012), Vol. 3, No.1, p. 30-40; R. Legvold (ed.) *Russian Foreign Policy in the 21st Century and the Shadow of the Past* (New York, 2007); A.P. Tsygankov, 'Vladimir Putin's Vision of Russia as a Normal Great Power' in *Post-Soviet*

Affairs (2005), Vol. 21, No. 2, p. 132-58; A.P. Tsygankov, *Russia's Foreign Policy: Change and Continuity in National Identity* (Lanham, 2016).
[4] M. Kofman et al., *Russian Military Strategy* (CNA, 2021), p. 10-11.
[5] Kofman et al., *Russian Military Strategy*, p. 11-12.
[6] K. Ven Bruusgaard, 'Russian Strategic Deterrence' in *Global Politics & Strategy* (2016), Vol.58, No.4, p. 7; Akimenko, *Russia and Strategic Non-Nuclear Deterrence*, p. 2-3.
[7] Akimenko, *Strategic Non-Nuclear Deterrence*, p. 3.
[8] *S. Cranny-Evans & S. Kaushal, 'The Intellectual Failures Behind Russia's Bungled Invasion', RUSI, 1st April 2022; L.W. Grau & C.K. Bartles, The Russian Reconnaissance Fire Complex Comes of Age* (Changing Character of War Centre, 2018); T. Thomas, *Russian Electronic, Information, Navigation, and Reconnaissance-Strike and -Fire Operations: Definitions and Use (Virginia, 2020).*
[9] Akimenko, *Strategic Non-Nuclear Deterrence*, p. 4-5.
[10] Kofman et al., *Russian Military Strategy*, p. 21.
[11] Cranny-Evans & Kaushal, 'Intellectual Failures'; Kofman et al., *Russian Military Strategy*, p. 23.
[12] Kofman et al., *Russian Military Strategy*, p. 25-6.
[13] R. Johnson & J.H. Matlary, *The United Kingdom's Defence After Brexit: Britain's Alliances, Coalitions and Partnerships* (Cham, 2018), p. 252-5.
[14] J. Barnes, 'Russia Warns of 'Military Consequences' if Finland and Sweden Join NATO', *The Telegraph*, 25th February 2022.
[15] G. Faulconbridge, 'Russia Warns of Nuclear, Hypersonic Deployment if Sweden and Finland Join NATO', *Reuters*, 14th April 2022.
[16] A.R. Hjermann & J. Wilhelmsen, *Russian Reframing: Norway as an Outpost for NATO Offensives* (NUPI, 2021); Boulègue, *Russia's Military Posture in the Arctic: Managing Hard Power in a 'Low Tension' Environment* (Chatham House, 2019); N. Childs, *Security and the Arctic: Navigating Between Co-operation and Competition* (IISS, 2021).
[17] See, for example: O.N. Ostapenko, S.V. Baushev, and I.V. Morozov, *Information-Space Support of RF Armed Forces Groupings* (St Petersburg, 2012) p. 203; Thomas, *Reconnaissance-Strike and -Fire Operations*, p. 15.
[18] Grau & Bartles, *Russian Reconnaissance Fire System*, p. 1.
[19] Ibid.
[20] Thomas, *Reconnaissance-Strike and -Fire Operations*.
[21] R. Connolly, 'Putin's Super Weapons' in S. Bendett et al. (eds.) *Advanced Military Technology in Russia: Capabilities and Implications* (Chatham House, 2021), p. 29-30.
[22] Connolly, 'Putin's Super Weapons'; Akimenko, *Strategic Non-Nuclear Deterrence*; CSIS Missile Threat Report, https://missilethreat.csis.org/ last accessed on: 18/04/2022.
[23] Bendett et al. *Advanced Military Technology*, p. 8-9.
[24] V. Gerasimov, quoted in Connolly, 'Putin's Super Weapons', p. 30.
[25] M. Tong, 'The Challenge of Defending European Airspace', IISS, 12th February 2020.
[26] Ibid.
[27] NATO, *NATO 2022 Strategic Concept* (Brussels, 2022), p. 6.
[28] Ministry of Defence, *Defence in a Competitive Age* (London, 2021), p. 9-10.
[29] National Advanced Surface-to-Air Missile System – NASAMS.

[30] Saab Dynamics - Robotsystem 98 – RBS 98.
[31] Sol-Air Moyenne-Portée/Terrestre (French for "Surface-to-Air Medium-Range/Land-based"), commonly known as SAMP/T.
[32] Tong, 'Defending European Airspace'.
[33] NATO, *AJP-3.3 Allied Joint Doctrine for Air and Space Operations* (Brussels, 2016) p. 1-9.
[34] Ministry of Defence, *JDP 0-30 UK Air and Space Power* (London, 2017), p. 28.
[35] NATO, *AJP-3.3*, p. 1-9.
[36] Ibid.
[37] MOD, *JDP 0-30*, p. 28.
[38] S. Kaushal et al., *The Future of NATO's Air and Missile Defence* (RUSI, 2021), p. 21.
[39] See ibid for a discussion of how Suppression of Enemy Air Threats can provide a defensive outcome using offensive means.
[40] IISS, 'Turkey, the S-400 and the F-35' in *Strategic Comments* (2019), Vol. 25, No. 6, p.iv-vi.
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[42] J. Watling, 'Just How Tall Are Russian Soldiers?', RUSI, 11 March 2022.
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[45] S. Cranny-Evans & T. Withington, 'Russian Comms in Ukraine: A World of Hertz', RUSI, 9 March 2022.
[46] Ibid; Akimenko, *Russia and Strategic Non-Nuclear Deterrence*, p. 12-13.
[47] Akimenko, *Strategic Non-Nuclear Deterrence*, p. 13.
[48] Bronk, 'Missing Russian Air Force'.
[49] Atlantic Council, 'Military Assessment'.
[50] Ibid; R. Rohozinski, 'The Missing 'Cybergeddon': What Ukraine Can Tell Us About the Future of Cyber War', IISS, 9 March 2022.
[51] Watling, 'Just How Tall'.
[52] CSIS Missile Threat Report.
[53] J. Bronk, 'Russia's Air Defence Challenge in Syria', RUSI, 29 June 2017.
[54] Ibid.
[55] N. Fiore, 'Defeating the Battalion Tactical Group' in *Armor* (2017), Vol. CXXVIII, No. 2, p. 9-17.
[56] Cranny-Evans & Kaushal, 'Intellectual Failures'.
[57] Ibid; N. Gould-Davies, 'Putin's Strategic Failure and the Risk of Escalation', IISS, 1 March 2022; M. Harries, 'Putin's Historic Mistake: The Missing Russian War Narrative', RUSI, 11 March 2022.
[58] E. Buchanan, 'The Ukraine War and the Future of the Arctic', RUSI, 18 March 2022.
[59] Kaushal et al., *Air and Missile Defence*; J. Bronk, 'Getting Serious About SEAD: European Air Forces Must Learn from the Failure of the Russian Air Force Over Ukraine', RUSI, 6 April 2022.
[60] Cranny-Evans & Kaushal, 'Intellectual Failures'.