

5. SECURITY STUDIES

RUSSIA'S AND NATO'S USE OF AIR POWER IN COMPARISON: WHAT IS TO BE EXPECTED?

...doctrine is more than a theoretical luxury of value only in the classroom. It must instead be the binder, the adhesive, *justifying* our future technological research and development, rationalizing our planned acquisition strategy and governing our present employment of forces (Hallion, 1987).

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ABSTRACT

This research analyses the Russian approach to the use of air power supporting direct subordination to ground forces in comparison with NATO's approach of an independent component directly conducting the military objective through deep air operations. By drawing upon mostly open sources, this paper sheds light on possible advantages and limitations of both sides' peculiar approaches in regards to possible future military encounters. Despite taking NATO's evolution of air power into account, it becomes clear that the Russian military air forces cannot fully adapt in the near future due to mainly historical, economic, technological and geopolitical factors. Therefore, Russia's air forces are rather unbalanced and incapable of applying the full potential of air power. Through analysing the origins and emphasising further implications as to future development, this research highlights the importance for NATO to focus more on achieving and maintaining air superiority including exploitation of its clear advantage in long-range aviation.

KEY WORDS

Air power, Russian air force, NATO air power, future warfare.

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Introduction

Many questions and doubts have arisen regarding the use of air power, ever since aviation was first used in military conflicts. The reasoning behind this long-lasting discussion can be found in five aspects of air power: Firstly, air power is relatively new in armed conflicts in comparison to land and

naval operations, as the first powered flight of the famous Wright Brothers dates back to 1903. Secondly, air power (comparable to naval power) is relatively expensive. Its full range of capabilities is only reserved for wealthy nations such as members of the G7 and Russia. Thirdly, due to its unique

characteristics of speed, range and flexibility (NATO, 2009), projection of air power often has a decisive role in the outcome and the tendency towards a more attrition-like form of warfare, as seen in the two Gulf wars. Fourthly, and in close context to the latter, air power can be highly effective, while simultaneously avoiding high risks and casualties, especially in comparison to high intensity land warfare. Hence, air power is politically more acceptable and the threshold for its application is lower. Fifthly, air power seems to be a flexible contribution to solving regional conflicts such as Libya 2011 or the current conflict in Syria, not only for western states, but also for Russia. At least politically, the threshold of unleashing it is relatively low.

During the discussion on how to apply air power best, two tendencies have emerged. One is more in support of seeing air forces independently, directly conducting the overall military objective through deep attacks. These supporters are principally represented by major NATO members such as the United States (U.S.) or the United Kingdom (U.K.). The others favour short-range massed aviation attacks in close support to the ground forces, mainly represented by Russia. As both are very different and imply not only advantages, when thinking of possible future scenarios, the question is which "philosophy" will prevail.

Despite the recent developments and lessons learned in Russia's air forces, also taking the evolution of western air forces into account, this paper will argue that Russia cannot fully adapt to the NATO's approach in the near future due to historical, economic, technological and geopolitical factors. This limits Russia to having a rather unbalanced air force, incapable of applying the full potential of air power. Firstly, this paper will analyse the origins of the current use of Russia's air power, by taking the

mentioned factors into account. Secondly, it will discuss the Soviet heritage for the use of air power against the background of recent developments in Russia's air forces. Thirdly, western and NATO's evolution of air power will be portrayed, before describing the most recent approach. On the basis of that research, the paper will describe further derivations and implications as to future developments and shed light on the subject of possible conclusions. A near future contest serves as a purely hypothetical assumption, which may or may not have been valid only in cold war times.

During the examination, this paper will focus on historical, economic, technological and geopolitical factors based on open sources. The analysis, the comparison and the contest will be limited to the European theatre and will not analyse the application of naval aviation or a potential clash between Russia and China. Ethical questions as to the use of air power will also not be addressed.

The development of Soviet air power prior and during World War II (WWII)

In order to understand the Russian perspective, it is necessary to analyse the historical developments of Russia's *Voyenno-Vozdushnye Sily* (VVS – military air forces) in combination with the exclusive impact on the doctrine by specific Soviet theorists. Prior to WWII, the Soviet chief aviation editor Lapchinskii described the nature of military aviation missions as independent (*nezavisimii*), separate (*samostoiatel'ni*) and service (*sluzhatel'ni*) (Sterrett, 2007, p. 19). A degree of independence of air power was to be based on size. Despite emphasising indirectly the independent role, Lapchinskii recommended that whenever air forces were massed at a military front, they were always to be subordinated to the respon-

sible ground forces commander (Kainikara, 2011; Sterrett, 2007). Different from the western way of thinking, total *air superiority* was not considered as achievable. In the area of ground forces' operations, air superiority was only to be seen as a temporary and tactical condition (Sterrett, 2007, p. 22). This mindset arguably indicates that air and ground campaigns were mostly to begin simultaneously. Additionally, the main tasks for the VVS resulted in conducting Close Air Support (CAS), Air Interdiction (AI) and Counter Air Operations (CAO) to a range of approximately 200 kilometres from the frontier (Sterrett, 2007, p. 27). During the Spanish civil war from 1936-1939, faith in long-range bombing had increased, but still doubts in bombing cities or factories dominated. Soviet commanders preferred to conduct attacks against nearby enemy air bases (Sterrett, 2007, pp. 52-53). But again success on the ground emphasised the supporting role of air power in Soviet doctrines, putting an end to tendencies towards a more independent VVS with more long-range capabilities (Kainikara, 2011; Sterrett, 2007). Because theory, main tasks and events drive the doctrine and allocation of resources, this explains why a preference of subordinated tactical aviation over independent long-range aviation has been so deeply ingrained.

After a disastrous start for the VVS in 1941, due to poor readiness and training, the main ideas basically did not change. Communication and coordination problems were solved through decentralising control to units away from the front. Not only did management and logistics become more complicated, but also the ability to centralise control and concentrate the effort of air power was given up (de Haas, 2004, p. 117; Sterrett, 2007). This did not apply in total to the long-range aviation at the strategic level. In order to gain the necessary decen-

tralisation of control, strategic aviation was directed by representatives of the Soviet High Command (Kozhevnikov, 1977, p. 225). Nonetheless, success of the VVS was still measured through decisive ground battles such as Stalingrad or Kursk (Kozhevnikov, 1977, p. 226). Despite the fact that strategic *air superiority* was achieved after these battles, the extent in which air attacks were related to major ground attacks increased from 70-75% at early stages to 90-95% in the Battle of Berlin (Kozhevnikov, 1977, p. 228). Partisan movements behind German lines had supported this high proportion (Sterrett, 2007). Instead of conducting deep air operations, long-range aviation flew approximately 71% of their sorties against troops, combat equipment and railroad targets. (Kozhevnikov, 1977, pp. 227-228). Even in 1945, as the Soviets clearly had the upper-hand, CAS and Defensive Counter Air (DCA) remained the main objectives, not only because of the Allies' Strategic Attack (SA) campaigns. Again partisan's achievements covered the need for more AI-capabilities (Sterrett, 2007, p. 133). During WWII, the successfully implemented tactics was the massing of tactical aviation, surprise and economy of force in support of ground forces' *hammer blows*. Not only did the VVS switch from centralised to decentralised control, but heavy investments in short-range capabilities and numbers, rather than in long-range aviation airplanes followed (de Haas, 2004, pp. 116-117; Sterrett, 2007). Massed, but subordinated employment of air power in the main thrust of ground forces became the staple for later post-war thinking. The Soviet application of air power had developed in this direction because it was affordable and necessary, after being attacked in June 1941.

Economic, technological and geopolitical factors relevant until today

Close cooperation between Russian aviation and ground forces is also based on influencing factors. Since its early days, the Soviet aircraft industry has been state-owned and divided into rather independent but closely interrelated sectors. Especially after aircraft became more advanced since the 1930s, technological complexity enforced an increasing specialisation on certain types of aircraft. Due to lack of competition, a missing necessity to maximise profit and as a result of the *Five-Year Plans*, the drivers of aircraft industry were high production output and spare parts supply rather than huge model variety or technological advantage (Greenwood, 1998). Besides operational requirements, mainly technological deficits, especially in engine design, led to further specialisation on relatively simple short-range combat aircraft, such as the famous Il-2 Sturmovik.¹ In comparison to the U.S. and U.K., who had an advanced technological knowledge and a higher industrial base, the Soviets could simply not afford ingenious long-range aviation (Greenwood, 1998). The aftermath of this development lasts until today and has a restrictive effect on the VVS's reforms and modernisation (Locksley, 2001; Jasinski & Mizin, 2004).

Furthermore, the geopolitical situation still plays an important role. Unlike the U.S. and U.K., the Russian Empire has always shared borders with potential enemies, making the land domain its main concern. The outcome of war would always be decided on the ground (Sterrett, 2002). This deeply different mindset contributed to a special understanding concerning the VVS's main tasks. Supporting in destroy-

ing the adversary and achieving those tasks beyond the capabilities of ground forces remained the VVS's main objective (Pennington, 1998). Hence, their limitations in technology and economy forced the Soviets into focusing on less expensive tactical aviation. Nonetheless, it was the undoubted success of the VSS during WWII, and the Soviet perception of its geopolitical situation that drove Soviet doctrines. Either in self-defence or in an act of pre-emptive strike, the first and foremost task for the VVS remains ensuring the triumph of their ground forces. A more independent role with special emphasis on deep air operations was for the VVS never completely outside its specifications. For example, medium and long-range bombers such as the Myasishchev M-4 (1955) or the Tupolev Tu-95 (1956) were introduced, whose secondary tasks were strategic atomic bombing (Dowling, 2015; Mladenov, 2015a). But based on perception and limitations, tactical aviation in a directly subordinated role for reasons of efficiency has always been prioritised.

The Soviet heritage – how is Russian air power applied today?

Recent Soviet military participation in regional conflicts only changed the general conceptions to a limited extent. During the Soviet-Afghan war from 1979-1989, despite the major role of providing CAS, many VVS Staff Officers realised that the more independent and centrally controlled air power could be executed, the more could be achieved. But so ingrained were views that many of these opinions were suppressed at that time (Lefebvre, 2003, pp. 44-47). Nevertheless, the use of air power in *Desert Storm* in 1990/91 and NATO's intervention *Deliberate Force* in Bosnia in 1995 made the Russian leadership rethink the VVS's

¹ See annex B, Figure 2.

structure and role between the first and second Chechen conflict (Lefebvre, 2003; Jasinski & Mizin, 2004). Forming four *territorial air staffs* and executing centralised control by the various commands of the VVS became the new principle for solving conflicts. This meant a more independent 'spearhead-like' approach prior to the use of ground forces (Lefebvre, 2003, pp. 44-45; de Haas, 2004, pp. 117-122). Contributing to solving regional conflicts were considered as future tasks, so modernisation of the *Dalnyaya Aviatsiya* (DA – long-range strategic aviation) was again given the lowest priority, behind the *Frontovaya Aviatsiya* (FA – tactical air force), the *Aviatsiya Sukhoputnykh Voysk* (ASV – Army aviation) and even the *Voyenno-Transportnaya Aviatsiya* (VTA – transport aviation forces) (Dick, 2000; Grätz, 2014). As a constant perception, displaying nuclear power was intended as the main task for the DA (Jasinski & Mizin, 2004). This also explains why the DA's 10 percent of the air forces' budget could never receive the western-style financial attention of 25-30 percent (de Haas, 2004, p. 122). Even though new western approaches were witnessed, a radically new approach was not achieved. An integral aspect remained the close allocation to ground forces' operations and the uppermost importance of tactical aviation for solving conflicts in Russia's periphery. From Russia's geopolitical and economic point of view, especially when taking the "price tag" of its nuclear deterrence program into account, prioritised distribution of resources to tactical aviation seems the logical approach.

The newest developments in Russia's air forces

After analysing developments mainly before the turn of the millennium, there is also recent evidence which shows that Russian

aviation has partially adapted. Similar to the Chechen conflict, the war in Georgia in 2008 revealed significant deficiencies of the VVS. According to researchers Pallin & Westerlund (2009) and Cohen & Hamilton (2011), especially the much needed Suppression of Enemy Air Defences (SEAD) against a limited enemy, the shortfalls in training, tactics and equipment and the inability to launch precision attacks from safe distances or under the cover of night are to be mentioned. The inability to never completely establish air superiority speaks for itself (Pallin & Westerlund, 2009; de Haas, 2011). Moreover, the war showed an inability to support the ground forces with much needed CAS. Lacking inter-service communication equipment made efficient cooperation of army and VVS impossible (Pallin & Westerlund, 2009, p. 407; de Haas, 2011, pp. 95-96). The shortcomings exposed in this conflict provided the basic motivation for a wider reaching reform, involving a smaller, but more effective performance-orientated army and a reduced, but better trained and equipped VVS (Baker, 2012, pp. 67-73; Grätz, 2014). The outcome was the merging of VVS and Russia's until then independent *Voiska Protivovozdushnoi Oborony* (VPVO – Air Defence Forces), reduction of bases aiming at better coordination accompanied by severe changes in personnel structure and training (Mladenov, 2015b, pp. 45-48). Furthermore, as a recent development, naval aviation was sub-ordinated to the VVS and the general organisation was changed from previous divisional or regimental structure to an air base organisation – similar to western countries. The idea behind this allocation across the military districts is that CAS and air cover can be provided more efficiently in the army brigades' most likely area of operations (Baker, 2012, pp. 69-70; Forss, et al., 2013, pp. 67-78; Järvenpää, 2014,

pp. 2-6). But above all, there is a shift to a belief, that quality will prevail over quantity for achieving air superiority and reaching strategic objectives (Lefebvre, 2003, p. 63).

Although the Russo-Georgian War has undoubtedly revealed the VVS's deficits, revolutionary changes in Russian doctrines have not yet taken place. What can be witnessed is that Russia is investing much in modern technologies such as unmanned aerial vehicles (UAVs), stealth bombers and electronic warfare (EW) capabilities (Baker, 2012; IISS, 2015, pp. 159-162; Tilghman, 2015). In particular, a new strategic bomber (which is under development) could complement the approximately 140 Soviet-era medium- and long-range bombers (Mladenov, 2015a). The very capable FA has approximately 580 aircraft at its disposal, from which 12 percent are considered as state-of-the-art and 4-5 percent being modernised annually (Grätz, 2014). By 2020, Russia aims at having 1500 new or modernised aircraft, including 600 mainly tactical fighters and bombers, 1000 helicopters and 200 new air defence systems (Forss, et al., 2013, p. 75). Additionally, past command, control and communication (C3) deficits could be overcome by introducing early warning and control aircraft comparable to NATO's AWACS planes (Gibbons-Neff, 2016). In comparison to the Russo-Georgian War, all of these innovations could improve the VVS's precision strike capability, the achievable sortie rate, operational tempo and inter-service integration. (Axe, 2016; Gorenburg, 2015). Some analysts therefore believe that all these reforms and investments, especially in drone and jamming capabilities, could abandon an almost familiar assumption of air superiority (Tilghman, 2015). But technological deficits, a decreasing and sanctioned economy, inter-service rivalries and a new personnel structure are still hamper-

ing these plans (Baker, 2012, pp. 75-76; de Haas, 2011, pp. 97-100; Grätz, 2014). However, more remarkable is that Russia does not seem to be able to detach itself from its old heritage of close support and subordination to ground forces' operations. Especially in the case of 2008, Russia's strategy was not to achieve decisive effects with air power, but to accomplish overwhelming superiority with land forces, having navy and VVS only in a supporting role (Pallin & Westerlund, 2009, p. 403-406; de Haas, 2011, p. 95). The VVS focused more on degrading military equipment than destroying critical infrastructure, which led to having the DA mainly drop unguided bombs from safe altitudes rather than conducting deep and precise attacks (Pallin & Westerlund, 2009, p. 409). Even in the current conflict of Syria, the high rate of imprecise air attacks does not give evidence to an increase in Russia's precision-strike capabilities (Copp, 2015; Gibbons-Neff, 2015). Therefore, even though a huge modernisation and reform programme was launched, full doctrinal changes seem to lag behind with the tendency of falling back to "classical habits" rather than looking ahead (Pallin & Westerlund, 2009; Cohen & Hamilton, 2011, p. 63). Last but not least, it is often the nature of conflicts that drives doctrines. Taking the past and current conflicts into account, new revolutionary changes are not to be expected soon.

Evolution and revision of air power in NATO

NATO's unified and efficient application of air power has been relatively consistent and successful, ever since military aviation has been used in major battles. Based mainly on the approaches of the Royal Air Force (RAF) and the later United States Air Force (USAF), three key principles are of utmost importance: *centralised control*,

decentralised execution and strategy-to-task (NATO, 2009, p. 1-4). Discussions on how to employ air power best and the development of these principles go back to the days prior to WWII. According to Mets (1999), the three main theorists that led the 'early western' mind set are Giulio Douhet (1869-1930, Italy), Hugh Trenchard (1873-1956, U.K.) and William Mitchell (1879-1936, USA). They all came from different backgrounds, but all three supported that air power as an offensive tool would be the decisive factor (Mets, 1999, p. 74). Although the effectiveness of strategic bombing during WWII is still heavily discussed, all underlined the importance of morale and the potential intimidating effects achieved by aviation deep inside enemy territory (Hallion, 2011, pp. 79-80; Mets, 1999, pp. 73-74). One of the main differences between the three is that Trenchard and Mitchell 'asserted the vulnerability of industrial and infrastructure as well as their importance to civilian morale' (Mets, 1999, p. 76). On the other hand, Douhet supported more the possibility of bombing cities (Segró, 1992, p. 358). All three classical theorists influenced the development of air power in western states.

Meanwhile, the classical theories have been slightly revised. First of all, their way of thinking emerged between the two Great Wars. Hence, they concentrated more on total wars between major states with totalitarian leaders. According to Mets, only Mitchell argued that even small actors could have so-called centres of gravity (COG), from which source they receive their morale or physical strength, will to fight or their freedom of action (Mets, 1999, p. 74; NATO, 2010, p. 2-C-3). Secondly, some analysts such as Futrell (2002) and Hughes (1995) indirectly support Russia's view by stressing the importance of tactical air power over strategic attacks for the success of

the Allies in WWII. Thirdly, all three classical theorists could not provide sophisticated answers as to the impact of future technologies such as long-range stealth bombers or precision-guided munitions (PGM). Most of this could not be further investigated until Desert Storm. Until that time, e.g. during the Korean war, Vietnam or any of the wars in the Middle East, strategic aviation had never been applied (Mets, 1999, pp. 75-77). Most of the new technologies had neither been developed nor been utilised in mission before. Therefore, the classical theories seem to be outdated or missing the maximum effectiveness and efficiency needed in modern scenarios.

The latest approach of western air power and NATO

At the dawn of Desert Storm, John Warden's theory of air power updated the existing theories. As in most of the classical theory, he assumes that gaining and maintaining air superiority is of the upmost importance accompanied by the importance of degrading the enemies' will to fight and favouring the offensive role of military aviation. But in contrast to the classical theories, he sees air forces capable of winning certain campaigns independently of other services, not only against smaller actors but also against states (Mets, 1999, pp. 59-62; Byman & Waxman, 2000, pp. 22-25). Better intelligence, PGMs, undetectable stealth bombers, such as the B-2², and highly efficient command networks and information systems have made it possible to attack COGs in parallel and with greater precision. Warden's (2000) core theory is that the COGs can be arranged in five rings, with leadership targets in the middle, then production facilities, critical infrastructure, population and ground forces to the

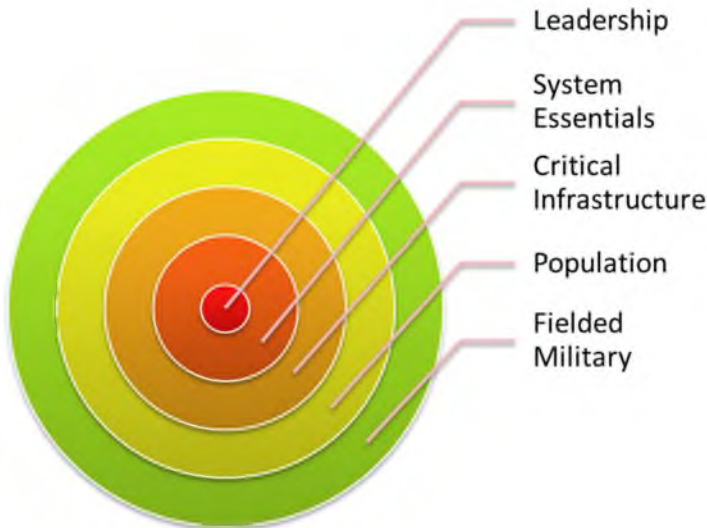
² See annex B, Figure 4.

outside³. The key to success is generally targeting from the centre and then moving to the outside, but targeting all the objectives in every ring in parallel rather than in sequential order is even more decisive (Mets, 1999, p. 59). His theory does not exclude the possibility to prioritise CAS over SA or AI, because certain situations and a necessary direct impact can create a state of emergency. But in general, long-range application of air power is always preferable to CAS, 'because it allows more targets to be killed at less cost' (Mets, 1999, p. 60). The success of the Gulf War's air campaign does support Warden's ideas, despite the undeniable demand for boots on the ground, as seen in later allied interventions (Segrč, 1992, p. 351).

force has generally prevailed since WWII. The preference of long-range attacks over close allocation and tasking to ground forces, controlled from a centralised command have also dominated.

This explains a different prioritisation of resources and the approaches towards long-range aviation in the RAF and the USAF, but also in other NATO countries such as Germany and France. The results of this process are well-balanced but rather expensive air forces, capable of winning the contest for air superiority and precisely striking deep inside enemy territory (Mason, 2011). Technological advance, unrestricted competition and higher economic output have made this possible. These advantages have formed the basis for the

Figure 1. Warden's Five Rings (own illustration)



Warden's ideas were not totally new, but did revise the classical theories. His theory adapted to new possibilities, but also to necessities resulting from new technologies and the change in conflict. However, a general preference of an independent air

success of NATO and have been proven to be successful.

Further derivations and implications for today

Russia has no further necessity to change. From a historical perspective, their strategy

³ See Figure 1.

has always been successful. It has won the Great Patriotic War and managed to contain every regional conflict such as Chechen or Georgia, with or without the VVS. From a geopolitical point of view, Russia's "sphere of influence" may have declined in the past 10-15 years, but the strategic depth which needs to be covered basically has not changed. High penetration capabilities of conventional ground forces have always been the key to success, with the VVS in an important but only supporting role. Reliance on consistently strong land forces and heavy nuclear capabilities, in terms of strategic missile and long-range aviation forces, have added to this way of thinking. Besides, conflicts such as Syria cannot be taken into account when comparing doctrinal changes because an extensive use of ground forces has never been on Russia's agenda. In order to change an over 70-year-old heritage, a mixture of intrinsic motivation and more external pressure might be necessary. In the end, accepting that the VVS has not yet really fought a predominant opponent, could contribute to a different mind-set.

From NATO's perspective, a necessity for change has not yet been identified. The main idea of a very independent air component focusing on deep air operations has not changed since NATO's foundation. The fundamental assumption during the Cold War was that NATO would face difficulties holding off the first echelon of attacking ground forces purely with air power, at least not without suffering a decisive amount of losses. Besides triggering a nuclear response, the main task for all across Germany dispersed ground units was to stop any further penetration (Hallion, 2011, p. 95). The main effort for NATO's air force was to achieve and maintain air superiority, which inevitably requires deep air operations. In order to support the ground

operations at best, focusing on the enemies COGs and denying him the ability to introduce further echelons of attacks was the logical approach to an enemy of great strategic depth. This rather offensive form of air war focuses not on winning a single battle, but on achieving simultaneous, precise and lasting effects with low own casualty rates. Furthermore, the capability to achieve deep effects adds an important deterrence factor to NATO's defensive posture (Futrell, 2002, pp. 445-446; Mason, 2011, pp. 46-48). Abandoning this successful approach in the near future seems as unlikely as Russia fully adapting to it.

But this perception may change and is very reliant on NATO-Russian relations and future missions. Indeed, since the Desert Storm, the tasks of western air forces and Russia's VVS have been rather similar. Taking the recent conflicts into account, solving regional conflicts has reached a high level also in NATO's task list. From the classical perception, a relatively new and uncharted terrain. Therefore, and especially when expecting a continuing change in conflict and technology, it seems fair to assume that further alterations could be possible. However, in a near-future contest, the Soviet heritage compared to NATO's air doctrine will not make an initial difference. As conflict develops, the analysis of this paper has shown that both sides will fall back to their peculiar approaches. In that case, NATO's well balanced but expensive mix of application offers more flexibility and the full potential of air power. The limitations of the Russian approach would be brutally revealed against an opponent with sophisticated long-range capabilities. In fact, the question is not whether NATO's approach is better, but what they can both politically and monetarily afford in the future.

Conclusion

This paper compared the Russian way of using air power with NATO's approach. Russia's "way" is based on special historical developments, but also from a geopolitical perspective, it is absolutely reasonable. Due to limitations in resources and technology, it focused more on what is required to support the ground forces. NATO took a rather different approach in using air forces more independently. From a generally defensive point of view and for political reasons, it required to take the necessary strategic depth, necessary deterrence factors and unacceptable high losses more into consideration than Russia. In both cases, there is evidence for an adaptation to new technologies or tasks. The VVS, for example, invests in rather sophisticated technologies which will primarily increase its tactical precision strike elements and improve air superiority capabilities within a limited operational depth. Simultaneously, its strategic aviation will develop and may open new possibilities in the future. In case the VVS is used, attacks on critical infrastructure, mainly with the purpose to dismantle C3 and to deny or limit access, but also to prepare ground operations can be expected. Despite the strategic depth, an approach which is similar to NATO and feasible given the current capabilities. On the other hand, NATO has developed technologies and tactics to dismantle an opponent's C3 ability and his moral even more efficiently. Given the desired effects, it seems fair to argue that there is not so much of a difference anymore. Prioritisation and the means may be different, based on strategic depths, capabilities and doctrines, but both are very capable of reaching decisive effects in the air and on the ground in modern conflicts. Nevertheless, in the long run both have their own way of applying air power, with NATO having an advantage over Russia.

NATO and Russia have not fought a direct confrontation in the past. Due to the nuclear capabilities of both sides and the devastating consequences, this will continue to apply in the near future. The described direct contest between them both emerges from revisionist tendencies and recovering Russia in terms of economic and military strength, yet it does not recommend to fall back into outdated Cold War-thinking. However, a detailed study of a future scenario could contribute to improving NATO's deterrence effect. The capabilities and limitations of both sides should be analysed over time and space. Apart from that, indirect confrontation as seen in the latest in Syria will be likely. Therefore, further research underneath the level of direct confrontation between NATO and Russian forces is required, where contributing to solving crisis is considered as the major task. Additionally, this paper analysed on the basis of a predominant NATO and did not analyse the use of tactical nuclear weapons. What if this basic assumption changes or is influenced, how much are the two sides willing to jettison their relatively old perceptions? Given the current scope of functions, both sides have been relatively successful with their approach. The mentioned adaptations make it even harder to clearly divide both. In the end, it might be only size, readiness and technological advantage, not doctrine which matters – but *all* mutually condition each other.

Annex A:

List of abbreviations

AI	Air interdiction
ASV	<i>Aviatsiya Sukhoputnykh Voysk</i> (army aviation)
AWACS	Airborne warning and control system
C3	Command, control and communication
CAO	Counter air operations

CAS	Close air support	U.K.	United Kingdom
COG	Centre(s) of gravity	U.S.	United States
DA	<i>Dalnyaya Aviatsiya</i> (long-range strategic aviation)	USAF	U.S. Air Forces
DCA	Defensive counter air	VPVO	<i>Voiska Protivovozdushnoi Oborony</i> (air defence forces)
EW	Electronic warfare	VTA	<i>Voyenno-Transportnaya Aviatsiya</i> (transport aviation forces)
FA	<i>Frontavaya Aviatsiya</i> (tactical air force)	VVS	<i>Voyenno-Vozdushnye Sily</i> (military air forces)
NATO	North Atlantic Treaty Organization	WWII	World War II
PAK FA	<i>Perspektivny Aviatsionny Kompleks Frontovoy Aviatsii</i> (literally prospective airborne complex of front-line aviation)		
PGM	Precision-guided munitions		
RAF	Royal Air Force		
SA	Strategic attack		
SEAD	Suppression of enemy air defences		
UAV	Unmanned aerial vehicle		

**ANNEX B:
Illustrations**

The pictures are provided with the intention to create a better understanding of the main topics and enhance the research in the main body of the paper.

Figure 2. Soviet Ilyushin Il-2 Sturmovik in combat, the most produced aircraft in aviation history
(Picture taken from <http://www.combatreform.org/mas.htm>).



Figure 3. Russian Sukhoi T-50 (PAK FA) state-of-the-art fifth generation tactical fighter, currently only 5 prototypes were built, but introduction to service is expected for 2017 (Picture taken from <http://www.airforce-technology.com/projects/sukhoi50stealthfigh/sukhoi50stealthfigh2.html>).



Figure 4. B-2 Spirit heavy penetration strategic bomber with stealth capabilities, one of the world's most expensive aircraft to operate and only run in the USAF (Picture taken from <http://www.airpowerworld.info/bombers/northrop-b-2-spirit.htm>).



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