Seapower

In Partnership with the Royal Navy Strategic Studies Centre

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Foreword

As observed by my colleagues, events in Ukraine have concentrated the mind. Assumptions about the state of European security in a post-Cold War era have now been rendered moot. Where Fukuyama once heralded the end of history, he now argues that history is back with a vengeance; the language and concepts of *realpolitik* – great power competition and spheres of influence – have returned to the lexicon.

For some of us this was not entirely unexpected, nor entirely forseeable. In a 2017 article for the *Naval Review*, I argued that Putin was no great strategist and that the Russian military was "incapable of the kind of comprehensive, complex and connected operations attributed to them". Unfortunately, such retrospectives offer scant comfort today.

In this second edition of *Seapower*, we take a dive through RUSI's back catalogue to shed light on the problems facing NATO navies in an era of Russian revanchism. There are no simple tactical answers to Russian naval forces, and we would be wrong to search for them. As the late Prof Sir Michael Howard essayed, military professionals should read widely, deeply, and contextually to find strategic truths and avoid pitfalls. Preparing our minds for tomorrow means studying today.

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In 2016, Justin Bronk (Senior Research Fellow, Air Power) examined the threat posed by (then) novel hypersonic missiles. Given Russia's purported use of *Knizhal* in Ukraine, it is worth revisiting.

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Is NATO About to Waste a Good Crisis?

Sam Cranny-Evans Dr Sidharth Kaushal

Commentary, 8 February 2022

The UK's plans to double its troop contribution to NATO's eastern borders is an important political step, but it is also a predictable one that does not address the threat posed by Russia.

Prime Minister Boris Johnson has ordered additional British troops to a number of NATO member states; included are land, air and sea assets that would double the UK's current troop contribution. Deployments are expected to begin this week and undoubtedly represent a welcome signal of intent for the Baltic states. The announcement also demonstrates that **Global Britain** is underwritten by an administration that is – in facing Russia at least – determined to be judged by its actions, rather than its words.

The UK has been prominent in responding to the Kremlin's attempts to exert pressure on Kyiv through its troop build-up. It has **provided** 2,000 Next Generation Light Anti-Tank Weapons (NLAW) and 30 **additional advisers** from the Ranger regiment to support Ukrainian forces in training on the new weapon. Additionally, the RAF **has increased** the frequency of RC-135W Rivet Joint electronic surveillance aircraft flights over Ukraine in support of similar US efforts in the region. The UK also supported Poland as Belarus positioned migrants on the border between the two countries; 140 British Army **engineers were deployed** to the country in December. So far, post-Brexit Britain has demonstrated its commitment to European security, as well as its resolve to NATO as an organisation.

Its actions, alongside similar declarations **from the US**, **France, Denmark and the Netherlands**, demonstrate that NATO remains committed to the defence of its eastern members, despite the fragmented response of the Alliance to events in Ukraine. It also signals to the European members of NATO that the transatlantic allies can lead on a response to Russia, which is a positive message given the inability of the EU to form and attend to its defence needs outside of NATO. Assessing the Russian perspective is challenging, but it is hard to imagine how the Russian General Staff could have planned the force build-up, without anticipating the possibility of a similar response by NATO. NATO planners should not be surprised if the additional deployments become part of a Russian **information narrative** designed to show that the Alliance is a genuine menace to Russia.

The above notwithstanding, the **current** and **past build-ups** of Russian troops demonstrate that Russia can generate and coordinate significant forces at short notice. It can do so with relative ease, and in a timeframe that would be challenging for NATO to match or beat. To deploy to Eastern Europe, NATO relies on a limited pool of critical infrastructure and supply lines that, in some locations, exceed **800 km**. Exercise *Trident Juncture* in 2018 demonstrated that it would **take NATO weeks** to move 50,000 troops to Norway in a response to an event that triggered Article 5 – the Alliance's mutual-defence provision. This was without Russia exacerbating political and military frictions in Europe to slow down deployment. This means that there is a fragility inherent in any knee-jerk reaction to a Russian build-up.

Assessing the Threat

Discussion around an Article 5 response typically involves one scenario: a Russian invasion of the Baltics, which leads to a massed response intended to stop the Russian forces before it is too late. This attitude plays to Russia's strengths and exacerbates NATO's weaknesses. If NATO is to stop Russian troops in their tracks, or deter them from acting at all, it must take the quality and quantity of troops deployed to at-risk areas more seriously. Alternatively, it must accept that territory will be lost, but that the costs will be catastrophic for the Kremlin and that it will only be a matter of time before Russian forces are rolled back.

At the heart of NATO's current posture in Europe is an inherent tension between two

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divergent aims: **perimeter defence** and **limited liability**. The former principle posits that a threat to the credibility or territorial integrity of the Alliance must be forestalled at all points along its perimeter. Temporary or small-scale losses put the credibility of Article 5 into question. Perimeter defence coexists with a limited-liability approach, which shuns the costs and political risks associated with maintaining large forward-deployed formations. In effect, the Alliance hopes to deter Russian aggression, both major and minor, through a **combination** of forward-deployed battlegroups and the agile reinforcement of remote theatres such as the Baltics.

However, the Russians will rapidly overrun forward forces and have a range of options to slow the pace of reinforcement. For example, Russian authors **contemplate** using limited conventional precision strike to destroy critical infrastructure, hoping to slow down both the physical movement of assets and NATO's political decision-making by undermining the resolve of wavering allies whose territory straddles critical transit routes. In addition, Russian assets such as special purpose submarines can target the undersea cables on which **strategic communications** depend. Though not capable of destroying this infrastructure entirely, Russia can **add weeks** to NATO planning cycles through careful disruption.

For an Alliance that sets itself the task of stopping or rolling back any Russian incursion rapidly, this represents a critical challenge. However, Russia's ability to slow down NATO deployments only matters because the Alliance has bought into Russian short war assumptions even though NATO has vastly superior aggregate capabilities, which could be mobilised given time. The Alliance could adopt an elastic defence that accepted the temporary loss of territory on NATO's eastern periphery as it built up its capabilities for operations to roll back Russian aggression. Forward NATO forces would, largely, only be required to buy time for forces to mobilise in depth.

Realistic Credibility

The credibility of Article 5 depends on NATO's ability to defeat aggression, but this can take time. In other words, effective Alliance defence in the short term may involve some partners bearing different levels of risk. This would imply painful choices – particularly for frontline states – but it would not be the first time that such choices have been necessary. During the Cold War, the Alliance **planned for** the temporary loss of German territory as it prepared to **compel** the USSR to retreat. Similarly, intra-Allied **disagreements** about tactical nuclear weapons as an offset to Soviet conventional strength and the costs their use would entail for frontline states persevered throughout the Cold War.

That said, NATO could instead opt to resolve the other half of this contradiction – that is, the Alliance could maintain its focus on perimeter defence and resource this strategy properly. In addition to substantial investments in facilities to support large-scale forward deployment, this would involve key members substantially improving their capabilities in areas such as armour and indirect fires at some cost. In addition, almost any NATO approach taken would require the more effective protection of critical national infrastructure from threats ranging from missiles to submarines.

If the Alliance chooses one of these options, it will face three obstacles: political dissension; cost; and the difficulty of changing course quickly. If NATO should opt for elastic defence and rollback, for example, it will have to secure buy-in from frontline states that will bear a disproportionate burden in the event of war. Absent a degree of urgency, such hard political discussions could well be deferred. If, alternatively, the Alliance opts to invest in a credible forward posture, this **will require** increased national investments in capabilities such as armour, as well as the **capacity** to sustain capabilities forward deployed at readiness – a process involving both costs and associated political friction.

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Moreover, even if these hurdles are overcome, generating new capabilities and the capacity to sustain and integrate them into a forward-leaning Alliance force posture is time consuming. For example, the procurement cycle of a meaningful number of new main battle tanks is **close to a decade**, and that of surface combatants is **longer still**. Forward deployment also produces **requirements** in areas ranging from the creation of supporting infrastructure to maintaining personnel and equipment at readiness. All this raises the question of whether, if NATO opts to change course, it would face a period of transitional vulnerability should conflict break out before it has adapted.

It is here that the tragedy in Ukraine may offer the Alliance an opportunity. A long war against popular resistance in Ukraine, protracted by indirect support to those resisting, could tie down significant numbers of Russian troops. Consider, for example, that even the light-footprint intervention in Syria saw 63,000 Russian troops cycled in and out of the country over three years. A Russian army tied down in Ukraine would not pose an immediate threat to the Alliance for years, buying NATO the time to change course. Second, such crises often create moments of political clarity within alliances. The 2014 invasion of Crimea, for example, facilitated one of the most wide-ranging **reassessments** of the Alliance's priorities in decades. Similarly, a Russian invasion could temporarily break political logjams regarding some of the choices that NATO has postponed: ranging from the strategic choices described above to operational ones such as the effective **resourcing of anti-submarine warfare** in the High North or delivering **integrated air and missile defence**.

As NATO updates its strategic concept and capstone warfighting concept, Ukraine's dilemma could be a blessing in disguise. As English writer Samuel Johnson put it, 'When a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully'.

Ukraine Crisis

RUSI has followed this confrontation from the start; **the collection here** brings together all our contributions from different perspectives and angles and across other intellectual disciplines, from history to economics, from epidemiology to the science of the battlefield.

Full Speed Ahead: Hypersonic Threats and Ship Survivability

Justin Bronk

Defence Systems, 11 March 2016

Hypersonic anti-ship missiles are a fast-approaching threat forcing new demands on navies to protect their major surface combatants

Hypersonic flight is generally understood to refer to speeds above Mach 5, or roughly almost 4,000 mile per hour. The extreme heat and pressure forces created by travelling at such speeds, especially at low altitudes where anti-ship missiles must operate, are barriers that missile engineers have until recently found insurmountable.

However, the US Air Force (USAF) has tested a prototype hypersonic cruise missile, the X-51 Waverider, since 2010, and China has tested the WU-14 manoeuvrable re-entry vehicle which streaks through the atmosphere at Mach 10. The WU-14 has important implications for the US Navy as a proof of concept for the much discussed DF-21D 'carrier-killer' anti-ship ballistic missile, which China claims can manoeuvre sufficiently in a hypersonic terminal phase to hit a US nuclear supercarrier at sea. However, defending against the DF-21D is a ballistic-missile defence (BMD) challenge – requiring radar and interceptor-missile technology separate from that normally employed against anti-ship missiles. But there is an altogether different disruptive technology changing the threat dynamics for shipping: hypersonic anti-ship cruise missiles.

Russia is developing the 3M22 Zircon anti-ship missile with a reported top speed of Mach 5–7 depending on flight profile. The Zircon is a ramjet-sustained cruise missile design suitable for vertical launch from large warships, as well as air launch from attack aircraft. The BrahMos-II Russo–Indian hypersonic anti-ship missile is understood to be an export version of the Zircon, which is scheduled to reach the market for supply to India by 2020. It is likely to find multiple customers due to its 300 km range, which means it falls within the terms of the Missile Technology Control Regime (MCTR) and the fact that it can hold almost any warship in the world at serious threat. Hypersonic anti-ship missiles are a dream for any country wishing to push high-end navies further away from their coastlines. This is because of the very serious problems that they pose for even the most modern naval-defence systems.

Firstly, hypersonic missiles at low altitudes are extremely difficult to track for most currently operational radar systems. Their extremely high speed results in a very pronounced Doppler shift effect beyond the tracking parameters of most traditional arrays, as well as requiring extremely fast scan frequencies to provide sufficiently accurate range information to generate target tracks for defensive systems. The aerodynamic shapes required for hypersonic flight also result in significantly reduced radar cross-sections compared to traditional cruise missile bodies. Only large and high-powered AESA arrays with significant post signal processing algorithms built into their mission systems are likely to be suitable for tracking such difficult targets. Such systems include the Northrop Grumman E-2D Hawkeye and Saab Erieye, but notably not the legacy E-2C and E-3 AWACS platforms which NATO currently relies on for early warning and situational awareness at sea and over land. This is important for fleet defence because, whilst fleet air defence missiles such as the SM-6 and Aster series may be capable of engaging hypersonic threats if they can be detected more than 100 km away, this can only be provided by aerial early warning assets due to the constraint of the horizon on surface-mounted arrays.

Ship-mounted AESA arrays such as those found on the Ticonderoga, Arleigh Burke and Type-45 fleet air-defence classes are capable of tracking hypersonic targets, but the sea-skimming flight profiles which anti-ship missiles can adopt on approach to target will reduce detection range

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to almost the visible horizon, limiting the engagement window. At sea level, Mach 5 is 6,126 km/h or 1,702 m/s. The horizon for a representative mast-mounted radar 10 metres above sea level on a guided-missile cruiser is 11.3 km. Assuming instantaneous detection by ship-mounted radar as a hypersonic missile appears over the horizon, at Mach 5 it will take only 6.63 seconds for the missile to hit the ship from the point of detection. This is an extremely tight engagement window for current generation ship-mounted self-defence systems to react in time to prevent impact. Traditional gatling gun-type defence systems which can engage targets within around 3 km simply cannot engage hypersonic threats within the window available of less than two seconds, especially if the missile can manoeuvre in its terminal phase.

Even with the longer range provided by the US Navy's Rolling Airframe Missile (RAM) over traditional close-in weapons systems (CIWS) like Phalanx and Goalkeeper, the launch sequence would have to be almost instantly triggered upon detection at the horizon to have any chance of intercepting an inbound hypersonic sea-skimming threat. This would leave no time whatsoever for meaningful human control to be a part of the firing sequence. CIWS defences have been designed with the capacity for fully autonomous operation since the 1970s, but ethical concerns have led to a human-in-the-loop requirement of Western navies during peacetime. As hypersonic sea-skimming missiles proliferate in the 2020s, this will almost certainly have to change.

Some see laser systems as a fast-as-light solution to the hypersonic threat, but it is worth considering that due to the extreme temperatures generated during hypersonic flight, missiles capable of such speeds are by necessity highly resistant to thermal ablation. This, coupled with the extremely short engagement window for lasers, which require line of sight, would mean that any laser CIWS would have to be able to generate power levels many orders of magnitude greater than what is currently in development to have any chance of successfully combating hypersonic anti-ship threats.

Hypersonic anti-ship missiles are a threat that will force new challenges on the sensor and defence system manufacturers which supply Western navies. However, it is also a potentially very lucrative capability niche due to the current gap between threat and defence capabilities. Until major surface combatants can reliably defend themselves against hypersonic sea-skimming threats, the emphasis will remain on having to destroy potential launch platforms before they can fire. In stand-off situations in congested sea space such as the Taiwan straits or South China Sea islands, this may not always be an option.

SELECTED READING - AMPHIBIOSITY

Amphibious Assault is Over

The conduct of amphibious operations is currently undergoing a drastic overhaul in response to an array of emerging threats.

Novel Concepts for Amphibious Force Resupply

Unmanned surface vessels have recently been tested which offer a significant advance in the ability of amphibious forces to conduct important ship-shore resupply from standoff distances.

Littoral Response Groups: It's About Mass...

Focus on the Future Commando Force misses the weak link in the littoral response group concept: insufficient enabling mass.

Russia's Port Sudan Naval Base: A Power Play on the Red Sea

Samuel Raman

Commentary, 7 December 2020

Russia is planning to expand its naval power projection on the Red Sea.

In November, Russia's Prime Minister Mikhail Mishustin approved a draft agreement to establish a naval base in Port Sudan, on Sudan's Red Sea coast. According to Russian state media outlet *TASS*, the Port Sudan logistics facility would be '**defensive**' in nature and aimed at 'maintaining peace and stability in the region'. The facility would also be used to carry out repairs, replenish supplies and as a resting spot for Russian navy personnel.

Although Russian officials have not commented on the Port Sudan facility's geopolitical significance, Russia's construction of a Red Sea base is an important landmark in its resurgence as a great power. Russia possesses just one major naval base outside of the post-Soviet space: Tartus in Syria. This facility furthers Moscow's vision of securing recognition as a blue-water navy and revives historical memories of the Soviet Union's superpower status. The Soviet Union possessed naval bases in South Yemen's capital of Aden, Berbera in Somalia and Nokra Island in Ethiopia, which provided it with footholds on the Arabian Peninsula and Horn of Africa. Even though Russia has focused on securing a favourable geostrategic position on the Mediterranean Sea since President Vladimir Putin's visit to Libya in 2008, Moscow has eyed the Red Sea as a future theatre of power projection for over a decade.

Seeking Spots in the Red Sea

In October 2008, the head of Russia's Federation Council, Sergei Mironov, **visited** Yemen and expressed support for the future construction of a base on its Red Sea coast. The instability that followed the overthrow of Yemeni President Ali Abdullah Saleh in 2012 derailed this plan and Russia redirected its focus towards constructing a facility in the Horn of Africa. In 2014, Russia engaged in **negotiations** to construct a naval base in Djibouti, but Djiboutian officials rebuffed Moscow's overtures in response to US pressure. Russian Foreign Minister Sergei Lavrov **held talks** with Eritrean officials about constructing a logistics centre on Eritrea's Red Sea coast in September 2018. However, no discernible progress was made on this project. As a result of these failures, Russia **capitalised** on Sudan's President Omar Al-Bashir's offer to host a naval base and continued discussions on building a Red Sea facility after Bashir's fall from power in April 2019.

Reconfiguring Russia's Naval Presence

In spite of **prior concerns** about the poor quality of Sudan's port facilities and a potential spillover of violence from Khartoum's war with South Sudan, Russia sees three potential benefits from its logistics centre in Port Sudan. First, Russia could use its facility in Sudan as a launchpad for expanded power projection on the Mediterranean Sea. An article in Russian newspaper *RBC* **opined** that Russia's naval base in Sudan would enhance its access to trade that passes through the Suez Canal, which links the Mediterranean to the Red Sea. Yuri Lyamin, a Moscow-based defence expert, **argued** that Russia's Port Sudan facility would alleviate the resupply commitments assumed by Tartus. This would help Tartus complete its transition from a resupply facility to multi-purpose naval base, which Russia **announced** as a key objective in May.

Second, Russia will use its Port Sudan facility to bolster its credibility as a bulwark against maritime security threats in the Red Sea and Indian Ocean. Russia's naval doctrine **lists** piracy in the Indian Ocean, alongside the Gulf of Guinea and Pacific Ocean, as a critical security threat. In October 2008, Russia **deployed** the *Neustrashimy* frigate to the Gulf of Aden, which worked with the UK's HMS *Cumberland* to fend off Somali pirates on 12 November. The May 2010 hijacking of the MV Moscow University tanker off the Gulf of Aden underscored the potential for Somali pirates to threaten Russian nationals. Although Russia has relied over the past decade on the US and China to secure the Red Sea from piracy, the Kremlin can use its base in Port

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Samuel Raman

Sudan to play a more **proactive role** in combatting pirates. Also, as Russia cooperates with Saudi Arabia on stabilising world oil prices via OPEC+, it does not want non-state actors, such as Yemen's Houthi rebels or Al-Shabaab, to **disrupt** the daily passage of 4.7 million barrels of oil through the Bab El-Mandeb Strait.

Third, Russia will use its new logistics facility to protect its investments in Sudan and consolidate its bilateral partnership with Khartoum. Russia has consistently supplied more than 80% of **Sudan's weapons** since 2003, and the Wagner Group has also deployed private military contractors to Sudan since 2018. These contractors were **officially tasked** with guarding Sudanese gold mines operated by M-Invest (which is linked to Wagner Group owner Yevgeny Prigozhin), but remain illegal under current Russian statutes. Anton Mardasov, an expert on Middle East affairs, **believes** that Russia's Port Sudan facility will allow it to 'legalise' its military presence in Sudan. This will help Russia augment the security of its gold mining assets and transit from a transactional relationship with Sudan based on arms sales to a more comprehensive security partnership.

The Enduring Challenge

In light of these benefits, Russia's reassertion as a naval power on the Red Sea has significant geopolitical implications. The US, the EU and Turkey likely view Russia's presence in Port Sudan as a challenge to their interests. After Vladimir Putin formally approved the Port Sudan facility's construction, the former commander of Russia's Black Sea fleet Vladimir Komoedov **warned** that the naval base aimed to challenge the supremacy of the US on the Indian Ocean. As the EU Naval Force Atalanta (EU NAVFOR) anti-piracy mission is set to expire at the end of December, Russia's Sudan-based warships **could supplant** European anti-piracy initiatives.

Russia's new logistics facility also presents a long-term challenge to Turkey's interests in Sudan. After a December 2017 meeting between Turkish President Recep Tayyip Erdogan and Omar Al-Bashir, Turkey agreed to spearhead the reconstruction of Suakin Island, which is located on Sudan's Red Sea coast. This announcement fuelled speculation that Turkey planned to construct a military base on Suakin Island. Cognisant of this prospect, Vladimir Mukhin, a columnist for *Nezavisimaya Gazeta*, **opined** that Russia competes with Turkey in Sudan and will use its Port Sudan base to counteract Ankara's $650 million investments in Suakin Island.

In contrast to the trepidations in Washington, Brussels and Ankara, Russia's Port Sudan logistics centre construction has been warmly greeted in Beijing. Chinese media outlets have interpreted Sudan's acceptance of a Russian base as a **sign** of Khartoum's willingness to combat 'foreign interference' from the US and France. An article in the *People's Liberation Army Daily* raised doubts about Russia's ability to help **stabilise Sudan** due to the coronavirus pandemic, low oil prices and an overstretched military budget, but there is **some optimism** that Moscow could help the Sudanese military prevent unrest.

Even though Moscow's willingness and ability to invest in its Red Sea presence is unclear, Russia's new Port Sudan naval facility is a landmark moment in the expansion of its naval capabilities. As Sudan edges closer to completing its fragile transition to democracy in 2022 and US–Sudan relations concomitantly thaw, Russia's naval presence will allow it to maintain a foothold on the Red Sea that remains impervious to the winds of political change in Khartoum.

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The Yasen-M and the Future of Russian Submarine Forces

Dr Sidharth Kaushal, James Byrne, Joe Byrne and Gary Somerville

Defence Systems, 28 May 2021

The recent launch of the Kazan, the second boat of Russia's Yasen class of nuclear submarines, provides a number of insights into the future of Russia's submarine fleet.

The Russian *Yasen-M*-class nuclear cruise missile submarine (SSGN) *Kazan* was constructed to a shorter build time than the lead boat *Severodvinsk*. It also appears to be shorter in length than its predecessor by about nine metres. Nonetheless, the two boats share a number of characteristics, including **a reported level of quietness** comparable to the very best Western SSNs and a long-range strike capability which exceeds that seen on most Western assets.

The *Kazan* was **constructed** in eight years, less than half the time taken to construct the *Severodvinsk*. The slow pace of the latter project was in large part due to the financial troubles which beset Russia in the immediate post-Soviet era. However, the design of the *Kazan* also evinces a number of evolutionary steps that should allow Russia to **cut unit construction** costs and build times for future vessels in the class. As such, we might expect future submarines in this class to enter the fleet at a more rapid pace than previously envisioned.

From a planning standpoint, the most notable feature of the *Kazan* – one which it shares with the *Severodvinsk* – is its capacity to launch a range of anti-ship and land attack missiles, including the hypersonic 3M22 Zircon. The shift from SSNs like the *Akula*, which are primarily optimised for a hunter-killer role, towards a concept closer to nuclear guided missile submarines (SSGNs), is likely indicative of a shift in the way that Russian submarines will contribute to future campaigns. Long-range strike missions appear to be superseding sea lines of communication (SLOC) interdiction as a primary task. This will likely necessitate a change in how NATO manages the anti-submarine warfare (ASW) challenge in the High North, given that a strategy of barrier defence at the GIUK (Greenland–Iceland–UK) gap may actually do little to impact Russian submarines, which may have little need to traverse this barrier in order to achieve their operational ends.

Smaller but No Less Capable

The *Yasen-M* is about nine metres shorter than its predecessor. Part of the reason for this is a **reported** four-metre reduction in berthing spaces on the vessel. This is consistent with the *Kazan* having a **smaller crew** than the *Severodvinsk*. Imagery analysis of the boat conducted by the authors and other analysts **suggests** that the primary differences between the two submarines are in the bow-to-sail and sail-to-missile compartment. The sail length of the *Yasen-M* actually exceeds that of the *Yasen* by a small margin.

In addition to a reduction in berthing spaces between the sail and missile compartment, two other design features have likely driven the size reduction. First, the incorporation of a fourth-generation **KTP-6 monoblock** reactor which does not have separate steam generators likely accounts for a 1.6-metre length difference between the missile compartment and the stern. The *Severodvinsk* used an older **OK-650** series reactor. In addition to compactness, the new-generation reactor will also contribute to the quieting of the submarine, meaning that the *Kazan* may surpass the *Severodvinsk* in terms of its ability to evade detection.
The second major difference is the length between the bow and sail. The difference in size here is likely accounted for by the fact that the *Kazan* fields a **conformal array sonar**, as opposed to the spherical MGK-600 Irtysh sonar suite on the *Severodvinsk*. The *Kazan* appears to be equipped with a conformal array comparable to that of the **Lira sonar suite** aboard the new *Lada*-class diesel-electric

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Dr Sidharth Kaushal, James Byrne, Joe Byrne and Gary Somerville

attack submarine (SSK). This system represents a significant improvement on preceding designs; it allows a larger surface area for hydrophone arrays, and thus greater **array gains** in passive mode compared to the older spherical array sonar configuration. The move towards conformal array sonar mimics the design principles being adopted by Western navies such as the Royal Navy and the US Navy. Moreover, the conformal array shares the spherical array's wide field of view, and thus represents a comparable improvement over the cylindrical array sonar typically found on Russian submarines. The design of the *Kazan* has likely **eliminated** the flank array sonar found behind the bow of the *Severodvinsk*, but the effects of this may well be offset by the advantages of a conformal array.

Like the other vessel in the class, the *Kazan* is equipped with the **UKSK (3P-14B)** vertical launch system comprised of 8SM-346 modules. These cells, with a length of 10 metres and a diameter of two metres, can hold either five 3M54-1 Kalibr missiles or four P-800 Oniks anti-ship missiles each. The system will also be able to launch the 4500km Kalibr-M missile which is **reportedly in development**, as well as, reportedly, a submarine launched variant of **the KH-101**. These missiles provide the *Yasen* and *Yasen-M* with significant land attack and anti-ship capabilities at long range.

Perhaps most importantly, the hypersonic 3M22 **Zircon** ASCM will be incorporated aboard the *Yasen*. With a **reported speed of Mach 6–8**, depending on its flight trajectory, the Zircon has the potential to overwhelm shipboard air defences by denying them the time they need to develop a firing solution. This will be particularly challenging if, **like the Russo-Indian Brahmos missile**, the Zircon can perform high-g terminal phase manoeuvres before impact.

In addition, the *Yasen* and *Yasen-M* carry ten heavyweight 533mm torpedo tubes, which can also be used to launch the UGST-M wire-guided torpedo, **as well as cruise missiles**. The submarines also carry **six 324mm torpedo launchers** as part of their countermeasures system. These lightweight torpedoes, comparable to the barrier system found on the *Akula*, act as decoys to divert incoming torpedoes.

Implications for the Future Russian Subsurface Threat

In principle, the *Yasen* and *Yasen-M* pose a substantial risk to Western forces. The combination of quietness and long-range strike capabilities poses a novel challenge to Western defenders both at sea and on land. The range at which the two submarines can strike targets on land means that they would not need to run the gauntlet of **the GIUK gap** in order to disrupt the effective mobilisation of Western forces in wartime. From the Norwegian Sea, these submarines could multiply the vectors from which sensitive targets such as key ports, airfields or command nodes could be struck. This poses a real challenge to Western assumptions that the key challenge for ASW against Russian submarines is to **stop them at the GIUK gap** to protect Atlantic SLOCs. The emphasis on long-range strike is evinced by the *Yasen* as well as the incoming ***Lada*** SSK and recent **conversions** of *Akula*-class SSNs to enable them to launch cruise missiles. This suggests that the hunter-killer mission along SLOCs does not have the priority that it did during the Soviet era. Russian naval planners recognise opportunities to disrupt NATO force posture without breaking into the North

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Atlantic. This raises a critical challenge for NATO planners: how to neutralise the *Yasen* and *Yasen-M* at forward positions such as the Bear Island–Norway gap, which will likely be denied to air and surface ASW assets by Russia's dense **sea denial and air defence networks** near its High North bastions?

Moreover, the incoming vessels pose a significant challenge to NATO surface vessels manning positions such as the GIUK gap. They could open the way for other assets like the *Akula* to break into the Atlantic by eliminating surface vessels manning the gap from long distances. The *Yasen* and *Yasen-M* appear to be equipped with **satellite communications**, with the former carrying the KORA Satcom system and the latter equipped with the Banknot-M system. It would seem, then, that the Russian approach to cueing them against moving vessels is likely analogous to Soviet plans for using the *Oscar* class in a similar capacity. Within this rubric, Russia's Legenda and Tselina ELINT and radar **satellites** would provide the rough locations of vessels to the *Oscar* class. The latter would then fire a salvo of P-700 missiles, with some of the missiles flying at high altitude to act as spotters for the remainder, which would follow safer low-altitude trajectories. Given the imprecision of ELINT data, this method requires a large number of missiles to be fired to ensure that the area in which a target might be located can be swept by the spotter missiles' active seekers.

Today, Russia's **ELINT constellation**, as well as its other methods of detection such as maritime patrol aircraft (MPAs), are limited. The Liana constellation – intended as a replacement for the Soviet-era system – is still incomplete, and Russia's **fleet** of IL-38 and TU-142 MPAs is smaller in size than its Soviet predecessor and will potentially be split between other duties such as ASW in wartime. As such, despite its substantial suite of capabilities, the *Yasen* lacks the system of systems to ensure accurate cueing. That being said, it should be expected that the vessel will receive at least intermittent engagement opportunities and, should it complete the kill chain, it could inflict crippling damage on a naval formation – raising the risks of operating near Russian anti-access bubbles.

Towards a Smaller but More Versatile Subsurface Threat

As the first *Yasen-M*-class SSN, the *Kazan* is a significant bellweather of the future Russian subsurface threat. It entered service far more quickly than its predecessor and demonstrates Russia's ability to cut building costs without compromising on quality. The pace at which the project was completed would suggest that future vessels in the class should be expected to enter service at a steady pace, avoiding the overruns that plagued the *Severodvinsk* project.

The vessel itself, moreover, is indicative of a shift in Russian planning. In addition to representing a qualitative leap in terms of its relative quietness and sensor suite, the *Yasen-M* is indicative of a shift from pure SSNs like the *Akula* towards SSGNs. This is eminently reasonable within the context of Russia's **planning assumptions** for a limited conflict on its borders, in which the ability to inflict **calibrated 'assigned damage'** and to disrupt key adversary nodes within Europe is of greater importance than SLOC interdiction in the Atlantic. After all, if **short war assumptions** prove accurate, then substantial US reinforcements should not materialise at the speed of relevance in any case. While it was

The Yasen-M and the Future of Russian Submarine Forces

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reasonable for the USSR to prioritise SLOC interdiction operations against the flow of US forces across the Atlantic in the context of a full-scale war in Europe, such operations are of less salience within the 'local war' rubric of current Russian planning.

Instead, **per current Russian thinking**, it is the disruption of the response options of NATO forces within Europe which will be key. This can be accomplished by **striking** key ports, airfields and command nodes, as well as the strategic use of **limited countervalue strikes** to slow down NATO decision-making by raising the perceived risks of wider conflict. Notably, none of these missions necessitate breaking through the GIUK gap and can be accomplished by the *Yasen* and *Yasen-M* from relatively safe positions in the High North.

Western maritime planners will need to shift their focus from fighting a fourth Battle of the Atlantic to neutralising an increasingly capable and versatile Russian submarine threat from forward positions.

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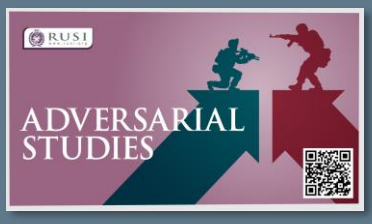

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