Conference Report

Missile Defence Conference 2019
Beyond Ballistic Missiles? Missile Defence in an Era of Great Power Competition

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188 years of independent thinking on defence and security

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Published in 2019 by the Royal United Services Institute for Defence and Security Studies.

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ON 13 AND 14 February 2019, RUSI convened its 19th Missile Defence Conference to examine how policies regarding missile defence must adapt to an era of great power competition. The conference was designed to stimulate discussion on how missile defence as an enterprise will have to undergo an overhaul that is as much a matter of underlying concepts as it is of introducing and incorporating specific technical changes in an era in which the *bête noire* of international order is no longer rogue states but near-peer challengers.

The event continued some useful discussions from the 2018 Missile Defence Conference regarding the need to overcome stovepiped air and missile defence systems to create genuinely integrated air and missile defence (IAMD) capabilities and explored both the challenges and potential posed by disruptive technologies in the realms of space, cyberspace and AI.

Equally important, however, was an effort by participants to situate the role of missile defence in a wider competitive strategy. Two key themes were identified at the strategic level – the utility of limited theatre-level IAMD in the context of limited and grey-zone conflicts and the need to nest missile defence within the framework of strategic counterforce.

**Strategy: Moving Beyond Stability to Competition**

As several conference delegates noted, no military capability exists in a strategic vacuum. Missile defence needs to be pursued in a manner that makes it compatible with a wider competitive strategy with which to confront near-peer competitors. This, however, requires a more sophisticated understanding of how near-peer competitors intend to use missiles in the context of their own competitive strategies than has been forthcoming in Western debates thus far.

Critically, as was discussed during the panel on the future of NATO’s missile defence policies, much of Western thinking on ballistic missiles is still tied to the Cold War notion that they are instruments for the delivery of strategic non-conventional payloads. As RUSI Associate Fellow Jeremy Stocker noted, this opinion is not shared by competitors such as Russia and China, who see short-range ballistic missiles (SRBMs) and intermediate-range ballistic missiles (IRBMs) equipped with conventional payloads as a critical component of any effort to cripple a Western response to a regional crisis, by targeting the ports and airfields upon which such a response
would depend. China also envisions using ballistic missiles in an anti-ship role with its DF-21D and DF-26 IRBMs capable, in principle, of targeting carrier battle groups at distances of 2,000 and 4,000 kilometres respectively. Moreover, delegates were told by speakers such as US Rear Admiral Archer Macy that both China and Russia envision using ballistic missiles as part of multi-vector salvos – that is, salvos that combine both ballistic and air-breathing threats (such as cruise missiles) launched from a variety of ground-, sea- and air-based platforms. The primary value of missiles to near-peer competitors, then, is at the theatre level as part of their anti-access and area denial networks, as opposed to being strategic levers.

A second critical difference between Western and non-Western approaches to nesting missiles within competitive strategies is the tacit role that missiles might play in escalation control. As speakers such as Europa Analytica Director Julian Lindley-French and Director Brad Roberts of Lawrence Livermore National Laboratory’s Center for Global Security Research pointed out in the panel on the role of missile defence in cross-domain competitions, both Russia and China plan on short, sharp conflicts followed by attempts at de-escalation. This is something China dubs ‘local wars under informationized conditions’. Missiles have a strategic impact in these conflicts even if they are not fired. The threat they pose to bases and assets deters the adroit reinforcement of a given theatre and the risk of further escalation that exchanges of missile salvos pose gives Western leaders an incentive to accept a fait accompli after the regional status quo has been altered.

One major takeaway, then, was that limited missile defences are of value irrespective of whether they can counter the strategic arsenals of peer competitors. While it has often been correctly noted that the strategic arsenals of near-peer states cannot be credibly prevented from overwhelming missile defences, the sorts of limited salvos that might accompany an attempt at a quick local campaign can in fact be defeated by limited missile defences. Credible defences against SRBM, medium-range ballistic missile and IRBM threats integrated with air defences capable of intercepting air-breathing salvos will be critical to deterring and, if necessary, defeating a limited local aggression backed by theatre-level salvos.

The threat posed by theatre-level salvos will be particularly acute in the maritime domain. As RUSI Research Fellow Justin Bronk and Georgetown University Professor Keir Lieber stated in the final panel on missile defence in an age of precision, the proliferation of anti-ship missiles will necessitate new technologies such as high-power lasers, along with non-kinetic efforts in the cyber and electro-magnetic spectrum (EMS) space to disrupt the kill chain of sensors and command-and-control (C2) assets – on which these missiles depend – will likely have to be integrated into theatre missile defence. Should a defensive capacity against the use of limited


theatre-level salvos be achieved, it will greatly complicate competitors’ efforts to fight short, sharp wars given that the initial ‘shock and awe’ effect of a massed salvo is critical to achieving local revisionist aims quickly. If, as panellists concurred throughout the event, precluding such rapid limited revisions is the core strategic challenge facing the West, then credible theatre missile defences will be critical to deterrence by denial. Moreover, knowing that a missile salvo will not necessarily render any adroit response moot will likely buttress the political will in Western capitals to respond to regional contingencies.

That said, changes that will upend traditional operating concepts and strategic assumptions are not restricted to the theatre level. A second trend was noted at the level of strategic exchanges—the gradual evolution of a new era of counterforce.3 As Lieber and Dartmouth College Professor Daryl Press convincingly argued, developments in multi-source data fusion (combining data from multiple sensors), along with the penetrating ISR capability provided by low-frequency sonar and underwater unmanned vehicles, mean that previously survivable mobile launchers on the ground and at sea are now increasingly vulnerable to a crippling first strike. Together with increasing warhead accuracy, which would allow missiles to be destroyed in hardened silos by even low-yield weapons, this portends a strategic picture in which crippling a substantial proportion of an opponent’s strategic arsenal in a first strike is no longer beyond the realm of possibility. As such, while the immediate concern is theatre-level salvos in the context of limited wars in the medium to long term, incentives to pursue first-strike capabilities at the strategic level will emerge as a factor driving the transformation of missile defence.

In this context, missile defences targeting a peer competitor’s strategic arsenal are no longer a futile expenditure. While no missile defence system can overcome a robust missile arsenal in its entirety, overcoming what is left of an opponent’s arsenal after a first strike has disabled much of it is a different matter entirely. Nor, it should be said, can concerns regarding strategic stability cause leaders to ignore this option. As Lieutenant General Henry Obering III noted during the conference, near-peer competitors are already operating on the assumption that the West will achieve this capacity and are actively developing countermeasures and offensive postures to prepare for a potential counterforce exchange. If indeed the technological trends driving the new era of strategic competition are irreversible, it is worth considering whether policy should be restricted by Cold War prescriptions regarding stability which were, even in their own time, hotly contested.4

3. A counterforce posture entails an effort to cripple or destroy much of an opponent’s nuclear and strategic arsenal with a first strike. It is juxtaposed with a countervalue posture where both parties deter one another by the risk of mutual catastrophic destruction. While the robustness and diversification of nuclear forces made successful counterforce unlikely in the past, this may well be changing. See Kier A Lieber and Daryl G Press, ‘The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence’, *International Security* (Vol. 41, No. 4, 2017), pp. 9–49.

Moreover, a conclusion that emerged from the panel on the relationship between missile defence and strategic stability was that in the context of strategic competition, achieving a degree of overmatch at the highest levels of competition (that is, full-scale warfare) may reinforce deterrence at lower levels by leaving the other party with more to lose in the event of escalation. This is particularly true in competitions with countries that cannot afford to match the West’s financial investments. Consider, for example, how the Strategic Defence Initiative (commonly referred to as the ‘Star Wars’ strategy) impacted Soviet perceptions of their ability to compete with the West by posing the prospect (however technologically distant) of a West capable of achieving overmatch rather than merely parity.

If this is indeed the case, missile defence needs to be explicitly nested within a wider policy shift towards counterforce. The role of strategic (but not theatre) missile defences would be to mop up a weakened nuclear arsenal after a crippling first strike as opposed to attempting to intercept missiles on a reactive basis. Ideas such as left-of-launch interception (the interception of a missile by kinetic or non-kinetic disruption before it is launched, which, as Lieber noted, already implies counterforce thinking) need to be integrated more explicitly into a policy shift towards counterforce than they currently are.

A final point on strategic competition noted during the conference, in particular when cross-domain competition was being discussed, was that missile defence needs to move apace with efforts to develop capacity and capability across competitive domains. Alliances such as NATO need to be more explicitly committed to competition as opposed to deterrence – a goal in which missile defence will play a part. By itself, however, missile defence is not a general panacea and can only have a strategic effect if capabilities in other areas are generated in tandem.

**Technology and Tactics: Integrating Systems and Disruptive Technology**

The conference heard from speakers such as Uzi Rubin of the Begin-Sadat Center for Strategic Studies and Brigadier General Kenneth Todorov of Northrop Grumman about how the threat environment is becoming more complex and cluttered, with ballistic missiles being joined by other tools as part of a salvo threat which combines ballistic and cruise missiles along with cheaper lower-flying projectiles such as UAVs and rocket fire. Technological advances deemed worthy of note were:

- The emergence of projectiles capable of following non-parabolic trajectories at Mach 6+ speeds. Notable examples were hypersonic glide vehicles capable of atmospheric skipping – that is, altering a warhead’s path mid-trajectory while it is outside the earth’s lower atmosphere.
- The emergence of massed low-cost munitions such as rockets and cheap UAVs.
- The eroding distinction between theatre and strategic threats.
- The integration of kinetic salvos with non-kinetic enablers in the EMS and cyberwarfare.
Over the course of the first day, speakers such as Richard Rushton of Lockheed Martin, Todorov and Rubin concurred that the emergence of hypersonic glide vehicles, such as China’s DF-ZF and Russia’s Avangard, severely complicates the tasks of tracking and intercepting missiles by posing a threat that traditional missile defence systems were not built to intercept. The task of calculating the trajectory of a ballistic missile following a parabolic arc at speed is an already complex one, rendered nearly impossible by hypersonic glide vehicles that do not follow a standard arc of trajectory.

As was noted in the panel on disruptive technologies, high-end threats such as hypersonics are not the only complication facing stovepiped missile defence systems. Closer to earth, ballistic and cruise missiles will be joined by salvos of rocket fire and swarms of cheap UAVs. As Russian operations to dislodge Ukrainian forces from Debaltseve have proven, swarms of cheap UAVs can suppress the sensors on which effective missile defences rely and pin forces to their positions in advance of a salvo of ballistic missiles (although at Debaltseve rockets rather than missiles were used to capitalise on the paralysis created by UAVs). Ukrainian forces had their C2 facilities suppressed by UAV swarms and could not effectively manoeuvre from their positions – leaving them incapable of responding effectively to the rocket salvo that followed. Moreover, even relatively primitive actors are learning to coordinate these assets – witness the Yemeni Houthi rebels’ use of UAVs to suppress Saudi patriot batteries in advance of ballistic missile attacks. The conference also heard from UK Rear Admiral Chris Parry about how threats in the cyber domain and in the form of electromagnetic suppression can facilitate the effective use of missile salvos.

The aforementioned complexity of the emerging operating environment is exacerbated by a blurring of the lines dividing theatre and strategic weapons. As the conference heard in the first day’s panels regarding the US missile defence review and NATO’s missile defence, the capacity of long-range air-breathing threats, such as Russia’s Kalibr cruise missiles, to carry nuclear payloads raises the question of whether assets can be neatly classified as being either theatre or strategic in nature. Indeed, as Macy pointed out, even conventionally armed missiles can be used coercively against civilian targets to, for example, deter a Western intervention by demonstrating an adversary’s willingness to escalate. It is thus not clear whether threats to fielded forces and strategic threats can be neatly categorised in the way they previously could.

That being said, the panel on disruptive technologies also suggested that emerging technology provides pathways forwards which might mitigate these risks. As Rubin noted, hypersonics might be more easily tracked using optical tracking by long-range high-altitude long-endurance UAVs. Additionally, space-based tracking and interception represents another fruitful avenue to pursue. Of interest was US Air Command and Staff College Professor Everett

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Dolman’s suggestion that distributed small space-based lasers, which could coordinate their beams onto a single position, might allow for the accurate and timely interception of hypersonic threats. Targeted energy, albeit from ground-based platforms such as Israel’s drone dome, a mobile system equipped with both a radio frequency jammer and a high-powered laser capable of exploding UAVs mid-air, was also suggested by Rubin as a means of mitigating the threat posed by UAV swarms. Additionally, it was suggested earlier in the day by Macy that cyber warfare represents a useful left-of-launch capability with which to thin missile salvos.

The pursuit of more cheap and short-range interceptors was put forward by a number of speakers over the course of the two days as a means to mitigate mass raids. As T X Hammes has noted, the fourth industrial revolution, with its breakthroughs in additive manufacturing, just-in-time delivery, and increases in the power of nano explosives, is likely to favour mass over precision. Efforts to augment the few and exquisite hit-to-kill interceptors that currently exist with tools that can either be deployed in mass or which, like targeted energy weapons, are restricted only by their power source, will be key to adaptation in this age.

Delegates heard from industry actors, such as Raytheon and Lockheed Martin, about how integration and interoperability within and across states can be achieved. In the near term, achieving interoperability between the sensors and shooters of partner states by ensuring that their fielded platforms can communicate will increase the robustness of sensor grids, improve warning times and increase the likelihood of successful intercepts. In the long term, interoperability will need to be superseded by true integration in the form of integrated fire control systems that are capable of fusing data from multiple sensors, prioritising targets and allotting tasks to disparate sensors and shooters across a system. A consensus emerged that this would require both a governmental effort in terms of coordinating procurement across partner states and an industry-led effort to improve interoperability across the platforms fielded by companies. Government–industry synergies were also identified as a key factor in rapidly adopting breakthrough technologies which, more often than not, emerge from the private and not the public sector.

Existing Policy: Change and Continuity

As might be expected, a substantial factor in the conference discussions was the 2019 US Missile Defense Review. Despite its broad embrace of left-of-launch interception and moving beyond kinetic interceptors, speakers such as CSIS Senior Fellow Tom Karako saw the review as a relatively tepid evolutionary step. The review restated commitments already made in documents such as the Joint Chiefs of Staff’s ‘Joint Integrated Air and Missile Defense: Vision 2020’ and, indeed, stopped short of the more explicitly transformational missile defeat (as opposed to

defence) framework outlined in the ‘National Defense Authorization Act for Fiscal Year 2018’. While promising commitments to intercepting both rogue-state missiles and the theatre-level assets of peer competitors left-of-launch, speakers such as Todorov noted that document was short on specifics.

At the level of NATO policy, a similar stasis is evident – a point that emerged from the event’s second panel on NATO’s missile defence. NATO still views ballistic missile defence (BMD) as a separate enterprise aimed at rogue states, while its IAMD capability at the theatre level relies on voluntary state contributions and consciously veers from ideas such as left-of-launch interception. Certainly, there are good reasons to be cautious about embracing an overly aggressive approach to theatre-level missile threats – as Frank Rose noted, theatre and strategic assets in states such as China, and to a lesser degree Russia, share C2 structures, raising the spectre of cascading instability. That said, a rigid stovepiped alliance posture with its limited theatre defence and stovepiped BMD looks to be woefully overmatched in a great power contest.

What seemed evident is that on both sides of the Atlantic great power competition has been embraced only tepidly as a paradigm – with important knock-on effects for missile defence. The goals of stability and completion are conceptually incompatible – competitions tend towards disequilibrium. This is not to say that certain forms of escalation should not be avoided, but in an era in which technology at the theatre and strategic level looks to be overwhelmingly offence dominated, a commitment to the comfortable remedies of the Cold War, with its neat delineations of theatre and strategic threats and the relative safety of both parties’ second-strike capabilities, looks to be inadequate.

Conclusions

The missile defence environment might be shifting towards a strategy dominated by offence rather than defence. At the theatre level, the ability of adversaries to launch powerful multi-vector salvos at short notice means that warning times to conflict are likely to shorten. This is matched at the strategic level by trends that incentivise counterforce postures. In this context, missile defence will need to be conceptualised, as Macy had it, as an enabler for other tools to do their task. Missile defence can buy time for forces to surge into an area and take the offensive at the theatre level, while at the strategic level a credible missile defence may play a mopping-up role after a strategic first strike. This offence-dominated environment will require old schemes about stability to be discarded.

Missile defence needs to be underpinned by a conceptual overhaul at the higher levels of policy and strategy. Western governments need to think in terms of long-term strategic competition spanning the full spectrum of conflict. Until this conceptual overhaul is achieved, generating

a full-spectrum response in which theatre and strategic missile defence can be nested will prove problematic.

Disruptive technology poses promise and pitfalls. On the one hand complex multi-vector salvos of cheap and exquisite weaponry will come to play an increasingly important role at the theatre level. That said, technological shifts in space, cyberspace and the realm of targeted energy have the potential to enable an evolution beyond a few, expensive hit-to-kill interceptors. Moreover, strides in data fusion make defence against strategic missile arsenals conceivable, subject to doctrinal evolution and the emergence of faster interceptors.

Cross-government and private sector synergies will be critical to leverage the opportunities afforded by the present environment and avoid its pitfalls.

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