

On Current and Near-Future Missile Defence Systems

A study commissioned by British Pugwash from Harry Spencer, a postgraduate scholar at the University of Birmingham, has been published online [here](#). The study addresses the capabilities and effectiveness of current and near-future missile defence against traditional and hypersonic missiles.

The Executive Summary reads as follows:

This report attempts to provide an illustration of the likely operational effectiveness of current and near-future missile defence systems. Accounting for various factors, including the allocated roles of systems, likely operational environments, risk tolerances, and persisting operational barriers the study attempts to paint a broad picture as to how one might expect National, Theatre, and Cruise missile defences to perform when placed in their likely operating circumstances. The research has aimed to draw attention to the highly circumstantial and situation-specific nature of missile defence operations, to demonstrate the difficulties in evaluating “effectiveness” and “success”, and to address the extent to which testing can be indicative of real-world performance. The analysis conducted by this study hopes to better inform discussions on the likely impact that the advent of hypersonic weapons will have on the effectiveness of missile defence operations and strategic stability; an issue that is briefly addressed in the final portion of the paper.

The content of this report's pages produce the following **key findings**:

- *The outcome of missile defence operations at all levels is dependent on a greater number of variables than can be accounted for in testing. Attempts to deduce the likely effectiveness of a system should look beyond the results of controlled tests and emphasise the influence of circumstantial factors that arise from a system's role and operating environment.*
- *Circumstantial factors will have a significant role in determining the meanings of “success” and “effectiveness”; definitions are likely to change between operations and are acutely sensitive to the assigned role of a system and the threats they are facing.*
- *In the majority of likely operating circumstances, national missile defences are unlikely to be permitted the necessary operational environment to be effective. Even in the most generous of scenarios, NMD systems will likely*

underperform and be unsuccessful in their assigned roles due to requiring a highly generous operating environment.

- *In certain operational circumstances, theatre missile defences demonstrate a reasonable capacity to perform effectively. Though, their operational effectiveness appears highly-sensitive to a number of situation-specific factors, particularly salvo size.*
- *The outcome of anti-cruise missile defence operations appears to be hugely dependent on early detection and reaction time. Systems conducting ACMD operations in optimal environments possess reasonable chances of success. However, environmental limitations and other factors can have a dramatic effect on outcomes.*
- *Based purely on the likely effectiveness demonstrated by missile defence systems, it is unclear as to why the advent of hypersonic weapons should be accompanied by an overall reduction in strategic stability. It is likely that the way states interpret and respond to hypersonic weapons will have a greater impact than the capabilities of the weapons themselves.*

Below are some reflections on some of the report's findings:

“Even in the most generous of scenarios national missile defence systems will likely underperform and be unsuccessful in their assigned roles.”

A main factor determining U.S. withdrawal from the 1972 Anti-Ballistic Missile treaty, in 2002, was a wish to develop a national missile defence. The subsequent U.S. NMD development programme has aroused concern in Russia and China. Both of these states worry that U.S. national missile defences can impact on the assuredness of their capacity to retaliate credibly for U.S. nuclear aggression. U.S. development of NMD has caused them to apprehend that ‘strategic stability’, a concept to which they attach great importance, is under threat. This has influenced their decisions to develop hypersonic glide vehicles to deliver intercontinental nuclear payloads in ways designed to circumvent U.S. NMD systems. The advent of those hypersonic systems is now causing concern in the United States and is generating demand for the United States to engage in a hypersonic arms race with Russia and China.

Rather than engaging in a hypersonic arms race, which can result in a heightened risk of nuclear war, it would be wise for the United States to recognise that the unintended consequences of its abandonment of the ABM treaty have eclipsed the intended consequence, and to offer to address NMD in future strategic arms limitation talks with Russia and China.

To abandonment of the ABM treaty and investment in NMD can also be credited, at least in part, China's decisions to expand its 'credible minimum deterrent' and intercontinental delivery platforms. Those steps have the potential to be misperceived in the United States as an indication of Chinese intent to commit nuclear aggression against the United States; they are likely to result in pressure for U.S. countermeasures that will fuel nuclear war risk. They are steps away, not towards the goal of eliminating nuclear weapons to which the five Nuclear Weapon States profess to be committed. It is highly regrettable that they have their root in the U.S. decision to develop NMD.

“[The] operational effectiveness [of theatre missile defence systems] appears highly sensitive to a number of situation-specific factors.”

This finding suggests that it would be rash for defence planners to rely on theatre missile defences to provide assured protection of strategic nuclear assets, such as early-warning radars, command and control centres and ground-based nuclear missiles. The likely inadequacy of TMD systems implies that theatre precision strike missiles have the potential to trigger nuclear escalation by destroying targets that an adversary considers to be of strategic value. It follows that, in the interest of containing nuclear risk, it would be desirable that nuclear-armed states come to an understanding that ground-, sea-, and air-launched precision strike theatre missiles will not be employed against strategic nuclear assets. Also desirable is an understanding that such missiles will never be nuclear-armed.

“Based purely on the likely effectiveness demonstrated by missile defence systems, it is unclear as to why the advent of hypersonic weapons should be accompanied by an overall reduction in strategic stability.”

This finding can seem paradoxical, since missile defence systems are likely to be even less effective against hypersonic missiles than against traditional missiles, for reasons including shortened reaction times and target ambiguity. The reasoning behind the finding, however, is that 'strategic stability' has rested till now on mutual confidence in the capability of strategic nuclear forces to deter nuclear aggression. The operational deployment of hypersonic missiles for strategic missions will not diminish that confidence; it will if anything, enhance it.