

## The Technical Basis for Russian Concern over NATO Missile Defense

- ⤴ **The planned Phased Adaptive Approach (PAA)** to European missile defense calls for roughly 440 SM-3 missile defense interceptors to eventually be based on 43 ships and two land sites in Europe. Russian officials have expressed concern regarding the PAA's phases III and IV which would start in 2018.
- ⤴ **Theoretical Capability:** More capable SM-3 “Block II” interceptors are envisioned in phases III and IV. These are expected to have a burnout speed of 4.5 –5.5 km/sec, faster than the Block I SM-3's (3.3 km/sec). Our studies show that Block II SM-3's would be theoretically capable of intercepting Russian warheads (see Figure1).

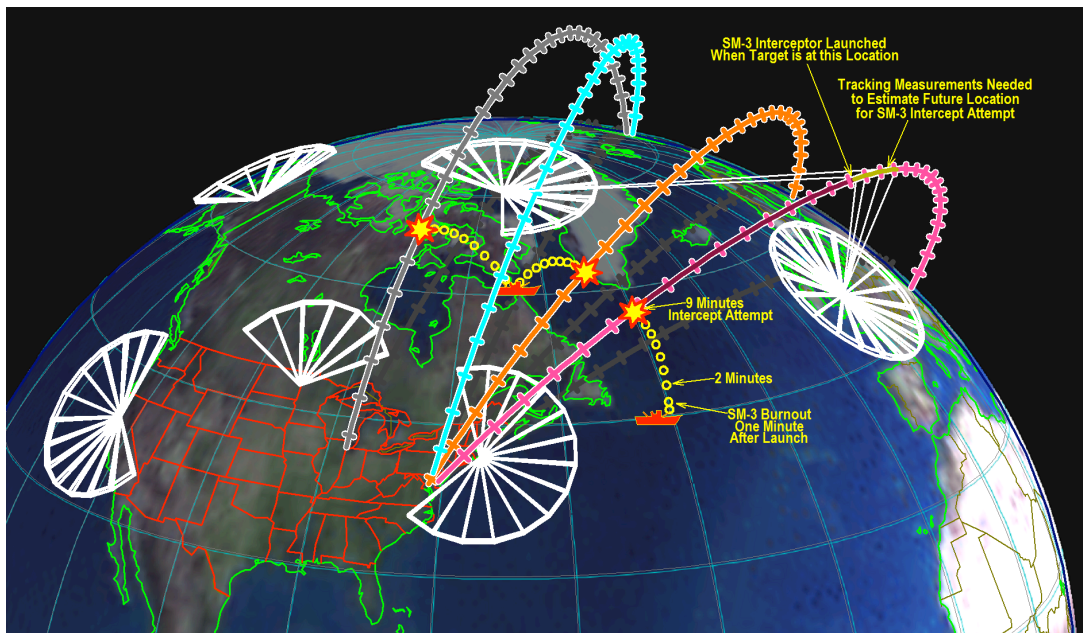


Figure 1. SM-3 Block II interceptors (with a conservative assumed burnout speed of only 4 km/sec) launched from Aegis ships (red) intercepting Russian warheads: each tick on the trajectories marks one minute. The analysis assumes that the attacking force does not use any decoys or countermeasures on their ICBMs.

- ⤴ **Countermeasures:** However, since the PAA system attempts to intercept warheads in the near-vacuum of space, where decoys and other countermeasures are highly effective, both Russia and states with emerging ballistic missile capabilities will be able to defeat or drastically degrade the defense’s performance. In practice the PAA will offer little, if any, protection leaving nuclear deterrence fundamentally intact. But even while the PAA would not significantly affect deterrence, it may be seen by cautious Russian planners to impose some attrition on Russian warheads which could represent, to them, an infringement on the numerical parity at the basis of New START. Russian planners will also be concerned about the potential for a large expansion in the

number of interceptors, unpredicted technical changes in the defense system, and the diversity and scale of sensor systems that are being brought online to support the system.

- ⤴ **Legal Case?** Article 4 of the Russian Resolution of Ratification of New START allows Russia to exercise its right to withdraw from the treaty if there is deployment by the “*United States of America, another state, or a group of states of a missile defense system capable of significantly reducing the effectiveness of the Russian Federation’s strategic nuclear forces.*” The Russian government has indicated that the deployment of the SM-3 Block II interceptors will be interpreted as satisfying this condition. The Russians do not appear to be concerned about phase I and II of the PAA, where just the SM-3 Block I interceptors would be used.
- ⤴ **Chinese Concerns:** Block II interceptors would also have a theoretical capacity to intercept Chinese warheads, as shown below. Chinese concerns about U.S. missile defense systems are a source of uncertainty, reducing Chinese support for promoting negotiations on the Fissile Material Cutoff Treaty (FMCT). China's leaders may wish to maintain the option of future military plutonium production, in response to U.S. missile defense plans.

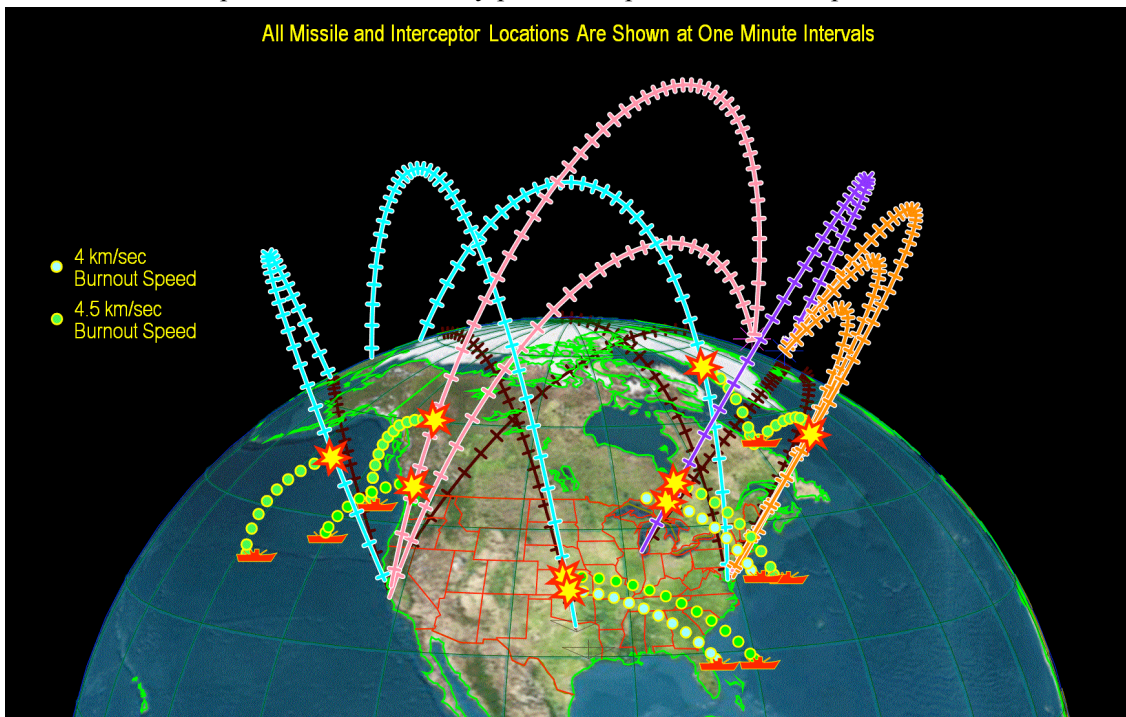


Figure 2. SM-3 Block II interceptors (of assumed 4.5 km/sec burnout speed) intercepting Chinese (light blue) and Russian ICBM warheads. Two 4 km/sec simulations for Aegis ships off of VA and FL are also included to show that even slower interceptors would still have a reach deep into the US mainland. Lofted trajectories are also shown for some Russian flightpaths to show that lofting does not provide much advantage against >4km/sec interceptors. The analysis assumes that the attacking force does not use any decoys or countermeasures on their ICBMs.

- ⤴ **Buying before Flying:** Neither the PAA, nor the Ground-Based Missile Defense System have ever been tested under conditions approximating those of real combat: e.g. a simulated attack of a salvo of missiles incorporating decoy warheads and other countermeasures, and where the timing and trajectories of the incoming missiles is a surprise to the intercept team. The Aegis system has not been tested during rough sea conditions: long gaps in coverage could arise during rough weather. None of the interceptors have ever been successfully tested against realistic countermeasures. The planned PAA remains fundamentally untested: We are “buying before flying.”

- ^ **What will happen if we stop development of Block II?** Abandoning the fielding of Block II interceptors will not impact the deterrence calculus between the U.S. and a (possible future) nuclear-armed Iran since both Block I and Block II interceptors have the same Achilles' Heel: they are both susceptible to decoys and countermeasures. Neither Block I nor Block II SM-3's would be likely to stop (possible future) Iranian ICBMs. Midcourse missile defense, in general – no matter how potent – would not alter the fundamental *deterrence* equation (with respect to Iran – or Russia) but it may, in the Russian view, constitute an infringement upon the *parity* set down in New START – especially the Block II interceptors due to their (theoretical) capability.
- ^ **Protection Paradox:** A decision to proceed with Phases III and IV of the PAA will result in an apparent paradox – defenses that will provide little or no actual combat effectiveness, but with technical and quantitative uncertainties that will cause cautious Russian planners to treat them as if they might work. Russia (and China) could react by increasing their stockpiles and/or by ending or blocking future nuclear arms reductions negotiations with the United States. This, in turn, will have far ranging implications for global security, and for President Obama's goal of moving towards a world free of nuclear weapons. Before any incarnations of missile defense are implemented, we recommend a non-partisan peer-reviewed study of its costs and benefits to U.S. and NATO security.

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