

Stanton Nuclear Security Fellows Seminar

PANEL 4: Dealing with Nuclear Weapons

1. Iskander Rehman, CEIP

Naval Nuclearization in the Indian Ocean and its Wider Implications

Currently in the process of completing my PHD dissertation on Indian naval modernization at the Institute of Political Sciences in Paris, I have focused my research over the past few years on issues pertaining to maritime security in Asia. During my time at the Carnegie Endowment for International Peace as a Stanton Fellow, I aim to make use of the exceptional opportunity I have been offered by engaging in a deep reflection on the nature of naval nuclear security in South Asia.

Building on the various issues laid out in some of my most recent research¹, my work will seek to explore in greater detail the ramifications of the emergence of sea-based nuclear assets in the Indian Ocean region. Using Cold war theorists' studies of escalation management as a point of departure, my research will examine how emerging nuclear powers within the IOR such as Pakistan, India, and China—as well as potentially Iran—view issues such as sea-based nuclear deterrence, nuclear war at sea, and the use of dual-use platforms. An impressive body of literature has emerged over the past two decades on the South Asian nuclear dynamic. Little work has been done, however, on the maritime aspects of the nuclear equation in the region. This can be attributed in part, no doubt, to the relatively recent nature of naval nuclearization in the region. Indeed, India only launched its first indigenously produced nuclear submarine, the INS Arihant, in 2009², and Pakistan has just formally officialized its desire for a functional nuclear triad³. The relative novelty-and timeliness-of my research, will, I hope, provide a valid contribution to the growing literature on contemporary nuclear dynamics in the Asia-Pacific by providing an entirely new angle of approach.

The research will take the form of several long reports which will be combined at the end of the year to form a more substantive monograph. The first report, which will hopefully be published around December, will scrutinize the interactions in-between conventional and nuclear-armed platforms at sea.

¹ Iskander Rehman, "Drowning Stability: The Perils of Naval Nuclearization and Brinkmanship in the Indian Ocean" *Naval War College Review*, Vol.65,no.4 (Autumn 2012), pp. 64-88

² India had previously chosen to lease a Soviet Charlie class SSGN from 1988 to 1991. The submarine, while nuclear-powered, was conventionally armed, in accordance with The Nuclear Nonproliferation Treaty expressly forbids the sale or lease of nuclear submarines equipped with conventional missiles that exceed three hundred kilometers in range or with nuclear missiles of any kind. The INS Arihant therefore constitutes India's first true step towards sea-based deterrence.

³ See "Naval Chief Inaugurates Naval Strategic Forces Headquarters," *Pakistan Inter Services Public Relations Press Release*, 19 May 2012. In the course of the ceremony, which was attended by the head of the Strategic Plans Division, Lt. Gen. (Ret.) Khalid Kidwai, and the current Chief of Naval Staff, Adm. Mohammad Asif Sandilia, it was highlighted that the new headquarters would "perform a pivotal role in the development and employment of the Naval Strategic Force," which was defined as the "custodian of the nation's second-strike capability."

In the final phases of the Cold War, eminent theorists warned how, within in a heavily nuclearized environment and under the conditions of strategic uncertainty characterized by Clausewitz's "fog of war", offensive naval operations could give birth to dangerously escalatory dynamics⁴. At the time, this argument was countered by a strong constituency of naval strategists who argued that the diversification-and resulting dispersal-of NATO's nuclear assets at sea both strengthened their survivability and buttressed overall deterrence⁵.

It is my contention, when examining the particularities of the South Asian nuclear dynamic that naval nuclearization will be highly detrimental to crisis stability, and throughout the year my work will seek to add substance and intellectual credibility to my position. In the course of this first report, for instance, I ambition to flesh out some of my principal arguments, notably by examining how some countries' growing proficiency in the conventional naval domain, in areas such as anti-submarine and anti-ship warfare, will come to be equated, in parallel, with advances in counter-force capability. This will add a layer to calcification to preexisting security dilemmas and radically transform the nature of naval interactions in the Indian Ocean. Indeed, whereas previously the region's maritime rivalries could be viewed through a refreshingly conventional prism, the injection of nuclear-armed naval assets into the mix has irremediably darkened the security environment of one of the world's formerly most placid oceans.

A second report will attempt to gauge the impact the introduction of nuclear arms at sea will have on respective nation's broader maritime doctrines and strategies within the region. Whereas the first report will largely revolve around escalation management and consist of a detailed assessment of hardware and tactical capabilities, this paper will be more doctrinal in nature.

Throughout the year, my work will be nourished by numerous interactions, both with my mentors at Carnegie, and with the policy community in Washington DC. I am also planning several research trips to India, Pakistan, and Bangladesh. I am particularly enthused at the idea of interacting with the Pakistani strategic community in order to get a better appreciation of their conceptualization of the nuclear threshold at sea. Indeed, thinkers have argued in the past that the escalatory dynamics leading to nuclear exchange are far less constrained at sea than on land⁶. It will be interesting to see whether Pakistan, which has long relied on a policy of brinkmanship in order to offset its larger, more powerful neighbor subscribes to this notion⁷; and whether its professed desire to acquire a sea-based deterrent can be viewed as a response to its perceived lack of strategic depth.

⁴ Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca: Cornell University Press, 1991).

⁵ See, for example, Linton Brooks, "Nuclear SLCMS add to Deterrence and Security", *International Security*, Vol.13, No.3 (Winter 1998/1999), pp.169-174

⁶ Desmond Ball, "Nuclear War at Sea", *International Security*, Vol.10, No.3 (Winter 1985/1986), pp.3-31

⁷ Robert Jervis, "Kargil, Deterrence and International Relations Theory", in Peter R. Lavoy (ed.) *Asymmetric Warfare in South Asia: The Causes and Consequences of the Kargil Conflict* (New York: Cambridge University Press, 2009), pp.377-398.

Throughout the year I will be confronted with questions which are directly linked to ongoing developments and have an immediate bearing on current policy formulation. Some of these interrogations can be broadly formulated as follows:

- Are we heading towards a less stable nuclear environment than during the Cold War?
- Is there a greater risk of inadvertent escalation than before? How will naval nuclearization change the nuclear equation in the Indo-Pacific?
- How will this affect the wider region over the next two to three decades?
- Can the United States and other more “mature” nuclear powers work towards introducing a modicum of greater stability in the region?
- What would be the effects of a future forward-deployment of Chinese nuclear assets in the Arabian Sea or wider Indian Ocean Region?
- Does the burgeoning Sino-US naval rivalry risk spilling out into in the Indian Ocean and enflaming the situation even further?
- Will naval nuclearization mitigate or exacerbate preexisting security dilemmas? How might differences in the cognitive sets of national leaderships add to the risk of critical misinterpretation?
- What role does the desire for prestige and/or other status-driven considerations play in the desire for a nuclear triad?

Towards the end of my fellowship I hope to provide a series of concrete policy recommendations which can help foster a more stable nuclear environment within the wider Indian Ocean Region.

I much look forward to the year ahead and am truly grateful to have been granted such a wonderful opportunity.

2. Vipin Narang, CISAC

Posturing for Peace?: The Sources and Deterrence Consequences of Regional Power Nuclear Postures

The world is heading toward a second nuclear age in which regional nuclear powers will play an ever-more important role. It is likely to be dominated by multipolar regional nuclear interactions in areas of the world that are characterized by longstanding rivalries. Because of a largely exclusive scholarly focus on the superpowers, we presently have a poor understanding of the world's unfolding nuclear dynamics—of how, for example, a future nuclear Iran might affect international relations and the probability of conflict. My book manuscript sheds some light on these important developments. It analyzes the experiences of the present regional nuclear powers—China, India, Pakistan, Israel, South Africa, and France—and develops the first comparative framework that thinks systematically about the content and sources of nuclear strategy, as well as the deterrence consequences of those choices. The book focuses on two crucial questions: (1) which nuclear postures have regional powers adopted, and why?; and (2) what effect have these choices had on their ability to deter conflict? In doing so, the book provides new insights into nuclear strategies and conflict dynamics across important areas of the world such as South Asia, the Middle East, and China. It also allows us to think about not only what type of posture future nuclear states, such as Iran, might adopt but *also* the likely impact of that posture on international conflict.

We are presently ill-equipped to answer these questions. The bulk of the scholarly literature on nuclear weapons has thus far focused on the Cold War experience of the United States and the Soviet Union. However, seven of the nine nuclear states, and all those that might emerge, are regional powers. Compared to the superpowers, these states face different constraints and opportunities, have developed arsenals that are orders of magnitude smaller, and must manage different conflict environments. As such, their thinking about, and experiences with, nuclear strategy have differed markedly from that of the United States and the Soviet Union—but their experiences have thus far been largely ignored. Moreover, much of the existing thinking about nuclear weapons and international conflict focuses on the initial proliferation of nuclear weapons. Instead, I explore the dynamics that unfold *after* a state crosses the nuclear rubicon, and argue that choices about posture and strategy fundamentally affect patterns of international conflict.

It is the unstudied experiences of the regional nuclear powers—an aggregate of over 200 years of nuclear interactions—that are most relevant to the present and emerging international nuclear landscape. Their choices and the resulting consequences for international conflict are therefore the focus of this book, which is divided into two parts. The first part of the book identifies the diverse nuclear postures adopted by the regional powers, often with original data collected from the field, and develops a novel theory for their selection. The second part of the book focuses on the consequent effects these choices have on international security, asking the crucial question: how much is enough to deter conflict? The answer has thus far been elusive to scholars, but I find that the mere possession of nuclear weapons fails to systematically deter conventional attacks. States, for better or worse, have had to do quite a bit more than merely acquiring nuclear weapons—often at substantial risk to themselves—

in order to successfully deter conflict. This finding overturns a central belief of modern deterrence theory that has been held for over half a century.

The Sources of Regional Power Nuclear Postures

In Part I, I first define and identify three regional power nuclear postures, arrayed across a spectrum of capabilities and deployment procedures. First, a *catalytic* posture, which consists of only a handful of nuclear weapons, threatens the breakout of nuclear weapons as a last-resort in the event the state's survival is threatened in order to compel—or catalyze—third-party intervention on the state's behalf; Israel, for example, adopted this posture for a significant portion of its nuclear history. Second, an *assured retaliation* posture involves the development of secure second-strike capabilities that enable a state to threaten certain retaliation should it experience some level of damage; India and China have adopted this posture. Third, an *asymmetric escalation* posture develops capabilities and procedures that credibly call for the rapid and first use of nuclear weapons to deter all levels of conventional and nuclear conflict; France and Pakistan have each, at some point, adopted this posture.

Based on this typology, I develop the first deductive theory of the sources of nuclear posture—the Rational Optimization Theory of Nuclear Posture. It explores how and why a regional power might select and optimize its posture in response to external security and internal domestic political and financial constraints. This theory recognizes that security variables, while certainly a critical regulator for nuclear strategy, are often indeterminate. It therefore specifies precisely when variables such as civil-military relations and resource constraints might push states toward one particular nuclear posture over another. It offers a determinate prediction for a state's nuclear posture based on several clearly identified, readily measurable, and sequential variables.

I then code, and test the sources of, each of the six regional powers' nuclear postures. I describe the specific nuclear posture each state has adopted over time in substantial detail. Much of this data is original, involving extensive fieldwork and interviews, especially in the cases of India and Pakistan. I test each state's choice of nuclear posture against my theory and several alternative explanations. For example, I show that Pakistan has shifted from a catalytic posture to an asymmetric escalation posture and deploy my theory to explain this choice; similarly, I offer an explanation for why India, China, and now Israel have all opted for small but secure assured retaliation postures, even though they have the capability to develop more aggressive strategies. Compared to the alternative explanations, my theory of rational optimization more accurately predicts both the form and character of regional power nuclear postures, and isolates the variables that push states toward a particular nuclear posture.

This part of the book provides substantial empirical value by systematically coding the nuclear strategies of each regional nuclear power, often with original data. Furthermore, it makes an important theoretical contribution by providing a framework that helps theorists and policymakers alike think about the critical variables that might drive a regional power to adopt a specific nuclear strategy, and under what conditions that power might shift strategies. The empirical tests establish the internal validity of my theory, thereby providing testable predictions for what posture future nuclear states, such as Japan or Iran, might adopt.

The Deterrence Consequences of Regional Power Nuclear Postures

The second part of the book analyzes the effects of these choices on a state's ability to deter conflict. The current literature on nuclear weapons and deterrence almost universally evinces an 'existential bias', treating all nuclear states as equivalent once they acquire even a single nuclear weapon. Yet there are theoretical and empirical reasons to believe that this line of thinking is fundamentally mistaken. I thus shift the unit of analysis in conflict deterrence from nuclear *weapons* to nuclear *posture*, the variable that I argue should instead drive deterrence success and failure. Because regional nuclear powers all had roughly the same size nuclear forces but different nuclear postures, this part of the book answers the critical question: what type of nuclear posture is required to deter conflict?

I use a nested research design to analyze the relationship between nuclear posture and deterrence. First, I create a new large- n directed-dyad dataset to analyze whether the adoption of any these postures, on average, dampens the frequency and intensity of attacks a state experiences. I show that the asymmetric escalation posture uniquely and significantly deters attacks from both nuclear and non-nuclear adversaries. The catalytic and assured retaliation postures, on the other hand, have had serious and systematic deterrence failures.

Second, I explore whether the effects found on average in the quantitative tests actually unfold in particular crises. I first examine five India-Pakistan crises, two prior to the 1998 nuclear tests, and three afterward. The balance of deterrence success clearly shifts after Pakistan is able to credibly move to an asymmetric escalation posture after 1998. The empirical richness of these crisis-cases was augmented by substantial fieldwork and interviews with key officials involved in national security decision-making, particularly in India. Second, I analyze a series of Arab-Israeli crises and find that after Israel adopted a catalytic posture, the incentives for preventive action against her—even by non-nuclear states—actually *increased*.

The most important finding from this part of the book is that, contrary to the conventional wisdom—indeed, contrary to a bedrock article of faith in the canon of nuclear deterrence—the acquisition of nuclear weapons does *not* produce a uniform deterrent effect against opponents. Rather, deterrence success varies systematically by nuclear posture. The acquisition of nuclear weapons by itself, and even the adoption of secure second-strike forces, may not significantly deter conventional conflict—despite what scholars including Kenneth Waltz, Robert Jervis, and John Mearsheimer have argued. States that wish to deter conventional attacks with nuclear weapons must explicitly orient their nuclear forces to do so. Nuclear weapons may deter, but they deter unequally.

Contributions

This book manuscript is, I believe, the first work to (1) systematically describe the diversity of regional power nuclear strategies and postures; (2) develop a rigorous and predictive theory for why regional powers select the postures they do; and (3) analyze how these choices affect a regional nuclear power's ability to deter attacks. The key empirical contribution of the book is that it provides comprehensive, often original, data on the diverse nuclear strategies of the six major regional nuclear powers. The key theoretical contribution of the book is that it shifts the unit of analysis from possession of nuclear weapons to nuclear posture. By doing so, it shows how and why states make the strategic choices they

do after they acquire nuclear weapons, and demonstrates that these choices *matter* deeply to international relations and conflict.

As such, I hope that this work will appeal to three major audiences. First, it should be of interest to scholars of international relations, since it provides original and detailed data on regional power nuclear strategies, a theory for their selection, and novel analysis about the relationship between nuclear weapons and conflict. It should also appeal to scholars who focus more closely on nuclear proliferation and deterrence, since it identifies the variation in regional power nuclear postures in a new and systematic way, and fundamentally revises our understanding of how and when nuclear weapons deter conflict. Finally, it will hopefully be of interest to a policy community that seeks to manage nuclear proliferation, providing relevant data and insights on nuclear states such as Pakistan, India, Israel, a rising China, and potential emerging nuclear powers such as Iran.

3. Anthony Barrett, RAND

Assessing and Reducing the Risks of Inadvertent Nuclear War Between the United States and Russia

INTRODUCTION

Despite the fall of the Soviet Union, a number of analysts argue that inadvertent nuclear war between the US and Russia still presents a significant risk. While the United States and Russia are not actively threatening each other with war, they have remained ready to launch hundreds of nuclear missiles within minutes in response to indications of attack. War involving significant fractions of the U.S. and Russian nuclear arsenals, which are by far the largest of any nations, would have catastrophic nuclear winter effects such as severely reducing global food production for years, potentially leading to collapse of modern civilization worldwide.

A wide range of events have been mistakenly interpreted as possible indicators of nuclear attack (including weather phenomena, wild animal activity, and control-room training tapes loaded at the wrong time) and such a conclusion could lead the US or Russia to respond in kind. Although many such failure modes have been identified and addressed in some way, additional research could be valuable in identifying both long-standing and new hazards, quantifying their relative risks, and informing policies.

In this research, I address the following questions: What are ways in which inadvertent nuclear war may be caused by adversaries (intentionally or otherwise), accidents, or natural phenomena? What are the risks of these failure and attack modes? What risk reduction options are available, and what are their tradeoffs? What are the policy and strategic implications?

METHODOLOGY

Before the fellowship, I built an initial computational model of inadvertence risks, and potential benefits of some inadvertence risk reduction options, using probabilistic risk analysis (PRA) modeling methods such as fault trees and Monte Carlo simulations. I used publicly available literature to build and populate the fault trees and parameter estimates. (Barrett et al. 2012)

In my fellowship work, I plan to engage in efforts in the following areas:

- Identifying and characterizing possible sources of risk by applying probabilistic risk analysis methods.
 - Revising the scope, forms, assumptions, and parameter values of my current inadvertence risk models using information from the literature, interviews, and other sources to the extent available.
 - Using methods for elicitation of expert judgments to better estimate important parameter values for which empirical data is lacking.
- Using game-theoretic decision models to assess a series of important deterrence characteristics of candidate risk-reduction options and strategies (e.g. their effects on first-strike incentives) in order to identify options and strategies with significant drawbacks under various conditions.

I plan to immediately begin efforts in each of the areas, to quickly develop working prototypes and working-report chapters that I improve iteratively, based in part on feedback from mentors and stakeholders.

Throughout the project, I will conduct exploratory, sensitivity and uncertainty analyses, and assess robustness of strategies given model limitations and uncertainties.

ASSUMPTIONS

Both the United States and Russia have systems of sensors designed to provide indications of missile attack underway, including satellites to detect hot plume gases from a missile launch and radar to detect missiles flying through the air. As with any sensor, both satellite and radar systems are susceptible to false positives. If indications of an attack seem sufficiently convincing, leaders are contacted and briefed on the situation, and must decide whether to launch their own missiles in response to the indications of attack. The model's estimates of the annual probability of inadvertent nuclear war would rest mainly on estimates of the rates of occurrence of serious false alarms under various conditions, and on estimates of the probability that U.S. or Russian leaders would launch an attack if presented with a false attack signal.

It has long been argued that the probability of inadvertent nuclear war is significantly higher during U.S.-Russian crisis conditions. It is possible that U.S.-Russian relations will significantly deteriorate in the future, increasing nuclear tensions.

False indicators of nuclear attack could be caused in a number of ways. A wide range of events have already been mistakenly interpreted as indicators of attack, including weather phenomena, a faulty computer chip, wild animal activity, and control-room training tapes loaded at the wrong time.

There are also a variety of ways for the probability of nuclear war to be increased by terrorists, nihilists, and rogue regimes. Some groups might bring about crises, or at least to observe and capitalize upon them, by actions such as exploding a stolen or improvised nuclear bomb. A variety of nuclear terrorism scenarios are possible. Al Qaeda has sought to obtain or construct nuclear weapons and to use them against the United States. Other methods could involve attempts to circumvent nuclear weapon launch control safeguards or exploit holes in their security.

The probability that there is a U.S.-Russia crisis at any particular point in time might be treated as an essentially independent or exogenous variable in the model, at least for some cases or decisions to be analyzed. Although some real-world crisis probability factors can be affected by U.S. and Russian decisions, such as escalation or de-escalation strategies employed in a crisis, crisis probability also has some factors that are exogenous to U.S. and Russian decisions, such as probabilities of conflicts affecting Russian interests in the Baltic states.

ANTICIPATED FINDINGS

I expect to be able to identify areas and areas and conditions of inadvertence risk, providing quantitative comparison where possible, and determining how risks may change over time. I also expect to characterize how inadvertence risks could be reduced via specific risk-reduction measures. Finally, I

expect to identify conditions under which candidate inadvertence risk-reduction schemes could arguably increase the overall risk of nuclear war (e.g. I plan to assess under what conditions the risk-reduction measures would increase first-strike incentives).

My work to date (Barrett et al. 2012) indicates that the nuclear systems and postures of the United States and Russia continue to pose significant risks of inadvertent nuclear war. My work also indicates there are options with the potential to substantially reduce inadvertence risks, even if implemented unilaterally by only the United States or only Russia. One such inadvertence risk reduction measure is the suggestion of Mosher et al. (2003) for each nation to move strategic submarines (SSBNs) far enough away from each other's coasts to substantially increase the amount of time between when the launch of submarine-launched ballistic missiles (SLBMs) would be detectable and when they would arrive at their targets. Another inadvertence risk reduction measure is the suggestion of Podvig (2006) for part-time lowering of alert level, such that if a false indication of an attack arrived on one nation's early warning systems during a period of when that nation is at lowered alert, that false indication of an attack would not lead to a counter-attack (and such that the lowering of alert levels would be performed in such a way that it would not be detected reliably by the other nation). At this point, these options seem promising, though it is not entirely clear whether they would be truly feasible and would avoid the same types of strategic-stability drawbacks as some other previously mooted proposals.

POLICY RELEVANCE

I will make recommendations on risk-reduction strategies and areas for further research, based on the results of the models, previous analyses, and policy context. Although many deterrence system failure modes have been identified in previous research, additional research would be valuable in identifying residual hazards, quantifying their relative risks, and informing policies. Potential risk-reduction strategies could then be considered in various ways by U.S. and Russian authorities, such as in the Nuclear Posture Reviews and revisions of strategy details periodically performed by the U.S. Department of Defense.

I will seek to discuss the work with the U.S. Strategic Command, which has primary overall responsibility for the U.S. nuclear arsenal and early-warning systems. I will also seek to engage other stakeholders, as appropriate. Finally, I will aim to disseminate the resulting work publicly, via means such as a report on the RAND website, and papers in peer-reviewed journals.

REFERENCES

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4. Jaganath Sankaran, RAND

Cooperative Missile Defense and Nuclear Arms Reduction

INTRODUCTION

Global nuclear weapons reduction has been linked by some nations to the current and the evolving capabilities of U.S. missile defense systems. Both Russia and China have indicated that they would increase their nuclear arsenal and modernize their Inter-Continental Ballistic Missiles (ICBMs) if they felt targeted and threatened by the capabilities of the U.S. missile defense systems. Both have demanded restrictions on the scope and abilities of the U.S. missile defense systems. These arguments have most recently occurred in response to the projected capabilities of the European Phased Adaptive Approach (EPAA) missile defense architecture.

A possible solution to this problem, from the U.S. perspective, would be to demonstrably limit the capability of missile defense systems. The defenses would need to defend (only) against certain adversaries (like North Korea or possibly Iran) that might conceivably gain technologically limited missile capabilities against the United States in the future, while reassuring the Russians and Chinese that these systems are not directed at degrading their nuclear retaliatory capabilities. The question is whether such solutions exist.

My goal during my fellowship is to analytically determine if such a solution can be created by restricting certain elements of a missile defense system. I plan to model and simulate the various components of the missile defense system to identify restrictions that can be placed on these components so as to limit their effectiveness to specific targets of concern.

METHODOLOGY

My research will be rooted in established analytical methods from various fields of engineering. I plan to analyze the different interceptors and sensors used in a missile defense system. This will require application of missile aerodynamics, thermal/IR engineering, radar engineering, space system studies (orbital mechanics) and some application of signal fusion and optimization.

I have limited exposure to these fields. I plan to improve on them and learn new skill sets as needed. I had attempted a limited similar study (as proposed above) in the course of doctoral dissertation research in which I had modeled and studied the effect of space-based sensors on U.S. missile defense capabilities. I plan to build on that study for my post-doctoral research plans.

LIMITATIONS

In order to make the problem described above tractable a number of limitations will be imposed:

1. The problem is focused only on national missile defenses architectures.
2. Any specific system design as hoped to emerge from the analysis explained above might have breakout potential, allowing the missile defense to rapidly expand its capability and arguably threaten the strategic forces of China and/or Russia. It is assumed that such breakout capabilities can be

identified. It is also assumed at this stage of the research that there are possible designs that do not have an extremely unstable breakout potential.

3. Issues like deterrence, destabilizing interactions, crisis stability etc. are an important component of any interaction between the nation instituting the missile defense system, the target nation and the other concerned nations. I will explore these additional issues only to the extent that these factors affect the scope of the analysis outlined above.

HYPOTHESIS / EXPECTED FINDINGS

I hope to identify, at the end of my research, possible missile defense architecture(s) that could make the U.S. missile defense system capable against threats like North Korea and Iran, but would not pose any reasonable challenge to Russian and Chinese ICBM retaliatory capability.

POLICY RELEVANCE

An analytic investigation of this unexplored design space for missile defenses could have a significant effect on two important issues. First, if accepted widely and embodied in the defenses, this should reassure both Russia and China that U.S. missile defenses really are not aimed at diluting their strategic deterrence. That alone could improve relations between the United States and both Russia and China. Second, such a reassurance could then help propel forward discussions on further reductions in nuclear arms among all three nations.