



**Calhoun: The NPS Institutional Archive**

---

Center on Contemporary Conflict

CCC PASCC Reports

---

2016-07

**Missile Defense, Extended Deterrence, and  
Nonproliferation in the 21st Century**

Kelleher, Catherine McArdle

---

<http://hdl.handle.net/10945/50379>



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

**Dudley Knox Library / Naval Postgraduate School  
411 Dyer Road / 1 University Circle  
Monterey, California USA 93943**

<http://www.nps.edu/library>

# Missile Defense, Extended Deterrence, and Nonproliferation in the 21st Century

PI: Dr. Catherine McArdle Kelleher

July 2016

---

This research was supported by the Naval Postgraduate School's Project on Advanced Systems and Concepts for Countering Weapons of Mass Destruction (PASCC) via Assistance Grant No. N00244-14-1-0025 awarded by the NAVSUP Fleet Logistics Center San Diego (NAVSUP FLC San Diego). The views expressed do not necessarily reflect the official policies of the Naval Postgraduate School nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government. BAA Number: NPSBAA13002

---

## Contents

Introduction to the Papers .....	2
Turkey's Turbulent Journey with the EPAA and Quest for a National System .....	3
Indian Ballistic Missile Defense and Regional Security .....	14
GCC Missile Defense: Obstacles on the Road to Integration.....	23
The Tactical Utility and Strategic Effects of the Emerging Asian Phased Adaptive Approach Missile Defense System .....	33
Ballistic Missile Defense in South Korea: A Common Threat, Separate Systems .....	44
Seeing Missile Defense as U.S. Hostility, North Korea Aims at More and Better Weapons .....	52

## Introduction to the Papers

The following papers were commissioned as part of this project for two purposes: 1) to create a body of work that provides an overview of the missile defense developments in major regions of the world; and 2) to provide emerging scholars the opportunity to conduct research, publish, and connect with each other. We believe we have succeeded on both counts. The papers written for this project will be valuable for academics and policymakers alike, and will be published and disseminated by the Center for International and Security Studies at Maryland. This element of the project has also been successful in further bringing together a new cadre of experts in the field and developing the next generation of academics and public servants who will benefit from their participation in this project.

The contributing scholars are:

**Debak Das**, a PhD candidate at Cornell University, wrote about India's quest to build its own missile defense system and its BMD relationship with its neighbors and with the United States.

**Nilsu Goren**, a PhD candidate at the University of Maryland, College Park, detailed Turkey's missile defense history and current dilemmas.

**Ari Kattan**, an MA candidate at the George Washington University, wrote about the Gulf Cooperation Council's struggle to create an interoperable missile defense system, and the relationship between missile defense and extended deterrence in the Gulf.

**Joshua Pollack**, editor of the Non-Proliferation Review at the Middlebury Institute for International Studies at Monterey, wrote about how missile defense figures into the relations between the United States and ROK and the ROK's relationships with Japan and other Asian neighbors.

**Jaganath Sankaran**, a Research Scholar at CISSM and holder of a prestigious scholarship with RAND and Sandia, wrote the paper on Japan's missile defense cooperation with the United States and its role in promoting nonproliferation in East Asia.

**Naoko Aoki**, a PhD student at the University of Maryland, College Park, wrote about North Korea's perceptions of U.S., Japanese, and South Korean missile defense efforts, and how North Korea figures into the missile defense calculations of the region.

Together, these papers provide an up-to-date report on the current status of ballistic missile defense worldwide, and offer analysis on how different choices by the United States and its regional allies may well shape offense/defense tradeoffs in doctrine and issues of credibility and trust in a rapidly changing political order, especially in Asia. This analysis will be useful for policymakers and academics as they continue to grapple with the issues of strategic stability, cost, system effectiveness, and credibility/utility as an instrument of public opinion mobilization in crisis and confidence building.

The draft papers were presented, reviewed, and discussed at a small event held at the University of Maryland, College Park, featuring the paper authors, Dr. Loukianova, and other interested experts on June 2, 2016. Each paper author presented his or her paper, followed by a discussion and Q&A session. The discussion and feedback provided at the event helped the authors finalize their papers before submission to PASCC.

Thanks are owed to Dr. Nancy Gallagher, the acting Center director of CISSM, to the late Professor John Steinbruner, Director of the Center, and to Ms. Francesca Perry of the Center's staff for their outstanding services and support of this project.

## Turkey's Turbulent Journey with the EPAA and Quest for a National System

By Nilsu Gören

### Timeline

**1991:** After NATO's slow response to Ankara's request for air defense reinforcements during the Gulf War, Turkish Armed Forces create the *Air Defense Master Plan* to prioritize the acquisition of low-altitude air defense systems.

**1997:** Turkey begins negotiations with Israel for the co-production of the Arrow air and missile defense system. (The deal fails in 2001 due to the financial crisis in Turkey.)

**March 2002:** The Turkish Air Force announces the "Aerospace and Missile Defense Concept," assigning the missile defense command to the Turkish Air Force.

**February 2003:** France, Germany, and Belgium block the deployment of NATO equipment to Turkey, including Patriot missile batteries and Airborne Warning and Control System (AWACS) surveillance planes prior to Operation Iraqi Freedom. U.S. and Dutch batteries are deployed instead.

**April 2009:** The Turkish Undersecretariat for the Defense Industry (SSM) issues a proposal for the purchase of a long-range air and missile defense system (T-LORAMIDS), and the following companies file bids for the \$4 billion tender:

- U.S. Raytheon and Lockheed Martin, PAC-3s
- Russian Rosoboronexport, S-300,
- China Precision Machinery Export Import Corp (CPMIEC), FD-2000 (export version of HQ-9)
- Italian-French joint venture Eurosam, the SAMP/T Aster 30.

**September 2009:** The Obama administration notifies Congress of a potential \$7.8 billion sale to Turkey, including 13 Patriot fire units, 72 Patriot Advanced Capability (PAC)-3 missiles, 197 MIM-104E Patriot Guidance Enhanced Missiles (GEM-T) and 4 validation missiles, and hardware for ground-based air defense.

**September 2011:** Turkey agrees to host the U.S. Army Navy/Transportable Radar Surveillance (AN/TPY-2) early-warning radar system in Kurecik, Malatya.

**September 2013:** Turkey selects China's CPMIEC for T-LORAMIDS.

**February 2013:** Following the June 2012 shooting of a Turkish reconnaissance jet by Syrian forces and shells killing Turkish civilians in Akcakale, NATO's "Active Fence" mission begins in southeast Turkey. The United States, Germany, the Netherlands, and later Spain provide Patriot missiles for protection of the Turkish-Syrian border.

**August 2014:** Combat Air Force and Air-Missile Defense Command is established in Eskisehir, responsible for missile defense control, strategic air assets, intelligence, and space activities under one C2.

**January 2015:** Turkey extends the deadline for T-LORAMIDS bids for the sixth time to open parallel talks with Eurosam and Raytheon/Lockheed Martin.

**March 2015:** The Turkish military's electronics manufacturer ASELSAN launches a Radar and Electronic Warfare Technology Center in Ankara.

**May 2015:** Turkish Aerospace Industries (TAI) establishes a Spacecraft Assembly, Integration, and Test Center in Ankara.

**November 2015:** Turkey cancels the long-range air and missile defense system tender.

**December 2015:** The United States and Germany withdraw their Patriot batteries and soldiers from Turkey, while Spain decides to extend its participation in the "Active Fence" mission until December 2016.

## **Executive Summary**

This paper provides an overview of the European Phased Adaptive Approach (EPAA) missile defense debate from a Turkish perspective. While Turkey participates in the EPAA by hosting a U.S. early-warning radar in Kurecik, Malatya, its political and military concerns with NATO guarantees have led to the AKP government's quest for a national long-range air and missile defense system. However, Turkish decision makers' insistence on technology transfer shows that the Turkish debate is not adequately informed by the lessons learned from the EPAA, particularly the technical and financial challenges of missile defense.

## **Introduction**

With Turkey being the closest NATO nation to the Middle East and lacking a robust integrated air and missile defense architecture, Turkish policymakers face decisions on continuing to rely on NATO resources, investing in indigenous capabilities, or procuring foreign systems. While the United States, Germany, and the Netherlands have historically provided Patriot systems to southeast Turkey, Turkey has political and technical concerns about NATO guarantees under the European Phased Adaptive Approach (EPAA), leading to the proposition that Turkey needs to develop indigenous air and missile defense capabilities to reduce vulnerability. However, Turkey's controversial tender for the foreign acquisition of a long-range air and missile defense system, dubbed the T-LORAMIDS process, has led to concerns within NATO about Turkey's strategic orientation and intentions.

This paper first identifies the missile threats to Turkey, mainly from Syria and Iran. It then defines Turkey's role in the EPAA and the Turkish activities towards procurement of a national long-range air and missile defense system that would allow for technology transfer to eventually achieve indigenous design. The main roadblocks to Turkish missile defense are the EPAA's technical limitations in providing continuous, comprehensive coverage to the entirety of Turkish territory, Turkey's insistence on domestic production that has led to the consideration of non-NATO systems, interoperability, and political issues. While Turkish authorities remain skeptical of the U.S./NATO security guarantees, this debate has proven that remaining interoperable under the NATO architecture and utilizing NATO resources as necessary is still Turkey's most efficient policy option, considering the financial and technical challenges of missile defense even for the US.

## **Missile Threats to Turkey**

Turkey's calculus on missile threats is based on the wide range of capabilities state and non-state actors have in the Middle East, including ballistic and cruise missiles, advanced guided rockets, artillery and mortars, anti-ship missiles, and unmanned aerial vehicles.<sup>1</sup>

Turkey's definition of the T-LORAMIDS project as 70% air defense and 30% ballistic missile defense reflects Turkey's perceptions in response to missile capabilities in its neighborhood: The system is only intended to address Turkey's regional competitor's systems, and not Israeli or Russian missiles.

Regarding Russia, Turkey would not try to or be able to counter its huge nuclear arsenal with a national missile defense system. However, it is worth mentioning that Russia deployed SS-26 Iskander missiles in Gyumri, Armenia, in 2013, threatening eastern provinces of Turkey within its 400 km range.<sup>2</sup> The Russian nuclear posture, military modernization, and the Ukrainian conflict all contribute to Turkey's increased threat perception.<sup>3</sup> The situation is exacerbated by the November 2015 Turkish downing of a Russian Su-24 bomber along the Syrian-Turkish border due to airspace violation, the major disagreements in the fight against ISIS and the future of Syria, and the dramatic deterioration of Russian-Turkish relations.

While the threat evaluation requires the consideration of both capabilities and intentions, heavy involvement of external actors such as Russia and the complexity of regional political relations make these "intentions" less predictable. Hence, Turkish decision makers prioritize a capabilities approach in their threat calculus, particularly toward Syrian and Iranian missile capabilities.

### *Syrian Missile Capabilities*

Today, Turkey's most immediate concerns regarding missile threats originate from both state and non-state actors along its Syrian border.

Prior to the civil war, the Syrian regime was capable of producing approximately 30 Scud-B/Cs per year but was dependent on foreign assistance, mainly Russia, China, North Korea, and Iran, for the components and technology.<sup>4</sup> The Assad regime has less than 100 road-mobile short-range ballistic missile (SRBM) launchers and solid-fuel SS-21 SRBMs and M-600 Tishreen ballistic missiles, which is the domestic version of the Iranian Fateh-110.<sup>5</sup> Syria also possesses Russian Yakhont anti-ship cruise missiles (ASCM) and cruise missiles designed for coastal defense.<sup>6</sup>

The Assad regime has three surface-to-surface missile brigades, with a concentration of Scud variants at the 4<sup>th</sup> Armored Division for regime survival.<sup>7</sup> The SS-21 (120 km range) and M-600 (250 km range) can hit Turkish cities near the border.<sup>8</sup> With the Scud-C (500-650 km range) and Scud-D (600-700 km range), Damascus could deliver both conventional and WMD warheads to Turkey's southeastern cities and critical facilities, while it could reach Ankara from Aleppo.<sup>9</sup> The limited stockpile of the Scud-D variant that Damascus owns is particularly worrisome to Turkish decision makers, as the modifications for re-entry and improved range would lead to a decrease in payload and make use of WMD warheads more likely, demonstrated by the 2005 Syria test-fire of 3 Scud-Bs and Scud-Ds at low-altitude airburst mode.<sup>10</sup> However, the civil war has brought uncertainty to the location and status of the missile arsenal, e.g. 2014 media reports that Hezbollah moved long-range Scud-D missiles, Iranian Fateh-110 and Fajr-5 rockets, and the Russian ASCM into Lebanon.<sup>11</sup> Since the conflict is prolonged, the Assad regime is likely to need to "replenish" its missile inventory by transfers from Iran, Russia, or China.<sup>12</sup>

Throughout the conflict, Turkish cities have been hit by stray artillery shells coming from Syria. On March 24, 2015, a Scud variant Fateh-110 missile fired by the Syrian army from the Tartus Russian naval base against the rebels exploded in the Reyhanli district of Hatay in Turkey, leaving a 15-meter wide crater and injuring five Turkish civilians.<sup>13</sup> The area was reported to be outside the radar range of the Patriot batteries, leading to the critiques that the batteries should protect the riskiest area, such as Hatay, instead of the Kurecik radar or the U.S. airbase in Incirlik.<sup>14</sup>

ISIS capabilities also threaten Turkey. ISIS fighters have been seen with Chinese-made FN-6 man-portable air defense systems or shoulder-fired heat-seeking MANDPADS.<sup>15</sup> According to U.S. intelligence estimates, it is also probable that ISIS fighters acquired the shoulder-fired Stinger missiles in Iraq.<sup>16</sup> In 2016, ISIS began hitting Turkish cities, especially Kilis, with Katyusha rockets.<sup>17</sup>

Turkey has also kept a close eye on Russian military buildup in Syria. Russia has deployed S-400 air defense systems in northern Syria with ranges extending into Turkish airspace. Russia has deployed at least one Iskander missile variant to its Humaymim Air Base according to satellite imagery.<sup>18</sup> Turkey has also heavily criticized both the Assad regime's and Russia's continued missile and rocket attacks in rebel-held towns near Damascus and Aleppo, and hitting Turkmen villages near Latakia in November 2015 instead of ISIS targets.<sup>19</sup> In November-December 2015, Russian warships and submarines in the Caspian Fleet and Mediterranean Sea launched sea-based Kalibr cruise missiles, the first use of the 3M-14 submarine variant, at ISIS targets in Syria, despite the incidents of deviation in flight path that crashed the cruise missiles in Iran and the Arctic.<sup>20</sup>

### *Iran's Missile Capabilities*

Iran has the largest and most diverse range of missile capabilities in the Middle East that can virtually target any critical asset in Turkey, including Istanbul, Ankara, U.S. and NATO bases. These capabilities include short-range artillery rockets, which can be used in irregular warfare, transferred to non-state or proxy actors such as Hezbollah, and have strategic impact to support ground forces without close air support.<sup>21</sup>

The main missile threats from Iran to Turkey are Iran's SRBMs and medium-range ballistic missiles (MRBMs). Iran has around 100 SRBM launchers that can be reloaded and fewer than 50 silo and mobile MRBM launchers.<sup>22</sup> The Iranian inventory of short-range missiles includes the Zelzal family (150-250 km), Fateh-110 (200-300 km), the Scud-B based Shahab-1 (350 km), Scud-C based Shahab-2 (750 km) and its upgrade Qiam-1 (700-800 km).<sup>23</sup> Iran's tactical ballistic missiles could be effective in an engagement with Turkish land forces close to the border, but the launches in salvos would be convenient targets for the Turkish Air Force.<sup>24</sup>

In the medium to longer range, the Iranian inventory includes the modifications of the North Korean No Dong missiles, namely the silo-based and road-mobile Shahab-3 (around 1300 km), the flight tests of its modification, which is a longer range Ghadir-1 (around 1600 km, also referred to as Kavoshgar or Shahab-3M), and the solid-propellant two-stage Sajjill-2, or Ashura that may deliver a 750 kg warhead to a range of about 2000 km.<sup>25</sup> Developmental systems include the Shahab-5 and Shahab-6 (3000-5000 km).<sup>26</sup> By the 2020s, Tehran could have the capability to relocate the road-mobile Sajjill-2 for preventive targeting and its reduced launch-cycle would undermine early-warning measures.<sup>27</sup>

Iran is estimated to have 50 operational Shahab-3 launchers.<sup>28</sup> Iran also reverse engineered and manufactured copies of the Chinese C-801 and C-802 anti-ship cruise missiles which has led to concerns that it could convert the HY-2 Silkworm ASCMs into longer-range land attack systems.<sup>29</sup> As the threat of land-attack cruise missiles is on the rise, Turkey cannot defend against the Iranian cruise missiles without a more sophisticated system with airborne sensors. In March 2015, there were media reports that Iran domestically produced the long-range land-attack cruise missile dubbed Soumar, based on the Russian Kh-55 with a 2000 km range.<sup>30</sup>

Iran conducts regular flight tests and exercises to demonstrate its missile capabilities. In July 2011, Iranian Revolutionary Guards Corp (IRGC) conducted a ten-day live-fire missile exercise dubbed "Great Prophet 6," showcasing the solid-fuel Fateh-110, the Tondar, and Khalije Fars anti-ship ballistic

missile, as well as the liquid-fuel Shahab-3.<sup>31</sup> Iran successfully launched a liquid-propellant, two-stage Safir space launch vehicle that can be used as an intermediate-range ballistic missile, in addition to plans for a larger vehicle called Simorgh.<sup>32</sup> During the February 2015 “Great Prophet 9” exercise, the naval wing of the IRGC implied that Iran had launched a missile from a submerged submarine.<sup>33</sup> In August 2015, Iran unveiled Fateh-330, the upgraded, 500 km version of the Fateh-110.<sup>34</sup> Following the formal adoption of the nuclear deal with P5+1 in October 2015, Iran test-fired a new, precision-guided ballistic missile dubbed Emad, leading to U.S. concern of violation of UNSCR 1929 and the nuclear deal.<sup>35</sup> While the US was expecting that Iran would be launching a Simorgh space rocket into orbit, in March 2016, Iran test-fired two missiles that were thought to be the Qiam-1 and Shahab-1.<sup>36</sup>

There are also technical limitations to Iran’s missile capabilities. Sankaran argues that Iranian missile capabilities are very speculative, as Iran has been alleged to “mislead and misinform” regarding their missile and space launch tests to “bluster.”<sup>37</sup> The systems lack advanced precision guidance and accuracy in GPS.<sup>38</sup> Elleman argues that the successful destruction of a fixed military target would require Iran to utilize a significant portion of its missile inventory.<sup>39</sup> He interprets this problem as an indicator that Iran’s priority is enhancing accuracy and lethality over longer range.<sup>40</sup> There is near consensus among missile experts that resolving these technical issues in the short-term requires direct foreign assistance and the sources are well-known.<sup>41</sup>

While Turkey and Iran have historically had “neighborly” relations, prior to the Joint Comprehensive Plan of Action (JCPOA) with the P5+1, Iran threatened to hit the Kurecik radar as a response to Turkish help to the “Zionist” regime.<sup>42</sup> In Iranian Brigadier General Hacizade’s words: “If there is an attack on Iran, our first target will be the missile shield systems in Turkey, and then we’ll turn to other targets.”<sup>43</sup> While Turkey welcomes the JCPOA, a major consideration is the exclusion of ballistic missiles from the nuclear deal. The sanctions on the Iranian ballistic missile program are expected to be lifted within the next 8 years. However, the latest Iranian fire tests have led to new U.S. sanctions on the country’s ballistic missile program.

### **Turkey’s Role in the EPAA**

Turkey’s direct role in the EPAA began in the completed Phase I by hosting the X-band early-warning radar in Kurecik, which is responsible for detecting the launch of a ballistic missile from the Middle East and transferring the information to the U.S. SM-3 interceptors to hit the missile mid-flight. In addition, Turkey’s military electronics manufacturer ASELSAN provides system engineering to improve NATO ballistic missile defense and contributes to air defense projects in Poland and Romania.<sup>44</sup>

The main concerns that Turkey initially had with hosting the radar were naming Iran as a threat, the U.S. command and control not allowing any Turkish influence, whether the missile shield would cover all of Turkey, and data sharing with non-NATO countries, Israel in particular.<sup>45</sup> However, Kibaroglu argues that the degree of divergence between Turkey and NATO was not as wide as it was reflected in the media coverage.<sup>46</sup> Turkish authorities considered the radar as a sophisticated NATO defense capability that would be a strategic asset for Turkey’s protection against “actual and potential” threats from its neighborhood.<sup>47</sup> They also perceive being one of the few host countries in EPAA as a privilege.<sup>48</sup> However, the future role of Turkey within the missile defense system is uncertain.

For robust defense, forward-based large radars in proximity to the origin of the missile are required, as the sea-based and land-based interceptors launch 100 seconds after the ballistic missile detection by the sensors.<sup>49</sup> The X-radar is the first chain loop in the system to transfer information to the interceptors, and has to be located at an optimum distance from the target. Proximity of Kurecik to the Middle East

provides an advantage to the NATO system in providing cueing information. Establishing each radar system costs approximately \$200 million to the US.<sup>50</sup> The radar is exclusively operated by U.S. personnel, and has a twin system at the Nevatim Air Force Base in the Negev desert in Israel.<sup>51</sup> The U.S. Army allocates roughly \$21 million per year for the Kurecik radar.<sup>52</sup>

While the US is likely to continue to host the radar due to its location, beyond the Turkish domestic concerns about sharing information with Israel, there are also critiques of the adequacy of the radar: According to the U.S. Defense Science Board, the TPY-2 land-based radar's tracking range is not adequate for a robust defense of Alliance territory and increase in sensitivity is required, as well as extremely high speed data sharing among multiple sensors in effective discrimination.<sup>53</sup> Authors argue that the AN/TPY-2 radar system was chosen in part because it has limited ability to see into the Russian airspace.<sup>54</sup>

Following the airspace conflicts between Turkey and Russia in Northern Syria, in December 2015, the NATO foreign ministers agreed on a Turkish air defense package to enhance air and naval presence, including maritime patrol aircraft, and an AWACS platform in the eastern Mediterranean provided by German and Danish ships.<sup>55</sup> The new NATO missile defense architecture is expected to include an extra deployment of Italian SAMP/T in Turkey and an Arleigh Burke-class U.S. ship to be deployed in the Black Sea on a constant basis.<sup>56</sup> While NATO underlines its commitment to Turkish security by readily-deployable forces, there is disagreement between Turkey and NATO on the types of threats and priorities, such as PKK terrorism vs. ISIS, Russian jets or missiles flying from Syria, and the measures to address these threats.

### **The Quest for a National Air and Missile Defense System: Current Status and Future Plans**

Currently, Aselsan, the Turkish military electronics producer, and the national missile manufacturer Roketsan have designed low- and mid-altitude air defense systems worth approximately 200 million Euros and 130 million Euros respectively.<sup>57</sup> Hisar-A is designed to address short-range threats for the protection of land units, and Hisar-O is designed for the medium-range, for the protection of larger units such as air defense batteries.<sup>58</sup> According to Roketsan officials, Hisar systems have a dual pulse (or stage), solid-propellant rocket engine (the timing for the firing of the second stroke is optimized into the guidance algorithm, creating a surprise element and uncertainty in maneuvers).<sup>59</sup>

Meanwhile, Turkey plans to carry its offensive, defensive, reconnaissance, surveillance, and early-warning resources and capabilities into space within the next ten years.<sup>60</sup> The Turkish Air Force is establishing a Space Group Command, an aerospace force unit that will specialize in satellite launches, reconnaissance space-based imagery, early warning, satellites, and satellite communications.<sup>61</sup> The early concept design of a proposed space launch vehicle (SLV) has been commissioned to Roketsan. Turkey plans to invest \$100 million to develop the SLV, dubbed the Turkish Satellite Launching System (UFS). SSM also has a vision to complete the radar requirements of the long-range, high-altitude air and missile defense systems, including an early warning radar and the "CAFRAD" Multifunction Phased Array Radar System, within the next four years.<sup>62</sup>

On long range BMD, after years of contention, in November 2015, Turkey entirely dropped the tentative agreement with China's CPMIEC for T-LORAMIDS based on technology transfer concerns.<sup>63</sup> Since then, Turkish officials began to argue for an off-the-shelf "stopgap" acquisition until Turkey develops an indigenous system.<sup>64</sup>

As the lead U.S. negotiator for missile defense basing agreements in Turkey, Romania, and Poland, Assistant Secretary of State Frank Rose, states, NATO encourages the allies to develop and contribute

their own national capabilities, including early-warning missile defense capable radars, in addition to basing support.<sup>65</sup> However, the key to missile defense cooperation is interoperability to complement and supplement layered systems, as seen in Israel's David's Sling, Iron Dome, and Arrow systems. At this point, Turkey faces some strategic choices.

NATO's electronic warfare security codes require interoperability of the systems that will be plugged onto NATO systems, unless it is a "stand-alone" system. By purchasing U.S. or European systems, Turkey would benefit from an expanded NATO capability in the Eastern Mediterranean through the integration of a national Turkish system with the EPAA architecture.<sup>66</sup>

Proponents of a stand-alone system or a possible non-NATO system argue that Turkey's pursuit of air and missile defense technology is not a challenge against NATO. Regarding the China deal, Defense Minister Yilmaz had initially argued that the missile defense system would be only integrated to the national systems for Turkey's defense without being integrated to NATO.<sup>67</sup> However, not integrating the national missile defense system to the NATO grid would only reduce efficiency and prevent the full coverage of threats to intercept ballistic missiles.<sup>68</sup> Meanwhile, high ranking defense procurement officials insisted that Turkey could address the concerns regarding information sharing between non-NATO and NATO systems by an interphase filter produced by the Turkish AYESAS that provides one-sided information.<sup>69</sup> A view widely unpopular among NATO officials, Turkey seems to have cancelled the initial plans but has not entirely ruled out the possibility.

One of the off-the-shelf systems that is currently being considered is the "Medium Extended Air Defense System"- MEADS, jointly developed by the US, Germany, and Italy.<sup>70</sup> The system uses a phase-array radar that provides 360-degree coverage that appeals to the Turkish decision makers.<sup>71</sup> While this system was initially intended to replace the Patriot systems, the US decided to discontinue funding the program, and neither Italy nor Germany have signaled that they will fund the procurement of the system.<sup>72</sup> The funding issue casts doubt on the feasibility of this option, unless Germany gives Turkey financial guarantees.

### **Turkey's Roadblocks to an Integrated Air and Missile Defense Architecture**

Turkish decision makers face technical challenges that lead to gaps in coverage in the EPAA architecture, procurement challenges originating from the AKP government's insistence on not purchasing an off-the-shelf system, and political implications on Turkey's commitment to NATO.

#### *Technical challenges with EPAA*

There has been little debate in Turkey on the technical limitations and vulnerabilities of EPAA systems, such as intercepting countermeasures and decoys, lack of realistic battlefield tests, and inability to intercept low-flying cruise missiles. Instead, the discussion has focused on whether the EPAA can address Turkey's security needs from purely a geographical coverage perspective.

Ankara has been negotiating concrete security guarantees that all of Turkish territory will be protected by the EPAA plan. This idea was explored as an option to have 10 SM-3 Block IIA land-based interceptors at the Incirlik Air Base and Ramstein Air Base in Germany each.<sup>73</sup> However, the U.S. Missile Defense Agency's (MDA) plan to choose Romania and Poland instead left parts of Turkey uncovered, unless additional resources, such as the Terminal High-Altitude Area Defense System (THAAD) system, were added to expand coverage and area defense.

According to Phase II of EPAA, THAAD can be introduced as "potential surge" for enhanced medium-range missile defense for areas out of coverage.<sup>74</sup> However, as the U.S. has more critical

strategic assets such as military bases in the Arab Gulf countries, and can protect Incirlik Air Base from the sea, it is unlikely that a THAAD system would be permanently stationed in eastern Turkey.<sup>75</sup>

Due to the trajectory of ballistic missiles and Turkey's geographical proximity to the region, the existing architecture doesn't provide defense over the entirety Turkish territory.<sup>76</sup> The SM-3 interceptor engages the target midcourse and therefore cannot engage the missile while it is in eastern Turkey during its ascent phase.<sup>77</sup>

To demonstrate this selective coverage issue, Sankaran simulates an Iranian missile attack with current capabilities on two U.S. bases in Turkey. First is the Incirlik Air Base at a 964-km distance to the launch site of a Shahab-3 in Tabriz, reached by the EPAA SM-3 IB interceptors (3.5 km/s burnout velocity) launched from the Eastern Mediterranean Sea with a time delay of 100 seconds needed for tracking the target missile and pinpointing the location for intercept.<sup>78</sup> Second is NATO's Izmir Air Base at a 16700-km distance from Tabriz, reached by the EPAA SM-3 IB interceptors launched from Deveselu, Romania with 100 seconds delay.<sup>79</sup> Sankaran concludes that, in both cases, assuming perfect information, minimum energy trajectory, and no countermeasures, intercept is kinematically possible.<sup>80</sup> Meanwhile, an EPAA SM-3 IB interceptor launched from Deveselu would not be able to defend against the missile attack on Incirlik Air Base, even with no time delay, whereas an Aegis ship in the Eastern Mediterranean would reach the Shahab-3 targeting Izmir Air Base with 100 seconds delay.<sup>81</sup>

#### *Procurement Issues and Financing*

Turkey's policy objectives in national air and missile defense acquisition are strengthening the domestic defense industry through international partnerships in technology transfer and military modernization. Hence, the Turkish government set the selection criteria as the possibility of coproduction, cost, and delivery date, instead of the technical specifications and track record of the systems in effectively addressing the range of air and missile threats, and the political implications of the decision. It is also crucial to note that the Turkish Defense Ministry prioritizes cost and technology transfer, while the Turkish Air Force demands to acquire the most advanced systems, heavily influenced by NATO. Meanwhile, the discrepancy between Turkey's national defense objectives and the \$15 billion annual defense spending motivates Turkish policymakers to prioritize costs in decision making.

Turkish security policy makers argue that Turkey remains dependent on the system providers as long as it doesn't co-develop the technology. "If Turkey opts for direct purchase of the system then it will be obliged to make new off-the-shelf purchases 15 or 20 years later. We will not settle for this. Our target is to gain national technological capability in the missile project," stated Ismail Demir, the Undersecretary of Defense Industries (SSM).<sup>82</sup> According to a Roketsan official, the measures that technology-providing countries impose to protect their competitive advantage requires Turkey to eventually develop the technology themselves beyond transfer agreements in the procurement plan.<sup>83</sup> However, they realize that Turkey's national solutions might bring lower performance, longer production times, and higher costs.

#### *Political Considerations and Lessons Learned from T-LORAMIDS*

Turkey considers lack of air and missile defense systems as a strategic weakness that left Turkish security policies dependent on the U.S. and allies' guarantees in every crisis. Turkey faced political hesitation leading to delay in the decision to send NATO systems, leading to loss of trust.<sup>84</sup> If NATO provides the systems to Turkey, there is concern in Ankara that there can be "strings attached," leading to the independence argument.<sup>85</sup>

According to Turkish decision makers, since Turkey cannot rely solely on the NATO alliance for its security needs, it is rational to develop indigenous capabilities.<sup>86</sup> L. Gen. Salih Ulusoy, president of Turkish General Staff planning and principles, states that off-the-shelf systems can no longer be the only option for Turkey, but this effort toward independence should not be interpreted as a threat to the U.S. defense industry, but as Turkey becoming a stable partner in the Middle East to cooperate more with.<sup>87</sup>

However, Turkey's quest for independence has not necessarily been welcome by its NATO partners, interpreted as a shift in Turkey's strategic orientation away from the Alliance. While aiming to bargain for strategic advantage, Turkey almost made a decision to choose a system that would not be interoperable with NATO assets. In addition, the US was particularly concerned with the choice of the Chinese company. CPMIEC has been listed under a number of nonproliferation sanctions by the United States. Had Turkey proceeded with the Chinese offer, missile defense would have had broader strategic consequences on U.S.-Turkish relations.

#### *Turkey's domestic constraints*

Currently, Turkey has internal security concerns that complicate the decisions regarding its defense spending and priorities. Turkey has gone back to conducting military operations in its counterinsurgency efforts against PKK, despite the ineffectiveness of air strikes. Major Turkish cities have also been targeted by ISIS. In addition to the high costs of the war against terror, Turkish economy no longer enjoys the high growth rate it had during the 2000s and has reached a plateau. Moreover, Turkey has spent \$10 billion for approximately 3 million registered Syrian refugees in Turkey. Despite the financial aid agreement with the Germany for 3 billion Euros, the future costs of hosting these refugees remain to be seen.

President Erdogan's quest for consolidation of power under an executive presidency through constitutional reform leads to concerns of increased authoritarianism, contributing to Turkey's never-ending democracy issues. This domestic struggle has dire implications on Turkey's regional and transatlantic relations, generating concern about Turkey's strategic orientation.

#### **Lessons from the EPAA**

The main lesson for Turkey from the EPAA experience is how establishing a missile shield is technically, financially, and politically very challenging, even for the US and NATO.

Technical challenges include but are not limited to low bandwidth of early warning radars, leading to discrimination problems against countermeasures and decoys, limited time for interception, need for continuous coverage, costs and lack of realistic operational conditions for flight testing, and the offense-defense cost curve being in favor of offensive missiles.

Financially, each test costs approximately \$400 million and generates terabytes of data to be analyzed, leading to one test on average per year.<sup>88</sup> In adjusted terms, the U.S. appropriations since 1996 on missile defense add up to \$274 billion.<sup>89</sup> Since 2006, 150 to 250 million Euros (approximately \$321 million) have been spent on theater missile defense, and additional 850 million euros will be needed to expand the system in the next decade.<sup>90</sup> European allies plan to contribute more than \$1 billion to develop the missile shield.<sup>91</sup>

Finally, BMD has strategic implications on Turkey's political relationships with its neighbors. As seen in EPAA's impact on Russian and Chinese threat perceptions, an increased BMD capability is likely to

trigger political reaction from countries such as Russia and Iran. Turkish BMD capability could also lead to missile and countermeasures proliferation in the region in the shorter range.

### **The U.S. Role in Turkey's Air and Missile Defense**

While the United States is working toward a region-wide ballistic missile defense (BMD) capability extending from Europe to the Persian Gulf, one of its key allies, Turkey, is questioning its role in the EPAA architecture and pursuing national air and missile defense. At the heart of the disagreements between the United States and Turkey are Turkey's historic concerns about the U.S. commitment to Turkish security, given political disagreements and divergences of security interests, as well as the "bureaucratic red tape" leading to significant delays in defense cooperation agreements.

In August 2015, the German and U.S. governments announced that the Patriot batteries and soldiers deployed in Turkey would not be renewed by the end of their mandate in 2016.<sup>92</sup> Meanwhile Spain continues to provide a BMD capability with a PAC-2 unit consisting of six launchers of four missiles near the Adana airport. The joint Turkish-U.S. statement underlined the U.S. commitment to support Turkish air and missile defense, and the need for "critical modernization upgrades" to the Patriot assets, prepared to return "within one week if needed."<sup>93</sup>

The U.S. withdrawal of the Patriot batteries deployed at the Gaziantep 5<sup>th</sup> Armored Brigade Command began in early October 2015.<sup>94</sup> In order to prove their commitment to military coordination against the instability in the Middle East and increased Russian military buildup in the region, the U.S. and Turkish Naval Forces held a joint training exercise called the "Eastern Mediterranean Sea Exercise" in November 2015, including the BMD-equipped USS Donald Cook, submarines, surface and air defense units.<sup>95</sup> In addition, the U.S. Defense Security Cooperation Agency (DSCA) approved a \$70 million sale of Joint Direct Attack Munitions (JDAM) to Turkey to be used on guidance kits and hard target penetrator warheads.<sup>96</sup>

Aiming to strengthen the defense of Turkey's airspace against non-NATO forces, in November 2015, the US deployed six F-15C air-to-air combat aircraft to Incirlik Air Base to join other U.S. aerial assets, including A-10 attack aircraft deployed at the base to fight against ISIS.<sup>97</sup> While these deployments were temporary and were withdrawn in December 2015, the U.S. intention is to demonstrate to Turkish officials that their requests for air-to-air support can be fulfilled on short notice.

Given the evolution of the conflicts in Syria and problematic relations with Russia, Turkey's demands for U.S. security guarantees have become broader than missile defense and the EPAA architecture. One of the main points of contention between Turkish and American officials is barriers to defense exports such as classification of sensitive materials and technology, delays in licensing, and controlling commercial components as military items. Turkish officials argue that these difficulties function as an "embargo," and lead to expensive and low-performing products.<sup>98</sup>

U.S. defense officials argue that there is an interagency process to develop a more flexible licensing mechanism for strategic trade authorization of close allies.<sup>99</sup> They add that it is the U.S. strategic interest to reduce the complexities and impediments to sharing technology with Turkey, as its defense sector is growing and becoming more sophisticated.<sup>100</sup> However, the Turkish defense authorities find this approach unconvincing due to the administrative delays that have a detrimental impact on Turkish security.<sup>101</sup> Hence, a major issue to be considered in future rounds of strategic dialogue is how U.S. allies such as Turkey perceive missile defense as an instrument in the larger strategic relationship and could be given security reassurances in alternative terms tailor-made to their security needs.

## **Consequences of a Reduced U.S. Role on NATO Missile Defense**

A reduced U.S. role on NATO missile defense is likely to trigger Turkey's historical concerns with respect to reliance on NATO guarantees, due to the technical and political implications of such a decision. Without U.S. platforms, early warning radars and Aegis ships in particular, neither Turkey nor its European allies are likely to succeed in the integration of layered BMD systems and proper testing. These countries would not be able to carry the technological and financial burden of EPAA without U.S. support.

In terms of the political relationship, a U.S. reduction in support for European missile defense would deteriorate the already stressed Turkey-US relations as a signal of abandonment. In such a scenario, Turkish authorities might go back to exploring non-NATO options for stopgap and technology transfer, which would have a detrimental impact on the U.S.-Turkish strategic partnership and Turkey's commitment to NATO.

## **Conclusion**

The national air and missile defense debate in Turkey reflects a larger independence and military modernization trend. The "equal partner" principle—that Turkey should utilize its national capacities and be a partner, not only a market for international defense projects—is unequivocally reflected on the guiding principles for national air and missile defense procurement. However, given the technical differences between low- and medium-altitude air defense systems and long-range ballistic missile defense systems, it is a technological leap for the Turkish defense industry. Since Turkey is years away from achieving indigenous capability, it should continue to rely on NATO force generation as needed and maintain a coherent NATO strategy that involves missile defense, instead of independence from the Alliance.

As seen by the progression of the missile defense deal with China, sudden deterioration of relations with Russia, and continued lack of progress in Russia-NATO relations, it is clear that Turkey's resources and current capabilities are inadequate to address its security concerns outside a NATO architecture. In making future procurement decisions, Turkish decision makers should carefully consider not only the financial and technical limitations of missile defense, but also the political implications, to maintain interoperability with NATO. By doing so, Turkey benefits from NATO information sharing, early warning and tracking data from radars, and intelligence. NATO pays for the costs of installing, operating, and maintaining expensive systems. Turkey benefits from layered NATO platforms, i.e. Aegis ships in the Mediterranean and the Black Sea, Aegis Ashore, THAAD if needed, PAC-3, and interoperability with the U.S. C2BMC (command and control, battle management, and communications system) and Geosynchronous Space Situational Awareness Program (GSSAP).

While the future of the EPAA architecture remains to be seen following the 2016 Warsaw Summit and the new U.S. presidency, considering missile defense as a component of NATO deterrence under U.S. guarantees is a less risky decision for Turkish policymakers than investing in disconnected, ineffective platforms of their own.

## **Indian Ballistic Missile Defense and Regional Security**

**By Debak Das**

### **Introduction**

India's interest in a Ballistic Missile Defense (BMD) system has primarily been a product of its geopolitical environment. Sharing large borders (and concomitant border disputes) with two nuclear neighbors, India's pursuit of nuclear weapons, ballistic missiles, and now ballistic missile defenses have all had arguably strong security related motivations. That India now sees itself as a strategic global player with critical stakes to defend in the region adds to this calculus. In 2012, then Defence Research and Development Organisation (DRDO) chief V.K Saraswat announced that an Indian BMD system was ready for induction in two cities—New Delhi and Mumbai. While this ended up not taking place, it signaled that the Indian pursuit of missile defense had advanced substantially and might critically affect the stability dynamics of Southern Asia.

This essay shall proceed to examine the threats that the Indian BMD system is designed to address, particularly the threats that India perceives from Pakistan and China. I will then look at the state-of-play of missile defense in India, along with a background of the program and its inception. This essay will also take a closer look at the implications of BMD for the Indian nuclear doctrine, as well as for strategic stability in the region. I will then turn to the current and future role of the U.S. in the missile defense architecture in the region. Finally, I discuss what a regional missile defense system in South Asia might potentially look like, and whether it is feasible.

### **Security Threats to the Subcontinent**

The Indian BMD program is primary aimed at Pakistan and China. As a country that is geopolitically located between two nuclear adversaries that work in close strategic cooperation with each other, the strategic imperative of the development of missile defense in India is unmistakable. Michael Krepon argues that there is a nuclear triangle in South Asia.<sup>102</sup> This, he argues, is a more sticky relationship to maneuver than the traditional adversarial nuclear dyad. For India, in the middle of the triad, it is a difficult balance to maintain, with Pakistan lowering the threshold of nuclear use on the one hand and China modernizing its nuclear forces on the other.

The nature of the threat that India perceives from Pakistan is two-tiered. In the first tier lies the state itself. In recent years, Pakistan's burgeoning missile development has led to the advancement of a number of capabilities. As Figure 1 below illustrates, the Pakistani arsenal encompasses a variety of nuclear-capable missiles that range from short-range ballistic missiles (SRBMs), to cruise missiles (both ground-launched and air-launched), and a number of medium-range ballistic missiles (MRBM). As a consequence of these varied ranges and deployment capabilities, Pakistan's military has the capability of targeting any place on the Indian mainland. The development of the new Shaheen-III missile with a range of 2,750 kilometers is meant to take Pakistan's capabilities beyond the Indian mainland and target the Andaman and Nicobar islands in the Bay of Bengal. This would allow Pakistan's missiles to reach the Indian military's tri-services theater command in Port Blair, thus enabling a strike capability (first or second) against any Indian assets that may be based in the region.<sup>103</sup>

**Fig.1 Pakistan’s Missile Forces (2016)**

Missile	Alternative Name	Type	Range	Payload	Nuclear Capable
Hatf-1		SRBM	70-100 km	500 kg	Yes
Hatf-2	Abdali	SRBM	180-200 km	250-450 kg	Yes
Hatf-3	Ghaznavi	SRBM	290-320 km	700 kg	Yes
Hatf-4	Shaheen-1	SRBM	750 km	700 kg	Yes
Hatf-5	Ghauri-1	MRBM	1300 km	500 kg	Yes
Hatf-5	Ghauri-3	IRBM	3000-3500 km	N/A	N/A
Hatf-5A	Ghauri-2	MRBM	1500-1800 km	700 kg	Yes
Hatf-6	Shaheen-2	MRBM	2500 km	700 kg	Yes
Hatf-7	Babur	Cruise Missile	750 km	450-500 kg	Yes
Hatf-8	Ra’ad	ALCM	350 km	450-500 kg	Yes
Hatf-9	Nasr	Surface to Surface multitube ballistic missile	60 km	100-150 kg	Yes
Shaheen-III		MRBM	2750 km		Yes

The main threat to India, however, from a strategic standpoint has been Pakistan’s development (first tested in 2011) of the Hatf-IX Nasr missile, which is capable of delivering tactical nuclear weapons up to a range of 60 kilometers. For many Indian analysts, the development of this missile represents a lowering of the threshold of nuclear use.<sup>104</sup> Given Pakistan’s current “no no first use” policy, this weapon system signals a potential shift to a first use policy, as most battlefield nuclear weapons tend to be associated with such a policy. It is important to note that for Pakistan this weapon system is claimed to provide “full spectrum deterrence,” a term which blurs the steps of the escalation ladder between conventional and nuclear.

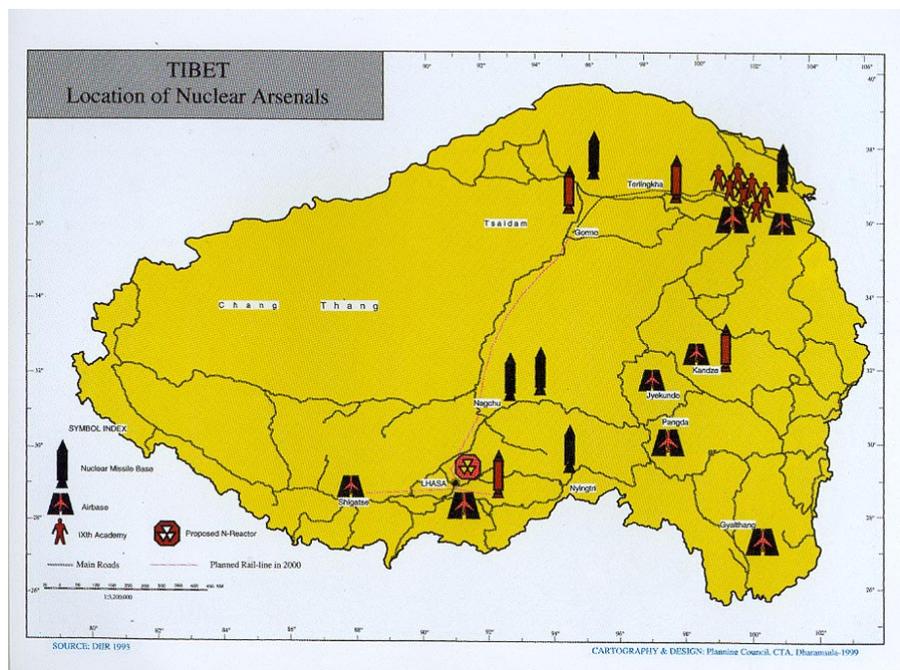
The second-tier of threats emanating from Pakistan come from non-state actors. These threats are primarily unrelated to missile defense needs, given the lack of technical sophistication of these actors. However, there is a strong fear that if non-state actors come to take control of some part of Pakistan’s missile arsenal, a BMD system would be very useful indeed. The attack anticipated in such a scenario would not be a full blown nuclear attack, but a limited attack with one or two missiles, potentially armed with nuclear weapons, being launched towards India. The small number of incoming missiles would improve the likelihood of them being intercepted by the Indian BMD system. While this is a

low-probability but very high-consequence event, in all fairness, given that Pakistan claims that its nuclear warheads are de-mated from the delivery vehicles, this would be an unlikely scenario.

It is unclear, however, if, during a crisis, the warhead and the missile would be de-mated. Nagappa et al. argue that the Hatf-IX Nasr poses a high risk to India because the deployment of tactical nuclear weapons during a conflict necessitates the pre-delegation of authority to battlefield commanders.<sup>105</sup> This is primarily because of the low time frame in which the battlefield commanders will have to operate. Given that these missiles are multi-tube rockets, it is likely that the warhead would be mated with the delivery vehicles. Crisis decisions taken by battlefield commanders at this stage could be motivated by the fear of loss of weapons (owing to close range), and the stress of misinformation, or failed authoritative communication capabilities.<sup>106</sup> The other fear in such a scenario is unauthorized use: a rogue commander acting in defiance of the state's directions and using the weapons at his disposal. This is a realistic fear because of the rise in the numbers and strength of radical elements in Pakistan,<sup>107</sup> and the possibility of Jihadist infiltration in the Pakistani army.

On the Chinese front, the deployment of Chinese missiles in Tibet is particularly threatening to India. China's 53<sup>rd</sup> missile base at Kunming (Yunnan province) and its 56<sup>th</sup> missile base in Xining (Qinghai province) can both target India given that they are armed with the Dong Feng-4 (ICBM), the DF-3A (MRBM) and/or the DF-21 (MRBM).<sup>108</sup> The close range of the Chinese missiles mean that the flight times of these missiles would be about 10-15 minutes. Other Chinese capabilities that pose a threat to India are the former's cruise missiles. The Seersucker, the Silkworm, the DH-10 (ground launched), the CJ-10, C-101, and others are all missiles that pose a credible aerial threat to India.<sup>109</sup> It must be mentioned in this regard that the presence of a Chinese No First Use (NFU) policy means that there is no real threat of a sneak attack by the Second Artillery.<sup>110</sup> The Chinese NFU coupled with the Indian NFU means that a nuclear exchange, either counter-value or counter-force, is highly unlikely. This is, of course, contingent upon both parties sticking to their stated nuclear doctrines during a serious crisis or if an actual conflict has begun.

**Fig. 2: Location of Chinese Nuclear Arsenal in Tibet<sup>111</sup>**



### The Indian BMD System: State of Play

The Indian pursuit of BMD began in the early 1990s with the confirmation of Pakistani acquisition of short- and medium-range ballistic missiles (M-9 and M-11) from China.<sup>112</sup> It was shortly after, in 1996, that a tri-services committee of the Indian armed forces considered the feasibility of missile defense. The committee came to the conclusion that a missile defense system would be desirable but was not cost-effective. The government, however, had begun the process to acquire missile defenses by then. This was thus more of a politically motivated decision rather than a military one.<sup>113</sup>

This decision to pursue an Indian BMD system was made public shortly after George W. Bush's announcement to build a national missile defense system in May 2001. This was a particularly surprising move by the Indian government, given its history of opposing missile defense systems over the last few decades. In fact, as late as July 2000, the then Defence Minister, George Fernandes, speaking on the possibility of the United States' National Missile Defense (NMD) system, said that, "the US should give up this whole exercise as it will lead to far too many problems than we can visualize now."<sup>114</sup> He was concerned that the American NMD system would dismantle the precarious global nuclear balance and destabilize the norm of Mutually Assured Destruction (MAD). In 2001, however, in the aftermath of President Bush's speech, India stated that it welcomed the process of moving away from "hair-trigger alerts associated with prevailing nuclear orthodoxies." It went further to state that there was a "strategic and technological inevitability in stepping away from a world that is held hostage by the doctrine of MAD to a cooperative, defensive transition that is underpinned by further cuts and a de-alert of nuclear forces..."<sup>115</sup>

**Fig. 3: Important milestones related to Indian BMD capability**

Year	Event
1983	Integrated Guided Missile Development Programme (IGMDP) launched under DRDO
1985	Surface-to-Air missile Trishul tested. The missile had a range of 9 km with a payload capacity of 5.5 kg
1988	First nuclear capable SRBM Prithvi-I is tested. The missile had a range of 150 m and a payload capacity of 1000 kg
1990	Surface-to-Air missile Akash tested. The missile had a range of 25 km with a payload capacity of 55 kg
1996	Tri-services committee considers feasibility of acquiring missile defense system
1997	First successful test of Indian BMD system
2001	Cruise Missile BrahMos is jointly developed by India and Russia is tested. The missile had a range of 290 km with a payload capacity of 200-300 kg
2012	DRDO chief announces that Indian BMD ready for deployment over Delhi and Mumbai
2013	Phase-I of Indian BMD (range 2000 km) complete. Phase II (range 5000 km begins)

The possibility of an NMD system in India similar to the American system was, and is, unlikely. According to an estimate by Dean Wilkening, the placement of a sophisticated BMD architecture in the country would require quite a tall order.<sup>116</sup> A modest capacity to guard against Pakistan would require a system in place which would have the equivalent of 50 THAAD interceptors, 20 SM-3 Block II interceptors, and two Green Pine radars. This would cost at least two billion U.S. Dollars. To defend against the Chinese missile threat, meanwhile, this cost would double. The system aimed at China would also require 50 THAAD interceptors, 100 SM-3 Block II interceptors, one PAVE PAWS radar, and one European Mid-Course Radar (EMR). The ancillary command and control systems would also have to be modified along with setting this up.<sup>117</sup>

The indigenous development of the Indian BMD system started with enquiries as to whether the surface-to-surface Prithvi missile could be intercepted by the Akash missile (surface to air). It was decided that the Akash would not do as an interceptor, and hence the Prithvi would have to be modified to be an interceptor.<sup>118</sup> The Indian Ministry of Defence's DRDO, which successfully completed the Integrated Guided Missile Development Programme (IGMDP), under which most of India's ballistic missiles were built, was tasked with the responsibility of spearheading BMD development.

The BMD capability being developed by the DRDO is a two-layered defense system. The first layer lies in the intercepting capacity of the Prithvi Air Defence (PAD) interceptor missile at the exoatmospheric level. The second layer lies in the Advanced Air Defence (AAD) interceptor at the endoatmospheric level. Both the layers seek to engage the incoming ballistic missiles in their terminal phase.

The Indian BMD development program has been conceptualized in two phases. In Phase I, the program has sought to develop the capability of intercepting missiles which are launched within a range of 2,000 km of the target. In Phase II, the DRDO shall look to increase the range of this BMD capability to being able to track and intercept missiles that are launched within 5,000 km of the target. This phase is meant to be similar to the THAAD (Terminal High Altitude Area Defense) system of the United States.<sup>119</sup> The DRDO has claimed in the past that the missile defense capabilities that its systems possess are 20-30 percent more capable than the Patriot Advanced Capability-3 (PAC-3) system.<sup>120</sup> It is important to note that (for the time being at least) BMD deployment in India is planned to be ground-based.

Once it is ready for deployment however, there is a debate on whether it should be Air Defense units of the Indian Army which should be handling BMD assets, or whether it should be the Indian Air Force doing so, given their mandate to defend the skies. While there is some inter-service rivalry that this will stoke, the Navy, for the time being, remains out of this. Its missile defense needs are being met with the induction of the Barak-8 air defense system, which India has been co-developing with Israel. The deployment of this system would considerably bolster the Indian Navy's air defense capabilities.<sup>121</sup>

An interesting thing to note about the Indian BMD program is that even though it is primarily an indigenous program, help for certain aspects of the system has been forthcoming from other countries. For example, the development of the Swordfish Long Range Tracking Radar (LRTR) received help from Israel. The Swordfish is similar to Israel's Green Pine radar. The DRDO has received other help in the form of fire-control radars from France, and seekers from Russia. India and France have also set up a defense joint venture company, BEL-Thales Systems Limited (BTSL,) between the India-based

Bharat Electronics limited (BEL) and Thales group based in France. This company is going to be producing the PHAROS multi-target tracking radar for gun and missile systems.<sup>122</sup>

Apart from its indigenous BMD program, India has also shown considerable interest in acquiring missile defense systems from Russia, in particular the Russian S-400 Triumph system, which can be used as both an anti-aircraft and an anti-ballistic missile system.<sup>123</sup> This system is touted to be capable of intercepting most medium- and short-range ballistic missiles, as well as cruise missiles. It has also been reported that the system can engage up to 36 targets simultaneously within a range of 400 km.<sup>124</sup> Presumably, the primary target for this system is Pakistan. The Indian Defence Acquisition Council (DAC) approved the order for five regimental units of the S-400 in December of 2015 at a cost of about \$5 billion, and is expected to receive these systems by 2018. Interestingly, China has bought about 5 of these systems as well.<sup>125</sup> This system is also being used in Syria by Russia to keep its planes safe in Syrian airspace.<sup>126</sup>

### **Doctrinal Implications and Regional Strategic Stability**

While this paper has already discussed the threat perceptions from Pakistan and China that Indian BMD seeks to address, it has not yet dealt with the implications of the development of this system. Beyond the technical issues, there are some other questions that the development of the Indian BMD system poses. Broadly speaking, these can be classified into doctrinal issues, and strategic stability in South Asia.

In terms of Indian nuclear doctrine, BMD poses some important questions. The doctrine that governs India's strategic forces is based on and around the basic principle of NFU and massive retaliation.<sup>127</sup> It does not mention BMD at all. In fact, to date there is no strategic doctrine or document that India has published that squares the Indian BMD system with its nuclear doctrine.

BMD by itself is a weapon system that accentuates the first strike capability of a nuclear weapons state. For instance, if India were to carry out a massive disarming strike on Pakistan's strategic forces, and the latter in response launched towards India, India could intercept Pakistan's surviving missiles and thus avoid unacceptable retaliation. The likelihood of Indian success in this would be accentuated by the potentially limited number and capacity of Pakistan's second-strike options. Though this scenario may not necessarily be envisaged by Indian policy-makers when considering the development of BMD, it has to be taken into consideration. The possibility of this scenario along with the Indian development of MIRVed missiles<sup>128</sup> and hypersonic stealth cruise missiles all point toward bolstering a first-strike capability. Given the circumstances, a doctrinal review with regard to these developments may well be in order. The underlying logic here is adroitly summed up by Nixon's statement, "If you have the shield, it is easier to use the sword."

The problem here ceases to be simply a question of the doctrinal compatibility of India's nuclear doctrine and its BMD aspirations, once the regional implications of the latter are considered. It is no surprise that the Indian pursuit of a BMD system raised a few red flags in Pakistan. While the development of the Hatf-IX Nasr was a response to the Indian Cold Start doctrine, it led to the miniaturization of Pakistan's nuclear warheads which can now be easily fitted on to Pakistani cruise missiles.<sup>129</sup> This would lead to a proliferation of nuclear-capable missiles in Pakistan aimed directly at countering Indian BMD development.<sup>130</sup> From a strategic stability point of view, this is an extremely problematic issue.

Whatever strategic advantage that India thus gains from the development and possession of active missile defenses gets undercut by the strategic ambiguity that it maintains regarding the strategic utility

and place of the BMD capability in India's nuclear doctrine. As regards China, in this equation, there is no evidence that it is flummoxed by Indian BMD capabilities. However, China's development of anti-BMD capabilities aimed at countering the United States' missile defense resources would definitely be useful in countering Indian missile defenses too.

### **U.S. Role in Indian BMD**

The United States has thus far not had an important role to play in the setting up of the missile defense architecture in South Asia. This is not to say that it has not had a hand in influencing it. The U.S. withdrawal from the 1972 Anti-Ballistic Missile Treaty was the facilitating factor for the proliferation of BMD in other parts of the world. For India, this moment marked a watershed, when it could break with its history of opposing missile defense and come out in support of U.S. plans citing it to be strategically and technically inevitable, thus gaining legitimacy for its own BMD program.<sup>131</sup>

In 2002-04, the U.S. vetoed the sale of the Arrow 2 system and its missiles by Israel to India.<sup>132</sup> As a co-developer of the anti-ballistic missile system, it argued that the sale would be in contravention of the rules of the Missile Technology Control Regime (MTCR).<sup>133</sup> There were also some reports at the time about Pakistani concern about the sale of the Arrow system to India which may have led to U.S. reticence to go ahead with the deal.<sup>134</sup>

India and the U.S. have come a long way since then, especially with the conclusion of the India-United States Civil Nuclear Agreement concluded in 2008. Beyond the sale of nuclear reactors and a new defense partnership, the U.S. has also been advocating Indian membership into regimes like the Nuclear Suppliers Group (NSG) and the MTCR. The improvement in this relationship and even the still not completed U.S. pivot to Asia mean that the U.S. now has a greater interest in cooperating with India than before. Strained relations between the U.S. and Pakistan also means that the former is in need of a reliable partner in the South Asian region—a role that India is quite willing to play.

The U.S. has been keen on a partnership with India on missile defense in the post-2008 era. The issue has been discussed as a part of the Next Steps in Strategic Partnership (NSSP) and the Joint Technical Group of the Indo-US Defense Policy Group.<sup>135</sup> Despite U.S. willingness to sell the Patriot PAC-3, India has been reluctant to buy the full system, opting instead to focus on the development of its own BMD system. This has opened up the possibility of collaboration between the two countries on C3 components and radars.<sup>136</sup> From an Indian standpoint, this would also ensure decreased dependence on imports for its defense needs, especially with its new mantra of "Make in India" in the defense sector (among others). The U.S.-India Defense Technology and Trade Initiative (DTTI), which is a 10 year defense agreement signed in 2015, is bound to have important implications for cooperation in missile defense technology as well.<sup>137</sup>

### **Lessons from the EPAA and Possibilities of Cooperation**

The U.S. missile defense architecture in Europe certainly brings up the question of whether such a system is possible in other regions of the world. East Asia and South Asia would definitely be high on the list of likely regions which would benefit from such a structure, as well as be geopolitically instrumental in bolstering the strategic needs of the United States vis-à-vis China.

What would a regional missile defense system in South Asia look like? It could potentially involve sea-based Aegis-equipped ships deployed in the Bay of Bengal and the Arabian Sea. This could be complemented by Aegis Ashore systems located strategically on the Indian subcontinent. However, if one of the lessons of the EPAA was that it is difficult to get allies to do much, it should be noted that it is even more difficult to get countries that are not allies to do anything at all. There is also the

economic question here. How much would it cost for India to buy and adopt into its defense posture all the necessary equipment for such a BMD system? The infrastructural costs would be very high. On the other hand, would the U.S. be willing to sell the Aegis system at all, and what would this mean for the indigenous development of the Indian BMD?

An Aegis-centric regional missile defense architecture in South Asia would not be in India's interests at all. First, given China's difficult relationship with India, it would make little sense for India to ally with the U.S. on missile defense and commit geopolitical hara-kiri. Especially given China and Pakistan's close relationship, there is no strategic interest for India to try and alter the status-quo in the region.

On the other hand, as is evident by Russia's sale of the S-400 system to India, the Indo-Russian defense relationship remains strong, despite being challenged in terms of gross turnover by the U.S. and Israel. Given the Russian misgivings about the EPAA, it would be unlikely that they would welcome a similar system in South Asia. Alienating the Russians on account of adopting a missile defense system that has a fairly questionable success rate<sup>138</sup> would also be inadvisable, from an Indian standpoint. This is especially true given the current Indo-Russian cooperation on a number of critical technologies beyond missile defense, especially in the realm of cruise missiles (BrahMos), and other strategic technologies. It must also be noted that India's DRDO considers its missile defense systems to be superior to that of the U.S.<sup>139</sup> Regardless, it has been pointed out by them that India's strategic needs could not be fulfilled by the American missile defense systems.

In the long run, far beyond the issue of missile defense itself, the question for India really would come down to if it would choose to ally with the U.S. and be a strategic partner in the U.S. pivot towards Asia. India would not have been averse to such a position if it were not in direct conflict with its other strategic partnerships and geopolitical needs. Smaller steps like the possibility of Indian data sharing from its radar and satellite systems which could be beneficial for U.S. missile defense interests could be pursued. In the absence of greater political and technical payoffs from the United States, Indian strategic recalibration towards the United States would be slow and measured.

India plans to continue its development of ballistic missile defenses with a special emphasis on indigenous technologies and production. Changes in the EPAA program or other missile defense programs would not affect this endeavor, especially given the dual imperative of external security threats and internal techno-scientific bureaucratic momentum. The "Make in India" project which is tied with defense production and cooperation will be crucial in facilitating further U.S. involvement in the Indian defense sector.<sup>140</sup> Future Indo-U.S. defense partnerships are thus more likely to be in the form of co-development and joint ventures. This is a field within which Russia, Israel, and France have already taken a lead. It is thus in the U.S. interest to try and involve itself in the region through greater technological cooperation and deeper defense partnerships with India—both of which have not been forthcoming from the U.S. over the years, but is slowly but surely starting to change.

## **Conclusion**

The Indian BMD system development is likely to continue unabated. The strategic drivers of this weapons development are primarily external, i.e., it is aimed at Pakistan and China. There is also an internal push from the DRDO to push BMD as its flagship project, following the end of the IGMDF.

The development of Indian BMD, however, has important implications for the subcontinent. Pakistan's development of tactical nuclear weapons has come as a response to the Indian BMD development. With India now developing MIRV capabilities as well, there is bound to be a strong reaction from

Pakistan. Feroze Khan and Mansoor Ahmed argue that Pakistan is likely to try and match India in its MIRV capabilities, as well as seek to bolster its space-based intelligence, surveillance, and reconnaissance capabilities with help of China.<sup>141</sup> This security dilemma is a major obstacle that India faces as it advances its missile modernization and ballistic missile defense programs.

In the next couple of decades, in the world of missile defense, South Asia is bound to be a major player. India will have Phase I (up to 2,000 km) and Phase II (up to 5,000 km) of its BMD program ready. While India is unlikely to buy Aegis systems from the U.S., it is likely that technical cooperation will increase between the two states. In fact, given Chinese and Pakistani missile developments, Indian cooperation with France and Israel on missile defense is bound to increase as well.

In particular, with France and Israel, India will be working on developing Long Range Tracking Radars and Sensors. With Indian entry into the MTCR I expect greater cooperation between India and other MTCR states on missile technology that will help its Advanced Air Defence interceptor (also being called the Ashvin)<sup>142</sup> which has not seen a lot of successes in recent years.

India's bid to become a strategic partner of the U.S.,<sup>143</sup> though stalled for the duration of the Obama administration, means that it will be competing for a strategic space in the U.S. alliance network which is currently held by Japan and South Korea. Given the U.S. support for Indian membership into multilateral regimes like the NSG, MTCR, the Australia Group, and the Wassenaar Arrangement, this is a space that U.S. is not averse to India occupying. However, given Indian involvement in other multilateral regimes like BRICS and the Shanghai Cooperation Organization, it is likely that India remains in a different strategic space than Japan or South Korea in its dealings with the U.S. Furthermore, the likelihood of defense cooperation on critical technologies between India, Japan, and South Korea in the next decade is bound to increase exponentially. In fact, the Indian opening up of foreign direct investment in the defense sector to a hundred percent means that instead of India vying for U.S. attention for these critical partnerships in the future, the U.S. will be vying with considerable competition from Russia, Israel, France, and Japan, as it tries to build a strong alliance with India with an eye towards checking China's rise.

## **GCC Missile Defense: Obstacles on the Road to Integration**

**By Ari Kattan**

### **Timeline**

**1980 – 1988:** Ballistic missiles widely used by Iraq and Iran during their eight-year war. Ballistic missiles used by Iraq against Iran's capital, Tehran, were extremely effective and contributed to Iran's decision to accept a ceasefire.

**1981:** Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Bahrain, and Oman form the Gulf Cooperation Council (GCC) to address growing regional instability.

**1991:** Iraq again uses ballistic missiles, this time against Saudi Arabia and Israel. Little damage was caused, but their use by Saddam Hussein demonstrated the political utility of ballistic missiles.

**2006:** Hezbollah fires 4,000 rockets into northern Israel, again demonstrating the political value of even short-range and unguided rocket and missile strikes.

**2006:** The George W. Bush administration launches the Gulf Security Dialogue to strengthen U.S.-GCC defense cooperation. Missile defense is an important item on the agenda.

**2010:** The U.S. Ballistic Missile Defense Review shifts U.S. policy toward a greater emphasis on regional defense systems, including in the Persian Gulf.

**2011:** The United Arab Emirates becomes the first foreign customer of the Terminal High-Altitude Area Defense missile defense system.

**2012:** The Barack Obama administration established the Gulf Strategic Cooperation Forum to enhance security cooperation. Missile defense issues have featured prominently in Strategic Cooperation Forum discussions.

**2013:** The P5+1 and Iran agree to the Joint Plan of Action, which consisted of a short-term freeze on Iran's nuclear program in exchange for sanctions relief to provide both parties with space to negotiate a final agreement.

**2015:** The P5+1 sign the Joint Comprehensive Plan of Action, which provides Iran with sanctions relief in exchange for limits on its nuclear program. Iran's ballistic missile program and state sponsorship of terrorism were not dealt with sufficiently according to many of Iran's Arab neighbors.

**2016:** Iran conducts ballistic missile tests after the conclusion of the Joint Comprehensive Plan of Action, signaling that it will continue to develop and improve upon its ballistic missile arsenal.

### **Executive Summary**

The U.S.-led effort to establish a missile defense architecture for the Persian Gulf has been slower and less successful than the United States had hoped, mainly due to an unwillingness and inability to cooperate among the Gulf Security Council nations whose nations the system is designed to defend. Given, inter alia, Iran's growing ballistic missile arsenal and unease with the Joint Comprehensive Plan of Action in Gulf Arab capitals, security reassurances to the Gulf monarchies will become simultaneously more important and more difficult to make credible. In this environment, missile defense will be an important, but by no means sufficient, mechanism for assuring the Arab Gulf states.

Cooperation on missile defense with the Gulf monarchies should continue, but with a realistic understanding of what is possible given the current chaos and political dynamics of the region.

## **Introduction**

Under President Barack Obama, the United States has shifted its missile defense focus from protection of the U.S. homeland to protection of forward-deployed U.S. forces and allies from regional ballistic missile threats.<sup>144</sup> This strategy advocates and requires cooperation from allies; without assistance from regional partners, any ballistic missile defense (BMD) assets deployed to the region will amount to little more than point defense for small targets. The expectation that regional allies would move quickly to integrate their various BMD assets, share information, and develop a joint doctrine has not materialized, at least not with the speed that the United States had hoped. Even in Europe, where the missile defense architecture is being set up through NATO, the project has faced problems and limitations. However, the European Phased Adaptive Approach (EPAA), as it is called, now seems on target to meet the conclusion of its third phase, based on Aegis-equipped ships and Aegis Ashore deployments in Romania and Poland, by the end of 2020.

In contrast, the Gulf Cooperation Council (GCC) has been procuring advanced BMD systems and talking about integration of a BMD architecture for the Persian Gulf for years, but little progress has been made towards an architecture capable of deterring or defeating the threat posed by Iran's ballistic missile arsenal.

It is unclear if the Joint Comprehensive Plan of Action (JCPOA),<sup>145</sup> the agreement signed by the P5+1 and Iran that limits the scope of Iran's nuclear program in exchange for sanctions relief, will have a noticeable effect on the GCC's willingness or ability to take the steps necessary to create an effective BMD architecture. The GCC states—Saudi Arabia, Kuwait, Qatar, Bahrain, the United Arab Emirates, and Oman—have publicly supported the deal but harbor varying degrees of suspicion about the agreement, Iran's intent to abide by it, and what it may mean for regional order.

This paper addresses the following questions: (1) What threats are ballistic missile defense in the Persian Gulf designed to address, and how might these threats change or evolve in the aftermath of the JCPOA; (2) What is currently being done to create a BMD architecture in the Persian Gulf; (3) What obstacles stand in the GCC's way; (4) What lessons can be learned from the BMD experience in Europe; (5) What role should the United States play in helping the GCC with its missile defense project; and (6) What would happen if the United States cut back on its commitment to provide BMD capabilities to the GCC? The answers to these questions will have implications for the Persian Gulf's security and the relationship between the United States and its Gulf Arab allies.

## **The Iranian Missile Threat and Regional Dynamics Before and After the JCPOA**

Ballistic missiles and rockets have a long history in the Middle East. The GCC states first witnessed their use during the Iran-Iraq War, which raged from 1980 to 1988. Iraq and Iran fired ballistic missiles at each other's cities, sowing fear and causing panic, especially on the Iranian side.<sup>146</sup> Towards the end of the war in 1988, Iraq fired close to 200 ballistic missiles at Iran, killing some 2,000 people.<sup>147</sup> These devastating strikes contributed to Iran's decision to accept a ceasefire, demonstrating the political utility of ballistic missiles when employed against civilian targets. Iraq again employed ballistic missiles during the Persian Gulf War in 1991 when it launched dozens of Scud missiles at Saudi Arabia and Israel. While Iraq ultimately failed in its attempt to goad Israel into the war and thus fragment the U.S.-led coalition that included Arab enemies of Israel, it came perilously close. Only the

reassuring deployment of Patriot missile defenses to Israel, along with strong diplomatic pressure, kept Israel out of the war. The effectiveness of Iraq's missile arsenal did not go unnoticed in GCC capitals.

Iraq's use of ballistic missiles received the lion's share of attention in the Arab Gulf from the 1980s to the early 2000s, but during this time Iran also embarked on a large-scale ballistic missile development program. It first acquired Scud missiles from Libya in 1985, and then began a ballistic missile development program with assistance from North Korea.<sup>148</sup> Iran now possesses the largest and most active ballistic missile program in the Middle East, with both short- and long-range missiles capable of hitting targets throughout the Gulf and even southern Europe. Exact estimates are not available, but it is believed that Iran possesses over 1,000 missiles with ranges varying from 150 km to 2,000 km.<sup>149</sup>

The effectiveness of short-range rockets and missiles was driven home during the summer of 2006, when Hezbollah, an Iranian proxy organization in Lebanon, fought a month-long war with Israel. Hezbollah fired over 4,000 short-range rockets (roughly 25 km) at Israel's home front throughout the war, and despite the Israeli military's best efforts to stop the barrages, Hezbollah was able to continue firing until a UN-imposed ceasefire was agreed to by both sides. Given the large number of rockets fired, a relatively small number of Israelis were killed—the rockets were unguided and thus unable to strike with any precision—but civilian life in Israel was paralyzed as people had to remain in their homes and bomb shelters for over a month. The inability of the Israel Defense Forces to stop the rocket fire despite its overwhelming superiority vis-à-vis Hezbollah's guerilla army constituted an embarrassment for Israel and allowed Hezbollah to portray itself as the victor.<sup>150</sup> Because Hezbollah is an organization funded, supplied, and directed by Iran, the Arab Gulf states viewed Hezbollah's effective use of short-range rockets against Israel as a strategy devised by Iran that could one day be employed against them. To counter this threat, the GCC states began to acquire U.S.-made BMD systems, and have continued purchasing them over the last decade.<sup>151</sup>

On the tactical level, these BMD assets are being procured to complicate Iran's decision-making by reducing its confidence in the effectiveness of missile raids against the Arab Gulf. If the GCC's missile defenses are reasonably effective, the narrative of Iran's powerful missile force striking the vulnerable Gulf monarchies would be turned on its head, constituting a propaganda coup for the GCC and an embarrassment for Iran. Instead, the perception would be one of a militarily-inferior Iran attempting to attack the more technologically-advanced GCC and failing. Again, an example of this can be seen by looking to Israel, where its Iron Dome anti-rocket system became a source of pride for Israelis during recent rounds of fighting against Hamas in the Gaza Strip.<sup>152</sup> The possibility that Iran's missile strategy might not have the intended effect if it were employed can help reduce the coercion value of Iran's arsenal.

With tensions between Iran and Saudi Arabia flaring as of late, the possibility of a military confrontation between the two states cannot be ruled out. In such an event, the GCC's missile defenses might actually be called upon to intercept Iranian missiles targeting their territory. This is a daunting challenge, and from the vantage point of the GCC, it is likely to become more challenging over the coming years because of the concessions made to Iran as part of the JCPOA.

UNSCR 2231 (passed to approve the JCPOA and supersede other resolutions pertaining to Iran sanctions) states that the embargo on ballistic missiles and associated technology to Iran will be removed after eight years, and the embargo on conventional weapons will be lifted after five years.<sup>153</sup> Iranian officials have made statements asserting that its ballistic missile arsenal and development program are not intended to carry weapons of mass destruction and are thus "outside the purview or competence of the Security Council resolution and its annexes."<sup>154</sup> Such statements signal that Iran

will continue to develop the shorter-range systems that will enable them to conduct Hezbollah-style attacks against the GCC.

With conventional weapons and ballistic missile restrictions lifted in under a decade, Iran is likely to increase not just the quantity but also the quality of its missiles. Reducing the circular error probable (CEP) of its missiles and achieving a precision-strike capability will allow Iran to hold targets in the Arab Gulf at risk with a higher degree of confidence, and will reduce the effectiveness of both active and passive defensive measures.<sup>155</sup> Officials in the GCC also worry that the restrictions that still remain in place post-JCPOA will not be strictly enforced by the P5+1 out of fear that such enforcement may jeopardize Iran's compliance with its nuclear program commitments.

In addition to the military utility of intercepting Iranian missiles, BMD procurement by the GCC is also designed to address a political threat: the perception of American retreat from the region and realignment towards Iran. One cannot understand the missile defense situation in the region post-JCPOA without understanding the unease in Arab Gulf capitals about their security relationship with the United States. When the Gulf monarchies assess the United States' commitment to the region, they see a country exhausted after a decade of war and occupation in Iraq and a country whose ability to intervene in the region is severely limited by domestic anti-war constraints. They also see the United States shifting its focus to the Asia-Pacific region, a policy referred to in the United States as the "pivot to Asia."<sup>156</sup> The Gulf monarchies see this loudly proclaimed shift in policy as an American "east of Suez" declaration, making U.S. guarantees to defend their security less credible. Adding to their fears of a wholesale U.S. retreat from the region was the U.S. response to the Arab Spring uprisings in 2011, particularly what the Gulf regimes viewed as the abandonment of Egypt's president and longtime U.S. ally, Hosni Mubarak. In a region of the world where a ruler's or a ruling family's hold on power is the most important security concern, the U.S. response to the Arab Spring created profound distrust and led many to question if the United States could truly be counted on to assist its authoritarian partners if their rule were endangered.

It is within this landscape of mistrust and fear that Iran's missile arsenal has grown and still grows larger and more sophisticated. Accordingly, BMD systems are procured not just to deter and potentially blunt Iranian missile strikes, but to keep the U.S. military and defense contractors integrated into the region's security architecture.<sup>157</sup> As the Arab Gulf states detected signs of American realignment away from the region, they also detected the Obama administration's shift towards regional missile defense and its enthusiasm for missile defense as a substitute for other forms of extended deterrence. Signing on to the Obama administration's regional BMD aims became a way to keep the military-to-military relationships strong. Purchasing the launchers, interceptors, and radars that comprise these BMD systems also kept U.S. industry focused on the region.<sup>158</sup> The political component to the GCC's interest in missile defense has always been significant. With the signing of the JCPOA, the GCC's interest in missile defense is likely to be strengthened on both the military and political front.

### **Current Status and Future Plans for GCC Missile Defense**

All of the GCC states have purchased or will purchase U.S.-made BMD systems (see Table 1). Some states have operated such systems for many years, and are upgrading their systems to better meet current challenges. Others are buying them for the first time. In 2013, the Obama administration allowed the GCC to purchase weapons collectively in a traditional American effort to foster cooperation and interoperability and the same arrangement the United States shares with its NATO allies—but so far they have only purchased weapons individually.<sup>159</sup> The United Arab Emirates

operates Patriot PAC-3 batteries and missiles, and Kuwait and Saudi Arabia are upgrading their PAC-2 batteries and interceptors to PAC-3.<sup>160</sup> Qatar has plans to deploy its own PAC-3 batteries as well. PAC-3, the most advanced iteration of the Patriot, is designed to defend small areas from ballistic missile attack with a hit-to-kill interceptor. For defending larger areas, the United Arab Emirates purchased the Terminal High-Altitude Area Defense (THAAD) system, and Oman, Qatar, and Saudi Arabia have all expressed interest in acquiring the system.<sup>161</sup> In addition to the BMD systems deployed by the GCC states, the United States also operates its own missile defenses in the region. The United States has two PAC-3 batteries each in Bahrain, Kuwait, Qatar, and the United Arab Emirates.<sup>162</sup> At sea, the U.S. Navy operates Aegis-equipped destroyers armed with SM-3 interceptors capable of defending against short- and intermediate-range missiles by intercepting them above the atmosphere.<sup>163</sup> All of this amounts to a substantial amount of missile defense hardware in the region.

Table 1: Missile Defense Systems in the Persian Gulf<sup>164</sup>

Country	U.S. Deployments in Gulf Countries	Deployed or Awaiting Delivery	In Acquisition or Considering
Saudi Arabia	None	PAC-2 upgrade to PAC-3	THAAD, Aegis Ashore
United Arab Emirates	PAC-3	PAC-3, THAAD	None
Qatar	PAC-3, FBX radar	None	PAC-3, THAAD
Bahrain	PAC-3	None	None
Kuwait	PAC-3	PAC-2 upgrade to PAC-3	None
Oman	None	None	THAAD
Gulf Theater	Aegis SM-3	N/A	N/A

Senior Obama administration officials, including former Secretary of State Hillary Clinton and former Secretary of Defense Chuck Hagel, have pushed for these BMD systems to be integrated together to provide a robust BMD capability in the region. For reasons described below, this has not yet happened. However, in the aftermath of the Iran negotiations, the Obama administration and the Gulf monarchies have issued public statements renewing their commitment to this objective. In a joint statement released by the White House after the U.S.-GCC Summit at Camp David in May of 2015, the parties “committed to develop a region-wide ballistic missile defense capability, including through the development of a ballistic missile early warning system.”<sup>165</sup> The United States also agreed to conduct a study of the BMD capabilities in the region and assist with the development of the early warning system. The statement also committed the parties to “undertake a senior leader tabletop exercise to examine improved regional ballistic missile defense cooperation.”<sup>166</sup> It remains to be seen if the JCPOA will lead the GCC states to purchase additional BMD equipment from the United States, or if equipment previously ordered will be expedited.

## **Obstacles on the Road to Integration**

One of the great paradoxes of the Obama administration's regional BMD strategy is that less threatened regional actors have made greater progress on BMD integration than more threatened regional actors. The EPAA, the regional missile defense architecture being implemented through NATO, is the most advanced regional system despite the fact that Iran does not yet have the ability to strike most of Europe (and the system is not designed for, nor does it have a capability against, Russia's strategic deterrent).<sup>167</sup> In contrast, Iran does have a substantial—and growing—capability to strike at targets in the GCC, yet progress towards integration within the GCC has been far slower and more complicated than in Europe. This can be explained primarily by three factors: a strong disinclination towards cooperation within the GCC; ineffective organizational structures within the GCC militaries; and bureaucratic obstacles that inhibit cooperation between the GCC and the United States.

### *Disinclination towards Cooperation within the GCC*

A full treatment of the history of the GCC, its ruling families, and its political culture is beyond the scope of this paper, and can be found elsewhere,<sup>168</sup> but a basic understanding of these issues is key to realizing why the political cooperation necessary for achieving an integrated BMD system is so difficult in the Persian Gulf. The most important facet of the region's security dynamics is the primacy of regime security. While the Arab Gulf monarchies certainly face external conventional threats—of which Iran is first and foremost—their primary security concern is their regimes' ability to stay in power, and often times the biggest threats to regime security in the Persian Gulf are not from adversary nations' military capabilities. Due to a long history of tribal rivalries, border disputes, and divergent security and economic interests, the six members of the GCC view each other with suspicion.<sup>169</sup> Fears abound about neighbors interfering in each other's internal affairs, leading to an atmosphere that makes close cooperation difficult. Fear of Saudi dominance among the smaller GCC states also precludes close cooperation—a structural issue given Saudi Arabia's much larger size, population, and global political clout. Attempts at information sharing and integrated command and control have been, and will continue to be, hampered by constant suspicions of Saudi infringement on the sovereignty of the other states, especially in light of King Salman's more activist foreign policy.

Lastly, but no less important, is the chaos and reordering of the Middle East that has been unfolding since the U.S. invasion of Iraq in 2003 and the Arab Spring uprisings that began in 2011. Different GCC states (particularly Qatar) have had and continue to have strong disagreements about how to handle the instability in Egypt and the civil war in Syria. Tensions have gotten so bad at times that three GCC states withdrew their ambassadors from Qatar over anger at Qatar's support for the Muslim Brotherhood and divergent foreign policy.<sup>170</sup> Such strong disagreements about pressing regional security issues, coupled with a history of mistrust within the GCC, make cooperation on a project as complicated and compromise-intensive as missile defense an extremely difficult endeavor, even with the threat from Iran looming ever larger.

### *Organizational Structures of the Arab Gulf Militaries*

The GCC's member states are often lumped together when in fact there are many important differences between them. However, they do share certain traits in common, including dynastic rule that relies on oil income for its budgets and to provide largesse to its citizens. Peculiarities in the development of many state and societal institutions have resulted from this form of governance, including the GCC's militaries and security services.<sup>171</sup> As stated earlier, the top priority of these governments is regime security and the ruling family's hold on power. Thus, the militaries and security services of these

monarchies are designed with “coup-proofing” in mind—the structuring of the armed forces in such a way that prevents their ability to harm or overthrow the regime.<sup>172</sup> Some such strategies for achieving this include: deliberately keeping certain units weak and unprofessional; limiting communication between units; creating multiple security and intelligence services to surveil and protect against each other; and placing regime loyalists in leadership roles. In the GCC, military leadership positions are often awarded to balance or reward different factions of the ruling family. This creates parallel military forces with unnecessary redundancy, commanded by (sometimes unqualified) members of the royal family who jealously guard their turf. Such organizational structures may prevent the military from posing an internal threat to the regime and serve as an effective vehicle for patronage, but it is not conducive to cooperation, either between units in the same military or between the GCC’s militaries.

Authoritarian states that face significant external threats, or for whom territorial expansion is integral to the regime, often avoid falling prey to the coup-proofing strategies that result in poor military performance.<sup>173</sup> Given the chaotic nature of the Middle East, the Arab Gulf states certainly face external threats, so why haven’t they adopted the model of authoritarian regimes with effective militaries? There are two possible reasons for this. First, the tribal and sectarian fault lines that run deep through the region mandate security forces that are inherently more inward-focused than might be necessary in other regions. Second, the Arab Gulf states receive protection from external threats from the United States, which has a decades-long history of providing security for the region.<sup>174</sup> Of late, the faith of the GCC states in the commitment of the United States to the region is shaky, but these militaries all developed under the protection of the American security umbrella. The legacy effects of this development will be difficult to overcome. Little has been specifically written on how the organizational structures of the Arab Gulf militaries have affected missile defense cooperation, but it is safe to say that it has played a role, perhaps a significant one, in retarding integration and interoperability across the GCC.

#### *Bureaucratic Obstacles between the United States and the GCC*

Another, although lesser, factor in the GCC’s difficulty in progressing towards an interoperable BMD system is bureaucratic obstacles with the United States. U.S.-GCC relations are close, but suffer symptoms of a patron-client alliance structure—one between a strong democratic state and a series of weak authoritarian ones. The authoritarian and regime security-oriented nature of these monarchies has limited the United States’ willingness to sell or transfer certain technologies to these countries for fear that they may be used inappropriately or they will find their way into a third party’s hands. This fear is compounded by the fact that many of the non-state actors of great concern to the United States, such as Al Qaeda and the Islamic State, have sympathizers within the GCC’s societies and militaries. Many officials in the GCC find the slow and sometimes fickle nature of U.S. equipment and technology transfer that results from these considerations—in addition to the already slow and complex export controls process—insulting and unhelpful towards building effective regional capabilities. This is an issue of contention in U.S.-GCC relations overall that has likely impacted cooperation on present missile defense plans.

#### **Lessons from the EPAA and their Salience in the Gulf**

In light of the difficulties facing missile defense in the Persian Gulf, what lessons might be gleaned from the more advanced and robust regional missile defense project in Europe, the EPAA? Obvious differences aside, there are some structural parallels between the strategic picture in Europe and in the Persian Gulf. Both NATO and the GCC are collections of states that fear a regional adversary in close proximity to their borders, and both view missile defense as a political instrument, not just or even

primarily as a military instrument. If the development of the EPAA is any indication, there are two main lessons to be learned with implications for the Arab Gulf.

First, while missile defense is a capability of great interest, it is not a substitute for other capabilities that regional allies deem essential to deterrence and their security.<sup>175</sup> Many NATO allies are growing increasingly concerned about Russia's behavior given its actions in Ukraine and its more aggressive interference of NATO airspace. Vis-à-vis Russia, the EPAA's value is in the physical presence of U.S. personnel and equipment since the interceptors do not threaten Russia's nuclear deterrent. But they also do not counter the capabilities Russia might bring to bear in any future action—hybrid or otherwise—against a NATO ally. Countries within the NATO alliance, especially those closer to Russia, are seeking more offensive weapons that would actually be capable of complicating a Russian ground invasion of their territory—something missile defense does not do and indeed cannot do in its present configuration. Missile defense is an important political demonstration of commitment, but is insufficient by itself in the face of increasing Russian hostility.

A similar paradigm exists in the Persian Gulf. Missile defenses respond to a more direct and immediate threat in the Persian Gulf than they do in Europe, but they are not a substitute for the greater diplomatic and military role the GCC states wish the United States would play in the region. As Saudi Arabia battles Houthi rebels in Yemen and remains fearful of Iran's control over Shiite militias in Iraq and elsewhere, the Arab Gulf states are most interested in U.S. diplomatic efforts to counter Iran's growing influence, as well as more advanced strike capabilities to enable greater unilateral conventional action. Selling additional BMD assets to the GCC states will not make up for the fact that they perceive U.S. diplomatic pressure on Iran to be diminishing, or the fact that strike capabilities are subject to slow and complex export regulations and concerns about Israel's qualitative military edge.<sup>176</sup>

Second, the EPAA project demonstrates how difficult BMD cooperation and integration is, even under more favorable political conditions. Different NATO allies have different perceptions of the threats posed by Russia and Iran, which makes some countries more motivated to contribute to the EPAA than others. On the BMD integration and cooperation front, NATO, despite having a long history of cooperation and higher levels of trust, has still run into difficulties. A Government Accountability Office report from 2014 highlights many of these challenges, including an incident where Patriot batteries deployed to Turkey were unable to be used for weeks due to a lack of prior planning and preparation.<sup>177</sup> Uncoordinated practices and procedures, and intelligence-sharing restrictions, created an embarrassing situation between close allies on a project that has been a main focus for the alliance. If NATO's more advanced EPAA is suffering from such cooperation difficulties, it is unlikely that the GCC states will fare better.

### **The U.S. Role in the Persian Gulf Going Forward**

In light of American interests, U.S. BMD objective in the region—encouraging integration and interoperability to create a region-wide missile defense architecture that is greater than the sum of its parts—is the correct objective. But the United States should have no illusions that this will be achieved quickly, or even at all. It is possible that the anxiety in Arab Gulf capitals caused by the JCPOA will result in a renewed and good-faith effort by the GCC states to engage in the information sharing and joint doctrine development that are necessary for BMD interoperability. But it is also possible that continued differences on regional security issues and structural deficiencies in their militaries will continue to stifle progress toward BMD interoperability, even post-JCPOA. Given this reality, the United States must temper its expectations and focus on two shorter-term objectives that will have quicker returns on both the military and political fronts.

The first focus should be a serious push for the information sharing necessary for a region-wide early warning system. This objective was specifically singled out during President Obama's May 2015 summit with GCC leaders. A region-wide early warning capability would consist of the radars and other sensors in other GCC countries (and linked to U.S. assets in the region) talking to each other. It would not involve the sharing of interceptors or a joint doctrine for regional defense. This is a first step towards true regional defense, and should be achievable in a shorter timeframe with a committed U.S. effort. But it would have a meaningful impact on each state's ability to unilaterally defend itself with its own interceptors. Due to the short missile flight times in the region (six minutes or less) and the topography, the earlier an incoming missile can be detected and tracked, the easier it will be to shoot down that missile. If a threat heading for one country is detected first by a radar in another country, it would be extremely valuable if this information could be shared in real time to enable the threatened country to better defend itself.<sup>178</sup>

The second focus should be improving the United States' own interoperability. Currently, different BMD systems operated by the U.S. military are unable to talk to each other. This makes it difficult to use the best interceptor to defeat the incoming threat. Northrop Grumman is currently working on an Integrated Air and Missile Defense Battle Command System (IBCS) that will enable the sensors associated with different BMD systems to communicate, alerting the warfighter and enabling him or her to select the best interceptor available to engage the incoming missile.<sup>179</sup> However, the IBCS is not slated to reach initial operational capacity until 2019.<sup>180</sup> Efforts should be made to speed up the development and procurement of this system. Talks should begin now with the GCC states about selling them the system to improve the capabilities of the BMD assets they already (or will soon) operate.

### **Consequences of a Reduced U.S. Role on Regional Missile Defense**

Reducing the U.S. role in assisting the GCC states with missile defense will have strong operational and political consequences. Operationally, the GCC states rely on the United States to sell them BMD equipment and help them operate it. Even under a dramatically reduced presence in the region, it is unlikely that such sales and military-to-military cooperation will cease. However, any BMD integration that may take place within the GCC in the future will rely heavily on U.S. leadership and persistent pressure and involvement. Failing to provide such leadership will result in slower progress towards BMD integration than already exists today.

Even more pronounced would be the political consequences. U.S.-GCC relations are already at a relatively low point—any backtracking on an issue that concerns them, such as missile defense, would be interpreted as a validation of GCC suspicions of American abandonment. This perception has already had an effect on GCC behavior. Saudi Arabia's campaign in Yemen would likely not be taking place were it not for the Kingdom's anger at Washington's thawing relations with Iran and (from its perspective) inaction against Bashar al-Assad in Syria and the Islamic State. BMD cooperation has been one of the few areas where the United States has shown a willingness to increase its involvement in the region. Reducing this role, for whatever reason, would be catastrophic for U.S.-GCC relations, and could have consequences in the region that do not align with U.S. interests.

### **Conclusion**

The Obama administration's objective of BMD integration in the region is moving slower than expected, and may not be achievable in a reasonable timeframe. The United States should focus on smaller steps—such as an integrated early warning system—that would be valuable but would fall short of true interoperability. The United States must also realize that missile defense will not serve as

an effective substitute for other forms of assurance and cooperation that the Arab Gulf states feel is necessary for their security. Missile defense is an important, but by no means sufficient, mechanism of extended deterrence. In the absence of additional forms of security assistance, including the more assertive U.S. leadership role that the GCC states desire from the United States, missile defense will not serve as a credible commitment to the security of the Arab Gulf monarchies. That being said, the goal of a regional missile defense architecture is a worthy one. The United States should continue working towards this goal—albeit with a realistic understanding of what is achievable given the realities of the region.

# The Tactical Utility and Strategic Effects of the Emerging Asian Phased Adaptive Approach Missile Defense System

By Jaganath Sankaran

## Introduction

Japan has invested significant resources into its missile defense plans. Its decision to pursue missile defense could be categorized as either a “threat-driven approach” meant to defend against missiles that North Korea (or China) might launch in against it or as a “structure-driven approach” meant to revamp and strengthen the U.S.-Japan alliance and its military interoperability.<sup>181</sup> It is very difficult to parse and separate these two motives. In the last decade or so, however, the “threat” factor from North Korea seems to be primarily driving Japanese choices. For example, in March 2016, the Japanese Defense Ministry announced that its “ground-based missile interception system [Patriot Advanced Capability-3] would be permanently deployed at a location in Tokyo following the Democratic People’s Republic of Korea’s increasingly frequent launches of ballistic missiles.”<sup>182</sup> Table 1 below summarizes a timeline of major events that have occurred in the course Japan’s pursuit of missile defenses.

The first major realization of a potential missile threat to the Japanese homeland occurred in August 1998, when North Korea flight-tested its Taepodong missile. The “Taepodong shock” changed the cautious attitude on missile defense that Japan had previously held. The incident measurably “altered the Japanese public’s threat perception vis-à-vis Pyongyang, particularly because the missile flew over the Japanese mainland.”<sup>183</sup> The 1998 North Korean missile test also “consolidated a large political support [leading to the passing of the U.S.-Japan Defense Guidelines legislation] not only allowing the government to officially launch a TMD [theater missile defense] co-research [project] with the U.S. but also to introduce domestically-produced reconnaissance satellites.”<sup>184</sup> This reaction from Japanese politicians to the 1998 incident seems to have even surprised the Japanese Maritime Self-Defense Forces (MSDF) officers. Some of them had observed that “Such quick political decisions would have been virtually impossible had the Taepodong incident not taken place—we are even ‘grateful’ to Pyongyang for ‘helping’ our cause to move on ahead with missile defense.”<sup>185</sup>

Over the years, North Korea has conducted many test launches of its missile and satellite launch vehicles and has not shied from issuing threats towards Japan. In 2013, for example, the Korean Central News Agency (KCNA) of North Korea issued a commentary that said: “Japan is always in the cross-hairs of our revolutionary army and if Japan makes the slightest move, the spark of war will touch Japan first.”<sup>186</sup> North Korea has approximately 1,000 missiles capable of reaching regional targets.<sup>187</sup> The most proliferated missiles are the various SCUDs that can target South Korea. From the Japanese perspective, the *Nodong* missiles with their 1,500 km range are the most worrisome. North Korea also seems to possess a limited number of the *Musudan* missile with a range of 3,500 km which puts all of Northeast Asia and Guam and Okinawa under threat. It should also be noted that it is speculated that North Korea could have as many as 20 nuclear weapons by the end of 2016.<sup>188</sup> North Korean motives for procuring a missile arsenal is usually attributed to two reasons: “first is to compel the United States to alter its strategic calculus so that it is willing to accept a political settlement on the Korean peninsula conducive to regime interests...second is to be prepared to defend its interests in case of renewed military action on the peninsula, including ensuring survival of the regime.”<sup>189</sup>

The first section of this article will examine the status of the North Korean missile arsenal and its potential to threaten forward-deployed U.S., Japanese and other allied forces. The second section of this article will study the state of readiness of the Asian Phased Adaptive Approach (APAA) missile

defense system that Japan and the U.S. are establishing and its ability to offer limited defense against North Korean missiles. The section will also highlight the various command and control (C2) challenges the APAA missile defense system has faced until now. The third section will examine potential obstacles to the APAA, including Chinese concerns regarding the program. The final section will conclude with a recommendation on managing the threat from North Korea while attempting to preserve stability between the major players in the region.

<i><b>Date</b></i>	<i><b>Event</b></i>
September 1986	Chief Cabinet Secretary Masaharu Gotoba issues public statement on Japan's participation in SDI
1989	U.S. DoD/SDIO initiates WESTPAC Study. Mitsubishi Heavy Industries wins contract to lead study
1991	Japan decides to acquire PAC-2 systems. Japanese Air Self-Defense Forces began receiving these PAC-2 systems in 1998.
1993	North Korea fires four short-range missiles into the Sea of Japan
October 1993	SecDef Les Aspin offers Japan formal participation in TMD
December 1993	U.S.-Japan bilateral Theater Missile Defense Working Group (TMDWG) formed. TMDWG is seen as the foundation work that has now led to the joint development of SM-3 IIA
1995	Japanese government sets aside 20 million yen for TMD research. The Office of Ballistic Missile Defense Research (BMDR) established in the Japanese Defense Agency (JDA).
March 1996	China fires four DF-15 missiles in the vicinity of Taiwan
August 31, 1998	North Korea launches a Taepodong missile that flies over Japanese mainland
September 1998	Both Houses of Japan's Diet passes an unanimous resolution condemning North Korean missile launch and urges Japan to explore all means to secure the safety of the population.
August 16, 1999	U.S. and Japan sign MOU on joint R&D of SM-3 IIA missiles
2003	Japan decided to deploy the SM-3 Block IA on-board its Aegis-equipped ships.
December 19, 2003	Japan announces decision to deploy a missile

	defense system by acquiring PAC-3 and Aegis SM-3 IA
May 2006	The United States deploys a forward-based X-band radar at the JASDF's Shariki Garrison
2007	First battery of PAC-3 interceptors deployed to Iruma Air Base
2010	Japan decides to increase the number of Aegis-equipped BMD ships to six
December 2014	Second U.S. X-band radar deployed to Kyogamisaki
March 2016	Patriot Advanced Capability-3 to be permanently deployed in Tokyo

Table 1: Timeline on Japanese Missile Defense<sup>190</sup>

### North Korea's Missile Arsenal and the Threat to Japan

The missile arsenal of North Korea has continued to grow in both quantity and quality for quite some time. In the 2000s, it was believed that North Korea had several hundred of missiles capable of reaching a wide range of locations in the Asia-Pacific.<sup>191</sup> In 2002, General Thomas A. Schwartz, Commander of United States Forces Korea testified before the U.S. Congress that North Korea had over 500 SCUD missile variants.<sup>192</sup> A 2009 report by the International Crisis Group suggested that North Korea had deployed over 600 SCUDs and around 320 Nodong missiles.<sup>193</sup> The 2010 United States Forces Korea *Strategic Digest* states that North Korea, "with as many as 800 missiles in its active inventory...intends to increase its offensive capabilities."<sup>194</sup> Finally, very recent estimates by the U.S. Air Force have suggested that North Korea could have a total 1,000 missiles with around 100 SCUD launchers and 50 Nodong launchers.<sup>195</sup> While it is very difficult to obtain an accurate count of North Korean missiles, it is, however, possible to develop a rough estimate based on various publicly available sources. Table 2 below summarizes an estimate of the North Korean missile inventory collated from multiple sources.<sup>196</sup> It should be noted that there are measurable discrepancies between these sources.

	Toksa (Viper/KN-02)	SCUD-B (Hwaseong-5)	SCUD-C (Hwaseong-6)	SCUD-ER	Nodong	Musudan (BM-25, Nodong-B, Taepodong-X, Mirim)	Taepodong-1 (Paektusan-1)	Taepodong-2 (Paektusan-2/Unha-2)	KN-08 (Hwaseong-13) (Road mobile ICBM)
Range (km)	120	300	500	700-1000	~1,500	> 3,000	1,500 to ~2,000	6,000 to ~10,000	~10,000
No. of Missiles		600-800			200-300	30 to ~50	20-30	~5	
No. of Launchers	~100	~40 to ~100			30 to ~50	25 to ~50		~6 (Road mobile)	

rs								version)	
Warhead Weight (kg)		1,000	770		700	650	500	650 to ~1,000	500 to 700
Status		Operational	Operational		Operational	Operational	Test Launch	Under Development	

Table 2: North Korean Missile Specifications<sup>197</sup>

While North Korea has an ambitious missile development program, its various missile capabilities are not equal. For example, its ability to successfully use an intercontinental ballistic missile (ICBM) or even an intermediate-range ballistic missile (range between 3,000 and 5,500 kilometers) is highly questionable, although recent successful space launches revive such concerns.<sup>198</sup> The 2013 U.S. Defense Department Annual Report on North Korea, for example, states: "...they [North Korea] unveiled an intermediate-range ballistic missile (IRBM) and a version of the NoDong medium range ballistic missile (MRBM) fitted with a cone-cylinder-flare payload at parades during the last three years. To date, the IRBM, like the new mobile ICBM, has not been flight-tested and its current reliability as a weapon system would be low." The report also says: "...a space launch does not test a reentry vehicle (RV). Without an RV capable of surviving atmospheric reentry, North Korea cannot deliver a weapon to target from an ICBM."<sup>199</sup>

However, North Korea's shorter range missiles, including various types of SCUDs and some Nodong missiles are more tested and presumed to have a higher likelihood of operational effectiveness. Figure 1 below shows the reach of these shorter range missiles. One of the largest worries for the U.S.-Japan-South Korean alliance is the concerns regarding the North's potential ability to use these missiles coupled with a nuclear weapon. The South Korean 2014 Defense White Paper, for example, speculates that "North Korea possesses about 40 kg of plutonium that can be used to produce nuclear weapons and it also assessed that a highly enriched uranium (HEU) program is underway. North Korea's ability to miniaturize nuclear weapons also seems to have reached a considerable level."<sup>200</sup> North Korea is also feared to have an arsenal of biological and chemical weaponry that could be delivered using its missiles. Its chemical weapons stockpile was estimated in 2005 to be between 2,500 and 5,000 tons.<sup>201</sup> Finally, even with mildly inaccurate conventional warheads, North Korean missiles could, in principle, substantially disrupt military operations and impede logistics at U.S. bases in the region.

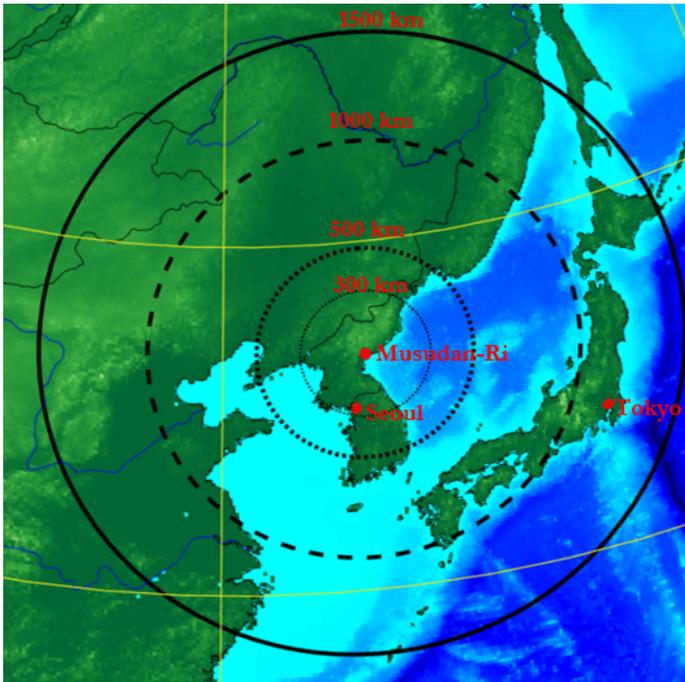


Figure 1: Notional Range of North Korean Missiles

### Japan Missile Defense Capacity and Capabilities

While a large proportion of Japanese missile defense infrastructure is relatively new, Japan has been involved in missile defense related research and development since the mid-1980s. Under a 1985 licensing agreement with the United States, Japan produced Patriot missiles.<sup>202</sup> Later on in 1998, Japanese Air Self-Defense Forces (JASDF) received a total of 24 Patriot Advanced Capability-2 (PAC-2) batteries. In 1999, Japan decided to upgrade to the PAC-3 missile defense system at a cost of \$1.7-\$2.3 billion.<sup>203</sup> In 2007, the first battery of PAC-3 interceptors was deployed to Iruma Air Base near Tokyo.<sup>204</sup> The JASDF now possesses a total of 16 PAC-3 fire units located at Naha, Kasuga, Gifu, and Iruma.<sup>205</sup> It should be noted that these PAC-3 batteries provide only terminal defense with very limited defensive footprints.

A national missile defense shield for Japan is provided by its current Aegis-equipped ships armed with the Standard Missile-3 (SM-3) Block IA interceptor.<sup>206</sup> In 2003, Japan decided to deploy the SM-3 Block IA on-board its Aegis-equipped ships.<sup>207</sup> In December 2005, the Japanese Cabinet and Security Council approved the joint development with the United States of the SM-3 Block IIA interceptor.<sup>208</sup> Japan might, eventually, also deploy an Aegis-Ashore SM-3 Block IIA system in mainland Japan similar to the system currently being deployed in Europe.<sup>209</sup> Japan tested the SM-3 Block IA missiles for the first time in 2007. An aegis-equipped Japanese warship, the JS Kongo, was used to track and intercept a mock target missile.<sup>210</sup> Presently Japan operates four Kongo class Aegis-equipped ships: Kongo, Chokai, Myoko, and Kirishma.<sup>211</sup>

In 2010, Japan decided to increase the number of Aegis-equipped BMD ships to six along with “four newly developed ground-based X-band radar sets (FPS-5), upgrades of seven radar systems (upgraded FPS-3), and modification of the Japan Air-Defense Ground Environment (JADGE), an automated integrated air-defense system.”<sup>212</sup> To support Japan’s missile defense mission, the United States has

deployed, among other things, a PAC-3 battalion at Okinawa. The United States has also deployed a forward-based X-band radar at the JASDF's Shariki Garrison in May 2006.<sup>213</sup> A second X-band radar was deployed to Kyogamisaki in December 2014.<sup>214</sup> The United States presently deploys five Aegis-equipped missile defense-capable destroyers in Japan. In 2014, then U.S. Secretary of Defense Chuck Hagel announced that "in response to Pyongyang's pattern of provocative and destabilizing actions... I can announce today that the United States is planning to forward-deploy two additional Aegis ballistic missile defense ships to Japan by 2017."<sup>215</sup>

In light of all these investments, are current missile defense deployments sufficient in tracking and destroying North Korean missiles?<sup>216</sup> What sort of coordinated attack scenarios can the missile defenses hold up against? The discussion below will illustrate that the Asian Phased Adaptive Approach missile defense system fares quite well on the former, but poorly on the latter. Figure 2 below illustrates the defensive footprint (based on kinematic reach<sup>217</sup>) of an Aegis-equipped Japanese naval vessel with SM-3 Block IA interceptors.<sup>218</sup> The nominal footprint shown in the figure indicates that the SM-3 Block IA interceptors do provide good coverage over Japan, with some parts exposed.

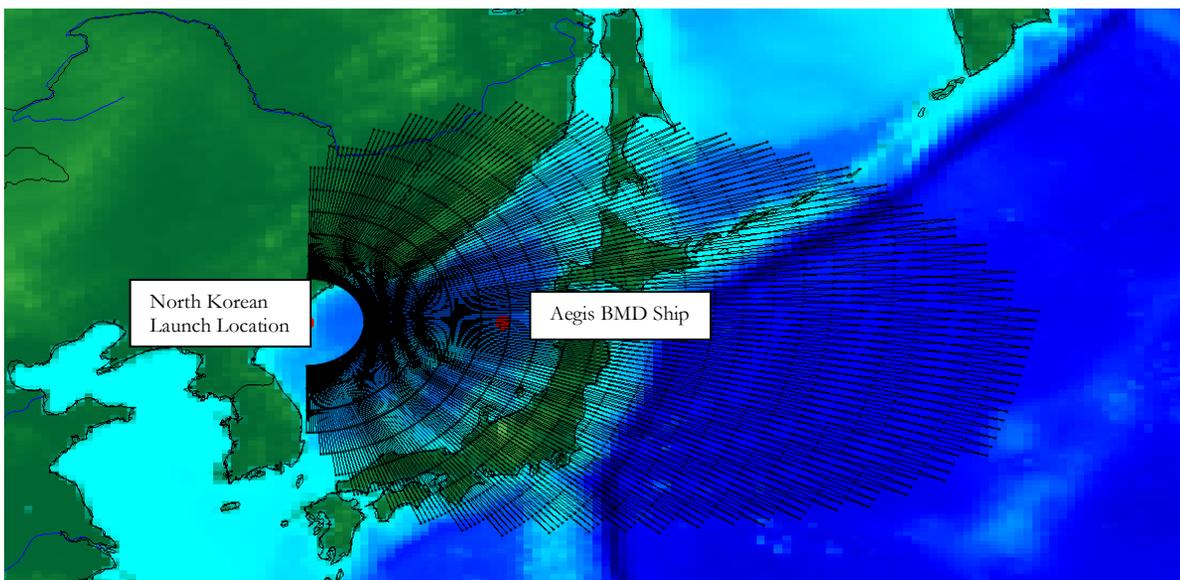


Figure 2: Nominal Defense Footprint of a Aegis-equipped Japanese ship loaded with SM-3 IA stationed in the Sea of Japan. The nominal footprint represents only the kinematic reach of the interceptor.

However, a good footprint alone is not sufficient to execute missile defense missions. It should be understood that missile defense cannot provide 100% guaranteed defense against every incoming missile. Rather, missile defenses are expected to intercept a significant fraction of an early salvo of missiles, thereby giving U.S. or Japanese forces sufficient time to respond. The presence of Japan's missile defense systems will not completely eliminate the missile threat that U.S. or Japanese forces may face from North Korea. Specifically, a single Aegis-equipped Japanese ship could, in theory, have as many as 90 interceptors dedicated to missile defense. In operational reality, however, the numbers might be much lower.<sup>219</sup> Figure 3 below shows the leakage rate (the number of missiles that pass through the missile defense shield) for a given missile defense system. If one interceptor is committed for every missile, then to obtain a leakage rate of 10% (i.e., 1 in 10 missiles leak through), the SM-3 Block IA interceptors have to possess a 90% probability of kill. A 90% probability of kill is an extremely optimistic value to expect. If the SM-3 Block IA interceptors possess a reduced probability

of kill of 70%, then to maintain the 10% leakage rate would require two interceptors per incoming target missile. In that case, a Japanese Aegis-equipped naval vessel with 60 SM-3 Block IA interceptors (the rest of the missile load in the ship can be presumed to be dedicated to other functions like air-to-air defense, anti-submarine warfare or cruise missiles, etc.<sup>220</sup>) would be able to defend against only 30 North Korean missiles under optimistic conditions. North Korea, on the other hand, is believed to possess 250-300 Nodong missiles that could conceivably be launched in a short time window.<sup>221</sup> The current inventory of four Japanese naval vessels would only be able to provide limited protection to critical civilian and/or military assets, particularly so if some of the ships are held back for later operations. A large North Korean attack salvo of around one hundred missiles could cause substantial damage to alliance forces or civilian populations. Nevertheless, the Aegis-equipped ships with SM-3 Block IAs along with the Patriot systems could offer a sufficient capability to preserve important military assets, thereby strengthening overall deterrence.

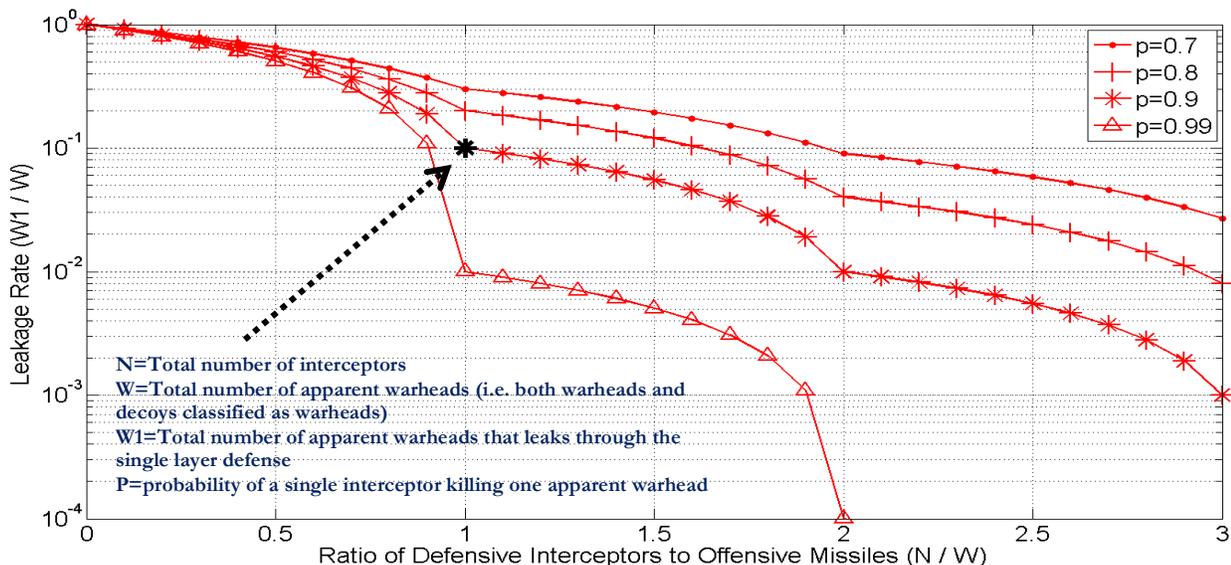


Figure 3: Leakage Rate of a Single Layer Missile Defense System

### Command and Control Challenges

While the disparity between the available number of missile defense interceptors in Japan's possession and offensive missiles in North Korea's arsenal is a cause for concern, equally worrisome is the performance of missile defense systems to date. There have been significant lapses in the command and control procedures of the system in the past when it was called upon to establish a shield over Japan.

For the past decade, Japan has been grappling with the process of establishing command and control procedures in the event of a sudden missile attack against it. Beginning in July 2005, Japan amended its Self-Defense Forces Law to establish procedures that pre-delegated interceptor launch authority to the Japanese Self-Defense Forces in the event of a rocket launch by North Korea if it overflowed Japanese territory.<sup>222</sup> This amendment permitted Japan's "defense minister to issue an order—in accordance with procedures approved by the Prime Minister—to destroy an incoming object so as to prevent the loss of lives or damage to property on Japanese territory."<sup>223</sup> In October 2005, the U.S.-

Japan Security Consultative Committee issued a document titled “U.S.-Japan Alliance: Transformation and Realignment for the Future” that included provisions for bilateral and joint operational coordination.<sup>224</sup> As part of this initiative, the JASDF Air Defense Headquarters was relocated to Yokota Air Base where the United States Forces Japan (USFJ) is based.<sup>225</sup> This relocation was intended to foster greater data sharing and integrated decision making between U.S. and Japanese forces in the event of a missile attack. In 2007, Japan’s Self-Defense Forces established the Joint Staff Office (JSO) to better coordinate operational requirements of missile defense. This action was motivated by the realization that “Joint [military] operations is also an essential foundation for effective BMD, because the MSDF’s [Maritime Self-Defense Forces] Aegis vessels and the ASDF’s warning and surveillance systems and Patriot missile defense systems are all part of the Japanese BMD system, and these assets should be closely coordinated for time-sensitive missile defense operations.”<sup>226</sup>

While all these actions cumulatively showcase a desire from the Japanese and U.S. forward-deployed forces to master the command and control cycle involved in missile defense interceptions, the real-world results have been less successful. In four instances to date, Japan and the United States have had an opportunity to demonstrate the system. In three instances (2006, 2009, and 2012), significant problems of command and control were uncovered.

In the 2006 instance:<sup>227</sup>

Despite the U.S. forces informing the SDF of the third missile launch on July 5 at 4:59 a.m. and the MSDF Aegis destroyer [Kongo] being dispatched to the Sea of Japan, *Kongo*’s radar failed to detect any trace of ballistic missiles. Taepodong-2 was estimated to have a height of 1,000 km, which, theoretically, was supposed to be visible on *Kongo*’s radar after the launch, but because the missile never attained the necessary height or distance to be properly detected, it took some time for Japan to confirm that the third missile was indeed a Taepodong...and confused JDA officials kept asking each other, ‘Was the launch a failure, or what?’ It is speculated that the six other missiles had been Nodongs or Scuds, and *Kongo*’s radar detected trajectories of half of those missiles...Some defense officials speculated that the reason why *Kongo* was unable to detect the missiles was because the U.S. government did not relay all of their information to the Japanese Aegis, subsequently fueling the suspicion that ‘the U.S. does not trust us well enough.’<sup>228</sup>

In the 2009 instance:<sup>229</sup>

On 4 April [2009] at 12:16, the FPS-5 phased-array radar at Iioka, Chiba Prefecture, detected an object above the Sea of Japan. This information was sent to staff at Air Defense Headquarters, Fuchu, Tokyo. In accordance with procedure, the staff reported verbally to other headquarters staff, using the phrases “Iioka detected” and ‘SEW [Shared Early Warning] detected’. However, there was a misunderstanding. At that time, SEW had not detected the missile launch. The voice-based information was immediately disseminated to the local government through the Cabinet Secretariat. Once minute later, the Joint Staff Office checked SEW information and noticed that SEW had not detected the missile launch. Accordingly, they reported that the 12:16 launch information was false. Finally, at 12:20, the corrected information—stating that no missile had been detected—was disseminated to the local government. According to the after-action report of 2009, the human error happened because one staff had been wrongly convinced that both FPS-5 and SEW had detected the missile launch.

In contrast, the situation was reversed in April 2012:<sup>230</sup>

On 13 April at 7:40 am, the MoD received SEW information from the US. However, it took time for other sensors to confirm the launch, to double check, and no Japanese sensors could detect it. For that reason, the GoJ's [Government of Japan] announcement of the missile launch was delayed for about one hour. Finally at 8:23, Defense Minister Naoki Tanaka announced the information at a press briefing, followed by a briefing by Chief Cabinet Secretary Osamu Fujimura at 8:37. The reason for this delay was that the GoJ had established a double-check principle to avoid the dissemination of false information, as had happened in 2009. In addition, in April 2012, North Korea's missile exploded immediately after the launch. In general, radar cannot pick up objects below the horizon...therefore, both the ground-based radar in Japan and the maritime-based radar of the Aegis vessel deployed in the Southern part of Japan could not detect the missile because it crashed before it rose above their horizon. This physical reality prevented the double-checking of the information released by the SEW space-based sensors.

Since then, the performances of the missile defense units have been tested twice. In December 2012, when North Korea launched a space launch vehicle, Japan was able to successfully disseminate early warning information to its local governments and between various missile defense military units quickly.<sup>231</sup> Most recently, in anticipation of the February 7, 2016, launch of North Korea's satellite launch vehicle, the Japanese Defense Minister, Gen. Nakatani, ordered Aegis-equipped missile defense warships and its PAC-3 missile defense units to, if needed, destroy components falling within its territory.<sup>232</sup> The report on the performance of the missile defense forces in these instances is still forthcoming. Its judgment would be extremely illuminating in understanding the performance of the Japanese missile defense forces. Such work is left to future iterations of this paper. However, the various command and control failures highlighted above does force one to question if the system will function effectively in the face of a surprise North Korean missile attack.

### **China's Opposition to U.S. and Japanese Missile Defense Deployments**

Chinese opposition to the deployment of missile defense in Northeast Asia by Japan and the United States falls under one of these reasons:<sup>233</sup> “(1) TMD cooperation with the United States would mark a qualitative upgrading of the U.S.-Japan alliance; (2) Provision of TMD-related missile technologies—such as propulsion and guidance—could contribute to a Japanese offensive ballistic missile program; (3) TMD cooperation with Japan could provide the technical and political basis for Japanese “remilitarization.” Japan will first develop missile defenses (a ‘shield’) and then may develop offensive missile forces (a ‘spear’); (4) Japanese deployment of upper-tier TMD could be used to defend Taiwan;<sup>234</sup> (5) TMD development may spark an arms race in Asia between China and Japan and consequently between Taiwan and China; (6) TMD and National Missile Defense (NMD) are closely related, so Japanese participation in joint development of TMD will ultimately assist the United States in the development of NMD; and (7) ‘US-Japan cooperation on TMD will aggravate tensions on the Korean peninsula’ and ‘the nuclear and missile-related problems with Korea can only be settled by political means through dialogue.’”

China has had an innate suspicion regarding U.S. missile defense deployments and U.S. intentions in East Asia. A recent Chinese military text, *The Science of Military Strategy*, has, for example, asserted that U.S. missile defense in Asia is “creating increasingly serious effects on the reliability and effectiveness of a Chinese retaliatory nuclear attack.”<sup>235</sup> Chinese personnel argue that missile defense deployments in their neighborhood would fundamentally alter the strategic balance and stability between the United States and China and, in turn, would force China to increase its nuclear arsenal. China (and Russia) has consistently argued that any missile threats from North Korea are a pretext to

deploy missile defenses targeting them.<sup>236</sup> They contend instead that “political, legal and diplomatic means, to explore the possibility of gradually working out a global control system in prevention of the proliferation of missiles and related technologies, and to conduct extensive and non-discriminatory dialogue and cooperation” is the way to address such threats.<sup>237</sup>

Although Washington is undertaking a missile defense plan that it clearly states is driven by legitimate U.S. and allies’ security considerations, China (and Russia) apparently have found it difficult to accept this U.S. articulation. Additionally, the United States has repeatedly pointed out that these systems do not and are not meant to alter strategic stability. For example, the recent U.S. Ballistic Missile Defense Review stated: “Engaging China in discussions of U.S. missile defense plans is also an important part of our international efforts...maintaining strategic stability in the U.S.-China relationship is as important to the administration as maintaining strategic stability with other major powers.”<sup>238</sup> The 2010 Nuclear Posture Review also made similar commitments.<sup>239</sup> Conceivably, however, “in dealing with the US, prudent states are necessarily going to assume that its intentions are at best ambiguous, and more likely adversarial.”<sup>240</sup> China (and Russia) tends to argue that even mild U.S. missile defense postures will over time accumulate increasing capabilities, and can therefore quickly convert such capability to a larger threatening posture.<sup>241</sup> Such logic can be observed directly in Chinese stated opposition to the deployment of U.S. missile defense radars in the region. Wu Riqiang from China’s Renmin University, for example, suggests that “Beijing’s biggest concern is that such [missile defense] radars will be deployed close enough to China to register the decoy-deployment process of strategic missiles...this prevents missile defense systems from being susceptible to mid-course decoy countermeasures, and should be seen as China’s red line.”<sup>242</sup>

Of course, in theory, U.S. missile defense systems in the Asia-Pacific could be reconfigured to offer limited defenses against Chinese short- and medium-range missiles. While North Korean missile threats permeate the discourse on Japanese missile defense, it is not inconceivable for it to maintain the potential to ramp capabilities against China if a significant threat perception arises.<sup>243</sup> Japan’s ambassador Imai Ryuichi, for example, seemed to have said: “...with all the debate and trouble TMD has caused in the SDF, it would be foolish to think that Japan spends enormous amounts of money to only defend against two or three North Korean Taepo Dongs.”<sup>244</sup> However, such a reconfiguration would be of limited effectiveness given that China’s deployed missile arsenal is one of the most extensive in the world.<sup>245</sup> China continues to modernize its missile arsenal and is also developing a number of newer and more capable offensive missiles.<sup>246</sup> China is believed to have around 1,200 short-range missiles. Its medium range-missile inventory could include as many as 400 CSS-6 missiles (with a range of 600 km) and around 85 CSS-5 missiles (with a range of 1,750 km).<sup>247</sup> China also possesses a significant number of other medium- and intermediate-range ballistic missiles.<sup>248</sup> These missiles could be targeted against U.S. forward-deployed forces, allied forces, and bases in the region.<sup>249</sup> Succinctly capturing this aspect of the tensions between the United States and China on missile defense, former U.S. Secretary of Defense William Perry said in 2000:<sup>250</sup>

I share the Chinese concern over the deleterious effect of an arms race in the region, but I believe that if an arms race does get underway it will have been stimulated by the extensive deployment of missiles, not the deployment of missile defenses...I am today more pessimistic about the future of United States-China relations than I have been for several decades.

Presently, ranges of Chinese conventionally-armed missiles extend to U.S. bases as far away as Guam. Any debate on U.S. missile defense reductions in the region should, therefore, also involve a discussion of China’s missile arsenal.

## **Conclusion**

Recurrent North Korean provocations have and will continue to shift Japanese preferences on missile defense to a more capable system. However, missile defense come with inherent limitations that under the best circumstances will provide only limited protection. Also, while the need to limit provoking China influences Japanese defense decisions, including the procurement and deployment of missile defense equipment, unless there is substantial change in the perception of the North Korea threat, it seems that such concerns will play only a secondary role. A jointly operated U.S.-Japan defensive system could turn out to be crucial to defend Japan and U.S. forward-deployed forces from North Korean threats, and in the larger context, help to ensure broader regional security in the Asia-Pacific arena.

## **Ballistic Missile Defense in South Korea: A Common Threat, Separate Systems**

**By Joshua H. Pollack**

### **Timeline**

**Late 1980s:** Emergence of a large-scale North Korean theater ballistic missile threat.

**May 29, 1993:** Four North Korean theater ballistic missile tests.

**June 1994:** North Korean nuclear crisis.

**October 1995:** Earliest South Korean media references to SAM-X program.

**1995-1996:** Earliest USFK Patriot deployments.

**August 31, 1998:** North Korean TD-1 space launcher overflies Japan.

**November 1998:** Earliest South Korean media references to M-SAM program.

**July 4 and 5, 2006:** North Korea ends missile testing moratorium with six theater ballistic missile tests and first TD-2 space launch attempt.

**October 9, 2006:** First North Korean nuclear test.

**October 2006:** Earliest South Korean media references to Korean Air and Missile Defense (KAMD).

**2008:** Negotiations to acquire German PAC-2 systems are concluded; deliveries to South Korea commence.

**January 2008:** Earliest South Korean media references to interest in acquisition of SM-2 naval interceptors from the United States.

**February 2008:** Earliest South Korean media references to interest in acquisition of SM-6 naval interceptors from the United States.

**2009:** Negotiations to acquire Israeli Super Green Pine radars are concluded.

**May 2009:** South Korean possession of SM-2 naval interceptors is publicized for the first time by the U.S. Department of Defense.

**October 2011:** Earliest South Korean media references to L-SAM program.

**October 2012:** Earliest South Korean media references to interest in acquisition of PAC-3 systems from the United States.

**October 1, 2013:** ROK Armed Forces Day parade in Seoul displays multiple missile systems, including SM-2 naval interceptors.

**Early 2016:** First Cheongung (M-SAM) systems reported deployed.

**January 7, 2016:** Fourth North Korean nuclear test, called its first thermonuclear test.

**February 7, 2016:** North Korea conducts its second fully successful TD-2 launch.

**February 7, 2016:** USFK releases text of a joint ROK-US statement on negotiations concerning THAAD deployment in South Korea.

## **Executive Summary**

Some of the most enduring disagreements in the alliance between the United States and the Republic of Korea (ROK) concern ballistic missile defenses (BMD). At the same time that South Korea has expanded its conventional offensive missile program, it has declined American proposals for a regionally integrated BMD architecture, insisting on developing its own national system in parallel to the defenses operated by U.S. Forces Korea (USFK). American proposals to enhance its own BMD in Korea by introducing the Terminal High-Altitude Area Defense (THAAD) to the Peninsula have been received cautiously, as have appeals for interoperability between U.S. and ROK systems. A desire for expanded autonomy in national security appears to underpin Seoul's attitudes on BMD. Rather than rely passively on American protection against North Korea's nuclear and missile threats, South Korea's military leaders have focused on developing precision-strike capabilities to intimidate Pyongyang, and resisted simply accepting an American BMD umbrella. Even more than they desire greater independence from their American patron-ally, South Koreans are suspicious of entanglements with Japan, their former colonial master, whose own defensive systems are already integrated with the American regional BMD architecture. This outlook encourages the pursuit of independent defense capabilities and discourages institutionalizing trilateral security arrangements.

## **Introduction**

South Korea (the Republic of Korea, or ROK) has the unusual distinction of hosting two unrelated ballistic missile defense (BMD) systems: one for the South Korean military and another for U.S. Forces Korea (USFK). Despite the standing presence of over 25,000 American troops, yoked to South Korea's armed forces in a Combined Forces Command (CFC); despite routine joint training and exercises between the two allies; and despite almost two decades of urgings from the United States to build an integrated BMD architecture, the two systems have remained separate. Even as Washington negotiates with Seoul for permission to enhance USFK's defenses by deploying the Terminal High-Altitude Area Defense (THAAD) system to the Peninsula, South Korea remains committed to its own national Korean Air and Missile Defense (KAMD) system, based on a variety of technologies from different sources, including indigenously produced interceptors. Years of pledges by South Korean defense officials have produced little observable progress toward making the separate American and Korean systems interoperable, despite benefits for the effectiveness of allied BMD in the theater.

South Korea's approach to BMD is thus at a great remove from America's experience with other allies. The European Phased Adaptive Approach (EPAA), adopted early in the Obama administration, has been portrayed as a model for other regional architectures, but South Korea's choices have allowed for only halting progress toward regional integration.<sup>251</sup> While the missile threat from North Korea (the Democratic People's Republic of Korea, or DPRK) justifies and motivates South Korea's interest in BMD capabilities, it has not, by itself, determined the ROK's approach. Instead, concerns unrelated to the operational effectiveness of any particular BMD architecture have shaped these choices.

## **South Korean BMD Concerns**

The first and greatest issue has been cost relative to perceived benefit; very simply, the South Korean defense establishment has preferred to invest in offensive missile capabilities to intimidate North Korea with the threat of precision strikes. Not far behind is national pride, in the form of South Korea's desire for greater independence from its patron-ally, the United States, and its resistance to entanglements with its former colonial master, Japan. Other considerations have included sensitivity to

the concerns of China, which is South Korea's top trading partner and main opportunity for leverage on North Korean behavior, and perhaps also the interests of South Korea's own defense industries.

Many of these issues and concerns have found their most visible expression in areas not immediately or uniquely linked to BMD. Korea has never truly been able to determine its own fate in the modern era; security issues therefore tend to impinge strongly on Korean national pride. One prominent example in the period discussed in this paper is the premature decision for the transfer of wartime operational control of the armed forces (OPCON) by 2012, initially agreed between the Minister of National Defense and the U.S. Secretary of Defense in fall 2006.<sup>252</sup> After North Korea's armed attacks against South Korea in 2010, the allies began to reconsider the original timeline for OPCON transfer, and then substituted a "conditions-based" process without fixed dates. Nevertheless, the retention of the commitment to OPCON transfer by two subsequent pro-American governments in Seoul testifies to the power of national feelings in South Korea.<sup>253</sup> These same feelings have informed repeated decisions to resist the adoption of a common, integrated BMD architecture.

Another aspect of Korean nationalism, in the form of anti-Japanese sentiment, also helps to explain Seoul's desire for a separate BMD system. The American BMD architecture in the Asia-Pacific region is integrated with Japan's; this is the system that Washington would like to see Seoul join. Even the mutually beneficial decision to share sensor data between the ROK and the United States could therefore contribute indirectly to the defense of Japan, Korea's former colonial master, whose intentions many Koreans continue to suspect. There are many examples of Korea's allergy to Japan from the period under consideration; the most salient would be the April 2011 episode, when the Korean side balked at the last moment rather than sign an agreement with Japan to permit the sharing of sensitive defense data (a General Security of Military Information Agreement, or GSOMIA). American efforts to bring about trilateral defense cooperation have had some incremental successes since this time, but the continuing elusiveness of a ROK-Japan GSOMIA is emblematic of the serious obstacles to cooperation.<sup>254</sup>

A third factor, involving the dominant perspective in China, may also have contributed to South Korea's go-slow approach on acquiring BMD and especially on achieving interoperability with American systems. China is South Korea's most important trading partner by far; it is also widely viewed as the only country capable of keeping the North Koreans in line. Probably for these reasons, Seoul has at times shown sensitivity to China's concerns about the American alliance network perched on its doorstep, including the role of BMD. A special concern sometimes reflected in the Chinese media is the potential for multinational BMD to embed the U.S. military more deeply in the region.<sup>255</sup>

A fourth potential concern may be a desire to create greater opportunities for South Korea's defense industry. In practice, this concern can be difficult to distinguish from nationalistic sentiment; the belief that independent defense capabilities are crucial to the ROK's autonomy goes hand-in-hand with favoring indigenous defense development and production. It is also consistent with South Korea's long history of industrial policy, including export-oriented industry. The defense sector has not been an exception to this pattern.<sup>256</sup>

Many of these factors appear to have been in play in the recent debate over the deployment of THAAD. USFK officials have described the need for these high-altitude interceptors in Korea in order to create a "layered defense," a BMD architecture that permits multiple shots at an incoming warhead. After years of discussion in the media, public opposition from the Chinese Ministry of Foreign Affairs, and a debate in Seoul over whether THAAD in Korea could somehow contribute to the defense of

Japan, the United States and South Korea finally agreed to discuss the deployment. Formal talks began promptly after North Korea's latest nuclear test in January 2016 and space launch in February 2016.<sup>257</sup>

From a U.S. perspective, South Korea's reticence has created obstacles to the highly collaborative, trilateral defense relationship that the United States has sought to establish between itself, Japan, and South Korea since the late 1990s. The ROK's insistence on a separate, parallel BMD system features prominently in this story, not least of all because an effective multinational BMD architecture would involve close ties between the allies' command-and-control networks.

Reviewing the history of South Korea's own BMD programs from the mid-1990s to the present shows the enduring strength of these concerns. Despite South Korea's recent movement toward cautious acceptance of an enhanced U.S. BMD system on its territory, these issues seem unlikely to abate in the foreseeable future.

### **Early Choices: Low Cost and Self-Reliance**

South Korea has faced a threat from hundreds of North Korean theater ballistic missiles since roughly the late 1980s. Seoul's concern about the threat grew after a series of North Korean ballistic missile flight-tests on May 29, 1993, florid threats from Pyongyang during the nuclear crisis of June 1994, and the start of USFK's deployment of Patriot batteries to protect its own facilities.<sup>258</sup> These events may have contributed to the start of serious discussions within the ROK Ministry of National Defense (MND), no later than fall 1995, about launching a new air and missile defense program. This undertaking was justified in terms of the need to replace South Korea's aging fleet of U.S.-supplied Nike-Hercules air-defense missiles.<sup>259</sup>

One path for the acquisition of a BMD system might have been to acquire new, up-to-date systems from a single supplier. Instead, South Korean leaders have persistently sought an independent course, and have resisted the American plans to integrate South Korea for a regional BMD architecture that would emerge later in the decade.

Cost concerns were prominent in the information disclosed to the public about the new, so-called "SAM-X" program. Media reports starting in early 1996 indicated that the MND was considering not only Raytheon's Patriot systems, but also their Russian counterpart, the Almaz-Antey S-300. The Russian offering was deemed the leading candidate on the grounds of cost. Russia had borrowed heavily from South Korea in the early 1990s, and found in discounted military exports to Seoul a way to pay down its debt.<sup>260</sup> South Korean interest in acquiring Russian systems naturally invited concern from the U.S. military. In May 1998, the USFK commander openly voiced his concern about the need for interoperability of American and South Korean defensive systems.<sup>261</sup>

American advice, or pressure, seems to have helped to refocus the SAM-X program on Patriot PAC-3 BMD systems, but this shift led to seemingly insuperable cost problems. Although SAM-X survived defense budget cuts after the financial crisis of 1997 and the election of opposition leader Kim Dae-jung to the presidency, it was subjected to repeated, years-long delays on account of lack of adequate funding.<sup>262</sup> Shortfalls in funding became an enduring theme in South Korean BMD acquisition from this time on, even as the country's own ballistic and cruise missile programs have prospered.<sup>263</sup>

North Korea's launch of a TD-1 multistage rocket over Japan on August 31, 1998 renewed interest in the United States in establishing a National Missile Defense (NMD) and a regional, multinational Theater Missile Defense (TMD) in Northeast Asia, an idea that Japan was quick to embrace.<sup>264</sup> The South Korean leadership was reticent about involvement from the start. Even once the MND had accepted the need for a Patriot buy, Minister of National Defense Chun Yong-tack drew a sharp line

against participating in the U.S. architecture, questioning its efficacy for deterring North Korea, citing the potential response of other regional countries, i.e., China, and noting South Korea's own lack of sufficient funds, and its lack of advanced defense technology. His successors would offer similar statements as well.<sup>265</sup>

Seoul may well have been wary of involvement in a defense architecture that could be seen as participating in the "containment" of China; keeping China closer to the ROK than the DPRK has been an important South Korean objective since the end of the Cold War. Minister Chun's reference to defense technology was perhaps even more significant, reflecting the yearning to achieve greater self-reliance in defense. Always being in need of superior foreign technology for national defense would mean that the ROK would never be able to choose its own course.<sup>266</sup> Implicitly, if the DPRK could build its own missiles to threaten the ROK, then the ROK should be able to make its own missile defenses, not to mention missiles for threatening retaliation, unless it was content to rely permanently on the protection of the United States. Under the presidency of Kim Dae-jung, too, South Korea's approach to the North leaned toward diplomacy and aid rather than new defense expenditures.

Although South Korea was too hard-pressed financially to invest the anticipated roughly one trillion won (about \$1 billion) needed to acquire a state-of-the-art theater BMD system like PAC-3, it was able to set aside about 10 billion won (about \$10 million) for the Agency for Defense Development (ADD) to start development of an indigenous "medium-range surface-to-air missile," or M-SAM, starting in 1998. (ADD is the developer of South Korea's indigenous missile systems, which bear a close visual resemblance to Russian short-range ballistic missiles.) This small effort was expected to take a decade to bear fruit, and was described at the outside as involving the assistance from "Russia and other advanced countries."<sup>267</sup>

Over time, M-SAM would be portrayed as an anti-aircraft weapon, designed to replace older U.S.-supplied Hawk SAMs. The first production M-SAM systems, renamed Cheongung, were deployed to the Northwest Islands by early 2016.<sup>268</sup>

In the meantime, the X-SAM program, which was supposed to fill the gap in South Korea's defenses by acquiring PAC-3 or its equivalent, continued to make little progress. The MND failed to find a viable path for acquisition until 2005, when it identified a solution in the form of secondhand Patriot PAC-2 systems owned by Germany.<sup>269</sup> The ensuing negotiation would last years.

### **The Korean Air and Missile Defense (KAMD) Concept**

Another reason for the slow path to acquisition of BMD was, in all likelihood, a lack of urgency. After the launch of the TD-1 over Japan in August 1998, North Korea had agreed to a moratorium in space launches and missile tests. Pyongyang adhered to this policy of restraint until July 2006, when it flight-tested a barrage of theater ballistic missiles, along with a three-stage TD-2 launcher. In October 2006, it conducted its first nuclear test. Later that year, South Korea announced the development of a new BMD architecture, the Korean Air and Missile Defense (KAMD), which officials described as "affordable." Early media accounts of KAMD described it as featuring a network of Patriot batteries, a new, indigenously developed early-warning radar, and its own dedicated command center.<sup>270</sup>

In 2008, Seoul's Defense Acquisition Program Administration (DAPA) finally concluded the purchase of the secondhand German PAC-2s, to be linked by new fire-control systems from Raytheon. The first shipment from Germany arrived in South Korea late that year, about 13 years after the initial decision

to replace the superannuated Nike-Hercules. The newly acquired interceptors were deployed around ROK Air Force bases.<sup>271</sup>

Now apparently feeling some urgency to erect a national BMD system, Seoul set aside the idea of an indigenous early-warning radar. In fall 2009, DAPA decided to purchase two Super Green Pine radars from Israel's Elta. These radars were originally designed to work with the Arrow BMD interceptor jointly developed by the United States and Israel.<sup>272</sup> Thus, KAMD was taking shape rapidly, with a minimum of equipment purchased directly from the United States.

But even as South Korea continued to receive shipments of old PAC-2 equipment from Germany, the MND concluded that these systems were ineffective against the North Korean missile threat. The equipment was outmoded and better suited to intercepting aircraft than missiles. The aging PAC-2 tracking radars broke down frequently and proved difficult to maintain.<sup>273</sup>

In consultations with the United States in late 2012, the government expressed renewed interest in acquiring new PAC-3 systems, to be deployed at an early date.<sup>274</sup> The U.S. Department of Defense received formal notice of Seoul's interest in a possible purchase in October 2013.<sup>275</sup> Indeed, as early as 2008, descriptions of KAMD future development had broadened to include new U.S.-made interceptors, in the form of Raytheon's SM-2 missiles, to be deployed aboard South Korea's new Aegis-class destroyers.<sup>276</sup> Later accounts also indicated an interest in the SM-6 interceptor, then under development.<sup>277</sup>

Two other new acquisition tracks also emerged under the KAMD umbrella. The first was naval, and moved briskly. As early as January 2008, descriptions of the architecture's future development broadened to include Raytheon's SM-2 missiles, to be deployed aboard the ROK Navy's new Aegis-capable destroyers.<sup>278</sup> Perhaps reflecting ambivalence within Seoul, the purchase and delivery of SM-2s have not been highly publicized. A DOD notice from May 2009 documenting South Korean interest in buying a batch of SM-2s noted that the ROK "already has these missiles in its inventory."<sup>279</sup> (Some SM-2s would be displayed in an October 2013 Armed Forces Day parade in Seoul.) Later accounts also expressed interest in acquiring the new SM-6 multi-role naval missile, which operates in both defensive and anti-ship modes.<sup>280</sup>

The second acquisition track involved more indigenous systems. At the same time that the shortcomings of the German PAC-2s were first brought before the public eye, MND also revealed news plans for developing another indigenous BMD interceptor, a program called L-SAM.<sup>281</sup> L-SAM has been depicted as an upper-tier interceptor for a layered defense, with the lower tier composed of PAC-3 and M-SAM batteries.<sup>282</sup> This high-altitude intercept role may suggest an additional, unstated reason for Seoul's early reluctance to discuss an American THAAD deployment to Korea; although THAAD is expected to be USFK's system, and not South Korea's, its presence in Korea might undercut the rationale for L-SAM.

Regardless of the exact configuration, the rapid emergence of the initial KAMD system seems to have pushed U.S.-ROK discussions toward the subject of interoperability between allied defense systems. South Korean Ministers of National Defense issued essentially identical pledges to achieve this goal in each joint statement of the annual ministerial-level U.S.-ROK Security Consultative Meeting (SCM) since 2012.<sup>283</sup>

Despite the operational advantages of having defensive assets exchange data and coordinate actions in combat, interoperability appears to have been a source of discomfort for the South Koreans. American officials may have contributed to that discomfort by linking the theme of interoperability to the

unpopular subject of trilateral defense cooperation with Japan, speaking in terms of “an interoperable regional missile defense architecture.”<sup>284</sup>

Perhaps the first concrete indication of progress on interoperability appeared in January 2016, when the MND announced plans to install a Link 16 tactical data link between the allies’ respective BMD command centers at Osan Air Base.<sup>285</sup> The U.S. BMD system uses Link 16 to connect the other elements of the system to a Command and Control, Battle Management, and Communications System.<sup>286</sup> The MND announcement emphasized that the data link would run only between the two command centers, which implicitly will remain separate despite their proximity, and will not have direct and unmediated access to each other’s BMD assets. Shortly thereafter, it was also announced that the allies would undertake a joint BMD exercise during the annual spring military exercises.<sup>287</sup> For the time being, at least, this modest level of interoperability seems to represent the extent of Seoul’s willingness.

### **Conclusions and recommendations**

Overall, KAMD seems to have had little in the way of a consistent system design, and remains very much a work in progress. It has emerged as a patchwork quilt—an improvisational assemblage of technologies from a variety of foreign and domestic suppliers. Its only fixed characteristic is the first word in its name: *Korean*. Whatever form it may take, KAMD is the national BMD system of the Republic of Korea, as opposed to a joint or regional architecture.

This pattern reflects Seoul’s tendency to respond to a variety of pressures and concerns by delaying acquisition of big-ticket American systems, selecting low-cost alternatives when possible, and investing in locally produced alternatives, all while insisting on the maximum operational autonomy. It is invariably North Korean missile and nuclear tests that have spurring greater interest in BMD in Seoul and, at least temporarily, greater willingness to collaborate with the United States in the BMD field.

As a result, South Korean defense officials have improvised a meandering course on BMD development and acquisition, now steering closer to their American partners, now further away. American officials may periodically get an impression of progress, but so far that progress remains tentative and incremental. With time, as Seoul’s technological capabilities mature, it is likely to shift toward an increasingly independent defense posture. Short of a fundamental shift in South Korean views on defense technology, national autonomy, or regional politics and security, no trilateral BMD system including the U.S. and Japan should be expected to take shape.

A certain tension can be seen in South Korea’s approach: the desire to keep costs under control conflicts with the goal of avoiding integration into a joint or multinational architecture. A multinational approach would presumably offer the best value in terms of operational effectiveness, since it would involve relatively mature technologies and take advantage of investments already made by foreign partners. Insisting on a low-cost approach to BMD has actually forced Seoul to accept some degree of dependence. For example, ROK defense officials have felt compelled to explain to reporters that a data link between command centers is desirable, since it will give South Korea access to U.S. space-based early warning data—something the ROK cannot afford to duplicate.

Faced with this situation, perhaps the most constructive approach for the United States would be to consider proposing a jointly developed U.S.-ROK defensive architecture, separate from its U.S.-Japanese equivalent, which would create a joint capability at substantial cost savings for South Korea. While this approach would not resolve all South Korean concerns, it would help to remove the most

acute issue. Despite a desire for greater freedom of action, South Korea's leaders are far from ready to separate themselves from their alliance from the United States. The continuing USFK presence helps to deter serious North Korean aggression, and may even be seen as offering a counterweight to China's growing military power. Seoul's interest in BMD has grown since the end of the North Korean missile-test moratorium and the first North Korean nuclear test, both in 2006, so a jointly developed system is not out of the question.

## **Seeing Missile Defense as U.S. Hostility, North Korea Aims at More and Better Weapons** **By Naoko Aoki**

### **Timeline**

**August 1998:** North Korea launches a satellite launch vehicle (SLV) over Japan, the militarized version of which would be the Taepodong-1 with a range of 1,500-2,000 km. Pyongyang announces that the rocket successfully placed a small satellite into orbit.

**September 1999:** North Korea agrees to a moratorium on testing long-range missiles for the duration of missile talks with the United States.

**July 2006:** North Korea test fires seven ballistic missiles, including an SLV whose militarized version is the Taepodong-2. The SLV fails less than a minute after launch.

**October 2006:** North Korea conducts its first nuclear test.

**April 2009:** North Korea launches another SLV and claims the rocket put a satellite into orbit.

**May 2009:** North Korea conducts its second nuclear test.

**March 2010:** South Korean navy ship Cheonan is sunk near the maritime border of the two Koreas.

**November 2010:** North Korea fires artillery rounds at the South Korean island of Yeonpyeong, killing two soldiers, two civilians and and injuring about 20 people.

**April 2012:** North Korea launches another SLV. It falls apart after about 90 seconds.

**December 2012:** North Korea launches an SLV and claims to put a satellite into orbit. The North American Aerospace Defense Command confirms an object achieved orbit.

**February 2013:** North Korea carries out its third nuclear test.

**March 2014:** North Korea test-fires two medium-range Rodong missiles, violating UN sanctions.

**March 2014:** North and South Korea exchange artillery fire in the disputed Western Sea border.

**February 2015:** North Korea claims to test a new anti-ship missile.

**May 2015:** North Korea claims to test a submarine-launched ballistic missile (SLBM), but outside observers say the launch was likely from a submerged barge.

**November 2015:** North Korea reportedly tests SLBM.

**December 2015:** North Korea reportedly tests another SLBM.

**January 2016:** North Korea conducts its fourth nuclear test, claiming to have detonated a hydrogen bomb for the first time.

**February 2016:** North Korea launches another SLV.

**April 2016:** North Korea launches intermediate-range Musudan missiles on April 15 and 28, which reportedly fail.

**April 2016:** North Korea test-fires SLBM, apparently successfully.

**May 2016:** North Korea launches Musudan again, fails again.

## **Executive Summary**

North Korea's nuclear and missile programs have spurred Japan and South Korea to develop their own ballistic missile defense (BMD) systems and to regenerate their interest in regional missile defense cooperation with the United States. Has North Korea reacted to such developments, and if so, how? This paper looks at North Korea's official proclamations as well as its missile capacity development and concludes that while Pyongyang does not believe that it is the region's sole target for U.S. and allied BMD, it feels deeply threatened by its deployment. Existing and potential BMD systems have not discouraged Pyongyang from building its own missiles. Rather, North Korea is continuing its efforts to improve and expand its missile arsenal to develop a survivable force, likely perceiving BMD systems as part of an overall U.S. strategy that is hostile to Pyongyang.

## **Introduction**

North Korea is believed to have begun developing its missile capability in the 1960s, and has acquired proficiency in a short time for a country of its technological and economic level.<sup>288</sup> By 1984, Pyongyang had reverse-engineered the Scud-B and flight-tested its own version, dubbed the Hwasong-5, with a range of 320 kilometers. By the early 1990s it was producing the 1,500-km range Nodong missile.<sup>289</sup> Currently, the country is believed to have as many as 1,000 missiles that can target its neighbors,<sup>290</sup> and is continuing to develop longer-range missiles that could threaten the continental United States.

The speed at which North Korea has acquired missile proficiency is often attributed to a combination of determination, foreign assistance and technology exchanges with countries such as Egypt, Iran, Libya, Pakistan, Syria and possibly Iraq.<sup>291</sup> Pyongyang has also sold its ballistic missile systems, missile parts, and materials to other Third World nations.<sup>292</sup>

To counter the threat posed by North Korea's improved missile capability, the United States has expanded its deployment of BMD assets in the Asia-Pacific region.<sup>293</sup> The North Korean threat has also led U.S. allies Japan and South Korea to acquire their own BMD capabilities and spurred some interest in regional cooperation.<sup>294</sup>

How has North Korea reacted to these developments? Have the North Koreans changed the pace of their missile program development because of American and allied ballistic missile defense? This paper explores these questions through an analysis of North Korea's comments and actions. The paper will first examine North Korea's official pronouncements on the topic, followed by its efforts in missile capability enhancement. It will then discuss the various interpretations of North Korea's words and actions and conclude with an analysis of its possible motivations.

## **What North Korea has Said**

North Korea's official media pronouncements argue that the deployment of American and allied BMD systems will provide a powerful shield for the United States that would make it easier for the country to attack North Korea.<sup>295</sup> For example, Minju Joson, the government newspaper, says in a July 2006 commentary:

What the U.S. is after is to freely carry into action its preemptive strike strategy after setting up a colossal missile defense system at every strategic vantage and binding other countries hand and foot to neutralize their means of retaliation.<sup>296</sup>

Regardless of whether the comments are made by a Foreign Ministry official, or in the form of an opinion piece in newspapers affiliated with the government or the ruling Workers' Party of Korea, they are also consistent in their argument that North Korea and Iran are not the only targets of U.S. BMD. The commentaries argue that the systems' cost and geographical scope indicate that the United States has a larger plan aimed particularly at containing China and Russia. The Korean Central News Agency (KCNA) said in a commentary in July 2013:

The U.S. moves to establish a missile defense system (MD) in the Asia-Pacific region is a clear indication of its sinister intention to contain the powers and maintain and further strengthen its military hegemony in the region. ... The U.S. is pushing ahead with its MD in a bid to stifle the DPRK any time and to contain the regional powers. The MD operational range covers the powers and the strategic vantage points in the Asia-Pacific region. The U.S. moves to build a missile shield is, in essence, the establishment of a powerful missile attack system to target the Eurasian continent.<sup>297</sup>

The argument frequently used in the commentaries is that American and allied BMD systems are aimed at weakening or disabling the strategic deterrent forces of the Asia-Pacific region and upsetting the regional security balance.<sup>298</sup> The commentaries also often argue that the United States is only using missile threats from North Korea as an excuse to deploy BMD assets in the region<sup>299</sup> and that Washington is trying to spark an arms race.<sup>300</sup>

North Korea has been less vocal about whether it views U.S. ballistic missile defense as being technically reliable. While a Foreign Ministry spokesman said in a 2007 statement that the system's "technical effectiveness has not yet been fully certified"<sup>301</sup> and a spokesman for the National Defense Commission's Policy Department called BMD defense assets in South Korea "threadbare"<sup>302</sup> in a 2013 statement, these comments are the exception rather than the rule in official pronouncements.

As for how to counter what North Korea sees as systems hostile to its defense, the commentaries argue that North Korea has no choice but to strengthen its military power. A spokesman for the Nationwide Emergency Measure Committee against Nuclear War Exercises against the North said in a statement in 2014:

We will never remain an on-looker to the U.S. and the puppet forces' moves to deploy THAAD and build MD but resolutely counter them by bolstering the nuclear deterrence in every way to defend the security of the nation and the regional peace.<sup>303</sup>

The spokesman was reacting to discussions about the United States deploying the Terminal High-Altitude Area Defense (THAAD) system in South Korea. What can be gleaned from a reading of North Korean statements is that the country sees the deployment of American and allied BMD systems as a serious threat, even if it is not their only target, and that it needs to develop a stronger capability to deal with the threat.

### **What North Korea has Done**

In recent years, North Korea placed more political emphasis on its missile development and also made actual progress in improving the quantity and quality of its arsenal. On the political front, North Korea renamed and elevated the status of its Missile Guidance Bureau to Strategic Rocket Force in 2012, underscoring the importance it places on its missile program. The new unit is believed to have the same status as the North Korean ground forces, Navy, Air and Anti-Air Force, making up the fourth force within the Korean People's Army.<sup>304</sup>

North Korea has also been publicizing its missile development efforts to the domestic public and the outside world more forcefully than previously. The country's official media has repeatedly published articles on leader Kim Jong Un observing missiles drills since 2014, a highly unusual move until that time.<sup>305</sup> This trend has continued. In a more recent example of such coverage, Kim visited a facility that contained a number of ballistic missiles, a compact nuclear weapon and a reentry body in March 2016.<sup>306</sup> During this visit, Kim said that the country has successfully miniaturized a nuclear warhead to fit on a missile, a necessary requirement for an operational ballistic missile-based nuclear capacity.<sup>307</sup> The state media's pronouncements have not always been independently confirmed.

On the technical side, North Korea has conducted a large number of missile tests after announcing an end to its moratorium on long-range missile testing in 2005,<sup>308</sup> making considerable technical progress. The moratorium had been in place since September 1999, when North Korea agreed to maintain it while talks with the United States on its missile program continued. The two countries came close to negotiating a comprehensive missile agreement, but time ran out for the administration of Bill Clinton to reach such a deal.<sup>309</sup>

Test-firing of missiles has led to the improvement of North Korea's Taepodong-2, a militarized version of the Unha SLV. The rocket, which if reconfigured as a missile could reach the continental United States, successfully put a satellite into orbit in December 2012, after three failed tests since July 2006. This also followed the failure of the 1998 test-firing of the Taepodong-1, which has a slightly shorter range.<sup>310</sup> Whether it can be used successfully as a missile is still questionable, as North Korea likely continues to face technical hurdles such as the development of a reliable reentry vehicle that can withstand atmospheric entry and carry a weapon to its target.<sup>311</sup>

Yet another important development in recent years is North Korea's efforts to diversify its missile force, particularly through the development of systems with greater mobility to enhance its survivability.<sup>312</sup>

This includes the development of road-mobile missiles with longer ranges, such as the Musudan intermediate-range ballistic missile and KN-08 intercontinental ballistic missile.<sup>313</sup> These missiles can reach American bases in Guam and the continental United States respectively.<sup>314</sup> North Korea conducted its third round of test-firing of the Musudan in May, but it ended in failure.<sup>315</sup>

Pyongyang has also tried to enhance the survivability of its nuclear and missile force through work on solid fuel rocket technology that would make its missiles quicker to launch and easier to store and transport.<sup>316</sup> This includes efforts to extend the range of the short-range KN-02 missile.

North Korea is believed to have used solid fuel in the test in April of a submarine-launched ballistic missile (SLBM) that flew a distance of about 30 kilometers.<sup>317</sup> The test was believed to have been successful, following several previous failures.<sup>318</sup> The development of North Korean SLBMs would be significant, as hard-to-detect submarines would give North Korea a second strike capability, or the ability to withstand a first strike and retaliate.

In addition, Pyongyang may also be developing an SLV that is larger than the existing Unha while also upgrading its satellite launching station in an effort to deploy ballistic missiles with a longer range than the existing Taepodong-2.<sup>319</sup>

### **What We Don't Know**

The previous two portions of this paper showed that North Korea likely perceives the deployment of American and allied ballistic missile defense as a significant threat to the country, and that Pyongyang

has grown its own missile capability over the years. However, reaching a conclusion as to whether there is a cause and effect at work—that is, whether BMD is fueling North Korea’s missile development—is complicated by two factors.

First is that from the outside looking in, it is difficult to separate the threat that North Korea perceives from the deployment of American and allied BMD assets from other types of external threats.

Two events are believed to have convinced North Korea that nuclear weapons are crucial for its survival; the U.S. attack on Libya in March 2011, eight years after it successfully pressured Libya to abandon its weapons of mass destruction programs; and the Israeli airstrike in 2007 on the North Korean reactor under construction in Syria.<sup>320</sup> Is North Korea’s drive to improve its missile capability fueled fundamentally by such threat perceptions, rather than any U.S. actions on BMD? Or is the threat from U.S. and allied BMD the primary factor accelerating Pyongyang’s efforts to acquire a stronger deterrent?

The second factor is that while North Korea’s efforts to strengthen its missile capability could well be a reaction to the deployments of U.S. and allied BMD systems, it could also have its origins in its inherent weakness.

Some analysts point out that North Korea can never be confident of its ability to protect a small nuclear arsenal due to its geographical size, economic level and the degree of technical sophistication, and would logically have to continue building its nuclear and missile capability.<sup>321</sup> According to this view, North Korea will never achieve an assured second strike capability as it is too small to achieve the geographical dispersion of weapons that was pursued by the Soviet Union and too poor to build an effective SLBM force or capable air defense.<sup>322</sup>

Interpretations of North Korea’s words and actions on the nuclear and missile developments vary. The U.S. Department of Defense believes that Pyongyang needs its nuclear and missile programs as “a credible deterrence capability essential to its survival, sovereignty, and relevance” and for supporting “its coercive military threats and actions.”<sup>323</sup> Other analysts believe that North Korea’s current strategy is based on a policy to pursue a more credible assured retaliation capability, but worry that it could evolve into one that includes options for the limited initial use of nuclear weapons aimed at bolstering the credibility of its deterrence.<sup>324</sup> Yet others have said that North Korea’s hostile statements on American and allied ballistic missile defense deployments may not have been just harsh rhetoric, but a means to stake out a bargaining position when Pyongyang was still holding talks with five other countries on its nuclear programs, the last round of which was held in December 2008.<sup>325</sup>

## **Conclusion**

North Korea’s official pronouncements on BMD assets of the United States and its allies show that it perceives them as a serious threat. Pyongyang suspects that the expensive and geographically dispersed U.S. system is aimed not only at countries like itself and Iran, but also at China and Russia. However, it sees the effort as part of overall U.S. policy that is hostile to the country and perceives the need to strengthen its military capability to counter it.

North Korea has carried out a number of significant activities in missile development in recent years. On the political front, it has raised the profile of its missile unit and publicized its missile development efforts in a way that it has not done before. On the technical side, it has carried out an increasing number of missile tests and made efforts to diversify its missile force.

It is difficult to separate the threat North Korea perceives from U.S. and allied BMD systems from other external threats, and to differentiate whether North Korea is strengthening its missile force in reaction to U.S. BMD systems or to make up for its inherent weaknesses. However, judging from its words and actions, North Korea is likely working to develop a stronger missile force at least partly due to the threat it faces from U.S. and allied BMD efforts, perceiving it as part of an overall U.S. policy against the country.

---

<sup>1</sup> Thomas Karako, "Missile Defense and Deterrence," *Global Forecast 2016*, Center for Strategic and International Studies, 99-100.

<sup>2</sup> Can Kasapoglu, "The Military Strategic Rationale of Turkey's T-Loramids Project and the Eurosam Offer," Fondation pour la Recherche Strategique, *Recherches and Documents*, No. 1, 2014.

<sup>3</sup> *Ibid.*, 10.

<sup>4</sup> "Syria," *Nuclear Threat Initiative*, August 2014, <http://www.nti.org/country-profiles/syria/delivery-systems/>.

<sup>5</sup> Paul K. Kerr, Steven A. Hildreth, and Mary Beth D. Nikitin, "Iran-North Korea-Syria Ballistic Missile Nuclear Cooperation," *Congressional Research Service*, February 26, 2016, 3-5, <https://www.fas.org/sgp/crs/nuke/R43480.pdf>.

<sup>6</sup> "Syria: Missile," Country Profiles, NTI, August 2014, at: <http://www.nti.org/country-profiles/syria/delivery-systems/>

<sup>7</sup> "Russia Sends More Advanced Missiles to Aid Assad," *The New York Times*, May 16, 2013.

<sup>8</sup> Kasapoglu, 21.

<sup>9</sup> *Ibid.*, 10-11.

<sup>10</sup> *Ibid.*, 21-22.

<sup>11</sup> *Ibid.*, 2014, 11-12.

---

<sup>11</sup> Ann Barnard and Eric Schmitt, “Hezbollah Moving Long-Range Missiles from Syria to Lebanon, an Analyst Says,” *The New York Times*, January 2, 2014, <http://www.nytimes.com/2014/01/03/world/middleeast/hezbollah-is-said-to-transfer-missiles.html>.

<sup>12</sup> Kasapoglu, 2014, 14.

<sup>13</sup> Ugar Ergan, “NATO’s Patriots fail to stop Syrian missiles hitting Turkey,” *Hurriyet Daily News*, March 26, 2015, <http://www.hurriyetdailynews.com/natos-patriots-fail-to-stop-syrian-missile-hitting-turkey.aspx?pageID=238&nID=80205&NewsCatID=341>.

<sup>14</sup> Ibid.

<sup>15</sup> “ISIS fighters seen with advanced anti-aircraft missiles,” *Al Arabiya*, October 28, 2014, <http://english.alarabiya.net/en/News/middle-east/2014/10/28/ISIS-fighters-seen-with-sophisticated-antiaircraft-missiles.html>; Kirk Semple and Eric Schmitt, “Missiles of ISIS may pose peril for aircrews in Iraq,” *The New York Times*, October 26, 2014, <http://www.nytimes.com/2014/10/27/world/middleeast/missiles-of-isis-may-pose-peril-for-aircrews.html>.

<sup>16</sup> “US-made Stinger missiles have likely fallen into ISIS hands, officials say,” *Fox News*, June 16, 2014, <http://www.foxnews.com/world/2014/06/16/us-made-stinger-missiles-have-likely-fallen-into-isis-hands-officials-say.html>.

<sup>17</sup> “TSK, Kilis’teki Patlama Sonrasi Suriye’deki ISID Mevzilerini Vurdu,” *Haberler.com*, January 18, 2016; and “ISID fuzeleri Kilis’i vurdu: Bir kadın bir çocuk oldu, uc yaralı,” *ABNA*, March 8, 2016, <http://tr.abna24.com/service/important/archive/2016/03/08/739761/story.html>.

<sup>18</sup> Jeremy Binny, “Iskander missile launcher spotted in Syria,” *IHS Jane’s 360*, March 31, 2016, <http://www.janes.com/article/59182/iskander-missile-launcher-spotted-in-syria>.

<sup>19</sup> Ercan Gurses and Suleiman al-Khalidi, “Missiles in Syria kill 50 as schools, hospitals hit, Turkey accuses Russia,” *Reuters*, February 16, 2016, <http://www.reuters.com/article/us-mideast-crisis-syria-turkey-idUSKCN0VO0H2>; “Esed ve Rusya IHH’nin yardım depolarını vurdu,” *TRT Haber*, January 10, 2016, <http://www.trthaber.com/haber/dunya/esed-ve-rusya-ihh-nin-yardim-depolarini-vurdu-228524.html>; Sam Dagher, “At least 65 Syrians Killed in Government Attack,” *The Wall Street Journal*, October 30, 2015, <http://www.wsj.com/articles/at-least-50-syrians-killed-in-government-attack-1446205919>; “Turkey condemns attack on Syrian Turkmen village, summons Russian envoy,” *Hurriyet Daily News*, November 20, 2015, <http://www.hurriyetdailynews.com/turkey-condemns-attack-on-syrian-turkmen-village-summons-russian-envoy-.aspx?pageID=238&nID=91459&NewsCatID=352>.

<sup>20</sup> See “Russian cruise missiles hit ISIS from Mediterranean & Caspian; 600 killed in one strike,” *RT*, November 20, 2015, <https://www.rt.com/news/322881-russia-cruise-missiles-isis/>; Christopher P. Cavalas, “Russian Submarine Hits Targets in Syria,” *Defense News*, December 9, 2015, <http://www.defensenews.com/story/breaking-news/2015/12/08/submarine-russia-kalibr-caliber-cruise-missile-syria-kilo/76995346/>; Thomas Gibbons-Neff, “Pentagon: Some Russian cruise missiles crashed in Iran,” *The Washington Post*, October 8, 2015, <https://www.washingtonpost.com/news/checkpoint/wp/2015/10/07/these-are-the-cruise-missiles-russia-just-sent-into-syria/>; Adam Withnall, “Russian cruise missile ‘deviates from flight path,’ accidentally hits Russian village,” *The Independent*, December 15, 2015, <http://www.independent.co.uk/news/world/europe/russian-cruise-missile-goes-astray-lands-near-village-a6774506.html>.

<sup>21</sup> Key types are Oghab (35-45 km), Fajr 3 (43 km), and Fajr 5 (75-80 km). Anthony H. Cordesman, *Iran’s Rocket and Missile Forces and Strategic Options* (Washington, DC: Center for Strategic and International Studies, 2014), ii-iii.

<sup>22</sup> Kerr, Hildreth, and Nikitin, 2-3.

<sup>23</sup> Cordesman, ii.

<sup>24</sup> Kasapoglu, 2014, 19.

<sup>25</sup> John Chipman, “Iran’s Ballistic Missile Capabilities: A Net Assessment-Press Statement,” *The International Institute for Strategic Studies*, May 10, 2010, <http://www.iiss.org/publications/strategic-dossiers/irans-ballistic-missile-capabilities/press-statement/>.

<sup>26</sup> Cordesman, iv.

<sup>27</sup> Kasapoglu, 2014, 19.

<sup>28</sup> *Ballistic & Cruise Missile Threat*, (Wright-Patterson Air Force Base, OH: National Air and Space Intelligence Center, 2013), 6-17, <https://info.publicintelligence.net/NASIC-BallisticMissileThreat.pdf>.

<sup>29</sup> Dennis M. Gormley, “Dealing with the Threat of Cruise Missiles,” *The Adelphi Papers* 41, no 339 (2001): 27, <http://www.tandfonline.com/doi/pdf/10.1080/05679320108457650>.

<sup>30</sup> Alon Ben-David, “Iran Produces First Long-Range Cruise Missile,” *Aviation Week*, March 14, 2015, <http://aviationweek.com/defense/iran-produces-first-long-range-missile>.

<sup>31</sup> “Iranian Missile Messages: Reading Between the Lines of ‘Great Prophet 6,’” *Arms Control Association*, July 12, 2011, <https://www.armscontrol.org/issuebriefs/Iranian-Missile-Messages>.

---

<sup>32</sup> Jaganath Sankaran, *The United States' European Phased Adaptive Approach Missile Defense System: Defending Against Iranian Threats Without Diluting the Russian Deterrent* (Santa Monica, CA: RAND Corporation, 2015), 10, [http://www.rand.org/pubs/research\\_reports/RR957.html](http://www.rand.org/pubs/research_reports/RR957.html).

<sup>33</sup> "Iran claims to have tested 'very special weapon'" *IHS Jane's 360*, March 5, 2015.

<sup>34</sup> Jeremy Binnie, "Iran unveils extended range Fateh ballistic missile," *IHS Jane's 360*, August 26, 2015, <http://www.janes.com/article/53816/iran-unveils-extended-range-fateh-ballistic-missile>.

<sup>35</sup> "US to raise Iranian missile test at UN Security Council," *Reuters*, October 14, 2015, <http://www.reuters.com/article/us-iran-missiles-usa-un-idUSKCN0S72ET20151014>. The UNSC Resolution 1929, adopted in 2010, stated that "Iran shall not undertake any activity related to ballistic missiles capable of delivering nuclear weapons, including launches using ballistic missile technology, and that States shall take all necessary measures to prevent the transfer of technology or technical assistance to Iran related to such activities."

<sup>36</sup> "Russia says Iran missile tests do not violate UN resolution," *RT News*, March 30, 2016, <https://www.rt.com/news/337753-iran-missile-tests-un/>.

<sup>37</sup> Sankaran, 13.

<sup>38</sup> Cordesman, vi.

<sup>39</sup> Michael Elleman, "Iran's Ballistic Missile Program," *The Iran Primer*, United States Institute of Peace, <http://iranprimer.usip.org/resource/irans-ballistic-missile-program>.

<sup>40</sup> "Iran Test-Fires a New, Precision-Guided Ballistic Missile," *NPR*, October 11, 2015, <http://www.npr.org/sections/thetwo-way/2015/10/11/447783979/iran-test-fires-a-new-precision-guided-ballistic-missile>.

<sup>41</sup> *Iran's Nuclear and Missile Potential: A Joint Threat Assessment by U.S. and Russian Technical Experts* (Washington, DC: East West Institute, 2009), 10.

<sup>42</sup> "Iran says deployment of NATO shield in Turkey 'inefficient'," *ISNA*, September 22, 2011, <http://www.isna.ir/ISNA/NewsView.aspx?ID=News-1853212&Lang=E>.

<sup>43</sup> Karen Kaya, "Turkey-Iran Relations after the Arab Spring," Foreign Military Studies Office, Joint Reserve Intelligence Center, September 2012, 8.

<sup>44</sup> "ASELSAN Contributes to Air Defense of Europe," *ASELSAN*, August 13, 2015, <http://www.aselsan.com.tr/en-us/press-room/news/Pages/ASELSANContributestoAirDefenceofEurope20150813.aspx>.

<sup>45</sup> Mustafa Kibaroglu, "NATO'nun Balistik Fuze Savunma Sistemi ve Turkiye," *Uluslararası İlişkiler* 9, no. 34 (Summer 2012), 193-195; "Erdogan: Fuze kalkani butonuna kim basacak?" *Vatan*, November 11, 2010, <http://www.gazetevatan.com/erdogan--fuze-kalkaninin-butonuna-kim-basacak-339967-gundem/>.

<sup>46</sup> Mustafa Kibaroglu, "Between Allies and Rivals: Turkey, Nuclear Weapons, and BMD," *Proliferation Papers*, no. 49, 2014, 28, <http://www.ifri.org/sites/default/files/atoms/files/pp49kibaroglu.pdf>.

<sup>47</sup> Kibaroglu, 30.

<sup>48</sup> Author interview with Professor Mustafa Kibaroglu, MEF University, February 2, 2015, Istanbul, Turkey.

<sup>49</sup> Defense Science Board, "Science and Technology Issues of Intercept Ballistic Missile Defense Feasibility," September 2011, <http://www.acq.osd.mil/dsb/reports/ADA552472.pdf>.

<sup>50</sup> Sydney J. Freedberg Jr, "Raytheon's Tippy Two Radar Gets Back in the Budget," *Breaking Defense*, March 15, 2013, <http://breakingdefense.com/2013/03/15/raytheons-tippy-two-radar-gets-back-in-the-budget-knock-on/>.

<sup>51</sup> Barbara Opall-Rome, "US Maintains full control of the Turkish-based radar," *Defense News*, January 30, 2012, <http://www.defensenews.com/article/20120130/DEFREG04/301300013/U-S-Maintains-Full-Control-Turkish-Based-Radar>.

<sup>52</sup> Steven J. Whitmore and John R. Deni, *NATO Missile Defense and the European Phased Adaptive Approach: The Implications of Burden Sharing and the Underappreciated Role of the U.S. Army* (Carlisle, PA: Strategic Studies Institute and U.S. Army War College Press, October 2013), 29-31.

<sup>53</sup> Whitmore and Deni, 12.

<sup>54</sup> Whitmore and Deni, 43; The forward based X-band (FBX) radar has a 9.2 m<sup>2</sup> antenna, much smaller than the European midcourse radar (EMR) in Czech Republic (105 m<sup>2</sup> antenna) and the low-frequency (UHF) early warning radar at Fylingdales, England (750 m<sup>2</sup> antenna.). *Iran's Nuclear and Missile Potential: A Joint Threat Assessment by U.S. and Russian Technical Experts*, 12.

<sup>55</sup> Robin Emmott, "NATO agrees Turkey air defense package, seeks 'predictability,'" *Reuters*, December 18, 2015, <http://www.reuters.com/article/us-mideast-crisis-turkey-nato-exclusive-idUSKBN0U123520151218>.

<sup>56</sup> Esteban Villarejo, "Spain to Stay with Patriots in Turkey, Italy Could Deploy Samp/T Missiles," *Defense News*, December 28, 2015, <http://www.defensenews.com/story/defense/2015/12/28/spain-stay-patriots-turkey-italy-could-deploy-sampt-missiles/77965082/>.

- 
- <sup>57</sup> On Turkish Armed Forces' defense systems manufacturer ASELSAN's national defense missile deal, see: "Aselsan'dan dev milli füze anlaşması," *Bugun*, June 22, 2011, <http://www.bugun.com.tr/haber-detay/159882-aselsan-dan-dev-milli-fuze-adimi-haberi.aspx>; and "Milli füze ureteceğiz," *Sabah*, June 21, 2011, <http://www.sabah.com.tr/Ekonomi/2011/06/21/milli-fuze-uretecegiz>.
- <sup>58</sup> Author's email exchange with Dr. Can Kasapoglu, September 25, 2015.
- <sup>59</sup> Dr. Sartuk Karasoy, Vice President, ROKETSAN, "Stratejik Hava Savunma Sistemleri ve Türkiye'nin Yol Haritası," SETA Ankara, October 25, 2015, <http://setav.org.tr/stratejik-hava-savunma-sistemleri-ve-turkiyenin-yol-haritasi/etkinlikler/31233>; The Roketsan design divides the combustion chamber into two with a barrier, allowing the firing of fuel in each chamber at different times, providing a tactical advantage in air defense against high speed targets by increased speed and high maneuverability. Omer Cakir, "Cok Darbeli Motor Teknolojileri ile Itki Kontrolu," *Roketsan Dergisi*, February 2013, 16-17, <http://www.roketsan.com.tr/wp-content/uploads/2014/01/RoketsanDergisi-Ocak2013-2.pdf>.
- <sup>60</sup> "Turkey: Defense White Paper 2000," <http://www.isn.ethz.ch/Digital-Library/Articles/Special-Feature/Detail/?lng=en&id=154907>.
- <sup>61</sup> Burak Ege Bekdil, "Turkey plots path toward space command," *Defense News*, April 9, 2013, <http://www.defensenews.com/article/20130409/DEFREG01/304090011/Turkey-Plots-Path-Toward-Space-Command>.
- <sup>62</sup> "SSM to Form 2020's Defense Industry Policy," *Defense Turkey*, Issue 63, September 14, 2015, <http://www.defenceturkey.com/?p=article&i=2090#.Vfs6OYtN3zl>
- <sup>63</sup> "Turkey abandons decision to purchase Chinese missile defense system," *Hurriyet Daily News*, November 15, 2015, <http://www.hurriyetdailynews.com/turkey-abandons-decision-to-purchase-chinese-missile-defense-system.aspx?PageID=238&NID=91165&NewsCatID=345>.
- <sup>64</sup> Burak Ege Bekdil, "Turkey Mulls Stopgap Air Defense Acquisition," *Defense News*, December 12, 2015, <http://www.defensenews.com/story/defense/air-space/2015/12/12/turkey-mulls-stopgap-air-defense-acquisition/76976836/>.
- <sup>65</sup> "Multinational Ballistic Missile Defense Conference," Prepared Remarks by Frank A. Rose, Assistant Secretary, Bureau of Arms Control, Verification, and Compliance, Seville, Spain, October 6, 2015, <http://www.state.gov/t/avc/rls/2015/248035.htm>.
- <sup>66</sup> Ian O. Lesser, "The New Look in Missile Defense: Thinking through Turkish Stakes," *The German Marshall Fund of the United States*, September 28, 2009, <http://www.gmfus.org/publications/new-look-missile-defense-thinking-through-turkish-stakes>.
- <sup>67</sup> "Ankara'dan flaş füze kararı," *Milliyet*, February 19, 2015, <http://www.milliyet.com.tr/ankara-dan-flas-fuze-karari/ekonomi/detay/2016327/default.htm>.
- <sup>68</sup> Ahmet Han and Can Kasapoglu, "Turkey's New Missiles of October: Defense Modernization or Political Statement?" *The German Marshall Fund of the United States*, March 12, 2015.
- <sup>69</sup> Author's interview with a senior executive at the Undersecretariat for Defense Industries (SSM), February 6, 2015, Ankara, Turkey.
- <sup>70</sup> Michael Kaplan, "Turkey Weighs New Defense Technology Amid Growing Regional Tensions," *International Business Times*, February 24, 2016.
- <sup>71</sup> "Confusion over Turkey's air defense system," *Hurriyet Daily News*, March 1, 2016.
- <sup>72</sup> Gustav Lindstrom, "Europe and Missile Defense," in *Regional Missile Defense from a Global Perspective*, ed. Catherine McArdle Kelleher and Peter Dombrowski, (Stanford: Stanford University Press, 2015).
- <sup>73</sup> "Options for Deploying Missile Defenses in Europe," Congressional Budget Office, February 2009, p. 19.
- <sup>74</sup> RDML Randall M. Hendrickson, "European Phased Adaptive Approach (EPAA) Ballistic Missile Defense: A Technical Overview, Missile Defense Agency, May 3-4, 2012, <http://photos.state.gov/libraries/russia/231771/PDFs/EPAA%20Technical%20Overview%20ENG.pdf>.
- <sup>75</sup> The US has a THAAD system in Guam against threats from North Korea, one in the Gulf, and three in strategic reserve. Author's interview with a former executive from the Undersecretariat for Defense Industries (SSM), January 30, 2015, Ankara, Turkey.
- <sup>76</sup> M.K. Kaya, "How much security will NATO's missile defense shield provide for Turkey?" *Turkey Analyst* 5, no.2, (January 23, 2012), <http://www.silkroadstudies.org/new/inside/turkey/2012/120123A.html>.
- <sup>77</sup> "A System of Elements," Missile Defense Agency, U.S. Department of Defense, <http://www.mda.mil/system/elements.html>.
- <sup>78</sup> Sankaran, 16.
- <sup>79</sup> Ibid., 17.
- <sup>80</sup> Ibid., 19-20.
- <sup>81</sup> Ibid., 21-22.

- 
- <sup>82</sup> Zachary Keck, "NATO Beware: Turkey May Buy Russia's S-300 Air Defense System," *The National Interest*, May 6, 2015, <http://nationalinterest.org/blog/the-buzz/nato-beware-turkey-may-buy-russias-s-300-air-defense-system-12822>.
- <sup>83</sup> Dr. Sartuk Karasoy.
- <sup>84</sup> Author's interview with Assist. Prof. Sebnem Udum, Hacettepe University, January 30, 2015, Ankara, Turkey.
- <sup>85</sup> Author's interview with a former executive from the Undersecretariat for Defense Industries (SSM), January 30, 2015, Ankara, Turkey.
- <sup>86</sup> Author's interview with senior official at the Turkish Ministry of Foreign Affairs' Center for Strategic Research (SAM), February 6, 2015, Ankara, Turkey.
- <sup>87</sup> Lieutenant General Salih Ulusoy, "Alliance and Standing Together Against Regional Threats," Defense and Security Affairs Panel, 34<sup>th</sup> Annual U.S.-Turkey Relations Conference, American Turkish Council, Washington D.C., September 28, 2015.
- <sup>88</sup> Michael Gilmore, "Ballistic Missile Defense Test and Evaluation," Center for International and Security Studies at Maryland (CISSM) Forum, University of Maryland, November 19, 2015.
- <sup>89</sup> Stephen I. Schwartz, "The Real Price of Ballistic Missile Defenses," *WMD Junction*, April 13, 2012, [http://wmdjunction.com/120413\\_missile\\_defense\\_costs.htm](http://wmdjunction.com/120413_missile_defense_costs.htm). See also: Edward-Isaac Dove, "Missile Defense Debate Reignites," *Politico*, April 13, 2012, <http://www.politico.com/story/2012/04/missile-defense-debate-reignites-075090>.
- <sup>90</sup> "Ballistic Missile Defense," *North Atlantic Treaty Organization*, May 20, 2012, [http://www.nato.int/nato\\_static/assets/pdf/pdf\\_topics/20120520\\_media-backgrounder\\_NATO\\_ballistic\\_missile\\_defence\\_en.pdf](http://www.nato.int/nato_static/assets/pdf/pdf_topics/20120520_media-backgrounder_NATO_ballistic_missile_defence_en.pdf); and Lindstrom, 114.
- <sup>91</sup> Rachel Oswald, "Next Phases of European Missile Shield on Track: DOD," *Global Security Newswire*, March 13, 2013, <http://www.nti.org/gsn/article/next-phases-european-missile-shield-track-pentagon/>
- <sup>92</sup> Burak Ege Bekdil, "US, Germany to Withdraw Patriots from Turkey," *Defense News*, August 17, 2015, <http://www.defensenews.com/story/defense/land/weapons/2015/08/17/us-germany-withdraw-patriots-turkey/31859885/>.
- <sup>93</sup> "US to Withdraw Patriot Missiles from Turkey," *Defense News*, August 17, 2015, <http://www.defensenews.com/story/defense/international/europe/2015/08/16/us-withdraw-patriot-missiles-turkey/31817279/>.
- <sup>94</sup> Burak Ege Bekdil, "US Begins Removing Patriot Missiles from Turkey," *Defense News*, October 11, 2015, <http://www.defensenews.com/story/defense/2015/10/11/us-begins-removing-patriot-missiles-from-turkey/73787688/>.
- <sup>95</sup> "US destroyer completes exercise with Turkish Navy," *Hurriyet Daily News*, November 8, 2015, <http://www.hurriyetdailynews.com/Default.aspx?pageID=447&GalleryID=2655>.
- <sup>96</sup> "US approves JDAM export to Turkey," *IHS Jane's 360*, October 29, 2015, <http://www.janes.com/article/55655/us-approves-jdam-export-to-turkey>.
- <sup>97</sup> Burak Ege Bekdil, "US Deploys Six F-15Cs to Turkish Base," *Defense News*, November 9, 2015, <http://www.defensenews.com/story/defense-news/2015/11/09/us-deploys-six-f-15cs-turkish-base/75455384/>.
- <sup>98</sup> Author's interview with a former high level Turkish defense official, January 30, 2015, Ankara, Turkey.
- <sup>99</sup> Beth M. McCormick, Director, Defense Technology Security Administration, U.S. Department of Defense, "Defense Trade Controls and Commercial Opportunity," Defense and Security Affairs Panel, 34<sup>th</sup> Annual U.S.-Turkey Relations Conference, American Turkish Council, Washington D.C., September 29, 2015.
- <sup>100</sup> Ibid.
- <sup>101</sup> Koksall Liman, Head of Department, Helicopter Projects, Undersecretariat for Defense Industries, "Defense Trade Controls and Commercial Opportunity," Defense and Security Affairs Panel, 34<sup>th</sup> Annual U.S.-Turkey Relations Conference, American Turkish Council, Washington D.C., September 29, 2015.
- <sup>102</sup> Krepon, Michael (2015). Nuclear Triangle, *Dawn*, <http://www.dawn.com/news/1166962>
- <sup>103</sup> This strategic utility of the Shaheen-III was made explicit by General Khalid Kidwai, the erstwhile Director General of Pakistan's Strategic Plans Division. "A Conversation with Gen. Khalid Kidwai", *Carnegie Endowment for International Peace*, accessible at <http://carnegieendowment.org/files/03-230315carnegieKIDWAI.pdf>
- <sup>104</sup> For a full report on the details of the Hatf-IX Nasr, see Rajaram Nagappa, Arun Vishwanathan, and Aditi Malhotra. 2013. Hatf- IX NASR- Pakistan's Tactical Nuclear Weapon: Implications for Indo-Pak Deterrence. *National Institute of Advanced Studies*. [http://issp.in/wp-content/uploads/2013/07/R17-2013\\_NASR\\_Final.pdf](http://issp.in/wp-content/uploads/2013/07/R17-2013_NASR_Final.pdf)
- <sup>105</sup> Ibid
- <sup>106</sup> Ibid. pg 31
- <sup>107</sup> Upadhyay, P.K. (2013), "The domination of Pakistan by Radical Islamists", *Institute of Defence Studies and Analyses*, [http://www.idsa.in/issuebrief/DominationofPakistan\\_PKUpadhyay1460713](http://www.idsa.in/issuebrief/DominationofPakistan_PKUpadhyay1460713)

- 
- <sup>108</sup> Romashkina, Natalia and Petr Topychkanov (2013), “Regional Missile Defence Programs (India, Israel, Japan, and South Korea)”, in Natalia Bubnova (ed), *Missile Defense: Confrontation and Cooperation*, Moscow: Carnegie Moscow Center. pg 303
- <sup>109</sup> Debalina Ghoshal, “India, Defeating the Cruise Missile Threat”, *The Diplomat*, accessed at <http://thediplomat.com/2013/10/india-defeating-the-cruise-missile-threat/>
- <sup>110</sup> The Chinese nuclear doctrine and posture can be accessed at a translation of China’s Nuclear Weapons Strategy (2015) by the Union of Concerned Scientists at <http://www.ucsusa.org/nuclear-weapons/us-china-relations/chinas-nuclear-weapons-strategy#.V2hIrbt97IU>; The Indian Nuclear Doctrine (2003) can be accessed at <http://pib.nic.in/archieve/lreng/lyr2003/rjan2003/04012003/r040120033.html>
- <sup>111</sup> Accessed at <http://www.tew.org/geography/t2000.nuclear.html>
- <sup>112</sup> Rajesh Rajagopalan, 2004. Missile Defences in South Asia: Much Ado about Nothing. *South Asian Survey* 11, no 2: 205-217, pg 211; Kumar, Vinod. 2008. A Phased Approach to India’s Missile Defence Planning. *Strategic Analysis* 32, no. 2: 171-195. Pg. 178
- <sup>113</sup> Rajesh Rajagopalan, 2004. Missile Defences in South Asia: Much Ado about Nothing. *South Asian Survey* 11, no 2: 205-217, pg 212
- <sup>114</sup> Rajesh Basrur, 2002. “Missile Defense and South Asia: An Indian Perspective”, in Michael Krepon and Chris Gagne (eds.) *The Impact of US Ballistic Missile Defenses on Southern Asia*, Washington: Henry L. Stimson Center. pg 2
- <sup>115</sup> Tellis, Ashley. 2006. The evolution of US-Indian ties: missile defense in an emerging strategic relationship. *International Security* 30, no. 4: 113-151. pg 129
- <sup>116</sup> These specifications were presented by Dean Wilkening (then at CISAC, Stanford University) at a presentation at the Centre for Air Power Studies, New Delhi in 2008. Quoted in Manpreet Sethi. 2009. *Nuclear Strategy: India’s March Towards Credible Deterrence*, New Delhi: Knowledge World. pg 225
- <sup>117</sup> Ibid
- <sup>118</sup> T. S. Subramanian. 2007. “Smashing Hit”, *Frontline*, 24 (25), [Online: web] Accessed 14 May 2013, accessed at <http://www.frontline.in/static/html/fl2425/stories/20080104242512300.htm>; Rajeswari Rajagopalan, (2011), “Missile Defence and Strategic Stability” [Online web], Accessed 8 July 2013, URL: <http://www.orfonline.org/cms/export/orfonline/documents/report/china-paper.pdf>.
- <sup>119</sup> Ibid. pg 4
- <sup>120</sup> Rajat Pandit. 2009, “India kicks off work on advanced missile defence shield”, *Times of India*, accessed at [http://articles.timesofindia.indiatimes.com/2009-03-10/india/28027742\\_1\\_interceptor-missile-missile-defence-bmd-system](http://articles.timesofindia.indiatimes.com/2009-03-10/india/28027742_1_interceptor-missile-missile-defence-bmd-system).
- <sup>121</sup> Press Trust of India. 2015. Indian Navy successfully test fires Barak-8 long range missile from INS Kolkata, *The Indian Express*, <http://indianexpress.com/article/india/india-news-india/navy-successfully-test-fires-barak-8-long-range-missile-from-ins-kolkata/>
- <sup>122</sup> Press Trust of India. 2016. “BEL and Thales to develop PHAROS fire control radar” *Economic Times*, <http://economictimes.indiatimes.com/news/defence/bel-thales-to-develop-pharos-fire-control-radar/articleshow/51600041.cms>
- <sup>123</sup> Missilethreat. 2016. S-400 Triumpf (SA-21 Growler), <http://missilethreat.com/defense-systems/s-400-sa-21-growler/>
- <sup>124</sup> Franz-Stefan Gady. 2015. India Cleared Purchase of Russian S-400 Missile Defense System, *The Diplomat*, accessed at <http://thediplomat.com/2015/12/india-cleared-purchase-of-russian-s-400-missile-defense-system/>
- <sup>125</sup> Franz-Stefan Gady. 2016. China makes advance payment for Russia’s S-400 Missile Defense System, *The Diplomat*, <http://thediplomat.com/2016/03/china-makes-advance-payment-for-russias-s-400-missile-defense-systems/>
- <sup>126</sup> Russia Beyond the Headlines. 2016. Russian S-400 Systems may stay in Syria for a while – Federation Council. [https://rbth.com/news/2016/03/15/russian-s-400-systems-may-stay-in-syria-for-a-while-federation-council\\_575905](https://rbth.com/news/2016/03/15/russian-s-400-systems-may-stay-in-syria-for-a-while-federation-council_575905)
- <sup>127</sup> Ministry of External Affairs (India). 2003. Indian Nuclear Doctrine
- <sup>128</sup> Multiple Independent Re-entry Vehicles
- <sup>129</sup> See Rajaram Nagappa et al. 2013 for further details.
- <sup>130</sup> P.K. Chakravorty. 2012. Impact of Pakistan’s TNWs. *Centre for land Warfare Studies*, Article no. 2257 (November 16), <http://www.claws.in/929/impact-of-pakistans-tnws-p-k-chakravorty.html>
- <sup>131</sup> Ashley Tellis. 2006. The evolution of US-Indian ties: missile defense in an emerging strategic relationship. *International Security*, 30(4), pp.113-151.
- <sup>132</sup> Atul Aneja. 2003. U.S. objects to sale of Arrow missiles to India. *The Hindu*. <http://www.thehindu.com/2003/09/08/stories/2003090805451100.htm>
- <sup>133</sup> See Richard Speier’s. 2003 “Arrows for India”. *The Washington Institute*. <http://www.washingtoninstitute.org/policy-analysis/view/arrows-for-india>

- 
- <sup>134</sup> Dawn. 2002. Missile Sale to India will hike tension. <http://www.dawn.com/news/55552/missile-sale-to-india-will-hike-tension>
- <sup>135</sup> Manpreet Sethi. 2009. *Nuclear Strategy: India's March Towards Credible Deterrence*, New Delhi: Knowledge World. pg 232
- <sup>136</sup> Ibid 232-3
- <sup>137</sup> Lala Qadir. 2015. United States and India Sign a 10-year Defense Agreement and Set the Stage for Increased Defense Cooperation. <https://www.globalpolicywatch.com/2015/06/the-united-states-and-india-sign-a-10-year-defense-agreement-and-set-the-stage-for-increased-defense-cooperation/>
- <sup>138</sup> More on the questionable success of the US missile defense systems can be found in Dr. Theodore Postol and Dr. George Lewis's work.
- <sup>139</sup> Rajat Pandit. 2009. India kicks off work on advanced missile defence shield, *Times of India*. [http://articles.timesofindia.indiatimes.com/2009-03-10/india/28027742\\_1\\_interceptormissile-missile-defence-bmd-system](http://articles.timesofindia.indiatimes.com/2009-03-10/india/28027742_1_interceptormissile-missile-defence-bmd-system).
- <sup>140</sup> Chandrajit Banerjee. 2016. "Make in India in Defence". *Indian Express*. <http://indianexpress.com/article/opinion/columns/make-in-india-in-defence-dpp-2016-defexpo-cii-reports/>
- <sup>141</sup> Feroz H. Khan and Mansoor Ahmed. 2016. Pakistan and Counterforce Targeting, in Michael Krepon et al. (ed.) *The Lure and Pitfalls of MIRVs*. Stimson Center: DC
- <sup>142</sup> Akash Joshi. 2016. "Why an Indian Missile You Haven't Heard of Has Pakistan Worried". *The Quint*. <http://www.thequint.com/world/2016/05/24/why-an-indian-missile-you-havent-heard-of-has-pakistan-worried>
- <sup>143</sup> PTI, "US Senate fails to recognize India as a major strategic partner", *Indian Express*, <http://indianexpress.com/article/india/india-news-india/us-senate-fails-to-recognise-india-as-major-defence-partner-2854071/>
- <sup>144</sup> For more on the Obama administration's missile defense strategy, see Department of Defense, *Ballistic Missile Defense Review Report*, February 2010, [http://www.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630\\_for%20web.pdf](http://www.defense.gov/bmdr/docs/BMDR%20as%20of%2026JAN10%200630_for%20web.pdf).
- <sup>145</sup> The JCPOA was signed on July 14, 2015. Implementation Day, or the day that the IAEA certified that Iran has complied with the terms of the agreement sufficiently to receive sanctions relief, was January 16, 2016. For more on the JCPOA and the steps taken by Iran to comply with the agreement, see U.S. Department of State, "Joint Comprehensive Plan of Action," <http://www.state.gov/e/eb/tfs/spi/iran/jcpoa/>.
- <sup>146</sup> F. Gregory Gause, III, *The International Relations of the Persian Gulf*, (Cambridge: Cambridge University Press, 2010), 75-83.
- <sup>147</sup> Dennis M. Gormley, *Missile Contagion: Cruise Missile Proliferation and the Threat to International Security*, (Annapolis: Naval Institute Press, 2008), 17.
- <sup>148</sup> Ibid., 32-33.
- <sup>149</sup> Yoel Guzansky and Yiftah S. Shapir, "Iran Goes Ballistic," *Middle East Quarterly* (Winter 2015), [http://www.meforum.org/4911/iran-goes-ballistic#\\_ftn1](http://www.meforum.org/4911/iran-goes-ballistic#_ftn1).
- <sup>150</sup> Amos Harel and Avi Issacharoff, *34 Days: Israel, Hezbollah, and the War in Lebanon*, (New York: Palgrave Macmillan, 2008), 259.
- <sup>151</sup> Guzansky and Shapir.
- <sup>152</sup> Debra Kamin and Jessica Steinberg, "Tel Avivians show their soaring affection for the Iron Dome," *Times of Israel*, July 25, 2014, <http://www.timesofisrael.com/tel-avivians-show-their-soaring-affection-for-the-iron-dome/>.
- <sup>153</sup> Arms Control Association, "Appendix E: Iran's Ballistic Missiles and the Nuclear Deal," August 11, 2015, <https://www.armscontrol.org/reports/Solving-the-Iranian-Nuclear-Puzzle-The-Joint-Comprehensive-Plan-of-Action/2015/08/Appendix-E-Irans-Ballistic-Missiles-and-the-Nuclear-Deal>.
- <sup>154</sup> Ibid.
- <sup>155</sup> Shahryar Pasandideh, "Iran's Missile Forces are Increasing in Range, Accuracy and Lethality," *World Politics Review*, October 14, 2015, <http://www.worldpoliticsreview.com/articles/16942/iran-s-missile-forces-are-increasing-in-range-accuracy-and-lethality>.
- <sup>156</sup> The anxiety caused by the Pivot to Asia has been widely discussed. See, for instance, the report authored by Afshon Ostovar, on his PASCC project "Deterrence and the Future of U.S.-GCC Defense Cooperation: A Strategic Dialogue Event," *Center for Naval Analyses*, July 2015, <http://calhoun.nps.edu/handle/10945/45796>.
- <sup>157</sup> Richard Weitz, "U.S. Pushes Missile Defense to Reassure Gulf Partners," *World Politics Review*, August 4, 2015, <http://www.worldpoliticsreview.com/articles/16377/u-s-pushes-missile-defense-to-reassure-gulf-partners>.

---

<sup>158</sup> An example of major defense contractor interest in the Persian Gulf can be seen from Raytheon's vice president of integrated air and missile defense, who stated that "In 2008, when the United Arab Emirates placed an order for a significant number of Patriot fire units, that really kicked off the resurgence of Patriot." Angus Batey, "UAE is Driving Next Generation Patriot," *Aviation Week Network*, November 7, 2015, <http://aviationweek.com/dubai-air-show-2015/uae-driving-next-generation-patriot>.

<sup>159</sup> Weitz.

<sup>160</sup> Michael Elleman and Wafa Alsayed, "Ballistic Missile Defense Cooperation in the Arabian Gulf," in *Regional Missile Defense from a Global Perspective*, ed. Catherine McArdle Kelleher and Peter Dombrowski, (Stanford: Stanford University Press, 2015), 161-167.

<sup>161</sup> Ibid.

<sup>162</sup> Ibid.

<sup>163</sup> Missile Defense Agency, "Aegis Ballistic Missile Defense," [http://www.mda.mil/system/aegis\\_bmd.html](http://www.mda.mil/system/aegis_bmd.html).

<sup>164</sup> Elleman and Alsayed, 161.

<sup>165</sup> The White House, "Annex to U.S.-Gulf Cooperation Council Camp David Joint Statement," May 14, 2015, <https://www.whitehouse.gov/the-press-office/2015/05/14/annex-us-gulf-cooperation-council-camp-david-joint-statement>.

<sup>166</sup> Ibid.

<sup>167</sup> For a technical analysis of the EPAA's capabilities, see, *inter alia*, Jaganath Sankaran, "The United States' European Phased Adaptive Approach Missile Defense System: Defending Against Iranian Threats Without Diluting the Russian Deterrent," *RAND*, 2015, [http://www.rand.org/pubs/research\\_reports/RR957.html](http://www.rand.org/pubs/research_reports/RR957.html).

<sup>168</sup> See, for example: Gause; and Christopher Davidson, ed., *Power and Politics in the Persian Gulf Monarchies*, (London: C. Hurst & Co., 2011).

<sup>169</sup> Ibid.

<sup>170</sup> Angus McDowall and Amina Bakr, "Three Gulf Arab states recall envoys in rift with Qatar," *Reuters*, March 5, 2014, <http://www.reuters.com/article/2014/03/05/us-gulf-qatar-ambassadors-idUSBREA2413N20140305>.

<sup>171</sup> Steffen Hertog, "Rentier militaries in the Gulf states: the price of coup-proofing," *International Journal of Middle East Studies* 43, no. 3 (2011): 400-402.

<sup>172</sup> See: Hertog; Laurence Louer, "Sectarianism and Coup-Proofing Strategies in Bahrain," *Journal of Strategic Studies* 36, no. 2 (2013): 245-260, particularly pp. 251-252; and James T. Quinlivan, "Coup-Proofing: Its Practice and Consequences in the Middle East," *International Security* 24, no. 2 (Fall 1999): 131-165.

<sup>173</sup> For an excellent examination of coup-proofing and military effectiveness, see Caitlin Talmadge, *The Dictator's Army: Battlefield Effectiveness in Authoritarian Regimes* (Ithaca: Cornell University Press, 2015), especially the introduction and the conclusion.

<sup>174</sup> For a history of the U.S. role in the Persian Gulf, see Michael A. Palmer, *Guardians of the Gulf: A History of America's Expanding Role in the Persian Gulf, 1833-1992*, (New York: Simon & Schuster, 1992).

<sup>175</sup> Ari Kattan, "Missile Defense: State of Play and Future Evolution," *NATO Defense College*, March 2015, 5, <http://www.ndc.nato.int/news/news.php?icode=780>.

<sup>176</sup> Jon B. Alterman, et al., *Federated Defense in the Middle East*, (Washington, D.C.: CSIS, September 2015), 26-28, <http://csis.org/publication/federated-defense-middle-east>.

<sup>177</sup> Government Accountability Office, "Ballistic Missile Defense: Actions Needed to Address Implementation Issues and Estimate Long-Term Costs for European Capabilities," April 2014, 13-14, <http://www.gao.gov/assets/670/662492.pdf>.

<sup>178</sup> Thomas Karako, "Getting the GCC to Cooperate on Missile Defense," *War on the Rocks*, May 13, 2015, <http://warontherocks.com/2015/05/getting-the-gcc-to-cooperate-on-missile-defense/>.

<sup>179</sup> Northrup Grumman, "Integrated Air and Missile Defense Battle Command System (IBCS)," [http://www.northropgrumman.com/Capabilities/IBCS/Documents/IBCS\\_datasheet.pdf](http://www.northropgrumman.com/Capabilities/IBCS/Documents/IBCS_datasheet.pdf).

<sup>180</sup> Jen Judson, "US Army's Integrated Air and Missile Defense System Defeats Cruise-Missile Target," *Defense News*, November 13, 2015, <http://www.defensenews.com/story/defense-news/2015/11/13/us-armys-integrated-air-and-missile-defense-system-defeats-cruise-missile-target/75716198/>.

<sup>181</sup> Lars Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo* (Berlin: Lit Verlag, 2007), 364. A third possible explanation is lobbying by the defense industry in Japan. For an argument that suggests this explanation, see: Saadia M. Pekkanen, "Japan's Ballistic Missile Defense and 'Proactive Pacifism,'" in *Regional Missile Defense from a Global Perspective*, ed. Catherine McArdle Kelleher and Peter Dombrowski, (Stanford, CA: Stanford University Press, 2015), 217-237. While Japanese defense contractors with vested interests in missile defense co-development projects, such as Kawasaki Heavy industries and Mitsubishi Heavy industries, were pleased with the possibilities, other defense contractors were not. The Japanese government per its 2004 National Program Guidelines

---

(NDPG) “cut spending in traditional defense equipment and systems in order to accommodate the large price tag of deploying BMD without increasing overall defense budget. Hence, Tokyo’s decision to move on forward with BMD at a time when the defense budget continued to decrease crowded out other defense priorities, forcing firms unrelated to BMD co-development to seek alternative clients to make ends meet. For these defense contractors, BMD turned out to be a menace—not a savior of the dwindling defense industry.” See: Kaori Urayama, *Missile Defense, U.S.-Japan Alliance and Sino-Japanese Relations, 1983-2007* (PhD Diss., Boston University, 2008), 151.

<sup>182</sup> Xinhua News, “Japan to Permanently Deploy Missile Interceptors amid Intensified Frequency of DPRK Launches,” *Xinhua News Asia & Pacific Edition*, March 22, 2016, [http://news.xinhuanet.com/english/2016-03/22/c\\_135212815.htm](http://news.xinhuanet.com/english/2016-03/22/c_135212815.htm).

<sup>183</sup> Urayama, *Missile Defense, U.S.-Japan Alliance and Sino-Japanese Relations*, 146.

<sup>184</sup> *Ibid.*, 30.

<sup>185</sup> *Ibid.*, 154.

<sup>186</sup> Charlotte Meredith, “North Korea States ‘Nuclear War Is Unavoidable’ As It Declares First Target Will Be Japan,” *Express*, April 12, 2013, <http://www.express.co.uk/news/world/391376/North-Korea-states-nuclear-war-is-unavoidable-as-it-declares-first-target-will-be-Japan>.

<sup>187</sup> John Schilling and Henry Kan, “The Future of North Korean Nuclear Delivery Systems,” (Washington: US-Korea Institute at SAIS, 2015), [http://38north.org/wp-content/uploads/2015/09/NKNF\\_Delivery-Systems.pdf](http://38north.org/wp-content/uploads/2015/09/NKNF_Delivery-Systems.pdf).

<sup>188</sup> David E. Sanger, “With U.S. Eye on Iran, North Korea’s Nuclear Arsenal Expanded,” *The New York Times*, May 7, 2015, <http://www.nytimes.com/2015/05/08/world/asia/with-us-eyes-on-iran-north-koreas-nuclear-arsenal-expanded.html>.

<sup>189</sup> Brad Roberts, *On the Strategic Value of Ballistic Missile Defense* (Paris: IFRI Security Studies Center, Proliferation Papers 50, June 2014), 12.

<sup>190</sup> Michael D. Swaine, Rachel M. Swanger, and Takashi Kawakami, *Japan and Ballistic Missile Defense* (Santa Monica, CA: Center for Asia-Pacific Policy, RAND Corporation, 2001); Shanelle Van, *Ballistic Missile Defense in Japan: Process-Tracing a Historical Trajectory* (Durham, NC: Undergraduate Thesis, Sanford School of Public Policy, Duke University, December 2014); Xinhua News, “Japan to Permanently Deploy Missile Interceptors amid Intensified Frequency of DPRK Launches,” *Xinhua News Asia & Pacific Edition*, March 22, 2016, [http://news.xinhuanet.com/english/2016-03/22/c\\_135212815.htm](http://news.xinhuanet.com/english/2016-03/22/c_135212815.htm); Sugio Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation* (Paris: IFRI Center for Asian Studies Security Studies Center, December 2012), 11, 17; Ministry of Defense, “Japan’s BMD System”; Ministry of Defense, “Japan’s BMD.”; U.S. Department of Defense, “Second Missile Defense Radar Deployed to Japan,” December 26, 2014, <http://www.defense.gov/News/News-Releases/News-Release-View/Article/605330/second-missile-defense-radar-deployed-to-japan>.

<sup>191</sup> Office of Secretary of Defense, Department of Defense, *Proliferation: Threat and Response*, January 2001, 9.

<sup>192</sup> Statement of General Thomas A. Schwartz, Commander In Chief United Nations Command/Combined Forces Command & Commander, United States Force Korea, Before the 107<sup>th</sup> Congress Senate Armed Services Committee, March 5, 2002, 8, [http://www.globalsecurity.org/military/library/congress/2002\\_hr/schwartz0305.pdf](http://www.globalsecurity.org/military/library/congress/2002_hr/schwartz0305.pdf).

<sup>193</sup> International Crisis Group, *North Korea’s Nuclear and Missile Programs* (Seoul/Brussels: International Crisis Group, Asia Report # 168, June 18, 2009) 8, [http://www.crisisgroup.org/~media/Files/asia/north-east-asia/north-korea/168\\_north\\_koreas\\_nuclear\\_and\\_missile\\_programs.ashx](http://www.crisisgroup.org/~media/Files/asia/north-east-asia/north-korea/168_north_koreas_nuclear_and_missile_programs.ashx).

<sup>194</sup> United States Forces Korea, *The New Korea. Strategic Digest 2010: Strategic Alliance 2015* (United States Forces Korea, October 2010), 11, <http://www.osan.af.mil/shared/media/document/afd-101101-005.pdf>. See also: Statement of General B. B. Bell, Commander, United Nations Command; Commander, Republic of Korea-United States Combined Forces Command; and Commander, United States Forces Korea Before the Senate Armed Services Committee, April 24, 2007, 7, [http://www.globalsecurity.org/military/library/congress/2007\\_hr/070424-bell.pdf](http://www.globalsecurity.org/military/library/congress/2007_hr/070424-bell.pdf).

<sup>195</sup> National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat* (Wright-Patterson Air Force Base, OH: National Air and Space Intelligence Center, 2013); Schilling and Kan, *The Future of North Korean Nuclear Delivery Systems*, 10.

<sup>196</sup> For a conservative estimate, see: Markus Schiller, *Characterizing the North Korea Nuclear Missile Threat* (Santa Monica, CA: RAND Corporation, 2012), 66. While acknowledging some level of speculation, he suggests that there are only hundreds of SCUD B models, around 100 SCUD C models, a few dozen SCUD D/ER models, a few dozen Nodong, around two Taepodong-II, and a small number of Musudan missiles in North Korea’s inventory. Furthermore, he argues that “only a small number of [North Korean] launch crews can be well trained...the lack of crew training will result in moderate results at best, with handling failures and low accuracy. If missile are produced in North Korea, they are not of excellent reliability and accuracy because of the lack of firing table creation and lot acceptance tests.”

<sup>197</sup> Office of the Secretary of Defense, Department of Defense, *Military and Security Developments Involving the Democratic People’s Republic of Korea. Annual Report to Congress* (Washington DC: Department of Defense, 2013), 19;

---

Ministry of Unification, Institute for Unification Education, 2014: *Understanding North Korea* (Seoul: Research and Development Division, Institute for Unification Education, 2014), 193; Ministry of National Defense, Republic of Korea, 2014 *Defense White Paper* (Seoul: Ministry of National Defense, 2014), Ch.1, 32, [http://www.mnd.go.kr/user/mnd\\_eng/upload/pblict/PBLICTNEBOOK\\_201506161152304650.pdf](http://www.mnd.go.kr/user/mnd_eng/upload/pblict/PBLICTNEBOOK_201506161152304650.pdf); Ministry of Defense, Government of Japan, *Defense of Japan 2015*, (Tokyo: Ministry of Defense, 2015), Ch.1, 20-22, [http://www.mod.go.jp/e/publ/w\\_paper/pdf/2015/DOJ2015\\_1-1-2\\_web.pdf](http://www.mod.go.jp/e/publ/w_paper/pdf/2015/DOJ2015_1-1-2_web.pdf); International Crisis Group, *North Korea's Nuclear and Missile Programs*; Anthony H. Cordesman et al, *The Changing Military Balance in the Koreas and Northeast Asia* (Washington DC: Center for Strategic and International Studies, 2015), 184, 187, <http://csis.org/publication/changing-military-balance-koreas-and-northeast-asia>; National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*.

<sup>198</sup> Mark Landler, "North Korea Nuclear Threat Cited by James Clapper, Intelligence Chief," *The New York Times*, February 9, 2016.

<sup>199</sup> Office of the Secretary of Defense, *Military and Security Developments Involving the Democratic People's Republic of Korea. Annual Report to Congress*, 10-11. However, speaking about the Hwasong-13 (also called the KN-08), the Vice Chairman of the U.S. Joint Chiefs of Staff, Admiral James Winnefeld, said: "We believe the KN-08 probably does have the range to reach the United States." See: Bob Orr, "Differing Views of NK Nuclear Threat," *CBS News*, April 12, 2013, <http://www.cbsnews.com/news/differing-views-of-nk-nuclear-threat/>.

<sup>200</sup> Ministry of National Defense, 2014 *Defense White Paper*, 32.

<sup>201</sup> Ibid.; J5 Strategic Communications Division, U.S. Forces Korea, *Strategic Digest: 2015* (U.S. Forces Korea 2005), 14, [http://www.usfk.mil/Portals/105/Documents/Strategic\\_Digest\\_2015\\_Eng.pdf](http://www.usfk.mil/Portals/105/Documents/Strategic_Digest_2015_Eng.pdf).

<sup>202</sup> Christian Science Monitor, "Japan Considers Building Missile," *Christian Science Monitor*, April 24, 1989, <http://www.csmonitor.com/1989/0424/oconsid.html#>; Karen Montague, *Japan's Ballistic Missile Defense Policies and Programs* (Washington DC: George C. Marshall Institute, Policy Outlook, June 2014), 1.

<sup>203</sup> Kenneth W. Allen et al., *Theater Missile Defenses in the Asia-Pacific Region* (Washington DC: Henry L. Stimson Center, June 2000), 62.

<sup>204</sup> Sugio Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation* (Paris: IFRI Center for Asian Studies Security Studies Center, December 2012), 11.

<sup>205</sup> Ministry of Defense, "Japan's BMD System," *Ministry of Defense, Government of Japan*, <http://www.mod.go.jp/e/jdf/no31/specialfeature.html>; Ministry of Defense, "Japan's BMD," *Ministry of Defense, Government of Japan*, [http://www.mod.go.jp/e/d\\_act/bmd/bmd.pdf](http://www.mod.go.jp/e/d_act/bmd/bmd.pdf).

<sup>206</sup> "Japan Fleet BMD: Upgrades & UORs," *Defense Industry Daily*, November 10, 2015, <http://www.defenseindustrydaily.com/up-to-387m-for-japanese-naval-abm-components-0807/>.

<sup>207</sup> Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 11.

<sup>208</sup> Ibid.

<sup>209</sup> Sam LaGrone, "Report: Japan Interested in Aegis Ashore for Ballistic Missile Defense," *USNI News*, September 16, 2014, <https://news.usni.org/2014/09/16/report-japan-interested-aegis-ashore-ballistic-missile-defense>.

<sup>210</sup> Simon Montlake, "Japanese Warship Tests Antimissile System," *The Christian Science Monitor*, December 18, 2007, <http://www.csmonitor.com/2007/1218/p99s01-duts.html>.

<sup>211</sup> Ministry of Defense, "Japan's BMD System"; Ministry of Defense, "Japan's BMD."

<sup>212</sup> Ibid.

<sup>213</sup> Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 17.

<sup>214</sup> U.S. Department of Defense, "Second Missile Defense Radar Deployed to Japan," December 26, 2014, <http://www.defense.gov/News/News-Releases/News-Release-View/Article/605330/second-missile-defense-radar-deployed-to-japan>.

<sup>215</sup> Zachary Keck, "Japan's Building 2 Aegis Destroyers," *The Diplomat*, July 23, 2014, <http://thediplomat.com/2014/07/japans-building-2-aegis-destroyers/>. See also: Sam LaGrone, "Navy Moving Two Additional BMD Destroyers to Japan," *USNI News*, October 17, 2014, <https://news.usni.org/2014/10/17/navy-moving-two-additional-bmd-destroyers-japan>.

<sup>216</sup> Missile defense, arguably, holds more value than in its intrinsic ability to intercept and destroy an incoming missile. It also retains strategic purposes in that it: (1) Creates uncertainty about the outcome of an attack in the mind of the attacker; (2) Increases the raid size required for an attack to penetrate, thereby undermining a strategy of firing one or two and threatening more, thus reducing coercive leverage; (3) Provides some assurance to allies and third party nations of some protection against some risks of precipitate action by the aggressor; (4) Buys leadership time for choosing and implementing courses of action, including time for diplomacy; (5) Reduces the political pressure for preemptive strikes; (6)

---

Helps to preserve freedom of action for the United States and its partners by selectively safeguarding key military and political assets; (7) Increases time and opportunity to attack an adversary's missile force with kinetic and non-kinetic means, potentially eliminating his capacity for follow-on attacks or decisive political or military effects; (8) Reduces or eliminates the vulnerability of allies, thus reinforcing their intent to remain in the fight." However, even to serve these strategic purposes, missile defense has to possess some level of operational efficiency. See: Brad Roberts, *On the Strategic Value of Ballistic Missile Defense*, 22-23. For a more Japanese viewpoint on use of missile defenses, see: Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 23-24.

<sup>217</sup> Kinematic reach is the ability of the interceptor to reach the same region in space occupied by the target missile at the same time. In some circumstances it might not be sufficient to intercept and destroy the target missile.

<sup>218</sup> There is no official record from either the United States or Japan on the burn-out velocity of the SM-3 IA interceptors. For the purposes of this paper, SM-3 IA interceptors are assumed to have a burn-out velocity of 3 km/s. See: Tom Z. Collina, "The European Phased Adaptive Approach at a Glance," *Arms Control Today*, May 2013, <https://www.armscontrol.org/factsheets/Phasedadaptiveapproach>. Burnout velocity is the maximum speed acquired by the interceptor. Simply put, the higher the speed of the interceptor, the farther it can go. Burnout velocity can, therefore, serve as a strong indicator of interceptor capability. Before it was canceled, the speculated burnout velocity for SM-3 Block IIB interceptors was between 5 km/s and 5.5 km/s. This report assumes that the value is 5.5 km/s.

<sup>219</sup> The Japanese Kongo class destroyers carry the 90-cell Mk-41 Vertical Launch system (VLS). The Japanese Atago class destroyers carry the 96-cell Mk-41 Vertical Launch system. See: Defense Industry Daily, "Japan's Fleet BMD: Upgrades & UORs," *Defense Industry Daily*, November 10, 2015, <http://www.defenseindustrydaily.com/up-to-387m-for-japanese-naval-abm-components-0807/>; and "Kongo Class Guided Missile Destroyers, Japan," *Naval Technology*, <http://www.naval-technology.com/projects/kongoclassdestroyer/>. The VLS contains a mix of the ship's defensive and offensive missile systems. "The VLS consists of vertical cells in the ship's fore and aft deck." In the case of the United States, "cruisers have two blocks on sixty cells each. The [U.S.] destroyers have one block of sixty-four cells and one block of thirty-two cells. Each cell can fire a Standard Missile (SM), a Tomahawk land-attack missile (LACM), or an anti-submarine missile. These VLS launching cells have almost no moving parts and are relatively easy to maintain. The VLS cannot be loaded underway, so reloading must be carried out in port or alongside a properly equipped resupply ship." The actual load-out of a particular ship depends on its designated missions and on missile availability. See: Kenneth W. Allen et al., *Theater Missile Defenses in the Asia-Pacific Region*, 6, 12.

<sup>220</sup> Japanese ships do not possess the ability to simultaneously perform missile defense and air defense. A Japanese missile defense ship will have to be dedicated to that purpose. However, at some point in the future, the Atago class ships will be upgraded to both functions. The author thanks George Lewis for pointing this out.

<sup>221</sup> The National Institute for Defense Studies, *East Asian Strategic Review 2015*, Ch.2, 64.

<sup>222</sup> Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 12, 15.

<sup>223</sup> Ibid.

<sup>224</sup> Ministry of Foreign Affairs of Japan, *Security Consultative Committee Document. U.S.-Japan Alliance: Transformation and Realignment for the Future*, Ministry of Foreign Affairs of Japan, October 29, 2005, <http://www.mofa.go.jp/region/n-america/us/security/scc/doc0510.html>.

<sup>225</sup> Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 18.

<sup>226</sup> Ibid., 16.

<sup>227</sup> Urayama, *Missile Defense, U.S.-Japan Alliance and Sino-Japanese Relations, 1983-2007*, 245-246.

<sup>228</sup> On the other hand, it has been argued that Japan is reticent to completely integrate its command and control system with the American system. Such integration might force Japan to intercept missiles that are not heading towards Japan but rather towards the United States or other allies. Intercepting such a missile could be interpreted as a violation of the Japan's constitutional limit on self-defense and be seen as practicing "collective self-defense." See: Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo*, 363. However, in 2003, the Japanese Defense Agency concluded "that the interception of ballistic missiles flying over Japanese air space toward the U.S. does not violate Japan's restrictions on collective security. On the other hand, they concluded that the interception of the ballistic missiles in air space that are not above Japan would violate current restrictions on collective security." See: Col. Tatsuya Arima, *Japanese Security Policy in the Next Ten Years* (Washington DC: The Henry L. Stimson Center, September 2003). In essence, this would indicate that the interception of North Korean or Chinese missiles on a trajectory towards the United States could be justified as long as it occurred over Japanese air space. The United States has continued to ask for commitments from Japan. In 2006, for example, then Commander of the U.S. Naval Forces in Japan, James D. Kelly, argued for the "need for Japan to exercise the right of collective self-defense so bilateral missile defense can work effectively." See: Kyodo News International, "U.S. Commander Sees Need of Japan Using Collective Defense Right," September 7, 2016. Former U.S.

---

Ambassador to Japan Thomas Schieffer has made similar comments. See: David Lawrence, “An Interview With John Thomas Schieffer, Former U.S. Ambassador to Japan,” *The Politic*, August 16, 2013, <http://thepolitic.org/an-interview-with-john-thomas-schieffer-former-u-s-ambassador-to-japan/>; Urayama, *Missile Defense, U.S.-Japan Alliance and Sino-Japanese Relations, 1983-2007*, 150.

<sup>229</sup> Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 13.

<sup>230</sup> *Ibid.*, 13-14.

<sup>231</sup> *Ibid.*, 14.

<sup>232</sup> Reiji Yoshida and Ayako Mie, “Tokyo Orders SDF To Shoot Down North Korean Missile If Threat To Japan,” *The Japan Times*, February 3, 2016, <http://www.japantimes.co.jp/news/2016/02/03/national/anger-sanctions-threats-greet-north-korea-rocket-launch-plans/#.VseKOGgrKM8>.

<sup>233</sup> Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo*, 176, 180.

<sup>234</sup> For example, Chinese Foreign Ministry Spokesman Zhu Bangzao had said in 1998: “China firmly opposes any direct or indirect activities which attempt to include the Taiwan Straits in the scope of the Japan-US security cooperation relationship... China holds a clear-cut and consistent stand that Japan-US security cooperation is a bilateral arrangement formed with a specific historical background; it should be strictly limited to the scope of bilateral relations between the two countries, otherwise it will upset surrounding countries in Asia and create complexity affecting the security situation in this region.” See: Statement by the Government of the People’s Republic of China, “Japan-US Security Moves Must Keep Off Taiwan Straits,” April 30, 1998, <http://fas.org/news/china/1998/980430-prec-japanhtm.htm>. Chinese strategists have also stated that “China would be compelled to also hit Japan with missiles in an armed crisis over Taiwan, because ‘we (China) know that Japan is by its treaty obligation in the same boat with the United States.’” See: Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo*, 378.

<sup>235</sup> Gregory Kulacki, “The Chinese Military Updates China’s Nuclear Strategy,” *Union of Concerned Scientists*, March 2015, 5, <http://www.ucsusa.org/sites/default/files/attach/2015/03/chinese-nuclear-strategy-full-report.pdf>.

<sup>236</sup> “Joint Statement by the Presidents of the People’s Republic of China and the Russian Federation on Anti-Missile Defense,” July 18, 2000, <http://fas.org/spp/starwars/program/news00/bmd-000718a.htm>.

<sup>237</sup> *Ibid.*

<sup>238</sup> U.S. Department of Defense, *Ballistic Missile Defense Review Report* (Washington DC: Department of Defense, 2010), 34.

<sup>239</sup> U.S. Department of Defense, *Nuclear Posture Review Report* (Washington DC: Department of Defense, 2010), 4, 29.

<sup>240</sup> Reuben Steff and Nicholas Khoo, “Hard Balancing in the Age of American Unipolarity: The Russian Response to US Ballistic Missile Defense during the Bush Administration (2001-2008),” *The Journal of Strategic Studies* 37, no. 2 (2014): 233.

<sup>241</sup> Ian E. Rinehart, Steven A. Hildreth, and Susan V. Lawrence, *Ballistic Missile Defense in the Asia-Pacific Region: Cooperation and Opposition* (Washington DC: Congressional Research Service, 2015), 15-18.

<sup>242</sup> Wu Riqiang, “China’s Anxiety About U.S. Missile Defence: A Solution,” *Survival* 55, no. 5 (October-November 2013): 46.

<sup>243</sup> Japanese security professionals do worry about the Chinese threat. In Japan, the 1995 nuclear testing by China is often portrayed as one of the first China-related “security shocks” to Japan. Apparently, then Japanese Prime Minister Tomiichi Murayama visited China in 1995 and requested China to refrain from further testing. However, Beijing ignored his request and continued its nuclear testing. This incident brought to the fore the lack of leverage Japan had in “influencing Chinese military behavior and had an ironic effect on Japanese domestic politics, in a sense that both the Left and the Right became united in their anti-China sentiments.” A second China-related security shock was the 1996 Chinese “decision to actually test its missiles over the Taiwan Straits” which “deeply alarmed many Japanese security professionals, leading them to doubt Beijing’s commitment to the so-called ‘no-first use’ policy.” See: Urayama, *Missile Defense, U.S.-Japan Alliance and Sino-Japanese Relations, 1983-2007*, 260-261. A short summary of the more recent Japanese concerns over China can be found in: Sugio Takahashi, *Rebuilding Deterrence: Post-2015 Defense Guidelines Challenges Facing the U.S.-Japan Alliance* (Washington DC: Project 2049 Institute, 2015),

[http://project2049.net/documents/Takahashi\\_2015\\_Defense\\_Guidelines\\_Challenges\\_US\\_Japan\\_Alliance.pdf](http://project2049.net/documents/Takahashi_2015_Defense_Guidelines_Challenges_US_Japan_Alliance.pdf).

<sup>244</sup> Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo*, 320.

<sup>245</sup> Cordesman et al, *The Changing Military Balance in the Koreas and Northeast Asia*, 467-472; Roberts, *On the Strategic Value of Ballistic Missile Defense*, 29-30.

<sup>246</sup> Office of the Secretary of Defense, Department of Defense, *Annual Report to Congress. Military and Security Developments Involving the People’s Republic of China 2010* (Washington DC: Department of Defense, 2010), I; Takahashi, *Ballistic Missile Defense in Japan: Deterrence and Military Transformation*, 20.

- <sup>247</sup> Office of the Secretary of Defense, Department of Defense, *Annual Report to Congress. Military and Security Developments Involving the People's Republic of China 2010*, 66.
- <sup>248</sup> Ibid.
- <sup>249</sup> Asmann, *Theater Missile Defense (TMD) in East Asia: Implications for Beijing and Tokyo*, 315.
- <sup>250</sup> William J. Perry, "Security and Stability in the Asia-Pacific Region," April 11, 2000, <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan005964.pdf>.
- <sup>251</sup> U.S. Department of Defense, Ballistic Missile Defense Review Report, February 2010.
- <sup>252</sup> Joint Communiqué of the 38th U.S.-ROK Security Consultative Meeting, Washington, D.C. October 20, 2006, para. 9.
- <sup>253</sup> For a critical portrayal of how nationalistic sentiments in South Korea shaped the initial OPCON transfer decision, see: Taewoo Kim, "The Korean Position on Alliance Formation and the Change of Public Trust between Korea and the United States: The Cheonan Incident and the OPCON Issue," *International Journal of Korean Studies* 14, no. 2 (Fall 2010): 147-159.
- <sup>254</sup> For a concise overview of problems in Japan-ROK relations surrounding the GSOMIA stumble, see: Seongho Sheen and Jina Kim, "What Went Wrong with the ROK-Japan Military Pact?" *Asia Pacific Bulletin* no. 176, July 31, 2012.
- <sup>255</sup> Christopher P. Twomey and Michael S. Chase, "Chinese Attitudes Toward Missile Defense," in Catherine McArdle Kelleher and Peter Dombrowski, eds., *Regional Missile Defense from a Global Perspective* (Stanford: Stanford University Press, 2015), pp. 197-216, especially pp. 204-205.
- <sup>256</sup> Richard Weitz, "South Korea's Defense Industry: Increasing Domestic Capabilities and Global Opportunities," Korea Economic Institute of America Academic Paper Series, November 7, 2013.
- <sup>257</sup> U.S. Forces Korea, ROK-U.S. Joint Announcement, February 7, 2016.
- <sup>258</sup> Son Tae-kyu, "Uneasiness over North Korean Scuds," *Hanguk Ilbo*, October 4, 1995.
- <sup>259</sup> *Korea Herald*, October 12, 1995.
- <sup>260</sup> Yonhap News Agency, February 20, 1996.
- <sup>261</sup> *Korea Times*, May 2, 1998.
- <sup>262</sup> *Korea Times*, January 26, 1998; *Korea Times*, September 14, 1998; *Korea Times*, May 1, 2002.
- <sup>263</sup> On the South Korean missile program, see Joshua H. Pollack, "The Emergence of an American/Korean Strategic Triangle," working paper published by the Judith Reppy Institute for Peace and Conflict Studies (PACS), May 1, 2016.
- <sup>264</sup> An overview and discussion appears in: Rex R. Kiziah, "US-Led Cooperative Theater Missile Defense in Northeast Asia," U.S. Air War College, Maxwell Paper no. 21, July 2000.
- <sup>265</sup> Nam Mun-hui, "Will the ROK Participate in the Theater Missile Defense Plan with the Purchase of PAC-3 Missiles?" *Sisa Journal*, August 20, 1999.
- <sup>266</sup> For example: Yim Ul-chul, "Will Self-Reliant National Defense Be Resolved with 'Weapons Shopping?'" *Hankyoreh*, July 1, 2004.
- <sup>267</sup> *Chosun Ilbo*, November 3, 1998.
- <sup>268</sup> Jeong Yong-soo and Sarah Kim, "Defense Mobilized to northwestern island," *Korea JoongAng Daily*, March 11, 2016.
- <sup>269</sup> Yu Yong-won, "Korea Eyes Second-Hand Patriot Missiles," *Chosun Ilbo*, May 16, 2005.
- <sup>270</sup> "S.Korea Plans Affordable Missile Defense Shield," *Chosun Ilbo*, December 21, 2006.
- <sup>271</sup> Jung Sung-ki, "Seoul Begins Deploying Patriot Missile Interceptors," *Korea Times*, September 16, 2008; Jung Sung-ki, "Air Force Takes Over 1st Batch of German Patriots," *Korea Times*, November 28, 2008.
- <sup>272</sup> Jung Sung-ki, "Israeli Radar to Track N. Korean Missiles," *Korea Times*, February 15, 2009; "Israeli Radar Chosen for Missile Defense," *Korea Times*, September 17, 2009.
- <sup>273</sup> "Patriot Missiles Useless as Radar Out of Order," *Chosun Ilbo*, September 19, 2011; Yun Sang-ho, "ROK is Reportedly Helpless Before North Korea's Ballistic Missiles Over the Next 10 Years," *Donga Ilbo*, October 3, 2011.
- <sup>274</sup> "S. Korea moves to upgrade Patriot defense system," *Yonhap News Agency*, October 18, 2012.
- <sup>275</sup> Kang Seung-woo, "Korea to buy 112 Patriot missiles," *Korea Times*, October 27, 2013.
- <sup>276</sup> Jung Sung-ki, "S. Korea Opposes Joining US Missile Defense System," *Korea Times*, January 3, 2008.
- <sup>277</sup> Jung Sung-ki, "Seoul to Build Missile Control Center by 2012," *Korea Times*, February 15, 2009.
- <sup>278</sup> Jung Sung-ki, "S. Korea Opposes Joining US Missile Defense System," *Korea Times*, January 3, 2008.
- <sup>279</sup> Defense Security Cooperation Agency, "Republic of Korea -- SM-2 Standard Missiles," May 26, 2009.
- <sup>280</sup> Jung Sung-ki, "Seoul to Build Missile Control Center by 2012," *Korea Times*, February 15, 2009.
- <sup>281</sup> Yun Sang-ho, "ROK is Reportedly Helpless Before North Korea's Ballistic Missiles Over the Next 10 Years."
- <sup>282</sup> "S. Korea to begin spy satellite project this year," Yonhap News Agency, January 19, 2015; Ministry of National Defense, Republic of Korea, *2014 Defense White Paper*, pp. 62-63.

- 
- <sup>283</sup> Joint Communiqué of the 44th U.S.-ROK Security Consultative Meeting, Washington, D.C. October 24, 2012, 2-3; Joint Communiqué of 45th ROK-U.S. Security Consultative Meeting, October 2, 2013, Seoul, para. 7; Joint Communiqué of the 46th ROK-U.S. Security Consultative Meeting, October 23, 2014, Washington D.C., para. 7; Joint Communiqué of the 47th ROK-U.S. Security Consultative Meeting, November 1, 2015, Seoul, para. 7.
- <sup>284</sup> “Interoperable missile defense architecture: official,” *Yonhap News Agency*, May 21, 2015.
- <sup>285</sup> “S. Korea, U.S., Japan to set up new channel to share info on N. Korea,” *Yonhap News Agency*, January 22, 2016.
- <sup>286</sup> Office of the Director, Operational Test and Evaluation, U.S. Department of Defense, FY 2014 Annual Report, January 2015, 307-310.
- <sup>287</sup> “USFK Deploys Another Patriot Missile Battery,” *Chosun Ilbo*, February 15, 2016.
- <sup>288</sup> Daniel Pinkston, “The North Korean Ballistic Missile Program,” *Strategic Studies Institute* (February 2008),14; Joseph S. Bermudez Jr., “A History of Ballistic Missile Development in the DPRK,” Center for Nonproliferation Studies, Occasional Paper #2 (1999), 1-2.
- <sup>289</sup> Pinkston, 18.
- <sup>290</sup> John Schilling and Henry Kan, “The Future of North Korean Nuclear Delivery Systems,” (Washington, D.C.: US-Korea Institute at SAIS, 2015),7; National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat* (Wright-Patterson Air Force Base, OH: National Air and Space Intelligence Center, 2013).
- <sup>291</sup> Bermudez, 1.
- <sup>292</sup> See, for example, Joshua Pollack, “Ballistic Trajectory: The Evolution of North Korea’s Ballistic Missile Market,” *Nonproliferation Review* 18, no. 2 (July 2011).
- <sup>293</sup> Department of Defense, *Ballistic Missile Defense Review Report* February 2010, 9-20.
- <sup>294</sup> Ian E. Rinehart, Steven A. Hildreth, Susan V. Lawrence, “Ballistic Missile Defense in the Asia-Pacific Region: Cooperation and Opposition,” *Congressional Research Service*, June 24, 2013, 9-11.
- <sup>295</sup> This paper used articles in the English language version of the *Korean Central News Agency* (KCNA), and where available, the *Rodong Sinmun*, the newspaper of the Workers’ Party of Korea, as well as commentary of the Minju Joson carried on KCNA.
- <sup>296</sup> “U.S. Moves to Deploy Interceptor Missiles under Fire,” *Korean Central News Agency*, July 11, 2006.
- <sup>297</sup> “KCNA Commentary Censures U.S. Moves to Build Missile Shield in Asia-Pacific,” *Korean Central News Agency*, July 20, 2013.
- <sup>298</sup> “U.S. Moves to Plug S. Korea into MD System under Fire,” *Rodong Sinmun*, May 2, 2015, [http://rodong.rep.kp/en/index.php?strPageID=SF01\\_02\\_01&newsID=2015-05-02-0010](http://rodong.rep.kp/en/index.php?strPageID=SF01_02_01&newsID=2015-05-02-0010).
- <sup>299</sup> “KCNA Commentary Discloses U.S. Sinister Intention to Maintain Military Supremacy,” *Korean Central News Agency*, August 1, 2014.
- <sup>300</sup> “DPRK Foreign Ministry Spokesman Blasts U.S. Establishment of MD,” *Korean Central News Agency*, June 15 2007.
- <sup>301</sup> *Ibid.*
- <sup>302</sup> “NDC Policy Department Slams Park Geun Hye’s Coarse Invectives against DPRK,” *Korean Central News Agency*, October 4, 2013.
- <sup>303</sup> “U.S. and S. Korean Authorities’ MD Moves against DPRK Assailed,” *Korean Central News Agency*, June 14, 2014.
- <sup>304</sup> Ha-young Choi and John Grisafi, “North Korea’s nuclear force reshuffles its politics, economy,” *NK News*, February 11, 2016, <https://www.nknews.org/2016/02/north-koreas-nuclear-force-reshuffles-its-politics-economy/>; Joseph Bermudez, Jr., “North Korea’s Development of a Nuclear Weapons Strategy,” *U.S.-Korea Institute at SAIS*, August 2015, 13, [http://38north.org/wp-content/uploads/2015/08/NKNF\\_Nuclear-Weapons-Strategy\\_Bermudez.pdf](http://38north.org/wp-content/uploads/2015/08/NKNF_Nuclear-Weapons-Strategy_Bermudez.pdf).
- <sup>305</sup> Office of the Secretary of Defense, Department of Defense, *Military and Security Developments Involving the Democratic People’s Republic of Korea. Annual Report to Congress* (Washington D.C.: Department of Defense, 2015) 1; examples of coverage can be found in Chad O’Carroll, “Kim Jong Un Attended Ballistic Missile Drill – State Media,” *NK News*, July 10, 2014, <http://www.nknews.org/2014/07/kim-jong-un-attended-ballistic-missile-launches/>.
- <sup>306</sup> Jeffery Lewis, “Five Things You Need to Know about Kim Jong Un’s Photo Op,” *38North*, March 11, 2016, <http://38north.org/2016/03/jlewis031116/>.
- <sup>307</sup> Naenara, “Guidance to Development of Nuclear Arsenal,” March 9, 2016, [http://www.naenara.com.kp/en/news/news\\_view.php?22+2899](http://www.naenara.com.kp/en/news/news_view.php?22+2899).
- <sup>308</sup> “Memorandum of DPRK Foreign Ministry,” *Korean Central News Agency*, March 3, 2005.
- <sup>309</sup> Gary Samore, “U.S.-DPRK Missile Negotiations,” *The Nonproliferation Review* (Summer 2002), 16.

---

<sup>310</sup> Rinehart, Hildreth, Lawrence, 9.

<sup>311</sup> Office of the Secretary of Defense, Department of Defense, *Military and Security Developments Involving the Democratic People's Republic of Korea. Annual Report to Congress*, 13-14. North Korean media showed photographs of Kim Jong Un observing a nose cone test for what was believed the KN-08 intercontinental ballistic missile reentry vehicle in March, but whether the test was successful or not is not known. Joseph S. Bermudez Jr. and Henry Kan, "Location of KN-08 Reentry Vehicle Nosecone Test Identified," March 23, 2016, <http://38north.org/2016/03/chamjin032316/>

<sup>312</sup> Schilling and Kan, 8

<sup>313</sup> Ibid.

<sup>314</sup> Ibid.

<sup>315</sup> Stella Kim and Alastair Jamieson, "North Korea's Test Launch of Musudan Missile Ends in Failure: South," *NBC News*, May 31, 2016, <http://www.nbcnews.com/news/world/north-korea-s-test-launch-musudan-missile-ends-failure-south-n582911>.

<sup>316</sup> Schilling and Kan, 8.

<sup>317</sup> John Schilling, "A New Submarine-Launched Ballistic Missile for North Korea," *38 North*, April 25, 2016, <http://38north.org/2016/04/jschilling042516/>

<sup>318</sup> Ibid.

<sup>319</sup> Schilling and Kan, 8.

<sup>320</sup> Bermudez, "North Korea's Development of a Nuclear Weapons Strategy," 12.

<sup>321</sup> Robert E. Kelly, "Will South Korea Have to Bomb the North, Eventually?," *The Diplomat*, March 5, 2016, <http://thediplomat.com/2015/03/will-south-korea-have-to-bomb-the-north-eventually/>.

<sup>322</sup> Ibid.

<sup>323</sup> Office of the Secretary of Defense, Department of Defense, *Military and Security Developments Involving the Democratic People's Republic of Korea. Annual Report to Congress*, 6.

<sup>324</sup> Bermudez, "North Korea's Development of a Nuclear Weapons Strategy," 13-14

<sup>325</sup> Rinehart, Hildreth and Lawrence, 13.