Policy Outlook
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Japan's Ballistic Missile Defense Policies and Programs

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Japan has a long history of support for ballistic missile defense programs (BMD). Its actions over the past decade mark a deepening commitment to both the development and deployment of a technically sophisticated defensive system. Japan's participation in BMD programs can be traced to the 1980s, as a part of the U.S.'s Strategic Defense Initiative (SDI). More recently, Japan has invested significant resources and technical knowledge in the Aegis sea-based BMD system in cooperation with the U.S. Missile Defense Agency (MDA).

In 1985, Japan acquired proper licensing to produce PATRIOT Advanced Capability-2 (PAC-2) missiles, and, in the late 1980s, Japan planned to deploy "26 Japanese-made Patriot systems over the next 10 years to replace its aging Nike-J missiles."[1] The PAC-2 missile defense system, first deployed in the U.S. in the 1980s, is a mobile, low-tier, land-based interceptor system designed to intercept incoming tactical ballistic missiles, cruise missiles, or aircraft. Japan introduced the system in 1989 followed by an upgraded system in 1996.[2] Each PAC-2 launcher holds four PAC-2 missiles. It was originally designed as an air-defense system, but it eventually became a critical system to intercept short-range ballistic missiles. Over 200 PAC-2 systems have been delivered to over 12 different countries, including Japan.[3]

Over the next 10 years, Japan slowly acquired and developed defenses in response to growing threats. The effort increased in seriousness in the fall of 1998. On September 1, 1998, North Korea launched a three-stage Taepodong-1 missile in attempt to put a satellite, known as Bright Star-1, into space. The launch was startling on several levels. First, the demonstration of such a capable missile took many by surprise. Second, no objects were tracked in space, leading foreign governments to call it a failure as a space mission.[4] But, third, the Taepodong-1 launch vehicle ended up flying over Japan and crashing into the Pacific Ocean, which foreign defense and intelligence officials said was not a path that a missile intent on placing a satellite into orbit would have followed, suggesting there are other motives behind the program.[5]

Figure 1 shows the trajectory of the Taepodong-1 missile launched in 1998. The shorter arm of the arrow indicates where the first stage dropped into the Sea of Japan and the longer portion of the arrow indicates the area in which the second and third stages are said to have landed. Defense analysts speculated that the real purpose of the launch was to test the missile and that the path it flew was intentional. It was after this incident that the Japanese government began to prioritize BMD.

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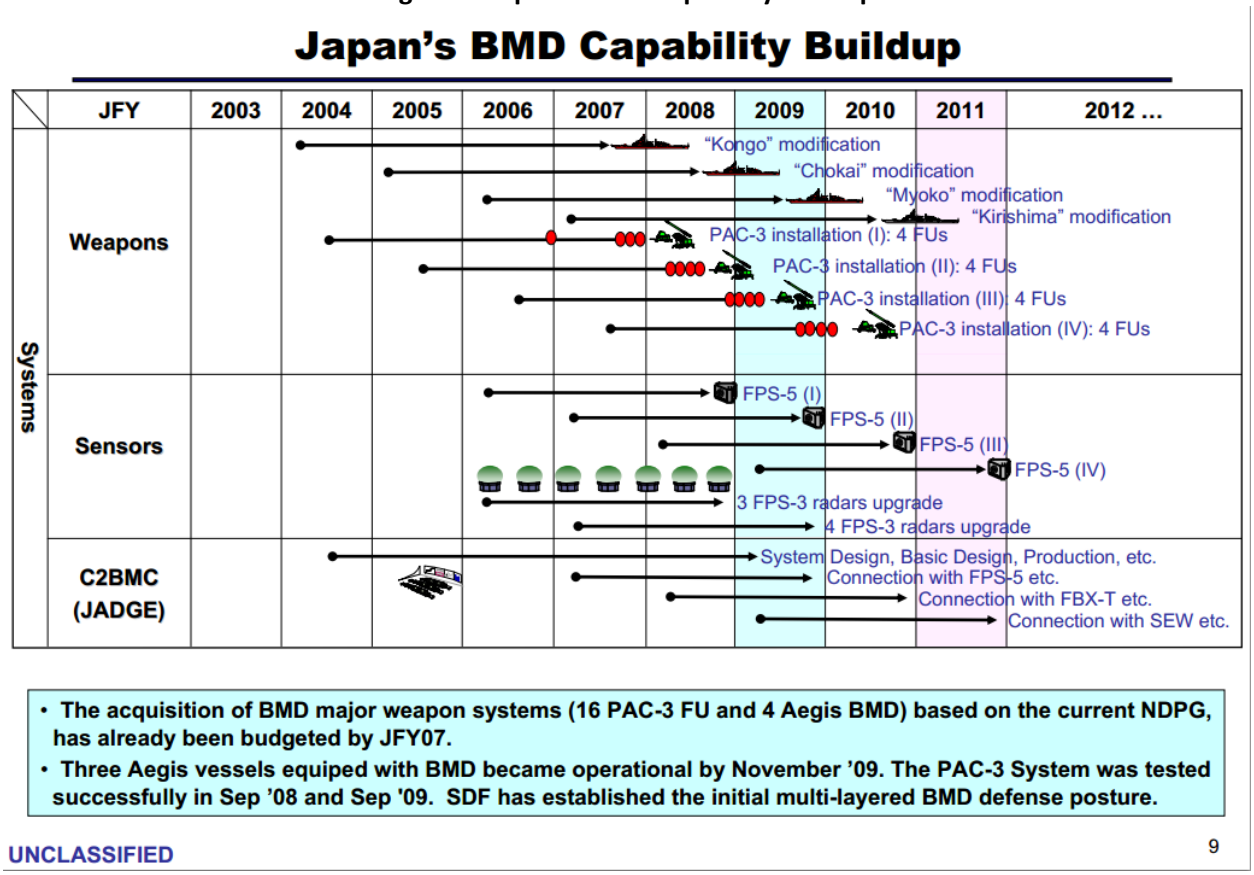
Figure 1. Trajectory of 1998 Taepodong-1 Missile Launch

Source: CNN

It became evident in May 2003 that Japan would begin to pursue missile defense, when then Prime Minister Junichiro Koizumi expressed the desire "to 'accelerate consideration' of Japan's participation in the United States ballistic missile defense (BMD) program."[6] In December 2003, Japan announced that it would introduce multi-layered BMD, which would include the PATRIOT Advanced Capability-3 (PAC-3) ground-based missile defense system as well as a Standard Missile SM-1A sea-based missile defense system.[7] The combination of these two systems was said to give Japan the ability to defend itself against incoming ballistic missile threats from both land and sea. Although it is not a complete and up to date picture of Japan's overall buildup, Figure 2, shows its weapons, sensors, and Command, Control, Battle Management, and Communications (C2BMC) capabilities buildup from 2004 to 2012.

Figure 2. Japan's BMD Capability Buildup

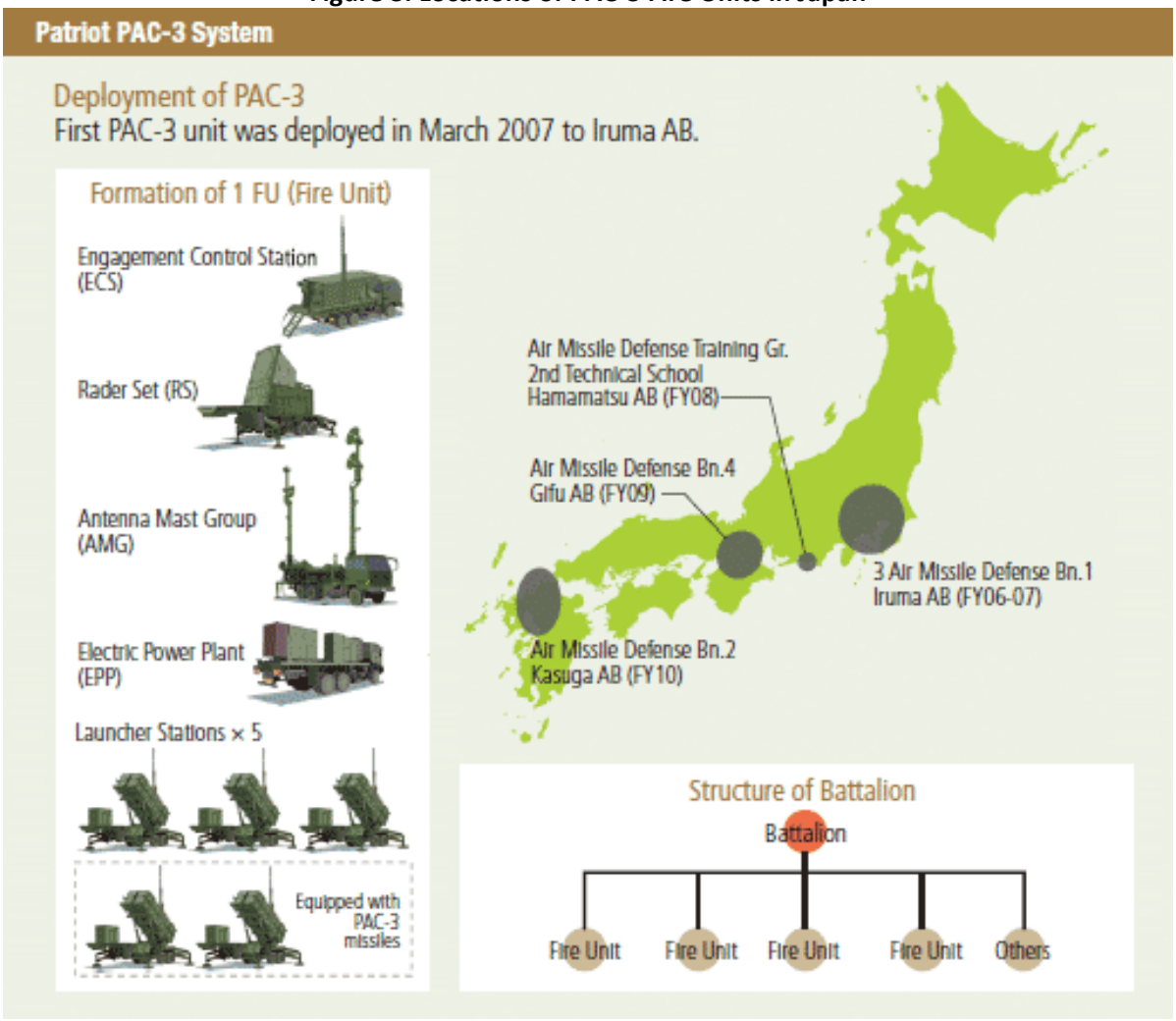


Source: Japan's Ministry of Defense Website

Japan's National Defense Program Guideline (NDPG) and the Mid-Term Defense Program (MTDP) both "clearly state the importance of establishing BMD capability" and enhancing U.S.-Japan BMD Cooperation.[8] The NDPG does so by clearly defining two objectives for Japan's security policy: "(a) to prevent any threat from reaching Japan and, in the event that it does, repel it to minimize damage; and (b) to improve the international security environment so as to reduce the chance of any threat reaching Japan at all," and that it should achieve those objectives by "combining three approaches: (a) Japan's own efforts, (b) cooperation with the United States, and (c) cooperation with the international community."[9] Furthermore, the Japan Defense Agency requested 144.2 billion yen (1.3 billion USD) for antimissile systems, which was a 35% increase in the budget from the previous year.[10] The Japanese government also had announced intentions to deploy the Aegis-destroyer based Standard Missile-3 (SM-3) missile.

In 2005, the Japanese government said it planned to purchase PAC-3 missiles from the U.S. for two years and then begin deploying PAC-3's manufactured under license in Japan.[11] The PAC-3 missile defense system is the U.S.'s most advanced low-tier, land based ballistic missile defense system.[12] Furthermore, it is a "guided missile system with long-range, medium to high-altitude, all-weather capabilities designed to counter tactical ballistic missiles (TMBs), cruise missiles, and advanced aircraft."[13] The PAC-3 is more advanced than the PAC-2, as it holds 12 more interceptors, uses hit-to-kill technology, and has an onboard radar transmitter and guidance computer. Figure 3 shows the locations of PAC-3 fire units deployed in Japan. It also indicates the elements that are part of a fire unit.

Figure 3. Locations of PAC-3 Fire Units in Japan



Source: Japan's Ministry of Defense Website

The other signature element of Japan's BMD program is its acquisition of the SM-3 missile. Japan first tested the Aegis BMD system with SM-3 missiles in 2007. The Aegis BMD system, according to Lockheed Martin, is the "primary sea-based component of the U.S. missile defense system. Aegis BMD seamlessly integrates the SPY-1 radar, MK 41 Vertical Launching System, and SM-3 missile through an advanced command and control system."[14] The mobility of Aegis BMD-equipped cruisers allows for intercepts during the ascent, midcourse, and descent phases, and also provides surveillance support for other elements of the BMD system.[15] Currently, Japan's Aegis-BMD equipped ships are using the Aegis BMD 3.6.1/SM-3 Block 1A system. The Aegis BMD 4.0.X/SM-3 Block 1B missile system is projected to be deployed in 2015. The U.S. has tested this system and will begin to deploy it soon. Once the U.S. has finished rolling out the system across its fleet, it will become available as an upgrade for Japan's fleet. Aegis BMD 5.1/SM-3 Block 2A is projected to be deployed in 2018.[16]

The SM-3 missile functions as a part of the Aegis sea-based BMD system that is installed on certain cruisers. The SM-3 missile is capable of intercepting short to intermediate-range ballistic missiles in the terminal phase using hit-to-kill technology.[17] There originally were four phases of development

projected for the SM-3 missile, however, in March of 2013, the U.S. announced that it would cancel the final phase of development, known as Block 2B.

U.S. BMD Assets in Japan

The U.S. and Japan have put a heavy focus on military cooperation since the 1990s. Since then, "forward-deployed forces in Japan have allowed the United States to maintain vital economic and strategic interests in the region, including security commitments to Japan…"[18] The U.S.-Japan Defense Cooperation guidelines were established 1997 as an extension of the U.S.-Japan Security Treaty signed in 1960. The aim was to create "a solid basis for more effective and credible U.S.-Japan cooperation under normal circumstances, in case of an armed attack against Japan, and in situations in areas surrounding Japan."[19] It is through the treaty and guidelines that the U.S. has been able to work so closely with Japan across a number of areas.

In June of 2006, the U.S. deployed a Forward-Based X-Band Radar, the FBX-T, to Shariki Sub Airbase. It was relocated to the U.S. Shariki Communications Site in 2007. In August 2006, a guided missile cruiser, the *USS Shiloh,* was sent to Yokosuka Naval Base. The following month, the U.S. deployed a PAC-3 battalion to Kadena Air Force Base in Okinawa, and it commenced operation in December of the same year.[20]

The Guidelines on Japan-U.S. Defense Cooperation were approved in 1997, which set the framework for cooperation between the two countries. Since then, joint operations have continued to improve. In December 2004, after a revision of its National Defense Program Guideline, it introduced a new Mid-Term Defense Program.[21] Furthermore, the U.S. and Japan operate under the Framework Memorandum of Understanding (MOU), which "sets general terms for cooperation on the development of BMD capabilities and covers various projects pertaining to information exchanges, joint research and development, and systems analysis."[22] Unlike the U.S.'s agreement with South Korea, Japan maintains full control over the use of its BMD forces, and the Minister of Defense has the authority to order "destruction measures" against ballistic missiles once all of the requirements are met, as per the emergency response procedure guidelines.[23]

Japan's Cooperation on Missile Defense

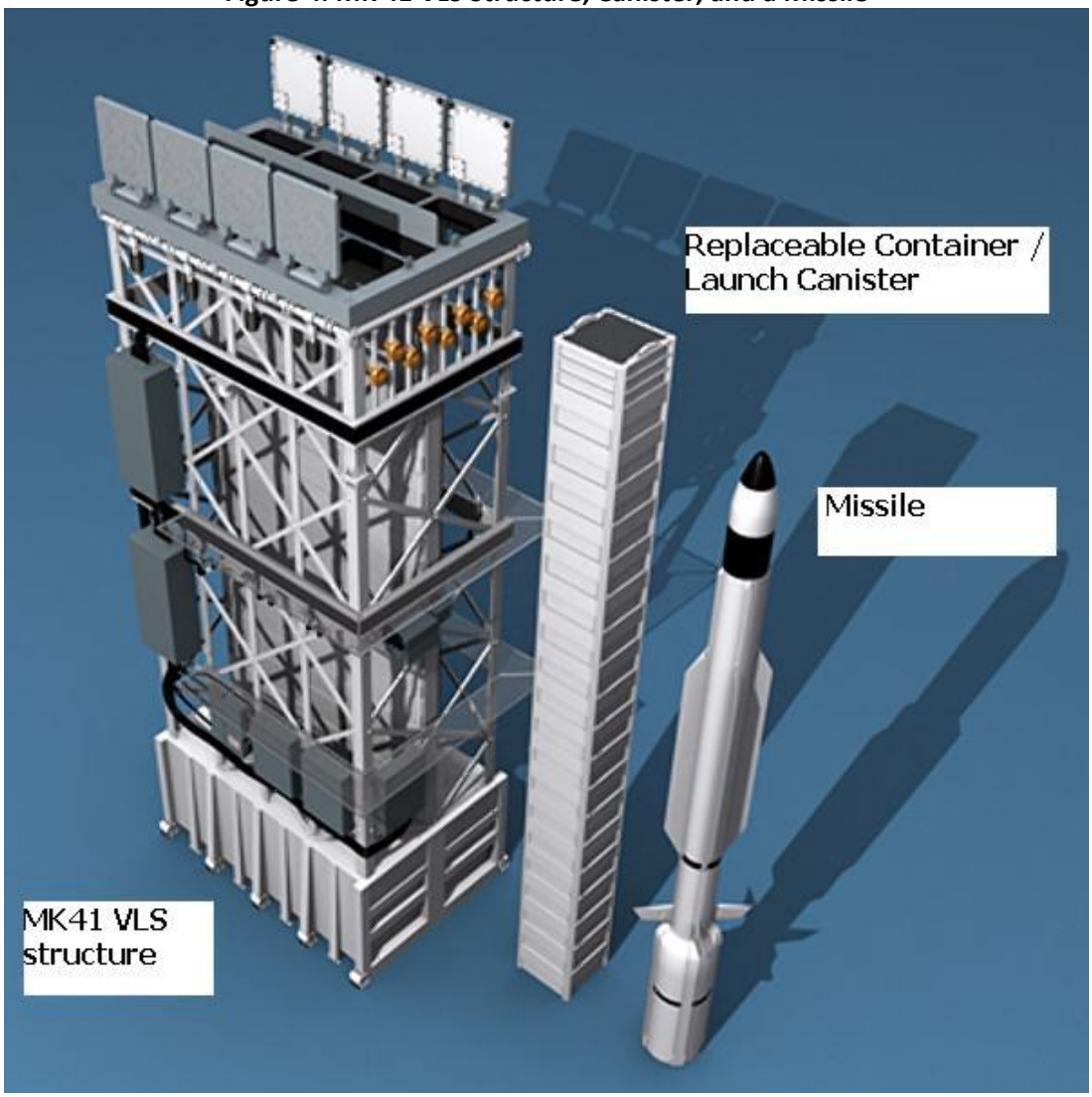
It is said that the "U.S.-Japan alliance and the U.S. military presence in Japan have served as the foundation for security, stability, and prosperity in East Asia" for over 50 years.[24] On the missile defense side, Japan began working with the U.S. on new missile defense systems after the 1998 North Korean launch. Their initial involvement was with the Navy Theater Wide (NTW) cooperation program. In December 1998, three months after North Korea's Taepodong-1 missile flew over Japan, the U.S. and Japanese governments signed a Memorandum of Understanding for "joint technology research for Navy Theater Wide (NTW) Theater Ballistic Missile Defenses."[25] Since Article 9 of Japan's Constitution places prohibitions on Japan's offensive military activities, the Japanese government asserted that cooperation with the U.S. on missile defenses would primarily be for defense and would not target other countries. Furthermore, "cooperation was divided into three phases: research, development, and procurement/deployment of any weapons system."[26]

However, Japan's official involvement intensified when then Prime Minister Junichiro Koizumi "announced that Japan would acquire and deploy missile defense capabilities and continue participation with the United States in the development of missile defenses."[27] Under the NTW cooperation program, the U.S. and Japan began co-developing the third phase of the SM-3 missile, the SM-3 Block 2A. The difference between the Block 1A and Block 2A missile is that the full length of the 2A's diameter will be

21 inches, as opposed having a 21-inch diameter booster stage and a 13.5-inch diameter remaining length like the Block 1 missile. Increasing the Block 2A's entire diameter to 21 inches was said to provide more room for rocket fuel and can "give the missile a burnout velocity (a maximum velocity, reached at the time the propulsion stack burns out) that is 45% to 60% greater than that of the Block IA/IB version."[28] Furthermore, the "full caliber round" as it is also known as, will provide "increased operational range, speed and room for more sensitive sensors and computers."[29]

However, there are also issues with this modification in regards to the vertical launching system (VLS). At 21 inches, the new missile is a tight fit in the VLS. As Raytheon business development for missile defense programs director Dean Gehr once stated, "it essentially fills up the full volume in that Mark 41 vertical launch canister."[30] The Mark 41 (MK 41) VLS comes in three sizes, the Strike Length MK41, the Tactical Length MK 41, and the Self-Defense Launcher (SDL). The only size capable of carrying any variation of the SM-3 missiles is the Strike Length size. However, it is said that because of the extended length of the Strike Length cells, they cannot be placed everywhere on a ship since they will not fit. Additionally, the MK 41 VLS contains eight cells in a system. More than one system can be installed on a ship if room allows. Some ships have up to 2 systems installed, allowing for 16 cells on a single ship. There are also different canisters and inserts available for the MK 41, which not only serve as transportation/storage containers and launch tubes, but also determine which missiles are capable of being fired from it. Of the six canisters that fit inside the MK 41 launcher, the Mk.29 is the only one that is capable of carrying the SM-3 Block 2 missiles. [31] Figure 4 shows the MK 41 VLS structure, an example of a replaceable container/launch canister, and a missile side by side.

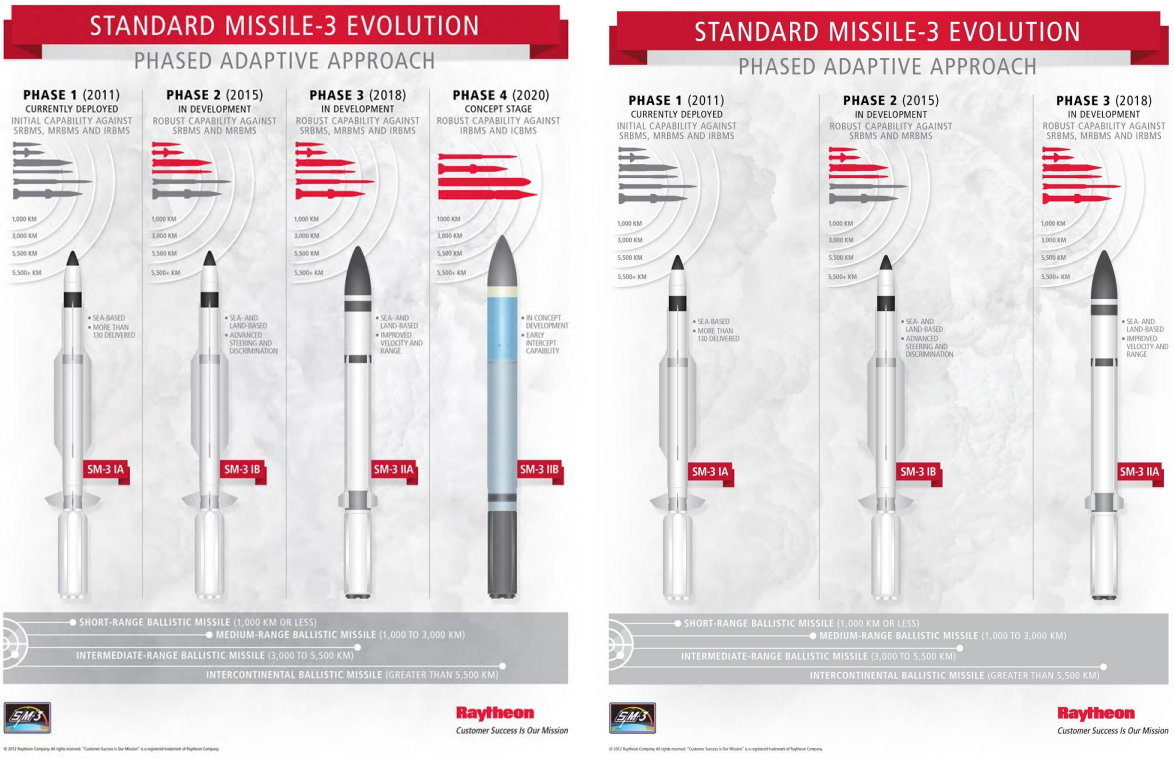
Figure 4. MK 41 VLS Structure, Canister, and a Missile



Source: UK Armed Forces Commentary

The U.S. and Japan have split the research and development costs for this program along with the areas of research. While both countries worked together to research and develop the advanced infrared seekers for the missile, Japan developed the clamshell nose cone and the 21-inch second-stage rocket motor, and "the U.S. developed the advanced propulsion system for the kill vehicle."[32] As mentioned earlier, the SM-3 Block 2A missile is projected to be deployed in 2018. Figure 5 shows the details of each phase of the SM-3 missile prior to 2013, and the current projected development after canceling Phase 4.

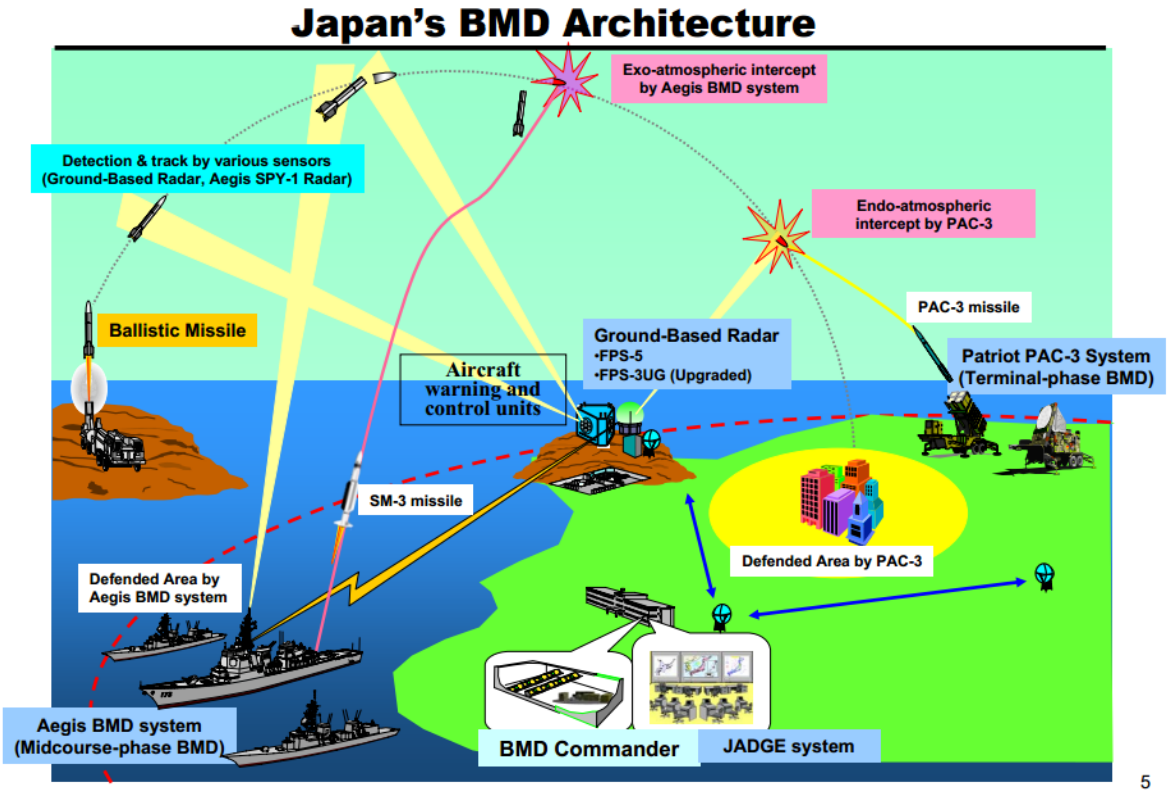
Figure 5. Evolution of the SM-3 Missile Prior to 2013 (Left) and After (Right)



Source: Raytheon

Japan's current BMD weapon architecture includes at least 16 PAC-3 fire units and four Aegis BMD equipped ships. The Defense Ministry reportedly plans to upgrade two more ships with Aegis BMD capabilities by 2018 and possibly procuring two additional Aegis ships, bringing the total count to eight.[33] Sensors that are integrated into the BMD shield are the Hazeltine AN/FPS-5 height-finding radar and the Bendix AN/FPS-3 search radar. All of these elements are tied together by a Command, Control, Battle Management, and Communications (C2BMC) system, which is the centerpiece of the BMD system.[34] Figure 6 depicts all elements of Japan's BMD architecture and how each is designed to function during a missile attack.

Figure 6. Japan's BMD Architecture



Source: Japan's Ministry of Defense Website

Since 2003, Japan has been increasing its BMD capabilities. Its cooperation with the U.S. has been critical for the creation of a BMD shield in East Asia. No other U.S. ally in East Asia is working with the U.S. on missile defense to the depth that Japan has. In contrast, South Korea, which possesses significant BMD assets, has intentionally kept distance from the U.S.-Japan partnership.[35]

However, pressures on the alliance may impact the BMD partnership. One defense scholar recently noted that "the alliance lacks a structure for a unified and integrated C2 for coalition operation. This gap stems from the Japan-U.S. Security Treaty itself. Compared to the NATO Treaty and the U.S.-ROK Security Treaty, the Japan-U.S. Security Treaty describes limited military obligation for Japan."[36] Furthermore, even though both countries re-wrote their defense guidelines in 1997 in order to:

> ...allow for more direct Japanese 'rear-area support' to U.S. forces in 'situations in areas surrounding Japan'...Japan interprets its constitution restrictively, which means that Japan's support cannot directly enable U.S. combat operations that are disconnected from its own self-defense. Japan must also avoid operating where a battle might occur, and none of this rear-area support is automatic because Japanese legislative approval is required. Thus, Japan's alliance contributions are strictly limited by mission (noncombat support) and by geography (rear-area operations).[37]

In October 2013, the U.S.'s Secretary of Defense and Japan's Ministry of Defense both agreed that revisions to the defense guidelines was needed. They recommend several changes:

1. Expanding the scope of bilateral cooperation,
2. Promoting security cooperation with other regional partners,
3. Enhancing bilateral consultation and coordination mechanisms,
4. Describing the appropriate role sharing within bilateral defense cooperation, and
5. Evaluating bilateral defense cooperation in emerging strategic domains.[38]

But even with gaps in the structure and contribution allowances, the cooperation between the U.S. and Japan on BMD has offered several benefits for better allied defense cooperation. A recent study by Sheila Smith of the Council on Foreign Relations concluded:

> It has realized the benefits of shared research and development, it has encouraged a considerable enhancement in Japan's capabilities, and it has prompted Japanese officials to seriously rethink their command requirements in the case of an attack. In 2005, Japan passed a law clarifying the civilian and uniformed roles in the command and control of BMD operations. In the spring of 2009, Japan's defense minister implemented these new rules of engagement by giving the Self-Defense Forces (SDF) commander final discretion to respond to the North Korean missile test.[39]

Furthermore, the purchase and deployment of the PAC-3, and the acquisition of SM-3 missile interceptors for Aegis-equipped U.S. warships, marked " a significant step forward in Japan-U.S. defense cooperation and integration," and the continued research and development and production done by these two countries is what has continued that cooperation and integration for the past 17 years.[40]

Endnotes

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