Long-range Strike Capabilities in the Asia-Pacific: Implications for Regional Stability

Veerle Nouwens, Interim Executive Director and Shangri-La Dialogue Senior Fellow for Indo-Pacific Defence and Strategy, IISS–Asia; Timothy Wright, Research Associate, Defence and Military Analysis, IISS; Dr Euan Graham, Senior Analyst, Australian Strategic Policy Institute; Blake Herzinger, Research Fellow, United States Studies Centre, University of Sydney

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Cover

A South Korean Hyunmoo-2 *SRBM and a US M30 rocket are launched during a joint military drill in South Korea, July 2017 (Photo by South Korean Defense Ministry via Getty Images)*

List of Abbreviations

ALCM	air-launched cruise missile
ASBM	anti-ship ballistic missile
ATACMS	Army Tactical Missile System
ATLA	Acquisition, Technology & Logistics Agency
ADF	Australian Defence Force
C4ISR	Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance
DSR	Defence Strategic Review
DSU	Defence Strategic Update
DoD	Department of Defense
GLCM	ground-launched cruise missile
HCM	hypersonic cruise missile
HGV	hypersonic glide vehicle
HIMARS	High Mobility Artillery Rocket System
INF Treaty	Intermediate-Range Nuclear Forces Treaty
ICBM	intercontinental ballistic missile
IRBM	intermediate-range ballistic missile
ISR	intelligence, surveillance and reconnaissance
JASDF	Japan Air Self-Defense Force
JASSM	Joint Air-to-Surface Standoff Missile
JASSM-ER	Joint Air-to-Surface Standoff Missile – Extended Range
JGSDF	Japan Ground Self-Defense Force
JMSDF	Japan Maritime Self-Defense Force
JSDF	Japan Self-Defense Forces
KPASF	Korean People's Army Strategic Force
LACM	land-attack cruise missile
LRASM	long-range anti-ship missile
LRHW	Long-Range Hypersonic Weapon
MIRV	multiple independently targetable re-entry vehicle
MRBM	medium-range ballistic missile
MTCR	Missile Technology Control Regime
ODC	Overall Defence Concept
PLA	People's Liberation Army
PLARF	People's Liberation Army Rocket Force
PLAN	People's Liberation Army Navy
PLAAF	People's Liberation Army Air Force
PrSM	Precision Strike Missile
QDR	Quadrennial Defense Review
RAAF	Royal Australian Air Force
SRBM	short-range ballistic missile
SSN	nuclear-powered attack submarine
TEL	transporter erector launcher
THAAD	Terminal High Altitude Area Defense
UAV	uninhabited aerial vehicle
USAF	United States Air Force
VLS	vertical launch system

Executive Summary

Missile arsenals are growing at an exponential rate in the Asia-Pacific region, as countries there attempt to alter or maintain the regional balance of power. China's and North Korea's expanding ballistic- and cruise-missile inventories, along with Beijing's increasingly assertive behaviour and Pyongyang's aggressive rhetoric and frequent testing of systems, are undermining regional security and driving other countries to improve their own long-range strike capabilities in response, albeit with widely differing levels of resources. Although most of those other countries are not developing missile types analogous to those now possessed by China and North Korea, their focus on long-range strike capabilities has contributed to a regional arms race that is unlikely to be constrained by arms-control limitations in the foreseeable future. It is therefore highly probable that all the countries of the Asia-Pacific will continue to expand their arsenals horizontally and vertically.

In response to China and North Korea attempting to upset the regional balance of power, Australia, Japan and South Korea have advanced furthest in their efforts to maintain the status quo. Australia's decision to invest in long-range strike capabilities represents an adjustment of Canberra's defence posture after supporting operations in the Middle East and the South Pacific for the last two decades. Many of the more advanced capabilities Australia seeks to acquire and develop are integral to the trilateral AUKUS agreement, and some will take more than a decade to come to fruition. In the meantime, to boost its deterrence, Australia is procuring several different types of long-range strike capabilities from allies and partners. Meanwhile, Japan's decision to acquire long-range land-attack capabilities is a major change for a state that has not had a substantial offensive strike capability since the Second World War. Although these capabilities will be used in accordance with Japan's post-war constitution, they will allow for a greater division of labour between Japan and the United States in the event of any joint military action. As for South Korea, it continues to expand and diversify its long-range strike capabilities in response to North Korean aggression. This has been facilitated by discarding the previous guidelines that restricted the range and warhead size of the missiles South Korea could develop.

Changing threat perceptions of China and North Korea, and resultant defence requirements, are visible elsewhere in the region. Taiwan's robust indigenous development programme and its ongoing imports of anti-ship missiles from the US reflect its unique security situation. In Southeast Asia, the Philippines and Vietnam are embarking on their own long-range-strike programmes, although on a smaller scale than Japan and South Korea. For now, many of these efforts are focused on developing anti-ship capabilities, mostly in response to China's assertive behaviour in the South China Sea and to ongoing territorial disputes. In the future, however, the Philippines, Taiwan and Vietnam may develop or procure more advanced capabilities, especially if regional security continues to deteriorate.

Despite all these developments, future long-range strike capabilities will need to be supported by connective tissue, including space-based intelligence, surveillance and reconnaissance capabilities and joint commands. While some countries in the region are attempting to address these issues, many US allies will be reliant on Washington to provide these capabilities in the short term.

The spread of long-range strike capabilities could play a stabilising role by helping to maintain the regional balance of power, thereby boosting deterrence against any temptation towards military adventurism that may arise in Beijing following China's advances in conventional- and nuclear-missile technology. Nonetheless, there are significant risks attached to this new 'missile age' in the Asia-Pacific. For instance, if some countries pursue independent capabilities and associated targeting cycles, and plan to operate them unilaterally, this could potentially

result in unintentional conflict escalation. Chinese and North Korean missile developments also have a nuclear dimension, given that many of these systems are dual-capable, and their use in a conflict could increase the danger of nuclear escalation because of pre- and post-launch warhead ambiguity. Despite these risks, advocates for arms control are likely to be disappointed, given China's and North Korea's intransigence on this issue. An accelerating security dilemma all but ensures this arms-racing dynamic will continue in an environment of limited transparency with regard to capabilities, inventories and intentions.

Introduction

Against a backdrop of geopolitical competition between the United States and the People's Republic of China (hereafter 'China'), a build-up of long-range strike capabilities by multiple countries in the Asia-Pacific is reshaping the regional military balance. This report will examine these developments and survey the extent of selected countries' Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) infrastructure.

China's missile arsenal, unconstrained by Cold War-era arms-control agreements signed by the Soviet Union and the US, and Beijing's determination to achieve credible deterrence against the US and its allies, have attracted much attention. So, too, have advances in North Korea's missile programme. Over the past two decades, China's People's Liberation Army (PLA) has invested in and developed extensive long-range strike capabilities. The centrepiece of these is a large arsenal of precision-guided ballistic and cruise missiles, including hypersonic glide vehicles (HGVs), which increasingly hold at risk US allies and partner countries across the Asia-Pacific, along with forward-deployed US military forces and bases. North Korea has also made rapid progress in testing and fielding its own inventory of theatre-range ballistic and cruise missiles, as well as longer-range intercontinental ballistic missiles (ICBMs). This has occurred in tandem with progress on its nuclear-weapons programme, prompting rising anxiety in Seoul, Tokyo and Washington.

Concurrently, the US decision in 2019 to withdraw from the 1987 Intermediate-Range Nuclear Forces (INF) Treaty paves the way for Washington to field a new generation of previously restricted longer-range missiles, driven mainly by US concern that its capabilities lag behind China's. It is almost certain that the US will deploy land-based ballistic and cruise missiles currently under development to the Asia-Pacific within the next five years, and that it will be a key partner in boosting the capabilities of its closest regional allies by exporting hitherto-restricted systems, deploying US equipment to their territories or assisting them on collaborative development programmes. Simultaneously, advances in missile technology, especially in the realms of accuracy, speed and survivability, are further improving the military utility of these systems, making numerous countries in the Asia-Pacific increasingly interested in acquiring them.

Though the various players have different motives and strategic requirements, Australia, Japan and South Korea are all moving to improve their conventional long-range strike capabilities in response to this shifting balance. In South Korea's case, the long-standing threat from North Korea, in addition to the increasing challenge from China, has resulted in Seoul developing a suite of land-attack cruise missiles (LACMs) and short-range ballistic missiles (SRBMs) for deterrence and operational purposes. Japan has committed itself to acquiring a credible so-called 'counterstrike' capability for the first time since the Second World War, through procurements from the US and domestic development. Meanwhile, Australia is rapidly acquiring a long-range strike capability in the context of an operationally closer and more integrated alliance relationship with the US.

These changes in threat perception and defence requirements are also influencing similar dynamics elsewhere in the region. Taiwan, a non-ally but close partner of the US, faces a direct military threat from China and has been developing its own capabilities since the mid-1990s, particularly in terms of anti-ship missiles and LACMs, in addition to purchasing some limited long-range strike capabilities from Washington. From a more restricted technological and financial base, some Southeast Asian armed forces are developing and acquiring their own stand-off capabilities, albeit on a more modest scale.

While Russia is geographically part of the Asia-Pacific region and has strategic interests there, it has been excluded from this study on the grounds that its long-range strike capabilities are primarily focused on supporting its ongoing invasion of Ukraine, and that

Moscow's security concerns in the Asia-Pacific are less pronounced than those of other countries in the region, given its current principal focus on the Euro-Atlantic. This does not, however, overlook the fact that Russia deploys and exercises equipment and platforms in the Asia-Pacific for deterrence purposes. Long-range-strike developments in South Asia also lie outside the scope of this report, partly for reasons of brevity but also because, at present, India's and Pakistan's conventional and nuclear forces are still primarily designed, deployed and postured to deter each other rather than other countries in the Asia-Pacific. However, with India's security perceptions gradually shifting, New Delhi is developing new missile technology increasingly with China in mind.

This report looks at trends in long-range strike capabilities in the Asia-Pacific, with a particular focus on countries and areas where action–reaction dynamics are most concentrated. It considers not only the primary strategic dynamics but also second-order implications for the United States' alliance framework as Washington's regional allies acquire more potent offensive military potential. It will first examine the capabilities of China, North Korea and the US, as those are the countries with the most long-standing and extensive missile programmes. It will then look at how other countries in the Asia-Pacific – namely Australia, Japan, the Philippines, South Korea, Taiwan, and Vietnam – are seeking to improve their own capabilities in order to achieve greater conventional deterrence.

1. China

In December 2012, President Xi Jinping noted that China's strategic missile force, the People's Liberation Army Rocket Force (PLARF), is 'the core strength of China's strategic deterrence, the strategic support for the country's status as a major power, and an important cornerstone safeguarding national security'.[1] Leading on from this, China's 2019 Defence White Paper notes that the 'PLARF plays a critical role in maintaining China's national sovereignty and security', and as a result 'is enhancing its credible and reliable capabilities of nuclear deterrence and counterattack, strengthening intermediate and long-range precision strike forces'.[2] The noted importance of long-range strike capabilities for ensuring regional deterrence has led China to embark on a mission to expand its ballistic- and cruise-missile inventory by investing in capabilities that were unavailable to the US (and Russia) at the time of Xi's statement and the Defence White Paper's release because of the Intermediate-Range Nuclear Forces (INF) treaty, which restricted the US and the Soviet Union (later the Russian Federation) from deploying ground-launched ballistic and cruise missiles with ranges of between 500 and 5,500 kilometres.

Having historically operated a small and potentially vulnerable strategic deterrent centred around a small number of liquid-fuelled ICBMs as well as a conventionally armed force that was predominantly focused around SRBMs, China has sought to develop a more credible nuclear and conventional capability against the US and its regional allies, and to a lesser extent against Russia. This effort was reflected in Xi's remarks at the 20th National Congress of the Communist Party of China in 2022, where he declared the aim of building 'a strong system of strategic deterrence'.[3] The PLARF is modernising and expanding its force of road-mobile ICBMs and has completed the construction of approximately 300 silos across three sites in central and western China, and filled some of them with ICBMs.[4] Unconstrained by the INF Treaty or any other arms-control limitations, and alongside increased Chinese defence spending more broadly, China has developed the largest and most capable theatre-range ground-launched ballistic- and cruise-missile inventory in the Asia-Pacific. Other service branches in the PLA are also enhancing their stand-off capabilities. The People's Liberation Army Navy (PLAN) and People's Liberation Army Air Force (PLAAF) have improved the range, speed and accuracy of their weaponry, increased the quantity and survivability of associated launch platforms, and integrated multiple types of stand-off precision-strike capabilities onto various existing aircraft and naval assets. While China's long-range strike capabilities in the air and sea domains currently lag behind those of the US, the PLA is investing significant resources and developing a large number of more capable systems and associated platforms to close this capability gap.

PLARF Precision-strike Capabilities

The PLARF is the principal service branch through which the PLA can utilise long-range precision-strike capabilities to fulfil its regional deterrence and war-fighting requirements. According to the 2023 assessment of China's military by the United States Department of Defense (DoD), the PLARF possesses an estimated 750 launchers for SRBM or medium- or intermediate-range ballistic missiles (MRBM, IRBM) and roughly 2,500 of these missiles that can be launched from these platforms.[5] While other service branches also possess long-range strike capabilities, Chinese texts describe the PLARF's forerunner, the Second Artillery Corps, as having the capabilities to strike 'in-depth targets, and seizing air and naval dominance in future local wars', suggesting its primacy among the service branches for conducting this type of mission.[6]

Although there are many potential flashpoints in the Asia-Pacific, China's ambition to reunite Taiwan with the mainland presents the likeliest possibility for a large-scale military confrontation with the US. Within the so-called first and second island chains, the US has extensive military bases that would play an important role in confronting the PLA in the event of a Taiwan

contingency. To negate Washington's ability to project power in the region and support its regional allies and partners, the PLARF has multiple conventional and nuclear systems that can hold US and allied targets at risk as far away as the second island chain. These systems also serve a useful additional purpose in deterring other nuclear-armed states in the region, including India and, to a lesser extent, Russia.

To strike potential targets in Taiwan and southern parts of the Japanese archipelago, the PLARF possesses multiple variants of the DF-11 (CH-SS-7), DF-15 (CH-SS-6) and DF-16 (CH-SS-11) SRBM designs. The US DoD's public estimate of the size of China's SRBM arsenal slightly decreased from a pinnacle of 250 launchers in 2019 to 200 in 2023, but the PLARF is estimated to possess roughly 1,000 SRBMs, providing it with the capacity for several reloads for each launcher.[7] While some of these systems lack sufficient range to target northern parts of the Japanese archipelago and other targets in the first island chain, China's large number of shorter-range systems are especially pertinent for a Taiwan contingency, evidenced by the PLARF conducting live fire drills in the Taiwan Strait with multiple DF-15 SRBMs in response to the visit to Taiwan by the then-speaker of the US House of Representatives, Nancy Pelosi, in August 2022.[8] Continued upgrades to improve the accuracy, survivability and utility of these systems underscore their importance to the PLARF, especially for a potential cross-Strait operation. Quantity is also a major factor, given the large number of targets that would need to be held at risk in a conflict.[9]

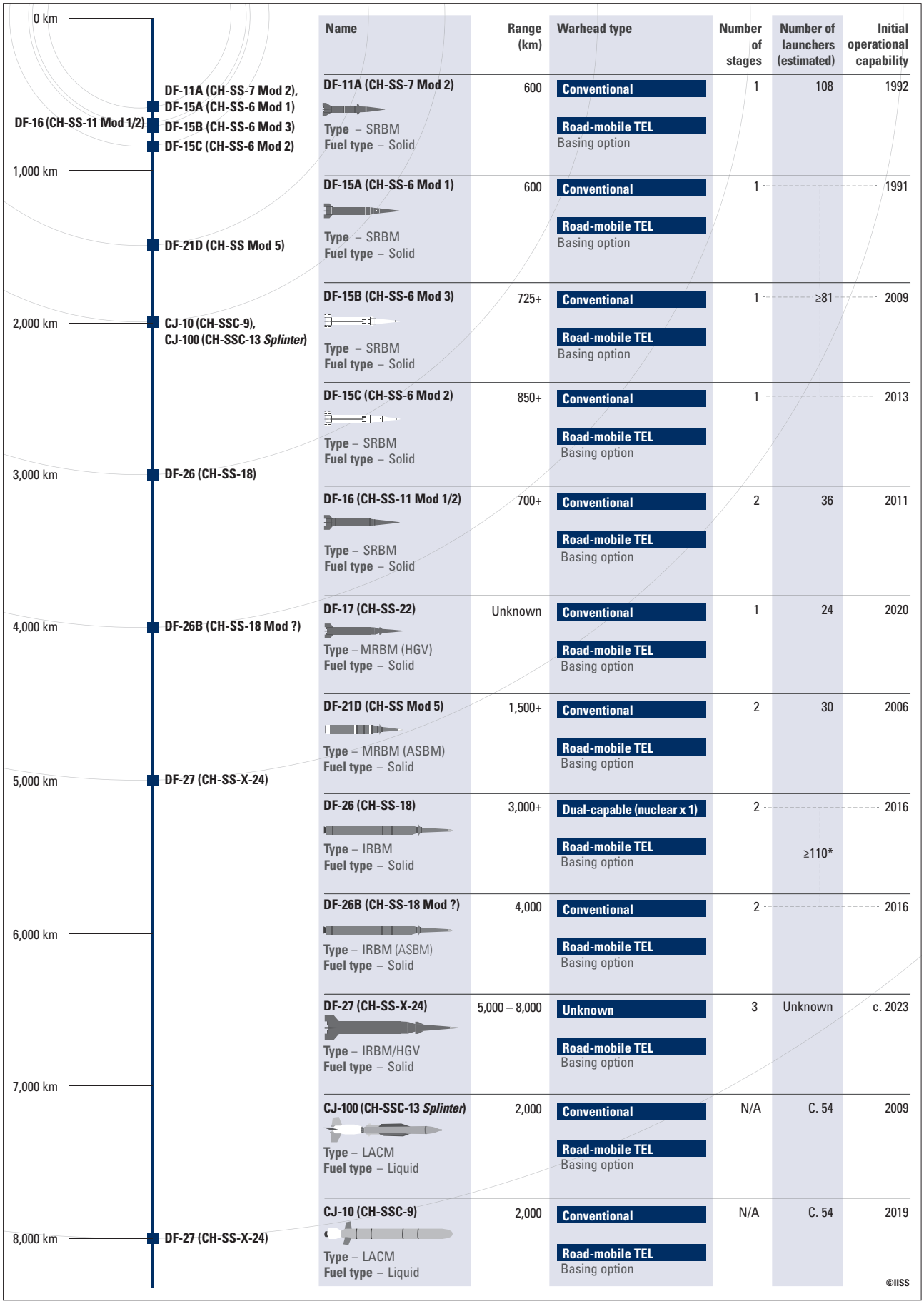
The PLARF is also improving the survivability of its arsenal through the development of new systems such as the DF-17 (CH-SS-22) MRBM/HGV. The DF-17 is equipped with a manoeuvrable HGV that will present an interception challenge to existing air and missile defences. At least three brigades are assessed to have been re-equipped with the new missile, and the PLARF may re-equip additional SRBM brigades with it in the future. In a conflict it is likely that the PLARF would use the DF-17 to strike high-value targets such as air and missile defences, radars and command-and-control centres in order to increase the probability that other, less capable systems could subsequently penetrate a degraded missile-defence architecture.

A Chinese DF-17 MRBM/HGV on display at a military parade in Beijing, 1 October 2019

(Photo by Greg Baker/AFP via Getty Images)

In the last decade, the PLARF has concentrated on qualitatively and quantitatively upgrading its MRBM and IRBM arsenal.[10] China possesses several different types of both, as well as long-range cruise missiles that could be used for a variety of different regional conventional and nuclear missions. All these systems utilise road-mobile transporter erector launchers (TELs) and solid propellant fuels, making it difficult for an adversary to target them pre-emptively or even post-launch. Multiple variants of the DF-21 (CH-SS-5) MRBM have historically provided the PLARF with a flexible medium-range weapon it could employ for conventional land-attack and anti-ship missions, as well as providing China with a regional nuclear-deterrent capability. Despite the adaptability of the DF-21 design, however, its variants have now been supplanted in the PLARF inventory by the longer-range DF-26 (CH-SS-18). The DF-26 extends the PLARF's reach out to the island of Guam, with its key US military facilities. While some weapons, such as the DF-21, may eventually be replaced with newer and more capable systems, it is likely that they will remain in the PLARF's inventory, providing additional 'magazine depth' in a contingency.[11] The PLARF also operates two ground-launched cruise missiles (GLCMs): the CJ-10 (CH-SSC-9) and CJ-100 (CH-SSC-13 *Splinter*). These provide China with a capability to strike targets up to 2,000 km away and enable the PLARF to threaten targets with simultaneous attack from different systems with multiple speeds and attack profiles, significantly complicating the task of missile defence.

Figure 1.1: **PLARF conventional ballistic- and cruise-missile inventory**



Sources: IISS Military Balance+; IISS, *Missile Technology: Accelerating Challenges*

China's Type-055 (*Renhai*-class) cruiser provides the PLAN with a useful platform for long-range-strike missions

(Photo by Sun Zifa/China News Service via Getty Images)

The PLARF is also upgrading its arsenal by introducing new types of equipment, though little is currently known about them. The Pentagon's 2023 report claims that the DF-27 (CH-SS-X-24) IRBM/HGV is under development; however, Pentagon documents leaked in early 2023 indicated that limited numbers may already have been fielded.[12] The leaked documents also assessed that the DF-27 has land-attack and anti-ship variants, offering the prospect of a PLARF capability to target high-value units of the US Navy further away than the previously conceptualised battlespace west of Guam.[13] The missile's warhead type is unknown but it is likely to be dual-capable, like those of many other Chinese ballistic missiles. The Pentagon's 2023 report also claims that China 'may be exploring development of conventionally armed intercontinental range missile systems'.[14] The Pentagon's cautious language suggests uncertainty about the status of this potential development, and that the missile may not have progressed beyond an initial design stage. Nonetheless, if China did develop and field a conventionally armed ICBM, it would provide a new capability to launch conventional strikes against targets in the continental US, Hawaii and Alaska. This would, however, create a significant risk of escalation, as the US would have no way of knowing if a detected system was armed with a nuclear or a conventional warhead until it reached the target.

PLAN and PLAAF Capabilities

Guided by PLA doctrine that precision-strike capabilities are critical in all domains, the PLAN and the PLAAF are also seeking to improve their long-range precision-strike capabilities, both quantitatively and qualitatively.[15] The PLAN currently has only limited precision-strike land-attack capabilities because it has not yet developed a dedicated LACM. It is, however, addressing this limitation. Likewise, the PLAAF is increasing its capacity for conducting offensive operations through the development of more advanced aircraft and stand-off weapons.

Concerning surface and subsurface precision-strike developments, the US DoD assesses that by the mid-2020s China will probably deploy an improved Type-093B (*Shang* III-class) guided-missile nuclear-powered attack submarine equipped with a long-range LACM.[16] Due to the Type-093B's projected lower acoustic signature, this will potentially allow China to launch precision strikes from a covert platform. Compared with its developing land-attack capabilities, the PLAN's anti-surface-warfare capabilities are currently more advanced. China's newest anti-ship missile, the YJ-18A (CH-SS-N-13), is already deployed aboard various Chinese naval platforms, such as the Type-055 (*Renhai*-class) cruiser.[17] Some modernised surface combatants have reportedly been equipped with the supersonic YJ-12A anti-ship missile to improve their anti-surface-warfare capabilities, and China may retrofit newer anti-ship missiles onto older surface platforms to enhance their lethality.[18] PLAN coastal defence YJ-12 anti-ship missiles may also have been deployed to China's artificially constructed bases in the contested Spratly Islands in the South China Sea, potentially complicating maritime navigation near these outposts.[19]

In the air domain, the PLAAF is enhancing its stand-off capabilities by improving the range and payload of its bomber force through incremental upgrades, as well as by developing new delivery platforms and types of missiles. The upgraded H-6K *Badger* bomber benefits from an extended range that has been achieved through the incorporation of more efficient engines, while the addition of extra pylons allows each aircraft to carry up to six CJ-20 LACMs, an air-launched variant of the CJ-10.[20] Although the H-6K lacks an in-flight refuelling capability, its estimated combat radius of 3,500 km and the approximate 1,500 km range of the associated CJ-20 provides the PLAAF with a useful long-range stand-off capability that could be used against targets in the

second island chain. The H-6J and K bomber variants can also carry an air-launched version of the YJ-12 anti-ship missiles, allowing them to conduct stand-off maritime strike missions from up to 500 km away. The most recent variant of the H-6 airframe, known as the H-6N, has been configured for aerial refuelling, extending its potential operating range even further, and features a modified fuselage that allows for the carriage of a large external air-launched ballistic missile known by its US classification as CH-AS-X-13. This missile, which is currently under development, appears to be an adapted, air-launched version of the DF-21 MRBM and potentially provides the PLAAF with a new Mach 5+ missile capability.[21] Despite having been under development since at least 2018, the CH-AS-X-13 is yet to be fielded, perhaps indicating a problem with the missile's design.[22] Satellite-imagery analysis also suggests that the PLAAF is operating only a small number of H-6N airframes, despite significant expansion of the Nanyang-Neixang airfield where the PLAAF's 106th Brigade deploys the aircraft.

Despite improving on the original H-6 airframe, both upgraded variants are ageing designs and the PLAAF is seeking to improve the capability of its bomber force by developing a new strategic bomber known as the H-20. The aircraft will possibly enter service by the mid-2030s and will have a range of more than 10,000 km.[23] The H-20 is expected to be a stealthy design; the Chinese media have depicted it as a tailless flying wing with an internal weapons carriage.[24] It is expected to be equipped with both conventional and nuclear weapons, probably in the form of air-launched cruise missiles (ALCM) as well as guided bombs. Whether the H-20's LACM will be an existing system or a new design is uncertain, but given the probable requirement to carry ordnance internally to reduce the aircraft's radar signature, it is unlikely that the H-20 will be equipped with an existing large LACM such as the CJ-10/A.

Limits to China's Kill Chain

China's conventional surface-to-surface ballistic- and cruise-missile force is extensive and utilises tried-and-tested technology. Its targeting capabilities are very likely to be sufficient to support attacks against fixed targets throughout most of the first island chain and beyond. Ultimately, even with the PLARF's purported capability to conduct long-range anti-ship attacks, the tactical problem of neutralising US forces in the Indo-Pacific would potentially be solved far more easily by launching a pre-emptive attack on naval and air equipment while they are located at their bases, rather than dispersed across multiple locations. There is some indication that the PLARF has at least considered that option, with ballistic-missile target ranges in western China appearing to host mock-ups of US bases and silhouettes of US Navy ships sitting in port.[25] By this measure, the PLARF already holds fixed US bases in Korea, Japan and Guam at risk.

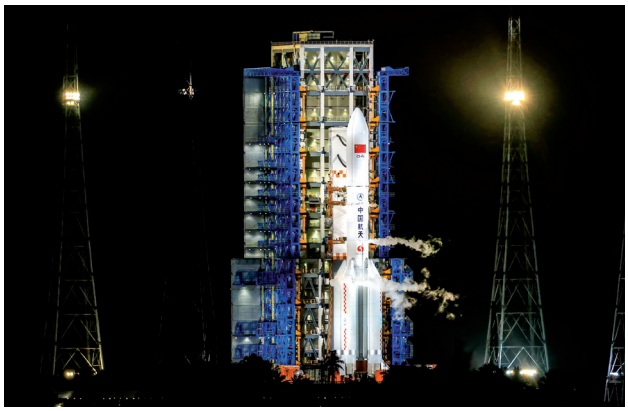
Despite the PLA's impressive precision-strike arsenal and its appreciation of the importance of precision strikes as a force multiplier, Beijing still faces limits to its 'kill chain'.[26] Specifically, its ability to hit moving targets reliably is unproven, it lacks over-the-horizon tactical awareness, and it suffers from a constricting chain of command.

Achieving a reasonable circular error probable (CEP) with a missile targeting a fixed point is far simpler than striking a moving target.[27] This can be seen in two cases in particular: China's much-vaunted 'carrier killer' DF-21D and DF-26 anti-ship ballistic missiles (ASBM), and its over-the-horizon radar capabilities for tactical awareness. The PLARF's ASBMs offer an interesting case study in denial and deterrence. Despite the system's alleged anti-access/area denial capabilities, these systems have only been partially tested against simulated moving targets.[28] While their capabilities remain mostly unproven, their existence implies the ability to deny maritime access to surface forces. This has prompted a significant reconsideration of US defence strategy in the Indo-Pacific because forward bases and maritime areas previously out of harm's way that US forces have long relied on are now within the PLARF's striking range, and the nuclear-powered aircraft carriers at the centre of US expeditionary strategy are also potentially vulnerable. However, according to some estimates, about 12 ASBMs are required to successfully hit a carrier, let alone disable or sink it.[29] Using this metric, two-thirds of a PLARF brigade's inventory would be needed to successfully target a single carrier, without even taking into account self-defence efforts or

Map 1.1: **PLARF missile bases and brigades (2022)**

*MUCD stands for 'military unit cover designator', a five-digit number the PLA uses to identify military units.
Sources: IISS *Asia-Pacific Regional Security Assessment 2022*; Decker Eveleth

China launches a *Yaogan*-41 military geostationary Earth-observation satellite, 15 December 2023



(Photo by Liu Guoxing/VCG via Getty Images)

US countermeasures. This trade-off could stretch and potentially exhaust the PLARF's missile inventory if it were to target large numbers of US surface vessels.

Furthermore, China is probably still struggling to develop the infrastructure required to target a moving platform with a ballistic or cruise missile, as the associated kill chain is highly technical and requires advanced ground- and space-based sensor coverage. While China does have over-the-horizon radar capabilities that enable some degree of visibility from its shores and artificial islands in the South China Sea, the PLA's ability to differentiate between contacts and maintain sufficient reliability to conduct a long-range missile strike is perhaps questionable, even in the case of launching a surprise strike under benign peacetime conditions. Even if operating only in the area inside the first island chain – bounded by Japan, Taiwan and the Philippines – there is a low likelihood that the PLA could achieve the degree of tactical awareness needed. And this is before considering likely opposing measures by the US. A surprise first strike might succeed without interference, but in any other conflict scenario the PLARF would be battling against not only physics but also the full spectrum of US electronic-warfare and cyber capabilities. However, space-based intelligence, surveillance and reconnaissance (ISR) is a priority area for the PLA and its investments in this area have been significant. As indicated in the Pentagon's annual military assessment, China currently has over 290 ISR satellites, a total that represents a two-fold increase since 2018 and is second only to the US.[30]

In summary, despite China's significant capabilities elsewhere, the oft-referenced Chinese anti-access/area-denial 'bubble' remains an unproven capability. It does not exist in peacetime and would probably not be impenetrable in a conflict, especially when taking into account defensive capabilities and offensive countermeasures taken to interrupt a lengthy and vulnerable kill chain. However, China is not the only country in the Asia-Pacific that has embarked on an extensive missile programme. North Korea is also driving towards stronger deterrent capabilities, chiefly against the US and its allies in the Asia-Pacific, although its existing capabilities and potential resources for future capability development are quite different from China's.

2. North Korea

North Korea's three main strategic objectives, all of them long-standing, are to ensure national sovereignty and freedom from the US, South Korea and Japan in its internal affairs; to maintain the dominant position of leader Kim Jong-un, his family and their supporters within the political hierarchy; and to ensure the unification of the Korean Peninsula under the country's banner.[31] Its nuclear weapons and ballistic- and cruise-missile programmes have been utilised to support these objectives, and it possesses diverse types of ballistic and cruise missiles to support its strategic objectives.

Kim's detailed military-modernisation directives at the Eighth Congress of the Workers' Party of Korea, in January 2021, provide insights into Pyongyang's ambitions for its nuclear and conventional missile force. Likewise, Pyongyang's updated 2022 nuclear doctrine articulates how it intends to use its nuclear weapons to deter adversaries in peacetime, or in war if deterrence fails. As North Korea continues to develop, test and deploy new missiles, it will also enhance its supporting ISR infrastructure to connect its kinetic capabilities more effectively to its command and control. Together, these ambitions and developments have important implications for regional security and the national defence postures of other states.

Capability and Objective Linkages

North Korea (the DPRK) places a strong emphasis on using its nuclear-armed missiles to safeguard national sovereignty, claiming that 'the nuclear forces of the DPRK are a powerful means for defending the sovereignty, territorial integrity and fundamental interests of the state'.[32] Its revised 2022 nuclear doctrine notes that the main mission of its nuclear forces is to 'deter a war by making hostile forces have a clear understanding [of] the fact that the military confrontation with the DPRK brings about ruin' and for 'repulsing hostile forces' aggression and attack and achieving decisive victory of war in case … deterrence fails.'[33] Gaining the capability to threaten the continental US with a nuclear-armed ICBM is a preeminent ambition for Kim, who sees it as a key component in deterring the US from launching military action against North Korea. Pyongyang would also use its strategic nuclear force, once operational, to undermine the US–South Korea alliance by attempting to cast doubt on US alliance commitments to South Korea, as Pyongyang could threaten the US with a nuclear strike should it intervene in a war between North and South Korea. Furthermore, because of the significant disparity between North and South Korea's conventional military forces, Pyongyang has pursued non-strategic nuclear weapons in an attempt to alter the balance of power on the Korean Peninsula in its favour.

North Korea tested the *Hwasong*-18 ICBM three times between April and December 2023

(Photo via Korean Central News Agency)

Enhancements to North Korea's Strategic Forces

Since its first ICBM test in 2017, North Korea has publicly displayed and tested at least five different ICBM designs of increasing range and capability, although the service status of some of these systems is questionable, given Pyongyang's propensity for propaganda and opacity.[34] Reflecting the requirement for the Korean People's Army Strategic Force (KPASF) to reliably and accurately target the US for deterrence purposes, Kim stressed at the 2021 party congress the need for a ICBM capability that will allow North Korea to 'strike and annihilate any strategic targets within a

range of 15,000 km with pinpoint accuracy'.[35] This goal may have been achieved following several successful tests in 2022 and the possible deployment of the liquid-fuelled *Hwasong*-17 ICBM, which is assessed to possess the desired range.[36] Whether the missile possesses the accuracy of more advanced ICBM designs such as the Russian RS-24 *Yars* (RS-SS-27 mod 2) is less certain, but North Korean reports on tests carried out in 2022 stated that the missile had hit its pre-set target area in the Sea of Japan, which suggests it will at least be capable of conducting 'countervalue' strikes against urban areas.[37]

Like other states possessing nuclear weapons, North Korea aspires to enhance the readiness and survivability of its nuclear forces as well as the range of its missiles. Kim's directive that North Korean engineers develop 'solid-fuel engine-propelled inter-continental … ground ballistic rockets' appears to have been partially realised, given a successful static ground test of a solid-fuel motor in December 2022 and two successful test launches of the solid-fuel *Hwasong*-18 ICBM in April and July 2023.[38] Possession of a solid-fuel ICBM in sufficient numbers would provide North Korea with a more responsive and resilient means to threaten the US.

Map 2.1: **The first and second island chain, and selected Chinese missile ranges**

Source: IISS, *Missile Technology: Accelerating Challenges*

North Korea's *Hwasal*-1/2 LACM increases the country's nuclear-delivery options

(Photo by Jung Yeon-je / AFP via Getty Images)

Kim has also charged the Academy of National Defense Science with developing multiple independently targetable re-entry vehicles (MIRV).[39] Possessing a MIRV capability will allow North Korea to deliver multiple warheads to different targets using a single missile, thereby enhancing its first-strike capability and its ability to overcome the US homeland's ballistic-missile defences. Work towards achieving this objective appears to be ongoing, and satellite-launch-vehicle tests on 26 February and 4 March 2023 may have been used as a cover to develop MIRV technologies, such as attitude-control motors, which could be incorporated into a dedicated post-boost vehicle capable of manoeuvring to place warheads on different trajectories.[40]

North Korea's Development of Theatre-range Missiles

North Korea also possesses several MRBM and IRBM designs that have sufficient range to deliver conventional and nuclear payloads to important US and allied military facilities in the Asia-Pacific, such as Guam. These include systems such as the *Hwasong*-12 IRBM, which has been in service with the KPASF since at least 2016.[41] Some North Korean MRBM designs appear to have provided the basis for developing a manoeuvring re-entry vehicle and an HGV, which Kim also prioritised as part of his 2021 military-modernisation directives.[42] North Korea may be developing an HGV because of the prestige associated with this type of missile technology, as well as to counter regionally deployed South Korean and US missile defences.

Alongside its more established MRBM and IRBM capabilities, North Korea has also made significant qualitative improvements to its conventional SRBM and cruise-missile arsenal. Pyongyang's frequent testing of its shorter-range missiles provides it with a credible capability for regional war fighting below the nuclear threshold and will have implications for South Korean and US defence postures. In a conflict, North Korea would probably attempt to quickly saturate high-value South Korean and US targets – including airfields, command-and-control centres, logistics hubs, missile defences and ports – with multiple salvos.[43] SRBMs useful for this task include the single-stage and solid-fuel KN-23 and KN-24 SRBMs (among other sub-variants of these designs) and the KN-25 multiple-launch rocket system.[44] Unlike many types of older ballistic-missile designs that travel across predictable parabolic trajectories, which fire-control radars can use to calculate an anticipated interception point for missile defences, the KN-23 and KN-24 fly on flattened trajectories and can purportedly manoeuvre in flight to defeat countermeasures and defensive systems.[45] The flattened trajectories of the KN-23 and KN-24 may also present challenges for US and allied missile defences as they appear capable of travelling within a coverage gap of the *Aegis*, *Patriot* and Terminal High Altitude Area Defense (THAAD) missile defences.[46] North Korea has also developed at least two variants of an LACM known as the *Hwasal*-1 and -2, both of which were first publicly tested in 2021 and multiple times in 2022–23.[47] Given the speed at which the cruise-missile programme apparently advanced to maturity, its development may well have been under way for some time.

North Korea has also linked the development of these shorter-range systems to its nuclear deterrent, as miniaturising and lightening non-strategic nuclear warheads was listed by Kim as a priority at the 2021 party congress.[48] Presumably these smaller warheads for shorter-range systems are being developed with nearby targets in South Korea and Japan in mind. Imagery released by North Korean media in March 2023 shows mock-ups of a compact nuclear-warhead design called the *Hwasan*-31 along with imagery of this warhead integrated into multiple delivery systems, indicating North Korea's ambition to possess a diverse tactical arsenal.

North Korea is seeking to develop its space-based ISR capabilities for targeting purposes

(Photo via Korean Central News Agency)

North Korea's rhetoric and behaviour also suggest that it views non-strategic nuclear weapons as a means to restore the growing conventional military imbalance between Pyongyang and its regional adversaries, especially Japan and South Korea. Statements by Kim praising a simulated 'nuclear counterattack by the units for the operation of tactical nukes' suggests that KPASF personnel are training to operationalise this capability.[49]

Advances in North Korean Propulsion Technology

Underpinning North Korea's progress in developing its theatre- and strategic-range missiles are its advances in solid-propellant technology. Utilising solid fuels will provide Pyongyang with a more survivable and responsive conventional and nuclear deterrent, complicate US and allied detection efforts, and shorten timeframes to strike detected launch preparations pre-emptively.

Whereas most liquid-fuel missiles are typically fuelled prior to launch because of the technical challenges associated with storing corrosive and sensitive liquid propellants, solid-fuel ballistic missiles can be launched much more quickly as the propellant is included at the point of manufacture.[50] The readiness benefits of this approach are clear: according to North Korean media, it took more than nine hours to fuel and launch a *Hwasong*-15 ICBM during a February 2023 snap exercise, indicating a lengthy potential detection and targeting time frame for South Korean and US forces to attack the launcher pre-emptively.[51] North Korea's efforts to develop a solid-propellant ICBM through the *Hwasong*-18 and other possible follow-on solid-fuel designs will almost certainly significantly reduce this targeting window, perhaps to around one hour. Following the *Hwasong*-18 launch, Kim declared that it will 'extensively reform the strategic deterrence components of the DPRK, radically promote the effectiveness of its nuclear counterattack posture and bring about a change in the practicality of its offensive military strategy'.[52]

Not only will future North Korean solid-fuel ICBMs be faster to launch than liquid-fuelled variants, but observable preparations will be easier to conceal from US and allied ISR systems. Because solid-fuelled ballistic missiles require less supporting infrastructure, such as fuel trucks, they have a smaller visible footprint. Solid-propellant variants also offer operators the option of placing the missile within a protective canister, providing it with greater protection from adverse weather conditions and accidental damage when traversing rough terrain. 'Canistering' is unavailable to road-mobile liquid-fuelled missiles, as launch crews need access to fuel caps located on the missile casing.

Despite these advantages, it is unlikely that North Korea will transition entirely to a solid-fuelled force soon. It has invested significant resources and infrastructure in research and development for liquid-fuelled engines, and the KPASF is experienced in handling liquid-fuelled designs. Liquid-fuelled missiles of the same size as solid-propellant variants also offer greater range and payload capability due to higher launch-weight-to-throw-weight ratios, making them more suited to MIRV payloads.

North Korea's Kill-chain Limitations

Although North Korea has improved the military utility of its ballistic- and cruise-missile forces, it has made less progress in enhancing other important elements of its kill chain, especially in terms of improving its ISR capabilities for targeting and situational awareness.

Compared to the scale and sophistication of US or, to a lesser extent, Japanese multi-domain ISR capabilities, Pyongyang has only a marginal capability to detect and track potential targets, especially mobile targets that may be difficult to locate. This limitation restricts North Korea's ability to conduct dynamic targeting, to gather and disseminate targeting data, and to conduct

battle-damage assessments before additional strikes if these are necessary.

Probably as part of efforts to provide its forces with better situational awareness and decision-making support for combat operations, Kim has referred to North Korea's need to 'secure the ability of reconnaissance and information gathering based on operation of a military reconnaissance satellite' and to 'develop reconnaissance drones and other means of reconnaissance capable of precisely reconnoitring up to 500 km deep into the front' as part of his military-modernisation directives.[53]

Reflective of this modernisation effort, North Korea has demonstrated some capability to operate modified commercial uninhabited aerial vehicles (UAVs) for ISR purposes.[54] Although North Korea has very limited opportunities to import dedicated military UAVs because of international sanctions, a lesson from Russia's war against Ukraine is how easily commercial UAVs can be adapted and utilised to provide combatants with an inexpensive and versatile means of conducting ISR and directing long-range fires.[55] Because of international sanctions and North Korea's technological restrictions and national directives, Pyongyang will probably continue to acquire and adapt commercial technology for military applications.[56] However, these systems have limited sensor technology, restricting the quality of information that may be gleaned from surveillance and reconnaissance activities.

In an effort to expand its ISR capabilities, North Korea is developing UAVs dedicated to ISR, including the *Saetbyol*-4 (Morning Star-4) and the *Saetbyol*-9 (Morning Star-9), which were unveiled at a weapons exhibition in July 2023. While both platforms appear externally similar to US UAVs, North Korea is not believed to have the equivalent airframe-production capability, sensor technology or communications systems to replicate more advanced US capabilities. These systems' utility will also be restricted by their vulnerability to South Korean and US air defences.[57]

Pyongyang has made multiple attempts to place satellites into orbit to support its space-based observation ambitions, but almost all these efforts have been unsuccessful.[58] Inspections by South Korea and US of salvaged North Korean equipment from a failed 2023 launch stated that the recovered satellite 'had no military utility … at all', probably in reference to the low quality of the optical equipment on board.[59] Nevertheless, given Kim's directive, the associated crossovers of satellite-launch-vehicle and ballistic-missile technology, and North Korea's need for better ISR capabilities, it is highly likely that Pyongyang will continue to devote resources to the further development of this technology, evidenced through its successful launch on 21 November 2023 of the *Malligyong*-1 satellite.[60]

3. United States

Rapid and well-publicised developments in Chinese ballistic-missile and HGV programmes have prompted American policymakers and military leaders to re-evaluate their own strategic assumptions and posture across the Indo-Pacific. Beijing's development of long-range strike options, and the explicit willingness of the Central Military Commission to use them in response to non-kinetic attacks, has cast doubt on the viability of Washington's regional strongpoints in South Korea, Japan and even Guam. Likewise, North Korea's missile developments continue to pose a considerable threat to the US and its allies in Northeast Asia.

US strategy needs to accommodate this changed environment by dispersing its forces and avoiding the kind of force concentration that has become the norm in Japan, for example, where there are several sprawling US bases. Finding hospitable arrangements around, or just outside, the first island chain will be necessary for the US to execute any effective military operation in the region, if only to avoid potentially being crippled by a pre-emptive strike. Long-range ground-based strike is one of the capabilities the US is most keen to develop and bring forward into the Indo-Pacific, in order to counter China's presently dominant missile force.

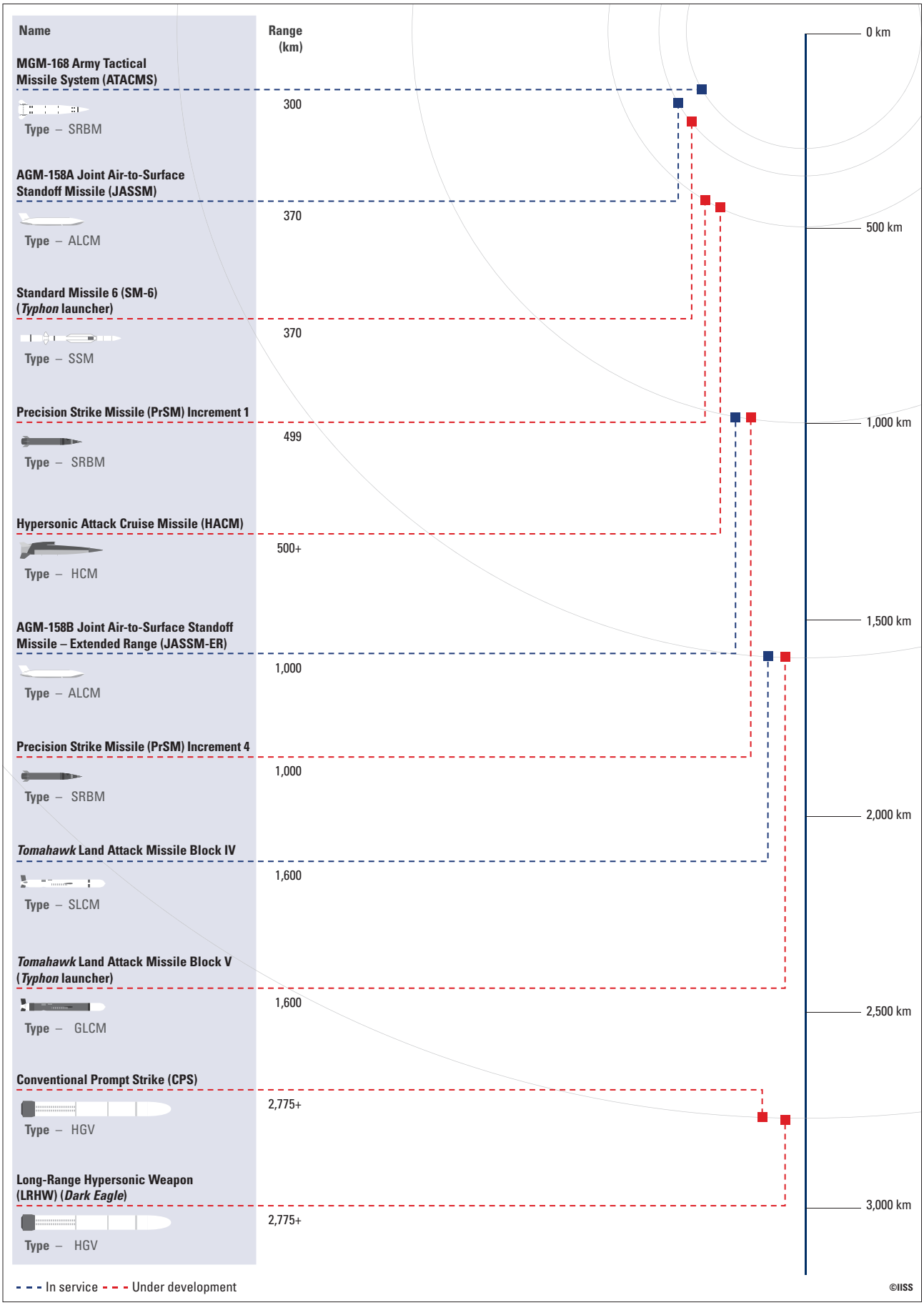
Beyond INF Ranges

Between 1987 and 2019 the US was restricted under the INF Treaty, along with the Soviet Union (and later Russia), from developing or deploying ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 km. The agreement's limited bilateral ambit allowed China (as well as other countries) to pursue long-range missile capabilities that had no ground-launched analogue in the US arsenal. This meant the US bases in the Indo-Pacific were largely relegated to a defensive posture reliant on ship- and ground-based ballistic-missile-defence systems and as forward-operating locations for maritime and air assets. Although the INF Treaty only restricted the deployment of ground-launched ballistic and cruise missiles, the US did not prioritise the development of new types of long-range air- or sea-launched precision-strike capabilities, with ranges equivalent to China's capabilities, during the two decades when it was focusing on counter-insurgency in Afghanistan and Iraq. Russia's violation of the INF Treaty through the development and deployment of the 9M729 (RS-SSC-8 *Screwdriver*) GLCM was therefore a strategic boon for Washington, allowing it to abandon the treaty owing to Moscow's non-compliance but with the added benefit of allowing new research and development of long-range ground-based strike capabilities for deployment in the Indo-Pacific.[61]

Since the INF Treaty's collapse in 2019, the US Army has moved rapidly to invest in INF-ranged weapons with an eye on placing them within range of the Chinese mainland as well as in the first island chain from locations such as Guam. First among these was a ground-launched version of the RGM-109E *Tomahawk*, a subsonic LACM employed by the US Navy since 1983 and capable of striking targets at ranges of up to 1,600 km. But the *Tomahawk*, despite its long service and multiple block upgrades, is a legacy weapon. As a subsonic system it is comparatively slow compared with China's YJ-12A and CJ-100 cruise missiles, both of which are capable of supersonic flight.

Ground-based *Tomahawk*s could nevertheless be seen as a stopgap while the US rushes to develop and field longer-range, higher-speed weapons. The US Army and US Navy are jointly developing an HGV known as the Common Hypersonic Glide Body (C-HGB), which will produce two similar systems apparently with ranges greater than 2,775 km.[62] The US Army planned to deploy its *Dark Eagle* Long-Range Hypersonic Weapon (LRHW) in a prototype battery before the end of the 2023 fiscal year, with two more batteries to follow in FY2025 and FY2027.[63] Due to testing delays, however, the weapon will not be deployed until 2024 at the earliest.[64] A ground-launched weapon equipped with an HGV, the LRHW is intended to be manoeuvrable and is purported to be capable of speeds up to Mach 16.[65] Early

Figure 3.1: **US conventional missiles currently deployed or under development**



Source: IISS, *Missile Technology: Accelerating Challenges*

plans call for US LRHW units to be organised into batteries of four TELs, with each carrying two missiles and accompanied by a mobile operations centre and other support vehicles and equipment.

The US Navy intends to deploy the C-HGB as part of its own complementary Conventional Prompt Strike programme, which is expected to reach initial operating capacity on the service's *Zumwalt*-class cruisers by 2025 and on *Virginia*-class submarines in 2028.[66] Other entities in the US joint environment bring their own long-range strike capabilities, such as the United States Air Force's (USAF) AGM-158 Joint Air-to-Surface Standoff Missile family and future Hypersonic Attack Cruise Missile. In the same vein, the US Army is funding work to add ramjet propulsion to Lockheed Martin's Precision Strike Missile (PrSM), with the upgraded variant extending the PrSM's original 499 km range to 1,000 km. This upgrade would create a High Mobility Artillery Rocket System (HIMARS)-launched replacement for the army's legacy Army Tactical Missile Systems (ATACMS), capable of ranging the Chinese coastline from Japan's southern islands and potentially available by 2027.[67]

Limitations for the US: Budget and Basing

Engineering challenges are unlikely to be the most formidable obstacle to operationalising the US Army's ground-based strike capability within the US Indo-Pacific strategy, despite the delays that several US programmes have encountered.[68] The primary issues to contend with will probably be budget, basing and infrastructure.

As has been highlighted during US efforts to provide advanced types of munitions to Ukraine, current levels of production are constrained by domestic supply lines and by the availability of critical components such as semiconductors. With reports that the LRHW programme may cost at least US$4.4 billion in the development stage plus US$2.5bn for producing 66 missiles, meaning each missile would cost more than US$100 million in total, financial considerations may also create opposition among some decision-makers if they assess the programme to be too expensive. The steep price tag for this capability may put the programme at risk if future US defence budgets cannot accommodate it, a fact reflected in congressional testimony stressing the importance of bringing the cost of these weapons in line with 'traditional weapons systems'.[69]

Beyond the budget issue, the question of where in the Asia-Pacific region to place US missiles has arisen. For various reasons the initial responses from regional allies such as Australia, Japan and South Korea have not been favourable. Moreover, while US options for the overseas basing of its weapons systems may be complex, recent commitments by Washington's closest allies in the region – Australia, Japan and South Korea – to build their own long-range strike capabilities might remove the need for US missiles on their territory, at least in peacetime. When the US withdrew from the INF Treaty in 2019, Japan was the first suggested location; however, the proposed missiles in question did not yet exist and Tokyo quickly demurred, with Japanese diplomats indicating that the idea of hosting missiles was not being considered.[70] Now that the LRHW is closer to reaching initial operational capability, there are some indications that the question is being more seriously considered in Tokyo.[71] The prospect of South Korea hosting long-range missiles implicitly directed at China is unlikely after the damaging diplomatic and economic fallout from Beijing following Seoul's decision in July 2016 to host the US THAAD ballistic missile-defence system.[72] Barring a direct attack, South Korea's unwillingness to antagonise Beijing is likely to preclude deployment of any new weapons that could be used in a US–China conflict.

In 2019, Australia's then-prime minister Scott Morrison appeared to pour cold water on suggestions that Australia could host US ground-based missiles in future.[73] That said, Australia's current emphasis on expanding its defence capabilities and deepening military integration within the bilateral Australia–US alliance, and through AUKUS (which also involves the United Kingdom), makes it the likeliest ally to host a new post-INF Treaty generation of land-based US missiles. A strong negative factor for deployment of US missiles in Australia, however, is geography. At the bottom end of its presently declared range of at least 2,775 km, the LRHW would be unable to strike Chinese military infrastructure in the South China Sea or on the Chinese mainland, even from the coastal fringes of northwest Australia. The LRHW's

Map 3.1: **Possible US basing options for selected ground-launched missiles in the Asia-Pacific**

Sources: Lockheed Martin, Raytheon, US Department of Defense

actual operational range may be longer than unclassified range estimates suggest, however.

Thailand, though a US ally, has drawn closer to China in the past decade, which is enough in itself to make the country a problematic basing option; but perhaps more importantly, Bangkok would be highly unlikely to approve the deployment of US missiles. As for the Philippines, there has been a positive turnaround in relations with the US under the leadership of President Ferdinand Marcos Jr. Manila hewed closer to Beijing under the leadership of Rodrigo Duterte, or at least tried to, but has since swung back towards the familiarity of its alliance with Washington as a necessary counterweight to China. There was a joint announcement in February 2023 that Manila would be granting access to US forces in four new locations under the 2015 Enhanced Defence Cooperation Agreement, including sites in northern Luzon, where long-range ground-launched US missiles would be capable of ranging PLA bases across Hainan Island and China's mainland.[74] However, access under the Enhanced Defense Cooperation Agreement does not guarantee the Philippines' willingness to host US long-range-strike equipment. The prospects for basing long-range fires in the country therefore remain unclear.

If basing in any of these countries proves not to be feasible, the US territory of Guam might be a viable base and would be available without the need for diplomatic wrangling. Another short-term solution to limited basing opportunities would be for the US to continue relying predominantly on its existing extensive air- and sea-launched weapons developed without INF restrictions. The AGM-158 Joint Air-to-Surface Standoff Missile (JASSM) is a USAF cruise missile first fielded in 2003, with a range of approximately 370 km; the extended-range variant, the AGM-158B JASSM-ER, equipped with an external fuel tank that is capable of taking the missile out to a range of 1,000 km, was first tested in 2006.[75] An extreme-range variant (AGM-158D JASSM-XR), with a range of up to 1,800 km, is scheduled to begin delivery in February 2027.[76] Designed to defeat modern air-defence systems and attack fixed targets, the JASSM and its variants can be launched from most USAF-crewed combat aircraft but are particularly potent when launched from long-range bombers such as the B-1B *Lancer* and B-52H *Stratofortress*, which are capable of carrying up to 24 and 12 JASSMs respectively.[77] The prospect that the future B-21 *Raider* very low-observable bomber might also be equipped with variants of the JASSM will also potentially significantly extend the USAF's ability to project power at long ranges while remaining undetected.[78]

Developed from the AGM-158B JASSM-ER design, the AGM-158C Long-Range Anti-Ship Missile (LRASM) is the US Navy's primary air-launched long-range stand-off weapon, though it can also be mounted on USAF B-1B bombers. Carried by USN F/A-18E/F and, in the near future, P-8A *Poseidon* aircraft, the LRASM is designed for attacking adversary ships in ISR-restricted environments and has also been integrated with the US Navy's ship-based Mk 41 vertical launch system (VLS).[79] Tenders have also been issued for its integration for launch from the F-35 Joint Strike Fighter.[80] While its range is probably comparable with that of the JASSM-ER, a future ship-launched LRASM would still be out-ranged by multiple cruise and ballistic anti-ship missiles within the PLA's arsenal.[81]

4. US Allies and Regional Long-range-strike Developments

Japan

Japan's current stand-off capabilities reflect the limitations of its post-1945 defence posture, enshrined in its 'peace constitution' and cemented through successive iterations of its National Defense Program Guidelines.[82] The deteriorating security environment in the Asia-Pacific, however, has increasingly concerned Tokyo, as reflected in the National Security Strategy (NSS), National Defense Strategy (NDS) and Defense Build-up Plan published in 2022. While earlier documents, including the 2013 and 2018 National Defense Program Guidelines, included commitments to enhance a variety of capabilities, Tokyo's decision in the 2022 NSS and NDS to acquire long-range land-attack capabilities is a ground-breaking change for a state that has not maintained a substantial offensive strike capability since the Second World War.[83] To meet these ambitions, Japan is embarking on greater acquisition of relevant technologies from the US under the framework of the US–Japan alliance, as well as developing indigenous long-range-strike and hypersonic capabilities and pursuing a whole-of-government approach aimed at achieving self-sufficiency in certain types of missile production (see table 1).

Current Stand-off Capabilities

Despite Tokyo's heightened threat perceptions, as of 2023 the Japan Self-Defense Forces (JSDF) still possess only very small quantities of guided weaponry capable of attacking ground targets, largely because of a previous focus on developing anti-ship and air/missile-defence capabilities. Figure _ outlines these capabilities across the various branches of the JSDF in greater detail.

Counterstrike Procurements

The Japan–US alliance has traditionally allocated the offensive capabilities to the US and the role of self-defence to Japan.[84] While Tokyo assesses that 'the basic division of roles … will remain unchanged', reaffirming the position of the US as Japan's ultimate security provider, its decision to acquire increasingly long-range 'counterstrike' capabilities, as it calls them, reflects the perspective of the Kishida Fumio government that 'the primary responsibility for defending Japan lies with itself'.[85]

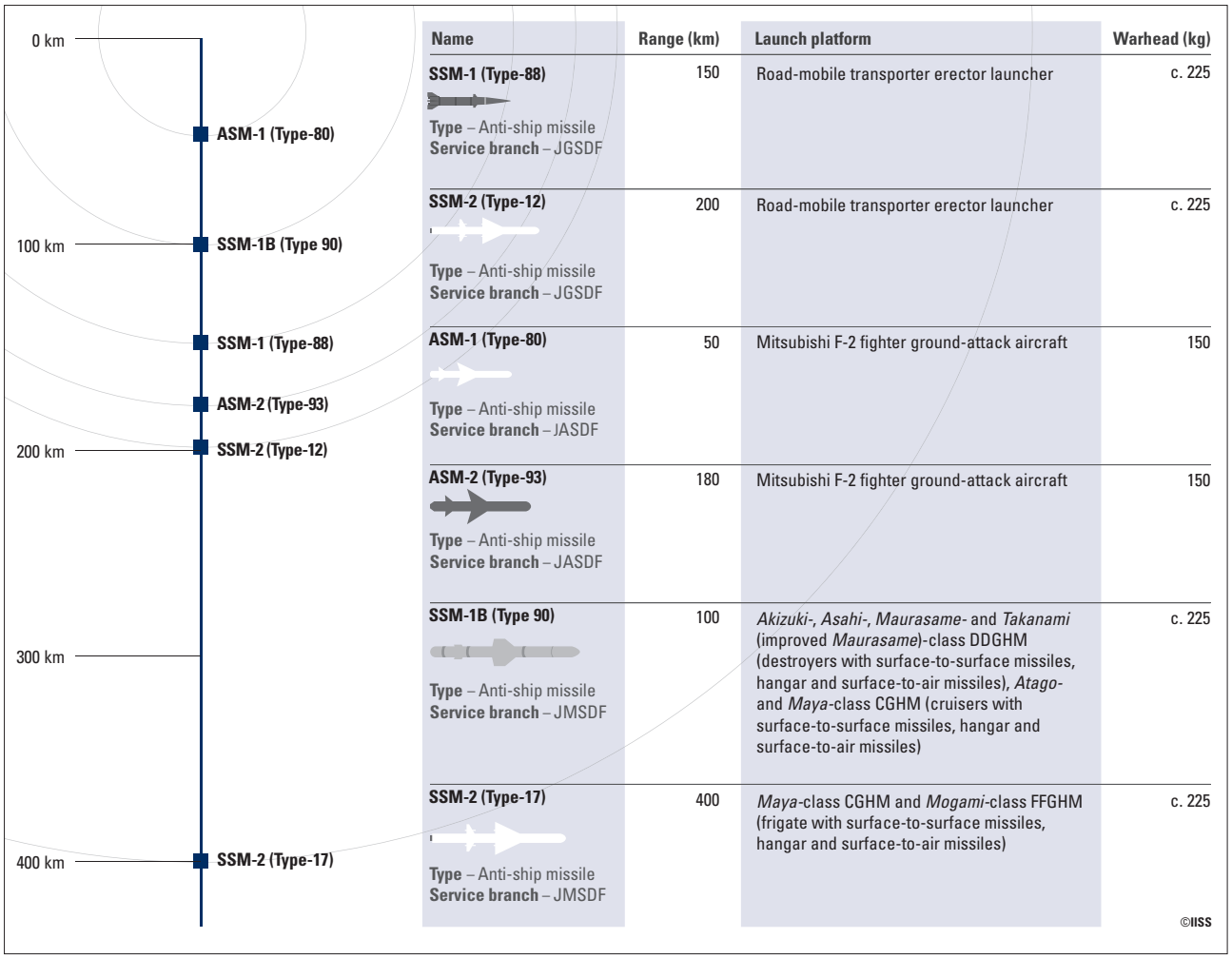
Japanese Prime Minister Kishida Fumio unveiling Japan's new National Security Strategy, 16 December 2022

(Photo by David Mareuil/Anadolu Agency via Getty Images)

Reflecting the changing strategic environment in the Asia-Pacific, especially capability advances and threatening behaviour by China and North Korea, the Japanese government's December 2022 National Defense Strategy stated that Japan would 'dramatically transform' its post-war approach to achieving its national-security objectives. A central component of the new strategy would be achieved by acquiring 'counterstrike capabilities'.[86] While Tokyo has expressed an interest in acquiring long-range precision-strike capabilities since 2018, its recent commitment is much more determined than the earlier policies that were constrained by domestic political concerns rooted in Japan's post-1945 pacifist posture.[87] To realise this ambition, Tokyo plans to procure foreign missile technology while also developing new domestically produced systems and upgrading existing ones.

A major element in Japan's procurement of foreign missile technology is its acquisition of 400 *Tomahawk* LACMs from the US, announced by Prime Minister Kishida on 27 February 2023.[88] Washington has so far supplied the *Tomahawk* only to the UK, in accordance

Figure 4.1: **Currently deployed JSDF surface-to-surface and air-to-surface missiles**



Sources: IISS *Military Balance 2023*, Japan Ministry of Defense

with strict export-control guidelines of the Missile Technology Control Regime (MTCR) and also because of its fear that the proliferation of a long-range LACM could set an undesirable precedent by encouraging other states to export, or attempt to acquire, this type of technology.[89] But the Joe Biden administration's 2023 Conventional Arms Transfer Policy attaches importance to providing arms to countries 'likely to confront armed aggression from United States adversaries or strategic competitors'. Washington's recent decision to sell *Tomahawk* to Japan reflects its desire to improve Tokyo's stand-off capabilities, primarily with deterring China in mind.[90]

While the *Tomahawk* is only one part of Japan's planned suite of counterstrike capabilities, the missile's 1,600 km range will significantly increase the JSDF's ability to hold targets at risk throughout the Korean Peninsula and in eastern and northeastern China if launched from maritime platforms in Japan's littoral waters. The US State Department approved the sale in November 2023, a year earlier than the Kishida administration originally planned, and Tokyo is aiming to achieve initial operational capability by 2026.[91] Tokyo originally planned to purchase the latest Block V *Tomahawk* variant, but Japan's Minister of Defense Kihara Minoru stressed that the worsening regional security environment, along with missile developments in North Korea, necessitated greater urgency in acquiring stand-off capabilities.[92] Japan has therefore decided to split its acquisition between the Block V and the earlier Block IV, as the latter can be delivered more quickly.

The emphasis in Japan's National Defense Strategy on acquiring capabilities to target an opponent's missile launchers and to 'disrupt and defeat [an] invasion' suggests Japan will opt for a mixture of *Tomahawk* variants for both land-attack and anti-ship roles.[93] The Block VA

variant can strike moving maritime targets due to the incorporation of a new imaging infrared seeker, thus restoring the missile's anti-ship role for the first time since the *Tomahawk* Anti-Ship Missile was withdrawn from US service in the 1990s.[94] The *Tomahawk* Block V and VB variants are capable of engaging a variety of land targets, including hardened structures, using different types of warheads.[95]

Japanese media have reported that the *Tomahawk* will be deployed aboard Japan Maritime Self-Defense Force (JMSDF) ships equipped with the *Aegis* combat system.[96] Japan currently possesses eight ships equipped for this role – two *Atago*-class and two *Maya*-class cruisers, and four *Kongou*-class guided-missile destroyers – and plans to build two 'Aegis system-equipped vessels' to replace its two cancelled *Aegis Ashore* sites.[97] If this intended distribution is realised, it would place a significant burden on these vessels in a conflict as they would be responsible for ballistic-missile defence as well as launching precision strikes. The JMSDF will also have to accept some trade-offs by having sufficient magazine capacity for both mission requirements. While Japan operates several other classes of warship that are fitted with the Mk 41 VLS, including the *Akizuki*-, *Asahi*-, *Murasame*- and *Takanami*-class guided-missile destroyers, these vessels are currently equipped with a shorter version that cannot launch the *Tomahawk* as the missile's length is greater than that of the missile-launch cell.[98] Japan could potentially replace the shorter 'tactical' Mk 41 modules on these vessels with the longer strike cell and thereby increase the potential maximum number of JMSDF ships operating *Tomahawk* from eight to 28, although it is likely that the cost of this refit will be high and the timeframe long.

Japan is also planning to arm its conventionally powered attack submarines (SSK) with an unnamed type of 'long-range anti-ship guided missile'.[99] Japan's 11 *Oyashio*- and 12 *Soryu*-class SSKs are each equipped with 533-millimetre torpedo tubes for launching the ageing UGM-84C *Harpoon* Block 1B anti-ship missile. Introducing a newer system will probably enhance the lethality of these platforms because the associated missile is likely to feature guidance, range and speed improvements over the *Harpoon*. While the *Soryu* and *Taigei* SSKs might be able to accommodate the anti-ship *Tomahawk* Block VA, it is currently unknown whether the JMSDF will equip its submarines with this missile or opt instead for a domestically produced system.

A Japanese *Atago*-class cruiser. This platform type will probably be equipped with *Tomahawk* LACMs.

(Photo by South Korean Defense Ministry via Getty Images)

Beyond sea-launched munitions, Japan has also placed several orders for air-launched weapons that will significantly improve the ability of the Japan Air Self-Defense Force (JASDF) to hold at risk well-defended ground and maritime targets. This includes purchasing an unknown number of Joint Strike Missiles for Japan's growing fleet of F-35A *Lightning* II aircraft, which is presently 33 strong.[100] The Joint Strike Missile is a high-subsonic ALCM that can be carried in the F-35's internal weapons bay and strike maritime and ground targets at ranges beyond 275 km. Japan is also aiming to acquire the US AGM-158B JASSM ALCM for a portion of its F-15J *Eagle* fleet, some of which will be upgraded with improved radar, electronic-warfare and weapons-carriage capacity.[101]

Domestic Developments

Besides procuring equipment from the US, Japan is also further developing its indigenous stand-off missile capabilities. What appears to be a new missile based on the existing SSM-2 (Type-12) anti-ship and ground-attack missile is being developed by Mitsubishi Heavy Industries, with the range extended from 200 to 900–1,000 km.[102] The missile has a substantially redesigned airframe to reduce its radar cross section and decrease opportunities for defenders to detect and intercept it.[103] Launched from a ground platform, the missile's increased range would allow the JSDF to strike ground targets throughout North Korea from Honshu

Japan's F-35A fleet will be equipped with new stand-off capabilities

(Photo by Jiji Press/AFP via Getty Images)

and Kyushu, and to hold at risk vessels operating in the East China Sea from Kyushu, and vessels in the Taiwan Strait and northern parts of the South China Sea and Philippine Sea from the Ryukyu Islands. Equipping aircraft and ships with the extended-range Type-12 will further improve the JASDF's and JMSDF's abilities to hold land and maritime targets at risk. As with Japan's decision to expedite *Tomahawk*'s procurement, the Japanese Ministry of Defense has brought forward the missile's planned in-service date by one year, from 2026 to 2025.[104]

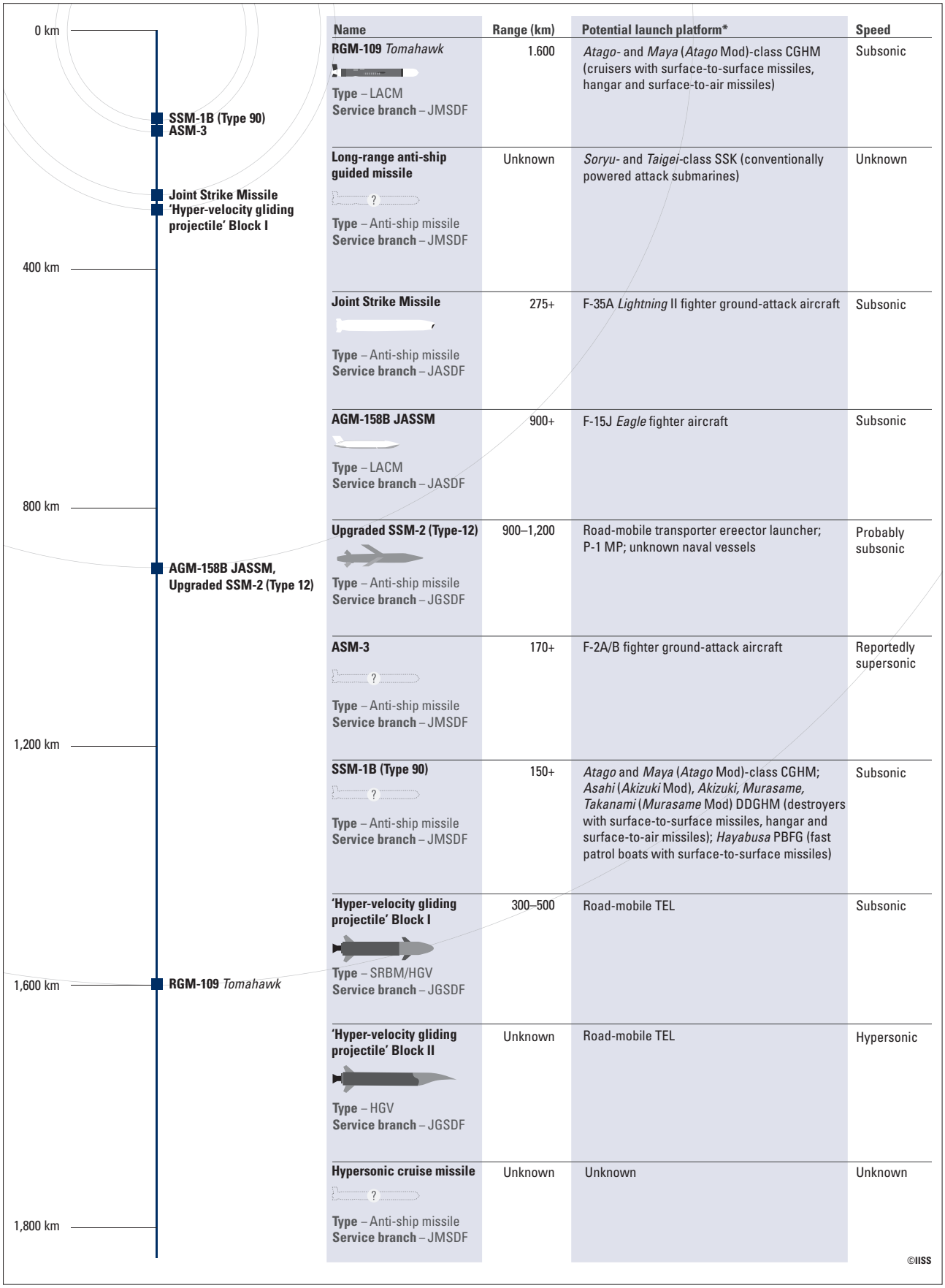
Japan is also developing a replacement for the JASDF's ASM-1 and ASM-2 air-launched anti-ship missile through the ASM-3 programme, with several variants apparently under development.[105] The reportedly supersonic ASM-3 will potentially create challenges for defenders by reducing detection and interception timeframes. Also under development, reportedly, is an upgraded version of the SSM-1B (Type 90) anti-ship missile, with extended range and improved guidance for JMSDF vessels.[106] While details of the system are unknown, the upgraded variant may share some features with the improved version of the SSM-2 as they have a common heritage through the ground-launched SSM-1 (Type-88).

High-speed Ambitions

As well as acquiring new subsonic and supersonic stand-off capabilities, Japan's national defence-procurement organisation, the Acquisition, Technology & Logistics Agency (ATLA), is also incrementally developing technology for very-high-speed missiles in the form of a hypersonic cruise missile (HCM) and two versions of a glide vehicle. Japan's motivations for acquiring very-high-speed technology were outlined in the 2018 National Defense Program Guidelines, which stated that the JSDF needed to 'qualitatively and quantitatively [enhance] capabilities in individual domains', especially to 'counter [the] invasion of remote islands'.[107] More recent Japanese policy documents emphasise the importance of reducing the time to target by conducting strikes at the early stages of an invasion and for Japan to maintain a technological edge over its rivals.[108] Because of the speed and manoeuvrability associated with HCMs and glide-vehicle designs, their use has the potential to reduce the time to target significantly and compress the reaction time for defenders.

The Japan Ground Self-Defense Force (JGSDF) plans to develop and deploy two battalions of 'hyper-velocity gliding projectile (HVGP) units' that will feature either a 'high-effective penetration warhead' for use against maritime targets or a 'high-density EFP [explosively formed projectile] warhead' for use against land targets.[109] The system's reported 300–500 km range and high supersonic (Mach 3–5) speed are limited when compared with other theatre-range HGVs such as China's medium-range DF-17, which has a range of at least 1,600 km.[110] This may be due to the use of a smaller or less efficient rocket booster for the boost phase and to the possibility of significant aerodynamic drag created by the missile's apparently conical nosecone.[111] Mass production of the system was planned to start in 2023, although there is no indication yet that it has begun, and the missile will reach initial operational capability in 2026 – three years earlier than originally planned, due to Japan's increasingly challenging security environment.[112] To reduce costs, Japan will utilise existing guided-missile components and ground equipment.[113] This suggests that an existing or modified land-based launch platform might be used, rather than building an entirely new design. Quoting defence officials, Japanese media have reported that the JSDF may deploy one battalion in Kyushu and another in Hokkaido.[114] If deployed on the main islands, the HVGP will be limited to ground and maritime targets close to the Japanese archipelago, as its 500 km range is insufficient to reach mainland China or North Korea from either area.

Figure 4.2: **Japan's new counterstrike capability**



*Assessment based on characteristics shared with systems already in service. Platform figures based on current IISS Military Balance+ figures. The actual number of platforms the new weapon has been integrated onto may be smaller.
Sources: IISS Military Balance +; Japan Ministry of Defense

Should the JGSDF deploy the system in the Ryukyu Islands, however, it could potentially be used against maritime targets operating around Taiwan.

An improved version of the HVGP is expected to reach initial operational capability by the early 2030s. The Block 2 version will be capable of hypersonic (Mach 5+) speeds and of striking targets at greater, albeit unknown, distances. This range extension and speed improvement will be facilitated by an improved propulsion system for the boost phase, as well as a more advanced airframe and control system.[115]

Japan's HCM programme is also at a developmental stage and ATLA is conducting research into advanced heat-resistant composites and propulsion, as well as airframe shape and structure.[116] The missile will reportedly utilise a supersonic combustion ramjet ('scramjet') engine, which suggests it will travel at speeds greater than Mach 6 because scramjet engines are typically less efficient at low hypersonic speeds.[117] Like the HVGP, the HCM will probably be able to strike both ground and maritime targets, given that its guidance package will utilise satellite and inertial navigation as well as radio-frequency imaging and an infrared seeker.[118]

Limits to Japan's Counterstrike Capability

Despite its acquisition of counterstrike capabilities, there are areas in the targeting chain where capability gaps will oblige Japan to continue relying heavily on the US. One significant area where Tokyo's assets are inadequate is in detecting and tracking targets. To resolve this shortcoming, the 2022 National Defense Strategy and National Security Strategy stated that Japan will enhance its ISR cooperation with the US and utilise commercial-satellite imagery.[119] Japan has launched multiple reconnaissance satellites to provide imagery of military sites, and launched a seventh observation satellite in January 2023.[120] Tokyo has also pledged to invest in new small-satellite constellations for target detection using optical and synthetic aperture radars, and over-the-horizon radars and advanced multistatic radars on the ground.[121] Despite these efforts, it is likely that Japan will continue to rely on the US in other areas, particularly in detecting ballistic-missile launches through space-based infrared systems, due to the significant costs and technological complexity associated with developing this type of equipment.

Moreover, transforming counterstrike capabilities into a credible doctrine of 'counter-attack' is not simply a matter of acquiring technological capabilities but also of having sufficient political will to utilise them. Despite embracing long-range precision-strike technology, Japan's 2022 National Security Strategy unequivocally states that 'pre-emptive strikes, namely striking first at a stage when no armed attack has occurred, remain impermissible'.[122] Tokyo has adopted a framework that would enable the JSDF to mount a counter-attack only after Japan itself has been struck, in alignment with Japan's constitutional limitations. Japan's strategic thinking about operational employment of its future counterstrike capabilities is currently guided by what are known as the 'Three New Conditions for Use of Force', part of its exclusively defence-oriented policy, which states that Japan may only use force against an adversary under the following conditions:

- When an armed attack against Japan occurs or when an armed attack against a foreign country that is in a close relationship with Japan occurs and as a result threatens Japan's survival and poses a clear danger to fundamentally overturn people's right to life, liberty and pursuit of happiness.
- When there is no other appropriate means available to repel the attack and ensure Japan's survival and protects its people.
- Use of force is limited to the minimum extent necessary.[123]

There are other considerations that have negatively impacted Japan's willingness to consider pre-emption. Firstly, advances in Chinese and North Korean missiles have reduced the number of visible warning signs that a missile launch may be imminent, and as a result have compressed the timeframe in which a missile launcher can be successfully engaged. These technological developments mean that detecting, identifying and pre-emptively striking a missile prior to launch would need to take place very quickly, which is possibly beyond the current capabilities even of the US.

The second consideration is Japan's current lack of a properly functioning joint command. The Kishida

government stated in the 2022 National Defense Strategy that it plans to establish a Permanent Joint Head Quarters by March 2025 to unify the command of its armed forces and to better coordinate strikes.[124] However, given Japan's inexperience with strike capabilities and lack of familiarity with joint operations under a single command, it is likely to take time before the JSDF are fully capable of conducting these types of complex operations across different service branches, or even in coordination with the US Indo-Pacific Command.[125] In practical terms, Japan's future counterstrike capabilities are likely to remain under the umbrella of the US–Japan alliance. The United States' other main ally in Northeast Asia, South Korea, has taken a different approach, however.

South Korea

Since President Yoon Suk-yeol took office in May 2022, Seoul has reinvigorated its so-called 'three axis' deterrence strategy, which is designed to prevent, intercept or punish North Korean strikes on South Korea through advanced military capabilities. The system revolves around three elements known as Kill Chain, Korea Air and Missile Defense, and Korea Massive Punishment and Retaliation (KMPR).

Unlike its Japanese equivalent, South Korea's deterrence strategy is being pursued independently of Seoul's alliance with the US. Indeed, Seoul's precision-strike ambitions are the most independent among the United States' major Western Pacific allies. Previous South Korean administrations leaned heavily on the alliance with the US to address the North Korean ballistic-missile threat, and the external branding of KMPR was softened by renaming KMPR as 'Overwhelming Response' during the administration of Moon Jae-in (2017–22) in an effort to emphasise peacebuilding efforts with Pyongyang.[126] President Yoon's decision to restore the original title formed part of Seoul's response to North Korean bellicosity and Seoul's desire to ensure it has a powerful autonomous capability to target North Korea.[127] However, Yoon's apparently more serious emphasis on building up domestic capabilities, and KMPR's focus on retaliatory strikes against North Korea's missile forces, leadership and capital city, could pose problems for South Korea's alliance with the US.

A South Korean *Nike* SRBM, 25 September 2001. South Korea's missile capabilities have since improved considerably.

(Photo by Chung Sung-Jun/Getty Images)

Precision-strike Capabilities

Compared with other US allies in the region, South Korea already possesses significant precision-strike capabilities. Seoul's ballistic-missile programme has matured considerably since its origins in the early 1970s, despite 'guidelines' agreed with the US in 1979 that limited the payload, fuel type and range of South Korean ground-launched ballistic-missile designs. A series of revisions to those guidelines over the course of four decades has seen the allowable ranges and warhead size increase in response to repeated North Korean threats and weapons tests. After the guidelines were revised in 2001, for instance, South Korea began developing the *Hyunmoo*-2 SRBM, of which at least three variants have been produced, incorporating various range and accuracy improvements since the baseline missile was introduced into service in 2008. In 2012 the guidelines were amended to increase the maximum possible range of South Korean ballistic missiles from 300 to 800 km. This alteration allowed South Korean forces to target the entirety of North Korea from any location in South Korea. In 2017 the guidelines were further amended to allow Seoul to develop ballistic missiles that could carry a payload of any weight, which significantly improved options for South Korean designers to develop ballistic missiles with heavier warheads that could be used to target hardened bunkers and caves that might be used for missile storage or command and control. Resultantly, in 2020, South Korea tested a new SRBM known as the *Hyunmoo*-4 that can deliver a 2,000-kilogram payload to a distance of 800 km. The bilateral guidelines

ALCMs, such as the *Taurus* KEPD 350K, are an important part of South Korea's deterrence strategy

(Photo by Chung Sung-Jun/Getty Images)

were eventually completely discarded in 2021.[128] In the meantime, because the guidelines' restrictions only applied to ground-launched ballistic missiles, South Korea had been able to develop and procure a suite of air- and sea-launched precision-strike cruise missiles, including the ship and submarine-launched *Haeseong*-2/-3 supersonic LACM, the air-launched *Taurus* KEPD 350K LACM and the road-mobile *Hyunmoo*-3 series GLCM. South Korea has also tested a conventional submarine-launched ballistic missile known as the *Hyunmoo*-4-4, which may act as a hedge for Seoul to hold at risk North Korean targets with little chance of North Korean retaliation given Pyongyang's mostly obsolescent naval platforms and poor anti-submarine-warfare capabilities. Seoul is also developing an indigenous LACM to complement its existing capability provided by *Taurus*.[129]

The end of the bilateral guidelines opened up new options for South Korean military responses to North Korean aggression but may also have broader implications for regional security. As South Korea's precision-strike capabilities increase in scale and sophistication, North Korea will probably continue to respond by expanding and diversifying its own conventional- and nuclear-weapons systems. A more powerful and flexible missile capability could become attractive to Seoul as a tool for responding to kinetic provocations by North Korea. Whereas past crises on the inter-Korean border usually involved duelling artillery barrages, in the future such clashes might involve missile exchanges.

Nuclear Developments in South Korea

Reflecting the challenging security environment, Yoon has also dropped hints of his government's potential willingness to pursue a domestic nuclear-weapons programme if deemed necessary, alluding to Seoul's potential to achieve a rapid nuclear breakout given the country's robust technological R&D capabilities.[130] The lack of restrictions on South Korea's ballistic-missile programme, especially its capability to deliver large and heavy payloads (which are typical of first-generation nuclear weapons), could provide Seoul with a readily available delivery system for a nuclear warhead, however remote that possibility may seem currently. But pursuing a nuclear weapon would probably come at an immense cost for South Korea given its international non-proliferation obligations, potentially resulting in it becoming an international pariah and losing its security guarantees from the US. Aware of South Korea's fears of abandonment – and to hedge against Yoon's tacit statements about acquiring nuclear weapons, and the South Korean public's high level of support for doing so – the 2023 Washington Declaration provides Seoul with input into a decision-making framework for potential nuclear-weapons use on the Korean Peninsula in the event of a conflict with North Korea.[131] Despite this, several comments made during the earlier days of the Yoon administration have highlighted that

A SpaceX *Falcon* 9 rocket launching a South Korean military communications satellite, 20 July 2020

(Photo by Paul Hennessy/SOPA Images/LightRocket via Getty Images)

the possibility of a nuclear-armed South Korea cannot be entirely dismissed.

Although Seoul is currently very unlikely to pursue a domestic nuclear-weapon capability, South Korea may seek to acquire other types of nuclear technology. During his successful 2017 presidential campaign, Moon Jae-in suggested that South Korea should develop nuclear-powered submarines due to the advantages the platform offers in terms of speed, concealment and extended time on station in comparison with conventional diesel-electric systems.[132] South Korea is presently prohibited from acquiring nuclear-propulsion technology under a nuclear-use agreement with the US, but the announcement in March 2023 of Australia's plans to acquire nuclear-powered conventionally armed submarines under the trilateral AUKUS agreement with the UK and the US could portend a more favourable future for a South Korean nuclear-submarine programme, even if Washington still has qualms about nuclear proliferation risks on the Korean Peninsula. South Korea's well-established civil nuclear-energy programme would probably give it a considerable advantage in efforts to develop nuclear-powered submarines.[133]

Limits to Seoul's Kill Chain

Developments in missile technology aside, South Korea, like Japan, remains heavily reliant on the US for many of the capabilities needed to employ these weapons effectively. This is particularly true with regard to C4ISR technologies, an issue Seoul has been seeking to address since the lifting of the bilateral missile guidelines in 2021. To this end, South Korea launched its first military surveillance satellite in December 2023 and plans to put four more space-based synthetic-aperture-radar satellites into orbit by 2025, giving it an all-weather capability.[134] It also plans to set up a strategic command incorporating all branches of the armed forces in 2024, with the intention of implementing and coordinating its three-axis deterrence architecture more effectively.[135]

However, South Korea's reliance on the US for early-warning and advanced space-based ISR capabilities is likely to remain significant for the foreseeable future, given the United States' much more extensive capabilities. These limitations on surveillance over North Korea would limit the effectiveness of unilateral pre-emptive attacks or retaliatory strikes from the South. Without real-time surveillance capabilities, KMPR's key objectives of detecting, tracking and striking mobile launchers and conducting 'decapitation' strikes against North Korea's leadership would be difficult to achieve, as the location of key leaders might be unknown without US assistance. This is likely to constrain any genuinely independent ability for Seoul to execute either pre-emptive strikes or retaliatory strikes.

Action-and-reaction Dynamics

Seoul's pursuit of long-range strike capabilities has implications for action–reaction dynamics with North Korea, with the US, and with Japan and China.

Firstly, North Korea's nuclear-weapons programme is the primary source of instability on the Korean Peninsula, and one that years of pressure and enticements have failed to end. But the continued development and intensification of threats from Pyongyang are now prompting changes in the structure and posture of South Korea's armed forces that could unintentionally trigger a conflict or escalate a minor skirmish.[136] The ending of the previous restrictions on missile-capability development opens new options for South Korea's long-range strike capabilities in terms of both scale and sophistication. An increased conventional capability could become more attractive to Seoul as a tool for responding to provocations by North Korea.

Secondly, Seoul's increasing quest for independent long-range strike capabilities also carries major implications for the US–South Korea alliance. Indeed, the quest in itself suggests insecurity on Seoul's part regarding the strength and reliability of US security guarantees, including America's extended nuclear deterrent. Yoon has questioned whether Washington would be willing to 'trade Seattle for Seoul' and has suggested that an indigenous nuclear weapon could act as a hedge in a hypothetical future where Washington would hesitate to defend Seoul's interests.[137] The introduction of South Korean nuclear capabilities would bring significant instability and escalation risks to the Korean Peninsula, particularly given the lack of potential warning time due to the short distances involved. Pyongyang's pursuit of a larger nuclear arsenal, including non-strategic nuclear

An RAAF F-111 bomber. Australia has been reinvesting in a long-range strike capability since the bomber's retirement in 2010.

(Photo by Mark Dadswell/Getty Images)

weapons using various delivery methods, is likely to be reinforced by Seoul's emphasis on decapitating North Korea's leadership and its strategy of pre-emptive strikes. Suggesting that South Korea might be able to destroy North Korea's missiles or decapitate its leadership before launch approval creates a use-or-lose dilemma for Kim's regime, incentivising North Korea to launch a pre-emptive attack.[138] Kim's regime has sought to avert such a dilemma, partly by devolving launch authority to military commanders if Kim were debilitated, making it impossible to attack a single point of failure but also vastly increasing the risk of inadvertent nuclear escalation.[139] Because of the US–South Korea alliance, lowering this threshold for nuclear use threatens to draw the US into an unrestricted nuclear conflict involving the three powers.

Finally, Seoul's development of advanced precision-strike capabilities affects the broader balance of power in the Indo-Pacific, especially vis-à-vis China, but also with Japan, which may feature in South Korea's thinking about its developing strike capabilities despite the improved political relationship between Tokyo and Seoul since Yoon took office. While South Korea has largely tried to avoid provoking Beijing's ire, the US is increasingly pressing its regional allies to join efforts aimed at balancing China's expanding military capabilities. Seoul's moves towards reconciling historical grievances with Japan and the United States' facilitation of an enhanced trilateral partnership between Seoul, Tokyo and Washington, combined with US encouragement in developing advanced conventional capabilities, may indicate that Yoon's government is interested in contributing to this regional balance alongside allies and partners, as opposed to focusing exclusively on the North Korea problem.[140]

Australia

Australia, another regional ally of the US, is also contributing to the regional balance. Its interest in reviving a long-range strike capability for the Australian Defence Force (ADF), following a prolonged capability hiatus, dates from the Defence Strategic Update (DSU) of July 2020.[141] The DSU heralded a significant adjustment to Australia's strategic thinking and defence posture.[142] Faced with a deteriorating strategic environment, the DSU identified a need to provide the ADF with greater firepower and range in order to strengthen its 'credible deterrence' posture, especially in the maritime domain. Longer-range strike weapons, the DSU argued, were needed so that the ADF could 'hold adversary forces and infrastructure at risk further from Australia'.[143]

Although it stopped short of describing China as a potential adversary, references within the DSU to the introduction of anti-access/area denial capabilities into the region and to coercive state behaviour pointed implicitly to China as the primary driver behind Australia's intensifying threat perceptions. In fact, concerns about China's military build-up and intentions had been steadily mounting within Australian strategic circles for more than a decade leading up to the DSU.[144]

Australia's status as a politically dependable US ally in the Western Pacific, beyond the range of China's conventional-missile force, suggests its geostrategic value as a potential location from which the US military could project some long-range strike capabilities in most scenarios for high-intensity conflict that involve China.

Canberra's Missile Development

Owing to its focus on US-led counter-insurgency operations in the Middle East, and smaller-scale stabilisation operations in the South Pacific between 2001 and 2021, Australia has lacked a long-range-strike platform since the Royal Australian Air Force's (RAAF) last F-111 bomber was withdrawn from service in 2010.[145] The DSU identified long-range strike as a national capability gap, while also flagging an ambition to produce these types of system domestically. The desire

for 'long-range lethality' in the DSU was linked to plans to acquire 'long-range rocket systems' and for 'enhanced missile development', potentially including a Mach 5+ weapon.[146] A very high-speed air-breathing weapon is likely be developed in conjunction with the US, or alternatively with the US and the UK through the AUKUS strategic technology-sharing framework.[147] Australia and the US have more than a decade of collaborative experience in developing scramjet technology through the Hypersonic International Flight Research Experimentation Program (HIFiRE) and successive Southern Cross Integrated Flight Research Experiment (SCIFiRE) programmes.[148]

Two developments in Australia's defence policy since the DSU have provided greater clarity on Canberra's plans to invest in a more potent set of missile capabilities and the platforms they are likely to operate from in future: AUKUS and the 2023 Defence Strategic Review (DSR). The platforms from which Australia intends to launch its long-range strike capabilities merit particular consideration because of the country's unusual range considerations: the Royal Australian Navy's two major fleet bases, in Sydney and near Perth, are located in the far southeast and southwest respectively.

Firstly, the establishment of AUKUS, in September 2021, has injected much greater impetus into the undersea component of Australia's plans for long-range strike, via an initial commitment to acquire at least eight nuclear-powered attack submarines (SSN) to replace its six ageing *Collins*-class diesel-electric submarines.

According to the AUKUS submarine-development pathway announced in March 2023, this will start with the navy acquiring three to five US *Virginia*-class submarines in the early 2030s, to be followed by a new SSN-AUKUS-class boat based on the British next-generation nuclear-powered submarine design that is slated to enter service with the Royal Australian Navy from the early 2040s.[149] While land-attack weapons have not been publicly identified as an operational requirement for Australia's future submarines, the *Virginia*-class boats from the US will be equipped with VLS cells that would in theory allow them to utilise *Tomahawk*s, while there are strong indications that Australia's future SSN-AUKUS will be configured for precision strike (unlike the cancelled French-designed conventionally powered submarines that AUKUS has replaced), including against land targets through the incorporation of VLS equipped for *Tomahawk*s, in addition to serving in the 'sea denial' roles more traditionally associated with submarines.[150]

Kongsberg's Joint Strike Missile, which will be integrated with the RAAF's F-35A fleet

(Photo by Carla Gottgens/Bloomberg via Getty Images)

A submarine-based strike capability would be particularly important for Australia, given the range limitations of the RAAF's principal fighter and ground-attack aircraft, the F-35A and F/A-18F respectively. *Collins*-class submarines may also be refitted with tube-launched *Tomahawk*s.[151] Australia has already committed to buying an initial batch of 220 *Tomahawk*s potentially for its surface fleet, composed of 20 Block-IV and 200 Block-V missiles in a package worth US$895m.[152] The *Collins*-class boats are scheduled to begin a life-extension programme in 2026 that is likely to see their service prolonged into the 2040s.[153]

Secondly, the commitment to acquiring a long-range precision-strike capability has been upheld and expanded upon by Australia's current Labor government, which took power in May 2022. The DSR, commissioned by the new government and published in unclassified form in April 2023, essentially maintains the course set out in the 2020 DSU, emphasising the 'speed of … acquisition including off-the-shelf (commercial and military) capabilities'.[154] The DSR explicitly embraces 'anti-access/area denial' as a concept worthy of imitation and adaptation by the ADF as part of a broader military 'strategy of denial' for Australia.[155]

Although the strategic framing of the DSR makes it clear that the US is no longer the 'unipolar leader of the Indo-Pacific', the review nonetheless commits Australia

Map 4.1: **Potential basing locations for B-21 *Raider* bombers in the Asia-Pacific**

Sources: IISS, Lockheed Martin, RAAF, USAF, US Department of Defense

to 'an enhanced and expanded Alliance with the United States', including further development of US force-posture initiatives in Australia. This paves the way for Washington (as well as London, under the AUKUS framework) to forward-position its own long-range-strike platforms in Australia more regularly in future, including US Navy and Royal Navy SSNs and USAF bombers, likely to include the B-52, the B-1B and also the B-21 *Raider* if, as planned, it reaches initial operating capability in the mid-2020s.[156] While some proponents had also argued for the ADF to consider B-21 bombers as a potential acquisition option, at present the opportunity costs appear to outweigh the advantages from the ADF's perspective.[157]

The DSR notes that the 'rise of the missile age' has 'radically reduced Australia's geographic benefits'. The ADF therefore needs to acquire more missiles of its own. In the air, the DSR mandates that the Kongsberg Joint Strike Missile should be integrated with the RAAF's 72-strong F-35A fleet.[158] Australia is also integrating the AGM-158C LRASM, of which the US approved the sale of up to 200 in 2020, with the RAAF's F/A-18F aircraft. The RAAF is set to acquire the AGM-158B JASSM-ER, which is likely to be fielded initially on the F/A-18F from 2024, three years ahead of schedule. In the DSR the Australian Army has also been tasked with developing long-range fires, including a specific requirement for land-based maritime strike.[159] In 2021 the army entered into partnership with the US military to help advance the PrSM SRBM/MRBM, the joint development of which is urged in the DSR.[160] Once fielded, the PrSM should give Australia's ground forces depth in coastal defence and a deep-strike role, following on from the decision already taken to acquire the shorter-range HIMARS, also operated by the US Marine Corps. The navy will replace the *Harpoon* anti-ship missile with Kongsberg's Naval Strike Missile on its *Anzac*-class frigates and future *Hobart*-class destroyers, which are planned to enter service from 2024.[161]

Australia's Long-range-strike Limitations

While Australia is investing more in its own space and ISR capabilities, as well as ISR data fusion, the ADF's long-range strike capabilities are likely to remain reliant on US support for the broader architecture of C4ISR enablers.[162] The previous Australian government had originally announced plans to launch four observation satellites, but Australia's space ambitions have since been targeted for funding cuts, leaving the prospects for an independent space-based ISR capability unclear.[163] Notably, Australia has stopped short of endorsing a potential role for itself in hosting post-INF US intermediate-range missiles, presumably because, like other US allies, it has reservations about making itself a target for pre-emptive or retaliatory strikes.

5. Other Asia-Pacific Developments

US allies are, to varying extents, developing their long-range strike capabilities as a means of strengthening the alliance network in the region against shared threats, essentially China and North Korea. These capabilities are being developed both in conjunction with the US and through indigenous programmes.

However, other countries in the Asia-Pacific, notably Taiwan, the Philippines and Vietnam, are also embarking on their own long-range-strike programmes. While Taiwan faces a particularly acute threat given Beijing's claims to sovereignty over the island and increasingly intimidating behaviour, the Philippines and Vietnam are concerned about China's assertive maritime behaviour and territorial expansionism in the South China Sea. The Philippines, a US treaty ally, is also geographically exposed by its proximity to any significant conflict over Taiwan. However, the current capabilities of these actors, as well as their resources for future capability development, are limited compared with those of Australia, Japan and South Korea.

Taiwan

Taiwan's security environment is dominated by the Chinese military threat. The latest (2021) iteration of Taipei's Quadrennial Defense Review (QDR), the island's legally mandated defence review that directs the development of its armed forces, describes how 'the major threat' to Taiwan's national security has continued to evolve and grow.[164] In 2017, Taiwan's then chief of the general staff, Admiral Lee Hsi-min, introduced the Overall Defence Concept (ODC), which envisaged shifting Taiwan's military capability towards preparing for an asymmetrical rather than an attritional conflict in an attempt to offset China's large and growing military superiority.[165] Although the ODC does not appear verbatim in the 2021 QDR or the 2021 National Defense Report, both documents assert that Taiwan will embrace an asymmetric defence strategy.[166] Taiwan's interest in acquiring long-range (1,000 km or more) strike capabilities, however, suggests that Taipei is in two minds about how best to deter a Chinese amphibious landing and how to retaliate should it occur.

Small and Smart

Taiwanese policy documents describe asymmetric capabilities as 'small, numerous, smart, stealthy, mobile and hard to detect' systems that are low cost and highly survivable.[167] Admiral Lee lists coastal-defence missiles, road-mobile short- and medium-range surface-to-surface systems and associated platforms as specific asymmetric weapons that fulfil these roles, and advocated in 2021 that Taiwan should allocate as much as 60% of its defence budget towards procuring such capabilities.[168]

Despite criticism from some US analysts that Taiwanese policymakers are too focused on acquiring limited numbers of expensive traditional platforms such as frigates and main battle tanks, the interest expressed in Taiwan's 2021 QDR in procuring anti-ship and land-attack capabilities is nonetheless an endorsement of Lee's 2017 ODC.[169] The ODC defined winning a conflict against the China as defeating an invasion rather than totally destroying PLA forces and proposed that Taiwanese forces focus on acquiring survivable anti-access/area denial systems and utilising Taiwan's geography to its armed forces' advantage.[170] Mobile anti-ship missiles that can inhibit PLAN vessels from operating in the Taiwan Strait and surrounding maritime littoral are one method of achieving this goal; another are LACMs that could target Chinese embarkation ports and other naval facilities, as well as disembarked PLA forces.

External Support

Because of limited official relations between Taiwan and most countries, Taipei has mostly been unable to import complete long-range strike capabilities or subcomponents for its domestic missile programme. The US is Taiwan's sole external supplier of major military equipment, which Washington provides under the auspices of the 1979 Taiwan Relations Act. Major stand-off equipment deliveries to date include several variants of

the *Harpoon* anti-ship missile that have been integrated with multiple Taiwanese maritime and air platforms.[171] The utility of some of Taiwan's older *Harpoon* Block I variants, however, has diminished due to their age and to advances in PLA air and missile defences, especially on PLAN surface platforms.[172]

Consistent with the 2021 QDR's emphasis on procuring asymmetric capabilities, Taiwan is upgrading its anti-ship missile arsenal with the US approving sales in September 2022 of up to 60 AGM-84L-1 *Harpoon* Block II missiles for Taiwan's F-16 fleet and up to 400 RGM-84L-4 *Harpoon* Block II missiles along with 100 *Harpoon* Coastal Defense Systems, a road-mobile four-tube TEL.[173] The *Harpoon* Block II has an updated guidance package and a range of over 120 km. The US has also approved a possible sale of as many as 11 HIMARS M142 Launchers along with 64 single-stage, solid-fuel ATACMS M57 Unitary Missiles.[174] The M57 has a 300 km range and can manoeuvre during its flight, complicating the challenge of interception for opponents' air and missile defences. In October 2020 the US also approved a sale of up to 135 AGM-84H Standoff Land Attack Missile Expanded Response (SLAM-ER) air-launched cruise missiles, which can be used against land and maritime targets to ranges up to 270 km.[175]

Decades of US restraint in supplying Taiwan with certain types of stand-off weaponry may be coming to an end following passage of the US 2022 Taiwan Policy Act. This legislation provides Taipei with almost US$4.5bn in security assistance and expands the provision of arms to Taiwan from those that are defensive to capabilities that are 'conducive to deterring acts of aggression by the People's Liberation Army'.[176] The legislation's passage could potentially open the door to the US exporting longer-range strike systems to Taiwan. The air-launched AGM-158B JASSM-ER may be particularly relevant considering Taipei's interest in acquiring 'air-launched missiles with highly extended range' that can 'inflict precision strike against the enemy [and] stretch out the depth of strategic defensive operations'.[177] As the JASSM-ER is already integrated onto US and some allied F-16 aircraft, it is likely that the weapon would present minimal integration challenges for Taiwan's air force. War-gaming has also assessed that the JASSM-ER's range, low detectability and ability to target

A Taiwanese *Hsiung Feng* II anti-ship missile

(Photo by Walid Berrazeg/Anadolu Agency via Getty Images)

maritime vessels would play a crucial role in countering an attempted PLA amphibious operation, further raising its appeal as a prospective stand-off capability to Taiwanese defence planners.[178] Taiwan may also seek to acquire variants of the PrSM SRBM/MRBM currently being developed in the US, given its compatibility with the HIMARS launcher and Taipei's desire to acquire longer-range strike capabilities.

Domestic Development and ISR

Because of the restrictions Taiwan would face if seeking to procure long-range strike capabilities from most countries, it is enhancing domestic production of stand-off weaponry. The limited opportunities for importing dedicated sub-components for missile technology have required Taipei to develop many of these itself. In 2019, Taiwan's government launched a defence-industrial policy to strengthen its independent defence-manufacturing capacities.[179] Taiwanese media reported in February 2023, for instance, that the country had produced 800 missiles of various types in 2022 and was aiming to further increase production to 1,000 systems per year.[180] However, as this figure appears to include diverse equipment (including UAVs and cluster munitions, for example), the number of long-range-strike weapons is unknown.

Taiwan's well-established domestic defence industry, supported by civilian manufacturers that can produce relevant components, may well be able to meet some of the country's stand-off missile requirements.[181] Among the long-range strike capabilities that Taiwan has already produced domestically, the *Wan Chien*

ALCM is notable given its 240 km range, which would allow the targeting of part of China's coastline from within Taiwanese airspace. Taiwan has also produced several different types of shore-based, shipborne and air-launched anti-ship missiles, including the *Hsiung Feng* II and III anti-ship missiles that complement its existing *Harpoons*.[182]

In addition to acquiring shorter-range missiles that could be used against targets in Taiwan's immediate periphery, Taipei has ambitions to develop longer-range capabilities. Although the deployment status of the missile is uncertain, Taiwanese officials claim that the supersonic *Yun Feng* GLCM is capable of striking targets as far away as Beijing.[183] While the development of such a weapon may appear incongruous with Taiwan's focus on 'small and smart' systems in the 2021 QDR, the ODC recommended that Taiwan should 'focus on mission kills and attack the enemy's center of gravity instead of focus on destroying their actual forces'.[184] For Taipei, the *Yun Feng* could deter Beijing from upending the status quo through the threat of deterrence by punishment, and provide Taipei with a precision-strike capability to hold at risk important Chinese economic, military and political targets. Developing a 1,000 km-plus GLCM might also indicate Taipei's fear that the US would not necessarily intervene militarily in a conflict should China attempt to retake Taiwan by force, given Washington's long-standing policy of strategic ambiguity.[185] However, using or threatening to use a long-range-strike weapon against strategic targets in China could risk greater conflict escalation. Taiwan might, for instance, attempt to carry out decapitation strikes on the Chinese leadership or to destroy dual-capable or dedicated nuclear-delivery vehicles. Although China ostensibly has a nuclear 'no first use' policy, it is unclear whether it would abide by this policy if its leadership or other strategic assets were attacked.[186]

So as not to damage US–China relations, Washington has historically urged Taiwan to refrain from developing long-range missiles. This was evident in 1982, when Washington was seeking to repair its relations with Beijing, in its successful effort to convince Taipei to cancel development of the *Tianma* SRBM.[187] As geopolitical rivalry between China and the US intensifies, however, Washington may turn a blind eye to Taiwan's development of increasingly long-range capabilities.

Limits to Taiwan's Long-range Strike Capability

Despite these efforts, Taiwan's capacity to use long-range strike capabilities effectively is limited by its deficiency in the dedicated military ISR capabilities necessary to strike distant targets accurately. This limitation is especially true in relation to relocatable targets. Neither the 2021 QDR nor the 2021 National Defense Report envisage Taiwan acquiring a dedicated military ISR satellite capability, although the island's burgeoning civilian satellite-launch-vehicle industry might provide a sovereign launch capability in the future to complement its other efforts to enter the space industry.[188] In the meantime, Taiwan will probably remain highly dependent on the US and commercial suppliers for targeting information.

The Philippines

In line with Manila's 2018 National Security Strategy, the Philippines' 2018–22 National Defense Strategy identified territorial disputes in the South China Sea as the foremost security challenge to the country's sovereignty and territorial integrity.[189] Freedom of navigation and ensuring that sea lanes of communication remain open were listed as vital security concerns.[190] Although China was not identified as a potential adversary in either document, Manila's assessment that its construction of artificial islands in the South China Sea is damaging to regional maritime security was a thinly veiled criticism of Beijing's assertive maritime and territorial expansionism.[191] While former president Rodrigo Duterte sought to strengthen ties with China early in his administration, Beijing's assertiveness and repeated incursions into the Philippines' Exclusive Economic Zone and archipelagic waters had thwarted any hopes of a rapprochement by the end of Duterte's term in office.[192]

Philippines–US Defence Cooperation

With China's assertive behaviour in the South China Sea continuing to sour relations with Beijing, Duterte's successor, President Ferdinand Marcos Jr, has sought to strengthen the Philippines' national defence capabilities and expand security cooperation with the US

and its allies, particularly Australia and Japan, since he took office in June 2022.[193] During 2023, this resulted in two important developments in Philippines–US defence cooperation: the Bilateral Defense Guidelines and a refinement of the 2014 Enhanced Defense Cooperation Agreement (EDCA). However, neither agreement is likely to facilitate the deployment of US long-range strike capabilities to the Philippines in the short term, as both focus narrowly on countering 'grey zone' activities and modernising the Philippines' national defence capabilities. So far, this has been realised through the expansion of Philippine and US military exercises and the resumption of joint maritime patrols in the South China Sea.[194] Moreover, there are concerns in Manila about how China might respond to any deployment of US ground-launched missiles in the Philippines. Although China has not explicitly warned the Philippines against agreeing to host US missiles, Beijing has said that additional US deployments to the Philippines would 'escalate tensions and endanger peace and stability in the region' and advised regional countries to 'remain vigilant and avoid being coerced or used by the US'.[195] In response to these signals from China, President Marcos has reportedly told Beijing that US forces operating from the Philippines are not meant for 'offensive action'.[196] The limited redevelopment activity currently under way at joint Philippine–US military sites reflects the EDCA's current limited focus. As of December 2023, the Philippines and the US have so far only agreed to expand Lal-lo Airport in Cagayan and Naval Base Camilo Osias in Santa Ana.[197] Manila claims that the purpose of these limited infrastructural improvements is to improve the Philippines' readiness to respond to grey-zone activities (such as incursions and aggressive actions by the China Coast Guard) and natural disasters.[198] In late 2023, satellite imagery showed no sign of significant expansion of existing facilities at either site. Senior US military officers have recommended that Washington and Manila consider additional sites for 'base sharing', although securing access to more bases will require mutual agreement.[199] The Philippines may alter its current cautious approach, however, if relations between Beijing and Manila worsen in the future. Any deployment of US offensive systems such as PrSM, a ground-launched *Tomahawk* or the LRHW would need to be agreed by both governments.[200]

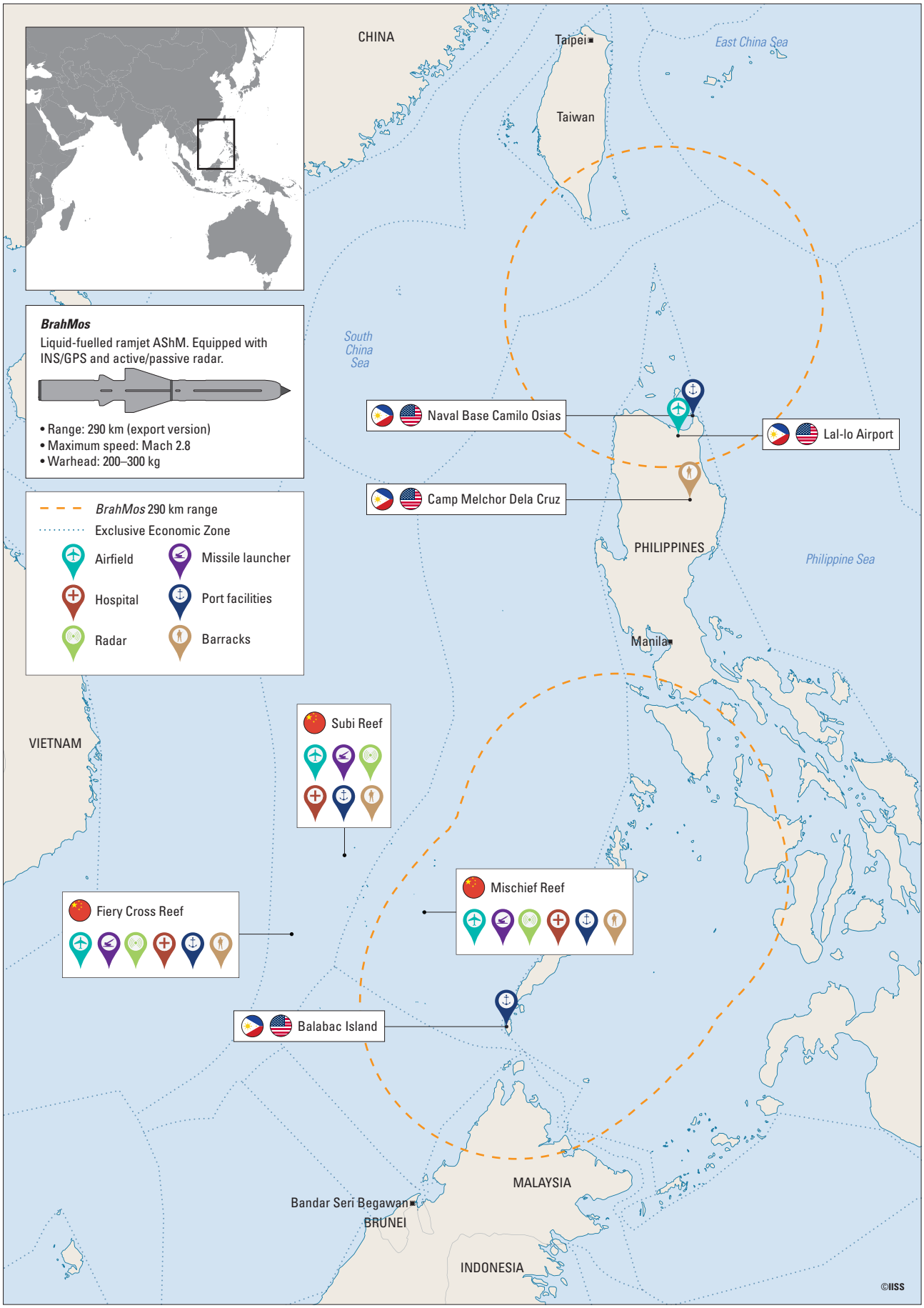
US and Philippine soldiers taking part in a joint exercise with the M142 HIMARS, 26 April 2023

(Photo by Walid Berrazeg/Anadolu Agency via Getty Images)

Improved Anti-ship Capabilities

Because of the risk of incurring China's ire by hosting US missile facilities on its national territory, Manila has decided, for now, to modernise its own ground, naval, littoral and air-force capabilities in order to safeguard and secure its national sovereignty and territorial integrity, as outlined in the 2018–22 National Defense Strategy.[201] To this end the Philippines has procured three batteries of *BrahMos* anti-ship missiles from India for a coastal-defence role with the Philippine Marine Corps.[202] *BrahMos* is a joint Indian–Russian-produced version of the Russian 3M55 (RS-SS-N-26 *Strobile*) supersonic anti-ship missile manufactured by NPO Mashinostroyenia. The export variant of the missile is advertised with a 290 km range to comply with the MTCR's restriction on subscribers exporting ballistic and cruise missiles with ranges greater than 300 km.[203] It utilises ramjet propulsion and has an estimated speed of around 3,400 km per hour, reducing the reaction time for defenders to detect, track and intercept an incoming missile. A small cadre of Philippine Marine Corps personnel completed training on the system in India in February 2023 and deliveries of the missile were expected to begin before the end of 2023, but appear to have been delayed.[204] The Philippine Army will also acquire a number of *BrahMos* batteries between 2023 and 2028 as part of the third segment of the Revised Armed Forces of the Philippines Modernization Program.[205] Although the size of the army's planned order is unknown, senior Philippine defence officials have said it will have more batteries than the Marine Corps.[206]

Map 5.1: **Possible coverage of the Philippines' new anti-ship missiles**



Source: IISS research

A Vietnamese 9K72/9K77 *Scud* B/C SRBM. Vietnam is attempting to diversify its missile capabilities away from Russian- and Soviet-supplied equipment.

(Photo by Nhac Nguyen/AFPvia Getty Images)

Limited ISR Capabilities

Although the deployment locations of the Philippines' *BrahMos* batteries are currently unknown, the missiles could reach maritime targets near the disputed Spratly Islands if launched from the southern Philippine island of Palawan. If Philippine platforms were deployed to northern Luzon, they could potentially hold at risk vessels operating in the strategically important Luzon Strait and Bashi Channel. However, the Philippines' ability to target adversaries' vessels at such long ranges is currently hampered by its armed forces' limited ISR coverage, including a lack of dedicated military satellites and only a limited number of surface vessels and aircraft equipped with long-range sensors. Given their emphasis on maritime-domain awareness, the Enhanced Defense Cooperation Agreement and the 2023 Bilateral Defense Guidelines offer potential means for Manila to increase its ISR capabilities.[207] This has already resulted in the US Indo-Pacific Command providing the Philippine Air Force with three Cessna 208B *Grand Caravan* EX aircraft for the ISR role since 2017.[208] Nonetheless, Manila will need additional equipment to link its kinetic capabilities to its command and control more effectively.[209]

Vietnam

Although Vietnam's 2019 Defence White Paper treads a cautious line on territorial disputes in the South China Sea, China's aggressive maritime activities and growing naval capabilities have become important influences on Hanoi's foreign and defence policy, given Vietnam's own extensive territorial claims and its reliance on the South China Sea for maritime access.[210] As a result, Hanoi has emphasised procuring long-range weaponry, especially anti-ship missiles, and has integrated these onto various air and naval platforms to bolster its deterrent capabilities.[211] It has also procured new ISR systems to improve its ability to detect and target surface vessels in its maritime littoral.[212]

Reliance on Russian Equipment

Vietnam currently possess a respectable anti-ship and land-attack capability compared to many of its Southeast Asian neighbours, with Russia being the main supplier of defence equipment.[213] The Vietnam People's Navy (VPN) operates six *Hanoi*-class (Project 636.1 (Improved *Kilo*)) attack submarines that can launch the 3M14E Klub-S (RS-SS-N-30B *Sagaris*) naval LACM and 3M54E (RS-SS-N-27 *Sizzler*) anti-ship missile.[214] The 3M14E is a reduced-range export version of Russia's 3M14 *Kalibr* (RS-SS-N-30A) long-range cruise missile. Despite its shortened range, the 3M14E provides the VPN with an accurate stand-off capability from a relatively modern platform. A notable feature of the 3M54E anti-ship missile is that it can accelerate to supersonic speeds during the terminal phase of flight.[215]

The VPN has also fitted an export version of the Russian-designed 3M24 *Uran* (RS-SS-N-25 *Switchblade*) subsonic anti-ship missile, known as the 3M24E *Uran*-E, onto various surface vessels, including its four modern Russian-designed *Gepard* 3.9-class frigates (locally known as the *Dinh Tien Hoang* and *Tran Hung Dao* classes).[216] Although the 3M24E offers the VPN a useful anti-ship capability, there is an open question as to how long subsonic systems can remain credible deterrents as faster and less detectable anti-ship missiles become increasingly available and defensive sensors and interceptors catch up in response.[217]

The Vietnam People's Air Force (VPAF) also has a maritime attack role, with some of its 35 Su-30MK2 *Flanker* ground-attack fighters equipped with the supersonic Kh-31A (RS-AS-17B *Krypton*) anti-ship missile.[218] The VPAF also possesses the Kh-59M (RS-AS-18 *Kazoo*) air-to-surface missile that is integrated onto its Su-30 aircraft.[219] Additionally, the Vietnam People's Army also possesses an unknown number of 9K72 *Elbrus*

(RS-SS-1C *Scud* B) and RS-SS-1D *Scud* C SRBMs.[220] However, given the low accuracy of these systems and their obsolescence, their utility and serviceability is questionable.

Diversification and ISR

Despite its continuing reliance on Moscow for guided weaponry, Hanoi is attempting to reduce its dependence on Russian defence equipment, maintenance and training by searching for potential new suppliers and expanding its defence-industrial base.[221] The possible reasons for this include concerns in Hanoi about provoking US sanctions based on Washington's Countering America's Adversaries Through Sanctions Act, a desire to diversify Vietnam's military equipment, and ambitions to acquire technology transfers as part of wider defence packages.[222] Vietnam is developing a domestically produced ground-launched anti-ship missile known as the VCM-01, which externally appears to be based on the 3M24E *Uran*-E; the missile has reportedly been tested several times since 2018.[223] India has also reportedly offered *BrahMos* anti-ship missiles to Vietnam as part of its drive to increase its defence exports, although there is currently no indication of a deal between the two states.[224]

Beyond stand-off missile systems, Vietnam is also making efforts to ensure it can better detect and track potential ground and maritime targets, and has procured ISR equipment for this purpose. This includes by procuring and developing UAVs and short- to medium-range maritime-patrol aircraft.[225] To obtain better tracking and targeting data, Hanoi also intends to procure its first dedicated military Earth-observation satellite, the VNREDSat-2, potentially from France or Israel.[226] The effectiveness of these capabilities will be limited by resource constraints, however.

Conclusion

China and North Korea remain in an open-ended phase of missile development that has already significantly altered the military balance across the Asia-Pacific, particularly in the Western Pacific. The increase in both states' strike capabilities also has a growing nuclear dimension, raising the risks of nuclear escalation in a crisis or conflict. Increased interest in developing long-range strike capabilities on the part of the US and its allies and partners can be seen as primarily a reaction to this deteriorating military balance and, in the case of the US, as partly a response to the recent removal of the INF Treaty's constraints.

The spread of long-range strike capabilities could play a stabilising role by helping to restore the regional balance of power, thereby boosting deterrence against any temptation towards military adventurism that may arise in Beijing following China's advances in conventional- and nuclear-missile technology. It also portends potentially far-reaching changes to the US alliance system in the Western Pacific, with Australia, Japan and South Korea, and to a lesser extent the Philippines, each assuming a more direct role in deterrence. This will redefine the strategic division of labour in the United States' alliance with each country. Japan's decision to acquire a counterstrike capability is a particularly notable point of departure from decades of constitutional self-constraint. This trend towards self-reliance, however, does not necessarily signal a weakening of alliance structures. In several cases it appears more likely to drive deeper institutional integration, given that the allies in question continue to depend on the US for C4ISR, at least for now.

Even so, there are important risks attached to this new 'missile age' in the Asia-Pacific:

While the alliance system is being strengthened by shared threat perceptions of China, North Korea or both, Washington's closest allies in the region currently appear unwilling to act as future hosts for a new generation of US ground-based intermediate-range missiles, post-INF Treaty. This raises questions concerning how the US will position its own capabilities and work with allies in the region to achieve greater collective deterrence.

Apart from stationing US firepower on allied territory, the alliance system could also be strengthened through direct US assistance for its closest allies' efforts to develop their own strike capabilities. This is not a straightforward matter, however. Discussions have arisen over the need for the US to reform its legal and regulatory system and mindset to allow the sharing of sensitive technology with allies. This would include reforming the US International Trade in Arms Regulations (ITAR), and Washington rethinking and reinterpreting its policy of not exporting certain types of long-range weaponry in accordance with the letter and spirit of the MTCR guidelines. The US has in fact already revised its interpretation of the MTCR to allow the export of UAVs, satellites and satellite components to close partners and allies on a case-by-case basis, in contrast to its previous policy of a strong presumption of denial.[227] Moreover, Australia has been granted an ITAR waiver under the auspices of AUKUS. It remains to be seen, however, to what extent the US can support regional deterrence efforts by better assisting its other allies.[228]

Even if the US assists its closest allies in achieving their own long-range strike capabilities, further research is required by US and allied defence planners on what associated targeting and sensing capabilities are required to better link kill chains for effective deterrence. This requirement will be most evident in Australia, Japan and South Korea, all of which still depend heavily on US ISR capabilities despite continuing efforts to improve their own national provision.

US alliance management may face significant challenges in the future, whether countries remain dependent on the US or develop their own ISR and other supporting capabilities. While the US remains largely in control of the ISR capabilities and thus the strike operations of its allies for now, this may create tensions in the alliance system and drive further development of sovereign capabilities aimed at circumventing US command.

Indeed, disagreements may arise between the US and its allies through divergent perceptions of how to use strike capabilities. South Korea's independent efforts to acquire strike capabilities are the most likely to result in greater strategic autonomy from the US. This has a direct bearing on regional stability and security, as the risks of advertent or inadvertent nuclear escalation are probably greatest on the Korean Peninsula.

The development of long-range strike capabilities that are sometimes paired with strategies to conduct so-called 'decapitation' strikes on adversaries' command and control may increase the escalation risk in the Asia-Pacific by potentially encouraging strikes and risking a lowering of the threshold for the use of long-range missiles and potentially nuclear weapons. It remains to be seen how the US will manage divergent interests among its allies, but regional stability is likely to be at stake.

Few countries outside the alliance framework are attempting to domestically develop their own long-range missile capabilities. Taiwan is likely to continue developing its home-grown long-range-strike technologies, though the challenges it faces in accessing foreign technology will probably limit its progress. Vietnam is likely to make incremental progress towards its more modest and achievable goal of acquiring a limited, domestically produced anti-ship capability, while the Philippines has turned to India for its capability acquisition. For those countries that do not currently possess the resources to embark on similar capability development, it is unclear how other countries' programmes might change their regional threat perceptions, and what consequences this could have for regional proliferation and the future of arms control in the Asia-Pacific as existing controls are retired or diluted.

In summary, a largely unconstrained build-up of long-range missile capabilities is taking place across much of the Western Pacific, with little prospect of this being ameliorated by arms-control frameworks. Both Beijing and Pyongyang are developing their own missile capabilities to blunt or block those fielded by the US and its partners, and neither is willing to accept limits on these because ultimately they are seen as guaranteeing deterrence and regime survival. Conversely, those seeking to close the missile-capability gap might be inclined to engage in arms-control negotiations but are likely to be disappointed, given China's and North Korea's intransigence on this issue. An accelerating security dilemma all but ensures this arms-racing dynamic will continue in an environment of limited transparency with regard to capabilities, inventories and intentions.

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The International Institute for Strategic Studies – UK
Arundel House | 6 Temple Place | London | WC2R 2PG | UK
t. +44 (0) 20 7379 7676 **e.** iiss@iiss.org www.iiss.org

The International Institute for Strategic Studies – Americas
2121 K Street, NW | Suite 600 | Washington DC 20037 | USA
t. +1 202 659 1490 **e.** iiss-americas@iiss.org

The International Institute for Strategic Studies – Asia
9 Raffles Place | #49-01 Republic Plaza | Singapore 048619
t. +65 6499 0055 **e.** iiss-asia@iiss.org

The International Institute for Strategic Studies – Europe
Pariser Platz 6A | 10117 Berlin | Germany
t. +49 30 311 99 300 **e.** iiss-europe@iiss.org

The International Institute for Strategic Studies – Middle East
14th floor, GFH Tower | Bahrain Financial Harbour | Manama | Kingdom of Bahrain
t. +973 1718 1155 **e.** iiss-middleeast@iiss.org