



The Undersea Dragon: China's Submarine Force and its Impact

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The People's Republic of China's (PRC) Naval forces under the People's Liberation Army Navy (PLAN) have undergone a dramatic transformation since the early 2000s.¹ This buildup has included developments in rocket technology, the carrier force, and the expansion of its fleet of modern frigates and destroyers.² Yet, the centerpiece of the PLAN's modernization has been the construction and employment of more advanced submarines, indicating a preference for power projection through submarines – as opposed to the US model which places aircraft carriers at the center of the power projection model.³ This paper focuses on the modernization of the PLAN submarine force and the roles that it expects each class of submarine to play. It also offers an assessment of the strategic reasoning behind the PLAN's submarine modernization, as well as the steps that the United States and its allies need to take to reinforce deterrence and maintain regional security.⁴

The question of deterrence, in particular, needs to be carefully considered to ensure that it is conducted in a responsible manner that can manage competition and reduce the chances of escalation in the region.⁵ The PLAN's modernization of its submarine fleet affects the maritime balance of power in the Indo-Pacific and requires the United States and its allies to evaluate and modernize Anti-Submarine Warfare (ASW) capabilities to maintain the balance of power and ensure that Western maritime values – of freedom of navigation and respect for international law – are represented.

People's Liberation Army Navy (PLAN) Submarine Modernization

The PLAN, at its birth, was a brown-water force focused on coastal defence.⁶ In the past 15 years, however, it has built blue water naval experience through forward deployments around the Pacific and as far as the Gulf of Aden in its counter-piracy role.⁷ As part of the 2015 Chinese Military Strategy "White Paper," the articulated strategy of the PLAN was to combine a focus on "offshore waters defence" with "open seas protection" which requires the continued production of naval assets including an increase in the number of nuclear powered attack submarines (SSNs) and nuclear-powered ballistic missile submarines (SSBNs) in the fleet.⁸ This shift has been a result of the Chinese Communist Party's (CCP) vision of China's place in the world, which has been evolving as the country undergoes substantial economic growth.⁹

The US Office of Naval Intelligence's (ONI) 2020 estimates indicated that the PLAN is operating 66 total submarines, including 55 conventional diesel-electric submarines (SSK), 7 nuclear-powered attack submarines (SSN), and 4 ballistic missile submarines (SSBN). ONI estimates that by 2030, the total will increase to 76 submarines, as the older SSKs are replaced with newer models and more SSNs and SSBNs are built.¹⁰ Each type of submarine provides the PLAN with a different capability.

There are currently four separate-classes of SSKs in service with the PLAN, the Yuan-class, the Song-class, the Ming-class, and the Kilo-class.¹¹ Yuan, Song, and Ming-classes are all Chinese designs, while the Kilo-class was purchased from Russia. All four are in service, but it is expected that the Ming, Song, and Kilo-classes will be phased out as they reach end of life (there is intelligence that indicates the Kilo-class is being phased out now).¹² The latest model of SSK produced for the PLAN is the Yuan-class (Type 039)¹³ which is now in serial production.¹⁴

The Yuan-class's design is probably based on the Kilo given similarities in the upright fin design of the first variant.¹⁵ There are currently three variants of the Yuan-class in production and, while the details of the upgrades between each variant are unavailable from open-source intelligence, the design of the fin has clearly changed each time. The latest variant now incorporates what appears to be a radar deflecting fin, which is superficially similar to a Swedish Gotland-class.¹⁶ The most recent design also appears to include a reel for a towed array, necessary for storing a sonar system onboard, rather than attaching it externally.¹⁷ This type of array enables passive sonar detection over a larger area compared to a bow or flank sonar array. The Yuan-class has also incorporated an Air Independent Propulsion (AIP) system into its design to allow for enhanced low-speed submerged endurance.¹⁸

Due to the lack of information provided by the Chinese government on the design, there is some debate as to the purpose of the submarine. In USNI News, Henry Holt argues that the *Yuan* is a small submarine (below 2,000 tons displacement) and its primary weapons system is an ACSM launched from the torpedo tubes.¹⁹ Christopher P. Carlson, however, argues that the *Yuan* is a large SSK, similar in size to the Japanese Soryu-class submarine, which has a displacement of just under 2,900 tons.²⁰ He also argues that the primary weapons system is the YU-6 Torpedo.²¹ The size and weapons estimate differentials speak to different perceived purposes for the submarine, with Holt arguing that the *Yuan* is primarily designed for operations in littoral waters, where it will wait, hidden by large merchant noise, to launch ASCMs at enemy ships. Carlson argues that the *Yuan* is for near sea deep water operations, where it will use flank and towed array sonar systems to detect and prosecute adversaries using torpedoes.²² Both analysts agree though that the *Yuan* is a significant upgrade from her predecessor (the *Song*) and that the inclusion of AIP, advanced sonar, and reduced acoustics will make the new generation of PLAN SSKs difficult to detect and prosecute.²³

Most analysts believe that Chinese SSKs will primarily be employed in the defence of Chinese maritime approaches in the event of a major conflict. The PLAN would likely use a sea denial strategy,²⁴ with torpedoes and anti-ship cruise missile (ASCM) as their primary weapons systems.²⁵ Due to the close proximity between Taiwan and China, they can also be deployed quickly to prevent hostile submarines from denying Chinese forces use of the straits of Taiwan.²⁶

A significant factor in Chinese calculations is the limited speed of an SSK (as an example, the Victoria-class normally travels at between seven and eight knots).²⁷ These submarines therefore require more time to get on station. While they can maneuver quickly for a limited period of time (over 20 knots for the Victoria-class)²⁸ that ability is limited to several hours due to battery capacity and maximum recharging rates. The ability to forward deploy a conventional submarine

outside of territorial waters is an option, but transit time to get to the patrol area is greater than it is for an SSN, reducing the time available to patrol without locally resupplying.²⁹ SSKs can also be used for covert insertions of special operating forces (SOF) and for intelligence, surveillance, and reconnaissance operations in both the visual and electromagnetic spectrum.³⁰ Both of these capabilities provide a better understanding of the land battle and the ability to use SOF forces to attack targets prior to a maritime invasion.

In addition to modernizing their SSKs, China is also modernizing and increasing the number of SSNs they operate.³¹ The PLAN currently operates the Shang-class (Type 093), which has been upgraded three times (variants I, II and III) and, based on open source intelligence, is developing a replacement class, but details are extremely limited on this class or even whether it will be new or an upgrade of the Shang-class.³² The *Shang*'s predecessor was the Han-class (Type 091).³³ This class was launched in 1974, after 16 years of development on what was initially dubbed Project 09.³⁴ Project 09 faced technical, economic, and political delays stemming from the collapse of relations with the Soviet Union and the Cultural Revolution.³⁵ When finally brought into operation, the Han-class saw limited deployment time and, according to a 1997 US report to Congress, had ceased to sail beyond regional waters. Its capability was certainly limited compared to Russian or Western ASW capabilities.³⁶

The Shang-class, developed in the 1980s and 1990s and launched in 2006,³⁷ represents an upgrade over the Han-class in terms of detectability but, according to the Office of Naval Intelligence (ONI), the Russian *Victor III* (1970s era³⁸) and *Akula* (1980s era³⁹) are both quieter boats.⁴⁰ Chinese researchers have suggested that reductions to the *Shang*'s acoustic levels are on par with the Los Angeles-class, and have reached the level of the *Akula*-class, which represents an upgrade from the open source ONI report.⁴¹ Either analysis still indicates that the *Shang*'s acoustic levels are not as quiet as the more modern Seawolf- or Virginia-class SSNs produced by the United States.⁴² The Shang-class is reportedly armed with ACSMs, torpedoes, and mines.⁴³ China is also reportedly developing a replacement to the Shang-class, currently called the Type 095.⁴⁴

SSNs can assume similar combat roles to SSKs (attacking ships and submarines by launching torpedoes and ASCMs, conducting covert SOF deployments, and gathering visual and electromagnetic intelligence (ISR activities)).⁴⁵ However their advantage comes from the nuclear propulsion plant, which allows for increased transit speeds and eliminates the requirement to return to periscope depth to charge the main batteries.⁴⁶ PRC writings regarding SSN have repeatedly suggested that the value of the platform is its ability to operate on long-range missions.⁴⁷

The value of such missions is clear. China imports 50%, of its oil from the Persian Gulf, which requires tankers to transit the straits of Malacca⁴⁸ and, in the 2000s and 2010s, spent more on importing semi-conductors than oil in order to support high-end computing requirements.⁴⁹ These factors, among others, make the ability of free passage of goods to and from China critical to the country's continued economic growth (through which it is able to modernize and expand the military)⁵⁰.

As an article from *Modern Ships* on Chinese strategy indicates, "Submarines are the PLAN's main long-distance sea force."⁵¹ An SSN's ability to project sea control through its speed and stealth allows it to ensure these commerce routes remain open from a blockade.⁵² Sea lines of communication (SLOC) defence is therefore emphasized in both China's most recent National Defence Strategy and military strategy white papers, with commentators noting, that "protecting China's sea lines of communication has become an important aspect of maritime security."⁵³ Chinese analysts have noted the rapid deployment of British SSNs to the Falklands as an example of such a vessel's ability to quickly deploy to distant locations to establish a level of sea control in

the area.⁵⁴ SSNs may also be valuable in preventing adversarial forces from leaving port in the event China decides to conduct offensive naval action in Taiwan. By assigning SSNs the task of patrolling the approaches to Yokosuka and Guam, the PLAN could both gather intelligence on departing force composition and potentially deter forces from exiting the harbor.⁵⁵

The development of Chinese SSBNs saw a similar trajectory to that of the SSNs. The first SSBN, the Xia-class (Type 092) was launched in the late 1980s, its powerplant undergoing the same development cycle as the Han-class discussed above.⁵⁶ The *Xia* was plagued by maintenance and reliability issues, including radiation leakage from the main reactor and high noise levels. Reportedly, it did not conduct any patrols, rendering it ineffective as a nuclear warfare deterrent.⁵⁷ The PLAN's current class of SSBN, the Jin-class (Type 094) was launched in July 2004.⁵⁸ There is speculation that the Chinese are developing a replacement class, currently dubbed the Type 096, with open source intelligence indicating that hull construction may have commenced in the Bohai (Huluado) Shipyard, the only shipyard currently constructing nuclear submarines in China.⁵⁹

The Jin-class' primary success metric is its survivability, which is measured by its ability to remain undetected from hostile ASW in order to deliver its Submarine Launched Ballistic Missiles (SLBM).⁶⁰ The primary tool an SSBN can use to increase its survivability is to remain undetected.⁶¹ The nuclear propulsion plant assists with that effort by eliminating the requirement to operate the diesel engines at periscope depth or on the surface to charge the main battery, which effectively minimizes the submarine's chance of being found by methods other than acoustic or magnetic detection.⁶² Acoustic detection will be the primary detection method, as magnetic detection can be mitigated through deperming prior to operations.⁶³

Assessments of the Jin-class estimate that its noise levels are similar, or slightly higher than the Shang-class and noisier than Soviet SSBNs developed in the 1970s (which are noisier than either current Russian or US SSBNs).⁶⁴ According to Chinese analysts, there have been recent modifications to the Jin-class to reduce its noise signature, but the basic design remains intact which limits the ability of the PLAN to significantly reduce its noise signature or reduce the impact of that noise signature by increasing the maximum diving depth of the submarine.⁶⁵ The Type 096 is expected to have a reduced noise signature and should be a significant improvement over the Jin-class.⁶⁶

An SSBN is designed to conduct deterrence patrols while carrying nuclear-armed SLBMs ready to be fired in either a pre-emptive or second-strike role.⁶⁷ The capabilities of the SLBM used and the SSBNs ability to remain undetected dictates their effectiveness in that role. The first SLBM developed by the Chinese for use in that role was the JL-1 (Juling-1) which had a reported range of 2,700 kilometers.⁶⁸ The development process commenced in concert with the development of Chinese nuclear propulsion and took 30 years to complete, the first launch being conducted from a Xia-class SSBN in 1988.⁶⁹ As with the development of nuclear propulsion the delays were both technological and political in nature.⁷⁰

With a range of only 2,700 kilometers and the inability to reliably deploy, the Xia-class SSBN, the JL-1 didn't serve as an effective nuclear deterrent. Successfully tested in 2001, the JL-2 was the replacement for the JL-1.⁷¹ The US Department of Defence estimates the JL-2 has a range of approximately 7,200 kilometers, enabling a nuclear strike as far as Eastern Europe or Northern Alaska if launched from within the East China Sea.⁷² In 2018 and 2019, the PLAN conducted two test launches of the JL-3, the latest version of the Chinese SLBM.⁷³ Since those test launches, the *South China Morning Post* reported in May 2021 that the Jin-class has been armed with these SLBMs, which are reported to have a range of over 10,000 kilometers (bearing in mind the *South China Morning Post* operates within Chinese media regulations, these claim may be

exaggerated).⁷⁴ As can be seen in Figure 1, a range of 10,000 kilometers enables a second-strike capability to launch on North America from a PLAN SSBN located in Chinese Territorial Waters.⁷⁵ The JL-3 is also reported to be armed with multiple independent targetable re-entry vehicles (MIRV), which is when one ballistic missile is armed with multiple warheads that are able to strike different targets, which increases the impact of the weapon and makes ballistic missile defence more difficult.⁷⁶

There are multiple points of view on how the Chinese may choose to employ their SSBNs. The first is that they may employ a bastion strategy, similar to that of the Soviet Union during the Cold War, where PLAN SSBNs conduct deterrence patrols in the South China Sea area.⁷⁷ This strategy entails establishing patrol areas close to the home country and protecting those patrol areas.⁷⁸ This strategy was employed by the Soviets for a number of reasons, including close proximity command and control, resupply, and the ability to concentrate seaborne ASW forces in the area.⁷⁹

This strategy would seem to make sense as transit to the western Pacific Ocean would expose submarines to choke points in the First Island Chain.⁸⁰ However, within the First Island Chain, the JL-2 doesn't have the required range to hit North America.⁸¹ The JL-3 range would solve this issue but is still under development. The bastion strategy also requires significant forces to defend the bastions from ASW that aren't required in the open ocean strategy.⁸² This would limit the flexibility to use Chinese surface and air forces for other types of operations.

The ability to deploy SSBNs to the open Pacific provides a number of benefits including reduced anti-ASM resources, the ability of the current Chinese SLBM to target North America, increased flexibility in patrol areas, and shorter SLBM flight times as the SSBNs are able to patrol closer to their target.⁸³ As discussed, China is working towards quieter SSBNs which will enable the PLAN to deploy the vessels on open ocean patrols with a reduced risk of detection when exiting the First Island Chain. If longer range SLBMs are successfully developed either strategy is possible for the PLAN, enabling flexibility when deploying their SSBNs on patrol.

Beijing has long held a No First Use policy when it comes to nuclear weapons.⁸⁴ Their strategy has undergone some debate in academic literature, with it being called "self-defensive deterrence," evolving to "minimal deterrence" and "credible minimal deterrence" with some recent Chinese writers advocating for "limited deterrence."⁸⁵ In combination with the relatively few ICBM and SLBM assets operated by the Chinese military, these strategic approaches do not suggest large scale nuclear operations as both the US and USSR envisaged during the Cold War.⁸⁶ Beijing has determined a sea-based deterrent is worth investing in as one of the tools to maintain

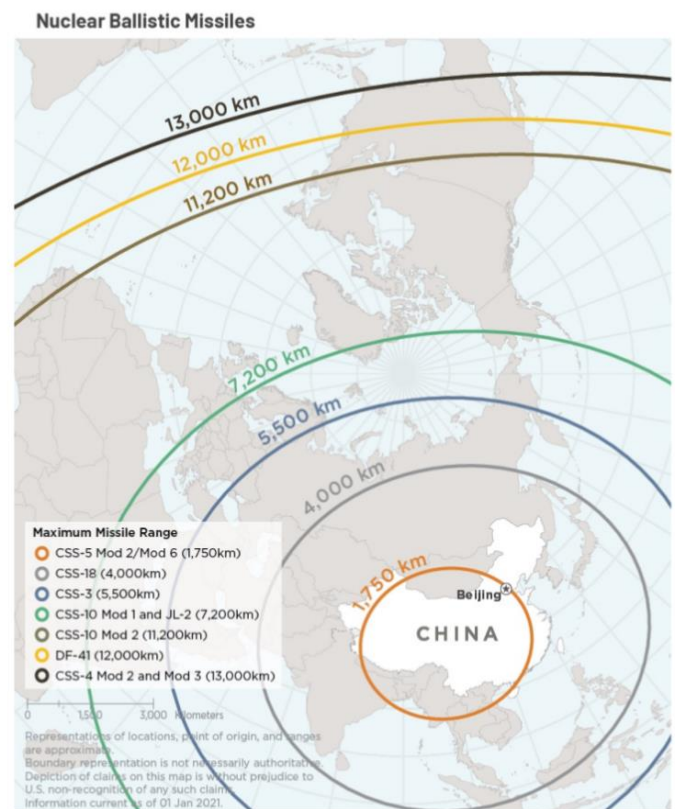


Figure 1: Chinese Nuclear Ballistic Missile Range. Source: U.S. Department of Defense. 2022 Report on Military and Security Developments Involving the People's Republic of China

the deterrence required to prevent an adversarial nuclear attack and provided a “significant and credible strategic threat.”⁸⁷ A credible second-strike capability has the potential to alter China’s relationships with both nuclear armed and non-nuclear armed countries by enabling China to fight a regional advisory without concern that a nuclear-powered great power will use the threat of a nuclear strike to dissuade China from stopping the conflict. When the threat of nuclear war is one-sided, it is much easier to get your way in a geopolitical situation. Despite the current survivability concerns with the Jin-class, a ballistic missile nuclear powered submarine is the most survivable component of a nuclear arsenal, with an extended submerged endurance that is difficult to detect in the open ocean.

To summarize, each of the three types of submarines the PLAN is currently employing fulfills a different and distinct role in China’s maritime strategy. Based on the western analyses studied, SSKs will primarily be employed in a sea denial strategy within local Chinese waters. The SSN is able to fulfill the same role and, due to their nuclear propulsion systems, can also conduct both sea control and sea denial in an expedient manner farther away from China’s local waters. Finally, the SSBN provides China with a survivable second-strike nuclear deterrent capability. There remains the potential that the Chinese will choose to use their submarines in an entirely different method than before, which necessitates continued study of developments in the Chinese submarine force.

The Impact of Submarines on China’s Maritime Strategy

In 1985, China established a naval strategy based on “offshore waters defence” and, while “offshore” wasn’t explicitly defined in the strategy, it is seen to focus on the first island chain, which was the first time in Chinese maritime strategy when SSNs and SSBNs became a critical component of that strategy.⁸⁸ Prior to that period, the strategy was driven by “near coastal defence.”⁸⁹ A strategy of defence of only the coastal areas doesn’t justify the requirement for nuclear powered submarines, as this role can be filled by SSKs as discussed earlier. The requirement for nuclear power was initially generated by the CCP’s desire to be seen as a great power in the world and not necessarily one based in defence policy. Early into the founding of the PRC, a stated goal of the Communist Party of China (CCP) was to develop SSNs and SSBNs as part of a strategy of nuclear arms development.⁹⁰ Chairman Mao Zedong was quoted as saying: “China is determined to develop nuclear weapons even if it would take us ten thousand years.”⁹¹ This desire can be aligned initially to competition with the great powers at the time, especially the Soviets, who initially supported Chinese nuclear development but, owing to later tensions between the countries, left China to develop nuclear weapons and propulsion on its own.⁹² Admiral Liu Huaqing, former commander of the PLAN and chairman of the Central Military Commission viewed SSBNs as not only a “deterrent force of the nation” but also as “an expression of our countries overall strength.”⁹³

The latest Chinese Military Strategy, published in 2015, has the PLAN moving from “offshore waters defence” to a combination of “offshores water defence” and “open seas protection.”⁹⁴ Maintaining and enhancing a credible SSBN deterrence is one of the five stated components of this strategy and is therefore is a core mission of the Chinese Submarine Force.⁹⁵ The other four components are preparing for operations against Taiwan, defending the South and East China Sea Claims, protecting SLOCs, and conducting diplomacy.⁹⁶ All five components have a submarine focus but, for the purposes of this paper, conducting diplomacy won’t be discussed as it is both self-evident and a mission set that can be conducted by any vessel in the PLAN.

Defending China's claims in the East and South China Sea and defending far flung SLOCs, are both missions suited to SSNs.⁹⁷ In 2015, Hu Jintao discussed the "Malacca Dilemma" to emphasize the inability of China to secure trade in the straits of Malacca despite its reliance on the area.⁹⁸ The continuation of trade is extremely important for China, and 85 to 90% of that trade is conducted on the ocean.⁹⁹ In the event of a conflict in the Indian Ocean, China would be particularly vulnerable, necessitating the ability to respond to maintain commerce for domestic requirements (energy being the most discussed).¹⁰⁰ While China is taking steps to minimize the impact of a stoppage of energy shipments, including pipelines from Pakistan and Russia, the ability to project sea control with SSNs is critical to maintaining traffic flows in the event of a dispute outside the first island chain.¹⁰¹ In 1998, Chinese International Relations Scholar Zhang Wenmu contended the US hegemony on sea control at the time threatened China not only economically, but militarily, and politically as energy resources affected those realms, "[U]nder globalization a nation's energy resources is no longer an economic issue alone. Instead, it is also a political issue, as well as a military issue"¹⁰²

A fourth component of China's latest military strategy that applies to the submarine force is preparing for war with Taiwan.¹⁰³ Chinese policy towards reunification with Taiwan is a core goal of the Chinese Communist Party, which sees the "One China" policy as a pillar of Chinese domestic policy.¹⁰⁴ The CCP sees a "One China" policy as one where the PRC has control over Taiwan and Taiwan becomes a "Special Administration Region" similar to Hong Kong.¹⁰⁵ During the Twentieth National Congress of the Communist Party of China in October 2022, Xi Jinping reemphasized reunification of Taiwan with China, preferably by peaceful means, but did not rule out the use of force.¹⁰⁶ Reunification with Taiwan continues to be a paramount concern of the PLAN, with deployment of submarines to the East China Sea a critical component of that strategy.¹⁰⁷ As discussed, due to the proximity of Taiwan and China, SSKs are more than capable of fulfilling that role and this is an indicator of why we are seeing a modernization of the SSK fleet with the Yuan-class. As air support can be provided from the mainland, this may be a possible indicator as to why Chinese aircraft carrier development has not been as critical to the PLAN modernization as SSKs, SSNs and SSBNs.¹⁰⁸

In the event of the use of force, Chinese military strategists have identified two possible centres of gravity, the will of the Taiwanese people to fight and the will of the US to come to the defence of Taiwan.¹⁰⁹ Both of these can be combatted using SSKs in the Taiwan Strait. By denying access to the strait, the Taiwanese people will lose basic necessities supplied to the island from the sea, which would have significant repercussions on the Taiwanese economy.

The U.S. Response to the PLAN Submarine Modernization

The U.S. and its allies' policies towards the PRC have become more adversarial in recent years. In the most recent U.S. Indo Pacific Strategy, the PRC's "coercion and aggression" was described as spanning "the globe, but it is most acute in the Indo-Pacific."¹¹⁰ The strategy notes that U.S. partners in the Indo-Pacific are most affected by a more aggressive China.¹¹¹ In Canada's recent Indo Pacific strategy, China was mentioned by name: "China's assertive pursuit of its economic and security interests, advancement of unilateral claims, foreign interference, and increasingly coercive treatment of other countries."¹¹² Despite the increase in adversarial language, these strategies conditionally emphasize the requirement to maintain relations and trade with China. Other Indo-Pacific and Western countries are reliant on the integrated economic

relationships between their countries and China and an unnecessary degradation of that relationship will have economic and political consequences.¹¹³

This paper has made the argument that China is emphasizing and modernizing its submarine force. This modernization is at least in part due to the success displayed by the U.S. submarine force during the Cold War, where U.S. innovations in nuclear propulsion, quieting, and training forced the Soviets to invest heavily to keep pace in the underwater realm, while also leading Moscow towards the bastion strategy, committing a large portion of the Soviet Navy to ASW activities to protect its SSBNs.¹¹⁴ The U.S. and its allies' approach to that modernization may have repercussions beyond the naval realm if the U.S. increases preparations for a strategic ASW campaign against China, and China sees that as escalatory. This could create a Cold War style arms race in submarines.¹¹⁵ That being said, an evaluation of current Chinese writings on U.S. ASW capabilities finds that while the SSN is an extremely capable platform, the reduction in surface fleet size and emphasis on multi-mission platforms, instead of ASW specific platforms, puts the U.S. in a less advantageous position to conduct ASW than in the past.¹¹⁶ Chinese military analysts have also recently assessed that the declining U.S. investment in SSNs has left the USN submarine force in a less dominant position than it enjoyed during the Cold War.¹¹⁷ In October 2020, the U.S. Defence Secretary Mark Esper called for an increase in the overall US fleet size and specifically for three Virginia-class submarines to be built a year.¹¹⁸ As of 2022, the Chief of Naval Operations (CNO) had a goal of 70 SSNs in service versus an actual fleet size of 66 with plans to build two Virginia-class SSNs per year for FY24-28.¹¹⁹

The U.S. has recently shown its defensive commitment to the region through the AUKUS agreement which is a defence sharing agreement between the U.S., the U.K., and Australia.¹²⁰ It is comprised of two parts, the first is a commitment to build SSNs for Australia, at first in the U.S. and then as a shared construction between the U.K. and Australia, using U.S. nuclear reactor technology.¹²¹ The second is a technology and intelligence sharing agreement to share information on technology including AI, Quantum Computing, and Hypersonic missiles.¹²² In response to AUKUS, the Chinese government has issued a condemnation, stating that the agreement is an escalation and urging member states to uphold their commitments to nuclear non-proliferation.¹²³ Despite its public stance, China has been increasing the number of SSNs and SSBNs that it is constructing, and this response may indicate concern over potential competition in the region. The U.S. needs to continue to update its ASW capability to counter Chinese submarine modernization. The US should be cautious of the discrepancy between the CCP's political statements on American ASW improvement efforts and the PLAN's submarine modernization, and should seek to limit escalation while preventing China from becoming a destabilizing force in the region through a tempered ASW response, otherwise rhetoric on the probability of a Chinese invasion of Taiwan may become a self-fulfilling prophecy.¹²⁴

Conclusion

The PLAN is conducting a modernization of its submarine force both in terms of size and capability. Each of the types of submarines being constructed and modernized has a role in China's maritime strategy. The SSKs are highly likely to be used for sea denial within the first island chain and are especially useful in the event of conflict with Taiwan. SSNs have similar uses but, due to their speed and stealth, they can also be used to protect critical SLOCs, maintaining trade routes in the event of a dispute outside of the first island chain. SSBNs and their SLBMs are being modernized to increase the range and survivability of the Chinese nuclear deterrent. The U.S.

response to this modernization will be guided by its commitment to allies in the region while managing tensions with China in order to avoid escalation if at all possible. The PLAN submarine force is a fundamental aspect of the naval service, and it is essential to assess advancements in Chinese submarine technology, not only in terms of the technology employed but also for potential strategies that the PLAN may use these submarines for in the future.

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Notes

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