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China's Military Rise
and the Implications for European Security

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Chapter Three

Chapter Three.
China Outside the Western Pacific: Military Capabilities for Power Projection

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Key Takeaways

- In response to the end of the Cold War and demonstrations of unmatched US power in the 1990s, China undertook a rapid and ambitious modernization and expansion of its military and accelerated progress in the last decade. This project has been, by any measure, successful. Today China is the dominant force in its own backyard, gradually pushing US power projection capabilities away from its coast.

- China has developed almost all capabilities necessary for regional power projection and is in the process of developing extra-regional capabilities. China is on the verge of a breakthrough and will be able to effectively project power extra-regionally within the next ten years: China will not necessarily be able to go toe-to-toe with the US and its allies in all contingencies, but it should be able to mount missions to intimidate and coerce small and medium-sized states through offshore threatening and to protect supply chains in the Indian Ocean, Middle East, and Africa, certainly if not challenged by a peer competitor.

- China possesses a world-class missile arsenal and fleet of surface support ships, but still trails the most advanced Western militaries in terms of the number and sophistication of aircraft carriers and the capabilities of its carrier strike groups (CSGs), specifically in areas such as jet fighters and anti-submarine warfare.

- China is undertaking enormous efforts to remedy the shortcomings in its CSGs and will narrow the gap with the most advanced Western militaries – though by how much remains a matter of debate – by 2035.

- Towards 2035, demographic, economic, political, technological and security developments may impede the continued development and maintenance of especially China's far seas military capabilities and to a lesser extent its near seas capabilities.

This chapter analyzes China's defense spending to illustrate how and why it has chosen to develop various military capabilities. In order to discern trends, the assessment starts in 1996, continues to the present day and projects trends to 2035. The emphasis is on China's capacity to project military power outside of East Asia and the Western Pacific and, crucially, to sustain such projection in the long run. For now, Europe remains largely on the sidelines in the intensifying Sino-American competition within the Western Pacific. Though strategic perceptions of China are changing in Europe, leading European military powers remain limited, materially and geographically, in their ability to influence the strategic situation in the region. It is more likely that Europeans will be involved in developments affecting the Indian Ocean, its adjacent waters and the 30 countries surrounding these waters. This is a region where China has laid the foundation to project power in another five to ten years.

For now, Europe remains largely on the sidelines in the intensifying Sino-American competition within the Western Pacific.

This chapter is devoted to the broad spectrum of China's military capabilities relevant to its ability to influence events in the Indian Ocean: China's far seas military capabilities such as its extra-regional power projection capabilities and long-range strike capabilities; command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); and additional capabilities. The chapter examines both the numbers and the relative quality of these capabilities, as well as their projected trajectory over the next decade-and-a-half. It concludes by returning to the typology developed in Chapter One, which evaluates China's ability to project military power outside its region.

This chapter concludes that China's ability to project power outside the Western Pacific is growing, and it could achieve a breakthrough within the ten five years. It has achieved parity with, or even surpassed, the United States and its allies in some areas, though it still lags in some categories. In sum, the significant military advances it has made since 1996 make it a formidable opponent within its own region, and it is developing the ability to project power into the Indian Ocean.

The starting point for this chapter is 1996, when the Third Taiwan Strait Crisis unfolded because this event had a significant impact on Chinese thinking. After China threatened Taiwan with missiles, the US sailed two Carrier Strike Groups (CSGs) into the Strait as a show of force. China felt impotent faced with US naval might. The People's Liberation Army (PLA) and the People's Liberation Army Navy (PLAN) were still at an early stage of technological development.[1] China's inability to deter US forces from operating close to their economic heartland – as well as the extent of US military power on display during the Gulf War in 1991 – galvanized China's military modernization. Specifically, it led to China's focus on developing its so-called Anti-Access Area Denial (A2/AD) capabilities and its naval capabilities. China is now capable of significantly raising the cost for US power projection within the First and Second Island Chain, but its ability to project power outside of the region is less well-charted.[2]

1 The International Institute for Strategic Studies (IISS), "East Asia and Australasia," in *The Military Balance 1996*, vol. 96, 1996, 170–201, 10.1080/04597229608460097.

2 The US is today much less assured that it can deter a Chinese attack on Taiwan. See e.g. Stephen Biddle and Ivan Oelrich, "Future Warfare in the Western Pacific: Chinese Antiaccess/Area Denial, US AirSea Battle, and Command of the Commons in East Asia," *International Security*, 2016; Paul van Hooft, "All-In or All-Out: Why Insularity Pushes and Pulls American Grand Strategy to Extremes," *Security Studies* 29, no. 4 (2020): 701–729.; Bonnie Glaser, "Bonnie Glaser's Testimony: Chinese Maritime Coercion in East Asia: What Tools Can Be Used to Respond?," The German Marshall Fund of the United States, May 13, 2021, https://www.gmfus.org/publications/bonnie-glasers-testimony-chinese-maritime-coercion-east-asia-what-tools-can-be-used.; Amti Vorndick, "China's Reach Has Grown; So Should the Island Chains," Asia Maritime Transparency Initiative, October 22, 2018, https://amti.csis.org/chinas-reach-grown-island-chains/.

3.1 Chinese military force projection

A state's military power does not automatically translate into the means needed to deter, compel, or achieve other political ends. For China to be able to exercise influence outside of its own region, it needs long-distance power projection capabilities and the capacity to not only transport and deploy forces for military operations but also to sustain them.[3] The term "expeditionary power projection" can be defined as "the strategy of stationing the bulk of the joint force [in the home country] and deploying them to distant locales to decisively defeat aggression," and provides insight into the operational aspects of the predominant approach.[4]

This report uses the following definition of extra-regional power projection:

> The ability to "win decisively in major combat" in order to "influence events" through the deployment of military assets outside of a state's own region.

Many recent and commonly used definitions of power projection are tailored to US conditions, as from the end of the Cold War onward, the US has been the only "global military power", meaning the only power with the ability to "plan, deploy, sustain and fight at distance – and at scale – from the [...] homeland [...] in a way currently possible for no other nation."[5] However, other powers – Russia, the United Kingdom, France, and China – maintain some ability to project power outside their region, even if not on a global scale, as they can "deploy limited capabilities at strategic range."[6]

Three constituent parts of power projection can be distinguished on the basis of these definitions, namely the *actions* a state should be able to perform to project power, a description of the political *aims* that the action seeks to achieve and, as per Paul Kennedy,[7] the specific *sources* of national power that make power projection possible. All definitions clearly articulate the sequence of *action(s)*, which in essence is the large-scale transportation, deployment, and sustainment of forces in an extra-regional theater.

Whereas *aims* have generally been centered on either domination or the prevention of domination by others,[8] *actions* pertain to the rapid and effective deployment as well as the sustain-

3 See further Toshi Yoshihara and Jack Bianchi, "Seizing on Weakness: Allied Strategy for Competing With China's Globalizing Military," 2021, 52, https://csbaonline.org/research/publications/seizing-on-weakness-allied-strategy-for-competing-with-chinas-globalizing-military.

4 Effective deployment and sustainment rests directly on a state's military and informational power and indirectly on its economic and political power. The examples of "far-off places" that Mazarr mentions are Taiwan, Korea, and the Baltics, as he specifically speaks of "long-distance power projection" in the US context. Michael J. Mazarr, "Toward a New Theory of Power Projection," War on the Rocks, April 15, 2020, https://warontherocks.com/2020/04/toward-a-new-theory-of-power-projection/.

5 Giegerich, Childs, and Hackett, "Military Capability and International Status."

6 Giegerich, "Military Capability and International Status."

7 Kennedy, *Rise and Fall*, xv-xvii.

8 The US Department of Defense (DoD) lists crisis response, a contribution to deterrence, and the enhancement of regional stability. Joint Chiefs of Staff, "Department of Defense Dictionary of Military and Associated Terms (As Ammended Through 31 August 2005)" (The Pentagon, Washington, DC, April 12, 2001), 417, https://apps.dtic.mil/sti/pdfs/ADA439918.pdf.

ment of forces, requiring not one act of force at a singular moment in time but a protracted one. Even for the US, rapid deployment requires quick means of transportation on a scale that enables the moving of large-scale forces and equipment over long distances.[9]

Like the US with its many obligations around the globe, Beijing has to make strategic choices as to force distribution.

The ability to "win decisively in major combat" and to "influence events" heavily depends on the dynamic interaction of intentions and capabilities of both the state and its adversaries. Like the US with its many obligations around the globe,[10] Beijing has to make strategic choices as to force distribution. This report therefore considers whom China is projecting power against – and the commitment of that rival to a particular region – in order to assess the PLAN's ability to project power.

Contemporary PLAN strategy stresses the need to provide "far seas protection" (*yuanhai fangwei*) *in addition to* its traditional "near seas defense" (*jinhai fangyu*) within the First Island Chain.[11] The latter focuses on protecting the Chinese mainland from attack and the safeguarding of "maritime rights and interests" and "national sovereignty,"[12] which includes territorial claims over Taiwan, large swaths of the East China Sea and almost all of the South China Sea. As touched on in the previous chapter, the former is largely "a function of the country's growing national interests" and relates to "ensuring access to supplies of crude oil [...] to protect the nation's energy security, defending China's growing expatriate community [...], and protecting overseas investments",[13] for which China relies on some critical choke points along the SLOCs (see Figure 2). Despite these expressed aspirations, Chinese naval strategists have concluded that, at this moment, the PLAN is not yet able to provide far seas protection, as it is unable to protect its strategic interests in a scenario of conflict outside of its region with its current force structure.[14]

Who then are the parties that might oppose Chinese attempts to "influence events" through power projection in the Indian Ocean? The US and India are China's main potential adversaries in this region, which they dominate. Australia, Japan, who join the US and India in the quad, the United Kingdom and France are additional potential adversaries for China in the Indian Ocean. The UK and Australia joined the United States in the recently announced AUKUS defense pact. France has considerable interests and naval capabilities and also operates in the Indo-Pacific (see Table 8).[15]

9 Mazarr, "Toward a New Theory of Power Projection." For a general history of U.S. defense posture please see: Stacie L. Pettyjohn, "U.S. Global Defense Posture, 1783–2011," January 14, 2013, https://www.rand.org/pubs/monographs/MG1244.html.

10 United States Naval Institute, "USNI News Fleet and Marine Tracker: April 26, 2021," *USNI News*, April 26, 2021, sec. Fleet Tracker, https://news.usni.org/2021/04/26/usni-news-fleet-and-marine-tracker-april-26-2021.

11 The State Council Information Office of the People's Republic of China, "China's Military Strategy - Chapter IV. Building and Development of China's Armed Forces," Ministry of National Defense - The People's Republic of China, May 2015, http://eng.mod.gov.cn/Database/WhitePapers/2015-05/26/content_4586713.htm.

12 Jennifer Rice and Erik Robb, "China Maritime Report No. 13: The Origins of 'Near Seas Defense and Far Seas Protection,'" *CMSI China Maritime Reports*, February 1, 2021, https://digital-commons.usnwc.edu/cmsi-maritime-reports/13.

13 Jeffrey Becker, "China Maritime Report No. 11: Securing China's Lifelines across the Indian Ocean," December 2020, 2.

14 Rice and Robb, "China Maritime Report No. 13."

15 The Netherlands has sent the Zr. Ms. Evertsen as part of the British Carrier Strike Group led by the HMS Queen Elizabeth to the SCS. France and Germany, too, have sent vessels to East Asia. Ma Saya Kato, "European Navies Build Indo-Pacific Presence as China Concerns Mount," Nikkei Asia, March 4, 2021, https://asia.nikkei.com/Politics/International-relations/Indo-Pacific/European-navies-build-Indo-Pacific-presence-as-China-concerns-mount.

China and the central sea lines of communication and straits on which it relies

Figure 2: China and the key SLOCs on which it depends.

As GDP growth has slowed in recent years, China's defense budget has increased with single-digit percentages rather than double digits (but from a much higher base).

3.2 Trends in Chinese defense spending

Developing military capabilities, especially power projection capabilities requires significant resources. Although the exact size of Chinese defense expenditures and their allocation remains unclear due to the opaqueness of China and the sensitivity of the topic,[16] the general trend, in absolute terms, is that China's defense spending has vastly increased. In 1996, China spent just 14,3 $bn, in 2006 51,4 $bn, in 2016 198,5 $bn, in 2020 252,3 $bn: an increase by an order of nearly 18 times.[17]

The rapid rise in Chinese spending on the military is in part a reflection of the rapid growth of the Chinese economy - defense spending as a percentage of its GDP has consistently fluctuated between 1,7% and 2,1% since 1996. As GDP growth has slowed in recent years, China's defense budget has increased with single-digit percentages rather than double digits (but from a much higher base).[18]

16 This section considers both the PLA's own figures and two additional authoritative sources: The Stockholm International Peace Research Institute's (SIPRI) Military Expenditure Database and the International Institute for Strategic Studies (IISS). The latter two consistently conclude that China's defense spending is higher than the PRC's official figures, as the PLA's official figures determined China's defense spending was only $151 billion in 2017 whereas SIRPRI estimated the total budget at $228 billion; a difference larger than $70 billion.

17 The Stockholm Peace Research Institute (SIPRI), "SIPRI Military Expenditure Database," 2021, https://www.sipri.org/databases/milex.

18 "What Does China Really Spend on Its Military?," ChinaPower, December 28, 2015, http://chinapower.csis.org/military-spending/.

Besides costly internal security chipping away at the defense budget,[19] defense of the near seas, the PLAN's principal objective, also requires substantial defense spending (see Table 8). The recent completion of six hyper-modern amphibious assault ships (Type 071) with an expeditionary capability;[20] the large-scale procurement of medium-range ballistic missiles (i.e. the DF-21) throughout the past two decades; as well as cruise missiles (i.e. the CJ-100) in the past two years; and a large number of smaller vessels such as corvettes[21] in the past five years (that in a scenario of war will be mostly of use in China's near seas) are a case in point.

PLA Responsibilities	Potential adversaries	Potential additional adversaries	Most relevant actor	Most relevant capabilities	Cost estimate: total (%)/average per unit cost
Domestic stability	Internal opposition		PAP	Armed police	20%[22]
Border security	India, Vietnam	N/A	PLA; PAP	Land, air, and rocket capabilities; armed police	15%[23]
Near Seas Defense (1): protecting mainland	US		People's Liberation Army Rocket Force (PLARF); People's Liberation Army Air Force (PLAAF)	Conventional missiles; aircraft; submarines	Low; missiles and aircraft are cheaper per unit than large vessels
Near Seas Defense (2): enforcing "sovereignty" over/invading Taiwan	Taiwan, US	Japan	PLAN; PLARF; PLAAF	Amphibious combat ships; expeditionary forces; conventional missiles; air force aircraft	High; the vessels required for an invasion of Taiwan – such as helicopter carriers – are more expensive than missiles, but less expensive than aircraft carriers
Near Seas Defense (3): enforcing "sovereignty" over South China Sea (SCS); East China Sea (ECS)	Taiwan, Japan, South-Korea, Philippines, Vietnam, Malaysia, US	Australia	PLAN; PAFMM;[24] PLARF; PLAAF	Patrol and coastal combatants, primarily corvettes; principal surface combatants, primarily frigates; conventional missiles; air force aircraft; naval aviation;	Medium; the vessels required for asserting "sovereignty" in the ESC and SCS – such as frigates – are more expensive than missiles, but less expensive than aircraft carriers
Far Seas Protection: safeguarding SLOCS; protecting diaspora and overseas investment	US; India	Australia, Japan, UK, France	PLAN	Principal surface combatants such as aircraft carriers, cruisers, destroyers, and frigates; carrier-based aircraft; and attack submarines	Very high; the vessels required to patrol the far seas – such as aircraft carriers and cruisers – are among the most expensive weapon systems

Table 8: The responsibilities, capabilities, and financial burdens of the People's Liberation Army (PLA) in 2021.

19 See on this "domestic drag" Peter E. Robertson and Adrian Sin, "Measuring Hard Power: China's Economic Growth and Military Capacity," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, 2015), Table 1, https://doi.org/10.2139/ssrn.2586915.; Andrew Scobell and Andrew J. Nathan, "China's Overstretched Military," *The Washington Quarterly* 35, no. 4 (October 1, 2012): 135–48, https://doi.org/10.1080/0163660X.2012.726438.

20 Matthew Funaiole and Joseph S. Bermudez jr., "China's New Amphibious Assault Ship Sails into the South China Sea," CSIS, November 24, 2020, https://www.csis.org/analysis/chinas-new-amphibious-assault-ship-sails-south-china-sea.

21 See appendixes 3 and 4.

22 Michael Beckley, "The Emerging Military Balance in East Asia: How China's Neighbors Can Check Chinese Naval Expansion," *International Security* 42, no. 2 (November 2017): 116, https://doi.org/10.1162/ISEC_a_00294.

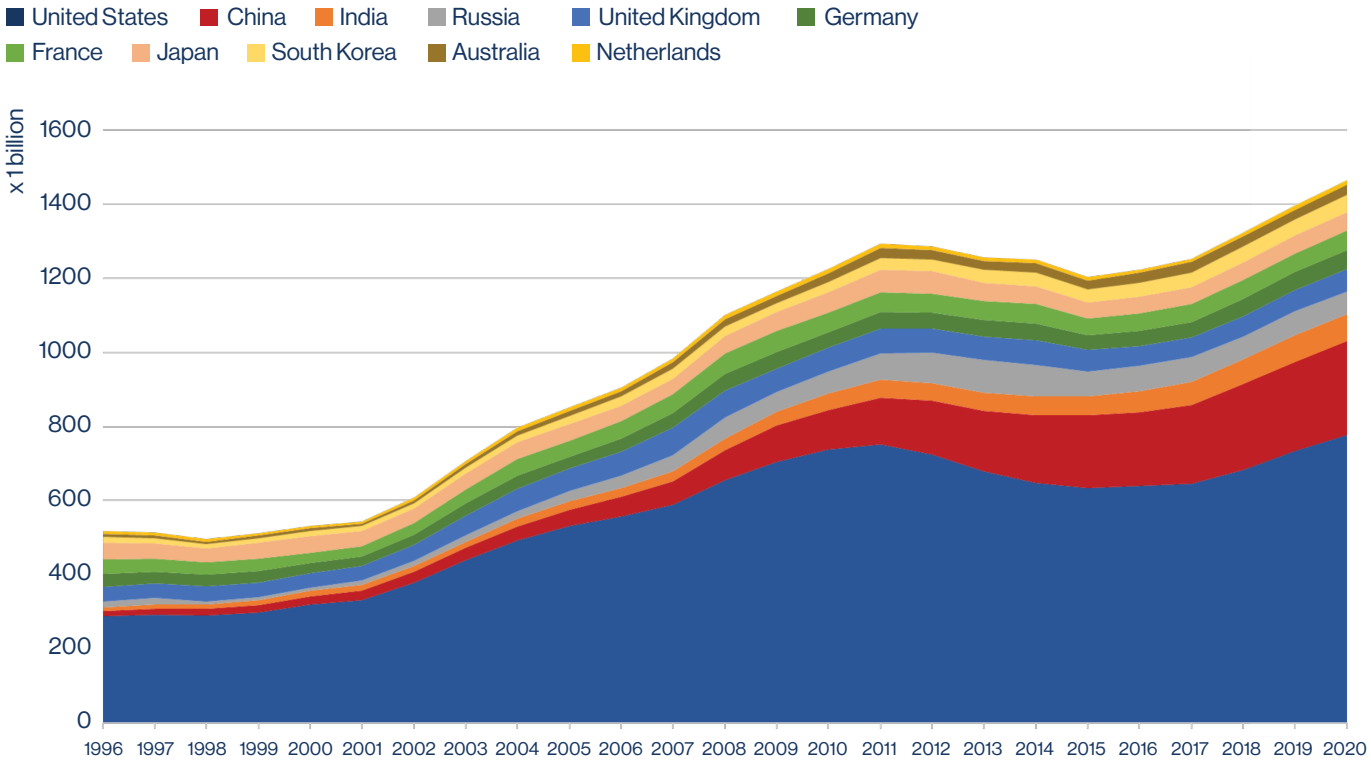
23 Robertson and Sin, "Measuring Hard Power," Table 1.

24 The People's Armed Forces Maritime Militia (PAFMM) conducts grey zone operations in the South China Sea, as recent pictures released by the Philippine Coast Guard show. Andrew S. Erickson and Ryan D. Martinson, "Manila's Images Are Revealing the Secrets of China's Maritime Militia," Foreign Policy, April 19, 2021, https://foreignpolicy.com/2021/04/19/manilas-images-are-revealing-the-secrets-of-chinas-maritime-militia/.

China has adopted an A2/AD strategy ostensibly able to "dissuade, deter, or, if ordered, defeat" US power projection near China's coast, perhaps as far out as 500 miles away from said coast.[25] The development of "long-range ballistic missiles, swarms of multiple drones [...], and cruise missiles and eventually hypersonic missiles" only strengthens this ability.[26] Given the suggestion that we have entered a so-called defense-dominant era in military technology, China's mainland defense can be regarded as having the advantage.[27]

Defense expenditure per country between 1996-2020, in USD

2020 prices



Source SIPRI Military Expenditure Databasea

Figure 3: Defense expenditures.

China's defense spending is by far the highest of any country in its region, but in relative terms some of its regional rivals outspend China, whose spending is still dwarfed by that of its primary global rival, the United States (See Figure 3). China was responsible for 42.2% of total defense spending in Asia in 2020 – excluding North Korea and Laos but including India.[28] The

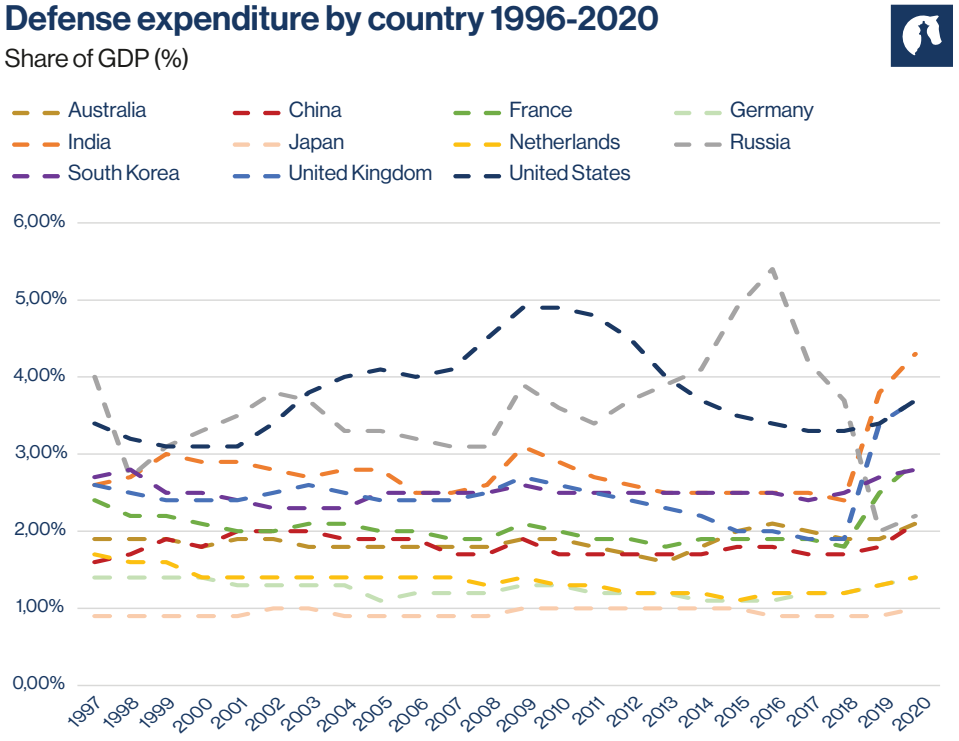
25 Erickson, "Chinese Anti-Ship Ballistic Missile Development and Counter-Intervention Efforts. Testimony before Hearing on China's Advanced Weapons Panel I: China's Hypersonic and Maneuverable Re-Entry Vehicle Programs U.S.-China Economic and Security Review Commission."; Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020," Annual Report to Congress (Washington DC: Department of Defense (DoD), September 1, 2020), 72, https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF.

26 Jonathan D. Caverley and Peter Dombrowski, "Cruising for a Bruising: Maritime Competition in an Anti-Access Age," *Security Studies* 29, no. 4 (August 7, 2020): 676, https://doi.org/10.1080/09636412.2020.1811460.

27 Stephen van Evera, "Offense, Defense, and the Causes of War," *International Security* 22, no. 4 (1998): 5–43, https://doi.org/10.2307/2539239.

28 James Hackett and International Institute for Strategic Studies, *The Military Balance 2021*, 224.

United States spends 1.5 times more on defense than all Asian countries combined, though it also has a military presence and commitments in multiple regions.[29] As a percentage of GDP, China spends less on defense than the US, South Korea, or India, but more than Japan and the same percentage as Australia (see Figure 4).[30]



Source SIPRI Military Expenditure Databasea

Figure 4: Defense expenditure as share of GDP.

Future Chinese defense spending is clouded with uncertainties.

Future Chinese defense spending is clouded with uncertainties. For 2021, China's Ministry of Defense (MoD) announced that China's defense spending would rise by 6,8%,[31] slightly above its 6% GDP target.[32] Importantly, though, the maintenance and operational costs of large vessels such as aircraft carriers over their lifespans – growing year-by-year – are often higher than "research and development, procurement and disposal costs."[33] China's defense spending is thus not likely to fall below levels of around ten or even five years ago. As assets get older, the cost of maintenance rises. Merely paying for existing capabilities will necessitate that China maintain defense budgets significantly higher than those of a decade ago.

In the upcoming fifteen years, a range of demographic, economic, political, technological, and security developments will put pressure on the continued development and maintenance of especially China's relatively expensive far seas military capabilities and, to a lesser extent, its near seas capabilities (See Table 9). China's defense spending has so far consistently

29 Hackett and International Institute for Strategic Studies, 218.

30 The Stockholm Peace Research Institute (SIPRI), "SIPRI Military Expenditure Database."

31 Panyue Huang, "China's Annual Defense Budget in 2021 Will Increase by 6.8% - China Military," China Military Online, March 8, 2021, http://eng.chinamil.com.cn/view/2021-03/08/content_9998617.htm.

32 China MFA, "Premier Li Keqiang Meets the Press: Full Transcript of Questions and Answers," accessed April 29, 2021, https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1860396.shtml.

33 Yoshihara and Bianchi, "Seizing on Weakness," 63.

covered approximately 2% of its GDP, but has fallen as a share of government spending from 15% in 1997 to just over 10% in 2006 and to just under 5% in 2020. Compensating for the strains on China's defense spending (see below) likely involves breaking with this tradition, in other words, raising defense expenditure above current relative levels.

Demographic	China's population is rapidly shrinking, facing the most severe ageing in world history [34] and suffers from a gender imbalance. The size of its working population is decreasing, as a result, putting an increasing burden on China's finances and funds available for defense.
Economic	China faces a declining GDP growth-rate, unsustainable debt levels,[35] increasingly extensive and expensive social programs and risks a decline in exports as Chinese labor becomes more expensive. At the same time, China faces an international environment that grows more wary of Chinese policies like 'Made in China 2025' and 'Dual Circulation' and may be less willing to invest in China's future. Beijing's Zero tolerance-COVID policy leads to disruptions of international supply chains, for instance because of the closure of major ports,[36] which may lead states to diversify their imports.
Political	Xi's succession is marred with uncertainty and may be characterized by an unpeaceful, disorderly transition of power, as his abolishment of leadership term limits cancelled the institutional mechanism the CCP found after the death of Mao to ensure an orderly transition of power.[37] Meanwhile, rising nationalism may well impede social stability in the upcoming decade and a half.
Technological	China will find it more difficult to fuel its military modernization with foreign technologies. Industrialized Western democracies are putting up new obstacles to Chinese acquisition of high technologies – such as investment screening and export controls – at a rapid pace.[38] High-tech companies, for instance in the chip industry, face increasing pressures from governments not to sell their products to China.[39] Incorporating foreign technology becomes more difficult in general, as weapon systems have grown ever more complex.[40]
Military	Land-based military threats – at China's borders and along the BRI – may demand a larger share of Chinese defense spending. China's increasing tensions with India, best evidenced by the fatal border clashes along the Line of Control in the Himalayas in 2020, are likely to demand greater resources and attention in its on-land theater. Meanwhile, Russia and China still have border disputes and a long history of animosity (pre-World War II and 1960s-1990) and even small-scale armed conflict that in the future might sour relations, in spite of current cooperation between China and Russia. Finally, the mass-incarceration of Uighurs in China's far-Western Xinjiang province may inspire Islamist and jihadist groups to pose a security risk to Chinese investment across the greater Middle East and pressure from local populations may force governments of Muslim-majority states along the BRI to take a harder diplomatic line against China.

Table 9: Constraints impeding the development of especially far seas but also near seas capabilities towards 2035.

34 Fang Cai and Yang Lu, "Population Change and Resulting Slowdown in Potential GDP Growth in China," *China & World Economy* 21, no. 2 (March 2013): 13–14, https://doi.org/10.1111/j.1749-124X.2013.12012.x.

35 Michael Pettis, *Avoiding the Fall: China's Economic Restructuring* (Washington, D.C.: Carnegie Endowment for International Peace, 2013). ; Fenghua Pan et al., "Developing by Borrowing? Inter-Jurisdictional Competition, Land Finance and Local Debt Accumulation in China," Urban Studies 54, no. 4 (March 2017): 1, https://doi.org/10.1177/0042098015624838.

36 Reuters, "Chinese Ports Choke over 'zero Tolerance' COVID-19 Policy | Reuters," August 20, 2021, https://www.reuters.com/world/china/chinese-ports-choke-over-zero-tolerance-covid-19-policy-2021-08-17/.

37 Richard McGregor and Jude Blanchette, "After Xi - Future Scenarios for Leadership Succession in Post-Xi Jinping Era" (Center for Strategic & International Studies (CSIS) and Lowy Institute, April 2021), https://www.lowyinstitute.org/sites/default/files/McGregor%20%26%20Blanchette%2C%20After%20Xi%2C%20CSIS-Lowy%20Institute%2C%20230421%20%28AUversion%20REVISED%29_0.pdf.

38 Manisha Reuter, "Responding to the China Challenge: The State of Play on Investment Screening in Europe – European Council on Foreign Relations," *ECFR*, November 27, 2020, https://ecfr.eu/article/responding-to-the-china-challenge-the-state-of-play-on-investment-screening-in-europe/.

39 Stu Woo and Yang Jie, "China Wants a Chip Machine From the Dutch. The U.S. Said No. - WSJ," July 17, 2021, https://www.wsj.com/articles/china-wants-a-chip-machine-from-the-dutch-the-u-s-said-no-11626514513.

40 Andrea Gilli and Mauro Gilli, "Why China Has Not Caught Up Yet: Military-Technological Superiority and the Limits of Imitation, Reverse Engineering, and Cyber Espionage," *International Security* 43, no. 3 (February 2019): 141–89, https://doi.org/10.1162/isec_a_00337.

3.3 Far seas military capabilities

Despite significant leaps in military and informational capabilities development, the results are mixed. In some areas, China has developed and deployed capabilities equal to the US and its allies, while in other areas, it either lags behind other great powers or there is not enough information to make a confident evaluation. For instance, essential components of Chinese Carrier Strike Groups (CSGs), such as the carrier itself, its carrier-based fighter, and the People's Liberation Army Force's (PLAAF) ostensibly "next-generation"[41] fighter jet, have serious technological short-comings (most detrimentally its engine).

Other parts, such as China's destroyers and frigates, are in a much more mature state and even appear to have some advantages over US and European counterparts, particularly in terms of anti-ship and anti-air missiles launched with Vertical Launch Systems (VLS). China has improved its attack submarines, but they are not yet as capable as American submarines in terms of silencing. [42] As China also struggles to develop Anti-Submarine Warfare (ASW) capabilities, this presents it with a problem. While China has also developed a larger number of corvettes that could be employed against lesser states, or for anti-piracy missions, they are not likely to be as effective against a peer or near-peer competitor.

China's highly developed and world-leading conventional long-range strike capabilities complement China's traditional resources, and progress in C4ISR makes a cohesive offense more likely. Three trends are fully established: the People's Liberation Army Rocket Force (PLARF) is increasing the average range, speed, and anti-ship capabilities of its long-range arsenal. Even though the Malacca Strait and swaths of the Indian Ocean are in range of its most advanced missiles, it remains highly unlikely that China's C4ISR capabilities are able to target and help the missile hit mobile targets in the far seas at this moment.

China has improved its attack submarines, but they are not yet as capable as American submarines in terms of silencing.

41 "Jet fighter with extreme stealth; efficient in all flight regimes (subsonic to multi-Mach); possible "morphing" capability; smart skins; highly networked; extremely sensitive sensors; optionally manned; directed energy weapons" John A Tirpak, "The Sixth Generation Fighter," 2009, 41.

42 Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress" (Washington DC: Congressional Research Service, March 2021), 8, https://fas.org/sgp/crs/row/RL33153.pdf. China has also greatly reduced the noise its strategic nuclear-power ballistic missile submarines (SSBNs) produce – specifically since the introduction of the, as is described in the section: 3.5 Long range strike capability. Franz-Stefan Gady, "China Resumes Production of Its Quietest Attack Submarine," January 6, 2017, https://thediplomat.com/2017/01/china-resumes-production-of-its-quietest-attack-submarine/.

3.4 Extra-regional power projection capabilities

Extra-regional power projection capabilities are formed by blue-water naval capabilities, alongside long-range aircraft and missiles, supported by C4ISR, and cyber (see Table 10).[43]

Section	Domain	Capabilities
Extra-regional power projection capabilities	Sea	Far seas high-intensity conflict capabilities, i.e.: Carrier Strike Groups (CSG) including Aircraft carriers Cruisers Destroyers Frigates Attack submarines
		Far seas low-intensity/near seas high-intensity capabilities, i.e.: Amphibious combat ships Corvettes Transport ships (roll-on, roll-off)
	Land	Expeditionary forces such as Armored Warfare Capabilities
	Air	Fighters/Ground Attack (N-Generation fighters) Long-range bombers Long range heavy/medium transport aircraft
Long range strike capability	Missile (conventional)	Intermediate-Range Ballistic Missiles (IRBMs) Medium-Range Ballistic Missiles (MRBMs) Ground-Launched Cruise Missiles (GLCMs)
	Missile (nuclear)	Inter-Continental Ballistic Missiles (ICBMs) Submarine-Launched Ballistic Missiles (SLBMs) Intermediate-Range Ballistic Missiles (IRBMs) Medium-Range Ballistic Missiles (MRBMs)
Command, control, communications, computers intelligence, surveillance, and reconnaissance (C4ISR)	Informational (in-space)	Military satellites
	Informational (air)	Reconnaissance aircraft (manned and unmanned)
Disruptive technology capabilities	Cyber	Comprehensive
	Space	Anti-satellite weapons

Table 10: Relevant Chinese far seas military capabilities in 2021.[44]

43 Naval power has historically been central to power projection for great powers, a view made famous by the father of modern naval strategy, Alfred Thayer Mahan. For a good discussion of Mahan's thinking and its impact on modern naval strategy, see Reynolds B. Peele, "Maritime Chokepoints: Key Sea Lines of Communication (SLOCs) and Strategy," US Army War College, 1997.

44 This table is an updated and more elaborate version of one devised in Richard J. Stoll, "In the Way? Chinese Power Projection in Historical Perspective," James A. Baker III Institute of Public Policy of Rice University, May 2000.

The PLAN today consists of more ships than any other navy in the world, growing from 255 battle force ships in 2015 to 360 today and projected to grow to 425 in 2030.

At present, driven by reasons both military-strategic and prestige, the primary expression of blue water naval power over long-distances is still CSGs – as it has been since the Second World War. China's navy is enormous. The PLAN today consists of more ships than any other navy in the world,[45] growing from 255 battle force ships in 2015 to 360 today and projected to grow to 425 in 2030.[46] China has by far the largest navy in Asia – accounting for almost 30% of total Asia's total naval tonnage, as a result.[47]

Still, there are significant shortcomings when the different categories of ships are considered, as well as pressing technological shortcomings, uneven organizational quality and the gaps in aerial support. Limiting its ability to project power in the Indian Ocean, for instance, China's fleet still consists of a large amount of "small service combatants" mostly able to protect the near seas. In addition, the PLAN's total number of VLS cells, the foremost way to launch missiles against the adversary, was nine times smaller than the total number of American VLS cells in 2020 (see Table 11).

Surface ships, VLS cells	China	Potential adversaries		Potential additional adversaries			
	China	USA	India	Australia	Japan	UK	France
Surface ships with multi-mission VLS	15	90	6	11	30	6	9
Total VLS Cells	**1.008**	**9.044**	**48**	**208**	**1.164**	**288**	**320**

Table 11: Projecting power in the far seas: Total VLS cells of the major powers in 2020.[48]

3.4.1 Peer-to-(near) peer conflict: Carrier Strike Group and battlegroup development

Aircraft carriers and carrier-based fighters

Though in possession of two aircraft carriers, the PLAN has not yet fulfilled all the requirements needed to effectively deploy carrier strike groups (CSGs) to project power. First, it lacks a sufficient number of aircraft carriers available to project power, especially when considering maintenance and training time. Second, China's two carriers have serious qualitative constraints, especially compared to American and even the most sophisticated French and UK carriers. Third, the PLAN – in general – lacks the "tribal knowledge" required to operate CSGs as its first carrier only became operational in 2016.[49] Chinese aircraft carriers would be "highly vulnerable" facing US ships and aircraft as a result but could "impress or

45 The United States navy consisted of 296 ships in the same year. Brad Lendon, "Analysis: China Has Built the World's Largest Navy. Now What's Beijing Going to Do with It?" CNN, March 6, 2021, https://www.cnn.com/2021/03/05/china/china-world-biggest-navy-intl-hnk-ml-dst/index.html.

46 Department of the Navy, "China: Naval Construction Trends Vis-à-Vis U.S. Navy Shipbuilding Plans, 2020-2030" (Office of Naval Intelligence, Farragut Technical Analysis Center Naval Platforms Department, February 6, 2021), 1, https://fas.org/irp/agency/oni/plan-trends.pdf.

47 Beckley, "The Emerging Military Balance in East Asia," 81.

48 As of 2020., Hackett and International Institute for Strategic Studies, *The Military Balance 2021*, 27.

49 The term "Tribal Knowledge" is used by Andrew Erickson in an interview with the Economist and captures the immaterial dimensions of being able to use a carrier very well. The Economist, "China's First Aircraft-Carrier Bares Its Teeth," *The Economist*, January 19, 2017, https://www.economist.com/china/2017/01/19/chinas-first-aircraft-carrier-bares-its-teeth.

intimidate" if the US is not involved.[50] Looking forward toward the 2030s, however, many of these difficulties may be overcome.

The Shandong, China's second aircraft carrier, which was entirely manufactured by China, has become operational as it concluded its first exercises – together with supporting vessels – in the South China Sea in May 2021.[51] China's aircraft carrier capability is likely to grow substantially in the near future, as its third, larger carrier is about to be completed.[52] Assembly of the fourth, which PLA sources claim is likely to be nuclear-powered, has commenced;[53] plans for a fifth are on hold[54] (see Table 12).

Name[55]	Specifics	Status	Operational (expected)
1. Liaoning Type001	Based on Soviet carrier – including large-scale Soviet parts (e.g., the hull) used60,000-66,000 tons 40-44 fixed and rotary wing aircraft Unable to launch fully fueled/fully loaded fighters (ski-jump ramp) Unable to carry airborne early warning and control aircraft Conventionally (diesel-)powered (necessitating frequent refueling; six days at sea max)	In use	2016
2. Shandong Type002	Based on Soviet carrier model – fully indigenously built by China 66,000-70,000 tons 44-52 fixed and rotary wing aircraft Unable to launch fully fueled/loaded fighters (ski-jump ramp) Unable to carry airborne early warning and control aircraft Conventionally (diesel-)powered (necessitating frequent refueling; six days at sea max)	In use	2021
3. Type003	85-85,000 tons Able to launch heavier aircraft and fully fueled/loaded smaller aircraft (through electromagnetic catapults; no ski-jump ramp) Conventionally (diesel-)powered necessitating frequent refueling)	Construction phase near-completion	Mid-decade (2020s)
4. Type003 (or Type004)	80-85,000 tons Able to launch heavier aircraft and fully fueled/loaded smaller aircraft (through electromagnetic catapults; no ski-jump ramp) Either nuclear or conventionally powered (conflicting reports)	Assembly started	Late-2020s; Post-2030
5. Type004 (or Type003)	(Expected) first nuclear powered PLA surface-ship	Postponed	Post-2030

Table 12: Chinese in use, nearly completed and under construction aircraft carriers.

50 Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities — Background and Issues for Congress," 17.

51 Kirstin Huang, "Shandong Carrier Group Finishes South China Sea Exercise," South China Morning Post, May 2, 2021, https://www.scmp.com/news/china/military/article/3131977/shandong-aircraft-carrier-group-concludes-south-china-sea.

52 Steven Stashwick, "Third Chinese Aircraft Carrier Nears Completion Amid Shipyard Expansion," *The Diplomat*, January 6, 2021, https://thediplomat.com/2021/01/third-chinese-aircraft-carrier-nears-completion-amid-shipyard-expansion/.

53 Minnie Chan, "China's Fourth Aircraft Carrier Likely to Be Nuclear Powered, Sources Say," *South China Morning Post*, March 13, 2021, sec. News, https://www.scmp.com/news/china/diplomacy/article/3125224/chinese-military-fourth-aircraft-carrier-likely-be-nuclear.

54 Minnie Chan, "China Plans Fourth Aircraft Carrier, but Further Plans Are on Hold," *South China Morning Post*, November 28, 2019, sec. News, https://www.scmp.com/news/china/military/article/3039653/chinese-navy-set-build-fourth-aircraft-carrier-plans-more.

55 Yoshihara and Bianchi, "Seizing on Weakness," 67.; On the Liaoning and the Shandong please find: "What Do We Know so Far about China's Second Aircraft Carrier?"

Another reservation here is that the Liaoning, China's first carrier, and the Shandong require long durations away from deployment, as carriers require "continuous and regularly scheduled maintenance", and its crew requires "a great deal of training to attain and sustain readiness levels" since they are among the most complex weapon systems in history. To elucidate, the US' eleven notional carriers were deployed only 19 percent of the time during a 32-month cycle – requiring in depot maintenance 24 percent of the time.[56]

	United States	United Kingdom	France	China	India[57]
In-use carriers	Eleven	Two	One	Two	One
Most sophisticated carrier	*USS Gerald R. Ford*	*HMS Queen Elizabeth*[58]	*Charles de Gaulle*[59]	*Shandong*	*INS Vikramaditya*
Year operational	2022	2017	2001	2021	2013
Propulsion	Nuclear	Conventional	Nuclear	Conventional	Conventional
Tonnage	110.000	65.000	42.000	66-70.000	45.000
Launch/recovery system	CATOBAR	STOVL/Ski-jump	CATOBAR	STOBAR/Ski-jump	STOBAR/Ski-jump
Ability to launch heavy, propeller-aircraft (e.g., for EW)	Yes	No	Yes	No	No
Aircraft	75+	40	24 +/-	44-52	30
Indigenously built	Yes	Yes	Yes	Yes	No

Table 13: Roaming the Indo-Pacific: US, UK, French, Chinese and Indian Aircraft Carriers.

China's current in-use carriers and carrier-based fighters have severe qualitative constraints, which the carriers of the United States do not (see Table 13). First, they are relatively small – and therefore, they can only house respectively 40-44 or 44-52 fixed and rotary-wing aircraft, whereas the largest US carrier, the USS Gerald R. Ford, can house over 75.[60] The Chinese carriers can only launch its fixed-wing carrier-based aircraft – the J-15 – if its fuel tank is half empty or if it only carries four missiles (two anti-ship and two air-to-air missiles), as it uses a ski-jump to get them in the air.[61] This severely impedes the J-15's fighting ability (especially at long-range) and durability. Propeller-driven aircraft – such as early warning and control aircraft –simply cannot be launched safely from a ski-jump, limiting the C4ISR capabilities of China's current CSGs".[62] Finally, the Liaoning and Shandong are diesel-fueled and therefore will likely need to refuel (for instance at friendly-ports when operating in the far seas) on a regular basis.[63]

56 The remaining 55 percent of the time these notional carriers were able to "surge" or – in other words – "able to provide additional forward presence as requested by theater commanders." Specifically, they were able to surge within 30 days 46 percent of the time and 30-90 days eleven percent of the time. Roland J. Yardley et al., "Aircraft Carrier Maintenance Cycles and Their Effects" (RAND Corporation, April 8, 2008), 1, https://www.rand.org/pubs/research_briefs/RB9316.html.

57 Shamseer Mambra, "INS Vikramaditya – The New Air Craft Carrier of Indian Navy," Marine Insight, February 28, 2019, https://www.marineinsight.com/types-of-ships/ins-vikramaditya-–-the-new-air-craft-carrier-of-indian-navy/.

58 Michael John Williams, "New British Carriers Can Transform Europe's NATO Naval Capabilities," Atlantic Council, April 7, 2020, https://www.atlanticcouncil.org/blogs/new-atlanticist/new-british-carriers-can-transform-europes-nato-naval-capabilities/.

59 Christina Mackenzie, "Macron Kicks off French Race to Build a New Nuclear-Powered Aircraft Carrier," Defense News, December 8, 2020, https://www.defensenews.com/global/europe/2020/12/08/macron-kicks-off-french-race-to-build-a-new-nuclear-powered-aircraft-carrier/.

60 "What Do We Know so Far about China's Second Aircraft Carrier?" June 15, 2021.

61 David Cenciotti, "No Match for a U.S. Hornet: 'China's Navy J-15 More a Flopping Fish than a Flying Shark' Chinese Media Say," The Aviationist, September 30, 2013, https://theaviationist.com/2013/09/30/j-15-critics/.; Gilli and Gilli, "Why China Has Not Caught Up Yet," 185.

62 Yoshihara and Bianchi, "Seizing on Weakness," 66.

63 "What Do We Know so Far about China's Second Aircraft Carrier?"

The US still has three times as many cruisers in use as China has launched and two-and-a-half-times the number of PLAN destroyers, in spite of the PLAN's progress.

Support Ships

Principal surface combatants: Cruisers, Destroyers and Frigates

Qualitatively, PLAN support (surface) ships are approaching "a level commensurate with, and in some cases exceeding, that of other modern navies," greatly improving air defense, anti-ship, and anti-submarine capabilities (see Table 14).[64] As advances in guided missile technology have been applied to PLAN cruisers, destroyers and frigates, they have become forces to be reckoned with.[65] Through the integration of HHQ-9 Surface-to-Air Missiles (SAMs) (for the destroyers and cruisers) and HHQ-16 SAMs (for the frigates) with "powerful, modern radars", they became "mobile Integrated Air Missile Defense systems in and of themselves."[66] These ships also have both towed array sonar and variable-depth sonar systems, enhancing the support ships' ASW capabilities. Nevertheless, as the helicopters that are supposed to further expand these capabilities still have serious shortcomings, ASW remains a serious weakness.[67]

At the time of writing, the US still has three times as many cruisers in use as China has launched[68] and two-and-a-half-times the number of PLAN destroyers, in spite of the PLAN's progress (see Table 18).[69] If current build rates are sustained, however, the PLAN will have sufficient principal surface combatants necessary to both protect its (by then four or five if current plans are carried out) aircraft carriers, which would be one key step in order to execute global power protection missions by 2030 or 2035.[70] In light of European concern for the Indian Ocean and future European procurement, this is an important finding.

Surface Support Ships	Cruiser	Destroyer	Frigate
Newest type	*Renhai* Type055	*Luyang-III* Type052D	*Jiangkai-II* Type054A
Total	3	14	30
Tonnage	11.000	7.500	4.100
Vertical Launch System (VLS)	14x8-cell	8x8-cell	4x8-cell
Anti-ship missile (AShM)	YJ-18A	YJ-18A	None
Surface-to-air missile (SAM)/Air-defense	HHQ-9B	HHQ-9B	HHQ-16
Anti-submarine (A/s msl)	Yu-8	Yu-8	Yu-8

64 Defense Intelligence Agency, "China Military Power: Modernizing a Force to Fight and Win" (Defense Intelligence Agency, 2019), 80, https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/China_Military_Power_FINAL_5MB_20190103.pdf.; Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Development Involving the People's Republic of China 2017" (Washington DC: Department of Defense (DoD), 2017), https://dod.defense.gov/Portals/1/Documents/pubs/2017_China_Military_Power_Report.PDF.

65 As a definition, we use "an unmanned vehicle moving above the surface of the Earth whose trajectory or flight path is capable of being altered by an external or internal mechanism." Joint Chiefs of Staff, "Department of Defense Dictionary of Military and Associated Terms," 231.

66 This is an accomplishment that Russia has not yet achieved. Justin Bronk, "Modern Russian and Chinese Integrated Air Defence Systems" (London, United Kingdom: Royal United Services Institute (RUSI), January 2020), 23, https://rusi.org/sites/default/files/20191118_iads_bronk_web_final.pdf.

67 Yoshihara and Bianchi, "Seizing on Weakness," 68. ; Rick Joe, "The Chinese Navy's Growing Anti-Submarine Warfare Capabilities," The Diplomat, 2018, https://thediplomat.com/2018/09/the-chinese-surface-fleets-growing-anti-submarine-warfare-capabilities/.

68 "Launched" means put into the water for the final stages of its construction.

69 "How Is China Modernizing Its Navy?," ChinaPower, August 25, 2020, http://chinapower.csis.org/china-naval-modernization/.

70 Yoshihara and Bianchi, "Seizing on Weakness," 68.

Surface Support Ships	Cruiser	Destroyer	Frigate
Quad launcher (quad lnchr)	None	None	2
AShM	None	None	YJ-83
Guided missile launch system (GMLS)	1x 24cell	1x24 cell	None
SAM/Air-defense	HQQ-10	HQQ-10	None
Torpedo Tubes	2 triple 324mm	2 triple 324mm	2 triple 324mm
Light Weight Torpedos (LWT)	Yu-7	Yu-7	Yu-7
Rotary Aircraft	Yes	Yes	Yes
ASW helicopters	Z-9/KA-28	Z-9/KA-28	Z-9/KA-28
Radars	Type 346B	Type 346A	Type 344/345

Table 14: PLA support ship modernization in February 2021 – Expanding anti-ship, anti-submarine, and anti-air capabilities.

China commissioned its first-ever cruiser, the modern *Renhai*-class Type055, only in early-2020, commissioning two more in the first half of 2021.

Two key strengths in the PLAN support ships are first its hyper-modern Type055 cruiser, which is a "potent offensive strike platform in its own right" but is expected to accompany the carriers, and its Type052D destroyer. Both wield considerably powerful anti-ship and surface-to-air-missiles as they carry the supersonic YJ-18 anti-ship cruise missile (ASCM), of which the range is estimated at 220-540km,[71] and HHQ-9B and HHQ-10 surface-to-air missiles (SAM) to bring down aircraft, such as aerial drones.[72] China's Type055 and Type052D have a relatively large number of VLS cells that can launch these anti-ship missiles (AShM) and the HHQ9-B as well as long-range Yu-8 torpedoes against submarines. Together, the Type52D and the Type055 form the core of China's carrier strike groups and battlegroups of the near future.[73]

Cruisers	Year						
	1996	2006	2016	2020	2021 (Feb)	2021 (May)	2021 + Launched
Total	**0**	**0**	**0**	**1**	**1**	**3**	**8**
Renhai Type055 (Newest)	0	0	0	1	1	3	8
Older	0	0	0	0	0	0	0

Table 15: PLAN modernization – Cruisers.

China commissioned its first-ever cruiser, the modern *Renhai*-class Type055, only in early-2020, commissioning two more in the first half of 2021. Five additional Type055 cruisers have been launched but not yet commissioned (see Table 15).[74] The Type055's large volume enables an integrated sensor mast, likely enhancing guided missile precision and enlarged VLS tubes. Its Type 346B AESA dual-band radars can spot threats hundreds of kilometers

71 CSIS Missile Defense Project, "YJ-18," Missile Threat, June 25, 2020, https://missilethreat.csis.org/missile/yj-18/.

72 See appendixes 3 and 4.

73 Franz-Stefan Gady, "China's Navy Commissions First-of-Class Type 055 Guided Missile Destroyer," January 13, 2020, https://thediplomat.com/2020/01/chinas-navy-commissions-first-of-class-type-055-guided-missile-destroyer/.

74 Minnie Chan, "Chinese Navy May Launch Eighth Stealth Destroyer Later This Year," South China Morning Post, August 20, 2020, https://www.scmp.com/news/china/military/article/3098205/chinese-navy-may-launch-eighth-type-055-stealth-destroyer-later. See appendixes 3 and 4.

away while it can also coordinate with weapons and sensors of friendly ships.[75] As a result, this cruiser can carry even more YJ-18 missiles. In addition, the Type055 can house two ASW helicopters in a hangar, "making dramatic improvements in PLAN anti-submarine warfare,"[76] especially in conjunction with its long-range torpedoes.[77] This cruiser is both "the largest surface combatant currently built in the world" and "one of the most advanced and powerful ships in the world, boasting a wide array of advanced-capability weapons and sensors developed domestically".[78]

Since 1996, China has improved both the quality and quantity of its destroyers, modernizing its older vessels and commissioning the new Luyang-III Type-052D on a large scale, accelerating its efforts in the last five years (see Table 16). The Type52D also enhances ASW capabilities, as it employs the slightly older Type 346A radars.[79]

The PLAN has more frigates that can accompany aircraft carriers than any other country in the world.

Destroyers	**Year**						
	1996	2006	2016	2020	2021 (Feb)	2021+ Launched	2025/ 2026
Total	**18**	**21**	**19**	**28**	**31**	**N/A**	**39/40**
Luyang III Type-052D (Newest)	0	0	2	11	14	25	N/A
Older	18	21	17	17	17	N/A	N/A

Table 16: PLAN Modernization – Destroyers.

The PLAN has more frigates that can accompany aircraft carriers than any other country in the world. The *Jiangkai* II Type054A frigate wields similar weaponry as the PLAN's cruisers and destroyers, except for its VLS cells, which do not fire anti-ship missiles (such as the powerful YJ-18 missile). Instead, its quad launcher can fire the YJ-83 AShM, which has a shorter range and subsonic top-level speed.[80] The Type054A is capable of over the horizon targeting, as it employs a "Type 382 phased-array radar system and Type 344 and Type 345 multifunctional fire control radar systems".[81] China's expanding number of frigates are already actively used in China's naval operations (see Table 17), as they are both central to China's anti-piracy missions in the Gulf of Aden and to the PLAN's SCS operations.[82]

75 Sebastien Roblin, "Patrol By Chinese Carrier Reveals Beijing's Modern Surface Fleet," Forbes, April 20, 2021, https://www.forbes.com/sites/sebastienroblin/2021/04/20/patrol-by-chinese-carrier-reveals-beijings-modern-surface-fleet/.

76 Daniel Caldwell, Joseph Freda, and Lyle Goldstein, "China Maritime Report No. 5: China's Dreadnought? The PLA Navy's Type 055 Cruiser and Its Implications for the Future Maritime Security Environment," *CMSI China Maritime Reports*, February 1, 2020, 23–24, https://digital-commons.usnwc.edu/cmsi-maritime-reports/5.

77 Rotary aircrafts are essential elements to engage in successful anti-submarine warfare when carriers and support ships sail in the blue waters.

78 Caldwell, Freda, and Goldstein, "China Maritime Report No. 5," 23. Xavier Vavasseur, "Shipyard in China Launched The 25th Type 052D and 8th Type 055 Destroyers For PLAN," Naval News, August 30, 2020, https://www.navalnews.com/naval-news/2020/08/shipyard-in-china-launched-the-25th-type-052d-and-8th-type-055-destroyers-for-plan/; Defense Intelligence Agency, "China Military Power: Modernizing a Force to Fight and Win," 80.

79 Roblin, "Patrol By Chinese Carrier Reveals Beijing's Modern Surface Fleet."

80 See appendixes 3 and 4.

81 Franz-Stefan Gady, "China Launches New Type 054A Guided-Missile Stealth Frigate," The Diplomat, December 20, 2017, https://thediplomat.com/2017/12/china-launches-new-type-054a-guided-missile-stealth-frigate/.

82 "How Is China Modernizing Its Navy?"

Frigates	Year				
	1996	2006	2016	2020	2021 (Feb)
Total	**36**	**42**	**54**	**52**	**46**
Jiangkai II Type054A (Newest)	0	0	20	30	30
Older	36	42	34	22	16

Table 17: PLAN Modernization – Frigates.

Notably, in 2020, the PLAN had far fewer destroyers and cruisers than the US Navy. At the same time, China's surface support ship capabilities far exceed those of India and all other navies that might challenge the PLAN in the Indian Ocean except for Japan.[83] Especially its modern and broadly introduced Type054A frigates can likely still achieve considerable success meeting any other challenger than the US navy in the open.

Overall, it is easier "to hide a submarine than to detect one".

	China	Potential adversaries		Additional potential adversaries			
	China	USA	India	Australia	Japan	UK	France
Cruisers	1	24	0	0	2	0	0
Destroyers	28	67	13	2	34	6	11
Frigates	52	19	13	8	11	13	11

Table 18: PLAN principal surface combatants modernization (early-2020) – Matching up to adversaries in the far seas.[84]

Attack Submarines

The number of attack submarines the PLAN uses has remained more or less the same. However, it has modernized the boats in use – allegedly reducing detectability – and has started to deploy them in the far seas, including the Indian Ocean (see Table 19).[85] The PLAN's newer submarines are far more capable compared to China's earlier submarines, yet less capable than Russian ones[86], let alone American nuclear-powered submarines. Its new Type093 nuclear-powered (SSN) and its Type039 diesel-electric submarines (SSK) make up more than half of the PLAN submarine fleet. In 2021, these are equipped with the YJ-18 cruise missiles and carry the Yu-3 and Yu-6 heavyweight torpedoes.[87]

ASW is best understood as "a game of hide-and-seek", adopting emerging technologies in stealth and detection to achieve a strategic edge. Overall, it is easier "to hide a submarine than to detect one". [88] Expanding its acoustic stealth, the diesel-electric Type039 (Yuan-class) is ostensibly one of the PLAN's quietest submarine-classes.[89] The nuclear-powered

83 "How Is China Modernizing Its Navy?"

84 See appendixes 3 and 4; "How Is China Modernizing Its Navy?"

85 Rice and Robb, "China Maritime Report No. 13," 13.

86 Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," 8.

87 See appendixes 3 and 4.

88 Sebastian Brixey-Williams, "Prospects for Game-Changers in Submarine-Detection Technology," ASPI | The Strategist, August 21, 2020, https://www.aspistrategist.org.au/prospects-for-game-changers-in-submarine-detection-technology/.

89 Gady, "China Resumes Production of Its Quietest Attack Submarine."

Type-093A is the PLA's most powerful attack submarine, partially because its larger volume grants space for "noise-reducing features." This led one analyst to conclude that China's SSN's are becoming increasingly stealthy.[90]

Attack Submarines	Year				
	1996	2006	2016	2020	2021 (Feb)
Total	**61**	**67**	**56**	**54**	**52**
Type093(A) Shang I/II Newest (nuclear-powered)	0	0	2	3	6
Type039 Newest (diesel-electric powered)	0	0	27	30	30
Older (nuclear-powered)	5	5	3	0 (3 in reserve)	0 (3 in reserve)
Older (diesel-powered)	55	61	24	18	16

Table 19: PLAN Modernization – Attack Submarines.

"[These] four operational JIN-class SSBNs represent China's first credible sea-based nuclear deterrent".

Trumping Chinese submarine capabilities, the US has almost as many combined SSGNs, SSNs, and SSKs as the PLAN – and is the only state that employs (a large number of) nuclear-powered cruise missile submarines. Even though this presents a problem for China due to its subpar Anti-Submarine Warfare capabilities, the PLAN's submarine capabilities far exceed those of its other potential challengers in the Indian Ocean, as it employs as many attack submarines as India, Japan, Australia, France, and the United Kingdom combined as of early-2020 (see Table 20).[91]

In addition to China's 100+ ground-based Inter-Continental Ballistic Missiles (ICBMs) carrying nuclear warheads, the PLAN's new nuclear-powered strategic submarine (SBBNs), the Type-094 (Jin-class), and the 12 JL-2 submarine-launched ballistic missiles (SLBMs) carry J-L2 ballistic missiles (soon to be replaced by the next generation Type-096 submarine with the new, solid-fuel JL-3), strengthening China's "second-strike capability" in the event that its entire land-based nuclear arsenal is taken out by an adversary. This development is not without consequence as "[these] four operational JIN-class SSBNs represent China's first credible sea-based nuclear deterrent".[92]

90 H. I. Sutton, "The Chinese Navy's Most Powerful Attack Submarine: The Type-093A," Naval News, November 15, 2020, https://www.navalnews.com/naval-news/2020/11/the-chinese-navys-most-powerful-attack-submarine-the-type-093a/.

91 "How Is China Modernizing Its Navy?" See also appendixes 3 and 4.

92 See appendixes 3 and 4; Office of the Secretary of Defense, "Annual Report to Congress: Military and Security Development Involving the People's Republic of China 2017," 29.; Ankit Panda, "China Conducts First Test of New JL-3 Submarine-Launched Ballistic Missile," December 20, 2020, https://thediplomat.com/2018/12/china-conducts-first-test-of-new-jl-3-submarine-launched-ballistic-missile/. Finally, its new H-6N bomber is -reportedly- capable of carrying a ballistic missile that can carry a nuclear warhead. Mike Yeo, "Video Reveals Chinese H-6N Bomber Carrying Suspected Hypersonic Weapon," Defense News, October 19, 2020, https://www.defensenews.com/global/asia-pacific/2020/10/19/video-reveals-chinese-h-6n-bomber-carrying-suspected-hypersonic-weapon/.

Submarines	China	Potential adversaries		Potential additional adversaries			
	China	USA	India	Australia	Japan	UK	France
Total	**54**	**53**	**16**	**6**	**21**	**6**	**5**
Nuclear-Powered Cruise Missile Submarines (SSGN)	0	50	0	0	0	0	0
Nuclear-Powered Attack Submarines (SSN)	6	3	1	0	0	6	5
Diesel-Electric Attack Submarines (SSK)	48	0	15	6	21	0	0

Table 20: PLAN submarine modernization (early-2020) – Matching up to adversaries in the far seas | Source: IISS/China Power.

3.4.2 Peacetime and low-intensity far seas military capabilities

Amphibious Combat Ships and Corvettes[93]

In times of peace or against weaker adversaries, amphibious assault capabilities, or the means necessary to execute a sea-land invasion, such as amphibious combat ships (ACS),[94] landing ships and armored warfare capabilities, and smaller naval units such as corvettes can also make appearances in the far seas. China currently has two types: the Yuzhao I-Type071 and the newer Yushen-Type075, which has the size of a small aircraft carrier, can launch armored assault vessels, and can carry up to 900 marines (see Table 21 and Table 22).[95] The PLAN's lack of Vertical Take-off and Landing (VTOL) fixed-wing aircraft, however, limits the ability of the Type075 to take part in high-intensity combat situations in the far seas as the helicopter carrier at this point cannot be protected by carrier-based fixed-wing aircraft and China has insufficient forward-deployed aerial capabilities to protect the Type075 with land-based aerial assets in the Indian Ocean. Reportedly, the PLAN works on a Type076 that includes a catapult system "of a type currently only employed on the most advanced aircraft carriers",[96] which would make the ship able to launch drones[97] and possibly fixed-wing aircraft.[98] If China's future fighter jets are capable of VTOL, the Type075 and Type076 may come to serve as capable small aircraft carriers in the far seas,[99] greatly expanding its carrier fleet.

Mainly understood as the means to take Taiwan, there are other missions that the Type071 and Type075 can (help) execute in the far seas. They can contribute to anti-piracy operations, provide humanitarian aid and evacuation operations for nationals, or execute political missions such as naval diplomacy through port calls and engagement activities or to

93 "smallest warship among the frigates and destroyers. Has similar functions to the frigate and destroyer, although the corvette is suitable for Arctic patrol, which frigates and corvettes are not." Peter Haydon, "Choosing the Right Fleet Mix: Lessons from the Canadian Patrol Frigate Selection Process," *Canadian Military Journal* 9, no. 1 (2008): 73.

94 Also known as "helicopter carriers."

95 David Lague, "China Expands Its Amphibious Forces in Challenge to U.S. beyond Asia," Reuters Special Report, July 20, 2020, https://www.reuters.com/investigates/special-report/china-military-amphibious/.

96 Minnie Chan, "China Planning Advanced Amphibious Assault Ship," *South China Morning Post*, July 27, 2020, sec. News, https://www.scmp.com/news/china/military/article/3094912/chinese-shipbuilder-planning-advanced-amphibious-assault-ship.

97 Chan, "China Planning Advanced Amphibious Assault Ship."

98 Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," 26.

99 Lague, "China Expands Its Amphibious Forces in Challenge to U.S. beyond Asia."

intimidate and impress smaller states.[100] Finally, the Type071 and Type075 are likely to achieve considerable success against weaker navies without carrier-based aerial capabilities.

Amphibious Assault Capabilities	**Year**						
	1996	2006	2016	2020	2021 (Feb)	2021 (April)	Current + Launched
Total ACSs	**0**	**0**	**3**	**6**	**6**	**7**	**9**
Yushen-*Type075* (Newest)	0	0	0	0	0	1	3
Yuzhao-*Type071* (Second newest)	0	0	3	6	6	6	6
Older	0	0	0	0	0	0	0
Transport Ships[101]	**56**	**50**	**47**	**49**	**49**	**N/A**	N/A
Landing ship tank (LST)	24	19	16	28	28	N/A	N/A
Landing ship medium (LSM)	32	31	31	21	21	N/A	N/A

Table 21: PLAN Modernization: Amphibious Combat Ships (1).

Amphibious Combat Ships (Helicopter carriers)	**Yuzhao-*Type071* (2nd newest)**	**Yushen-*Type075* (newest)**	***Type076* (Reported)**
Tonnage	20.000+	40.000	Slightly larger than Type075
Rotary-wing aircraft	16[102]	30	30+
Can carry marines, vehicles, landing craft and helicopters.	Yes	900	Yes, even greater numbers.
Electromagnetic catapults to launch drones and possibly fixed-wing aircraft	No	No	Yes

Table 22: PLAN Modernization – Amphibious Combat Ships (2).

The PLAN's employment of a large number of small-surface combatants highlights the importance of Near Seas Defense and coastguard enforcement in disputed waters. Its Jiangdao-II Type-056A stealth corvette has been commissioned on a large scale (See Table 23). Like the ACS, however, these corvettes first and foremost serve a function in the South China Sea and East China Sea for purposes such as "patrol, escort, search-and-rescue, surveillance, exclusive economic zone (EEZ) protection, electronic warfare (EW), fishery resources protection, anti-aircraft warfare (AAW), anti-submarine warfare (ASW) and anti-surface warfare (ASUW) operations."[103] Nevertheless, the corvettes can be of use against weaker adversaries, in light-intensity conflict and for other sorts of (e.g. political) missions in the far seas.

100 Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," 20.

101 This table does not consider the smaller transport ships (i.e., landing crafts) that the PLAN and other PLA department also employ.

102 Xavier Vavasseur, "China: End of the Type 071 LPD Program, Start of the Type 075 LHD One ?," Naval News, August 5, 2019, https://www.navalnews.com/naval-news/2019/08/china-end-of-the-type-071-lpd-program-start-of-the-type-075-lhd-one/.

103 Naval Technology, "Jiangdao Class (Type 056) Corvette, China," accessed May 17, 2021, https://www.naval-technology.com/projects/jiangdao-class-type-056-corvette/.

Corvettes	Year				
	1996	2006	2016	2020	2021 (Feb)
Total	**0**	**0**	**22**	**43**	**55**
Jiangdao-II *Type-056A* (Newest)	0	0	4	22	33
Older	0	0	18	21	22

Table 23: PLAN Naval Modernization – Corvettes.

3.4.3 Airforce capabilities: "Next-Generation" and older fighters and bombers

A key PLA weakness is in the aerospace realm. The technological problems with its indigenously built fixed-wing aircraft are plentiful; for instance, whether China's J-20 is really a fifth-generation fighter is disputed.[104] In addition, the Indian Ocean is not within combat range of China's fighters, as China lacks forward-deployed bases (discussed below), and it lacks the number of carriers and hence capacity to deploy carrier-based J-15s to the region. In theory, two classes of adjusted H-6 bombers are however capable of carrying a ballistic missile, which does extend the PLAAF's range over part of the Indian Ocean (see Table 24).

In spite of progress in aerial capabilities, China has run into persistent problems plaguing the development of any fighter – especially its attempts to successfully develop a fifth-generation fighter. First, it has failed to develop advanced jet engines – impeding the "reliability, performance and stealthiness of the aircraft."[105] The J-20 Black Eagle, supposedly the equal of the US F-22, failed to live up to expectations as it lacks "powerful and reliable thrust-vectoring turbofan engines capable of supercruise."[106] China has looked for compromises by importing a Russian engine and using an older indigenously-manufactured one, but both are of inferior quality compared to the American F-22.[107] On avionics, moreover, the software for flight control in fighter jets is becoming "endlessly more complex." Given China's failures to successfully copy US fighter engines, China is unlikely to have achieved more success "in this more challenging realm".[108] Finally, features of its design suggest the J-20 is far easier to detect with radar and thermal sensors.[109]

These failings have persisted despite enormous investment in research and design.[110] Andrea and Mauro Gilli advance more reasons for skepticism, pointing out that China has enjoyed extensive access to: American aircraft designs both through industrial cyber and traditional

104 In fact, according to China's official classification the J-20 is a fourth-generation fighter. The US F-22 and F-35 are considered fifth-generation fighters. "Does China's J-20 Rival Other Stealth Fighters?," ChinaPower, August 2020, 2, https://chinapower.csis.org/china-chengdu-j-20/.

105 Yoshihara and Bianchi, "Seizing on Weakness," 67. and Zhen Liu, "Could China's Unwanted FC-31 Gyrfalcon Stealth Fighter Finally Land a Role in the Navy?," *South China Morning Post*, July 2020, https://www.scmp.com/news/china/military/article/3091563/could-chinas-unwanted-fc-31-gyrfalcon-stealth-fighter-finally.

106 Gilli and Gilli, "Why China Has Not Caught Up Yet," 182.

107 Gilli and Gilli, 182. and Andrew S. Erickson and Gabe Collins, "The 'Long Pole in the Tent': China's Military Jet Engines," 2012, https://thediplomat.com/2012/12/the-long-pole-in-the-tent-chinas-military-jet-engines/.

108 Gilli and Gilli, "Why China Has Not Caught Up Yet," 184.

109 Michael J Pelosi and Carlo Kopp, "A Preliminary Assessment of Specular Radar Cross Section Performance in the Chengdu J-20 Prototype," July 4, 2011, http://www.ausairpower.net/APA-2011-03.html. and Gilli and Gilli, "Why China Has Not Caught Up Yet," 181.

110 In 2010, 33.3 percent of total military spending went toward equipment. By 2017, that figure stood at 41.1 percent." ChinaPower, "How Developed Is China's Arms Industry?," ChinaPower Project, February 18, 2021, http://chinapower.csis.org/arms-companies/.

espionage;[111] the study of an American fighter with stealth features (F-117) downed in Serbia in 1999; access to an American F-16 via Pakistan; as well as technology transfers from other countries.[112]

Aerial Capabilities		Year				
		1996	2006	2016	2020	2021
Naval Aviation (PLAN)						
Fighter/Ground Attack	**Total**	**40**	**274**	**254**	**139**	**153**
	J-15 *Flanker* (Newest/carrier-based fighter)	0	0	14	20	34
	Older	40	274	240	119	119
Bomber	**Total**	**146**	**68**	**30**	**35**	**45**
	H-6G/G mod (provides target data to GLCMs)	0	0	30	27	27
Airforce (PLAAF)						
Fighter/Ground Attack	**Total**	**400**	**1169**	**626**	**794**	**866**
	J-20A *Flanker* (Next-Generation Fighter/Newest)	0	0	0	22+	24+
	J-10A *Firebird* (Most-generic)	0	0	144	220	220+
Bomber	**Total**	**420+**	**222**	**120**	**176**	**176**
	H-6A (Nuclear bomber)	0	0	0	12	12
	H-6K (Most generic/ carries YJ-12 anti-ship missiles or 6x CJ-10/CJ-20 CMs)	0	0	50	100	100
	H-6N (Newest/believed to carry ballistic missile)	0	0	0	4+	4+

Table 24: PLA Modernization – PLAAF and PLAN aerial capabilities.

In case of conflict in the Indian Ocean, the J-20's combat range is still insufficient for the fighter to be used effectively against vessels there.

In case of conflict in the Indian Ocean, the J-20's combat range is still insufficient for the fighter to be used effectively against vessels there. Only the PLAAF tasked with "homeland air defense" is in possession of J-20 fighter jets, not the PLAN, which is responsible for "fleet air defense and defending the territorial waters and coastline of China."[113] The Chinese mainland and Hainan Island are simply too far away, even though island-building efforts in the South China Sea bring the PLAAF in closer reach of the Malacca Strait. Even if China in the future could station a version of the J-20 on carriers or on bases around the Indian Ocean, the PLAAF has, for now, an insufficient number of J-20s (estimated at 24+ in 2021) to compete with the superior (e.g., F-35) fighter jets of the US and its allies in the Indian Ocean.

111 For cyber, see: David Axe, "Was China's Stealth Tech Made in America?," *Wired*, January 24, 2011, https://www.wired.com/2011/01/was-chinas-stealth-tech-made-in-america/. For traditional espionage see: "Foreign Spies Stealing US Economic Secrets in Cyber Space: Report to Congress on Foreign Economic Collection and Industrial Espionage, 2009-2011," in *Homeland Security Digital Library* (United States. Office of the National Counterintelligence Executive; United States. Office of the Director of National Intelligence, 2011), https://www.hsdl.org/?abstract&did=.

112 Gilli and Gilli, "Why China Has Not Caught Up Yet," 180.

113 Reports differ on the J-20's range from 1.200 kilometers on the one hand and 2.700 kilometers on the other, which would put (part of) the Indian Ocean in striking distance. "Does China's J-20 Rival Other Stealth Fighters?"

The PLAAF and PLAN combined hold 200+ H-6 bombers – all with lineage to the Russian Tupolev Tu-16 bomber – and may be used to effect in the near seas, particularly in a Taiwan contingency against US carriers.[114] At a longer distance, the H-6K, making up approximately half of China's bombers, can strike by using its YJ-12 anti-ship missiles and CJ-10 or CJ-20 air-launched cruise missiles.[115] Its combat range is "around two thousand miles, or even 3.500 miles with inflight refueling".[116] The newer Chinese H-6N is believed to carry a ballistic missile that "appears to be a hypersonic warhead boosted by a conventional rocket", resembling the DF-17 ground-launched hypersonic missile.[117] If the air-launched version of the DF-17 (which the H-6N presumably carries) has the same range of 2000+ kilometers, and this is added to the plane's flight range, then the H6-N strike capability also covers the entire Indian Ocean. [118]

Finally, China is developing the H-20, a next-generation strategic bomber that will "feature a longer range and perhaps nuclear delivery capability". It can contribute to "strike missions" and "strategic deterrence".[119] The PLAAF can be "increasingly confident" to threaten American targets as far out as Hawaii, and also American allies such as Australia have reason to feel "increasingly threatened" by the additional capabilities the H-20 will provide China with.[120] The H-20 – in combination with Air-launched Cruise Missiles (ALCMs) and Air-launched Ballistic Missiles (ALBMs) – is hence likely to have a range that easily covers the Indian Ocean. Currently, however, using these airborne missiles effectively at such long distances would depend on striking while undetected or at least unchallenged, as the H-6K and H-6N are both "slow" and "not at all stealthy," as a result of which they are easy targets for fighters and SAMs.[121]

114 David Axe, "China Needs A Hundred Bombers To Punch Through An American Flattop's Defenses," *Forbes*, January 27, 2021, sec. Aerospace & Defense, https://www.forbes.com/sites/davidaxe/2021/01/27/china-needs-a-hundred-bombers-to-punch-through-an-american-flattops-defenses/.

115 The anti-land CJ-10's range is estimated to be 1.500+ kilometers. The anti-ship YJ-12's range is estimated to be 400 kilometers. CSIS, "Missiles of China," Missile Threat, July 16, 2020, https://missilethreat.csis.org/country/china/.

116 This equals an extended combat range of about 3.250 km to 5.630 kilometers.

117 Yeo, "Video Reveals Chinese H-6N Bomber Carrying Suspected Hypersonic Weapon."

118 CSIS, "Missiles of China."

119 Derek Grossman et al., "China's Long-Range Bomber Flights: Drivers and Implications," November 14, 2018, 50, https://www.rand.org/pubs/research_reports/RR2567.html.

120 Grossman et al., 54.

121 Sebastien Roblin, "China's H-6 Bomber: Everything You Want to Know about Beijing's 'B-52' Circling Taiwan," Text, The National Interest (The Center for the National Interest, December 18, 2016), https://nationalinterest.org/blog/the-buzz/chinas-h-6-bomber-everything-you-want-know-about-beijings-b-18772.

3.5 Long-range strike capability

The greatest relative advantage vis-à-vis the US, Russia and leading European states has long come from China's quantitative and qualitative expansion of its missile arsenal (See Table 25 and Table 26).[122] Missiles are effective, long-range, low-cost, and increasingly precise.[123] The PLARF is continuously increasing the average range, speed, and anti-ship capabilities of its long-range arsenal. In fact, these missiles – together with the improvements in sensing and other technologies – effectively call into question the military dominance that CSGs have had for almost a century and on which the United States' ability to project power globally relies on China's near seas.[124] Their precision in use over long-distances, however, is far less accurate and involves greater risks.

The range of China's medium-range missiles puts it in a position to hit the Bay of Bengal, the Arabian Sea and perhaps the Malacca Strait, while its IRBMs cover large swaths of the Indian Ocean and the Malacca Strait. The precision of China's most notorious MRBMs and IRBMs over long distances remains unclear, as assessments of the precision of the conventional ballistic and cruise missiles vary, e.g., the land attack DF-21C MRBM, the anti-ship DF-21D MRBM, the dual-capable DF-26 IRBM, the DF-17 Hyper-boost Glide Vehicle (HGV), and the supersonic CJ-100 GLCM.

The land-attack DF-17 HGV and the anti-ship CJ-100 may just put the Malacca Strait in reach as well as limited parts of the adjacent waters, such as the Bay of Bengal. China's DF-21C land attack missile can just cover the Malacca Strait and only those waters closest to China's Mainland. The DF-21D, the world's first anti-ship ballistic missile dubbed "carrier-killer", cannot reach the Malacca Strait, but likely only the Bay of Bengal. China's pre-eminent IRBM, the DF-26, likely extends China's precision strike to fixed targets around the chokepoints and bases in Guam,[125] reaching almost the whole Indian Ocean and adjacent waters up to Australia in the south and Eastern Africa in the west.[126] The lauding of the development of the DF-26B suggests that an anti-ship variant has been built that is "prepared for US aircraft carriers."[127]

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122 One of the reasons that China has been capable of this enormous expansion is that it is not a signatory to the INF-treaty while its competitors in terms of military capabilities, Russia and the US, put far-reaching limitations on their conventional missile development. In fact, the Intermediate-range Nuclear Forces (ING) Treaty prohibited the development as well as deployment of land-based missiles that have a range of 500 to 5.500 kilometers from its signing in 1987 to the Trump Administration's withdrawal from the treaty in 2019. "Intermediate-Range Nuclear Forces Treaty (INF Treaty)" (U.S. Department of State, December 8, 1987), //2009-2017.state.gov/t/avc/trty/102360.htm. See also Harry B. Admiral Harris jr., "Statement Of Admiral Harry B. Harris Jr., U.S. Navy Commander, U.S. Pacific Command Before The Senate Armed Services Committee On U.S. Pacific Command Posture" (Senate Armed Services Committee, April 27, 2017), 7, https://www.armed-services.senate.gov/imo/media/doc/Harris_04-27-17.pdf.

123 Especially compared to principal surface naval combatants required to project power in the far seas.

124 The Congressional Research Service has stated: "The U.S. Navy has not previously faced a threat from highly accurate ballistic missiles capable of hitting moving ships at sea. For this reason, some observers have referred to ASBMs as a "game-changing" weapon. [...] The relative long ranges of certain Chinese ASCMs have led to concerns among some observers that the U.S. Navy is not moving quickly enough to arm U.S. Navy surface ships with similarly ranged ASCMs." Congressional Research Service, "China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress," 6.

125 Jordan Wilson, "China's Expanding Ability to Conduct Conventional Missile Strikes on Guam," Center for International Maritime Security, August 16, 2016, https://cimsec.org/chinas-expanding-ability-conduct-conventional-missile-strikes-guam/.

126 CSIS, "Missiles of China."

127 The DF-26 is the intermediate-range version of the DF-21-class MRBM, which has an anti-ship variant. Global Times, "Hopefully, 'Carrier Killer' Missiles Would Never Be Used in the South China Sea: Global Times Editorial - Global Times," Global Times, August 28, 2020, https://www.globaltimes.cn/content/1199208.shtml.

Name	Type	Purpose	Delivery	Estimated range (km)	In Range	
					Malacca Strait	Indian Ocean/Adjacent waters and countries
CJ-100*	GLCM, Supersonic; Hypersonic according to Chinese state media	Anti-ship	Conventional; Nuclear capability unknown	Unknown; 2.000 according to IISS; 2.000-3.000 according to "military insider" cited in SCMP, a Chinese newspaper	Maybe	Likely only limited parts (e.g., Bay of Bengal and Arabian Sea)
DF-17*	Ballistic Missile (BM) with hypersonic boost-glide vehicle (HGV)	Land attack: Anti-ship version under development says PLA	Only conventional (Likely)	1.800-2.500	Almost/ Just	Likely only limited parts (e.g., Bay of Bengal and Arabian Sea)
DF-21C	Ground-launched Ballistic Missile (GLBM)	Land attack	Conventional	2.150	Just	No, only some sections (e.g., Bay of Bengal and Arabian Sea)
DF- 21D ("Carrier-killer")	GLBM	Anti-ship	Conventional	1.450-1.550	No	No, only minor sections (e.g., Bay of Bengal)
DF-26 ("Guam express")	GLBM	Land attack/ (Anti-ship unconfirmed)	Dual capable	4.000	Yes	Yes, large swaths (e.g., Suez, Gulf of Aden, North-Australia)
H-6K with CJ-10 (or CJ-20)	Bomber carrying Cruise Missile (CM)	Land attack	Conventional	H-6K range including in-air refuel: 3.250-5.630 CJ-10 Range: 1.500	Yes	Yes, likely the majority (e.g., the Eastern Mediterranean, East Africa, Northern Australia)
H-6K with YJ-12	Bomber carrying CM	Anti-ship	Conventional	H-6K range including in-air refuel: 3.250-5.630 Y-12 range: 500-540	Yes	Yes, likely large swaths (e.g., Suez, Gulf of Aden, Northern Australia)
Unconfirmed						
H6-N with version of DF-17	Bomber carrying BMs/HVG	Land Attack	Only conventional (Likely)	H-6N range: unknown DF-17 range: 2000+	Yes	Yes, likely entirely

*Debuted at China's 2019 National Day Parade, celebrating the 70th anniversary of the People's Republic of China

Table 25: Extending sea denial – the PLA's pursuit of conventional missiles to put the far seas in range.[128]

Large-scale procurement of these advanced missiles potentially compromises traditional missile defense systems meant to intercept them. Whereas China had no IRBMs in 2015, in 2020 IRBMs took up over 40% of China's total conventional and dual-capable MRBM and IRBM arsenal (see Table 26).[129] China's IRBMs consist of an estimated 110+ DF-26s in 2021.[130] Notably, the US Department of Defense (DoD) puts the number of Chinese ground-launched ballistic and cruise missiles at an approximately 50% higher rate than the International

128 'Missile Threat', CSIS, accessed 3 September 2021, https://missilethreat.csis.org/. For estimated range see CSIS, "Missiles of China."; according to international observers, the speed of the CJ-100 is likely supersonic but was announced as "hypersonic" by CGTN in 2019. Williams and Dahlgren, "More Than Missiles: China Previews Its New Way of War."; Sebastien Roblin, "The DF-100 Is China's Biggest Threat To The U.S. Navy," Text, The National Interest (The Center for the National Interest, April 17, 2020), https://nationalinterest.org/blog/buzz/df-100-chinas-biggest-threat-us-navy-145172., *DF 17, DF 100 & DF 41 Make Debuts at National Day Parade* (CGTN, 2019), https://www.youtube.com/watch?v=CMUbpMTfZtE&t=183s.

129 Moving the bulk of China's IRBMs further West is another condition for China to put the Indian Ocean and its Adjacent waters properly in range, as today the majority of China's missiles are still located in its Central, Eastern, South-Eastern and Southern regions with a primary focus on the near seas. "How Are China's Land-Based Conventional Missile Forces Evolving?," China Power Centre for Strategic and International Studies, ChinaPower, September 21, 2020, http://chinapower.csis.org/conventional-missiles/.

130 See appendixes 3 and 4.

Institute for Strategic Studies (IISS) does, stacking up the IRBMs at 200, MRBMs at 150, and GLCMs at 100 in 2020.[131]

Class	Range	Type	IISS Estimate				
			1996	2006	2016	2020	2021
IRBM	3.000-5.500km	**Total**	**0**	**0**	**16**	**72**	**110+**
		DF-26 (dual-cap)	0	0	16	72	110+
MRBM	1.000-3.000km	**Total**	**10**	**33**	**N/A**	**94**	**106**
		DF-21C (land attack)	N/A	N/A	36	24	24
		DF-21D (anti-ship)	0	0	18	30	30
		DF-17 (land attack; HGV)	0	0	0	16	16
GLCM	>1.500km	**Total**	**0**	**0**	**54**	**70**	**108**
		CJ-100 (anti-ship)	0	0	0	16	54

Table 26: China expands mid-range and intermediate-range ballistic missiles and swaps land attack for anti-ship missiles | Source IISS The Military Balance.

Despite stated improvements in Intelligence, Surveillance and Reconnaissance (ISR) and maneuvering reentry vehicle development,[132] the DF-26 at its maximum distance of 4000km was in 2015 and 2016 described as "far from accurate" as its Circular Error Probability (CEP) was estimated between 150 and 450 meters, making it unlikely that it is able to hit ships at long-distances.[133] Since 2013, the PLARF has struck vessel-like fixed objects in the Gobi Desert, some of them emulating ships in harbors.[134] Yet on 26 August 2020, China ostensibly conducted a successful test strike against a large moving target ship in the South China Sea using the (both road-mobile[135]) DF-26(B) IRBM from far into China's interior (its Northwestern Qinghai province), which would likely be over 2,800km away from the target, and a DF-21D MRBM from its coastal Zhejiang province, likely over 1,500km away from the target.[136]

There are additional caveats to China's use of missiles against other powers in the far seas. Besides the obvious domestic incentive to overstate targeting ability, China "seeks to overawe audiences limited in access to technical details [...] to generate deterrence it has not earned operationally."[137] Moreover, from a nuclear crisis stability point of view, in case of land-based launches from Southern China, China must shoot over the territories of other countries. The pivotal question here is what happens if China launches a conventional missile over

131 Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020."

132 CSIS, "Missiles of China."

133 Wilson, "China's Expanding Ability to Conduct Conventional Missile Strikes on Guam," 11. citing IHS, Jane's Strategic Weapons Systems: Offensive Weapons, China, DF-26, September 11, 2015, 2.

134 Joseph Trevithick, "Chinese Long-Range Ballistic Missiles Struck Moving Ship In South China Sea: Report," The Drive, November 16, 2020, https://www.thedrive.com/the-war-zone/37662/chinese-long-range-ballistic-missiles-struck-moving-ship-in-south-china-sea-report.

135 Another way to overcome the problem of ensuring accuracy in strikes further away from the mainland is to deploy missiles in overseas bases on territory of allies. That said, these would be easily found and acted against in case of conflict.

136 Huang, "China Fires 'Aircraft-Carrier Killer' Missile in 'Warning to US,'" South China Morning Post, August 26, 2020, https://www.scmp.com/news/china/military/article/3098972/chinese-military-launches-two-missiles-south-china-sea-warning.

137 Andrew S. Erickson, "China's DF-21D And DF-26B ASBMs: Is The U.S. Military Ready?," Andrew S. Erickson, November 15, 2020, https://www.andrewerickson.com/2020/11/chinas-df-21d-and-df-26b-asbms-is-the-u-s-military-ready/.

nuclear-armed India that, in a short time window, has to decide whether to launch what New Delhi's leaders would think is a retaliatory nuclear strike? Since China has both a large stockpile of nuclear weapons as well as an increasingly potent second-strike capability, such a scenario can play out disastrously.

Targeting moving vessels and readjusting in flight, a combination of an "expanding network of sky wave and surface wave over-the-horizon (OTH) systems" supports China's long-range strike capability,[138] while its expanding fleet of unmanned aircraft, maritime patrol and surveillance aircraft, new principal surface combatants, "long-range sensors" on its man-made islands in the South China Sea, and space-based sensors improve China's warning and targeting capabilities.[139]

3.6 C4ISR

C4ISR is a necessary condition for modern armies, navies, air forces, and rocket forces to operate effectively.

C4ISR is a necessary condition for modern armies, navies, air forces, and rocket forces to operate effectively. [140] PLA military strategies have attributed a greater role to C4ISR over time, as the PLA's "basic point for preparation for military struggle (PMS)" moved toward "winning local wars under conditions of informationization, highlighting maritime military struggle and maritime PMS".[141] Winning such wars requires networked, technologically-advanced naval, aerial, and missile forces with robust ISR capabilities. Hence, China has invested in expanding its C4ISR capabilities. This includes all-around command and control, in particular, focusing on Emerging Disruptive Technology (EDT) and maritime Intelligence, Surveillance and Reconnaissance (ISR) capabilities as deployed in the SCS.

On the cusp of a military-technological revolution driven by AI and autonomy,[142] China's CSGs, including carrier-based fighters, a wide range of surface support ships, and attack submarines, all carry their own complex sensors and radars.[143] Disruptive technologies can improve the effectiveness of such groups as they help decision-makers strike with "superior speed and precision" across the 21st century domains, providing enhanced situational

138 "Military and Security Developments Involving the People's Republic of China: Annual Report to Congress 2020," 59.

139 Trevithick, "Chinese Long-Range Ballistic Missiles Struck Moving Ship In South China Sea."

140 The fusion of technologically advanced offensive weapons through C4ISR make them "greater than the sum of their parts." In fact, "without adequate C4ISR systems, aircraft cannot be safely launched, employed, or recovered; Tomahawk cruise missile strikes cannot be coordinated; and defensive capabilities can be degraded so significantly as to allow and even invite the hostile engagement of friendly vessels or aircraft." Kevin MacG. Adams and Thomas J. Meyers, "The US Navy Carrier Strike Group as a System of Systems," *International Journal of System of Systems Engineering* 2, no. 2/3 (2011): 95, https://doi.org/10.1504/IJSSE.2011.040547.; James S. Johnson, "China's Vision of the Future Network-Centric Battlefield: Cyber, Space and Electromagnetic Asymmetric Challenges to the United States," *Comparative Strategy* 37, no. 5 (October 20, 2018): 373–90, https://doi.org/10.1080/01495933.2018.1526563.

141 The State Council of the People's Republic of China, "China's Military Strategy - Strategic Guideline of Active Defense," May 2015, http://english.www.gov.cn/archive/white_paper/2015/05/27/content_281475115610833.htm.

142 Some observers have argued, however, that this technological change will be of an evolutionary nature. See e.g. Jeremy Stöhs, "How High? The Future of European Naval Power and the High-End Challenge," Centre for Military Studies (University of Copenhagen, February 18, 2021), 44, https://cms.polsci.ku.dk/english/publications/how-high-the-future-of-european-naval-power-and-the-high-end-challenge/. F. Hoffman, "Will War's Nature Change in the Seventh Military Revolution?," *Undefined*, 2017, 19–31, /paper/Will-War%27s-Nature-Change-in-the-Seventh-Military-Hoffman/0cf9a738fb94d77972aeb62bb1074c398e61e642.

143 These systems will become more complex as China swaps its current carrier-based fighter for a new version of the J-20.

awareness through sea, air, land, as well as space-based censors and cyber.[144] Beijing's "Made in China 2025" ten-year plan, China's 14th Five-Year Plan and its dual circulation policy, all target dual-use technologies that can build up its EDT capacity, drawing on SOE-private innovation at home and acquisitions of high-tech abroad.[145]

China has also expanded its ISR capabilities by investing in high-frequency direction finding (HF/DF); (military) satellites;[146] and land-based, sea-based, and air-based radars. [147] At the same time, the bulk of China's ISR components are centered on the mainland or around the SCS, as it attempts to further solidify its overview of, control over, and A2/AD capabilities in its direct environment.[148] The aforementioned weaknesses of China's power projection capabilities, namely its aircraft carriers' inability to launch early-warning aircraft, further limits the PLAN's current ISR capabilities in the far seas.

China has also expanded its ISR capabilities by investing in high-frequency direction finding (HF/DF); (military) satellites; and land-based, sea-based, and air-based radars.

	2016	2020	2021
Military Satellites (Total)	77	117	132
Communications	5	9	9
Navigation/positioning timing	18	34	45
Meteorology/Oceanography	N/A	8	8
ISR[149]	39	25	29
ELINT/SIGINT	15	41	41

Table 27: Charting the oceans – The expansion of China's military satellite capabilities.[150]

Dramatically increasing the number of military satellites,[151] the PLA requires "low-earth orbit satellites" for weapon guidance, which is what China has attempted to accomplish as it put (at least) 15 ISR satellites into low-earth orbit between 2017 and 2019 (see Table 28).

144 Stöhs, "How High?," 45.; Franz-Stefan Gady, "What Does AI Mean for the Future of Manoeuvre Warfare?," IISS, May 5, 2020, https://www.iiss.org/blogs/analysis/2020/05/csfc-ai-manoeuvre-warfare.

145 See for the fourth industrial revolution high-tech industries targeted James McBride and Andrew Chatzky, "Is 'Made in China 2025' a Threat to Global Trade?," Council on Foreign Relations, May 13, 2019, https://www.cfr.org/backgrounder/made-china-2025-threat-global-trade.; see also Elsa B. Kania and Lorand Laskai, "Myths and Realities of China's Military-Civil Fusion Strategy," Center for a New American Security (CNAS), January 28, 2021, 2, https://www.cnas.org/publications/reports/myths-and-realities-of-chinas-military-civil-fusion-strategy.

146 A military satellite is "an orbiting vehicle, which relays signals between communications stations used for military purposes." Joint Chiefs of Staff, "Department of Defense Dictionary of Military and Associated Terms," 107.

147 Felix K. Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea," Foreign Policy Research Institute, May 5, 2021, https://www.fpri.org/article/2021/05/chinas-maritime-intelligence-surveillance-and-reconnaissance-capability-in-the-south-china-sea/.

148 An additional reason might be to create a naval-bastion to protect its sea-based nuclear strike capability. Advances in the PLA's ISR can create the conditions necessary for precision launches of AShBMs to strike – or perhaps even to deter from entering the SCS – enemy combatants. Felix K. Chang, "China's Nuclear Interest in the South China Sea," FPRI, April 17, 2017, https://www.fpri.org/2017/04/chinas-nuclear-interest-south-china-sea/. What is certain is that the concentration of ISR capabilities aimed at capturing developments on the SCS highlights China's continued focus on the near seas. Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea."

149 None of the 39 ISR satellites that China had in use in 2016, namely the 1 Haiyang 2a; the 36 Yaogan Weixing (remote sensing); The 2 Zhangguo Ziyuan (ZY-2 remote sensing) are still listed as part of the 29 ISR-satellites active in 2021, which are the 2 Jianbing-5; 4 Jianbing-6; 3 Jianbing-7; 5 Jianbing-9; 4 Jianbing-10; 3 Jianbing-11/-12; 4 LKW; 2 Tianhui-2; 2 ZY-1; 2 Jianbing-10; 3 Jianbing-11/-12; 4 LKW; and 2 Tianhui-2; 1 ZY-1. See appendixes 3 and 4.

150 See appendixes 3 and 4.

151 See appendixes 3 and 4.

Furthermore, it added a remote-sensing satellite, with nine more intended to follow to ensure "uninterrupted observation" of the SCS.[152] The United States is the only country that has more military satellites in-use while China's other challengers remain far behind (see Table 28).

	China	Potential adversaries		Potential additional adversaries			
	China	USA	India	Australia	Japan	UK	France
Military Satellites (Total)	**132**	**141**	**21**	**1**	**11**	**8**	**7**
Communications	9	46	2	1	2	8	3
Navigation/positioning timing	45	31	7	N/A	N/A	N/A	N/A
Meteorology/Oceanography	8	6	N/A	N/A	N/A	N/A	N/A
ISR	29	17	11	N/A	9	N/A	4
ELINT/SIGINT[153]	41	27	1	N/A	N/A	N/A	N/A
Space Surveillance	N/A	6	N/A	N/A	N/A	N/A	N/A
Early Warning	N/A	8	N/A	N/A	N/A	N/A	N/A

Table 28: Military Satellites – Who can see where?[154]

China has one of the largest radar networks in the world – and employs both land-based Over-the-Horizon Backscatter (OTH-B) radar sites that can detect ships such as aircraft carriers thousands of kilometers away (albeit with limited precision), and coastal radars, which are more precise but have challenges "peering beyond 200 to 250km offshore."[155] Their presence on Mainland China, Hainan Island, and its artificial islands in the SCS does not put the far seas in reach.[156]

Large-scale breakthroughs in the development and deployment of autonomous, unmanned vehicles, which would then also connect to the aforementioned networked C4 systems, and in "digitally fused sensors" will simplify surveillance of the seas, including of submarines.[157] Investment in these capabilities can help the PLAN overcome its ASW deficiencies, e.g. through cultivated undersea artificial intelligence (AI) and "highly capable Unmanned Underwater Vehicles (UUVs)".[158] Toward an "Underwater Great Wall",[159] in 2018 the existence of two underwater sensors between the SCS and the Island of Guam were revealed,

152 Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea."

153 ELINT means "Electronic Intelligence". SIGINT stands for "Signals Intelligence".

154 See appendixes 3 and 4.

155 Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea."

156 See Chun Han Wong, "China Appears to Have Built Radar Facilities on Disputed South China Sea Islands," *Wall Street Journal*, February 23, 2016, sec. World, https://www.wsj.com/articles/china-appears-to-have-built-radar-gear-in-disputed-waters-1456198634.

157 Traditionally, "costly manned-platforms" such as attack submarines, frigates, and patrol aircraft shouldered this burden. Due to advances in technology a clear trend has emerged towards USVs, UAVs, and UUVs adopting these tasks. As a result, smaller, "more expandable", and less expensive "to develop, produce, modify and deploy at scale" pieces of military hardware will come to perform an important ISR activity. Brixey-Williams, "Prospects for Game-Changers in Submarine-Detection Technology."

158 Lyle J. Goldstein, "China Hopes UUVs Will Submerge Its Undersea Warfare Problem," Text, The National Interest (The Center for the National Interest, March 28, 2020), https://nationalinterest.org/blog/buzz/china-hopes-uuvs-will-submerge-its-undersea-warfare-problem-138597.

159 Catherine Wong, "'Underwater Great Wall': Chinese Firm Proposes Building Network of Submarine Detectors to Boost Nation's Defence," South China Morning Post, May 19, 2016, https://www.scmp.com/news/china/diplomacy-defence/article/1947212/underwater-great-wall-chinese-firm-proposes-building.

strengthening deep-sea surveillance capabilities and likely fulfilling an intelligence gathering and early warning role.[160]

Potentially rolled out along the Maritime Silk Road by 2035,[161] China has deployed "a network of (both fixed and floating) sensors and communications capabilities" on surface-level serving in the Northern South China Sea, specifically between Hainan Island and the Paracel Islands, as part of the "Blue Ocean Information Network" (*lanhai xinxi wangluo*) pilot.

The KJ-500, China's newest Airborne Early Warning (AEW) aircraft, has a phased array radar that is capable of simultaneously tracking 60-100 airborne targets up to a distance of 470 km.[162] Yet with ski-jump ramp carriers and lack of foreign bases there is only one KJ-500s that contains an aerial refueling probe allowing it to "provide persistent AEW&C" (airborne early warning and control) coverage beyond the First Island Chain.[163] Nevertheless, a range of Chinese vessels, such as its two aircraft carriers and the Type055-cruiser, have potent radars that China can make use of in the far seas.

3.7 Non-kinetic capabilities

In a conflict scenario, China could use its cyber capabilities against non-military targets, including parts of the economy that help sustain power projection, such as ports and energy facilities.

Acknowledging the importance of the cyber domain,[164] the PLA established the Strategic Support Force (SSF) in 2016 to put under one banner China's "space, cyber, electronic, and psychological warfare" capabilities.[165] PLA documents highlight the effectiveness of cyber warfare in targeting "C2 and logistic networks" to disable an adversary from operating in the early stages of a conflict.[166]

In a conflict scenario, China could use its cyber capabilities against non-military targets, including parts of the economy that help sustain power projection, such as ports and energy facilities. Their fragile cyber-defenses have become all too apparent over the last years. Maersk, a shipping company that handles one out of seven containers globally, was hit by a cyber-attack in 2017, causing a breakdown that affected all of its business "including container shipping, port and tug boat operations, oil and gas production, drilling services, and

160 Joseph Trevithick, "China Reveals It Has Two Underwater Listening Devices Within Range of Guam," The Drive, January 21, 2018, https://www.thedrive.com/the-war-zone/17903/china-reveals-it-has-two-underwater-listening-devices-within-range-of-guam.

161 J. Michael Dahm, "Exploring China's Unmanned Ocean Network," Asia Maritime Transparency Initiative, June 16, 2020, https://amti.csis.org/exploring-chinas-unmanned-ocean-network/. A PLA daily article described the sensors of having the purpose "to defend islands and reefs in the SCS."; Zhuo Chen, "China Launches New System to Defend Islands and Reefs in South China Sea - China Military," China Military Online, April 1, 2019, http://english.pladaily.com.cn/view/2019-04/01/content_9464939.htm.

162 In addition, China's new ISR-capable high-altitude long-endurance reconnaissance UAVs, the BZK-005 and WZ-7, have shorter radar range but can hover overhead for long-time periods providing "persistent surveillance." Chang, "China's Maritime Intelligence, Surveillance, and Reconnaissance Capability in the South China Sea."

163 Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020," 52.

164 Here defined as "involv[ing] units organized along nation-state boundaries, in offensive and defensive operations, using computers to attack other computers or networks through electronic means." Charles Billo and Welton Chang, "Cyber Warfare: An Analysis of the Means and Motivations of Selected Nation States" (Institute for Security Technology Studies, November 2004), 3, https://cryptome.wikileaks.org/2013/07/cyber-war-racket-0003.pdf.

165 In fact, China has publicly identified cyberspace as critical for its national security. Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020," 61, 83.

166 "Military and Security Involving the People's Republic of China: Annual Report to Congress 2020," 83.

oil tankers."[167] The 2021 attack on the US Colonial Pipeline led to disrupted energy supply and led gasoline prices to reach "its highest levels in six-and-a-half years". Ostensibly carried out by a Russian non-state actor, the question here is what (escalation) ensues in case of a sizable attack against key European infrastructure power projection resources.[168] The US Department of Defense warns that Chinese cyberattacks can disrupt the use of a natural gas pipeline in the United States "for days to weeks."[169]

Like the cyber capabilities, space capabilities are playing an increasingly important role in China's military capabilities. China developed space and counter-space capabilities and developed an anti-satellite (ASAT) weapon, the SC-19. This missile is believed to have been "operationally deployed" to some units and started operational training for its use. The SC-19 is likely a variant of the road-mobile DF-21C MRBM.[170] China's space program creates synergies with its Anti-ship Ballistic Missile (AShBM) program, "including [in the area of] the missile's supporting architecture."[171]

3.8 Conclusion

Today China is the dominant force in its own backyard, gradually pushing US power projection capabilities away from its coast.

Determining that China has made impressive progress in all the capability categories that together make up far-seas military capabilities, China's ability to project power outside the Western Pacific is growing and should achieve a breakthrough within the next ten years. It has achieved parity with, or even surpassed, the United States and its allies in some areas, including missiles and surface support ships, though it still lags in some categories. In sum, the significant military advances it has made since 1996 make it a formidable opponent in its own region, and it is closing in on the ability to project power into the Indian Ocean.

In response to the end of the Cold War and demonstrations of unmatched US power in the 1990s, China undertook the rapid and ambitious modernization and expansion of its military, accelerating its pace over the last decade. This project that been, by any measure, successful. Today China is the dominant force in its own backyard, gradually pushing US power projection capabilities away from its coast.

China has developed almost all capabilities necessary for regional power projection and is in the process of developing extra-regional capabilities. China is on the verge of a breakthrough and will be able to effectively project power extra-regionally within the next ten years. China will not necessarily be able to go toe-to-toe with the US and its allies in all contingencies, but it should be able to mount missions to intimidate and coerce small and medium-sized

167 Jacob Gronholt-Pedersen, "Maersk Says Global IT Breakdown Caused by Cyber Attack," *Reuters*, June 28, 2017, https://www.reuters.com/article/us-cyber-attack-maersk-idUSKBN19I1NO. ; Scott Jasper, "Assessing Russia's Role and Responsibility in the Colonial Pipeline Attack," Atlantic Council, June 1, 2021, https://www.atlanticcouncil.org/blogs/new-atlanticist/assessing-russias-role-and-responsibility-in-the-colonial-pipeline-attack/. & Andy Greenberg, "The Untold Story of NotPetya, the Most Devastating Cyberattack in History," *Wired*, August 22, 2018, https://www.wired.com/story/notpetya-cyberattack-ukraine-russia-code-crashed-the-world.

168 The US DoD's annual assessment of China's military and security capabilities specifically mentions China's "ability to [...] disrupt [...] a natural gas pipeline for days or weeks in the United States,". See Office of the Secretary of Defense, "Military and Security Developments Involving the People's Republic of China 2020," 83.

169 Office of the Secretary of Defense, 83.

170 Brian Weeden, "Current and Future Trends in Chinese Counterspace Capabilities," November 2020, abstract, 24-25.

171 Andrew S. Erickson, *Chinese Anti-Ship Ballistic Missile (ASBM) Development: Drivers, Trajectories, and Strategic Implications* (Brookings Institution Press, 2013), 5, https://www.jstor.org/stable/10.7864/j.ctt1dgn67n.

states through offshore threatening and to protect supply chains in the Indian Ocean, Middle East, and Africa, certainly if not challenged by a peer competitor. China possesses a world-class missile arsenal and fleet of surface support ships but still trails the most advanced Western militaries in terms of the number and sophistication of aircraft carriers and the capabilities of its carrier strike groups (CSGs), specifically in areas such as jet fighters and anti-submarine warfare.

China undertakes enormous efforts to remedy these profound shortcomings still standing in the way of effectively deploying its military capabilities extra-regionally (for a summary of the current shortcomings, see Table 29) and will narrow the gap with the most advanced Western militaries – though by how much remains a matter of debate – by 2035. Towards 2035, demographic, economic, political, technological and security developments may impede the continued development and maintenance of especially China's far seas military capabilities and, to a lesser extent, its near seas capabilities.

Realm	Capability	Kind	Shortcoming
Air	Next-generation fighter (J-20)	Technological	Cannot be used to protect sea-faring naval assets, as it cannot land on aircraft carriers and helicopter carriers; No Vertical Take-Off and Landing (VTOL) ability
Air	Fixed-wing aircraft (J-15 and J-20)	Technological	Limited air fighting capabilities; Even the newest Chinese fighter/ground attack aircraft (J-15 and J-20) suffer engine issues
Air	Helicopters	Technological	CSGs are vulnerable to submarine warfare; As PLA helicopters have limited Anti-Submarine Warfare (ASW) capabilities
Sea	Carrier-strike group	Numerical	Lacks the number of aircraft carriers and cruisers required to project power extra-regionally; as it (as of May 2021) only has two (Liaoning and Shandong) carriers and three commissioned cruisers (with five on the way)
Sea	Aircraft carrier	Technological	Carriers have limited sea-faring range before refueling is required; the PLAN's first two carriers and the third one (on the way) are diesel-fueled, putting severe limitations on how far they can sail without refueling
Sea	Aircraft carrier	Technological	PLAN's current aircraft carriers have limitations in force projection; as they are relatively small as compared to American carriers
Sea	Aircraft carrier	Technological	Carriers have limited situational awareness or "ISR capabilities", as they cannot launch Airborne Early Warning & Control Aircraft; have ski-jump ramps/lack CATOBAR launch systems
Sea	Aircraft carrier	Technological	Limited naval aviation offense and defense as it cannot launch fully fueled aircraft or only with a limited amount of missiles; Has a ski jump ramp; lacks a CATOBAR launch system
Sea; Air	Aircraft carrier	Technological	Limited naval aviation offense and defense; as the PLAN's carriers are protected by the older J-15 and not by China's newest J-20
Sea; Air	Combined	Operational	The PLAN lacks the operational experience (or "tribal knowledge") necessary to operate highly complex Carrier Strike Groups and battle groups even in situations of peace/low-intensity combat – let alone during high-intensity conflict
Missile	Ballistic Missile	Technological	Cannot be used with sufficient precision and safely over long distances; No anti-ship application over longer distances/using ballistic missiles against ships or bases in the Indian Ocean and adjacent waters to shoot over (nuclear-armed) countries

Table 29: Overview of impediments to the PLA's ability to effectively use its Far Seas military capabilities

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