

## V. Chinese nuclear forces

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As of January 2021, China maintained an estimated total inventory of about 350 nuclear warheads. This is an increase of 30 from the previous year, due largely to the indication that the DF-5B intercontinental ballistic missile (ICBM) can carry more warheads than previously believed.<sup>1</sup> Just over 270 warheads are assigned to China's operational land- and sea-based ballistic missiles and to nuclear-configured aircraft (see table 10.6). The remainder are assigned to non-operational forces, such as new systems in development, operational systems that may increase in number in the future, and reserves.

This estimate relies on publicly available information on the Chinese nuclear arsenal. China has never declared the size of its nuclear arsenal. Occasionally, Chinese officials reference open-source estimates as a means to discuss China's nuclear weapon programme publicly or in diplomatic negotiations.<sup>2</sup> As a result, many of the assessments here rely on data from the United States Department of Defense (DOD) and must therefore be treated with a degree of caution.

### **The role of nuclear weapons in Chinese military doctrine**

The Chinese Government's declared aim is to maintain its nuclear capabilities at the minimum level required for safeguarding national security. The goal is 'detering other countries from using or threatening to use nuclear weapons against China'.<sup>3</sup> For decades, China did so with a dyad of mainly liquid-fuelled land-based ballistic missiles and a few sea-based ballistic missiles, with a small stockpile of gravity bombs available for bombers as a semi-dormant back-up capacity. China is now building a fully operational triad of nuclear forces with solid-fuelled land-based missiles, six nuclear-powered ballistic missile submarines (SSBNs), and bombers with a full, re-established nuclear mission in order to strengthen its nuclear deterrence and second-strike capabilities in response to what it sees as a growing threat from other countries.<sup>4</sup>

<sup>1</sup> US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2020*, Annual Report to Congress (DOD: Arlington, VA, 21 Aug. 2020), p. 56.

<sup>2</sup> E.g. Chinese Ministry of National Defense, 'China reiterates it will not join so-called China-US-Russia arms control negotiations', 9 July 2020.

<sup>3</sup> Chinese State Council, *China's National Defense in the New Era* (Information Office of the State Council: Beijing, July 2019), chapter 2.

<sup>4</sup> Fabey, M., 'China on faster pace to develop nuclear triad, according to Pentagon, analysts', *Jane's Navy International*, 3 May 2019; and 'Chinese military paper urges increase in nuclear deterrence capabilities', Reuters, 30 Jan. 2018.

**Table 10.6.** Chinese nuclear forces, January 2021

All figures are approximate and some are based on assessments by the authors.

Type/Chinese designation (US designation)	No. of launchers	Year first deployed	Range (km) <sup>a</sup>	Warheads x yield <sup>b</sup>	No. of warheads <sup>c</sup>
<i>Aircraft</i>	20 <sup>d</sup>				20
H-6K (B-6)	20	2009	3 100	1 x bomb	20
H-6N (B-6N)	–	[2022]	..	1 x ALBM	–
H-20 (B-20)	–	[2020s]	.. ..	.. ..	–
<i>Land-based missiles<sup>e</sup></i>	244				204
DF-4 (CSS-3)	6 <sup>f</sup>	1980	5 500	1 x 3.3 Mt	6 <sup>f</sup>
DF-5A (CSS-4 Mod 1)	10	1981	>12 000	1 x 4–5 Mt	10
DF-5B (CSS-4 Mod 2)	10	2015	12 000	5 x 200–300 kt	50
				MIRV	
DF-5C (CSS-4 Mod 3)	–	..	..	MIRV	–
DF-21A/E (CSS-5 Mod 2/6) <sup>g</sup>	40	1996/2017	2 100	1 x 200–300 kt	40
DF-26 (CSS-18)	100	2016	>4 000	1 x 200–300 kt	20
DF-31 (CSS-10 Mod 1)	6	2006	>7 000	1 x 200–300 kt	6
DF-31A/AG (CSS-10 Mod 2)	72	2007/2018	>11 200	1 x 200–300 kt	72
DF-41 (CSS-20)	–	[2021] <sup>h</sup>	>12 000	3 x 200–300 kt	–
				MIRV	
<i>Sea-based missiles (SLBMs)</i>	4/48 <sup>i</sup>				48 <sup>j</sup>
JL-2 (CSS-N-14)	48	2016	>7 000	1 x 200–300 kt	48
<b>Total stockpile</b>	<b>312</b>				<b>272</b>
Other stored warheads <sup>k</sup>					[78]
<b>Total inventory</b>	<b>312</b>				<b>[350]<sup>k</sup></b>

.. = not available or not applicable; – = nil or a negligible value; [] = uncertain figure; ALBM = air-launched ballistic missile; kt = kiloton; Mt = megaton; MIRV = multiple independently targetable re-entry vehicle; SLBM = submarine-launched ballistic missile.

<sup>a</sup> For aircraft, the listed range is for illustrative purposes only; actual mission range will vary according to flight profile, weapon loading and in-flight refuelling.

<sup>b</sup> Warhead yields are listed for illustrative purposes. Actual yields are not known, except that older missile warheads had Mt yields. Newer long-range missile warheads probably have yields of a few hundred kt.

<sup>c</sup> Figures are based on estimates of 1 warhead per nuclear-capable launcher, except the MIRVed DF-5B, which can carry up to 5 warheads. The DF-26 is a dual-capable launcher. It is thought that its mission is primarily conventional and only a few launchers are assigned nuclear warheads. Only 1 missile load is assumed for nuclear missiles. The warheads are not thought to be deployed on launchers under normal circumstances but kept in storage facilities. All estimates are approximate.

<sup>d</sup> The number of bombers only counts those estimated to be assigned a nuclear role. H-6 bombers were used to deliver nuclear weapons during China's nuclear weapon testing programme (one test used a fighter-bomber) and models of nuclear bombs are exhibited in military museums. It is thought (but uncertain) that a small number of H-6 bombers previously had a secondary contingency mission with nuclear bombs. The US Department of Defense (DOD) reported in 2018 that the People's Liberation Army Air Force has been reassigned a nuclear mission.

<sup>e</sup> China defines missile ranges as short-range, <1000 km; medium-range, 1000–3000 km; long-range, 3000–8000 km; and intercontinental range, >8000 km.

In addition to the nuclear-capable missiles listed in this table, the US Central Intelligence Agency concluded in 1993 that China had 'almost certainly' developed a warhead for the DF-15 (CSS-6), but the warhead does not appear to have been fielded.

<sup>f</sup> Although a few liquid-fuelled DF-4s are still in service, they are thought to be in the process of being retired.

<sup>g</sup> The range of the nuclear-armed DF-21 variants (CSS-5 Mod 2 and Mod 6) is thought to be greater than the 1750 km reported for the original (CSS-5 Mod 1), which has been retired. In 2017 the US Air Force's National Air and Space Intelligence Center (NASIC) reported that China had 'fewer than 50' Mod 2 launchers. The Mod 6 is thought to be a replacement for the Mod 2.

<sup>h</sup> The DF-41 was publicly displayed for the first time in 2019 and is being integrated into training regiments, but as of Jan. 2021 it had not been declared fully operational. The D-41 is thought to be able to carry at least 3 warheads. SIPRI estimates that c. 18 launchers and c. 54 warheads might become operational during or after 2021. See note k.

<sup>i</sup> The first figure is the total number of operational nuclear-powered ballistic missile submarines (SSBNs) in the Chinese fleet; the second is the maximum number of missiles that they can carry. China has 4 operational Type 094 SSBNs, each of which can carry up to 12 SLBMs. Two more Type 094 SSBNs are in development, but were not operational as of Jan. 2021. SIPRI estimates that their armament of 24 additional JL-2 missiles and warheads have probably been produced and might become operational during or after 2021. See note k.

<sup>j</sup> Although Chinese SSBNs conduct patrols, there is no authoritative information suggesting that they have nuclear weapons onboard under normal circumstances.

<sup>k</sup> In addition to the c. 272 warheads estimated to be assigned to operational forces, SIPRI estimates that an additional c. 78 warheads might have been produced to arm China's new DF-41s (c. 54 warheads) and additional JL-2s (c. 24 warheads), for a total estimated inventory of c. 350 warheads. China's inventory is expected to continue to increase.

Sources: US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat*, various years; US Air Force Global Strike Command, various documents; US Central Intelligence Agency, various documents; US Defense Intelligence Agency, various documents; US Department of Defense, *Military and Security Developments Involving the People's Republic of China*, various years; Kristensen, H. M., Norris, R. S. and McKinzie, M. G., *Chinese Nuclear Forces and US Nuclear War Planning* (Federation of American Scientists/Natural Resources Defense Council: Washington, DC, Nov. 2006); *Bulletin of the Atomic Scientists*, 'Nuclear notebook', various issues; Google Earth; and authors' estimates.

Despite the continuing growth in the sophistication and size of its nuclear arsenal, China's ongoing modernization programme (see below) does not, so far, appear to portend changes to its long-standing core nuclear policies, including its no-first-use policy.<sup>5</sup> Although the Chinese military is working to increase the overall readiness of its missile forces, Chinese nuclear warheads are believed to be de-mated from their delivery vehicles—that is, stored separately and not available for immediate use.<sup>6</sup>

Throughout 2020, US officials asserted that there is 'increasing evidence' that China is moving towards adopting a launch-on-warning posture for its land-based ICBMs, which would necessitate the mating of warheads with delivery vehicles; however, while a fully operational SSBN force would require warheads to be loaded on the missiles (see below), there is

<sup>5</sup> US Department of Defense (note 1), p. 86.

<sup>6</sup> Stokes, M. A., *China's Nuclear Warhead Storage and Handling System* (Project 2049 Institute: Arlington, VA, 12 Mar. 2010), p. 8; Li, B., 'China's potential to contribute to multilateral nuclear disarmament', *Arms Control Today*, vol. 41, no. 2 (Mar. 2011); and US Department of Defense (note 1), p. 88.

no publicly available evidence that this has happened yet. Moreover, the evidence of a nascent launch-on-warning posture that US officials have pointed to so far—the development of early-warning systems and new silos for solid-fuelled missiles, in addition to observing the People’s Liberation Army Rocket Forces (PLARF) conducting high-alert and combat readiness drills—appears to be relatively circumstantial.<sup>7</sup>

### **Aircraft and air-delivered weapons**

Medium-range combat aircraft were China’s earliest means of delivering nuclear weapons and were used to conduct more than 12 atmospheric nuclear tests in the 1960s and 1970s. As of 1993, the US National Security Council stated that ‘The [People’s Liberation Army Air Force (PLAAF)] has no units whose primary mission is to deliver China’s small stockpile of nuclear bombs. Rather, some units may be tasked for nuclear delivery as a contingency mission.’<sup>8</sup>

Before 2018, the US DOD’s annual reports on Chinese military developments asserted that PLAAF bombers did not have a nuclear mission. This was probably because China’s older bomb-equipped aircraft were unlikely to be useful in the event of a nuclear conflict. This changed in 2018, when the US DOD assessed that ‘the PLAAF has been newly re-assigned a nuclear mission’.<sup>9</sup> Throughout this time, SIPRI had continued to assess that China maintained a small inventory of gravity bombs for secondary contingency use by H-6 (B-6) bombers.<sup>10</sup> In its 2020 report, the US DOD concluded that China in 2019 had ‘signaled the return of the airborne leg of its nuclear triad after the PLAAF publicly revealed the H-6N (B-6N) as its first nuclear-capable air-to-air refuelable bomber’.<sup>11</sup> Legacy H-6 bombers did not include an air-to-air refuelling probe, which significantly limited their long-range targeting capability.

In 2018 the US Defense Intelligence Agency reported that China was developing two new air-launched ballistic missiles (ALBMs), ‘one of which

<sup>7</sup> US Department of Defense (note 1), pp. 85–88.

<sup>8</sup> US National Security Council, ‘Report to Congress on status of China, India and Pakistan nuclear and ballistic missile programs’, 28 July 1993.

<sup>9</sup> US Department of Defense (DOD), *Military and Security Developments Involving the People’s Republic of China 2017*, Annual Report to Congress (DOD: Arlington, VA, 15 May 2017), p. 61; and US Department of Defense (DOD), *Military and Security Developments Involving the People’s Republic of China 2018*, Annual Report to Congress (DOD: Arlington, VA, 16 May 2018), p. 75.

<sup>10</sup> For the aircraft, missiles and submarines discussed here, a designation in parentheses (in this case B-6) following the Chinese designation (in this case H-6) is that assigned by the USA.

<sup>11</sup> US Department of Defense (note 1), p. 50.

may include a nuclear payload'.<sup>12</sup> The missiles may be variants of the Dong Feng-21, or DF-21 (CSS-5), medium-range ballistic missile (MRBM).<sup>13</sup> The first base to be equipped with this capability might be Neixiang, Henan province.<sup>14</sup> Once deployed, the ALBM 'would provide China for the first time with a viable nuclear triad of delivery systems dispersed across land, sea, and air forces', according to the US DOD.<sup>15</sup> Even so, the 'viability' of the triad would depend on the survivability and capability of each leg.

In addition to the intermediate-range H-6 bomber, the PLAAF is developing its first long-range strategic bomber, known as the H-20 (B-20). The aircraft may have a range of up to 8500 kilometres and a stealthy design. It might be in production within 10 years, according to the US DOD.<sup>16</sup> In its 2020 report, the US DOD also suggested that the H-20 will be able to deliver both conventional and nuclear weapons.<sup>17</sup>

### Land-based missiles

China's nuclear-capable land-based ballistic missile arsenal is undergoing gradual modernization as China replaces ageing silo-based, liquid-fuelled missiles with new mobile, solid-fuelled models and increases the number of road-mobile missile launchers. China's shift towards more survivable mobile missiles has been motivated by concerns that the USA's advances in intelligence, surveillance and reconnaissance (ISR) capabilities and in precision-guided conventional weapons pose a pre-emptive threat to fixed missile launch sites and supporting infrastructure.<sup>18</sup>

<sup>12</sup> Ashley, R., Director, US Defense Intelligence Agency, 'Worldwide threat assessment', Statement for the record, US Senate, Armed Services Committee, 6 Mar. 2018, p. 8. See also US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2019*, Annual Report to Congress (DOD: Arlington, VA, 2 May 2019), p. 67; and US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat 2020* (NASIC: Wright-Patterson Air Force Base, OH, July 2020), p. 37.

<sup>13</sup> Wright, T., 'Chinese PLAAF H-6N pictured carrying large missile', International Institute for Strategic Studies (IISS), 23 Oct. 2020; and Panda, A., 'Revealed: China's nuclear-capable air-launched ballistic missile', *The Diplomat*, 10 Apr. 2018.

<sup>14</sup> Lee, R., 'China's Air Force might be back in the nuclear business', *The Diplomat*, 9 Sep. 2020.

<sup>15</sup> US Department of Defense (note 1), p. 87.

<sup>16</sup> US Office of the Deputy Assistant Secretary of Defense for Nuclear Matters, *Nuclear Matters Handbook 2020* (US Department of Defense: Arlington, VA, Mar. 2020), figure 1.1, p. 3. See also Yeo, M., 'In first, China confirms "new long-range strategic bomber" designation', *Defense News*, 11 Oct. 2018; and Tate, A., 'Details emerge about requirement for China's new strategic bomber', *Jane's Defence Weekly*, 4 Jan. 2017, p. 4.

<sup>17</sup> US Department of Defense (note 1), p. 80.

<sup>18</sup> O'Connor, S., 'Sharpened Fengs: China's ICBM modernisation alters threat profile', *Jane's Intelligence Review*, vol. 27, no. 12 (Dec. 2015), pp. 44–49; and Eveleth, D., 'China's mobile ICBM brigades: The DF-31 and DF-41', *A Boy and His Blog*, 2 July 2020.

*Intercontinental ballistic missiles*

In its 2020 report, the US DOD estimated that China's arsenal includes 100 ICBMs, and that the number of warheads on Chinese ICBMs capable of reaching the USA is expected to grow to 200 by 2025.<sup>19</sup> The silo-based, liquid-fuelled, two-stage DF-5 (CSS-4) family of missiles—which first entered into service in the early 1980s—are currently China's longest-range ICBMs. Along with the road-mobile, solid-fuelled, three-stage DF-31A/AG (CSS-10 Mod 2) ICBM, they are the only operational missiles in China's arsenal capable of targeting all of the continental USA and Europe.<sup>20</sup>

The PLARF has been developing a longer-range ICBM—the road-mobile, solid-fuelled, three-stage DF-41 (CSS-20)—since the late 1990s. The DF-41 has an estimated range in excess of 12 000 km, similar to that of the older DF-5. Rail-mobile and silo-based versions of the missile are believed to be under development.<sup>21</sup> Satellite imagery in 2019 and 2020 indicated that the PLARF was building a significant number of silos—16 so far—at a missile training area near Jilantai, Inner Mongolia, possibly for the DF-41.<sup>22</sup> It also indicated that new silo construction might have started at Sundian, Henan province, in 2017.<sup>23</sup> However, it is unclear whether these silos are intended to achieve an operational capability or if they are just for training; the US DOD assessed in 2020 that Jilantai 'is probably being used to at least develop a concept of operations for silo basing [the DF-41] system'.<sup>24</sup> There have been 11 known flight tests of the DF-41 since 2012. The most recent, in November 2019, was presumably one of the last tests of the system before it becomes operational.<sup>25</sup> The DF-41s are currently being integrated into the first PLARF brigades; and a small number of launchers might reach operational status in 2021.<sup>26</sup>

After many years of research and development, China has modified a small number of ICBMs to deliver nuclear multiple independently targetable re-entry vehicles (MIRVs). This is apparently to improve the penetration capabilities of its warheads in response to advances in US and, to a lesser

<sup>19</sup> US Department of Defense (note 1), p. 56.

<sup>20</sup> US Department of Defense (note 1), p. 56.

<sup>21</sup> US Department of Defense (note 1), p. 56.

<sup>22</sup> Kristensen, H. M., 'China's expanding missile training area: More silos, tunnels, and support facilities', Federation of American Scientists (FAS) Strategic Security Blog, 24 Feb. 2021; and Kristensen, H. M., 'New missile silo and DF-41 launchers seen in Chinese nuclear missile training area', FAS Strategic Security Blog, 3 Sep. 2019.

<sup>23</sup> LaFoy, S. and Eveleth, D., 'Possible ICBM modernization underway at Sundian', Arms Control Wonk, 5 Feb. 2020.

<sup>24</sup> US Department of Defense (note 1), p. 89.

<sup>25</sup> Gertz, B., 'Long-range missile test adds to growing Chinese arsenal', *Washington Times*, 25 Nov. 2019.

<sup>26</sup> US Department of Defense (note 16), p. 3; and US Air Force (note 12), p. 29.

extent, Russian and Indian missile defences.<sup>27</sup> The DF-5B (CSS-4 Mod 2) is a MIRVed variant of the DF-5 that can carry up to five MIRVed warheads, two more than previously assumed.<sup>28</sup> A second variant under development, the DF-5C (CSS-4 Mod 3), can reportedly also carry MIRVed warheads. Some US media reports have suggested that it might be capable of carrying up to 10 warheads, but it seems more likely that it will carry a number similar to the DF-5B version.<sup>29</sup> There has been speculation that the DF-41 is able to carry 6–10 MIRVed warheads, but there is significant uncertainty about the actual capability, and it is likely to carry fewer than its maximum capacity in order to maximize range.<sup>30</sup>

### *Intermediate- and medium-range ballistic missiles*

In 2016 the PLARF began the deployment of the new dual-capable DF-26 (CSS-18) intermediate-range ballistic missile.<sup>31</sup> This missile has an estimated maximum range exceeding 4000 km and can therefore reach targets all over India and the western Pacific Ocean, including the US strategic base on Guam.<sup>32</sup> The missile is equipped with a manoeuvrable re-entry vehicle (MaRV) that is reportedly capable of precision conventional or nuclear strikes against ground targets, as well as conventional strikes against naval targets.<sup>33</sup> In August 2020 China conducted a flight test of a DF-26B, a variant of the DF-26 that could have an anti-ship mission.<sup>34</sup> China appears to be producing the DF-26 in significant numbers, and might have had an inventory of up to 100 launchers as of the beginning of 2021, with many more in production. There were sightings of the missile at several PLARF brigade bases during 2020.<sup>35</sup>

The PLARF currently deploys an estimated 40 nuclear-capable DF-21 (CSS-5) MRBMs. The DF-21 is a two-stage, solid-fuelled mobile missile. The original DF-21 (CSS-5 Mod 1) was first deployed in 1991 but has since been

<sup>27</sup> US Department of Defense (note 12), p. 65; and Lewis, J. G., 'China's belated embrace of MIRVs', eds M. Krepon, T. Wheeler and S. Mason, *The Lure and Pitfalls of MIRVs: From the First to the Second Nuclear Age* (Stimson Center: Washington, DC, May 2016), pp. 95–99.

<sup>28</sup> US Department of Defense (note 12), p. 44; and US Department of Defense (note 1), p. 56.

<sup>29</sup> Gertz, B., 'China tests missile with 10 warheads', Washington Free Beacon, 31 Jan. 2017.

<sup>30</sup> O'Halloran, J. C. (ed.), *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coulsdon, 2015), pp. 21–22; and Gertz, B., 'China flight tests new multiple-warhead missile', Washington Free Beacon, 19 Apr. 2016.

<sup>31</sup> US Department of Defense, *Military and Security Developments Involving the People's Republic of China 2018* (note 9), p. 36; and US Department of Defense (note 12), p. 44.

<sup>32</sup> US Department of Defense (note 1), pp. 59, 81; and Deng, X., 'China deploys Dongfeng-26 ballistic missile with PLA Rocket Force', *Global Times*, 26 Apr. 2018.

<sup>33</sup> Tate, A., 'China touts ASBM capabilities of DF-26', *Janes*, 28 Jan. 2019; and Deng (note 32).

<sup>34</sup> Huang, K., 'Chinese military fires "aircraft-carrier killer" missile into South China Sea in "warning to the United States"', *South China Morning Post*, 26 Aug. 2020; and Pollack, J. H. and LaFoy, S., 'China's DF-26: A hot-swappable missile?', *Arms Control Wonk*, 17 May 2020.

<sup>35</sup> Kristensen, H. M., 'China's new DF-26 missile shows up at base in eastern China', *Federation of American Scientists (FAS) Strategic Security Blog*, 21 Jan. 2020.



retired. An upgraded variant, the DF-21A (CSS-5 Mod 2), was first deployed in 1996 and an enhanced version (CSS-5 Mod 6) was fielded in 2017.<sup>36</sup> Two other versions of the missile (DF-21C and DF-21D) were designed for conventional anti-ship and anti-access/area-denial (A2/AD) missions.<sup>37</sup>

In October 2019 the PLARF paraded 16 new DF-17 (CSS-22) MRBMs carrying hypersonic glide vehicles (HGVs), although the missiles are unlikely to have begun combat deployment as of January 2021.<sup>38</sup> The missile's nuclear capability remains unclear: despite the parade announcer referring to the missiles as conventional, in 2020 the commander of US Strategic Command, Admiral Charles A. Richard, described the DF-17 as a 'strategic nuclear system'.<sup>39</sup> Because of the high level of uncertainty about the status of the DF-17, it is not included in SIPRI's estimate for January 2021.

### Sea-based missiles

In 2020 China continued to pursue its long-standing strategic goal from the early 1980s of developing and deploying a sea-based nuclear deterrent. According to the US DOD's 2020 report, the PLA Navy (PLAN) has constructed six Type 094 SSBNs, although the two latest boats—which are believed to be variants of the original design known as Type 094A—are not yet operational.<sup>40</sup> The US DOD report assessed that the four operational Type 094 SSBNs constitute China's 'first credible, sea-based nuclear deterrent'.<sup>41</sup>

China's four Type 094 submarines can each carry up to 12 three-stage, solid-fuelled Julang-2 (JL-2 or CSS-N-14) submarine-launched ballistic missiles (SLBMs). The JL-2 is a sea-based variant of the DF-31 ICBM. It has an estimated maximum range in excess of 7000 km and is believed to carry a single nuclear warhead.<sup>42</sup>

There has been considerable speculation about whether the missiles on China's SSBNs are mated with warheads under normal circumstances; there appear to be no credible reports that nuclear-armed patrols have commenced. The routine deployment of nuclear weapons on China's SSBNs would constitute a significant change to the country's long-held practice of keeping nuclear warheads in central storage in peacetime and would

<sup>36</sup> ed. O'Halloran (note 30), pp. 15–17.

<sup>37</sup> US Air Force (note 12), p. 22.

<sup>38</sup> New China TV, 'China holds grand gathering, parade on 70th National Day', YouTube, 1 Oct. 2019.

<sup>39</sup> New China TV (note 38); and Richard, C. A., Commander, US Strategic Command, Statement, US Senate, Armed Services Committee, 13 Feb. 2020, p. 4.

<sup>40</sup> US Department of Defense (note 1), p. 45. The Type 094 SSBN is designated the Jin class by the USA and the North Atlantic Treaty Organization (NATO).

<sup>41</sup> US Department of Defense (note 1), p. 45.

<sup>42</sup> US Department of Defense (note 1), p. 45.



pose operational challenges for its nuclear command-and-control arrangements.<sup>43</sup> During a war, geographic choke points and advanced US anti-submarine warfare capabilities could force China to deploy its nuclear submarines in a protective bastion within the South China Sea, rather than sail them past Japan and out into the Pacific Ocean. These constraints significantly limit Chinese SSBNs from targeting the continental USA.

The PLAN is developing its next-generation SSBN, the Type 096. The US DOD predicted in 2020 that construction would probably begin in the early 2020s.<sup>44</sup> Reports vary widely on the design parameters, but the new submarine is expected to be larger and quieter than the Type 094 and might be equipped with more missile launch tubes. Given the expected lifespans of both the current Type 094 and the next-generation Type 096 submarines, the PLAN will probably operate both types of SSBN concurrently. In 2020 the US DOD assessed that China could have up to eight SSBNs by 2030.<sup>45</sup>

The Type 096 will be armed with a successor to the JL-2: the JL-3 SLBM.<sup>46</sup> The new missile is thought to use technologies from the land-based DF-41 ICBM and have a longer range than the JL-2. The US Air Force's National Air and Space Intelligence Center (NASIC) assesses that the JL-3 will be capable of carrying multiple warheads and have a range of more than 10 000 km.<sup>47</sup>

<sup>43</sup> China Power, 'Does China have an effective sea-based nuclear deterrent?', Center for Strategic and International Studies (CSIS), Mar. 2020.

<sup>44</sup> US Department of Defense (note 1), p. 45.

<sup>45</sup> US Department of Defense (note 1), p. 45.

<sup>46</sup> US Department of Defense (note 12), p. 36.

<sup>47</sup> US Air Force (note 12), p. 33.