

V. Chinese nuclear forces

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China maintains an estimated stockpile of about 280 nuclear warheads. The size of the stockpile has remained fairly stable over the past decade but is now increasing slowly. Around 234 warheads are assigned to China's land- and sea-based ballistic missiles. 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. China may also have some residual nuclear air-strike capability (see table 6.6). China's nuclear warheads are believed to be 'de-mated' from their delivery vehicles—that is, stored separately and not available for immediate use.¹

China continues to modernize its nuclear arsenal as part of a long-term programme to develop more survivable and robust forces consistent with its nuclear strategy of assured retaliation. The Chinese Government's stated goal is to 'strengthen [China's] capabilities for strategic deterrence and nuclear counterattack' by improving the 'strategic early warning, command and control, rapid reaction, and survivability and protection' capabilities of its nuclear forces.² In accordance with its self-declared minimum deterrence posture, China has focused on making qualitative improvements to its nuclear arsenal rather than significantly increasing its size.³ These have included the development of new capabilities in response to the ballistic missile defences and precision-guided conventional strike systems being deployed by the United States and other countries.⁴

The Chinese Government has reorganized the country's nuclear forces as part of a larger move to restructure and modernize the military under a streamlined command system.⁵ At the beginning of 2016 it established a new People's Liberation Army (PLA) Rocket Force (PLARF) as the fourth service in China's military. It has command responsibility for all three legs of China's nuclear triad and maintains custodial and operational control over the country's nuclear warheads.⁶ While remaining the 'core force of strategic deterrence', the PLARF has also been put in charge of conventional

¹ Stokes, M. A., *China's Nuclear Warhead Storage and Handling System* (Project 2049 Institute: Arlington, VA, 12 Mar. 2010), p. 8; and Bin, L., 'China's potential to contribute to multilateral nuclear disarmament', *Arms Control Today*, vol. 41, no. 2 (Mar. 2011), pp. 17–21.

² Chinese State Council, *China's Military Strategy*, Defense White Paper, section 4 (Information Office of the State Council: Beijing, May 2015).

³ Cunningham, F. and Fravel, M. T., 'Assuring assured retaliation: China's nuclear posture and US–China strategic stability', *International Security*, vol. 40, no. 2 (fall 2015), pp. 12–15.

⁴ Saalman, L., 'China's calculus on hypersonic glide', SIPRI Commentary, 15 Aug. 2017.

⁵ Chinese Ministry of National Defense, 'China establishes Rocket Force and Strategic Support Force', 1 Jan. 2016.

⁶ Cordesman, A. and Kendall, J., *The PLA Rocket Force: Evolving Beyond the Second Artillery Corps (SAC) and Nuclear Dimension* (Center for Strategic and International Studies: Washington,

missile systems and tasked with strengthening China's medium- and long-range precision strike capabilities.⁷

Chinese officials have emphasized that the reorganization of the country's nuclear command structure does not herald changes to its nuclear policies or strategy. China remains committed to its no-first-use policy on nuclear weapons and has pledged to keep its 'nuclear capability at the minimum level required for safeguarding its national security'.⁸ Nor has the Chinese Government given any indication that it will change its long-standing policy of maintaining nuclear forces at a low level of alert in peacetime. In recent years there have been internal discussions within the Chinese military about raising the alert level and moving towards a more launch-ready posture in order to ensure responsiveness.⁹

Land-based ballistic 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. China's shift towards more survivable mobile missiles has been motivated by concerns that US 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.¹⁰

In its most recent annual report on Chinese military developments, the US Department of Defense (DOD) estimated that China deployed 75–100 intercontinental ballistic missiles (ICBMs) in 2017.¹¹ The silo-based, liquid-fuelled, two-stage Dong Feng (DF)-5A and the road-mobile, solid-fuelled, three-stage DF-31A are currently China's longest-range operational ICBMs and the only missiles in its arsenal capable of targeting all of the continental USA.

China is developing another longer-range ICBM: the road-mobile, solid-fuelled, three-stage DF-41, which has an estimated range in excess of 12 000 kilometres, making it capable of striking targets throughout the

DC, 13 Oct. 2016); and Tiezzi, S., 'The new military force in charge of China's nuclear weapons', *The Diplomat*, 5 Jan. 2016.

⁷ Chinese Ministry of National Defense (note 5).

⁸ Xinhau, 'China's nuclear policy, strategy consistent: spokesperson', 1 Jan. 2016.

⁹ See Heginbotham, E. et al. (eds), *China's Evolving Nuclear Deterrent: Major Drivers and Issues for the United States* (RAND Corporation: Santa Monica, CA, 2017), pp. 131–33; and Kulacki, G., 'China's military calls for putting its nuclear forces on alert', Union of Concerned Scientists, Jan. 2016.

¹⁰ 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.

¹¹ US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2017*, Annual Report to Congress (DOD: Washington, DC, May 2017), p. 31.

Table 6.6. Chinese nuclear forces, January 2018

Type/Chinese designation (US designation)	Launchers deployed	Year first deployed	Range (km) ^d	Warheads x yield	No. of warheads ^b
<i>Land-based ballistic missiles^c</i>	131 ^d				186
DF-4 (CSS-3)	5	1980	5 500	1 x 3.3 Mt	10
DF-5A (CSS-4 Mod 2)	10	2015	12 000	3 x 200–300 kt	10
DF-5B (CSS-4 Mod 3)	10	MIRV	30
DF-15 (CSS-6 Mod 1)	..	1994	600	(1 x 10–50 kt)	.. ^e
DF-21 (CSS-5 Mods 1/2)	<50	1991	2 100 ^f	1 x 200–300 kt	80
DF-21 (CSS-5 Mod 6)	..	2016	2 100 ^f	1 x 200–300 kt	..
DF-26 (CSS-.)	16	(2018)	>4 000	1 x 200–300 kt	16
DF-31 (CSS-10 Mod 1)	8	2006	>7 000	(1 x 200–300 kt)	8
DF-31A (CSS-10 Mod 2)	32	2007	>11 200	(1 x 200–300 kt)	32
DF-31AG (CSS-10 Mod .)	..	(2018)
DF-41 (CSS-X-20)	..	(2018)	(12 000)	MIRV	..
<i>Sea-based ballistic missiles^g</i>	48				48 ^h
JL-2 (CSS-NX-14)	48	(2016)	>7 000	(1 x 200–300 kt)	48
<i>Aircraftⁱ</i>	(20)				(20)
H-6 (B-6)	(20)	1965	3 100	1 x bomb/ (ALCM)	(20)
Attack (.)	..	1972–..	..	1 x bomb	..
<i>Cruise missiles^j</i>
Total					280^k

.. = not available or not applicable; () = uncertain figure; ALCM = air-launched cruise missile; kt = kiloton; Mt = megaton; MIRV = multiple independently targetable re-entry vehicle.

^a Aircraft range is for illustrative purposes only; actual mission range will vary according to flight profile and weapon loading.

^b Figures are based on estimates of 1 warhead per nuclear-capable launcher, except the MIRVed DF-5B, which is estimated to have 3 warheads. The DF-4 and DF-21 have reload missiles with additional warheads. The warheads are not thought to be deployed on launchers under normal circumstances but kept in storage facilities. All estimates are approximate.

^c China defines missile ranges as short range, <1000 km; medium range, 1000–3000 km; long range, 3000–8000 km; and intercontinental range, >8000 km.

^d The estimate only counts nuclear launchers. Some launchers might have 1 or more reloads of missiles.

^e The US Central Intelligence Agency concluded in 1993 that China had ‘almost certainly’ developed a warhead for the DF-15, although it is unclear whether the capability was ever fielded.

^f The range of the nuclear DF-21 variants (CSS-5 Mods 1, 2, and 6) is thought to be greater than the 1750 km normally reported.

^g The JL-1 submarine-launched ballistic missile (SLBM), which dates from the 1980s, is no longer considered to be operational.

^h The estimate is based on the assumption that warheads have been produced for the JL-2 SLBMs on China’s 4 Type 094 (Jin class) nuclear-powered ballistic missile submarines (SSBNs). The operational status of the missile is unclear.

ⁱ Chinese aircraft do not currently have a nuclear weapon delivery mission but it is assumed here that some residual nuclear capability exists.

^j The US Air Force National Air and Space Intelligence Center’s (NASIC) 2013 assessment on ballistic and cruise missile threats listed the DH-10 ground-launched cruise missile as

'conventional or nuclear' and the US Air Force Global Strike Command's command brief from 2013 listed the CJ-20 as nuclear. These designations were not used in the NASIC 2017 assessment on ballistic and cruise missile threats but it is possible that China is developing nuclear-capable cruise missiles.

^k As well as the c. 254 warheads thought to be assigned to operational forces (which includes the estimate for residual air-strike capability), a further 26 or so warheads are believed to be in storage or production to arm additional DF-26s and future DF-41 missiles. The total stockpile is believed to comprise c. 280 warheads and is slowly increasing.

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; International Institute for Strategic Studies, *The Military Balance 2018* (Routledge: London, 2018); 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); 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; Google Earth; and authors' estimates.

continental USA.¹² It is also believed to be developing rail- and silo-based versions of the missile.¹³ According to a Chinese state media report in 2017, the DF-41 could enter service in the first half of 2018.¹⁴ The PLARF carried out a flight test of a DF-41 ICBM, apparently carrying two dummy warheads, near the South China Sea on 6 November 2017. This was the eighth test of the system since 2012.¹⁵

After many years of research and development, China has modified a small number of ICBMs to deliver nuclear warheads in multiple independently targetable re-entry vehicles (MIRVs). China has prioritized the deployment of MIRVs in order to improve its warhead penetration capabilities in response to advances in US and, to a lesser extent, Indian and Russian missile defences.¹⁶ The missile identified as being MIRV-equipped is a modified version of the liquid-fuelled, silo-based DF-5A ICBM, the DF-5B.¹⁷ In February 2017 the Chinese Ministry of National Defense acknowledged the test launch of a new variant of the missile, the DF-5C, and cited US media reports that it might carry as many as 10 warheads. However, it did not confirm the reports.¹⁸ The deployment of MIRVs on the ageing DF-5 missiles may have

¹² Gady, F. S., 'China tests new missile capable of hitting entire United States', *The Diplomat*, 19 Aug. 2015.

¹³ O'Halloran, J. (ed.), 'DF-41', *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coulsdon, 2015), pp. 21–22.

¹⁴ Deng, X., 'Missile Dongfeng-41 matures considerably, will serve PLA within months: analysts', *Global Times*, 19 Nov. 2017.

¹⁵ Gertz, B., 'China confirms DF-41 missile test', *Washington Free Beacon*, 6 Dec. 2017.

¹⁶ Lewis, J., '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.

¹⁷ US Department of Defense (note 11).

¹⁸ Chinese Ministry of National Defense, 'China says its trial launch of DF-5C missile normal', Press release, 6 Feb. 2017; and Gertz, B., 'China tests missile with 10 warheads', *Washington Free Beacon*, 31 Jan. 2017.

been an interim arrangement necessitated by delays in the development of the DF-41 mobile ICBM.¹⁹ Chinese analysts have speculated that the DF-41 can carry 6–10 MIRVed warheads, although there is significant uncertainty about the actual capability.²⁰ In 2017 Chinese state media reports indicated that a new variant of the DF-31A ICBM, the DF-31AG, might be armed with MIRVed warheads.²¹ However, MIRVed warheads would require a significantly modified DF-31A missile, which according to the US Air Force National Air and Space Intelligence Center (NASIC) carries only one warhead.²² The DF-31AG might therefore be an improved launcher for the existing DF-31A.

In 2016 China began deploying the new DF-26 intermediate-range ballistic missile (IRBM), which is capable of precision conventional or nuclear strikes against ground targets, as well as conventional strikes against naval targets. It has an estimated maximum range exceeding 4000 km and can reach targets in the western Pacific Ocean, including the US territory of Guam.²³

The PLARF currently deploys one nuclear-capable medium-range ballistic missile. The DF-21 is a two-stage, solid-fuelled mobile missile that was first deployed in 1991. A modified version, the DF-21A, was deployed beginning in 1996.²⁴ Reports indicate that a new version of the DF-21 was deployed in 2016.²⁵

Ballistic missile submarines

China continues to pursue its long-standing strategic goal of developing and deploying a sea-based nuclear deterrent. According to the US DOD's 2017 annual report on China's military power, the PLA Navy (PLAN) has commissioned four Type 094 nuclear-powered ballistic missile submarines (SSBNs).²⁶ A fifth submarine with a modified hull structure, designated by some sources as the Type 094A, may be under construction.²⁷

¹⁹ Minnick, W., 'Chinese parade proves Xi in charge', *Defense News*, 6 Sep. 2015.

²⁰ Deng (note 14); and Gertz (note 15).

²¹ Fisher, R., 'DF-31AG ICBM can carry multiple warheads, claims China's state media', *Jane's Defence Weekly*, 16 Aug. 2017, p. 9.

²² US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson Air Force Base, OH, July 2017), p. 29.

²³ US Department of Defense (note 11), pp. 31, 49; and Wilson, J., 'China's expanding ability to conduct conventional missile strikes on Guam', US–China Economic and Security Review Commission, Staff Research Report, 10 May 2016, p. 8.

²⁴ O'Halloran, J. (ed.), 'DF-21', *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coulsdon, 2015), pp. 15–17. Two subsequent versions of the missile were designed for conventional anti-ship and anti-access/area-denial (A2/AD) missions.

²⁵ US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2016*, Annual Report to Congress (DOD: Washington, DC, May 2016), p. 58.

²⁶ US Department of Defense (note 11), p. 24. The Type 094 SSBN is designated the Jin class by the United States and the North Atlantic Treaty Organization.

²⁷ Fisher, R., 'Images show possible new variant of China's Type 094 SSBN', *Jane's Defence Weekly*, 15 July 2016.

The Type 094 submarine can carry up to 12 three-stage, solid-fuelled JL-2 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. The PLAN is thought to have deployed the JL-2 SLBM. According to the US DOD's 2017 annual report, the four operational Type 094 SSBNs are equipped to carry up to 12 JL-2s.²⁸

There has been considerable speculation about when a Type 094 SSBN carrying nuclear-armed JL-2 SLBMs will begin deterrence patrols. Although there were media reports in 2016 that China would soon commence patrols, there was no evidence in 2017 that they had begun.²⁹ In May 2017 the Director of the US Defense Intelligence Agency, Lieutenant General Vincent R. Stewart, stated that, when armed with a JL-2 SLBM, the PLAN's Type 094 SSBN 'will provide Beijing with its first sea-based nuclear deterrent'.³⁰ The annual US DOD reports on China's military power have been predicting since 2014 that commencement of submarine deterrence patrols was imminent, but the 2017 report does not refer to the issue. The routine deployment by China of nuclear weapons on its SSBNs would constitute a significant change to the country's long-held practice of keeping nuclear warheads in central storage in peacetime.

The PLAN is developing its next-generation SSBN, the Type 096. In 2017 the US DOD assessed that construction is likely to begin in the early 2020s.³¹ Reports vary widely on the design parameters, but the new submarine is expected to be larger, quieter and equipped with more missile launch tubes than the Type 094. The Type 096 will reportedly be armed with a longer-range successor to the JL-2, the JL-3 SLBM.³²

Aircraft and cruise missiles

According to the US DOD's 2017 annual report on China's military power, the PLA Air Force (PLAAF) 'does not currently have a nuclear mission'.³³ However, it is likely that some residual nuclear capability exists. In 2016 the

²⁸ US Department of Defense (note 11), p. 60.

²⁹ Borger, J., 'China to send nuclear-armed submarines into Pacific amid tensions with US', *The Guardian*, 26 May 2016.

³⁰ Stewart, V. R., Director, US Defense Intelligence Agency, Statement for the Record, 'World-wide Threat Assessment', Armed Services Committee, US Senate, 23 May 2017, p. 10.

³¹ US Department of Defense (note 11), p. 24.

³² Dempsey, J. and Boyd, H., 'Beyond JL-2: China's development of a successor SLBM continues', Military Balance blog, International Institute for Strategic Studies, 7 Aug. 2017.

³³ US Department of Defense (note 11), p. 61. 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. Norris, R., Burrows, A. S. and Fieldhouse, R. W., *Nuclear Weapons Databook, vol. 5: British, French, and Chinese Nuclear Weapons*, National Resources Defense Council (Westview Press: Boulder, CO, 1994), pp. 367–68.

PLAAF confirmed reports in the Chinese state media that it was building a long-range strategic bomber.³⁴ According to Chinese military sources, the aircraft, known as the H-20, will have stealth characteristics comparable to those of the US B-2 bomber.³⁵ The PLAAF was reportedly assigned a 'strategic deterrence' mission in 2012.³⁶ However, it has not confirmed whether the new aircraft will have a nuclear role.

The PLA currently deploys or is believed to be developing several types of ground-, sea- and air-launched cruise missiles. In its 2017 assessment of ballistic missile and cruise missile threats, NASIC did not list any Chinese cruise missile as being nuclear-capable.³⁷ In its previous assessment, published in 2013, NASIC had listed the ground-launched Donghai-10 (DH-10, also designated Changjian-10, CJ-10) as a 'conventional or nuclear' (dual-capable) system. In his statement in May 2017, Stewart noted that China was developing two new air-launched ballistic missiles, 'one of which may include a nuclear payload', but he did not identify the systems.³⁸

³⁴ Zhao, L., 'PLA Air Force commander confirms new strategic bomber', *China Daily*, 2 Sep. 2016; and Zhao, L., 'Long-range bomber may be in China's plans', *China Daily*, 7 July 2015.

³⁵ Tate, A., 'Details emerge about requirement for China's new strategic bomber', *Jane's Defence Weekly*, 4 Jan. 2017, p. 4.

³⁶ US Department of Defense (note 25), p. 38.

³⁷ US Air Force, National Air and Space Intelligence Center (note 22).

³⁸ Stewart (note 30).