

V. Chinese nuclear forces

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China maintains an estimated total stockpile of about 250 nuclear warheads and is increasing its stockpile slightly and slowly.¹ It is widely believed that in peacetime China stores its nuclear warheads in storage facilities separate from their delivery vehicles and that they are not ready for immediate launch.² Of its planned triad of land, air and maritime nuclear forces, only the land-based ballistic missiles and nuclear-configured aircraft are currently considered operational: about 180 warheads are assigned to these forces. None are deployed on delivery systems—instead, they are thought to be in central storage. The remaining warheads are assigned to non-operational forces, including new systems that are under development, operational systems that will increase in number in the future and spares (see table 6.6).

The Second Artillery of the People's Liberation Army (PLA, China's army) maintains control over China's nuclear arsenal and land-based missiles through a centralized management system. Missile units appear to be organized into six geographically dispersed basing areas and one central storage facility.³ The Second Artillery reports directly to the Chinese Government's Central Military Commission (CMC), chaired by President Xi Jinping.⁴

According to high-ranking Chinese officials, the ongoing modernization of China's nuclear arsenal is part of a long-term programme that can be linked to improvements being made by other countries in advanced offen-

¹ This estimate is in line with US Government estimates. In 2012 the Commander of the US Strategic Command, Gen. Robert Kehler, stated that 'the Chinese arsenal is in the range of several hundred' nuclear warheads. The US Central Intelligence Agency (CIA) estimated the size of the Chinese stockpile at 200–300 warheads in 1996 and 200–250 warheads in 1993. Kristensen, H. M., 'STRATCOM Commander rejects high estimates for Chinese nuclear arsenal', Strategic Security, Federation of American Scientists, 22 Aug. 2012, <<http://fas.org/blogs/security/2012/08/china-nukes/>>; US Central Intelligence Agency, Directorate of Intelligence, *Proliferation Digest*, DI PD 96-003CX, 29 Mar. 1996, <http://www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0000996348.pdf>; and US Central Intelligence Agency, Directorate of Intelligence, Office of Scientific and Weapons Research, 'China's nuclear weapons testing: facing prospects for a comprehensive test ban', Intelligence memorandum, 30 Sep. 1993, <http://www.foia.cia.gov/sites/default/files/document_conversions/89801/DOC_0000996367.pdf>, p. 3.

² See e.g. Zhang, H., 'China', ed. R. Acheson, *Assuring Destruction Forever: Nuclear Weapon Modernization around the World* (Reaching Critical Will: New York, 2012), p. 17; and Stokes, M. A., *China's Nuclear Warhead Storage and Handling System* (Project 2049 Institute: Arlington, VA, 12 Mar. 2010).

³ Stokes (note 2), p. 7.

⁴ Gill, B. and Medeiros, E. S., 'China', eds H. Born, B. Gill and H. Hänggi, SIPRI, *Governing the Bomb: Civilian Control and Democratic Accountability of Nuclear Weapons* (Oxford University Press: Oxford, 2010), p. 147.

Table 6.6. Chinese nuclear forces, January 2014

Type/Chinese designation (US designation)	No. deployed	Year first deployed	Range (km) ^a	Warhead loading	No. of warheads
<i>Land-based missiles</i>	<i>-150^b</i>				<i>~140</i>
DF-3A (CSS-2) ^c	..	1971	3 000	1 x 3.3 Mt	..
DF-4 (CSS-3)	-10-15	1980	5 500	1 x 3.3 Mt	-10-15
DF-5A (CSS-4)	20	1981	13 000	1 x 4-5 Mt	20
DF-15 (CSS-6 Mod 1)	..	1994	600	(1 x 10-50 kt)	..
DF-21 (CSS-5 Mods 1, 2)	<100	1991	2 100 ^d	1 x 200-300 kt	~80
DF-31 (CSS-10 Mod 1)	-5-10	2006	>7 200	(1 x 200-300 kt)	-5-10
DF-31A (CSS-10 Mod 2)	~20	2007	>11 200	(1 x 200-300 kt)	~20
New ICBM (..)	-	1 x .. ^e	..
<i>SLBMs</i>	<i>(48)</i>				<i>(48)</i>
JL-1 (CSS-N-3)	(12)	1986	>1 700	1 x 200-300 kt	(12)
JL-2 (CSS-NX-14)	(36)	(2014)	>7 000	(1 x 200-300 kt)	(36)
<i>Aircraft^f</i>	<i>~20</i>				<i>(~40)</i>
H-6 (B-6)	~20	1965	3 100	1 x bomb	(~20)
Attack (..)	..	1972-..	..	1 x bomb	(~20)
<i>Cruise missiles</i>	<i>150-350</i>				..
DH-10 GLCM ^g	150-350	2007	>1 500	1 x
(CJ-20 ALCM) ^h	..	(2014)	>1 500	1 x
Total					(~250)ⁱ

.. = not available or not applicable; - = zero; () = uncertain figure; ALCM = air-launched cruise missile; GLCM = ground-launched cruise missile; ICBM = intercontinental ballistic missile; kt = kiloton; Mt = Megaton; SLBM = submarine-launched ballistic missile.

^a Aircraft range is for illustrative purposes only; actual mission range will vary.

^b Some launchers might have 1 or more reloads of missiles.

^c The last DF-3A-equipped brigade appears to have been converted to DF-21.

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

^e According to the US Department of Defense, 'China may also be developing a new road-mobile ICBM, possibly capable of carrying a multiple independently targetable re-entry vehicle (MIRV)'. China has researched MIRVs for several decades and the single-warhead DF-5A has been considered a potential carrier for many years.

^f Figures for aircraft are for nuclear-configured versions only. The nuclear role of aircraft is uncertain and, if it exists, is only a secondary mission.

^g The US Air Force's National Air and Space Intelligence Center (NASIC) lists the DH-10 as 'conventional or nuclear', the same designation used for the Russian AS-4 and Pakistani Babur and Ra'ad nuclear-capable cruise missiles.

^h US Air Force Global Strike Command lists the CJ-20 as nuclear capable; NASIC does not.

ⁱ Additional warheads are thought to be in storage or production to arm future DF-31A and JL-2 missiles as well as cruise missiles. The total stockpile is believed to comprise c. 250 warheads and is slowly increasing.

Sources: US Department of Defense, *Military and Security Developments Involving the People's Republic of China*, various years; US Department of Defense, *Military Power of the People's Republic of China*, various years; US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat*, various years; US Air Force Global Strike Command; US Central Intelligence Agency, various documents; Kristensen, H. M., Norris, R. S. and

McKinzie, M. G., *Chinese Nuclear Forces and U.S. Nuclear War Planning* (Federation of American Scientists/Natural Resources Defense Council: Washington, DC, Nov. 2006); Norris, R. S. et al., *Nuclear Weapons Databook*, vol. 5, *British, French, and Chinese Nuclear Weapons* (Westview: Boulder, CO, 1994); 'Nuclear notebook', *Bulletin of the Atomic Scientists*, various issues; Google Earth; and authors' estimates.

sive and defensive non-nuclear weapon systems that might threaten China's nuclear forces. The modernization of China's nuclear forces is aimed at developing a more survivable force and strengthening its nuclear retaliatory capabilities. To achieve these goals, China is focusing on qualitative modernization, rather than a simple increase in the number of nuclear weapons.⁵

The latest of China's biennial Defence White Papers, published in April 2013, repeated the Second Artillery's principle of building a 'lean and effective force' but omitted an explicit mention of China's long-standing no-first-use pledge.⁶ This generated a debate among China experts and officials on whether this indicated that China might be changing its position on nuclear weapons.⁷ However, high-ranking Chinese military representatives and other Western experts clarified that no-first-use remained the cornerstone of China's nuclear policy.⁸ Chinese officials also reaffirmed China's long-standing no-first-use policy in statements at international forums, such as the the Conference on Disarmament.⁹

In late 2013 and early 2014, Chinese Government news outlets showed several exercises and operations involving nuclear-capable weapon systems. In October 2013 China Central Television (CCTV) broadcast video of naval operations that included new and old footage of nuclear-powered ballistic missile submarines (SSBNs) of the PLA Navy (PLAN, China's navy).¹⁰ In January 2014 a PLA-affiliated website showed photos of a Dong

⁵ See e.g. Hu, S., [The road towards China's nuclear weapons], *Huánqiú kǒxué*, no. 12 (2007).

⁶ Chinese State Council, *The Diversified Employment of China's Armed Forces*, Defence White Paper (Information Office of the State Council: Beijing, Apr. 2013), chapter II.

⁷ E.g. Acton, J. M., 'Is China changing its position on nuclear weapons?', *New York Times*, 18 Apr. 2013.

⁸ See e.g. Yao, Y., 'China will not change its nuclear policy', China-US Focus, 22 Apr. 2013, <<http://www.chinausfocus.com/peace-security/china-will-not-change-its-no-first-use-policy/>>; Fravel, M. T., 'China has not (yet) changed its position on nuclear weapons', *The Diplomat*, 22 Apr. 2013, <<http://thediplomat.com/2013/04/china-has-not-yet-changed-its-position-on-nuclear-weapons/>>; and Acton, J. M., 'Debating China's no-first-use commitment: James Acton responds', Carnegie Endowment for International Peace, 22 Apr. 2013, <<http://carnegieendowment.org/2013/04/22/debating-china-s-no-first-use-commitment-james-acton-responds/g0lx>>.

⁹ E.g. Wu, H., Permanent Representative of China, Statement to the Conference on Disarmament, Geneva, 26 Mar. 2013, <http://www.reachingcriticalwill.org/images/documents/Disarmament-fora/cd/2013/Statements/26March_China.pdf>.

¹⁰ [Secret Chinese Navy nuclear submarine force shown for the first time], China Central Television, 27 Oct. 2013, <<http://www.chinanews.com/shipin/2013/10-27/news316598.shtml>> (in Chinese); and [Secret Chinese Navy nuclear submarine force shown for the first time], Xinhua, 28 Oct. 2013, <http://news.xinhuanet.com/mil/2013-10/28/c_125612654.htm> (in Chinese).

Feng-21 (DF-21) launch drill by the Second Artillery.¹¹ While the Chinese media justified the displays as meeting Western demands for military transparency, others suggested that China may be using this selective transparency to display its military strength.¹²

China is estimated to possess the smallest inventories of military highly enriched uranium (HEU) and plutonium of the five legally recognized nuclear weapon states (see section X below). Although China has never officially declared a formal moratorium on fissile material production for military purposes, it is believed to have ceased military HEU production at some time between 1987 and 1989 and military plutonium production in 1991. The current inventories mean that China could not significantly expand its nuclear warhead stockpile without restarting production of military fissile material.

Land-based ballistic missiles

China is modernizing its land-based ballistic missiles and replacing ageing liquid-fuelled missiles with newer road-mobile and solid-fuelled models.

China's nuclear-capable ballistic missile arsenal consists of approximately 140 missiles of seven types. One of China's oldest ballistic missiles, the liquid-fuelled, single-stage DF-3A, appears to have been replaced by the newer road-mobile, solid-fuelled, two-stage DF-21 medium-range ballistic missile (MRBM), which acts as a regional nuclear deterrent. Additionally, China fields the road-mobile, solid-fuelled, three-stage DF-31 intercontinental ballistic missile (ICBM), which is capable of reaching Alaska in the western United States, Russia and Europe. The DF-31 ICBM is replacing the ageing liquid-fuelled, two-stage DF-4 ballistic missile.

The liquid-fuelled, two-stage DF-5A and the road-mobile, solid-fuelled, three-stage DF-31A, both with an estimated range of over 11 000 kilometres, are China's furthest-reaching ICBMs. It remains unclear whether the Second Artillery will replace the ageing DF-5A, which has recently been upgraded, with the DF-31A or will maintain both missile systems.

The US Department of Defense (DOD) assesses that 'China may also be developing a new road-mobile ICBM, possibly capable of carrying a multiple independently targetable re-entry vehicle (MIRV)' and equipped

¹¹ [A unit of the Second Artillery], 21 Jan. 2014, <http://photo.chinamil.com.cn/pla/2014-01/21/content_5743847.htm> (in Chinese).

¹² For the former view see e.g. 'Demystifying nuclear subs a welcome move', *Global Times*, 29 Oct. 2013, <<http://www.globaltimes.cn/content/820956.shtml>>. For the latter view see e.g. Weitz, R., 'Global insights: nuclear displays show that China has learned to love the bomb', *World Politics Review*, 19 Nov. 2013, <<http://www.worldpoliticsreview.com/articles/13389/global-insights-nuclear-displays-show-that-china-has-learned-to-love-the-bomb>>; and Chan, M., 'China's nuclear missile drill seen as warning to US not to meddle in region', *South China Morning Post*, 23 Jan. 2014.

with penetration aids.¹³ The US Air Force National Air and Space Intelligence Center (NASIC) has made the same assessment.¹⁴ China has been researching MIRVs for decades and has had the capability to deploy multiple warheads on the DF-5A for years but has not done so. The increasing efforts to field road-mobile, solid-fuel nuclear-capable ICBMs reflect the Second Artillery's emphasis on increasing the survivability and mobility of its nuclear forces. However, according to the US DOD, the Second Artillery has relatively limited experience in managing mobile missile patrols, which could pose serious challenges for China's current command and control structures.¹⁵

China is also expanding its conventional ballistic missile programme. The dual-capable (i.e. both conventional and nuclear-capable) DF-15 short-range ballistic missile (SRBM) has been deployed since the mid-1990s and two conventional versions of the DF-21 are being deployed: the DF-21C and the DF-21D anti-ship missile. Mixing conventional and nuclear missiles poses a critical risk of mistaken escalation of a conflict, as an adversary would not be able to determine whether a missile that has been launched is armed with a conventional or a nuclear warhead.¹⁶

Ballistic missile submarines

China has encountered considerable difficulties in developing a sea-based nuclear deterrent.¹⁷ The PLAN has built a single Type 092 (designated Xia class by NATO) SSBN equipped to carry 12 solid-fuelled, two-stage Ju Lang-1 (JL-1) submarine-launched ballistic missiles (SLBMs). The JL-1 is the sea-based derivative of the DF-21. The submarine has never conducted a deterrent patrol and is not thought to be fully operational, despite several refits.

The PLAN has developed a successor SSBN, the Type 094 (designated Jin class by NATO). According to the US DOD, three Type 094 SSBNs are in operational service (without missiles), and it projects that the PLAN will

¹³ US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2013*, Annual Report to Congress (DOD: Washington, DC, May 2013), p. 6. The 2012 version of the report had not reiterated this statement. Media and expert reports often refer to a possible next generation ICBM as DF-41.

¹⁴ US Air Force, National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*, NASIC-1031-0985-13 (NASIC: Wright-Patterson Air Force Base, July 2013), p. 19.

¹⁵ US Department of Defense (note 13), p. 32.

¹⁶ Some analysts also believe nuclear and conventional DF-21 missiles are mixed at the same bases. Lewis, J. W. and Xue, L., 'Making China's nuclear war plan', *Bulletin of the Atomic Scientists*, vol. 68, no. 5 (Sep./Oct. 2012). Other analysts believe nuclear and conventional missiles are deployed at separate bases.

¹⁷ For a comprehensive overview of China's submarine bases and facilities see Patton, T., Podvig, P. and Schell, P., *A New START Model for Transparency in Nuclear Disarmament: Individual Country Reports* (United Nations Institute for Disarmament Research: Geneva, 2013), pp. 13–16.

construct up to five boats.¹⁸ One is believed to be associated with the PLAN's North Sea Fleet, with its home port at Jianggezhuang near Qingdao, and at least one with the South Sea Fleet, with its home port at Yulin on the island of Hainan.¹⁹ It remains unclear how many Type 094 SSBNs China intends to build. Evidence of a fourth boat being constructed may have been provided by commercial satellite imagery taken in October 2013 that shows a Type 094 SSBN in dry dock at the Bohai shipyard in Huludao, Liaoning province, China's submarine-production facility.²⁰ However, this may be one of the first three SSBNs.

The Type 094 SSBN can be armed with up to 12 three-stage, solid-fuelled JL-2 SLBMs (the sea-based derivative of the DF-31). In March 2014, Admiral Samuel J. Locklear, US Navy Commander of the US Pacific Command, projected that the Type 094-JL-2 combination could become operational before the end of 2014.²¹ The JL-2 programme has encountered several delays due to technical difficulties in the past. According to unconfirmed reports, what might have been a series of final JL-2 flight tests conducted from a Type 094 SSBN occurred in January and August 2012.²²

Chinese SSBNs have yet to conduct a deterrent patrol but may do so in the near future. It remains to be seen if China will send SSBNs to sea with nuclear warheads installed on the JL-2 SLBMs. The CMC has traditionally been reluctant to hand over nuclear warheads to the military services in peacetime. An alternative posture could potentially be that China will operate the SSBNs without nuclear-armed missiles and leave the option to deploy warheads until a crisis.

Although the future roles and missions of its current and future SSBN fleet remain uncertain, the US DOD has reiterated its concerns that the progress in China's sea-based nuclear forces will also pose challenges to the PLAN's existing command and control structures, as it has no operational experience in managing SSBNs on patrol.²³

¹⁸ US Department of Defense (note 13), pp. 4, 6.

¹⁹ Wu, R., 'Survivability of China's sea-based nuclear forces,' *Science & Global Security*, vol. 19, no. 2 (2011), pp. 94–96.

²⁰ Kristensen, H. M., 'China SSBN fleet getting ready—but for what?', Strategic Security, Federation of American Scientists, 25 Apr. 2014, <<http://fas.org/blogs/security/2014/04/chinassbnfleet/>>.

²¹ Locklear, S. J. (Adm.), Statement on US Pacific Command posture before the US Senate Committee on Armed Services, 25 Mar. 2014, <<http://www.armed-services.senate.gov/hearings/114-03-25-us-pacific-command-and-us-forces-korea>>, p. 10.

²² Richardson, D., 'Chinese Navy conducts series of Julang-2 SLBM firings', *Jane's Missiles and Rockets*, vol. 16, no. 3 (Mar. 2012), p. 10; and Gertz, B., 'Ready to launch', Washington Free Beacon, 21 Aug. 2012, <<http://freebeacon.com/national-security/ready-to-launch/>>.

²³ US Department of Defense (note 13), p. 32.

Aircraft and cruise missiles

The PLA Air Force (PLAAF) is believed to maintain a small number of gravity bombs to be delivered by the H-6 medium-range bomber and potentially also a shorter-range combat aircraft. Nevertheless, the PLAAF is not believed to have units whose primary mission is to deliver nuclear bombs.²⁴

The PLA operates several types of cruise missile. However, only the ground-launched Donghai-10 (DH-10, also designated Changjian-10, CJ-10), has been reported as being possibly nuclear capable.²⁵ Relatively little is known about the DH-10's technical characteristics, and claims about its derivation and classification are inconsistent.²⁶ According to unconfirmed media reports in 2012, a sea-launched version of the DH-10 also appears to be under development, although no known sources have credited that version with potential nuclear capability.²⁷

China is also developing an air-launched land-attack cruise missile, which some sources refer to as the CJ-20, a derivative of the DH-10, possibly for delivery by an upgraded version of the H-6 aircraft.²⁸ A command briefing published by the US Air Force Global Strike Command in 2013 listed the CJ-20 as nuclear capable, but NASIC's 2013 report did not list the missile at all.²⁹

²⁴ US National Security Council, 'Report to Congress on the status of China, India and Pakistan nuclear and ballistic missile programs', 28 July 1993, obtained under the US Freedom of Information Act by the Federation of American Scientists, <<http://fas.org/irp/threat/930728-wmd.htm>>.

²⁵ The US Air Force refers to the DH-10 as 'conventional or nuclear', the same designation as the Russian AS-4 and Pakistani Babur and Ra'ad, which are known to be dual-capable. US Air Force, National Air and Space Intelligence Center (note 14), p. 29.

²⁶ Easton, I., 'The assassin under the radar: China's DH-10 cruise missile program', Futuregram no. 09-005, Project 2049 Institute, 1 Oct. 2009, <<http://project2049.net/publications.html>>; and Gormley, D. M., Erickson, A. S. and Yuan, J., *A Low-Visibility Force Multiplier: Assessing China's Cruise Missile Ambitions* (National Defense University Press: Washington, DC, 2014).

²⁷ Minnick, W., 'Glimpse of China's new fighter fuels rumors', *Defense News*, 5 Aug. 2012.

²⁸ 'Military might: China develops its strategic missile systems', *Jane's Intelligence Review*, 1 Aug. 2013.

²⁹ Lt Gen. James M. Kowalski, Commander, US Air Force Global Strike Command, 'Air Force Global Strike Command', Presentation, Barksdale Air Force Base, 7 May 2013, available at <<http://fas.org/blogs/security/2013/05/afgsc-brief2013/>>; and US Air Force, National Air and Space Intelligence Center (note 14).