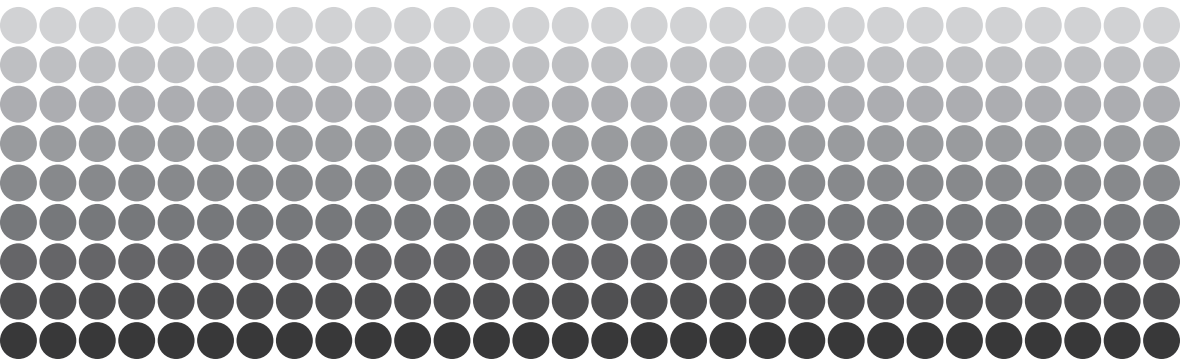


SIPRI YEARBOOK 2013

Armaments, Disarmament and International Security

Chinese nuclear forces

PHILLIP SCHELL AND HANS M. KRISTENSEN



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V. Chinese nuclear forces

PHILLIP SCHELL AND HANS M. KRISTENSEN

Among the five legally recognized nuclear weapon states, China has long been the least transparent about its nuclear forces. The Chinese Government provides no official information about the size and composition of its nuclear forces. It is estimated that China maintains a total stockpile of about 250 nuclear warheads, indicating a gradual expansion of its nuclear arsenal. 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.¹ 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 185 of the total stockpile of 250 warheads are assigned to these forces. None are deployed on delivery systems but 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 Chinese People's Liberation Army (PLA) maintains strict control over China's nuclear arsenal and land-based missiles through a centralized management system, in which missile units appear to be organized into six geographically dispersed basing areas and one central storage facility.² The Second Artillery reports directly to the Chinese Government's Central Military Commission (CMC), chaired by President Xi Jinping.³ The year 2012 was an active period of missile testing: the Second Artillery reportedly test launched all types of its nuclear-capable missile arsenal.

The modernization and moderate expansion 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 offensive 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

¹ 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 Li Bin, 'Tracking Chinese strategic mobile missiles', *Science and Global Security*, vol. 15, no. 1 (2007), p. 11.

² Stokes, M. A., *China's Nuclear Warhead Storage and Handling System* (Project 2049 Institute: Arlington, VA, 12 Mar. 2010), p. 7.

³ 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 2013

Type/Chinese designation (US designation)	No. deployed	Year first deployed	Range (km) ^d	Warhead loading	No. of warheads ^b
<i>Land-based missiles^c</i>	<i>~144</i>				<i>~144</i>
DF-3A (CSS-2)	~12	1971	3 100 ^d	1 x 3.3 Mt	~12
DF-4 (CSS-3)	~12	1980	5 500	1 x 3.3 Mt	~12
DF-5A (CSS-4)	20	1981	13 000	1 x 4–5 Mt	20
DF-15 (CSS-6)	~350	1990	600	1 x
DF-21 (CSS-5)	~60	1991	2 100 ^e	1 x 200–300 kt	~60
DF-31 (CSS-10 Mod 1)	~20	2006	>7 200	1 x 200–300 kt?	~20
DF-31A (CSS-10 Mod 2)	~20	2007	>11 200	1 x 200–300 kt?	~20
<i>SLBMs</i>	<i>(48)</i>				<i>(48)</i>
JL-1 (CSS-N-3)	(12)	1986	>1 770	1 x 200–300 kt	(12)
JL-2 (CSS-NX-14)	(36)	(2013)	>7 400	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>				<i>..</i>
DH-10	150–350	2007	>1 500	1 x ^g
Total					(~250)^h

.. = not available or not applicable; () = uncertain figure; kt = kiloton; Mt = Megaton; SLBM = submarine-launched ballistic missile.

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

^b A distinction can be made between warheads assigned to operational forces and warheads assigned to non-operational forces. Only China's land-based ballistic missiles and nuclear-configured aircraft are considered operational, comprising a total of c. 185 nuclear warheads assigned to operational forces. The second category includes warheads produced for systems that are not yet operational (SLBMs), warheads produced for operational systems that will increase in number (DF-31/A), and spares.

^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 range of the DF-3A may be greater than is normally reported.

^e The DF-21A (CSS-5 Mod 2) variant is believed to have a range of up to 2500 km.

^f Figures for aircraft are for nuclear-configured versions only.

^g It is unclear if the DH-10 has nuclear capability, but US Air Force intelligence lists the weapon as 'conventional or nuclear', the same as for the Russian nuclear-capable AS-4. The US Department of Defense, however, does not list the DH-10 as nuclear-capable.

^h Additional warheads are thought to be in storage to arm future DF-31, DF-31A and JL-2 missiles. The total stockpile is believed to comprise c. 250 warheads.

Sources: 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), various documents; 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.

simple increase in the number of nuclear weapons.⁴ This perspective on the modernization of China's nuclear forces was reiterated by the latest Chinese Government biennial defence white paper, released in March 2011.⁵ The document repeated China's commitment to the policy of no-first-use of nuclear weapons and its intention to limit its nuclear capabilities to the minimum level required for national security. However, it provided no information about the size or structure of China's nuclear forces.

China is estimated to possess the smallest inventories of military highly enriched uranium (HEU) and plutonium of the 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.

In 2011 and 2012 some US and Russian academics and former officials speculated that China's nuclear arsenal could be much larger than previously estimated—as many as 1600–3000 warheads—because it may have hidden warheads and missiles in underground facilities.⁶ These claims were rejected by General Robert Kehler, the commander of US Strategic Command.⁷

Land-based ballistic missiles

China is modernizing its land-based ballistic missiles and replacing ageing silo-based, liquid-fuelled missiles with newer road-mobile and solid-fuelled models. By being more mobile and able to launch their missiles more quickly, the new models will increase the survivability of the deterrent. This has become an increasingly important consideration for Chinese planners in assuring the credibility of the country's nuclear retaliatory capabilities.

The Second Artillery conducted a series of missile tests in the second half of 2012. According to an unconfirmed Western media report, it test fired all Chinese types of nuclear-capable intercontinental ballistic missile (ICBM).⁸

⁴ Hu S., [The road towards China's nuclear weapons], *Huánqiú kēxué*, no. 12 (2007).

⁵ Chinese State Council, *China's National Defense in 2010* (Information Office of the Chinese State Council: Beijing, Mar. 2011).

⁶ Esin, V., [Third after the USA and Russia], *Voenno-Promyshlenniy Kurier*, 2 May 2012; and Stephens, B., 'How many nukes does China have?', *Wall Street Journal*, 24 Oct. 2011.

⁷ Kristensen, H. M., 'STRATCOM commander rejects high estimates for Chinese nuclear arsenal', Strategic Security Blog, Federation of American Scientists, 22 Aug. 2012, <<http://blogs.fas.org/security/2012/08/china-nukes/>>.

⁸ Gertz, B., 'Chinese missile tests continue', Washington Free Beacon, 4 Sep. 2012, <<http://freebeacon.com/chinese-missile-tests-continue-2/>>.

While the Chinese Ministry of National Defence acknowledged the tests, it did not specify what types of missile were launched.⁹

China's nuclear-capable ballistic missile arsenal consists of approximately 144 missiles of six different types. One of China's oldest ballistic missiles, the liquid-fuelled, single-stage Dong Feng-3A (DF-3A), is being 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 ICBM, capable of reaching the western United States (Alaska), 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 10 000 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.

Unconfirmed Western media reports in 2012 suggesting an apparent test of a next-generation ICBM, referred to as the DF-41, revived speculation about possible Chinese follow-on ICBM systems.¹⁰ The US Department of Defense (DOD) had previously reported that 'China may also be developing a new road-mobile ICBM, possibly capable of carrying a multiple independently targetable re-entry vehicle (MIRV)'.¹¹ No reliable information about the missile's status and technical characteristics is available.¹²

Following the PLA's missile trials, the Chinese state media reported that the Second Artillery had fully transitioned from 'troops in the mountains' to 'troops on wheels', referring to the evolution of China's land-based nuclear forces to road-mobile delivery vehicles from previous silo and cave-based systems.¹³ The increasing number of deployed road-mobile, nuclear-capable missiles reflects 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 man-

⁹ 'Defense spokesman says missile tests targeted at no specific country', Xinhua, 30 Aug. 2012, <http://news.xinhuanet.com/english/china/2012-08/30/c_131818392.htm>.

¹⁰ Kulaki, G. 'New York Times: distorting Chinese press report on missile capabilities?', All Things Nuclear, Union of Concerned Scientists, 27 Aug. 2012, <<http://allthingsnuclear.org/new-york-times-distorting-chinese-press-report-on-missile-capabilities/>>; Gertz, B., 'Ready to launch', Washington Free Beacon, 21 Aug. 2012, <<http://freebeacon.com/ready-to-launch/>>; and Gertz, B., 'Manchu missile launch', Washington Free Beacon, 15 Aug. 2012, <<http://freebeacon.com/manchu-missile-launch/>>.

¹¹ US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2011*, Annual Report to Congress (DOD: Washington, DC, May 2011), p. 3. The 2012 version of the report did not reiterate this statement.

¹² For a comprehensive account on the DF-41 see Lewis, J. W. and Hua D., 'China's ballistic missiles programs: technologies, strategies, goals', *International Security*, vol. 17, no. 2 (fall 1992), pp. 29–31.

¹³ 'China's strategic missiles realize mobile launch', *Global Times*, 2 Sep. 2012.

aging mobile missile patrols, which could pose serious challenges for China's current command and control structures.¹⁴

China is also expanding its conventional DF-21 MRBM programme and has deployed the dual-capable (i.e. both conventional and nuclear-capable) DF-21C and DF-15 short-range ballistic missile (SRBM). 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 the missile fired is armed with a conventional or nuclear warhead.¹⁵

Ballistic missile submarines

China has encountered considerable difficulties in developing a sea-based nuclear deterrent. The PLA Navy (PLAN) has built a single Type 092 (designated Xia class by NATO) nuclear-powered ballistic missile submarine (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) submarine. According to the US DOD, two Type 094 SSBNs are in operational service.¹⁶ One is believed to be associated with the PLAN's North Sea Fleet, with its home port at Jianggezhuang near Qingdao, and one with the South Sea Fleet, with its home port at Yulin on Hainan.¹⁷ The status of a third boat under construction remains unclear. How many Type 094 SSBNs China intends to build and the future roles and missions of its current and future SSBN fleet also remain uncertain.

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. The JL-2 programme has encountered several delays due to technical difficulties. According to unconfirmed reports, what could be a series of final JL-2 flight tests conducted from a Type 094 SSBN occurred in January and August 2012.¹⁸ In its annual report to the US Congress, in 2012 the US-China Economic and Security Review Commission projected that the Type 094-JL-2 com-

¹⁴ US Department of Defense (DOD), *Military and Security Developments Involving the People's Republic of China 2012*, Annual Report to Congress (DOD: Washington, DC, May 2012), p. 25.

¹⁵ Some analysts also believe nuclear and conventional DF-21 missiles are mixed at the same bases. See 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.

¹⁶ US Department of Defense (note 14), p. 24.

¹⁷ Wu R., 'Survivability of China's sea-based nuclear forces', *Science & Global Security*, vol. 19, no. 2 (2011), pp. 94-96.

¹⁸ 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, 'Ready to launch' (note 10).

bination could become operational within two years.¹⁹ The US DOD reiterated this assessment and further expressed concerns that the progress in China's sea-based nuclear forces will also pose challenges to the Second Artillery's existing command and control structures, as it has only limited experience in managing submarines on patrol.²⁰ So far, Chinese SSBNs have never conducted a deterrent patrol.

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 fighter-bomber. Nevertheless, the PLAAF is not believed to have units whose primary mission is to deliver nuclear bombs.²¹

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.²² Relatively little is known about the DH-10's technical characteristics, and claims about the missile's derivation and classification are inconsistent.²³ China is also developing an air-launched version of the DH-10, possibly for delivery by an upgraded version of the H-6 aircraft. According to unconfirmed media reports in 2012, a sea-launched version of the DH-10 also appears to be under development.²⁴

¹⁹ United States–China Economic and Security Review Commission, *2012 Report to Congress* (US Government Printing Office: Washington, DC, Nov. 2012), p. 7.

²⁰ US Department of Defense (note 14), p. 24.

²¹ 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>>.

²² The US Air Force refers to the DH-10 as 'conventional or nuclear', the same designation as the Russian AS-4, which is known to be dual-capable. US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson Air Force Base, OH, June 2009), p. 29. In its 2012 report to the US Congress, the US–China Economic and Security Review Commission referred to the air-launched version of the DH-10 as possibly being nuclear capable. United States–China Economic and Security Review Commission (note 19), p. 181.

²³ 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>>.

²⁴ Minnick, W., 'Glimpse of China's new fighter fuels rumors', *Defense News*, 5 Aug. 2012.