

V. Chinese nuclear forces

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China has been slowly increasing the size of its nuclear weapon stockpile over the past decade. The pace of growth has increased in recent years with the fielding of new weapon systems. As of January 2020, China maintained an estimated total stockpile of about 320 nuclear warheads, compared with an estimated total of 260 warheads in 2015.¹ Around 240 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.

China is modernizing and diversifying its nuclear forces as part of a long-term programme to develop a more survivable and robust deterrence posture consistent with its nuclear strategy of assured retaliation.² The Chinese Government's declared aim is to maintain its nuclear capabilities at the minimum level required for safeguarding national security. China has adopted a nuclear strategy of self-defence, the goal of which is 'deterring other countries from using or threatening to use nuclear weapons' against it.³ In this context, China has prioritized building an operational triad of land-, sea- and air-based nuclear forces to strengthen its nuclear deterrence and counterstrike capabilities in response to the evolving nuclear strategies of other countries.⁴

Despite the continuing growth in its nuclear arsenal, China's ongoing modernization programmes do not appear to portend changes to its long-standing nuclear policies. In 2019 the Chinese Government reaffirmed its commitment to 'a nuclear policy of no first use of nuclear weapons at any time and under any circumstances and not using or threatening to use nuclear weapons against non-nuclear-weapon states or nuclear-weapon-free zones unconditionally'.⁵ In its 2019 annual report to the United States Congress on Chinese military developments, the US Department of Defense (DOD) stated that while there has been some debate in China about the conditions

¹ See Schell, P. P. and Kristensen, H. M., 'Chinese nuclear forces', *SIPRI Yearbook 2015*, pp. 491–95.

² Cunningham, F. and Fravel, T., 'Assuring assured retaliation: China's nuclear posture and US–China strategic stability', *International Security*, vol. 40, no. 2 (Oct. 2015), pp. 7–50. Assured retaliation is the ability to survive an initial attack and retaliate with nuclear strikes that inflict unacceptable damage on the attacker.

³ Chinese State Council, *China's Military Strategy*, Defence White Paper (Information Office of the State Council: Beijing, July 2019), section 2.

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

⁵ Chinese State Council (note 3). See also Pan, Z., 'A study of China's no-first-use policy on nuclear weapons', *Journal for Peace and Nuclear Disarmament*, vol. 1, no. 1 (2018), pp. 115–36.

for the application of its no-first-use policy, there 'has been no indication that national leaders are willing to attach such nuances and caveats' to China's existing policy.⁶ 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.⁷

As part of the Chinese Government's move to restructure and modernize the military under a streamlined command system, it established the People's Liberation Army (PLA) Rocket Force (PLARF) in 2016 as the fourth service in China's armed forces.⁸ As the 'core force of strategic deterrence', the PLARF has assumed command responsibility for all of China's nuclear forces, and exercises custodial and operational control over the country's nuclear warheads.⁹ In addition, the PLARF has been put in charge of conventional missiles and support forces and tasked with strengthening China's medium- and long-range strike capabilities in accordance with the requirements of 'full-area war deterrence'.¹⁰

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 and increases the number of road-mobile missile launchers. 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.¹¹

Intercontinental ballistic missiles

In its 2019 annual report on Chinese military developments, the US DOD estimated that China had deployed a total of 90 intercontinental ballistic

⁶ US Department of Defense (DOD), Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China 2019*, Annual Report to Congress (DOD: Arlington, VA, May 2019), pp. 65–67.

⁷ 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.

⁸ Chinese Ministry of National Defense, 'China establishes Rocket Force and Strategic Support Force', 1 Jan. 2016. The PLARF replaced the PLA Second Artillery Corps.

⁹ Gill, B. and Ni, A., 'The People's Liberation Army Rocket Force: Reshaping China's approach to strategic deterrence', *Australian Journal of International Affairs*, vol. 73, no. 2 (Jan. 2019), p. 163.

¹⁰ Gill and Ni (note 9), p. 164.

¹¹ 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.

Table 10.6. Chinese nuclear forces, January 2020

Type/Chinese designation (US designation)	Launchers deployed	Year first deployed	Range (km) ^a	Warheads x yield	No. of warheads ^b
<i>Land-based ballistic missiles^c</i>	188 ^d				172
DF-4 (CSS-3)	.. ^e	1980	5 500	1 x 3.3 Mt	..
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	3 x 200–300 kt	30
				MIRV	
DF-5C (CSS-4 Mod 3)	..	..	..	MIRV	..
DF-15 (CSS-6 Mod 1)	..	1994	600	[1 x 10–50 kt]	.. ^f
DF-21 (CSS-5 Mod 2/6) ^g	40	1996/2017	2 100	1 x 200–300 kt	40
DF-26 (CSS-..)	72	2017	>4 000	1 x 200–300 kt	36
DF-31 (CSS-10 Mod 1)	8	2006	>7 000	1 x 200–300 kt	8
DF-31A/AG (CSS-10 Mod 2)	48	2007/2018	>11 200	1 x 200–300 kt	48
DF-41 (CSS-X-20)	..	[2020] ^h	>12 000	3 x 200–300 kt	..
				MIRV	
<i>Sea-based ballistic missilesⁱ</i>	48				48 ^j
JL-2 (CSS-NX-14)	48	2016	>7 000	1 x 200–300 kt	48
<i>Aircraft^k</i>	20				20
H-6K (B-6)	20	2009	3 100	1 x bomb	20
H-6N (B-6)	..	[2025]	..	1 x ALBM	..
H-20 (B-20)	..	[2020s]	..	..	..
<i>Cruise missiles^l</i>	..	..	..	..	..
<i>Other stored warheads^m</i>					80
Total	256				320^m

.. = not available or not applicable; [] = uncertain figure; ALBM = air-launched ballistic 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-26 is a dual capable launcher. It is estimated that half of the dual-capable missiles 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.

^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 with non-nuclear capability (for medium or intermediate-range ballistic missiles) might have 1 or more reloads of missiles.

^e It is thought that the DF-4 has been withdrawn from service or is in the process of being retired.

^f 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.

^g The range of the nuclear-armed DF-21 variants (CSS-5 Mods 2 and 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 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.

^h The DF-41 was publicly displayed for the first time in 2019 but has not yet been declared operational.

ⁱ China has 4 operational Type 094 nuclear-powered ballistic missile submarines (SSBNs), each of which can carry up to 12 sea-launched ballistic missiles (SLBMs), giving a total of 48 launchers. Two additional Type 094 SSBNs are in development but are not yet operational.

^j There is no authoritative information that Chinese SLBMs are armed with nuclear warheads under normal circumstances.

^k The US Department of Defense (DOD) reported in 2018 that the People's Liberation Army Air Force has been reassigned a nuclear mission. H-6 bombers were used to deliver nuclear weapons during China's nuclear weapon testing programme (one test used a fighter) and models of nuclear bombs are displayed in military museums. It is thought (but uncertain) that a small number of H-6K bombers might have been assigned a nuclear mission. The new H-20 is expected to be nuclear capable.

^l Official US Government documents are inconsistent and contradictory about possible Chinese nuclear cruise missiles. US Air Force Global Strike Command in 2013 listed the CJ-20 as nuclear capable. In 2013 NASIC listed the CJ-10 as 'conventional or nuclear' but in 2017 it listed the CJ-10 as conventional. A US DOD fact sheet from 2018 listed both an air-launched cruise missile (ALCM) and a sea-launched cruise missile (SLCM). No estimate is provided here because of the very high degree of uncertainty.

^m In addition to the c. 240 warheads estimated to be assigned to operational forces, an additional c. 80 warheads are thought to have been produced (or be in production) to arm China's new DF-41s (c. 56 warheads) and additional JL-2s (c. 24 warheads), for a total estimated stockpile of c. 320 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.

missiles (ICBMs).¹² The silo-based, liquid-fuelled, two-stage Dong Feng-5 (DF-5 or CSS-4) family of missiles 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.¹³

The PLARF has been developing a longer-range ICBM, the road-mobile, solid-fuelled, three-stage DF-41 (CSS-X-20), since the late 1990s. With an estimated range in excess of 12 000 kilometres, the DF-41 will have a range similar to that of the older DF-5. Rail-mobile and silo-based versions of the missile are believed to be under development.¹⁴ Open-source imagery in 2019 indicated that the PLARF was building a new type of silo at a missile training area near Jilantai in northern China, possibly for the DF-41, and new silo construction might have started in Henan Province in 2017.¹⁵

¹² US Department of Defense (note 6), pp. 44, 66.

¹³ US Department of Defense (note 6), p. 46.

¹⁴ US Department of Defense (note 6), p. 45.

¹⁵ Kristensen, H. M., 'New missile silo and DF-41 launchers seen in Chinese nuclear missile training area', FAS Strategic Security Blog, Federation of American Scientists, 3 Sep. 2019; and LaFoy, S. and Eveleth, D., 'Possible ICBM modernization underway at Sundian', Arms Control Wonk, 5 Feb. 2020.

There have been 10 known flight tests of the DF-41 since 2012.¹⁶ In January 2019 the DF-41 might have been part of a simulated second-strike exercise conducted by the PLARF.¹⁷ DF-41 launchers operated at the Jilantai training area in April–May 2019 and were publicly displayed for the first time during the annual National Day parade held in Beijing on 1 October 2019.¹⁸ While there has been speculation that the missile has completed its development and testing cycle and achieved an initial operational capability, it had not entered into service by the end of 2019.¹⁹

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, Russian (and Indian) missile defences.²⁰ It has modified the liquid-fuelled, silo-based DF-5A (CSS-4 Mod 1) ICBM, which first went into service in the early 1980s, to carry multiple warheads.²¹ One variant of the missile, the DF-5B (CSS-4 Mod 2), is assessed to carry up to three MIRVed warheads.²² 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.²³ The deployment of MIRVs on the ageing DF-5 missiles may have been an interim arrangement necessitated by delays in the development of the DF-41 mobile ICBM.²⁴ 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.²⁵

Intermediate- and medium-range ballistic missiles

In 2018 the PLARF began the deployment of the new dual-capable DF-26 intermediate-range ballistic missile, which has an estimated maximum range exceeding 4000 km and can reach targets in the western Pacific Ocean,

¹⁶ Gertz, B., 'China flight tests new multi-warhead ICBM', Washington Free Beacon, 6 June 2018.

¹⁷ Liu, X., 'China's rocket force conducts mock ICBM strike exercise', *Global Times*, 22 Jan. 2019.

¹⁸ Kristensen (note 15); and Yang, S. and Liu, X., 'China debuts most advanced ICBM DF-41 at parade', *Global Times*, 1 Oct. 2019.

¹⁹ US Department of Defense, Office of the Deputy Assistant Secretary of Defense for Nuclear Matters (ODASDNM), *Nuclear Matters Handbook 2020* (ODASDNM: Arlington, VA, Mar. 2020), p. 3.

²⁰ US Department of Defense (note 6), p. 65; and 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.

²¹ US Department of Defense (note 6), p. 44.

²² O'Halloran, J. (ed.), 'DF-5', *IHS Jane's Weapons: Strategic, 2015–16* (IHS Jane's: Coulsdon, 2015), pp. 7–8.

²³ Gertz, B., 'China tests missile with 10 warheads', Washington Free Beacon, 31 Jan. 2017.

²⁴ Minnick, W., 'Chinese parade proves Xi in charge', *Defense News*, 6 Sep. 2015.

²⁵ O'Halloran, ed. (note 22), pp. 21–22; and Gertz, B., 'China flight tests new multiple-warhead missile', Washington Free Beacon, 16 Apr. 2016.

including Guam.²⁶ The missile is equipped with a manoeuvrable re-entry vehicle (MaRV) warhead that is capable of precision conventional or nuclear strikes against ground targets, as well as conventional strikes against naval targets.²⁷ A flight test of a DF-26 was carried out on 27 January 2019.²⁸ China appears to be producing the DF-26 in significant numbers and there were sightings of the missile at several brigade bases during 2019.²⁹

The PLARF currently possesses one nuclear-capable medium-range ballistic missile (MRBM). The DF-21 (CSS-5) is a two-stage, solid-fuelled mobile missile that was first deployed in 1991. An upgraded variant, the DF-21A (SSC-5 Mod 2), was first deployed in 1996 and an enhanced version (SSC-5 Mod 6) was fielded in 2017.³⁰ 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.

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 2019 annual report on Chinese military developments, the PLA Navy (PLAN) has commissioned four Type 094 nuclear-powered ballistic missile submarines (SSBNs).³¹ Two additional submarines are being outfitted at a shipyard in Huludao.³² The DOD report assessed that the four operational Type 094 SSBNs represent China's 'first credible, sea-based nuclear deterrent'.³³

The Type 094 submarine can carry up to 12 three-stage, solid-fuelled Julang-2 (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 JL-2 SLBM has been deployed on China's four operational Type 094 SSBNs.³⁴

²⁶ US Department of Defense (note 19), pp. 31, 49; and *Global Times*, 'China deploys Dongfeng-26 ballistic missile with PLA Rocket Force', 27 Apr. 2018.

²⁷ Tate, A., 'China touts ASBM capabilities of DF-26', *Jane's Defence Weekly*, 6 Feb. 2019, p. 6; and *Global Times* (note 26).

²⁸ Liu, X., 'Missile launch shows China's DF-26 able to adjust position mid-flight, attack moving aircraft carriers: Expert', *Global Times*, 27 Jan. 2019.

²⁹ Kristensen, H. M., 'China's new DF-26 missile shows up at base in eastern China', FAS Strategic Security Blog, Federation of American Scientists, 21 Jan. 2020.

³⁰ O'Halloran, ed. (note 22), pp. 15–17; and US Department of Defense (note 6), p. 66.

³¹ US Department of Defense (note 6), p. 36. The Type 094 SSBN is designated the Jin class by the United States and the North Atlantic Treaty Organization.

³² Dill, C., 'Counting Type 094 Jin-Class SSBNs with planet imagery', Arms Control Wonk, 21 Nov. 2018; and Tate, A., 'Satellite imagery shows two Chinese SSBNs in Huludao', *Jane's Defence Weekly*, 5 Dec. 2018.

³³ US Department of Defense (note 6), p. 36.

³⁴ US Department of Defense (note 6), p. 36.

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 2019 to suggest that they had begun.³⁵ In its 2014 report on Chinese military developments, the US DOD predicted that China would commence submarine deterrence patrols imminently. Some of the subsequent reports have made the same claim but the 2019 report did 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 and would pose operational challenges for its nuclear command and control arrangements.³⁶

The PLAN is developing its next-generation SSBN, the Type 096. In 2019 the US DOD assessed that construction would probably begin in the early 2020s.³⁷ 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.³⁸

The Type 096 will be armed with a successor to the JL-2: the JL-3 SLBM.³⁹ The new missile is thought to use technologies from the land-based DF-41 ICBM and have a longer range than the JL-2. It might also be MIRV capable. On 2 June 2019 the PLAN reportedly conducted the second flight test of the JL-3 SLBM from a modified conventional submarine in the Bohai Sea, following an initial test in November 2018.⁴⁰ The Chinese Government did not officially confirm the tests. It has yet to reveal publicly the number of missiles to be carried by the Type 096 or how many submarines will be built.

Aircraft and cruise missiles

According to the US DOD's 2018 annual report on Chinese military developments, the PLA Air Force (PLAAF) had been 're-assigned a nuclear mission'.⁴¹

³⁵ See e.g. Borger, J., 'China to send nuclear-armed submarines into Pacific amid tensions with US', *The Guardian*, 26 May 2016.

³⁶ Center for Strategic and International Studies, 'Does China have an effective sea-based nuclear deterrent?', *China Power*, updated Mar. 2020.

³⁷ US Department of Defense (note 6), p. 36.

³⁸ US Department of Defense (note 6), p. 66.

³⁹ US Department of Defense (note 6), p. 36.

⁴⁰ Tate, A., 'China conducts probable test launch of JL-3 SLBM', *Jane's Defence Weekly*, 3 June 2019.

⁴¹ US Department of Defense (DOD), Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China 2018*, Annual Report to Congress (DOD: Arlington, VA, Aug. 2018), p. 75. 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.

The previous year's DOD report had stated that the PLAAF 'does not currently have a nuclear mission'.⁴²

China possesses a small number of H-6K bombers that may have been given a nuclear weapon delivery role as an interim measure until a new bomber is available.⁴³ The PLAAF is currently developing its first long-range strategic bomber known as the H-20. The aircraft, which may have a range of up to 8500 km, reportedly will have stealth characteristics similar to those of the US B-2 bomber.⁴⁴ The H-20 will be able to deliver both conventional and nuclear weapons and is expected to be fielded sometime in the 2020s.⁴⁵

The US Defense Intelligence Agency reported in 2018 that China was developing two new air-launched ballistic missiles, 'one of which may include a nuclear payload'.⁴⁶ The missiles may be variants of the DF-21 MRBM for delivery by a modified H-6N bomber.⁴⁷ The H-6N was displayed at the National Day parade in Beijing in October 2019 but there was no reference to a possible future nuclear capability.⁴⁸

The PLA currently deploys several types of ground-, sea- and air-launched cruise missiles, but there is considerable uncertainty about whether these may have nuclear delivery roles. For example, in its 2017 assessment of ballistic missile and cruise missile threats, the US Air Force National Air and Space Intelligence Center (NASIC) did not list any Chinese cruise missile as being nuclear capable.⁴⁹ 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.⁵⁰

⁴² US Department of Defense (DOD), Office of the Secretary of Defense, *Military and Security Developments Involving the People's Republic of China 2017*, Annual Report to Congress (DOD: Arlington, VA, May 2017), p. 61.

⁴³ US Department of Defense (note 6), p. 41; and Military-Today, 'H-6K: Long-range strategic bomber', [n.d.].

⁴⁴ US Department of Defense (note 6), p. 61; 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.

⁴⁵ US Department of Defense (note 6), p. 61.

⁴⁶ Ashley, R., Director, Defense Intelligence Agency, Statement for the Record: Worldwide Threat Assessment, Armed Services Committee, US Senate, 6 Mar. 2018, p. 8. See also US Department of Defense (note 6), p. 67.

⁴⁷ Panda, A., 'Revealed: China's nuclear-capable air-launched ballistic missile', *The Diplomat*, 10 Apr. 2018.

⁴⁸ Yang, S. and Liu, X., 'China unveils new H-6N bomber with extended range, extra capabilities', *Global Times*, 1 Oct. 2019.

⁴⁹ 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. 37.

⁵⁰ US Air Force, National Air and Space Intelligence Center (NASIC), *Ballistic and Cruise Missile Threat* (NASIC: Wright-Patterson Air Force Base, OH, 2013), p. 29.