ANALYSIS

CHINA'S NUCLEAR DELIVERY VEHICLES

Mark B. Schneider

China has the world's largest missile modernization program. Delivery vehicle modernization and force expansion are the most visible aspects of China's nuclear efforts. With the exception of the possibly dual-capable (nuclear and conventional) DF-27 ICBM/IRBM, all Chinese strategic missiles are nuclear armed. The size of the Chinese nuclear arsenal will be significantly impacted by the scale of China's missile and bomber programs

In 2021, then-Vice Chairman of the Joint Chiefs of Staff (JCS) General John Hyten pointed out that over the past five years the United States had conducted nine hypersonic missile tests while China had done hundreds.[1] In 2014, Lee Fuell, a technical intelligence specialist with Air Force Intelligence told the Congressional China Commission that, "At this point" Air Force Intelligence believes that China's Wu-14 hypersonic vehicle is "associated with their nuclear deterrent forces," although it could also stage conventional strikes.[2] (U.S. hypersonic missiles are conventional.[3]) In 2021, the *Financial Times* (in a story later confirmed) reported that, "China tested a nuclear-capable hypersonic missile in August [2021] that circled the globe before speeding towards its target, demonstrating an advanced space capability that caught U.S. intelligence by surprise."[4]

The annual Department of Defense (DoD) reports are the most authoritative unclassified treatments on China's military power but have a poor record in assessing China's nuclear threat. In combination, the 2022 and 2023 DoD reports stated that China had 500+ "operational" nuclear warheads in May 2023, growing to 1,000+ "operational" warheads in 2030, and is "on track to exceed previous projections," i.e., about 1,500 warheads in 2035.[5]

---

[1] Arpan Rai, "Retiring top general says US has done 9 tests of hypersonic weapons while China does hundreds," *The Independent*, October 29, 2021, available at https://www.independent.co.uk/news/world/americas/general-china-hypersonic-missile-tests-b1947528.html.

[22] Bill Gertz, "Inside the Ring: Pentagon goes hypersonic with long-range rapid attack weapon," *The Washington Times*, March 19, 2014, available at https://www.washingtontimes.com/news/2014/mar/19/inside-the-ring-pentagon-goes-hypersonic-with-long/.

[3] Bill Gertz, "China now leads the world in nuclear and conventional hypersonic missiles, U.S. intelligence warns," *The Washington Times*, March 12, 2024, available at https://www.washingtontimes.com/news/2024/mar/12/china-now-leads-world-nuclear-and-conventional-hyp/.

[4] Demetri Sevastopulo and Kathrin Hille, "China tests new space capability with hypersonic missile," *Financial Times*, October 16, 2021, available at https://www.ft.com/content/ba0a3cde-719b-4040-93cb-a486e1f843fb.

[5] Mark B. Schneider, "Will the Pentagon Ever Get Serious About the Size of China's Nuclear Force?," *Real Clear Defense*, December 15, 2022, available at https://www.realcleardefense.com/articles/2022/12/15/will_the_pentagon_ever_get_serious_about_the_size_of_chinas_nuclear_force_870335.html.: Department of Defense, *Military and Security Developments Involving the People's Republic of China 2023* (Washington, D.C.: Department of Defense, October 2023), pp. VIII, 55, 59, 67, 104, 110, 111, 188, available at https://media.defense.gov/2023/Oct/19/2003323409/-1/-1/1/2023-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.: Department of Defense, *Military and Security Developments Involving the People's Republic of China 2022* (Washington, D.C.: U.S. Department of Defense, 2022), p. 98, available at https://media.defense.gov/2022/Nov/29/2003122279/-1/-1/1/2022-MILITARY-AND-SECURITY-DEVELOPMENTS-INVOLVING-THE-PEOPLES-REPUBLIC-OF-CHINA.PDF.

© National Institute Press, 2024

These numbers may undercount China's nuclear arsenal significantly. If DoD's warhead projections are correct, China will achieve rough numerical parity with the United States in the mid-2030s. If the DoD is wrong, China may achieve superiority—several thousand nuclear weapons—within a few years. If so, Washington will likely be much less capable of deterring China than is expected based on DoD's estimates.

The annual Federation of American Scientists (FAS) China nuclear report is often treated in the media as authoritative, but it may substantially undercount China's nuclear weapons and future force growth.

The Chinese ICBM Force

The following chart from the October 2023 DoD China military report provides estimates of the number of Chinese land-based nuclear missile launchers and missiles.[6]

CHINA'S ROCKET FORCE			
System	Launchers	Missiles	Estimated Range
ICBM	500	350	>5,500 km
IRBM	250	500	3,000-5,500 km
MRBM	300	1,000	1,000-3000 km
SRBM	200	1,000	300-1,000 km
GLCM	150	300	>1,500 km

The chart contained important new information. It elaborated on the notification to Congress that China had exceeded the U.S. ICBM force.[7] The DoD's conclusion that China is building ICBM launchers faster than it is building missiles and building ICBMs faster than warheads creates the potential for large undercounting.

The new Chinese ICBMs are more modern and reportedly have much greater throw-weight than the 1970-vintage 1,150-kilogram throw-weight three warhead U.S. Minuteman III (which has been downloaded to one warhead).[8] Reportedly, 1) the MIRVed DF-5 has a

[6] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., p. 67.

[7] Bryan Harris, "China surpasses US in number of ICBM launchers," *Defense News.com*, February 7, 2023, available at https://www.defensenews.com/congress/2023/02/07/china-surpasses-us-in-number-of-icbm-launchers/.

[8] "The Minuteman III ICBM," *Nuclear Weapons Archive*, October 7, 1997, available at https://nuclearweaponarchive.org/Usa/Weapons/Mmiii.html.

throw-weight of 3,000-4,000-kilograms.[9] 2) the newer version of the DF-31 has a throw-weight of 1,750-kilograms,[10] and 3) the MIRVed DF-41 has a throw-weight of 2,500-kilograms.[11] (The Chinese People's Liberation Army Rocket Force's [PLARF] disclosure of a six 650-kiloton and ten 150-kiloton warhead option for the DF-41[12] suggests to this author it has a throw-weight of about 3,200-kilograms.)

The high throw-weights of China's ICBMs mean it can potentially deploy two-three times as many warheads than assessed by the DoD in 2035.

Chinese ICBM Silos

The new ICBM silos were unexpected. The 2023 DoD China report said there are "at least 300" completed ICBM silos, some probably armed with DF-31s (the oldest modern Chinese ICBM), despite the fact they could house the more capable DF-41.[13] The report indicated China is "…building more silos for DF-5 class ICBMs; increasing the number of brigades while simultaneously increasing the number of launchers per brigade – though there is no indication this project will approach the size or numbers of the solid propellant missile silos."[14]

The 2024 FAS China nuclear report said China had "320 new silos for solid-fueled ICBMs [DF-31s and DF-41s]" and "will increase the number of DF-5 [which the DoD credits with "up to five" warheads] silos from 18 to 48."[15] In 2022, then-STRATCOM Commander Admiral Charles Richard said there would be "…at least 360 solid fueled intercontinental ballistic missile silos…"[16] Hence, the difference in the reported silo numbers is modest. Much more important is the missile deployed in the silos (DF-31 vs. DF-41) and whether the DF-41 carries three warheads, according to DoD, or up to ten as stated by senior U.S. military leaders.[17]

---

[9] Center for Strategic and International Studies, "DF-5" (Washington, D.C.: Center for Strategic and International Studies, April 23, 2024), available at https://missilethreat.csis.org/missile/df-5-ab/.

[10] Center for Strategic and International Studies, "DF-31 (Dong Feng-31 / CSS-10)" (Washington, D.C.: Center for Strategic and International Studies, April 23, 2024), available at https://missilethreat.csis.org/missile/df-31/.

[11] Center for Strategic and International Studies, "DF-41 (Dong Feng-41 / CSS-X-20)" (Washington, D.C.: Center for Strategic and International Studies, April 23, 2024), available at https://missilethreat.csis.org/missile/df-41/.

[12] Colonel (Ret.) Vinayak Bhat, "#China #PLARF ppt slide #DF41 range14000km 1,6or10MIRVs yields 1x1600kg 5.5megaton," March 6, 2017, available at https://x.com/rajfortyseven/status/838921803057758208.

[13] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., pp. 104, 107.

[14] Ibid., p. 107.

[15] Hans M. Kristensen, Matt Korda, Eliana Johns, and Mackenzie Knight, "Chinese nuclear weapons, 2024," *Bulletin of the Atomic Scientists*, January 15, 2024, pp. 50, 62, available at https://thebulletin.org/premium/2024-01/chinese-nuclear-weapons-2024/.

[16] "Senate Armed Services Committee Hearing: Nuclear Weapons Council," May 4, 2022, available at https://www.stratcom.mil/Media/Speeches/Article/3022885/senate-armed-services-committee-hearing-nuclear-weapons-council/.

[17] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., p. 107; and, Bill Gertz, "China Tests Missile With 10 Warheads," *Free Beacon.com,* January 31, 2007, available at https://freebeacon.com/national-security/china-tests-missile-10-warheads/.

In 2021, then-Vice Chairman of the JCS General John Hyten said that the DF-41 could carry 10 warheads.[18] In 2022, Admiral Richard said the new silos could house missiles with "up to 10 warheads on top of it."[19] Bill Gertz rightly pointed out that, "If 10 warheads are deployed on the DF-41s in the new silos, China's warhead level will increase to more than 4,000 warheads on its DF-41s alone."[20]

China is reportedly developing a new heavy ICBM which could carry many more warheads than even the numbers presented by Gen. Hyten and ADM Richard. It will be discussed below. China expert Richard Fisher believes China's new silos may be large enough to house this new heavy missile.[21]

Since there is a MIRVed version of the DF-31,[22] deployment of the more capable DF-41 in the new silos is not necessary to achieve DoD's 1,500 warheads in 2035. If the silos house DF-41s, the number of Chinese warheads likely is considerably higher and their main mission may be a counterforce first strike against the United States.

Even if the new silos are being built from super concrete, they are obviously less survivable than China's so-called Underground Great Wall (UGW), 5,000-km of missile tunnels reportedly hundreds of meters underground,[23] which protect Chinese mobile ICBMs. The rationalization of the UGW as defensive[24] was based upon the discredited belief that China would maintain a small nuclear force. The astronomically expensive UGW is probably 50-100 times longer than is necessary to protect any plausible number of Chinese mobile ICBMs or, indeed, the entire Chinese mobile missile force. Indeed, in 2011, this author, in Congressional testimony, noted that irrespective of the number of U.S. nuclear weapons, it was "virtually impossible to target."[25]

---

[18] John Grady, "Hyten: China's 'Unprecedented Nuclear Modernization' Chief Concern," *USNI News*, September 14, 2021, available at https://news.usni.org/2021/09/14/hyten-chinas-unprecedented-nuclear-modernization-chief-concern.

[19] Admiral Charles Richard, Speech, 2022 Space and Missile Defense Symposium, August 11, 2022, available at https://www.stratcom.mil/Media/Speeches/Article/3126694/2022-space-and-missile-defense-symposium/.

[20] Bill Gertz, "EXCLUSIVE: China building third missile field for hundreds of new ICBMs," *The Washington Times*, August 12, 2021, available at https://www.washingtontimes.com/news/2021/aug/12/china-engaged-breathtaking-nuclear-breakout-us-str/.

[21] "23rd Nuclear Triad Symposium," *YouTube*, July 22, 2022, available at https://www.youtube.com/watch?v=3-77jWb8mH8.

[22] General Anthony Cotton, "STATEMENT OF ANTHONY J. COTTON COMMANDER UNITED STATES STRATEGIC COMMAND BEFORE THE SENATE COMMITTEE ON ARMED SERVICES 9 MARCH 2023," p. 6, available at https://www.armed-services.senate.gov/imo/media/doc/2023%20USSTRATCOM%20Congressional%20Posture%20Statement%20-%20SASC.pdf.

[23] Hui Zhang, "The defensive nature of China's "underground great wall," *Bulletin of the Atomic Scientists*, January 16, 2012, available at https://thebulletin.org/2012/01/the-defensive-nature-of-chinas-underground-great-wall/0.

[24] Ibid.

[25] Subcommittee on Strategic Forces, House Armed Services Committee, "NUCLEAR WEAPONS MODERNIZATION IN RUSSIA AND CHINA: UNDERSTANDING IMPACTS TO THE UNITED STATES," H.A.S.C. No. 112-78, October 14, 2011, available at https://www.govinfo.gov/content/pkg/CHRG-112hhrg71449/html/CHRG-112hhrg71449.htm.

Chinese Mobile ICBMs and IRBMs

In the context of China's dynamic nuclear expansion, there is always uncertainty concerning deployed mobile missile numbers because they are very difficult to count. China's UGW creates a new level of monitoring problems because of its gigantic concealment potential.

Until the discovery of the new silos, it was believed that China had switched to mobile ICBMs and for that reason built the UGW. China has DF-31 and DF-41 mobile ICBMs and DF-26 mobile IRBMs. The 2023 DoD Rocket Force chart reproduced above suggests about 150 Chinese mobile ICBMs and it indicates there are 250 IRBM launchers and 500 missiles. The chart indicates that, given the number of IRBMs, China has a substantial reload capability—two-five missiles per launcher. However, it apparently assumes about 150 empty ICBM launchers and no reload missiles for mobile ICBMs, which creates the real possibility for considerable undercounting in DoD's 2023 estimate of 500+ warheads.

The 2023 DoD China report provides no number for DF-41 launchers or missiles. The 2024 FAS estimate of 28 deployed DF-41s apparently assumes DF-41 brigades with six launchers.[26] This is based on "the number of garages at the bases…"[27] Missile base garages are not necessarily a good indicator of deployment numbers if China is attempting to hide its DF-41 numbers. (The Russians demonstrated it could base SS-25 mobile ICBMs outside of normal base facilities in one of its START Treaty violations.)[28] Fisher estimates 24 DF-41s per brigade.[29]

China reportedly has a rail mobile DF-41 program.[30] Fisher projects up to 100 possible rail-mobile DF-41s by 2030 or soon after.[31] If true, this would further increase Chinese ICBM launcher and warhead numbers over those presented in DoD and FAS reports.

The 2023 DoD report states that "…sources indicate a 'long-range' DF-27 ballistic missile is in development," with a range of "…5,000-8,000 km, which means the DF-27 could be a new IRBM or ICBM."[32] The *South China Morning Post* said it can attack all major U.S. Pacific bases and *has been operational for four years*.[33] The 2024 FAS China nuclear report stated "…a US intelligence assessment of February 2023 notes that 'land attack and antiship

---

[26] Kristensen, Korda, Johns, and Knight, "Chinese nuclear weapons, 2024," op. cit., pp. 50, 59.

[27] Ibid., p. 64.

[28] Department of State, *Adherence to and Compliance with Arms Control and Nonproliferation Agreements and Commitments* (Washington, D.C.: Department of State, August 2005), p. 13, available at https://2009-2017.state.gov/documents/organization/52113.pdf.

[29] Richard Fisher, "PLA Sprint To Nuclear Superiority: A New Existential Threat," Mitchell Institute Nuclear Deterrence Forum, August 5, 2021, mimeo, Slide 2.

[30] Kristensen, Korda, Johns, and Knight, "Chinese nuclear weapons, 2024," op. cit., p. 64.

[31] "23rd Nuclear Triad Symposium," op. cit.

[32] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., p. 67.

[33] Minnie Chan, "China's advanced DF-27 hypersonic missile which can strike parts of US has been in service for several years, source says," *South China Morning Post*, May 20, 2023, available at https://www.scmp.com/news/china/military/article/3221198/chinas-advanced-df-27-hypersonic-missile-which-can-strike-parts-us-has-been-service-several-years.

variants [of the DF-27] likely were fielded in limited numbers in 2022….'"[34] It also noted that a 2021 Chinese exercise possibly featured the DF-27.[35] This may be another instance of the DoD report being years behind open press reporting.

If the DF-27 has a range of 8,000 km, it is probably a follow-on to the DF-31, which was apparently originally designed against Russia. However, it could target Hawaii and Alaska. The DF-27 may be the first dual-capable ICBM, also carrying an anti-carrier hypersonic vehicle.[36] Bill Gertz writes that leaked Pentagon documents say the missile is "an intermediate-range, ballistic missile-class, 'multi-role' hypersonic glide vehicle…."[37] China is rumored to be developing an advanced version of the DF-27 called the DF-27A with improved accuracy and range.[38]

Any missile's range can be extended by mounting a light nuclear warhead. Conversely, a heavy conventional warhead could reduce it to IRBM range. The DF-27 is reportedly much lighter than the DF-31A,[39] hence, it is likely more mobile. Its hypersonic capability would make it important, but it apparently is not a major driver of Chinese nuclear weapons numbers unless it is given a MIRV capability. However, if operational, it is not being counted in any of the DoD or FAS estimates of existing Chinese nuclear weapons.

Fisher says Chinese sources report the development of a new mobile ICBM "[s]ometimes called the DF-45 or DF-51, [and] it is clearly intended to outperform the DF-41."[40] He also says that in 2020 China shut down the blogs that were reporting about it.[41] Bill Gertz reported, "The DF-45 would have a takeoff weight of 112 tons and a payload weighing 3.6 tons and be armed with seven 650-kiloton warheads."[42] It is unclear whether the DF-45/DF-51 is one or two systems. If it is two systems, one might be a replacement for the DF-41 and the other for the DF-5.

There are other reports of a DF-51. For example, there is a passing reference to it in a 2006 article in a Hong Kong publication.[43] One report indicates that: 1) its launch-weight is 130-tons, 2) it can carry three five- megaton MIRVs, and 3) it can carry China's Fractional

---

[34] Kristensen, Korda, Johns, and Knight, "Chinese nuclear weapons, 2024," op. cit., p. 64.

[35] Ibid.

[36] Missile Defense Advocacy Alliance, "DF-27," *Missile Defense Advocacy Alliance*, April 2023, available at https://missiledefenseadvocacy.org/missile-threat-and-proliferation/todays-missile-threat/china/df-27/; and, George Allison, "America has the medicine for the DF-27 'aircraft carrier killer' hypersonic missile," *Telegraph.com*, March 4, 2024, available at https://www.telegraph.co.uk/news/2024/03/04/usa-hypersonic-missile-defence-htbss-satellites-aegis-gpi/.

[37] Bill Gertz, "Documents leaked by airman reveal China's advanced hypersonic arms," *The Washington Times*, April 19, 2023, available at https://www.washingtontimes.com/news/2023/apr/19/inside-ring-documents-leaked-airman-jack-teixeira-/.

[38] "DF-27 Missile System," *China Arms.com*, June 21, 2024, available at https://www.china-arms.com/2023/07/df27/.

[39] "DF-27," op. cit.

[40] Bill Gertz, "China building new generation of mobile ICBMs," *The Washington Times*, March 6, 2024, available at https://www.washingtontimes.com/news/2024/mar/6/exclusive-china-building-new-generation-of-mobile-/.

[41] "23rd Nuclear Triad Symposium," op. cit.

[41] Gertz, "China building new generation of mobile ICBMs," op. cit.

[42] Ibid. In 2017, the PLARF reported a six 650-kiloton warhead option for the DF-41.

[43] Dr. Mark B. Schneider, "Testimony before the U.S.-China Economic and Security Review Commission Hearing on 'Developments in China' Cyber and Nuclear Capabilities'," March 26, 2012, p. 5, available at https://www.uscc.gov/sites/default/files/3.26.12schneider.pdf.

Orbital Bombardment System.[44] Another report says it has a range of 15,000-km and can carry 14 warheads.[45] The U.K.'s *Teleraph.com* says 10 warheads.[46] Both ten and 14 relatively light warheads are reasonable numbers for a missile more capable than the DF-41.

Chinese Ballistic Missile Submarines

China may be building a ballistic missile submarine (SSBN) force about as large as that of the United States or Russia. All Chinese SSBNs can carry MIRVed SLBMs and China is not arms control constrained on MIRV numbers.

DoD's assessment of China's SSBN capability appears to be one of its most serious threat assessment blunders. In 2020, the DoD assessed eight Chinese SSBNs in 2030 and did not project MIRVed SLBMs until the late 2020s.[47] Until November 2022, DoD did not mention JL-3 deployment on China's type 094 SSBNs. Yet, in August 2021, Admiral Richard said that there were "…six second-generation JIN-class ballistic missile submarines with JL-3 SLBMs…."[48] The DoD's May 2023 500+ warhead estimate could not have assumed that JL-3s were MIRVed, which is explicitly stated in the 2024 FAS report.[49] Yet in 2020, the DIA assessed the JL-3 carried "multiple warheads."[50]

Many of the differences among the alternative estimates of the growth of China's nuclear warheads are based upon different assessments of the number of warheads on Chinese MIRVed ICBMs and SLBMs. These are illustrated in the following chart:

---

[44] "[R&D] DF-51/Chinese Fractional Orbital Bombardment System," *Reddit.com*, 2021, available at https://www.reddit.com/r/GlobalPowers/comments/qfrwm3/rd_df51chinese_fractional_orbital_bombardment/?rdt=35512.

[45] "Why has the Dongfeng-51, which has a range of 15,000 kilometers and carries 14 warheads, become a nightmare for the West? Can't intercept at all?," *INF News*, July 2, 2023, available at https://inf.news/en/military/42b0da027e7d87d73d57140c8d6de592.html.

[46] Roland Oliphant and Freddie Hayward, "China replaces North Korea as Japan's top security threat in annual military assessment," *Telegraph.com*, September 27, 2019, available at https://www.telegraph.co.uk/news/2019/09/27/japan-sees-china-bigger-threat-north-korea-report-indicates/.

[47] Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020* (Washington, D.C.: Department of Defense, 2020), p. 45, available at https://media.defense.gov/2020/Sep/01/2002488689/-1/-1/1/2020-DOD-CHINA-MILITARY-POWER-REPORT-FINAL.PDF.

[48] Admiral Charles Richard, Speech at "2021 Space and Missile Defense Symposium," August 23, 2021, available at https://www.stratcom.mil/Media/Speeches/Article/2742875/2021-space-and-missile-defense-symposium/.

[49] Kristensen, Korda, Johns, and Knight, "Chinese nuclear weapons, 2024," op. cit., p. 50.

[50] Defense Intelligence Ballistic Missile Analysis Committee, *2020 Ballistic and Cruise Missile Threat* (Wright-Patterson AFB, OH: NASIC, July 2020), p. 33, available at https://media.defense.gov/2021/Jan/11/2002563190/-1/-1/1/2020%20BALLISTIC%20AND%20CRUISE%20MISSILE%20THREAT_FINAL_2OCT_REDUCEDFILE.PDF.

MAXIMUM WARHEAD LOAD FOR CHINA'S MULTIPLE WARHEAD (MIRVed) MISSILES

Type Estimates	DoD	FAS	Alternative Estimates	Sources for Alternative
DF-5	5	5	6	Fisher
DF-41	3	3	10	General Hyten, Admiral Richard, Liberation Army Rocket Force
DF-45/DF-51	n/a[a]	n/a[a]	7-14	Gertz, Fisher, other press reports
DF-31A	1[b]	1	3?[c]	General Cotton[d]
JL-2A	1[b]	1	3	People's Liberation Army Rocket Force, Asia press reports
JL-3	1[b]	"multiple warheads"[e]	3-10	Fisher, Defense Intelligence Agency says "multiple warheads"

a Does not mention the DF-45/DF-51. May be one type of missile or two.
b Does not list it as a MIRVed missile.
c No nation has built a MIRVed missile that carries less than three warheads because of the weight of the MIRV bus.
d General Cotton indicated it was MIRVed but gave no warhead number.
e While the FAS attributes "multiple warheads" to the JL-3, it counts it as one in its warhead chart.

The 2023 DoD China report said China had: 1) "six operational TYPE 094 JIN-class SSBNs" armed with up to 12 JL-2 or JL-3 missiles, 2) that the "next generation SSBN, the TYPE 096 is expected to enter service the late 2020s or early 2030s," and is "probably intended to field MIRVed SLBMs," and 3) will be operated concurrently with the 094.[51] It provides no estimate for the size of the 096 force. Fisher predicts China may build six 096 SSBNs with 14 missiles each and noted that Chinese sources say three-ten warheads.[52] The Global Security Organization reports that one source said five-seven 35-kiloton MIRVs.[53] In 2019, Bill Gertz reported a JL-3 test with a hypersonic vehicle.[54]

[51] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., pp. 59, 108.

[52] "23rd Nuclear Triad Symposium," op. cit.

[53] "Julang-3 (JL-3) / JL-2C," *Global Security.org*, July 19, 2019, available at https://www.globalsecurity.org/wmd/world/china/jl-3.htm.

[54] Bill Gertz, "China Tests New Sub-Launched Strategic Missile," *Washington Free Beacon*, June 13, 2019, available at https://freebeacon.com/national-security/china-tests-new-sub-launched-strategic-missile/.

The older JL-2 SLBM is counted as a single warhead missile.[55] Yet, in 2017, the PLARF said JL-2A SLBM carried three 60-kiloton warheads.[56]

The pattern of Chinese modernization suggests a successor to the JL-3 SLBM – either an improved version or a JL-4 for the new 096 missile submarine. While ambiguous, the DoD reports may be assuming this.

Chinese Nuclear Bombers

The Chinese bomber force is made up of H-6 bombers, based on the Soviet Tu-16. The "heavily reworked" H-6K, introduced in 2006, has advanced avionics, upgraded engines, improved range, higher speed and, since 2018, the ability to launch six CJ-20s cruise missiles.[57]

The recent DoD reports may substantially undercount the number of Chinese bomber nuclear weapons. DoD is assessing the H-6N as China's only nuclear-capable bomber. It carries nuclear-capable 3,000-km range DF-21 ballistic missiles.[58] DoD described it as restoring China's nuclear bomber capability.[59] This capability may never have gone away. China reportedly retained a regiment of older H-6 bombers for the nuclear mission.[60] The 2019 DoD China report said, "Since at least 2016, Chinese media have been referring to the H-6K as a dual nuclear-conventional bomber."[61] The 2024 FAS report credits China's H-6K with nuclear bombs.[62] In July 2024, China's military released a photograph of the H-6K carrying four YJ-21 1,500-km range ballistic missiles.[63] *The War Zone* reports that the Pentagon assesses that the YJ-21 "…is likely available in nuclear-capable and conventionally armed versions," and has an anti-ship and a land-attack capability.[64]

DoD's May 2023 500+ warhead assessment apparently assumes no Chinese nuclear-capable cruise missiles. Yet, a declassified 1995 CIA report stated that a 1995 Chinese

---

[55] *2020 Ballistic and Cruise Missile Threat*, op. cit., p. 33.

[56] "China Ballistic Missiles and Nuclear Arms Thread," *Sino Defense Forum*, September 25, 2017, available at https://www.sinodefenceforum.com/china-ballistic-missiles-and-nuclear-arms-thread.t5881/page-233.

[57] Ryan Cunnigham, *China Military Aircraft* (London: Amber Books Ltd., 2023), p. 48; and, *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., p. 68.

[58] "Ankit Panda, "Revealed: China's Nuclear-Capable Air-Launched Ballistic Missile," *The Diplomat*, April 10, 2018, available at https://thediplomat.com/2018/04/revealed-chinas-nuclear-capable-air-launched-ballistic-missile/.

[59] "STATEMENT OF CHARLES A. RICHARD COMMANDER UNITED STATES STRATEGIC COMMAND BEFORE THE SENATE COMMITTEE ON ARMED SERVICES," April 20, 2021, available at https://www.armed-services.senate.gov/imo/media/doc/Richard04.20.2021.pdf.

[60] Andreas Rupprecht, "The Dragons' Wings," *Air Combat*, February 2012, p. 63.

[61] Office of the Secretary of Defense "Military and Security Developments Involving the People's Republic of China 2019" (Washington, D.C.: Office of the Secretary of Defense, 2019), p. 41, available at https://media.defense.gov/2019/May/02/2002127082/-1/-1/1/2019_CHINA_MILITARY_POWER_REPORT.pdf.

[62] Kristensen, Korda, Johns, and Knight, "Chinese nuclear weapons, 2024," op. cit., pp. 50, 66.

[63] "China's H-6K Bomber Displays High Ballistic Missile-Carrying Capacity," *Sputnik News*, June 3, 2024, available at https://sputnikglobe.com/20240702/chinas-h-6k-bomber-displays-high-ballistic-missile-carrying-capacity-1119218676.html.

[64] Thomas Newdick, "China's H-6K Bomber Seen Firing Air-Launched Ballistic Missile For First Time," *The War Zone*, May 1, 2024, available at https://www.twz.com/air/chinas-h-6k-bomber-seen-firing-air-launched-ballistic-missile-for-first-time.

nuclear test may be aimed at developing "a cruise missile warhead and may involve safety upgrades to existing systems."[65] In 2000, *Jane's Defense Weekly* said that, "China's development of a nuclear-armed cruise missile was reported in a 1995 Russian document, which also suggested that the complete production facility was transferred to Shanghai," and that the CJ-20 was "probably associated with the [Russian] Kh-55 (AS-15 'Kent')."[66] (The KH-55 is a long-range nuclear Air-Launched Cruise Missile (ALCM).)[67] In 2009, the Air Force's National Air and Intelligence Center said the DH-10 (the ground- and sea-launched CJ-20) was nuclear capable.[68] In 2013, then-Commander of the U.S. Global Strike Command Lieutenant General James Kowalski said that China's CJ-20 was a nuclear-capable ALCM.[69] In 2013, Russian Colonel General (ret.) Viktor Yesin wrote that China's DH-10 was nuclear-capable.[70] In 2019, *The War Zone* reported the CJ-10K and CJ-20 land-attack ALCMs were dual capable.[71] In 2021, General Hyten said China was rapidly building nuclear cruise missiles.[72] A 2024 report of the International Institute for Strategy Studies (IISS) stated that China had nuclear-capable long-range cruise missiles.[73]

The 2023 DoD report states that China is "…developing new medium- and long-range stealth bombers to strike regional and global targets."[74] This has the potential to increase dramatically China's air-launched nuclear capability. The H-20 reportedly is a stealthy subsonic nuclear-capable heavy bomber with a 10,000-km+ range and a 45-ton weapons

[65] Director of Central Intelligence, "China Nuclear Test [Deleted] Nuclear Test," *National Intelligence Daily*, March 7, 1995, available at https://nsarchive2.gwu.edu/NSAEBB/NSAEBB200/19950307.pdf.

[66] "China's new cruise missile programme 'racing ahead', ASIA PACIFIC," *Janes's Defense Weekly*, January 12, 2000, available at https://web.archive.org/web/20090604083602/http://www.janes.com/articles/Janes-Defence-Weekly-2000/China-s-new-cruise-missile-programme-racing-ahead.html.

[67] Center for Strategic and International Studies, "Kh-55 (AS-15)" (Washington, D.C.: Center for Strategic and International Studies, April 23, 2024), available at https://missilethreat.csis.org/missile/kh-55/.

[68] National Air and Space Intelligence Center, *BALLISTIC AND CRUISE MISSILE THREAT*, NASIC-1031-0985-09, (Wright-Patterson AFB: NASIC, April 2009), p. 29, available at https://irp.fas.org/threat/missile/naic/NASIC2009.pdf.

[69] Lieutenant General James M. Kowalski, "Air Force Global Strike Command," May 7, 2013, p. 5, available at http://fas.org/programs/ssp/nukes/nuclearweapons/AFGSC-CommandBrief-May2013.pdf.

[70] Viktor Yesin, "On China's Nuclear Potential without Underestimates or Exaggeration" (Washington, D.C.: Georgetown University, May 12, 2012), p. 3, available at https://www.strategicdemands.com/wp-content/uploads/2015/01/YESIN-China-s-Nuclear-Potential_2012.pdf.

[71] Tyler Rogoway and Joseph Trevithick, "Intel Report Confirms China Developing Stealthy Tactical Bomber In Addition To Strategic Bomber," *The War Zone*, January 16, 2019, available at https://www.twz.com/25989/intel-report-confirms-china-developing-stealthy-regional-bomber-in-addition-to-strategic-bomber.

[72] John A. Tirpak, "New Threats Demand Nuclear Modernization," *Air and Space Forces.com*, March 2, 2021, available at https://www.airandspaceforces.com/new-threats-demand-nuclear-modernization/.

[73] Veerle Nouwens and Timothy Wright, "Long-range Strike Capabilities in the Asia-Pacific: Implications for Regional Stability" (London: International Institute for Strategic Studies, January 2024), p. 9, available at https://www.iiss.org/globalassets/media-library---content--migration/files/research-papers/2024/01/iiss_long-range-strike-capabilities-in-the-asia-pacific_implications-for-regional-stability_012024.pdf.

[74] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., p. 63.

payload.[75] The medium stealth bomber may be the enigmatic JH-XX which may be supersonic with fighter-like maneuverability.[76]

Fisher credits China with 150 H-6 bombers in 2023, increasing to 250 bombers in 2035, including the H-20.[77] Fisher assesses their potential as 950 nuclear ALCMs in 2023, growing to 1,700 in 2035.[78]

China's Non-Strategic Nuclear Delivery Vehicles

In June 2024, Captain (ret.) James Fanell, former Senior Intelligence Officer for the U.S. Pacific Fleet, told Congress that, "Beijing already possesses more tactical nuclear weapons and theater forces than does the U.S."[79] This is not difficult because the United States has a small non-strategic nuclear force (only B-61 bombs).

China has vast numbers of non-strategic missiles (see the DoD chart reproduced above), the only questions being which are nuclear-capable and the number of nuclear warheads. In February 2024, STRATCOM Commander General Anthony Cotton said China "…has approximately 1,000 medium and intermediate-range dual-capable…ballistic missiles…."[80] Recent DoD China reports credit only the DF-26 IRBM and two versions of the DF-21 MRBM as nuclear-capable.[81] Very few Chinese non-strategic nuclear warheads can fit into DoD's May 2023 estimate of 500+ nuclear warheads.

In 2007, noted China expert Colonel [ret.] Dr. Larry Wortzel pointed out that China "…put[s] nuclear and conventional warheads on the same classes of ballistic missiles and colocate them near each other in firing units of the Second Artillery Corps [now the Rocket Force]…." [82] This may mask a signature of nuclear capability and contribute to DoD undercounting. Despite China's 2006 announcement that it had "tactical operational [short range] missiles of various types," [83] the DoD reports have ignored this announcement.

---

[75] Ibid., pp. 9. 63. 92; and, Gabriel Honrada, "China's H-20 stealth bomber ready for take-off," *Asia Times*, July 14, 2022, available at https://asiatimes.com/2022/07/chinas-h-20-stealth-bomber-ready-for-take-off/.

[76] Steve Trimble, "China Teases New Bomber, But Timing Remains Unclear," *Aviation Week.com*, October 13, 2022, available at https://aviationweek.com/shows-events/ausa/china-teases-new-bomber-timing-remains-unclear.

[77] "23rd Nuclear Triad Symposium," op. cit.

[78] Ibid.

[79] "Congressional Testimony of James E. Fanell, CAPT USN (Retired)," House Committee on Oversight and Accountability, June 26, 2024, p. 6, available at https://oversight.house.gov/wp-content/uploads/2024/06/Fanell-Testimony.pdf.

[80] Cotton, "STATEMENT OF ANTHONY J. COTTON COMMANDER UNITED STATES STRATEGIC COMMAND BEFORE THE SENATE COMMITTEE ON ARMED SERVICES 9 MARCH 2023," op. cit., p. 4.

[81] *Military and Security Developments Involving the People's Republic of China 2023*, op. cit., pp. 66-67; and, *Military and Security Developments Involving the People's Republic of China 2022*, op. cit., p. 95.

[82] Larry M. Wortzel, *China's Nuclear Forces: Operations, Training, Doctrine, Command, Control, And Campaign Planning* (Carlisle, PA: Army War College, May 1, 2007), p. 31, available at https://press.armywarcollege.edu/cgi/viewcontent.cgi?article=1680&context=monographs.

[83] *China's National Defense in 2006*, *China.org.cn*, December 2006, available athttp://www.andrewerickson.com/wp-content/uploads/2019/07/China-Defense-White-Paper_2006_English-Chinese_Annotated.pdf.

In 2001, a Taiwan Defense Ministry official reportedly said that China's short-range M-11 (DF-11) missile "…can fire a variety of warheads ranging from nuclear and chemical warheads to electromagnetic pulse warheads."[84] Colonel General (ret.) Viktor Yesin characterized the DF-15 and the DF-11 as China's operational tactical nuclear missiles, and said that China has 5- to 20-kiloton nuclear warheads for the DF-15A, the DF-15B, the DF-11A, the DH-10 cruise missile and Chinese fighter aircraft.[85] He repeated this in 2016.[86] Yesin implies that essentially all Chinese regional strike missiles are nuclear-capable and many are nuclear-armed. Fisher has discussed many types of Chinese non-strategic nuclear missiles and suggests most or all may be dual capable.[87]

DoD is silent on nuclear-capable Chinese fighters. Yet, retired Russian Colonel Yuriy Sumbatyan wrote that "as many as 500 or 600" of China's combat aircraft "are capable of carrying nuclear weapons."[88] In 2014, noted Russian expert Alexi Arbatov, former Deputy Chairman of the Defense Committee in the Russian Parliament (Duma), wrote "authoritative Russian assessments" credit China with "more than 1,100 [nuclear] warheads," including "570 gravity bombs and air-launched cruise missiles on 400 airplanes," and nuclear warheads on 204 land-based tactical ballistic missiles…"[89] A 2024 report of the IISS stated that, "China possesses several different types of both [MRBMs and IRBMs], as well as long-range cruise missiles that could be used for a variety of different regional conventional and nuclear missions."[90] China's stealth fighters are obvious candidates for the nuclear mission.

Reportedly, nuclear-capable DH-10s are carried by Chinese type 052D guided missile destroyers and type 093A nuclear attack submarines.[91] DoD's assumption that China has no nuclear-capable cruise missiles can dramatically undercount China's nuclear weapons.

Except for anti-ship ballistic missiles, the DoD reports do not credit China with tactical nuclear weapons (i.e., designed to attack ground forces, naval, anti-air or anti-missile targets). In 1988, China tested a neutron bomb,[92] which opens a range of advanced tactical nuclear weapons options. By the late 1980s, China reportedly could deliver "super-miniature

---

[84] Cited in Schneider, "Testimony before the U.S.-China Economic and Security Review Commission Hearing on 'Developments in China' Cyber and Nuclear Capabilities'," op. cit., p. 4.

[85] Yesin, "On China's Nuclear Potential without Underestimates or Exaggeration," op. cit., p. 3.

[86] Richard D. Fisher, Jr., "Taiwan: Theater nuclear missile deceptions," *Taipei Times*, March 4, 2024, available at https://www.taipeitimes.com/News/editorials/archives/2024/03/04/2003814406.

[87] Ibid.

[88] Cited in Schneider, "Testimony before the U.S.-China Economic and Security Review Commission Hearing on 'Developments in China' Cyber and Nuclear Capabilities'," op. cit., p. 5.

[89] Alexei Arbatov, *ENGAGING CHINA IN NUCLEAR ARMS CONTROL* (Moscow: Carnegie Moscow Center, October 2014), p. 3, available at https://carnegie-production-assets.s3.amazonaws.com/static/files/Arbatov_China_nuclear_Eng2014.pdf.

[90] Nouwens and Wright, *Long-range Strike Capabilities in the Asia-Pacific: Implications for Regional Stability*, op. cit., p. 9.

[91] Jeffrey Lin and P.W. Singer, "China Shows Off Its Deadly New Cruise Missiles," *Popular Science*, March 10, 2015, available at https://www.popsci.com/china-shows-its-deadly-new-cruise-missiles/.

[92] Jonathan Ray, *Red China's "Capitalist Bomb": Inside the Chinese Neutron Bomb Program* (Washington, D.C.: Institute for National Strategic Studies National Defense University, January 1, 2015), available at https://inss.ndu.edu/Media/News/Article/652871/red-chinas-capitalist-bomb-inside-the-chinese-neutron-bomb-program/.

nuclear warheads" with yield of "10 to 100 tons of TNT…."[93] A declassified 1993 CIA report said in a nuclear test, "China could be seeking to confirm the reliability of a nuclear artillery shell…."[94] Another declassified report said a 1990 nuclear test "may be related to development of a warhead for a Chinese short-range ballistic missile."[95] In 2002, Russian Lieutenant Colonel O. Moiseyenkov and Captain 1st Rank A. Smolovskiy wrote that China had tactical nuclear missile warheads and artillery rounds.[96] (In 2006, there was a similar report in a Hong Kong publication.)[97] In 2002, a Hong Kong journal with reported close ties to China's military stated, "China has achieved progress by leaps and bounds in its tactical nuclear weapons, making nuclear weapons practical and facilitating their use in future high-tech, local wars."[98]

Much of the historic difference between the DoD estimates and the higher estimates of China's nuclear arsenal appears linked to assessments of how many tactical nuclear weapons China has. Regarding the actual expected growth in China's nuclear warheads through 2035, the following chart compares the DoD and FAS estimates of Chinese nuclear weapons numbers from 2023 through 2035 with the alternative credible estimates.

[93] Mark Schneider, *The Nuclear Doctrine and Forces of the People's Republic of China* (Fairfax, VA: National Institute Press, November 2007), p. 20, available at https://nipp.org/wp-content/uploads/2021/05/China-nuclear-final-pub.pdf.

[94] Director of Central Intelligence Agency, "China: Accelerated Nuclear Test Schedule*," National Intelligence Daily*, February 19, 1993, available at https://nsarchive2.gwu.edu/NSAEBB/NSAEBB200/19930219.pdf.

[95] Director of Central Intelligence Agency, "China New Nuclear Test," *Science and Weapons Review*, July 31, 1990, available at https://nsarchive2.gwu.edu/NSAEBB/NSAEBB200/19900731.pdf.

[96] *Section II. Minimum Deterrence: Fragile Hope of a Constant and Benign Threat Environment* (Fairfax, VA: National Institute for Public Policy, September 2014), p. 509, available at https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Litigation_Release/Litigation%20Release%20-%20Section%20II%20Minimum%20Deterrence%20Fragile%20Hope.pdf.

[97] Ibid.

[98] Cited in Schneider, "Testimony before the U.S.-China Economic and Security Review Commission Hearing on 'Developments in China' Cyber and Nuclear Capabilities'," op. cit., p. 4.

ESTIMATES OF CHINESE NUCLEAR WEAPONS NUMBERS			
Year	DoD	FAS	Alternative Estimates
2023	500+[a]	500[c]	1,570-2,206 – Fisher (2023)[b] 976 – Yeaw (2024)
2030	1,000+[a]	n/a[d]	1,000-1,500 – Creeden (2023)
2035	~1,500	n/a[d]	6,108 – 6,734 – Fisher (2023)[a] 3,390 – 3,740 – Howe (2019) 3,584 – Yeaw (2024)[e]

a "Total Operational."
b Strategic only. The numbers are calculated using open source numbers from both Chinese and Western sources concerning the MIRV potential of Chinese ICBMs, SLBMs and the nuclear ALCM delivery potential of Chinese bombers.
c Of the 500, the FAS says 440 are "operational."
d The 2024 FAS report discusses the DoD numbers but does not explicitly support or deny them.
e Estimates are for 2034. See, Dr. Christopher Yeaw, "Geopolitical Nuclear Force Context with a Focus on China," *Triad Symposium*, Louisiana State University Shreveport, June 20, 2024.

Conclusion

At the 2024 Chinese Communist Party third plenum, its Central Committee pledged to "speed up the development of strategic deterrence forces."[99] Concurrently, China's Foreign Ministry attacked the American "nuclear umbrella" of its allies.[100] The Chinese nuclear and military buildup began after the threat to China had evaporated due to the demise of the Soviet Union and the post-Cold War cuts in American nuclear and military capability. It is neither defensive nor intended only to deter aggression against China. Rather, it coincides with Beijing's aggressive, expansionist policies in which nuclear weapons provide coercive leverage for regional expansion and the ultimate means in war-fighting strategies.

The most costly aspect of a nuclear deterrent is the delivery vehicles. China already has enough modern systems to deploy thousands of nuclear weapons now. This will increase as China deploys 096 SSBNs, more bombers, probably more ICBMs, improved strategic missiles

[99] Hayley Wongin and Amber Wang, "China's third plenum shows it is 'not in the mood' to slow down on nuclear arms," *South China Morning Post*, July 24, 2024, available at https://www.newsweek.com/china-makes-nuclear-weapons-demands-us-1928848.

[100] Ryan Chan, "China Makes Nuclear Weapons Demands to U.S. and Allies," *Newsweek*, July 23, 2024, available at https://www.newsweek.com/china-makes-nuclear-weapons-demands-us-1928848.

with better accuracy and more warheads, and a variety of dual-capable non-strategic missiles.

The 2035 estimate of 1,500 Chinese nuclear warheads (DoD, FAS and SIPRI) may turn out to be very low. Indeed, a 2023 Rand Corporation analysis concluded that even small, poor and technically backward North Korea was aiming at 300-500 nuclear weapons.[101] The numbers presented in the DoD and FAS reports appear to undercount the Chinese nuclear arsenal because there seems to be an analytical disconnect between the rapid visible growth in Chinese delivery systems and the slower assessed growth in deployed nuclear warheads. The DoD assessed only 500+ Chinese nuclear warheads in May 2023 despite crediting China with 350 ICBMs, two types of multiple warhead ICBMs and 72 deployed SLBMs, which alone add up to 422 warheads without even assuming a single MIRVed missile. This leaves only about 100 assessed warheads to cover China's MIRVed ICBMs, MIRVed SLBMs, non-strategic nuclear warheads (medium- and intermediate-range ballistic missiles), and air-delivered nuclear weapons. Any one of these categories could push China's number above 500+ and in combination the total should be substantially higher. Questionable assumptions in both the DoD and FAS reports include: 1) a large number of China's ICBM silos are complete but empty; 2) less capable DF-31 ICBMs are probably being deployed in the new silos; 3) China's numerous H-6K bombers are not nuclear-capable; 4) China lacks nuclear-capable short-range ballistic missiles; and, 5) China has no nuclear-capable cruise missiles. These assumptions contradict many open sources including statements by senior U.S. generals and admirals and, in some cases, previous DoD China reports.

Due to Chinese secrecy, deception, the inherent difficulty in counting mobile missiles and the concealment potential of the UGW, the United States may not grasp the full scope of Chinese nuclear systems. Another factor may be DoD's unwillingness to acknowledge that U.S. policy has misjudged China, being optimistic in the extreme, and remains lethargic as China achieves a larger, more modern and sometimes more capable force than the Cold War legacy American nuclear deterrent.

Nothing in current Chinese behavior suggests that it will use superiority in a responsible manner. China does not support a rules based international order. Its foreign policy is driven by strong nationalism and expansionist goals. President Xi is attempting to revive Communist ideology. China is becoming increasingly involved in Europe in support of Russian aggression. It appears to seek nuclear superiority to preclude American support to its allies against Chinese attack and assure Chinese victory in a future war.

Dr. Mark B. Schneider is a Senior Analyst with the National Institute for Public Policy. Before his retirement from the Department of Defense Senior Executive Service, Dr. Schneider served as Principal Director for Forces Policy, Principal Director for Strategic Defense, Space and Verification Policy, Director for Strategic Arms Control Policy and Representative of the Secretary of Defense to the Nuclear Arms Control Implementation Commission. He also served in the senior Foreign Service as a Member of the State Department Policy Planning Staff.

[101] Bruce Bennett, "How Kim Jong Un's Fears Shape North Korea's Nuclear Weapons Agenda" (Santa Monica, CA: RAND Corporation, April 19, 2023), available at https://www.rand.org/pubs/commentary/2023/04/how-kim-jong-uns-fears-shape-north-koreas-nuclear-weapons.html.