

Atomic Dragon: Chinese Nuclear Weapon Development and the Risk of Nuclear War

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Abstract

As China's economy, military, and regional power continue to grow, so do tensions between it and the United States. Long characterized as peaceful, China's ascension to a world power has been accompanied by a marked increase in sophistication of its nuclear arsenal and strategy. China is currently developing stronger nuclear deterrents, and there have been calls from the Chinese military to shift its nuclear policy from a more passive strategy to a higher level of alertness, worrying US military planners. This research will delve into the background of China's nuclear program, details of China's current nuclear development, and the risk to global security that these developments present.

About the Author

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Introduction

With the end of the Cold War in 1991, the threat of nuclear war seemed to disappear. Nuclear stockpiles stagnated and began to shrink, and trade expanded between former adversaries, particularly between the United States and China. Although the world is not free of nuclear weapons and the same nuclear doctrines that dominated the post WWII-era (such as mutually-assured destruction) are still in effect, nuclear apocalypse no longer appears to be on the forefront of international diplomacy. As a quasi-capitalist country, China appears more preoccupied with managing its economy than with spreading its political ideology. Despite their poor relations, Russia and the United States rarely discuss nuclear weapons outside of low-level arms reduction treaty talks.

However, there are undercurrents of a resurgence in nuclear tensions, particularly in East Asia: A slow nuclear arms race between China and the United States now appears to be intensifying. Not only do tensions remain high between the two countries, but territorial disputes and historical grievances between China and several US allies also still remain unresolved. One major source of tension is that China's nuclear arsenal is both smaller and less technologically advanced than that of the United States. An American first-strike could potentially destroy China's small nuclear stockpile, putting China at risk for a nuclear attack on its military or population centers.

Recent technological and policy developments have become a significant concern for the Chinese military. US military advancements and foreign policy decisions have led to a Chinese backlash, leading in part to an increasing rate of expansion in both the size and sophistication of China's nuclear arsenal. This paper will explore the military capabilities and organization of China's nuclear program as well as the technical and policy changes that this program is now undergoing.

Background on Chinese Nuclear Weapons

China completed its first successful nuclear test in 1964 (Nuclear Threat Initiative, 2015). This was the culmination of 9 years of nuclear research, hampered by the withdrawal of Soviet technical assistance due to the Sino-Soviet split. Since its inception, the Chinese nuclear program had different goals and technical specifications than the US or Soviet programs. The primary focus, rather than offensive capabilities, was largely defensive in nature. Very shortly after China became a nuclear weapons state, it declared a no-first-use (NFU) policy, a policy that it has since maintained (Office of the Secretary of Defense 2016, p. 58). The NFU policy is a guarantee by China not to use nuclear weapons against other countries unless China is targeted by nuclear weapons first. China has additionally pledged not to launch strategic nuclear first-strikes against its enemies even during times of war, in contrast Soviet and American policies.

The rationale for China's NFU policy stems back to Mao Zedong's thoughts on nuclear weapons. Mao believed that nuclear weapons were mere "paper tigers," weapons that appeared powerful but were not decisive in terms of international conflict and diplomacy. Mao wished for China to acquire nuclear weapons as a security precaution against American (and later Soviet) nuclear threats. China faced potential one-sided nuclear war during the Korean War and the Taiwan Straits Crisis; by developing nuclear weapons, China sought to dissuade the United States from launching a nuclear attack on China. This framed China's nuclear program and its future developments: The Chinese nuclear program focused primarily on deterrence, and continues to do so (China Daily, 2015).

Although China's nuclear arsenal remained much smaller than the massive Soviet or American arsenals, China's possession of nuclear weapons effectively ended the US experts'

discussion of a nuclear attack on China. This arsenal did not need to be large, as its mere existence was enough to prevent a nuclear strike for fear of large-scale nuclear war. From there, China sought to increase the survivability of its arsenal in the event of a nuclear first-strike. China began developing (or copying from Soviet strategy) various methods to ensure that a nuclear first-strike could not destroy its nuclear arsenal, which would leave it essentially defenseless against follow-up strikes, such as mobile nuclear missiles and later nuclear submarines.

Recently, China's level of nuclear organization has increased both technologically and structurally. Communication systems used by the People's Liberation Army (PLA) have improved in recent years, ensuring that they can remain functional in the event of a nuclear strike (Federation of American Scientists, 2000a). Control of China's nuclear weapons has recently been given to the People's Liberation Army Rocket Force, the successor to the Second Artillery Division (Ministry of National Defense of the People's Republic of China, 2015).

This branch of the military will have the same level of authority as the PLA (People's Liberation Army, which is composed primarily of ground units), PLA Navy (PLAN), and the PLA Air Force (PLAAF). Nuclear weapons still play only a small role in Chinese strategic planning, but are nonetheless increasingly autonomous from other branches of the military. While China's fledgling nuclear submarine fleet did not appear to be under the control of the Second Artillery Division, which was part of the PLA, they have now been given over to the Rocket Force. This indicates a consolidation of nuclear power under a single military branch, possibly due to the increased sophistication of China's expanding nuclear triad. The Rocket Force will control both land- and sea-based missiles, as well as nuclear-capable bombers

(Kelsey, 2016). This consolidation reflects the increased sophistication of China's nuclear strategy and organization.

Even so, China's offensive nuclear measures remain generations behind the United States. China only developed and deployed intercontinental ballistic missiles (ICBMs), capable of striking the entire United States in 1981, when the Dongfeng-5 (DF-5) ICBM reached initial operational capability (Federation of American Scientists, 2000b). China's air and sea capabilities remain very vulnerable to conventional attack by the US military. Nevertheless, China has developed an impressive arsenal of nuclear missiles and delivery systems capable of striking potential enemies as well as nuclear strategies intended to keep its arsenal safe and ready for launch.

Chinese Nuclear and Military Capabilities

China does not publish records of its nuclear stockpile or most of its military capabilities, making it difficult to obtain concrete numbers; As a result, these estimates are somewhat speculative in nature. Nevertheless, satellite footage and public releases by the Chinese government provide rough information on China's military developments. By observing China's non-commercial nuclear reactors and estimating the size of its total load of fissionable material (nuclear material that can be made into nuclear weapons), the size of China's nuclear arsenal can be calculated (International Panel on Fissile Materials, 2016). It is believed that China has around 260 nuclear weapons and a variety of delivery systems (Kristensen and Norris, 2015). These nuclear weapons are on a low-alert setting, often with the warhead and the missile stored separately (U.S.-China Economic and Security Review Commission, 2015, p. 20). Most of China's nuclear weapons are land-based, though China has been deploying submarine-launched

ballistic missiles (SLBMs) and the submarines necessary to deliver them. These delivery systems (while inferior to US systems) are capable of targeting any location in the United States with nuclear weapons and of resisting US first strikes. China's nuclear arsenal is intended to deter a US first-strike that could destroy China's retaliatory capabilities.

Most of China's nuclear missiles are silo-launched, meaning that they are launched from land-based locations throughout China. China is believed to have between 75-100 ICBMs in total, all of them from the Dongfeng missile series (literally "East Wind", to be referred to as DF) (Office of the Secretary of Defense, 2016, p. 25). While China may have as many as 12 or 13 varieties of land-based rockets, only the DF-5 and the DF-31A have the capacity to strike the United States (Nuclear Threat Initiative, 2015). The DF-5 was first tested in 1971 and fully deployed 10 years later (Federation of American Scientists, 2000b). It comes in two varieties: the DF-5A, which has a single warhead, and the DF-5B, which carries multiple, independently-targetable re-entry vehicles (MIRVs). The DF-5B is suspected to be able to carry up to three warheads on a single missile, and therefore its destructive capability is vastly greater than the DF-5A. There are believed to be only 10 of each type of DF-5 missile, which have an estimated range of 12,000-15,000 km. Both are liquid-fuel rockets, meaning that the warheads are kept separate from the missiles. The fuel, which is corrosive to the missile itself, is stored separately on-site (Goldstein and Erickson, 2005, p. 15).

As such, it could take several hours after approval has been granted to launch one of these missiles, making them vulnerable to a US first-strike. However, some of China's nuclear missiles are mobile, meaning that they are mounted on trucks or other such vehicles equipped with mobile launching stations. The DF-31A is China's primary mobile nuclear missile, and there are an estimated 25 such missiles that are operational (Federation of American Scientists,

1999a). The DF-31A has an estimated range of 10,000-14,000 km. China could have many of these nuclear weapons in motion on its vast highway system, from downtown Shanghai to the empty deserts of Xinjiang province. These vehicles are most likely located on the roads in the rural countryside, ensuring that these mobile nuclear weapons would almost certainly remain intact even if China were targeted by a nuclear strike. Critically, these rockets are some of the few in the Chinese arsenal that are solid-fuel rockets, meaning that the missile and warhead are stored together. If authorized, a DF-31A missile could be launched in a very short period of time, possibly minutes after launch approval was granted.

China is also in the process of developing ICBMs with longer ranges and improved accuracy. The DF-41 ICBM, which could have a range greater than that of the DF-5, is nearing completion and has been tested as a rail-mobile missile (Missile Threat, 2014). This would allow for China's developed railroad system to be weaponized, housing ICBMs capable of targeting anywhere location in the United States while remaining untraceable due to the vast amount of trains on the rails at any given time. Although this project appears to be in the final stages of development, it will probably not replace the Chinese mobile arsenal for at least another few years. However, even in its current state, Chinese land-based ICBMs are essentially impossible to destroy in a first-strike, given the sheer size of China. This guarantees that a land-based deterrent will remain intact, even after an enemy first-strike.

China also possesses the capacity to deliver a nuclear strike using its Air Force assets. The PLAAF maintains some 120 H-6 bombers, which are essentially the Chinese version of the Russian Tupolev Tu-16 (Airforceworld.com). China is currently in the process of deploying the H-6K, which is specifically designed to be a long-range strategic bomber platform. The H-6K has the capability to carry up to six (or possibly seven, as sources conflict) cruise missiles that

could be fitted with nuclear warheads (military-today.com). It has a combat radius of 3,500 km, and its cruise missiles have an additional range of around 2,000 km, meaning that from mainland China it could strike targets as far as Alaska. While a bomber-based nuclear strike does not figure prominently in Chinese nuclear plans, China, like the United States, retains the capability to do so.

Chinese Nuclear Submarine Development

Despite its strong land-based deterrent and growing air-based nuclear capabilities, fears of a successful US first-strike have led to Chinese development of sea-based nuclear delivery systems. China has been developing nuclear submarines with the capacity to launch submarine-launched ballistic missiles (SLBMs) capable of striking the United States. The JL-2 SLBM has an estimated range of 7,400-8,000 km and is currently being readied for deployment (Federation of American Scientists, 1999b). The estimated number of JL-2 missiles varies widely from 48-96 missiles in total (Kristensen, 2015). China's Jin-class submarine, which will form the base of the Chinese nuclear submarine fleet, has recently been completed.

The advantages of a nuclear submarine fleet are critical in regards to nuclear deterrence. While the JL-2 missile can only reach the west coast and Alaska from Chinese territory or coastal waters, a Chinese nuclear submarine could target any part of the continental United States from Hawaii (O'Rourke, 2016 p. 18). Nuclear submarines are very difficult to find and destroy, making it likely that China will be guaranteed a nuclear deterrence even in the event of a successful US nuclear first-strike. The United States is developing anti-submarine strategies, such as new submarine detection capabilities and strategic chokepoints to stop Chinese submarines in the western Pacific. In the event of a military confrontation with China, the United

States, the Philippines, Japan, and Taiwan could collectively mount an anti-submarine war in the Yellow Sea, the Ryukyu Islands, and the South China Sea, concentrating their efforts around key locations and thereby preventing Chinese nuclear submarines from reaching the high seas.

However, China is currently preparing to send out a nuclear “deterrence patrol,” which would begin long-range voyages throughout the Pacific (Baker, 2015). These submarines will be difficult to track and harder to destroy. If deployed first during peacetime, they would already be past the Pacific defensive lines in the event of an outbreak of hostilities. A single submarine could carry as many as 12 JL-2 SLBMs, ensuring that even one submarine could lay waste to a dozen American cities in the event of nuclear war (O’Rourke, 2016, p. 18). This submarine fleet would function as a serious deterrent to a nuclear first-strike against China. The Jin-class nuclear submarines, however, are known to be very noisy and are generally outclassed by opposing US submarines, making them vulnerable to a sea-based first-strike. (U.S.-China Economic and Security Review Commission, 2015, p. 347).

Furthermore, the United States has been creating several anti-submarine systems. One of these is the Sea Hunter, an autonomous navy drone designed to track and follow enemy submarines, is intended to ensure that targets cannot avoid detection in the event of war (Pellerin, 2016). Future US technological developments could potentially counter the relatively outdated Chinese sea-based deterrent before it is even deployed. Nevertheless, the development of a functional sea-based deterrent marks a major step towards China finally developing a nuclear triad and makes it even harder to neutralize China’s nuclear arsenal with a first-strike.

Chinese Military Concerns

China's security concerns continue to grow as the United States expands its military capabilities. China follows a no-first-use nuclear policy since 1964, in spite of a changing political and military landscape (China Daily, 2015). Because China's nuclear arsenal is very small in comparison to the US arsenal (which contains over 7,000 nuclear weapons), the threat of a nuclear first-strike is still considered to be significant (Arms Control Association, 2014). The sheer number of US nuclear weapons has led planners to fear that a nuclear first strike could destroy some or all of the Chinese arsenal before it could be deployed against the United States.

The United States has a wide variety of advanced delivery systems, early warning systems, and nuclear defense systems. A US strike can be launched from land-based nuclear silos, submarines, or by nuclear bombers while China is still struggling to develop any form of secure submarine deterrent. Many Chinese military scholars believe that China is at risk of a United States nuclear first-strike, a fear that could potentially lead to a major expansion of the Chinese nuclear arsenal as well as a potential shift away from China's low-alert status of nuclear weaponry (Kulacki, 2016, p. 5)

The current US nuclear mentality is deeply worrying to China; In the view of Chinese experts, the US refusal to recognize its vulnerability to Chinese nuclear weapons is an indication that it seeks to develop the means to neutralize the Chinese nuclear program (Kulacki, 2016, p. 1). The United States has spent billions of dollars attempting to develop an anti-ballistic missile (ABM) system; while this has largely been ineffective, American willingness to develop these ABM systems worries Chinese planners.

The United States has been attempting to construct nuclear defense systems, such as the Aegis and THAAD anti-ballistic missile system, which could theoretically intercept Chinese

nuclear weapons en-route to the United States. Although it would not necessarily be directed at China, plans to deploy a THAAD system in South Korea to defend against North Korean nuclear weapons has elicited protests from the Chinese government. The Chinese government claims that such a system could be used against China's nuclear arsenal and is thus an attack on China's security and retaliatory capabilities (Missile Threat, 2015). Effective missile defenses on the Korean peninsula could weaken China's offensive nuclear capabilities in Northeast Asia (despite THAAD's limited range and effectiveness), and many Chinese military experts are worried by this prospect (The Interpreter, 2016). This has contributed to rising tensions between the United States and China.

Another potentially destabilizing factor is the development of a "Prompt Global Strike" system, which could potentially allow the United States to destroy any target inside China with non-nuclear missiles within hours (Woolf, 2014 p. 2). These missiles could target nuclear storage sites, missile silos, and military targets from US territory without the use of nuclear weapons. Just as with the anti-ballistic missile systems, PLA military experts have expressed concern over this neutralization strategy. A conventional first-strike by the United States could cripple China's nuclear deterrent, leaving China unable to retaliate beyond conventional means. Due to the development of defensive strategies and alternative offensive measures by the United States, China has focused on the development of rail-launched nuclear missiles, as explained previously, and has been developing its submarine fleet. However, there are many in the People's Liberation Army who do not believe that these measures are sufficient, and there have been calls by PLA military experts to shift China's nuclear weapons onto a higher-alert status (Kulacki, 2016, p. 1)

Chinese Policy Changes and Nuclear False Alarms

Of the estimated 45 land-based nuclear weapons that can reach the United States, the majority are believed to be mobile solid-fuel rockets which can be launched fairly quickly. Unlike US missiles however, China's missiles are on a low-alert status. This means that it could take several hours to authorize a nuclear launch, even if the nuclear missiles are attached to solid-fuel rockets. As such, a first-strike by the United States could lead to the destruction of China's nuclear arsenal before it has a chance to launch a nuclear retaliation, a scenario that has not been lost on Chinese military experts. In 2013, the Chinese Academy of Military Sciences published *The Science of Military Strategy (SMS)*, a comprehensive overview of Chinese military strategy and nuclear weapons policy (Kulacki, 2016, p. 4).

This book, intended for Chinese readers, explains (among many other topics) China's concerns with US policy and potential countermeasures. Strategists in the PLA call for shifting China's nuclear weapons to hair-trigger alert, allowing them to be launched "on warning," or after a missile launch has been detected, but before it reaches its target. The work references the ongoing development of an early-warning system to detect enemy nuclear missile launches, though it does not go into specifics. This lack of specificity is worrying because of a key risk in the field of global nuclear proliferation: nuclear false alarms.

There have been several false alarms in which early-warning systems detected non-existent nuclear missile launches, nearly resulting in nuclear war. The Union of Concerned Scientists has compiled several memorable and terrifying incidents: In 1980, a malfunctioning computer chip led to the detection of a Soviet nuclear missile launch, leading to the mobilization of the US nuclear bomber fleet (Union of Concerned Scientists, 2016, p. 8). This could have

resulted in the deployment of nuclear bombers over Soviet territory, triggering a conventional or nuclear war. In 1983, sunlight reflecting off of clouds led a Soviet satellite to erroneously detect the launch of five nuclear missiles from the United States (Union of Concerned Scientists, 2016, p. 7). This came at a period of high tensions between the two countries.

Despite the alert, the Soviet officer in command of the early-warning system suspected that this was an error and did not report the launch. However, had he done so, the Soviet Union would have launched a nuclear strike against the United States. In 1995, a Norwegian rocket designed to study arctic aurora was detected by the Russian early warning system as a potential SLBM launch and was interpreted to be an attempt to damage Russian radar systems with a nuclear electro-magnetic pulse (Union of Concerned Scientists, 2016, p. 8). While Norway had informed Russia of this rocket launch, the information had not reached the relevant authorities, nearly leading to Russia launching nuclear weapons at the United States. These are only a few of the accidental near-launches, all of which are a result of the hair-trigger status of nuclear weapons. The Chinese early-warning system is most likely in its infancy; should it detect an erroneous nuclear launch, China's launch-on-warning policy could potentially lead to actual nuclear war.

One potential consequence of relying on early-warning systems for a launch-on-warning policy is that a first-strike by conventional missiles could also trigger an accidental launch. As the United States expands its Prompt Global Strike system, conventional missiles heading towards Chinese nuclear sites could be mistaken for nuclear weapons, even if launched at a depressed angle (unlike an ICBM, which launches at a much higher angle, though the previously mentioned Norwegian rocket also travelled at a depressed angle and was still believed to be a

nuclear weapon) (Woolf, 2016, p. 34). Should Chinese commanders mistake these missiles for a nuclear first strike, a conventional, non-nuclear war could escalate into nuclear conflict.

There have also been concerns, raised primarily by American military experts, that China may abandon its NFU policy. China's nuclear submarine developments have concerned many US analysts that China may change its nuclear doctrine or that it may not to keep its pledges to limit nuclear weapons to retaliatory purposes. With a submarine deterrent, China could discontinue the policy because it is no longer necessary to keep China safe from a preemptive nuclear strike (Woolgar-James, 2015). However, China's 2015 Military Defense Paper and the SMS both reference the NFU policy as the cornerstone of Chinese nuclear policy and show no indication of changing it.

The SMS describes nuclear weapons as playing a relatively minor role in Chinese military strategy, even following a nuclear attack on China. China's nuclear retaliation plans do not involve striking US military centers, but rather population centers. (Kulacki, 2015). The main reason behind this is that experts believe that China's nuclear program is too small to successfully cripple the US military and thus is primarily a deterrence program. A successful Chinese nuclear retaliation would cause tens of millions of civilian casualties, ensuring that the cost of nuclear war with China would be too heavy for any nation to pay. A Chinese strike on an enemy's military capabilities may not be successful and could leave China without an adequate nuclear deterrent. There is no conceivable reason to alter the NFU policy as China does not appear to be upgrading its nuclear weapons for battlefield use. Even though a shift of China's nuclear weapons to a high-alert status is being considered, Chinese military experts do not appear to be abandoning the NFU policy.

Conclusion

Understanding Chinese nuclear development is critical in understanding China-US relations as well as the future of bilateral nuclear arms control. China's nuclear program and its ongoing changes reflect the pressures that China faces from its rivals abroad. While China's arsenal may be smaller and less advanced than the American arsenal, it is slowly approaching military parity. Shifting Chinese nuclear weapons to a high alert status, would make the world significantly less secure from the threat of nuclear war. It is vital to understand China's nuclear policy along with the trajectory of its current development in order to understand the risks facing global stability and security. Perhaps with this understanding, US policies could be modified or abandoned in order to ensure that another Cold War and nuclear arms race does not materialize.

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