

AIR WAR COLLEGE

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CHINA'S MILITARY MODERNIZATION:

A LOOK TOWARD 2030

by

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Introduction

Since Deng Xiaoping began opening China to the world, China has experienced an economic revolution that fueled a tremendous rise in national power. With subsequent globalization and rapid economic growth, China has become more globally connected and integrated. China's rising economic interdependence suggests that the potential for military conflict should be diminished.

Nevertheless, during recent years China has undertaken a prolonged military buildup and modernization program. China is improving anti-access capabilities including maritime forces, air defense, and ballistic and cruise missiles. Also, China is focusing considerable attention on disruptive technologies such as cyber, counterspace, and directed-energy weapons. China's neighbors and the United States have raised concerns regarding this buildup, and question the possible motives for these trends in an environment where international threats to China are diminishing. While much of the new military capability can be attributed to a potential Taiwan conflict, China's military long-term goals may reach much further.

As China's power rises and its national interests expand, China will seek to maintain its own "freedom of action" in controlling threats to Chinese sovereignty and economic lines of communication. China's long-term military aims will support its vision as a regional power. With a ring of influence in the Western Pacific, China's military will have sufficient power to prevent outside efforts to intervene in China's affairs. Taiwan will remain the most likely near-term source of China-U.S. conflict, but the probability of conflict over Taiwan will diminish by 2030 as peaceful reconciliation progresses. As China's interests expand globally, protecting

lines of commerce and access to natural resources may also prompt China to flex its newly developed military powers.

If current economic trends continue, Chinese national power may rival or even exceed that of the United States by 2030. The lack of Chinese transparency makes it difficult to precisely assess their current strength and ascertain future intentions. However, it is plausible that the current economic trends will enable military growth to continue at a remarkable pace, and that at least regionally, China will be a dangerous military peer to the United States in 2030.

As a military peer, China will create different challenges for the United States than any previous potential adversary. China's military is a complex combination of old and new—from Sun Tzu to cyberspace—but the spoils of economic success have combined with a unique military culture to produce, at least by 2030, a capable, regional military peer to the United States with particular emphasis on anti-access capabilities and asymmetric effects.

This paper begins with a look at China's past and how the military evolved to what it is today. It then examines current Chinese military organization and discusses China's distinctive military strategy and culture. It then provides an overview of current Chinese military capabilities. Lastly, it analyzes China's military development by examining current trends and projecting them in the context of Chinese military strategies, leading to an outline of projected Chinese military capabilities for the year 2030.

Historical Perspective of China's Military

For most of the last 4000 years, China has been the world's dominant economic power. From the first century A.D. to the nineteenth century, China was responsible for at least 25 percent of the world's GDP, with a maximum of 33 percent in 1820.¹ However, the influence of western

colonial powers, including the Opium Wars, led to a dramatic decline. By 1950, China only represented five percent of the global GDP. This was a period of continuing shame for the Chinese, often referred to as a “century of humiliation,” which lasted over a hundred years.²

In 1931, Japan invaded Manchuria in pursuit of Chinese territory and resources. The Japanese conflict escalated into open war in 1937 and continued until the Japanese defeat in World War II. During this time, the Chinese people suffered greatly at the hands of the Japanese occupiers, strengthening anti-Japanese sentiments in China.

Chinese anger was also directed at the Nationalist government. The Nationalist government of Chiang Kai-shek was more concerned with exterminating Chinese communists than the advancing Japanese forces. Although the Nationalists and Communists reached an uneasy agreement to resist the Japanese in 1937, the fragile alliance did not last long. From 1938 to the end of World War II, the two parties fought often, even in Japanese controlled areas, and when war ended the country was on the brink of civil war.

Despite U.S. assistance during WWII, the Nationalist Army was so weakened by the long war with Japan and by internal disorder, that it was no match for the People’s Liberation Army (PLA) of Mao Zedong. The Communists established the People’s Republic of China in October, 1949 and Chiang Kai-shek fled to the island of Taiwan with a few hundred thousand Nationalist supporters. In March of 1950, Chiang again declared himself the President of the Republic of China, refusing to concede defeat to the communists. The Nationalist government enjoyed much international support and continued to declare itself the rightful government of China, which set the stage for the continuing conflict between the government in Beijing and the Republic of China on Taiwan.³

The PLA was initially used as the primary means of domestic control before the CCP created more elaborate internal policing structures.⁴ The PLA also engaged foreign forces on several occasions, to include intervening in Korea (1950-52), and border conflicts with India (1962), the Soviet Union (1969), and Vietnam (1979).⁵ Throughout this period, the military remained a land-focused force. Out of necessity, China's strategic culture emphasized manpower instead of technology to defend the homeland from invasion by a more advanced enemy. China did not have the ability to develop both a technologically advanced conventional and nuclear force, so Mao chose to the nuclear path. The advent of nuclear weapons forced modernization on the PLA, but the strategy merely adapted nuclear weapons into previous concepts, articulated as "People's War Under Modern Conditions."⁶

Recognizing the tremendous gap in capabilities with the United States, the PLA began a program of long-term transformation under Deng Xiaoping. The PLA began to evolve from a manpower-focused, technology-challenged force into a smaller, technologically advanced force. Planning shifted from fighting a major defensive war for the homeland to preparing to fight wars at or near China's borders.⁷ Also, the PLA focused more on joint doctrine and conducted a number of joint exercises to develop these capabilities.⁸ Modernization continues today as the PLA pursues a Revolution in Military Affairs (RMA) with Chinese Characteristics,⁹ striving to build an army capable of winning information warfare.¹⁰ Technology plays a pivotal role as China stresses the need to "accelerate change in the generating mode of war fighting capabilities by drawing on scientific and technological advances" and "strives to make major breakthroughs in some basic, pioneering and technological fields of strategic importance."¹¹

China's Military Today

The People's Liberation Army, often referred to as the CCP's "Great Wall," is first and foremost an army of the Party. Chinese Army officers take no oath to a constitution or nation, but instead declare in their oath office to "closely unite around the Party Center."¹² The organization, command structure, and strategic culture of the Chinese military reflect the Party's tight control of the PLA. The Party wields the power of the Army for both domestic and international goals, but recent advances in capabilities have generated a force optimized for defending China's borders and influencing Taiwan.

Military Organization

China's military is divided into three separate organizations: active and reserve units of the PLA, Chinese People's Armed Police force, and the People's Militia. The PLA is primarily responsible for defending China against external threats, while the Police and Militia are domestic-focused paramilitary organizations. By law, the Police and PLA are separate, but there is some cooperation and sharing of personnel between agencies. Significantly, the PLA can be tasked with domestic security in extreme circumstances.¹³ Other aspects of China's domestic security apparatus include the Ministry of Public Security for law enforcement and the Ministry of State Security for intelligence and counter-espionage.

The PLA consists of the Army, PLA Navy, PLA Air Forces, and strategic missile forces (2nd Artillery). Command authority of the PLA rests with the Central Military Committee (CMC) which is currently headed by the communist party General Secretary, Hu Jintao, and includes the most senior military leaders—all are party members. In September, 2004, Hu Jintao added service chiefs from the Air Force, Navy, and 2nd Artillery to CMC in an apparent effort to

improve joint-military cooperation and effectiveness.¹⁴ During peacetime, the CCP Standing Committee acts as national command authority, but in wartime authority passes to the CMC.¹⁵

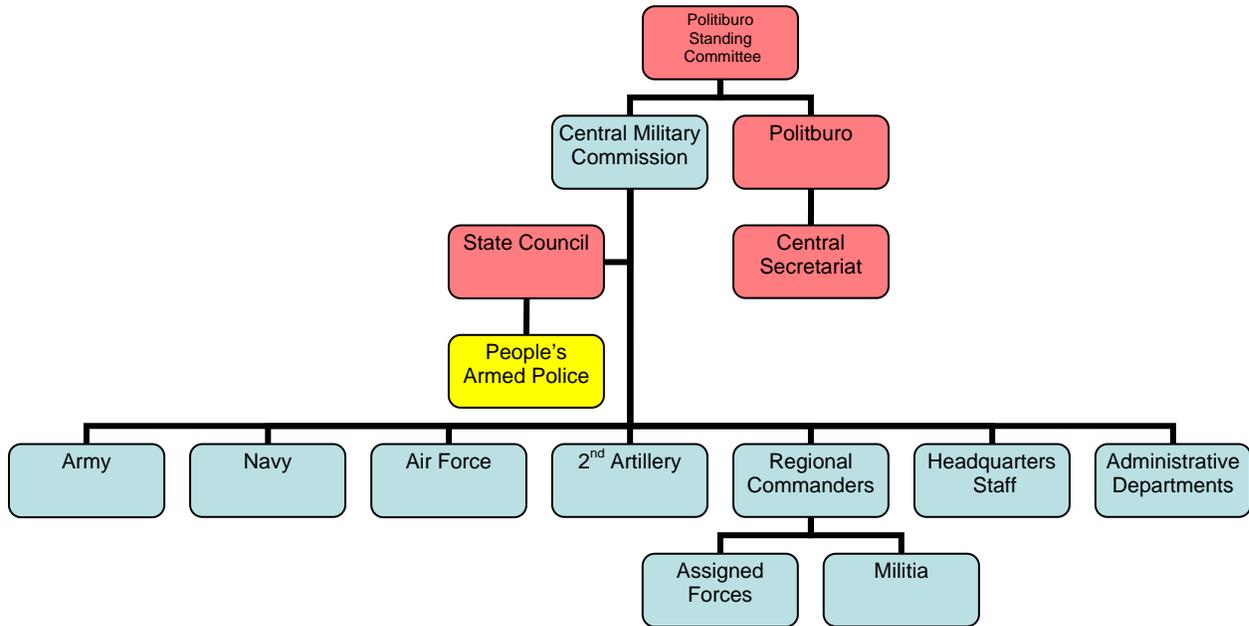


Figure 1: Chinese Communist Party and Military Command Structure¹⁶

The bulk of PLA forces are organized into seven distinct military regions, each with their own commander, who report directly to the CMC. These separate military regions function as separate “theaters” in peacetime, but during conflict a cross-theater joint structure may be created.¹⁷ All ground, air, and sea forces fall under the Military Region Commanders’ authority except the independent 2nd Artillery.¹⁸

The organizational “stovepipes” of the Military Regions helps keep too much power from being concentrated in any one part of the military. This is consistent with the CCP’s complex system of internal controls and monitoring of military leaders, epitomized by civilian leadership of the CMC. Also, the one-party system mutually benefits both the Party and the PLA, making coup attempts by individual military leaders very difficult and unlikely to succeed.¹⁹

The Role of Unorthodox Forces in Chinese Military Strategy

Chinese military culture has thousands of years of history that continues to influence thinking today. Most famously, the teachings of the military philosopher and strategist Sun Tzu represent the cultural basis of Chinese military thinking. Among his ideas, Sun Tzu focused on the primacy of strategy, rather than brute strength, to manipulate the adversary, create opportunity, and obtain victory decisively. According to Sun Tzu, the ultimate achievement in strategy is to defeat an enemy without using force. In addition to valuing speed and surprise, a key element is the role of deception, made famous by Sun Tzu's statement, "Warfare is the Way (Tao) of deception."²⁰ Of particular importance are Sun Tzu's ideas regarding the role of "orthodox" (cheng) and "unorthodox" (chi'i) forces. "Unorthodox" tactics are characterized by employing forces in imaginative, innovative, and unexpected ways. Both are important, but "in battle one engages with the orthodox and gains victory through the unorthodox."²¹ In fact, the original text always orders the forces as chi'i/cheng, unorthodox/orthodox, emphasizing the dominance of unorthodox before the orthodox.²² This emphasis on indirect, unconventional methods of warfare takes on new significance when considering the implications of China's efforts to develop new technologies with potentially disruptive military effects, including cyber, directed energy, and space.

When China goes to war, it will seek to paralyze first, and then annihilate as quickly as possible. In attacking key, potentially paralyzing targets, the Chinese doctrine calls for employment of *shashoujian*, sometimes called "assassin's mace" weapons as part of a doctrine called "the Inferior Defeats the Superior."²³ While not decisive alone, these advanced technology weapons include anything that produces asymmetric effects, both physically and psychologically, when targeted against enemy "acupuncture points."²⁴ China's short range

ballistic missiles (SRBMs) are often cited as an assassin's mace capability, as are the potential effects of cyber, electronic-warfare (EW), directed energy, and space systems.²⁵ Reflecting Sun Tzu's influence on China's military thinking, Chinese military modernization includes new conventional air, naval, and ground forces, but also many more asymmetric or unorthodox capabilities that play major roles in Chinese military strategies.

Current Military Capabilities

Through an aggressive program of foreign purchases, primarily Russian, and indigenous programs, China has developed significant capabilities for power projection, anti-access, and area denial. China's modernization program is focused, for at least the next decade, on providing capabilities necessary to prevent, if necessary, Taiwan independence.²⁶

Ballistic and Cruise Missiles

China has approximately 900 mobile SRBMs within range of Taiwan and is increasing their numbers by roughly 100 per year.²⁷ These include the DF-15 (CSS-6) and DF-11 (CSS-7) which have a range of roughly 600 km, and each can carry high-explosive or nuclear warheads, as well as payloads designed to disrupt electronic systems and penetrate hardened targets.²⁸

The ICBM force is also improving, including the road-mobile DF-31 and longer-range DF-31A, expected to be fielded within the year.²⁹ With the expected 11,270 km range, the DF-31A, will be capable of targeting most of the world, including the continental United States, with a more flexible and survivable system than their 20 liquid-fueled, silo-based CSS-4 ICBMs.³⁰ China also has sub-launched ballistic missiles (SLBM), including the JL-1 and soon the JL-2, that provide very flexible capabilities to strike land and sea targets regionally and beyond.³¹

Another major focus of China's anti-access capabilities is cruise missiles. They currently have a 200-300km range land-attack cruise missile (LACM) and are working to develop more

capable systems.³² Reports from Taiwan indicate that there may be more than 200 LACM deployed and aimed at Taiwan.³³ The PLA Navy also has several types of anti-ship cruise missiles (ASCMs), including the new YJ-62³⁴ and the Russian-made Sunburn and Sizzler missiles³⁵ that are specifically designed to target aircraft carriers by defeating the Aegis anti-missile system.³⁶

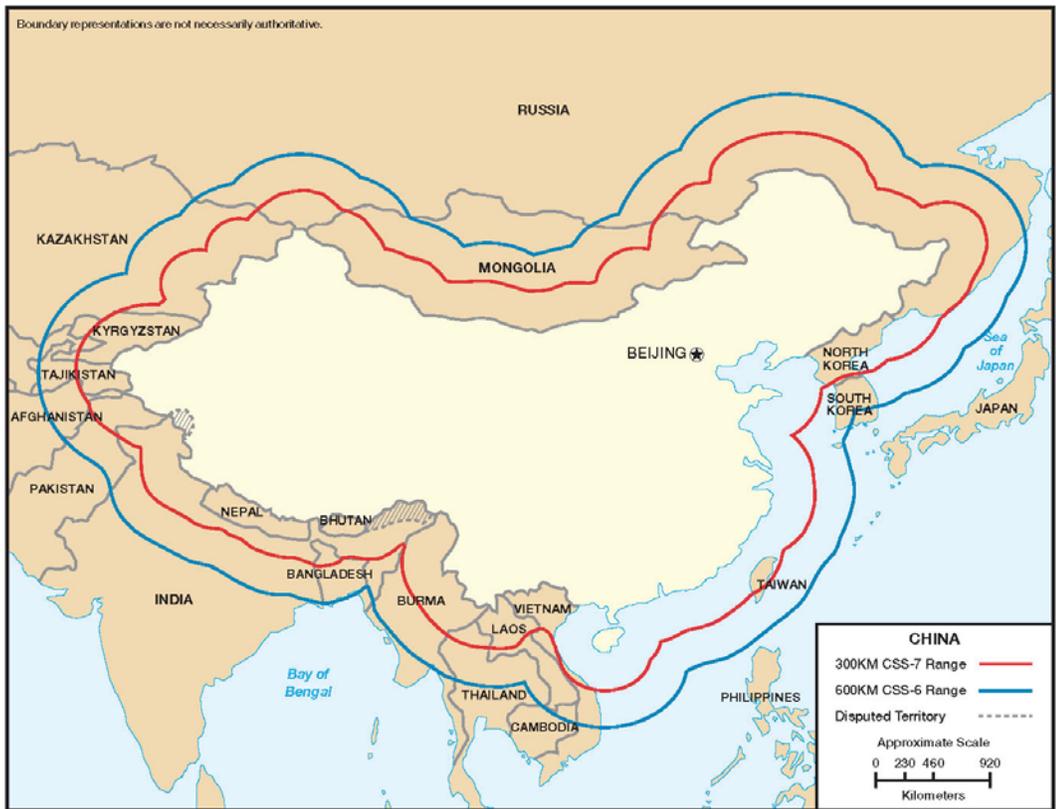


Figure 2: Chinese Conventional Short-Range Ballistic Missile Range³⁷

Naval Power

Chinese naval forces are primarily designed for “green water” or littoral operations. The PLA Navy includes 72 principal combatant ships, 58 attack submarines, and about 50 amphibious lift vehicles.³⁸ From Russia, China has procured a fleet of a dozen Kilo-class submarines with the Sizzler ASCM.³⁹ The Navy’s newest ship is the Luzhou-class guided

missile destroyer with the Russian SA-20 Surface-to-Air Missile (SAM) system.⁴⁰ The Luzhou complements the Luyang II destroyer and Jiangkai II-class frigate which are also equipped with modern search and guidance radar and SAMs.⁴¹ The Navy also has emphasized the development of advanced mines to support its anti-access strategy.⁴² However, the Chinese Navy has no aircraft carriers, nor are they within ten years of deploying one.

Air Power

Air superiority over the Taiwan Strait is a very high priority for the PLA Air Force, and China has invested heavily in aircraft and air defense. Of the over 2,300 combat aircraft, more than 700 of them are capable of combat operations against Taiwan without refueling.⁴³ The Chinese Air Force has significant numbers of fourth-generation⁴⁴ fighter aircraft, including over 300 Russian-built SU-27 and SU-30 fighters. They also have licensed with Russia to co-produce their own variant of the SU-27, the J-11. In addition, China has developed and produced an indigenous fourth-generation fighter, the J-10.⁴⁵ These aircraft are equipped with modern air-to-air missiles, air-to-surface precision munitions, and cruise missiles. China's air defenses feature Russian-purchased top-of-the-line systems, including the SA-10 and SA-20, as well as indigenously produced HQ-9 and HQ-15 SAMs.⁴⁶ The range of these systems extends to the Taiwan coast, and present considerable air superiority challenges for any Chinese adversary.⁴⁷ While the PLA Air Force has roughly 450 transport aircraft, aerial refueling capabilities are extremely limited. However, acquisition programs are underway to provide more refueling aircraft in the near future.⁴⁸



Figure 3: Chinese Surface-to-Air Missile Coverage over the Taiwan Strait⁴⁹

Ground Forces

The PLA has 1.4 million active ground forces, of which 400,000 are located near the Taiwan Strait.⁵⁰ In general, ground forces have not received the same modernization resources as naval and air forces the past 15 years, but lately they have received some attention. The PLA is fielding upgraded tanks, armored personnel carriers, and artillery. Of note is a new third-generation tank, the ZTZ-99, fielded in April 2006.⁵¹ Also, the PLA has reportedly developed a new amphibious assault vehicle that, along with equipment upgrades and better training, has improved this capability considerably.⁵²

Assassin's Mace Capabilities

There is much speculation and uncertainty regarding Chinese development and intentions for this class of technologies and systems. Certainly, China received tremendous attention when they demonstrated an anti-satellite (ASAT) ballistic system on January 11, 2007.⁵³ This test represented not just a clear demonstration of space capability, but spoke to the tremendous technical growth China achieved in recent years. Marine General James Cartwright, former Commander of U.S. Strategic Command, testified that the successful test was “the third in a series...the adjustments they made through those three tests to have a successful third test were good in terms of science, manufacturing and R&D...They got there very quickly.”⁵⁴ However, China's ASAT test was just the most recent attempt by the Chinese to test disruptive anti-satellite technologies. In September, 2006, the Chinese used a high-powered laser to illuminate a US satellite--an action that can potentially “blind” or damage sensitive electronics and sensors.⁵⁵ China also has made notable strides in developing space-based capabilities. This includes satellite systems for multi-spectral and synthetic-aperture radar imaging, navigation, and communications. Among the most impressive of its recent space achievements was China's second manned space mission in October 2005 and a lunar-orbiting satellite in November 2007.

China has also been perhaps the most notorious suspect in cyber-attacks in recent years. In 2004, U.S. government computers were attacked in 2004 in an attempt to collect information, and the attack was traced back to China's Guangdong province.⁵⁶ General Cartwright recently testified that China is conducting “a substantial amount of reconnaissance” of U.S. government and industry computer networks for information and identifying weaknesses.⁵⁷ China has been suspected of many other cyber attacks and regardless of whether the attacks are state-directed or

not, there is nevertheless a clear intention to further develop informational warfare capabilities including cyber attacks.

China's Military by 2030

China is in the midst of an organized modernization program that by 2030 will transform the military into a formidable power. China's initial objective is to build the capability to influence and control affairs within the Taiwan Strait and the South China Sea. Within this limited geographical area China will be a military peer to the United States by 2030.

In parallel, China is also building toward a longer term goal—the ability to project power and protect its vital interests particularly in the Western Pacific, the Middle East, and Africa. The U.S. intelligence community estimates it will take until 2010 or longer for China to be capable of defeating a moderate-size modern force.⁵⁸

The Path to 2030

China is managing international perceptions regarding its military growth, but Chinese intentions for this new power remain uncertain. A feature of China's modernization is the desire to sustain military growth, but grow slowly enough to inhibit anti-Chinese reactions. Hu Jintao's "peaceful rise" campaign is a concerted effort to characterize China's development as peaceful and calm regional fears of China's increasing military power.⁵⁹ Deng Xiaoping's famous 24-Character strategy stated that China should "observe calmly; secure our position; cope with affairs calmly; hide our capabilities and bide our time; be good at maintaining a low profile; never claim leadership."⁶⁰ This strategy led some to suggest China is possibly a "patient hegemon."⁶¹ Also, Lt Gen Mi Hanyu, Vice Commandant of the Academy of Military Sciences,

said “for a relatively long time it will be absolutely necessary that we quietly nurse our sense of vengeance...We must conceal our abilities and bide our time.”⁶²

For the next five to ten years, China will continue focusing development on anti-access capabilities, including “assassin’s mace” weapons, to deter or counter any adversary near Chinese territory. Specific aims of the anti-access strategy are to slow deployment of adversary forces and compel cause these forces to operate from distances further than desired.⁶³ To achieve these aims, Chinese doctrinal writings propose a combination of conventional and asymmetric weapons. These include the use of ballistic and cruise missiles, aircraft, and covert operations to attack regional adversary bases. These same weapons, along with electronic jamming, anti-satellite weapons, electro-magnetic pulse (EMP) weapons, and computer network attacks are designed to degrade command and control and early-warning capabilities. Finally, submarines, destroyers, aircraft, mines, cruise missiles, and conventional ballistic missiles may be used to attack aircraft carriers, forcing them to operate up to 1500 km away from China.⁶⁴

Another trend in China’s growing military power is the leveraging of foreign military purchases and technologies to obtain anti-access capabilities. For at least the next ten years, Chinese indigenous capabilities cannot meet its military goals, but foreign purchases will fill the gap while China leverages foreign aid to internally develop capabilities for much greater power projection beyond 2015.⁶⁵ The PLA is now the world’s largest buyer of foreign-made arms including Russian aircraft, submarines, munitions, and satellite payloads.⁶⁶

Not only do foreign purchases provide a leap in capability, China is also using these acquisitions to strengthen the Chinese industrial base and improve their ability to produce and innovate technologically.⁶⁷ China has historically been weak in the advanced metallurgy required for fighter turbofan engines, but a long partnership with Rolls-Royce helped produce the

QinLing engine for the JH-7A fighter-bomber.⁶⁸ Perhaps more significantly, this relationship may have enabled a Chinese breakthrough—the WS-10A is China’s first indigenous high-power fighter turbofan and may eventually power China’s fifth-generation fighters.⁶⁹ Chinese solid-propellant rocket motors also benefited when Martin Marietta helped improve a Chinese solid-motor satellite perigee kick motor. The technical assistance reportedly helped China solve motor failures on the DF-21 ballistic missile.⁷⁰ China also partnered with Britain’s Surrey Satellite Technology Ltd to co-develop microsattellites, leading to speculation that Surrey’s nano-satellite technology is at the core of Chinese small satellite development.⁷¹ Finally, the relationships with Russian companies have helped China in developing its own platforms including Song submarines and the J-10 fourth-generation fighter.⁷²

In parallel with producing anti-access capabilities, China is also beginning to focus more resources on developing systems to project military power beyond the region.⁷³ New Chinese conventional theater ballistic missiles are capable of projecting power beyond Taiwan.⁷⁴ Also, the PLA is also seeking to purchase or develop over-the-horizon sensors and space-based C4ISR assets to track distant naval targets.⁷⁵ The PLAAF will soon field its first-ever aerial refueling capability with the Russian Il-78 Midas and indigenous B-6U, extending the range of strike and bomber aircraft beyond the Taiwan Strait.⁷⁶ Finally, advanced destroyers and nuclear submarines, both Russian and Chinese-made, will considerably advance China’s power projection abilities.

The most visible sign of a blue-water naval program is China’s on-going interest in deploying an aircraft carrier. In October 2006, Lt Gen Wang Zhiyuan of the PLA’s General Armament Department stated that the “Chinese army will study how to manufacture aircraft carriers so that we can develop our own...[A]ircraft carriers are indispensable if we want to

protect our interests in oceans.”⁷⁷ Although China has expressed varying degrees of interest in carriers for over twenty years, this most recent declaration comes at a time when China has a rapidly growing set of interests beyond its borders that may require protection and the resources to achieve this goal. Nevertheless, most analysts agree that Chinese efforts to deploy a carrier will not be successful before 2020.⁷⁸

Military Capabilities in 2030

China’s military, fueled by economic growth and aided by foreign technology, will mature and represent a very modern, dangerous threat to any adversary in 2030. Much of China’s ground and air forces will be regionally limited to the Taiwan Strait and the Yellow, East China, and South China Seas. However, China will be capable of projecting some aspects of military power beyond the region via aircraft carriers, submarines, conventional ballistic missiles, cyberspace, and space platforms. China will not be an expeditionary force, but will selectively use these few projection options to ensure access to natural resources and commerce.

Conventional Military Forces

Naval forces will play a large part in China’s future military plans. While an aircraft carrier may not be operational until 2020, by 2030 China will likely have several carriers. These carriers are significant to China’s desired military balance. Without them, China will be still susceptible, in their eyes, to U.S. coercion regarding the flow of oil and commerce. Though a direct confrontation with a U.S. carrier strike group is not likely, China is more likely to deploy these assets as a show of force near vital national interests. By deploying at least one carrier at all times, China will be able to patrol areas such as the Straits of Hormuz and Malacca to protect

the flow of oil, or perhaps off the coast of Africa as a show of force to influence any threats to Chinese interests.

China will also have the other necessary elements of an effective carrier strike group. Chinese-produced destroyers and submarines will complement their aircraft carriers, along with replenish-at-sea ships. China's shipyards already have the capacity to produce ships for re-supply of a blue-water navy.⁷⁹ Also, Chinese shipbuilders have made tremendous strides over the past twenty years in quality, especially in key subsystems such as air defense systems.⁸⁰ Realistically, China will have all the elements necessary to deploy a carrier strike group by 2030.

China is on track to field state-of-the-art ballistic missile and fast-attack nuclear-powered submarines, probably much sooner than 2030. China is currently building and testing a second-generation ballistic-missile submarine, the Jin-class, and the Shang-class attack submarine began sea trials in 2005.⁸¹ If China succeeds in launching ten new Shang-class submarines in the next few years, this would greatly strengthen the navy and confirm China's commitment to a blue-water navy.⁸² Given these developments, China will plausibly develop a more advanced ballistic submarine, by 2030, capable of firing cruise or conventional ballistic missiles.

A pillar of Chinese anti-access strategy will continue to be ballistic and cruise missiles. China is expected to have hundreds of modern land-attack cruise missiles by 2030,⁸³ and possibly several thousand SRBMs, if current trends persist. Along with improved anti-ship cruise missiles, many of these systems are designed to penetrate carrier group defenses. The U.S. Navy's Sea Basing concept, if employed, will provide attractive targets for Chinese SRBMs and cruise missiles. In addition, improved EMP warheads will specifically target naval electronic command and control systems. Supersonic, long-range, anti-radar missiles, evolved

from the Russian Kh-31, will also be used to target missile defense radars. Collectively, these systems will present a serious challenge for naval forces operating close to Chinese waters.

Chinese air defense systems and aircraft are improving technologically at a rapid pace. Modern SA-10/20 SAM systems, from both land and ships, provide coverage across the entire Taiwan Strait (Figure 3) and makes control of the air a serious challenge even today.⁸⁴ Also, China is developing one or possibly two fifth-generation fighters by 2030. The J-12, by Shenyang Aircraft Company, is similar in size and shape to the F-22. It is reportedly a twin-engine aircraft with stealth characteristics; an active, phased-array radar; internal weapon carriage; and thrust-vectoring engines.⁸⁵ In parallel, Chengdu Aircraft is developing the J-10A, possibly based on the defunct Russian Mikoyan article 1.44 fighter. Perhaps with Russian assistance, Chinese engineers have designed this canard aircraft to be larger than the J-12 but with many of the same features. It possibly employs Russian plasma-stealth technology to provide stealth without significantly altering the fourth-generation fighter shape of the J-10.⁸⁶ Achieving air superiority will almost certainly be difficult and costly for any future Chinese adversary operating in the South China Sea.

Transport and refueling aircraft will also be vastly improved over current capabilities by 2030. Current efforts to buy more Russian Il-76 transport aircraft will improve the deployment of airborne troops.⁸⁷ Ukraine's Antonov aircraft company has sought Chinese investment to build a new version of the large AN-124 transport aircraft, capable of 150 metric tons, even more than the 118 tons for a C-5B.⁸⁸ Also, in August 2007 China began assembling Airbus A320 aircraft in Tianjin. This is the most recent example of Airbus' commitment to industrial exchange and cooperation with the Chinese aviation industry. Through this relationship, China

will plausibly have the ability to either procure or produce state-of-the-art transport and refueling aircraft by 2030.

The PLA's 1.4 million ground forces did not receive the high-tech acquisitions of their navy and air force counterparts in the 1990s and 2000s, but the modernization of the army is also underway and will sustain the army as a credible fighting force through 2030. Although the PLA will remain largely focused on domestic security, a growing portion is dedicated to the Taiwan strategy. Increasingly, troops are conducting extensive joint operations and training in combined arms with Air Forces and Navy in support of regional power projection.⁸⁹ One quarter of the PLA's current maneuver divisions and brigades focus on training for amphibious operations.⁹⁰ China will soon deploy a new amphibious assault vehicle and is modernizing existing ones.⁹¹ By 2030, Chinese shipbuilders will likely produce very large ferries that can carry hundreds of troops along with light armor, artillery and supplies up to 1000 nm at 60 kts, allowing the PLA to quickly deploy large numbers of forces to the near abroad.⁹² China also intends to imitate the U.S. Army's Future Combat System capabilities and digitally interconnect sensors, platforms, and individual soldiers for greater speed and weapon-system accuracy.⁹³ China's next-generation tanks, including the recently-deployed ZTZ-99, are significant improvements over previous systems.⁹⁴ However, deploying heavy armor across the Taiwan Strait will rely on the success of China's anti-access strategy to delay an adversary's naval forces.

Unconventional Military Forces

In the future, the Chinese will use all aspects of national power to support national interests. In addition to the conventional capabilities above, China is developing emerging, unconventional forms of military power including space and counterspace systems, directed-energy (DE)

weapons, and information operations. Technological advances in these areas will generate new and improved capabilities that will challenge adversaries in any Chinese conflict.

Already a space power, China will continue to develop new means of force enhancement and application from space. According to USSTRATCOM Commander, General Cartwright, the Chinese are developing a “continuum of capability in space,” fielding a “broad range of jamming anti-satellite type capabilities, position navigation and timing, and also ISR type capabilities.”⁹⁵ The PLA is developing at least two new types of tracking and data-relay satellites to transmit real-time ISR and communications data, supporting control and targeting of cruise and ballistic missiles.⁹⁶ China already uses GPS and the Russian GLONASS space-based navigation systems, and is also investing in the future European Galileo system, and its own system. The Chinese Beidou navigation system includes four satellites in geosynchronous orbit and provides 20-meter accuracy.⁹⁷ Although its capabilities are limited, this developmental system is providing valuable technical experience and is thought to provide guidance for ICBMs.⁹⁸ A new, independent space-based navigation is in development, named Compass, and may be operational sometime after 2020. In an attempt to design-in protection for the new system, Chinese engineers plan to employ a nav-signal frequency very close to the new M-code on future GPS satellites, so any attempts by the U.S. to jam Compass signals would degrade or deny GPS users as well.⁹⁹

Perhaps the area of greatest Chinese space interest is in countering the asymmetric advantages the United States enjoys via its space assets. Chinese analysis of recent US military operations have convinced them that the United States is dependent on its network of space-based assets, and the vulnerability of these assets create a substantial weakness that may be

exploited.¹⁰⁰ In the eyes of Chinese analysts, the US dependence on space represents “the U.S. military’s ‘soft ribs’ and strategic weaknesses.”¹⁰¹

In addition to the direct ascent ASAT attack discussed above, China is developing a family of ASAT options including ground attack, co-orbital “killer” satellites, directed energy (DE) weapons, and electronic attack.¹⁰² Ground attack of stationary control segments and communication nodes with conventional forces, possibly ballistic or cruise missiles, are an increasing threat.¹⁰³ Direct ascent attacks, like the recent test, are currently capable of reaching satellites in low-earth orbit including valuable ISR assets. Soon a larger booster, such as the DF-31, may be used to threaten medium-earth orbit satellites such as GPS, or even geosynchronous communications and early-warning systems.¹⁰⁴ However, the cost of using direct ascent to attack distant satellites, along with the difficulty of maintaining surprise, may make alternate methods more attractive. China has an interest in producing very small “parasitic satellites” that can intercept and damage other satellites.¹⁰⁵ These agile killer-satellites can deploy on small mobile boosters or as secondary payloads on larger “peaceful” missions, making them difficult to detect and track while preserving surprise. These satellites can remain dormant for years in relatively similar orbits to potential targets, and an attack can evolve slowly over hours or days as the satellite maneuvers to rendezvous with the target satellite.¹⁰⁶ Chinese strategists have openly and repeatedly called for development of such space weapons.¹⁰⁷ Given the level of interest and China’s rapidly growing space experience, it seems reasonable to expect Chinese direct-ascent and co-orbital satellite counterspace capabilities to threaten all U.S. space assets by 2030. Chinese literature also describes extensive research and development on DE beam weapons.¹⁰⁸ U.S. intelligence asserts that China could eventually field a laser capable of destroying, not just blinding, satellites.¹⁰⁹ Several on-going research areas may produce a DE

weapon, including a Chemical Oxygen-Iodine Laser (COIL).¹¹⁰ One of the most troublesome research areas is China's X-ray laser program. The preferred power source for such a laser is a small nuclear explosion, but China has been working on using high-powered lasers to produce X-ray lasing. Such a system has the potential to destroy electronics, trigger some types of munitions, and even set off nuclear weapons.¹¹¹ Overt attack or destruction of space assets risks considerable consequences. China may prefer a more passive "denial of service" approach using EW to jam or disrupt satellite uplink and downlink signals.¹¹² Chinese military planners have written specifically on the means and benefits of EW attacks on satellite links including using these methods to deny GPS to U.S. users and systems.¹¹³

Directed energy weapons will likely threaten ground, sea, and air assets and represent significant Chinese defensive and offensive firepower by 2030. In addition to lasers, high-power microwave (HPM) weapons are also relatively mature, and may be used for air defense, anti-ship, and ASAT missions. Chinese military planners believe HPM will be the "superstar" of DE weapons in the 21st century.¹¹⁴ Similar in effects to an EMP, pulsed HPM weapons generate a sustained barrage of high-power electromagnetic energy that can disable or destroy electronic platforms.¹¹⁵ The latest western research suggests it may be possible to multiply the speed and power of HPM pulses without huge electrical generators.¹¹⁶ This research lends credibility to Chinese efforts to develop small, weaponized HPM systems.

China has several programs to develop HPM assets including warheads, beam weapons, and advanced sensors. Efforts to produce smaller, effective EMP warheads may be operational within 10 years.¹¹⁷ High-power microwave air defense systems, which could disrupt the electronics on precision-guided munitions or aircraft, and air-launched HPM anti-satellite weapons, may be operational after 2020.¹¹⁸ This technology is also being developed into

smaller, more powerful jammers, non-kinetic beam weapons for disabling cruise and anti-ship missiles, and stealth-detecting sensors. As a sensor, HPM technology could generate enough power for a sensor on a fighter aircraft to detect stealth objects at 100 mi with 1-m resolution.¹¹⁹ While these concepts are at different stages of development, by 2030 HPM weapons will play a significant role in Chinese military strategy.

Translated Chinese writings reveal clear intentions to develop and employ a very integrated information warfare (IW) strategy that will be used in concert with other forms of national power. China views western information infrastructure, including command and control systems, as relatively weak and vulnerable to attack. They predict that key “trump cards” of future wars will include computer network attacks, viruses, and hackers, as well as EMP/HPM weapons and anti-satellite capabilities.¹²⁰ These information attacks are intended to not only impact military forces, but also disrupt financial, transportation, and other electronic systems to harm adversaries politically, economically, and psychologically.¹²¹ One proposed employment method involves inserting a virus into the enemy’s Command and Control computer during peacetime and then render the computer unusable at the desired time.¹²² Such “sleeper” code strategies raise concerns for commercial hardware made in China. Also, Chinese writers have proposed “virtual warfare” using virtual reality and computer imaging technology to produce false images on sensors displays, propaganda imagery, or even holographic religious icons to create confusion and hesitation.¹²³ Major General (ret) Dai Qingmin, former head of the IW Directorate of the Chinese General Staff, describes China’s approach to information warfare as integrated network and electronic warfare. China’s goal is to achieve “information supremacy,” thereby increasing battlefield transparency for Chinese commanders while creating “fog” for their enemy.¹²⁴

By 2030, China will use their well-developed asymmetric forces to confuse, weaken, and slow their adversaries. After several decades of sustained growth and modernization, China will be a military peer of the U.S., at least regionally, and a formidable rival with limited blue-water naval capabilities.

Conclusions

Whether China sincerely seeks a “peaceful rise,” or plans to maximize its global balance of power, the United States must pay close attention to growing Chinese military capabilities. At present, the United States’ advantages in critical military technologies and conventional forces provide a valuable deterrent. Mr. Dennis Wilder, Senior Director for East Asian Affairs, National Security Council, explains that, for now, “the F-22 is ten feet tall in the eyes of the Chinese.”¹²⁵ Some Congressional leaders have expressed the need to strengthen the U.S. military. The Chairman of the House Defense Appropriations Sub-Committee recently said he now believes there could be a greater need for F-22 fighters than currently planned “because of what’s happening in China.”¹²⁶ But inevitably, China will close the technology gap with the United States in key areas by 2030.

On its current pace, China’s economy will dominate Asia and much of the world by 2030, and militarily China will be a near-peer to the United States. China will employ its military strength to defend its borders, maintain domestic control, and protect vital interests in Asia, Africa and the Middle East. As China develops, it will rely heavily on asymmetric technologies to exploit vulnerabilities and give Chinese military forces an advantage.

China’s strategy of military modernization and growth has produced varying degrees of concern internationally. China’s future as a military power is fairly clear, but forecasting Chinese intentions for this power is much more difficult. Theories will persist regarding China’s

intentions, whether it will maintain the status quo or transform into a revisionist power, but the mere existence of that military power requires careful military and diplomatic planning by the United States.

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