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The Conventional Missile Capabilities of China's Second Artillery Force: Cornerstone of Deterrence and Warfighting

MICHAEL S. CHASE and ANDREW S. ERICKSON

Abstract: *Since its establishment in the early 1990s, the conventional missile component of the People's Liberation Army's Second Artillery Force (SAF) has emerged as a centerpiece of China's accelerating military modernization program. The conventional missile force has grown in size and sophistication, and China has developed a doctrine for its employment. Chinese military publications emphasize that it plays an increasingly important role in deterrence and warfighting. In particular, Chinese sources underscore its role in achieving information dominance, air superiority, and sea control as well as countering third-party intervention. China's development of advanced conventional missile capabilities highlights the growing vulnerability of fixed bases and surface ships. Moreover, organizational tendencies, could fuel dangerous escalation. In response to these challenges, the United States must adapt its traditional approach to military operations and deterrence in the Asia-Pacific.*

Introduction

The transformation of the Second Artillery Force (SAF) – the part of the People's Liberation Army (PLA) responsible for most of China's conventional and nuclear ballistic missiles and land-attack cruise missiles (LACM) – is one of the most important elements of Chinese military modernization. China has progressed rapidly from having a limited and vulnerable nuclear ballistic missile capability to having one of the most impressive nuclear and conventional ballistic missile and land-attack cruise missile programs of any nation.¹ This transformation is underscored by the 2010 unclassified report on Chinese military power issued by the US Department of Defense (DoD), which states that “China has the most active land-based ballistic and cruise missile program in the world.”²

Several scholars have examined the emerging conventional missions and capabilities of the SAF. They generally conclude that the SAF is increasingly capable of performing conventional strike missions as part of military operations designed to achieve Chinese policy objectives in the event of a regional war.³ Drawing extensively on Chinese military publications that have become available in recent years, this article presents an updated analysis that expands on the findings of previous studies. We argue that doctrinal, force structure, and training developments underscore the growing emphasis

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China is placing on its conventional missile force as an instrument of deterrence and warfighting and that this development has major implications for US force posture and operations in the Asia-Pacific.

As highlighted by the 2009 unclassified US National Air and Space Intelligence Center (NASIC) report on foreign ballistic and cruise missile capabilities, China is “developing and testing offensive missiles, forming additional missile units, qualitatively upgrading certain missile systems, and developing methods to counter ballistic missile defenses.”⁴ Chinese writers rarely offer detailed descriptions of China’s deployed or developmental missile systems, but they appear increasingly confident about China’s missile capabilities. As one Chinese source states, “With the remarkably swift development of science and technology, the weapons of the Second Artillery are being replaced by better models, one after the other. New models and new equipment series are being distributed among the troops, and old equipment is given a longer life and heightened effectiveness through technological updates.”⁵ In pursuing this path, China is filling the vacuum created when the United States and Russia signed the Intermediate-Range Nuclear Forces (INF) Treaty on December 8, 1987. The INF Treaty, which entered into force on June 1, 1988, prohibited both sides from producing nuclear and conventional ground-launched ballistic and cruise missiles with ranges between 500 km and 5,500 km (300–3,400 miles) and obligated them to destroy their existing inventories.⁶

For all these reasons, conventional ballistic and land-attack cruise missiles have emerged as the centerpiece of a PLA strategy that seeks to increase China’s ability to assert control over contested areas of its maritime periphery, foremost among them Taiwan, but also including the East China Sea and South China Sea. The essence of this strategy is to develop weapons systems and strategies that match Chinese strengths against the weaknesses of potential opponents cost-effectively. Conventional missiles promise to further these ends by holding both land-based targets and surface ships at risk. The main goals of this approach appear to be deterring Taiwan from pursuing independence, protecting the mainland from attack, increasing China’s leverage in its maritime territorial disputes with Japan in the East China Sea and with several rival claimants, including Vietnam and the Philippines, in the South China Sea, and raising the potential costs of US military intervention in the event of a regional crisis or conflict.

Since its establishment in the early 1990s, the SAF’s conventional missile force has become the cornerstone of China’s approach to deterrence and coercive diplomacy. Once responsible solely for nuclear deterrence and counterattack, the SAF since the early 1990s has shouldered the mission of “dual deterrence and dual operations” (双重威慑, 双重作战), meaning that it is charged with nuclear and conventional deterrence and strike operations. Along with this shift in strategy, China’s conventional missile force has grown in size and sophistication to a point where the “inventory of conventional weapons and equipment is about seven times as large” as the SAF’s relatively small nuclear-capable weapons arsenal.⁷

The SAF has also developed concepts for the employment of the conventional missile force on its own or as part of joint campaigns involving the other services. In particular, Chinese military publications underscore the centrality of missile attacks

in operations aimed at achieving information dominance, air superiority, and sea control as well as countering third-party intervention. Chinese writers use the term “counter-intervention” to describe an effort to discourage the involvement of powerful potential adversaries, especially the United States, in disputes of critical interest to Beijing by demonstrating ability and will to inflict harm on enemy forces and to prevent such intervention from thwarting Beijing’s attempts to achieve its operational and strategic objectives if deterrence fails. The US military uses the term “antiaccess/area denial” to encapsulate this approach from the opposite perspective. Chinese strategists undoubtedly see the development of capabilities and concepts aimed at countering foreign military intervention as consistent with China’s broader strategy of “active defense,” wherein China portrays its stance as strategically defensive but seeks to gain and maintain the initiative by undertaking offensive actions tactically and operationally.

The role of the SAF’s conventional missile force in such actions should be considered in light of how Chinese military authors think about deterrence more broadly. *The Science of Military Strategy* (SMS), an important volume on strategy that was originally published in Chinese in 2001 and was later released in an English edition intended for an overseas audience, defines several types of strategic deterrence: nuclear deterrence; conventional deterrence; space force deterrence; information deterrence; and “deterrence of People’s War.”⁸ Among these, it explains conventional deterrence by noting that “conventional force can be both used in warfighting and deterrence.” The authors also state that “the gap of operational efficiency between non-nuclear weapons and nuclear weapons has been narrowed. The application of advanced guidance technology has also made the long-range precision strike possible.” At the same time, however, the authors note that conventional deterrence is only part of the larger picture, and because it plays a relatively limited role in “containing war,” it must be integrated with other means of strategic deterrence to cope with “various forms of challenges.”⁹ Notwithstanding this important caveat, this definition appears to underscore the growing importance of conventional deterrence, in which the conventional ballistic and land-attack cruise missile forces of the SAF play a central role.

Although the nuclear missile force remains vital as a deterrent to escalation and a backstop for conventional military operations, Chinese writers indicate that threats involving the conventional missile force are more credible because of the lower threshold for the employment of conventional missile firepower. “Nuclear weapons are the most important tools of national deterrence strategy,” according to the SAF’s *Science of Second Artillery Campaigns* (SSAC), an authoritative source published by the PLA Press in 2004 that appears to be intended as a high-level professional military handbook for missile force personnel.¹⁰ But nuclear deterrence is subject to a number of limitations. As SSAC indicates, “nuclear deterrence plays a huge role in terms of its shock value, but it is clearly restrained by international public opinion.” Consequently, the threshold for nuclear deterrence and nuclear counterattack operations is very high. In contrast, conventional missiles are much less destructive than nuclear weapons, and therefore, there are fewer restraints on their use. Indeed, the authors of SMS emphasize that conventional deterrence is “more controllable and less risky.”¹¹ This is part of what makes conventional missiles especially useful with respect to Taiwan. Indeed, according to a passage in SSAC that highlights the importance of such options in

scenarios involving Taiwan, “in the primary direction of military struggle the means of deterrence against the primary operational opponent are conventional weapons; and the main components of conventional means of deterrence are conventional missiles.”¹²

Chinese military writers state that this makes conventional missiles much more flexible instruments of 威慑 (*weishe*), which official Chinese sources translate as “deterrence,”¹³ but some observers have suggested it might best be understood as a broader concept more along the lines of what Thomas Schelling describes as “coercion.” This includes both deterrence (the threat of force to discourage an adversary from taking a particular action) and “compellence” (the threat or use of force to persuade an adversary to comply with one’s demands). Although *weishe* is consistently translated as “deterrence” by authoritative Chinese sources, the concept of *weishe* clearly embodies aspects of compellence or coercive diplomacy as well as deterrence.¹⁴ Accordingly, it is sometimes more appropriate to think of *weishe* as roughly equivalent to Thomas Schelling’s broader concept of “coercion,” which includes deterrence and compellence.¹⁵ Indeed, at least one prominent Chinese scholar acknowledges that even though *weishe* is translated as “deterrence,” its actual meaning is closer to the broader concept of “coercion.” Li Bin, a leading Chinese scholar of nuclear issues, states that even though official sources translate *weishe* as “deterrence,” conceptually, “‘weishe’ does not mean deterrence; ‘weishe’ means coercion: to force others to yield to oneself.”¹⁶ Although we follow the convention of translating *weishe* as deterrence, it should be noted that *weishe* is somewhat broader conceptually, as reflected by the definition of “deterrence” that appears in the English edition of SMS, by Major Generals Peng Guangqian and Yao Youzhi. According to Peng and Yao, “Warfighting and deterrence (实战和威慑) are two major functions of the armed forces. What is termed deterrence is the military conduct of a state or political group in displaying force or showing the determination to use force to compel (迫使) the enemy to submit (屈服) to one’s volition and to refrain (不敢采取) from taking hostile actions or escalating the hostility.”¹⁷ Furthermore, Peng and Yao elaborate on the goals of strategic deterrence, which they assert “plays two basic roles: one is to dissuade the opponent from doing something through deterrence, the other is to persuade the opponent what ought to be done through deterrence, and both demand the opponent to submit to the deterrer’s volition.”¹⁸ Similarly, in *Intimidation Warfare* (IW), a detailed volume edited by Lieutenant General Zhao Xijun, who served as SAF deputy commander from 1996–2003, the editor notes that there are many examples of countries using *weishe* not only to prevent other countries from taking certain actions but also to compel other countries to submit to their demands.¹⁹ As these examples illustrate, although *weishe* is translated as “deterrence,” conceptually, it can include not only what is typically referred to as “deterrence” in Western political science literature, but also actions that could best be classified as “compellence” or “coercive diplomacy.”

Accordingly, Chinese authors continue to distinguish between what they describe as “offensive” and “defensive” forms of deterrence based on the type of countries that are conducting deterrence operations and the objectives they seek:

... as a form of struggle in the military field, strategic deterrence can be adopted by the strategic offensive side and can also be adopted by the strategic defensive

side. . . . The state or the political group that pursues offensive strategy tends to put pressure on the opponent by means of strategic deterrence for the purpose of compelling him to give up the determination of resistance and thus securing the political objective that could only be obtained by war. The state or the political group that is positioned in the strategic defensive posture tends to resort to the strategic deterrent means for the purpose of making the opponent feel that his attack may fail or lead to the loss outweighing the gain, and thus give up his attempt to attack. Therefore, strategic deterrence by its nature can fall into two broad classes: offensive strategic deterrence and defensive strategic deterrence. While the offensive strategic deterrence is principally adopted by the states or military groups that pursue the invasive expansion strategy, the defensive strategic deterrence is principally adopted by the states that pursue the defensive strategy.

China . . . is a socialist country and pursues the guideline of active defense strategy. China's strategic deterrence is self-defense in essence. Self-defense is the most fundamental and most evident characteristic of China's strategic deterrence that distinguishes from other states', especially the hegemonist ones'. In the new historical period, the role of China's strategic deterrence is chiefly to deter foreign invasion, defend the sovereignty, rights and interests, and to deter the conspiracies of internal and external rivals for separating and subverting China, so as to protect the stability of national political situation, defend territorial integrity and national unification.²⁰

In keeping with China's long-held, official strategic defensive posture of "active defense," here the Chinese clearly associate themselves with the "defensive deterrence" form of *weishe* and attribute the offensive form of *weishe*, which more closely resembles compellence or coercive diplomacy, to "hegemonist" countries. Chinese sources do not refer to China as employing "compellence" or "coercive diplomacy" to achieve its objectives, even though China, like the United States and other major powers, has employed force or the threat of force in a variety of ways to advance its interests over the years.

The remainder of this article consists of five parts. The first reviews the development of China's conventional missile force. The second surveys its emerging doctrine for deterrence and strike operations. The third examines the conventional missile capabilities China is developing and deploying to enable the SAF to implement these force employment concepts. The fourth provides an overview of recent developments in SAF training. The fifth assesses the challenges that China's growing conventional missile force capabilities may pose to the United States and its allies and friends in the Western Pacific and offers recommendations for US planners and policymakers.

The Origins and Development of the SAF's Conventional Missile Force

China's interest in the development of conventional ballistic missile forces grew out of its need to respond to the threat of a Soviet invasion in the 1980s. The PLA's desire to supplement China's relatively weak capability to conduct air strikes was thus one of the

main motives for China's early research and development work on conventional short-range ballistic missiles (SRBMs), which began in 1984.²¹ Industry was also a strong advocate of developing conventional ballistic missile capabilities, and another motive for China was the possibility of profiting from exports to customers in the developing world.²² In the late 1980s, for all of these reasons, the Central Military Commission (CMC) decided to develop conventional missile forces.

China's analysis of the 1990–91 Gulf War provided further motivation for transforming the PLA so that it would be better prepared for future conflicts along China's periphery. The PLA was awed by the US military's precision-strike capabilities during this conflict, which underscored the PLA's relative backwardness. The conspicuous US success against Iraqi forces confirmed that the PLA needed to adapt to major changes in modern warfare. Jiang Zemin's "Military Strategic Guidelines for the New Period," promulgated in January 1993, reflected this assessment and codified these imperatives. Following Jiang's speech to an enlarged CMC meeting in December 1995, Chinese "army building" has been guided by the "Two Transformations" policy line, which calls for the PLA to prepare to win "limited local wars under high-technology conditions," emphasize quality over quantity, and shift from being personnel-intensive to being science- and technology-intensive.²³

The Gulf War and subsequent conflicts impressed the PLA with the need to acquire asymmetric "assassin's mace"²⁴ technologies and systems that it could use to overcome a militarily superior adversary and couple them with the command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems required to permit swift and precise execution of short-duration, high-intensity wars. China's conventional missile arsenal, and its supporting infrastructure, is one of the most visible manifestations of this approach.

Another important milestone in the development of the conventional missile forces that came in the early 1990s was the CMC's decision to assign the SAF the mission of "dual deterrence and dual operations," which emphasizes the importance of deterrence and combat roles for both the conventional and nuclear missile forces.²⁵ China's first conventional missile unit, the 815th Launch Brigade, was formed in 1991 as a test and evaluation unit. The unit received missiles in April 1992 and conducted its first launch on November 23, 1993. The unit subsequently participated in the military demonstration exercises opposite Taiwan in 1995 and 1996. It also took part in the People's Republic of China (PRC) National Day military parades in 1999 and 2009.²⁶ Thus prepared, "At the beginning of the 1990s, the Chinese Communist Party Central Committee, the State Council, and the CMC studied and sized up the situation according to the needs of the international military struggle and the development of Chinese weapons and equipment, scientifically making a strategic decision to speed up the development of new models of Chinese missile weapons."²⁷

Within a few years, China's nascent conventional missile capability reached the forefront of its coercive diplomacy toward Taiwan. In response to what Beijing viewed as a dangerous trend toward proindependence sentiment in Taiwan and a reversal of long-standing US policy toward the island that culminated in Washington's decision to issue President Li Teng-hui a visa to visit the United States to deliver an address at Cornell University, Chinese leaders ordered the PLA to conduct a series of military exercises

aimed at intimidating Taiwan and influencing the United States. During the ensuing 1995–96 Taiwan Strait Crisis, the conventional missile force conducted two “large-scale conventional deterrence firing exercises.”²⁸ These exercises included a total of 10 SRBM launches into designated waters off the Northern and Southern Taiwan ports of Keelung and Kaohsiung.²⁹ To many observers, the exercises seemed to solidify support for Li more than they discouraged independence supporters, but some Chinese sources evaluate the missile launches as a successful display of force that deterred Taiwan from moving further toward formal independence. In any case, during the next few years, plans were apparently implemented for the SAF to begin establishing five SRBM brigades opposite Taiwan.³⁰ *The Science of Campaigns* (SOC) states, “In April 1998, the Second Artillery established the concept of the conventional missile attack campaign,” and compiled a textbook on the Conventional Missile Attack Campaign of the Second Artillery, further enriching and developing the various forms of Second Artillery campaigns.”³¹ This doctrinal development was necessary to provide a general guide for the SAF’s conventional units in training, planning, and execution of operations.

Still another important milestone with implications for the development of the SAF’s conventional missions and capabilities came in 2002, when China updated the “Military Strategic Guidelines” that were issued almost a decade earlier. In revising the guidelines, President Hu Jintao directed the PLA to focus on “local wars under informatized conditions,” meaning that the PLA had to improve the utilization of information technology and networks and be prepared to degrade or deny an adversary’s capability to use its own information technology and networks.³² The publication of SSAC in 2004 was an additional step in the doctrinal development process.

The development of China’s conventional missile force has subsequently been driven by several factors. These include a desire to influence politics in Taiwan and deter US intervention in a regional crisis or conflict and the relative advantages offered by emphasizing missile force modernization rather than relying primarily on the development of capabilities such as stealth aircraft to conduct precision strikes.³³

Chinese Conventional Missile Force Employment Concepts

China’s thinking about the employment of its conventional missile force is best understood within the context of “active defense,” a broader concept under which China’s strategic goals (such as protecting China’s interests along its maritime periphery) are viewed as inherently defensive, but offensive measures may be employed as necessary operationally and tactically to safeguard these strategic interests (i.e., by using anti-ship ballistic missiles [ASBMs] to target a US carrier strike group [CSG] dispatched to preclude China from coercing Taiwan). Within this context, Chinese conventional missile operations are part of an asymmetric approach intended to deter foreign military forces from threatening Chinese interests along China’s contested maritime periphery. Chinese conventional missile forces would play a key role in a range of different operations that are highlighted in Chinese military publications, such as campaign firepower assaults, joint blockade campaigns, and joint anti-air raid campaigns.

PLA writings on campaign firepower assaults envision coordinated air and missile strikes against enemy targets such as command and control (C2) facilities, communications and transportation nodes, air and missile defenses, and air bases. As part of this campaign, the PLAAF and SAF strikes would also be accompanied by electronic warfare (EW) and computer network attacks.³⁴ According to the DoD's 2011 report, the PLA might implement such a campaign "in an attempt to degrade Taiwan's defenses, neutralize Taiwan's leadership, or break the public's will to fight."³⁵

PLA sources indicate that the joint blockade campaign involves air, naval, and missile force action aimed at enforcing an air and naval blockade of Taiwan.³⁶ According to Wayne Ulman, the PLA's joint blockade campaign "would be planned as a much more destructive operation than a simple quarantine or embargo. Enforcing the joint blockade would likely involve kinetic strikes against at least ports, airfields, and air-defense assets."³⁷ SAF conventional missile strikes would thus likely play a key role in such a campaign.

The joint anti-air raid campaign is composed of defensive and offensive actions. It involves not only air defense of critical targets on the Chinese mainland to protect them from enemy precision strikes, but also offensive air and missile strikes against targets such as enemy air bases, CSGs, and logistics and communications facilities.³⁸ This campaign is "designed specifically to counter the intervention of a strong adversary such as the United States."³⁹

More broadly, China's approach is based partially on "non-linear, non-contact, and asymmetric" (三非) operations. Nonlinear operations involve launching attacks from multiple platforms in unpredictable fashion that range across an opponent's operational and strategic depth. Noncontact operations entail targeting enemy platforms and weapons systems with precision attacks from a distance sufficient to potentially preclude the enemy from striking back directly.⁴⁰ Asymmetric operations involve exploiting inherent physics-based limitations to match Chinese strengths against an opponent's weaknesses. Chinese military publications discuss missile force coercion and strike operations that would support this broader approach.

One area that does not appear to be particularly well developed in available Chinese doctrinal publications is the issue of escalation management. Indeed, authoritative PLA sources appear to reveal overconfidence in China's ability to control escalation, which could present extraordinary dangers, especially in a conflict between nuclear-armed powers. For example, PLA doctrinal publications mention firing "warning" missile shots in front of an enemy's aircraft carriers, but the authors of these publications do not address the issue of whether US naval operators or political decision makers would view such launches as a warning or misinterpret them as misses or failures.⁴¹ The difference in an adversary's perception between an intentional deterrent action and an unintentional failed strike could have significant repercussions and possibly trigger inadvertent escalation. Perhaps the Second Artillery is overconfident because it has "never had any actual combat experience,"⁴² nor has China had the sobering experience of a Cuban Missile Crisis to impress its leadership with the realities of the "fog of war" and the potential for misperceptions and unintended, potentially disastrous consequences – including preemptive strikes against important Chinese assets, or retaliatory strategic strikes.

Conventional Missile Force Deterrence

Chinese military publications underscore that the foundation of missile force deterrence effectiveness is the operational strength of the missile force. According to IW, “deterrence must take reliable strength as its foundation.”⁴³ The requirements include appropriate force size, high-quality weapons and equipment, efficient means of C2, and advanced operational theories. Some bluff and bluster may be involved, but deterrence is impossible without real strength to ensure that threats will be plausible enough to influence enemy decision-makers. The basic requirement of deterrence is credibility, and for a modern missile force, this translates into striking power and survivability. Consequently, Chinese strategists view continuously improving the missile force's survivability, rapid response capability, ability to penetrate missile defense systems, and destructiveness as indispensable elements of its power to deter an adversary, as well as requirements for its effectiveness in implementing firepower strikes.⁴⁴ The willingness to use these capabilities and the ability to communicate one's capability and resolve to an adversary are also seen as prerequisites for successful deterrence operations.

Within this broader context, SSAC defines “Second Artillery campaign deterrence” as a series of military activities in which missile force units “display the possession of the capacity to deliver inexorable, unstoppable, disproportionate force” (造势和显势; *zaoshi he xianshi*) to accomplish specified strategic and campaign-level objectives.⁴⁵ This is a process, not a defined result: The Chinese characters “*xianshi*,” like the “*wei*” in “*weishe*,” evoke the image of drawing a bow. Sufficient arming and tension guarantee that were it released, there would be no way to stop the arrow, and the other side would be doomed. Sun Zi's metaphor for the last character, “*shi*,” is one of boulders rolling down an enormous mountain, or a grindstone smashing against an egg: complete, inevitable destruction. In SSAC, the authors stress that campaign deterrence operations constitute an important component of the SAF's mission of “dual deterrence and dual operations.” The goal of campaign deterrence operations is to “force an enemy to accept our will or to contain an enemy's hostile actions.”⁴⁶ This involves overawing or frightening the enemy. The long-range strike capabilities of the SAF play a central role in this process.

SAF campaign deterrence operations take place in peacetime, during the period preceding combat operations, and during wartime. Local wars under informatized conditions, the type the PLA expects it may need to fight in the future, often begin with campaign deterrence operations aimed at persuading the adversary to accept certain conditions. SAF “dual deterrence” operations are one of the main activities in the preliminary stages of local wars under informatized conditions. The prelude to a campaign usually involves deterrence actions that are intended to intimidate the enemy. Chinese sources describe missile forces on high alert as “like swords drawn out of their sheath, arrows on the bent bow, and bullets loaded.”⁴⁷ Nuclear and conventional missile force units can thus be used to conduct deterrence operations designed to create an advantageous situation for China.

When the SAF conducts campaign deterrence activities, the goal is to force the enemy to accept the conditions put forward by China through a process of “intimidation” (恫吓). This process begins with lower-intensity deterrence actions such as

warnings and demonstrations of strength and gradually progresses to higher-intensity actions such as launch exercises or even test launches close to enemy targets.⁴⁸ SAF campaign deterrence activities are an important means for achieving campaign-level objectives, and even national strategic goals.⁴⁹

The important role the conventional missile force plays in deterrence is stressed in Chinese military publications, which emphasize that conventional missile force deterrence operations must be closely aligned with the diplomatic struggles they are intended to support.⁵⁰ According to Zhao Xijun, conventional missile force deterrence operations may be divided into three categories based on the level of pressure they place on the adversary: low-intensity conventional deterrence; medium-intensity conventional deterrence; and high-intensity conventional deterrence.⁵¹ Low-intensity conventional missile force deterrence involves methods employed regularly in China such as using the media to transmit propaganda about the missile force and rearranging its units. Medium-intensity conventional missile force deterrence, by contrast, has a “definite confrontational quality” and may entail conventional missile force exercise launches. High-intensity conventional missile force deterrence, even more powerful, may employ “close proximity or critical deterrence strikes.” These involve firing missiles toward an area near an enemy state or into the waters off of an enemy-occupied island to increase psychological pressure on the enemy.⁵² Apparent examples include China’s missile launches during the 1995–96 Taiwan Strait Crisis.

Conventional missile force deterrence operations are designed to influence the enemy’s decisions by demonstrating that China has powerful missile force strike capabilities and the will to employ them if necessary. The objective might be to deter the enemy from challenging China’s interests or to compel the enemy to accept Beijing’s demands. If deterrence fails, the SAF must be prepared to conduct strike operations, either on its own or in coordination with other services.

Conventional Missile Force Strikes

SSAC defines conventional missile attack campaigns as “the offensive operational action of conventional firepower strikes on the enemy’s key targets, which is carried out under unified command. It is implemented by the large conventional missile formation of the Second Artillery based on the operational intentions of higher levels, in order to achieve specific strategic or campaign objectives.”⁵³ Authoritative publications list multiple potential targets for SAF conventional missile strikes, including enemy command centers, communications hubs, radar stations, other information- and communications-related targets, missile positions, military facilities, transportation and logistical facilities, energy and electrical power centers, and CSGs.⁵⁴

Attacks would combine conventional cruise and ballistic missile strikes. SSAC indicates that the SAF also has EW forces and states that missile firepower strikes will increasingly be integrated with network warfare and EW.⁵⁵ Information warfare will “pave the way” prior to the initiation of firepower strikes. Initial targets would include information systems such as C2 centers, radar stations, and communications networks. By striking these critical yet weak targets first, the SAF aims to achieve the effect of “striking one point and paralyzing a large part of the body.”⁵⁶

According to the 2006 edition of SOC, published by the PLA's National Defense University, the "conventional missile strike campaign" (常规导弹突击战役) may be organized and implemented independently, but it is usually carried out as part of a joint campaign.⁵⁷ It may be part of a joint firepower strike campaign, joint blockade campaign, joint island landing campaign, joint border counterattack campaign, or joint anti-air raid campaign.⁵⁸ The SAF plays a crucial role in joint operations by helping to achieve electromagnetic dominance, air supremacy, and sea control, as well as facilitating ground operations if required.

The role of the SAF becomes even more prominent if a "powerful enemy," presumably a very thinly veiled reference to the United States, intervenes in a conflict along China's periphery. Chinese writers assess that possible forms of military intervention by a "powerful enemy" could include a show of military strength through deployment of one or more CSGs, establishment of no-fly areas and restricted sea zones, direct intervention by enemy air and naval forces, and strategic air strikes.⁵⁹

In the event of a conflict with a nuclear-armed adversary, the SAF would also conduct nuclear deterrence operations to influence enemy decision-makers and constrain their options. Chinese military publications state that a conventional missile strike campaign would be "carried out under nuclear deterrence conditions." This is especially important because potential adversaries do not have "no first use" policies and could be expected to coerce China with nuclear threats unless checked by China's own nuclear deterrence operations.⁶⁰

Nuclear deterrence operations may prevent escalation, but the SAF's missile forces could still be key targets for enemy conventional strikes. The missile forces thus need to rely on denial and deception, EW, and mobility to protect themselves from enemy precision strikes throughout the course of the campaign. The authors of SOC emphasize the importance of countering enemy satellite and airborne reconnaissance and defending against enemy precision-guided weaponry strikes, air attacks, and special force raids. Chinese military publications indicate that "close protection" and "rapid reaction" capabilities are required to address these threats.⁶¹

Chinese Conventional Missile Force Modernization

The conventional missile force of the SAF has grown rapidly, enabling China to employ it for deterrence and conventional firepower strike operations. Today, China's constantly expanding conventional ballistic missile force contains SRBMs, medium-range ballistic missiles (MRBMs), and LACMs.

SRBMs. China's SRBM forces have expanded dramatically since the establishment of the conventional missile force component of the SAF in the early 1990s, tripling during the past eight years. By December 2010, China's arsenal consisted of about 1,000 to 1,200 solid propellant road-mobile SRBMs, all deployed in areas opposite Taiwan.⁶² According to DoD, this includes about 350 to 400 CSS-6 SRBMs (with 90 to 110 launchers) and about 700 to 750 CSS-7 SRBMs (with 120 to 140 launchers).⁶³

While DoD estimated in 2009 that China's SRBM inventory was increasing at a rate of more than 100 missiles per year,⁶⁴ it currently judges that the number of

SRBMs appears to be holding relatively steady but that China is replacing older missiles with newer, more accurate and capable models. According to the 2011 report, “As of December 2010, the PLA had somewhere between 1,000–1,200 SRBMs. The total number of SRBMs represents little to no change over the past year. However, the PLA continues to field advanced variants with improved ranges and more sophisticated payloads that are gradually replacing earlier generations that do not possess true precision strike capability.”⁶⁵

Several factors could plausibly account for the relatively consistent number of SRBMs during the past few years. First, the return of the Kuomintang (KMT) to power in Taiwan with the election of President Ma Ying-jeou in 2008 reduced cross-strait tensions, which may have made further increases in numbers seem less urgent compared with 2000–08, when mainland China–Taiwan relations were tense and Beijing viewed many of then-Taiwan President Chen Shui-bian’s actions as highly provocative. Another possibility is that the addition of LACMs and conventional MRBMs, along with the fielding of more accurate, longer-range SRBM variants, may make much larger numbers of SRBMs seem unnecessary from the perspective of PLA and Chinese Communist Party (CCP) leaders.⁶⁶

Although the SRBM force no longer seems to be growing as quickly as it did from about 2000–08, increased SRBM deployments during the earlier period of rapid growth of the force required organizational expansion. China’s SRBM force has grown from a single regimental-sized unit to seven brigades by 2008, including five controlled by the SAF and two directly subordinate to PLA ground forces, one in the Nanjing Military Region (MR) and another in the Guangzhou MR. This may have changed more recently. According to an April 2011 assessment by Mark Stokes, “there are indications that two tactical missile brigades under the PLA Army have transferred to the Second Artillery.”⁶⁷

In addition to growing numbers of SRBMs and an increase in the number of brigades, there have been improvements in quality as China has upgraded the capabilities of its SRBMs. According to the DoD, China’s first-generation SRBMs are not true precision-strike weapons, but later generations of Chinese SRBMs feature “greater ranges, improved accuracy, and a wider variety of conventional payloads, including unitary and submunition warheads.”⁶⁸ According to an unclassified estimate released by NASIC, China currently fields at least five different types of conventional SRBMs. The 2011 DoD report assesses that together with improvements in ships, submarines, aircraft, and C4ISR, SRBMs “threaten to negate many of those factors upon which Taiwan has depended” to deter or defend against a Chinese attack.⁶⁹

Longer-Range Conventional Ballistic Missiles. Beyond its formidable arsenal of SRBMs, China has deployed conventional MRBMs to enable longer-range precision strikes. Future developments may include further expansion of the SAF’s conventional MRBM force and possibly conventional intermediate-range ballistic missile (IRBMs). According to a Chinese media report, China is also developing an intermediate-range conventional missile with a range of about 4,000 km. Reportedly scheduled for deployment in 2015, this missile would enable the SAF to launch conventional strikes against targets as far away as Guam, which is emerging as an increasingly important hub of US military operations in the Asia-Pacific region.⁷⁰

China's interest in employing ballistic missiles to target aircraft carriers dates at least to the 1995–96 Taiwan Strait Crisis, during which the United States deployed two aircraft carrier groups to the region in response to Chinese SRBM flight tests and military exercises. Now China is developing and deploying in small numbers⁷¹ a 1,500+ km (932+ mile)-range ASBM.⁷² As with its SRBMs, China can also be expected to continue to improve the accuracy and lethality of its MRBMs and to develop an even greater variety of warheads. For example, authoritative Chinese publications discuss electromagnetic pulse (EMP) and antiradiation warheads for ballistic missiles. SSAC envisions using EMP submunitions to “paralyze” a CSG's C2 system by disabling its electronics electromagnetically, and using antiradiation submunitions to disable radar stations (i.e., on *Aegis* ships protecting the carrier).⁷³

Land-Attack Cruise Missiles (LACMs). The SAF is also deploying indigenously developed ground-launched LACMs to enhance conventional long-range precision-strike capabilities.⁷⁴ The 2009 DoD report, for instance, estimates that by December 2009, China had deployed about 200 to 500 DH-10 LACMs and 45 to 55 launchers.⁷⁵ The 2010 DoD report indicates that the DH-10 has a range of 1,500 km to 2,000 km, allowing it to reach potential targets throughout Japan and the Philippines.⁷⁶

Training: Bringing It All Together

Although international media reports tend to focus largely on new missiles entering the inventory of the SAF, within the force itself at least equal emphasis is devoted to personnel development and training. According to SMS, “Strategic deterrence is based on warfighting. . . . The more powerful the warfighting capability, the more effective the deterrence. . . . those making purely bluffing threats and intimidations hardly can afford deterrence . . .”⁷⁷ For theoretical doctrine to be viable, it must be proven to be executable by existing forces through training. One way to determine the extent to which doctrine is being implemented is to examine reports of actual training. Training is the essence of creating a capable deterrent force and helps to demonstrate the ability and will to use that force and send messages to those to be deterred. Training is also vital to sharpening the conventional missile force's operational capabilities.

Improving personnel quality has been a consistent theme throughout the reform era. Jiang Zemin once declared, “Though we're unable to develop all high-technology weapons and equipment within a short period of time, we must train qualified personnel first, for we would rather let our qualified personnel wait for equipment than the other way round.”⁷⁸ The “people-first” concept of Hu Jintao's “scientific development theory” carried this underlying principle forward and is unlikely to be abandoned with new leadership in 2012 and beyond.

In January 2011, SAF Commander Jing Zhiyuan and Political Commissar Zhang Haiyang issued an order emphasizing the central role of training in further enhancing the combat capabilities of the missile force. Jing and Zhang urged the missile force to “uphold military training as a key focus in expanding and deepening preparation for military struggle, the basic way to generate, consolidate, and enhance combat power, and regular, core work in the development of [missile force] units.” Reflecting this

high-level emphasis on the importance of training, Chinese military media reports suggest that SAF training is growing in realism and complexity. In particular, as part of the PLA's broader program of training reforms, the SAF is making progress in areas such as training under more realistic combat conditions, incorporating opposition "blue forces," EW, nighttime and adverse weather training, air-defense and counter-ISR tactics, and more rigorous training evaluations. These developments represent significant progress in the complexity of SAF training.

The SAF emphasizes that "troops should train as they will fight," meaning that exercises should take place under realistic conditions to temper the skills their units will need in actual combat. Jing and Zhang demand "flexible application of principles and tactics" in keeping with making training as realistic as "actual war."⁷⁹ For one model brigade, this entails "updating concepts, innovating boldly, and putting [them] to real-war tests."⁸⁰ Chinese military media reports indicate that some recent exercises have simulated loss of communication links, forcing units to switch to backup communications. Others have tested emergency repair capabilities such as erecting replacement bridges, clearing blocked roads, and repairing damaged facilities. Another important way in which many PLA exercises now attempt to enhance the level of realism is by incorporating opposing forces. SAF units frequently conduct opposing force exercises as part of this drive to train under more realistic and challenging conditions.⁸¹ One recent exercise reportedly featured sophisticated blue force efforts from young, well-educated personnel familiar with foreign military capabilities.⁸² Such use of "blue forces" in exercises is a particularly noteworthy development because it makes training more realistic and challenging, encourages officers to take the initiative in response to changing situations, and gives troops exposure to possible adversary tactics.

Other reports indicate that training is sometimes designed to force participating units to deviate from their prepared plans. This is done to prepare officers and soldiers to cope with actual combat situations in which they may lose the ability to communicate with higher headquarters or find that the enemy has reacted to their actions in unexpected ways. Along these lines, SAF units have practiced moving to alternate launch sites and erecting temporary launch pads when primary launch positions are "destroyed" during exercises.⁸³ Since the late 1990s, SAF training has also emphasized intertheater deployments, which entail considerable operational and logistical challenges. Chinese military media reports indicate that SAF units are also conducting nighttime maneuver training.⁸⁴

The SAF has also practiced a variety of techniques to counter enemy ISR, precision strike, jamming, and EW attacks.⁸⁵ In keeping with the emphasis on training in a "complex electromagnetic environment" contained in recent General Staff Department training guidelines, this is intended to improve the PLA's ability to operate in an EW environment and to allow military units to practice various types of counter-reconnaissance, EW, and counter-EW techniques. The SAF has followed these guidelines by conducting exercises that emphasize EW training, according to Chinese military media reports.⁸⁶ Many exercises have focused on employing countermeasures against enemy ISR systems, and some have incorporated simulated enemy precision air strikes and electronic jamming. In addition, Chinese media reports indicate that the SAF is conducting exercises that test its ability to employ increasingly sophisticated

decoys and camouflage methods to counter adversary airborne and space-based ISR capabilities, including optical, infrared, and radar imagery systems.⁸⁷

One of the most prominent themes in reporting about SAF training is the number of live fire exercises conducted in recent years. As in other areas, the 815th Launch Brigade reportedly has been at the vanguard of efforts to enhance tactical proficiency through training.⁸⁸ According to Chinese military media, as China's first conventional SRBM brigade, the unit has conducted more live missile firings than any other brigade,⁸⁹ but Chinese military media reports indicate that other brigades also conduct an extensive program of live launches.⁹⁰

These launches are intended to increase the technical proficiency necessary to conduct the conventional missile force's combat tasks, thus increasing its deterrent and warfighting value. The PLA has also conducted numerous multiservice exercises in recent years, providing considerable opportunities for the SAF to improve its experience with the conduct of joint operations and joint C2.⁹¹ For example, in summer 2006, the PLA conducted the North Sword-0607(S) exercise, in which SAF units operated alongside two ground force divisions, PLAAF units, and People's Armed Police troops. The exercise scenario involved long-distance maneuver, intelligence collection, and mobile counterattack operations.⁹² Similarly, Chinese military media reports indicate that SAF exercises in 2009 included one in which four brigades subordinate to the SAF's 52 Base deployed and practiced tasks that would be required in a joint fire-power or conventional missile strike campaign.⁹³ More recent examples of joint training involving ground force, PLAAF, and SAF forces reportedly include Mission Action 2010C, in which an SAF unit reportedly provided fire support to ground forces,⁹⁴ and another exercise conducted in 2010 that included infantry, army aviation, PLAAF, and SAF forces.⁹⁵ Although official Chinese media has covered joint training involving the SAF and ground force and air force units, no joint training involving the SAF and the PLA Navy has been reported.

Still another important area of emphasis in training is command automation and missile force C2. Current senior leadership training guidance highlights the importance of the "informatization" of the missile force and the development of "information system-based system of systems' operations capabilities."⁹⁶ Chinese military media reports also highlight the SAF's employment of an "integrated command platform" that enables commanders to coordinate and direct the operations of multiple brigades and launch units with different types of equipment⁹⁷ and to conduct structured attack training.⁹⁸ Related exercises have involved deploying a new field command post.⁹⁹

The SAF is also making greater use of simulations, computer war games, and command-post exercises to improve the planning and decision-making skills of commanders and their staffs. These relatively low-cost techniques allow officers and soldiers to accumulate valuable experience at lower expense and risk than live-fire exercises. The SAF has been employing simulators to prepare its forces to operate developmental missile systems before they are deployed.¹⁰⁰

Finally, a sometimes overlooked but very important element of the PLA's training reform program is the emphasis on standardization of training and the development and application of more stringent criteria for the examination and evaluation of military training. This emphasis on rigorous screening and evaluation is reflected in the recent

promotion of “two commanders, one operator” testing and evaluation, which focuses on assessing the capabilities of missile launcher and launch battalion commanders and specialist operators in the SAF.¹⁰¹ This marks a particularly important change in that more rigorous evaluation of training can help identify problems and shortcomings and contribute to the development of a more realistic appraisal of readiness and combat capabilities. In addition, the SAF has issued a series of regulations intended to standardize training practices and promote more robust testing and evaluation of nuclear and conventional missile-force units.¹⁰² Chinese military media reports indicate that training assessment is becoming increasingly realistic and that units are being compelled to address shortcomings identified as part of the evaluation process. Commanding officers reportedly are held accountable when units fail to measure up to training standards and are obligated to identify problems and draw up plans for improvement to raise the level of training.

Chinese military media reports emphasize that capabilities have definitely increased during the past decade, but they also suggest that many shortcomings remain in terms of knowledge and proficiency of operational personnel and overall unit capabilities. For example, according to one service article: “At present, some commanders being specialized in the missile technology are relatively short of IT knowledge, and do not have sufficient experience in joint operation joint training with multiple services, and do not have a strong enough awareness and capability of joint operations.”¹⁰³ Another states that “in some units, the training of command and staff organs still lag far behind the training of combat units, the fact that the training of command and staff organs does not meet the requirements of future military operations remains a rather salient problem.”¹⁰⁴ Yet another emphasizes: “At present, personnel training has not yet completely kept pace with the development of the revolution in military affairs, and is still mainly aimed at meeting the immediate needs. The concept of cultivating superior talents for winning in the future has not been really established yet.”¹⁰⁵

Overall, available Chinese military media reports appear to provide evidence that the conventional missile force of the SAF is becoming more capable and reliable. Such reporting contributes to China’s general deterrence posture by painting a picture of an increasingly credible conventional missile force – one that China is willing and able to use to protect its national security interests.

Implications for the United States

China has made impressive strides in the modernization of its conventional and nuclear missile force capabilities. In less than two decades since the establishment of the SAF’s conventional missile force, China has developed an imposing conventional ballistic and cruise missile force and elaborated concepts for its employment to conduct precision strikes as well as for deterrence and coercive diplomacy. As a result, China’s growing conventional ballistic and cruise missile capabilities could pose an extremely grave threat to Taiwan in various cross-strait conflict scenarios.¹⁰⁶ China’s conventional missile force capabilities could also present serious challenges to the ability of US forces to conduct operations from regional air bases if the United States intervened militarily in a regional conflict involving China.¹⁰⁷ Moreover, China appears to be interested in further enhancing these capabilities, as suggested by recent articles in the Chinese

media advocating further development of long-range conventional strike weapons and suggesting that strengthening such capabilities would bolster China's ability to deter US military intervention.¹⁰⁸

One obvious target for these developments is Guam, where the United States is continuing to build up its regional military power. The ability to target Guam with LACMs or perhaps conventional IRBMs could deny the US military a potential sanctuary. It is also possible in the longer term that China could attempt to develop conventional strategic strike capabilities – such as submarine-launched LACMs, conventional intercontinental ballistic missiles, or hypersonic glide vehicles – that would allow the PLA to carry out conventional strikes against targets in Hawaii, Alaska, or the continental United States. This would enable Beijing to address at least partially the longstanding asymmetry in conventional strategic warfare capabilities that has historically prevented the PLA from being able to retaliate in kind if the United States launched conventional attacks against targets in mainland China.¹⁰⁹ In sum, China's development of advanced conventional missiles highlights the vulnerability of fixed facilities such as air bases, and potentially surface ships including US CSGs, to conventional missile strikes in a conflict around China's periphery.¹¹⁰

Chinese organizational tendencies make these emerging capabilities more worrisome by obscuring what Beijing would do under what conditions and how it would seek to communicate strategically. There is tension between the SAF's emphasis on opacity to enhance deterrence and the need for transparency to facilitate crisis management by offering reassurance, as well as between the SAF's emphasis on demonstrating resolve and on signaling self-restraint and limited aims to enable de-escalation. This risk-acceptant approach risks undermining mutual deterrence and hence could prove extremely destabilizing.

Compounding matters, Chinese experts themselves worry that China's stove-piped, hierarchical bureaucracy, with military and civilian decision-making only truly integrated by the leader at the top, is particularly unsuited to crisis management. None of these factors bode well for US–China strategic relations, particularly as the SAF is growing more powerful and assuming new missions amid rising nationalism, ongoing territorial disputes, and simmering regional tensions.

The United States is unlikely to be able to “dissuade” China from further developing its conventional land-attack and antiship ballistic missile capabilities. China appears to have concluded that it needs these capabilities to deter Taiwan from moving toward independence and to deter or counter US military intervention in a regional crisis or conflict. This approach offers China several advantages. It provides a cost-effective means of addressing challenges associated with potential near seas flashpoints such as Taiwan, the Senkaku/Diaoyu Islands, and the South China Sea. Conventional missiles also serve as powerful and relatively affordable instruments of deterrence and coercive diplomacy that China can use to attempt to influence decision makers in Taipei, Washington, Tokyo, Hanoi, and elsewhere.

To respond to China's development of a powerful arsenal of conventional missiles, the United States must continue to develop new operational concepts and capabilities. Potential areas of investment could include undersea warfare, dispersing and defending forward deployed assets, and capabilities that would make it more difficult for China

to locate and strike key platforms.¹¹¹ Particular efforts should be made to leverage the advantages that the United States retains in the undersea environment. The United States has the world's premier submarine force and can conduct a wide range of missions, including missile strikes, from undersea. As for fixed targets such as bases, the United States should increase dispersion and invest in passive defenses (i.e., "pouring concrete"). The United States should strongly encourage its Asia-Pacific allies (e.g., Japan) and friends (e.g., Taiwan) to pursue similar approaches.

Making it more difficult for China to locate and strike high-value platforms should be another area of emphasis for the United States and its allies and friends. This can include complicating PRC targeting through denial and deception and other means. Another possibility is using obscurants to counter the seekers that missiles use to find and hit their intended targets.¹¹²

Enhanced long-range precision-strike capabilities could be another desirable area for future investment, but a decision about employing such capabilities in a conflict would need to consider the possibility that large-scale conventional strikes against China's homeland or strikes against particularly sensitive targets could risk horizontal or vertical escalation of a conflict that the United States or its allies might otherwise desire to limit in geographic scope or intensity.

Washington will also need to adapt its traditional approach to deterrence, which has long relied on regional air bases and the deployment of naval forces, especially aircraft carriers, to maintain stability and prevent crises from escalating into conflicts.¹¹³ The vulnerability of air bases and aircraft carriers to China's growing arsenal of conventional missiles suggests that such traditional approaches to signaling US resolve and underscoring the strength of America's commitments to its allies and friends could prove ineffective in the event of a serious regional crisis involving China, or perhaps even inadvertently destabilizing if the perceived vulnerability of key military assets creates incentives for one or both sides to launch preemptive strikes.¹¹⁴ To address this emerging problem, the United States will need to be able to demonstrate its willingness and ability to employ combat power that is both sufficient to influence the calculations of decision makers in Beijing and less vulnerable to preemptive conventional missile strikes.

NOTES

1. The scope of this article is limited to the conventional ballistic and LACMs deployed by the SAF, but it should be noted that China's conventional missiles also include air-launched LACMs in the inventory of the PLA Air Force (PLAAF), land-based coastal defense cruise missiles, and antiship cruise missiles launched from aircraft, surface ships, and submarines.
2. DoD, *Military and Security Developments Involving the People's Republic of China 2010* (Hereafter, DoD [2010]), p. 1.
3. Recent studies that are completely or partially devoted to assessing the conventional missions and capabilities of the SAF include Ron Christman, "Conventional Missions for China's Second Artillery Corps," *Comparative Strategy* Vol. 30, No. 3 (July 2011), pp. 198–228; Ron Christman, "Conventional Missions for China's Second Artillery Corps: Doctrine, Training, and Escalation Control Issues," in Andrew S. Erickson and Lyle J. Goldstein, eds., *Chinese Aerospace Power: Evolving Maritime Roles* (Annapolis, MD: Naval Institute Press, 2011), pp. 307–327; Vitaliy O. Pradun, "From Bottle Rockets to Lightning Bolts: China's Missile-Centric Strategy and PLA Strategy against Military Intervention," *Naval War College Review* Vol. 64, No. 2 (Spring 2011), pp. 7–38; Evan S. Medeiros, "Minding the Gap: Assessing the Trajectory of the PLA's Second Artillery," in Andrew Scobell and Roy Kamphausen, ed., *Right-Sizing the People's Liberation Army: Exploring the Contours of China's Military* (Carlisle, PA: US Army War College, Strategic

- Studies Institute, 2007), pp. 143–190; Kenneth Allen and Maryanne Kivlehan-Wise, “Implementing Second Artillery Doctrinal Reforms,” in James Mulvenon and David M. Finkelstein, eds., *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the People's Liberation Army* (Alexandria, VA: Center for Naval Analyses, 2005), pp. 159–220; Mark A. Stokes, “The Chinese Joint Aerospace Campaign: Strategy, Doctrine, and Force Modernization,” in James Mulvenon and David M. Finkelstein, eds., *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the People's Liberation Army* (Alexandria, VA: Center for Naval Analyses, 2005), pp. 221–306; and Bates Gill, James Mulvenon, and Mark Stokes, “The Chinese Second Artillery Corps: Transition to Credible Deterrence,” in James C. Mulvenon and Andrew N. D. Yang, eds., *The PLA as Organization: Reference Volume v1.0* (Santa Monica, CA: RAND, 2002), pp. 510–586.
4. NASIC, *Ballistic and Cruise Missile Threat*, NASIC-1031-0985-09, April 2009, p. 3.
 5. Wang Yongxiao, Cao Jienbing, and Tao Shelan, “第二炮兵科技強軍——導彈突擊能力實現新跨越” [Second Artillery Uses Science and Technology to Strengthen Forces – Rapid Missile Strike Capability Makes New Strides], 中新社 [China News Agency], July 23, 2007.
 6. See “Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles,” available at <http://www.state.gov/www/global/arms/treaties/inf2.html>
 7. Christman, “Conventional Missions for China's Second Artillery Corps,” p. 307.
 8. Peng Guangqian and Yao Youzhi, eds., *The Science of Military Strategy* (Hereafter, SMS) (Beijing: Military Science Press, 2005), pp. 217–221.
 9. SMS, pp. 218–219.
 10. PLA, Second Artillery Force, 第二炮兵战役学 [The Science of Second Artillery Campaigns] (hereafter, SSAC) (Beijing: PLA Press, 2004), p. 274.
 11. SMS, p. 219.
 12. SSAC, p. 274.
 13. “The prevention from action by fear of the consequences. Deterrence is a state of mind brought about by the existence of a credible threat of unacceptable counteraction.” Committee on the US–Chinese Glossary of Nuclear Security Terms, *English–Chinese, Chinese–English Nuclear Security Glossary* (Hereafter, Glossary) (Washington and Beijing: National Academies Press and Atomic Energy Press, 2008), p. 16. Available at <http://www.nap.edu/catalog/12186.html> This official document has been endorsed by the SAF and China's nuclear weapons establishment.
 14. There is also a specific Chinese word for compellence, 威逼 (*weibi*), defined as “The use of force to compel a desired action by one's adversary.” Glossary, p. 9.
 15. On the distinctions between deterrence and compellence, see Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale, 1966), pp. 69–78.
 16. Li Bin, “China's Nuclear Strategy,” paper presented at Carnegie International Nonproliferation Conference, Washington, DC, June 25–26, 2007. Available at http://www.carnegieendowment.org/files/deter_disarm_li.pdf
 17. SMS, p. 213. The Chinese terms are from p. 230 of the Chinese edition.
 18. SMS, p. 215.
 19. Zhao Xijun, 慑战——导弹威慑纵横谈 [Intimidation Warfare: A Comprehensive Discussion of Missile Deterrence] (hereafter, IW) (Beijing: National Defense University Press, 2005), p. 178.
 20. SMS, pp. 216–217.
 21. John Wilson Lewis and Hua Di, “China's Ballistic Missile Programs: Technologies, Strategies, Goals,” *International Security* Vol. 17, No. 2 (Fall 1992), p. 6.
 22. Lewis and Hua, “China's Ballistic Missile Programs,” p. 6.
 23. David M. Finkelstein, “China's National Military Strategy: An Overview of the Military Strategic Guidelines,” in Roy Kamphausen and Andrew Scobell, eds., *Right Sizing the People's Liberation Army: Exploring the Contours of China's Military* (Carlisle, PA: US Army War College, 2007), pp. 135–136.
 24. The term “assassin's mace” (杀手锏 or 撒手锏) is best translated in colloquial English as “silver bullet.” It is widely used in the Chinese strategic-studies literature. There is little evidence that it refers to specific hidden capabilities or “black” programs. An intelligent discussion of this issue is found in Alastair Iain Johnston, “Towards Contextualizing the Conception of a Shashoujian (Assassin's Mace)” (Harvard University Faculty of Arts and Sciences, August 2002).
 25. SSAC, p. 54.
 26. The authors wish to thank one of the reviewers for bringing this information to their attention.
 27. 二炮装备部 [Headquarters of the Second Artillery Armament Department], “‘长剑’——锋自磨砺出——见证某新型导弹装备‘两成两力’建设” [The Long Sword' Owes Its Sharpness to the Whetstone—A Witness's Account of the Build-Up of the Two Capabilities of a Certain New Type of Missile], in Second Artillery Political Department, ed., 辉煌年代: 回顾在改革开放中发展前进的第二炮兵 [Glorious Era: Looking Back on Second Artillery Development and Advances in the Reform and Opening Period, 1978–2008] (Beijing: Central Literature Press, 2008), pp. 681–682.

28. SSAC, p. 54.
29. On the 1995–96 Taiwan Strait Crisis, see Robert S. Ross, “The 1995–1996 Taiwan Strait Confrontation: Coercion, Credibility, and the Use of Force,” *International Security* Vol. 25, No. 2 (Fall 2000), pp. 87–123.
30. Authors’ correspondence with Mark Stokes.
31. See Wang Houqing and Zhang Xingye, ed., 战役学 [The Science of Campaigns] (Beijing: National Defense University Press, May 2000), pp. 367–384.
32. “China’s National Defense in 2006,” Information Office of the State Council, People’s Republic of China, December 29, 2006.
33. Mark Stokes, *China’s Evolving Conventional Strike Capability* (Arlington, VA: Project 2049, September 14, 2009), pp. 6–8. Available at http://project2049.net/documents/chinese_anti_ship_ballistic_missile_asbm.pdf
34. For more on campaign firepower assaults, see Zhang Yuliang, ed., 战役学 [The Science of Campaigns] (Hereafter, SOC [2006]) (Beijing: National Defense University Press, 2006), pp. 161–172.
35. DoD, *Military and Security Developments Involving the People’s Republic of China* (Washington, DC: Office of the Secretary of Defense, August 24, 2011) (Hereafter, DoD [2011]), p. 51. Available at http://www.defense.gov/pubs/pdfs/2011_CMPR_Final.pdf
36. For more on the joint blockade campaign, see SOC (2006), pp. 276–292.
37. Wayne A. Ulman, “China’s Military Aviation Forces,” in Erickson and Goldstein, eds., *Chinese Aerospace Power*, p. 42.
38. For more on the joint anti-air raid campaign, see SOC (2006), pp. 312–330.
39. Ulman, “China’s Military Aviation Forces,” p. 41.
40. This is a theoretical construct; there is no reason that both sides could not engage in such actions simultaneously in different areas.
41. SSAC, pp. 401–402.
42. 二炮后勤司令部 [Headquarters of the Second Artillery Logistics Department], “战时后勤保障理论和实践的新探索” [A New Exploration of the Theories and Practice of Logistics Support in Wartime], in Second Artillery Political Department, 辉煌年代, p. 638.
43. IW, p. 83.
44. IW, pp. 77–78.
45. SSAC, p. 270.
46. SSAC, p. 270.
47. IW, p. 114.
48. SSAC, p. 271.
49. SSAC, p. 271.
50. IW, p. 167.
51. IW, p. 171.
52. IW, p. 171.
53. SSAC, p. 46.
54. IW, p. 17; SSAC, pp. 139–141.
55. SSAC, pp. 78–79.
56. SSAC, p. 79.
57. See SOC (2006), pp. 616–628.
58. SOC (2006), p. 317.
59. SOC (2006), p. 400.
60. SOC (2006), pp. 616–628.
61. SOC (2006).
62. DoD (2011), p. 30.
63. DoD (2010), p. 66.
64. DoD, Military Power of the People’s Republic of China 2009 (Hereafter DoD [2009]), p. 22.
65. DoD (2011), p. 30.
66. If the PLA has achieved its desired level of SRBM deployments, it seems likely that the SAF may be shifting its focus in the coming decade to building its LACM and MRBM forces and other longer-range conventional missiles reportedly under development.
67. Mark Stokes, “Expansion of China’s Ballistic Missile Infrastructure Opposite Taiwan,” *AsiaEye*, April 18, 2011. Available at <http://blog.project2049.net/2011/04/expansion-of-chinas-ballistic-missile.html>
68. DoD (2009), p. 22.
69. DoD (2011), p. 47.
70. Zhang Han and Huang Jingjing, “New Missile Ready by 2015.” *Global Times*, February 18, 2011. Available at <http://military.globaltimes.cn/china/2011-02/624275.html>
71. Ministry of Defense, “National Defense Report,” in Editorial Board, 中華民國壹百年國防報告書 [Republic of China Centennial 2011 National Defense Report] (Taipei, Taiwan: Ministry of Defense, 2011), p. 60.
72. DoD (2010), p. 2.
73. SSAC, pp. 401–402. Submunitions are smaller weapons ejected as a warhead approaches its target. EMP, which may be generated by nuclear and nonnuclear means, is a burst of electromagnetic radiation that can

- damage electronics through current and voltage surges. Antiradiation weapons home in on selected radar emissions.
74. China's LACM capabilities also include air-launched variants such as the YJ-63 and a new long-range air-launched LACM. The YJ-63 reportedly has a range of about 200 km and is carried by the PLA's B-6 bombers. China is currently enhancing this capability with an upgraded bomber and new long-range air-launched cruise missile. The B-6 armed with this new LACM will extend the reach of China's regional precision strike capabilities out to 3,000 km, bringing US bases on Guam within range of the PLA's conventional antiaccess capabilities. DoD (2011), p. 33; "KongDi-63 Air-Launched Land Attack Cruise Missile," *China's Defence Today*, October 20, 2008, available at <http://www.sinodefence.com/airforce/weapon/kd63.asp>
 75. DoD (2010), p. 66.
 76. DoD (2010), p. 66.
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