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## Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States

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# Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States

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**ABSTRACT** The People's Republic of China (PRC), no longer content with its longstanding 'minimalist' nuclear posture and strategy, is enhancing the striking power and survivability of its theater and strategic missile forces and rethinking its nuclear doctrine in ways that may pose serious challenges for the United States. Although the modernization of Chinese nuclear and missile forces may ultimately result in greater strategic deterrence stability, this change will not come about immediately or automatically. Indeed, it is entirely possible that China's growing missile capabilities could decrease crisis stability under certain circumstances, especially in the event of a US–China conflict over Taiwan.

**KEY WORDS:** China, Nuclear Strategy, Ballistic Missiles

The People's Liberation Army (PLA), once widely dismissed as a bloated, poorly trained military with an enormous, but largely antiquated collection of weapons and equipment, is becoming a leaner, more professional, and increasingly operationally capable fighting force. Major increases in Chinese defense spending over the past decade have enabled an accelerating military modernization program. As part of this ongoing transformation, the People's Republic of China (PRC) has clearly prioritized the improvement of its missile capabilities. Although much attention has been focused on China's rapidly growing arsenal of short-range ballistic missiles (SRBMs), its theater and strategic conventional and nuclear missile forces are undergoing equally important changes. Many analysts have portrayed Chinese longer-range missile and nuclear forces as modernizing very slowly, but recent developments, including advances in technology, increasingly realistic

training, and doctrinal evolution, underscore the necessity of updating the conventional wisdom on China's theater and strategic missile capabilities and the US–China strategic relationship. Indeed, China is currently enhancing the striking power and survivability of its theater and strategic missile forces and rethinking its nuclear doctrine in ways that may pose serious challenges for the United States. The principal drivers of these developments are China's assessment of its changing external security environment, especially vis-à-vis the United States, and its growing concerns about the viability of its traditional deterrent posture, particularly in a missile defense environment.

China's transition from its longstanding 'minimalist' strategic posture to one that consists of a much more potent combination of theater and strategic missile and nuclear systems raises several important questions: Most fundamentally, what is the actual composition of China's missile forces at this time and how will this force structure evolve over the next few years? How is the Chinese military training to use the new weapons it is adding to its arsenal? How will Chinese planners and decisionmakers think about using these emerging capabilities? What doctrinal tensions might arise in the future now that China no longer has to make virtue out of necessity? What are the implications for the US–China strategic relationship and deterrence stability in a Taiwan Strait crisis or conflict?

### Recent Assessments of China's Nuclear and Missiles Forces

Despite major advances in Chinese strategic capabilities, some analysts continue to portray China as being relatively unconcerned about modernizing its missile and nuclear forces. Most prominently, Keir Lieber and Daryl Press argue that Beijing's arsenal is 'growing at a glacial pace'.<sup>1</sup> According to Lieber and Press, 'It will probably soon be possible for the United States to destroy the long-range nuclear arsenals of Russia or China with a first strike. This dramatic shift in the nuclear balance of power stems from a series of improvements in the United States' nuclear systems, the precipitous decline of Russia's arsenal, and the glacial pace of modernization of China's nuclear forces.'<sup>2</sup> Lieber

<sup>1</sup>Keir A. Lieber and Daryl G. Press, 'The End of MAD? The Nuclear Dimension of US Primacy', *International Security* 30/4 (Spring 2006), 27. The principal conclusion of this article is that the era of mutually assured destruction (MAD) is ending and the world is entering a period of nuclear primacy because Russia's nuclear arsenal is decaying and China's is staying small even as the US is continuing to upgrade its nuclear capabilities.

<sup>2</sup>Keir A. Lieber and Daryl G. Press, 'The Rise of US Nuclear Primacy', *Foreign Affairs* (Mar./Apr. 2006), <[www.foreignaffairs.org/20060301faessay85204/keir-a-lieber-](http://www.foreignaffairs.org/20060301faessay85204/keir-a-lieber-)

and Press assess that Chinese nuclear forces are vulnerable to a disarming first strike and conclude that this is unlikely to change anytime soon. In their words, 'Given the history of China's slow-motion nuclear modernization, it is doubtful that a Chinese second-strike force will materialize anytime soon. The United States has a first-strike capability against China today and should be able to maintain it for a decade or more.'<sup>3</sup>

Lieber and Press are not the only analysts who portray Chinese nuclear and missile forces as modernizing very slowly despite what Chinese analysts perceive as the security challenges stemming from an increasingly threatening strategic environment. Jeffrey Lewis has argued persuasively that Beijing traditionally believed changes in the size, configuration, and readiness of nuclear forces had little influence on deterrence, and that this conviction allowed China to limit its nuclear capabilities in ways that maximized political control and lowered costs.<sup>4</sup> Lewis contends that China's nuclear force is unlikely to change rapidly because of durable beliefs on the part of Beijing's leadership concerning the opportunity costs (particularly in centralized control), and the limited marginal utility, of additional nuclear weapons, especially in sophisticated deployment patterns. Lewis's nuanced assessment of China's nuclear arsenal challenges more aggressive foreign estimates of its qualitative and quantitative modernization, and it correctly reflects the historical context of the country's nuclear development. Although China historically was satisfied with the 'minimum means of reprisal', however, much has changed in recent years and there is ample evidence to suggest that Chinese planners and strategists no longer regard minimalism as an appropriate principal upon which to base their calculations about national force structure requirements.<sup>5</sup>

As this essay will demonstrate, China has clearly discarded the belief that the quantity and quality of its missile and nuclear forces have little

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daryl-g-press/the-rise-of-u-s-nuclear-primacy.html>. See also Peter C. W. Flory *et al.*, 'Nuclear Exchange: Does Washington Really Have (or Want) Nuclear Primacy?' *Foreign Affairs*, Sept./Oct. 2006, <<http://www.foreignaffairs.org/20060901faresponse85514/peter-c-w-flory-keith-payne-pavel-podvig-alexei-arbatov-keir-a-lieber-daryl-g-press/nuclear-exchange.html>>.

<sup>3</sup>Lieber and Press, 'The Rise of US Nuclear Primacy', Mar./Apr. 2006, <[www.foreignaffairs.org/20060301faessay85204/keir-a-lieber-daryl-g-press/the-rise-of-u-s-nuclear-primacy.html](http://www.foreignaffairs.org/20060301faessay85204/keir-a-lieber-daryl-g-press/the-rise-of-u-s-nuclear-primacy.html)>.

<sup>4</sup>Jeffrey Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age* (Cambridge, MA: MIT 2007).

<sup>5</sup>For a critical review of Lewis's work, see Brad Roberts, 'Book Review: Nuclear Minimalism', *Arms Control Today*, May 2007, <[www.armscontrol.org/act/2007\\_05/BookReview.asp](http://www.armscontrol.org/act/2007_05/BookReview.asp)>.

influence on deterrence, especially since its planners appear to be changing both, presumably to enhance the credibility of Beijing's deterrent and provide Chinese decisionmakers with a greater range of options in a changing strategic environment. Indeed, China currently perceives a variety of challenges to its strategic security arising from what it sees as Washington's determination to occupy a position of absolute nuclear superiority and the US military's increasingly lethal conventional precision strike capabilities. Consequently, Beijing is far from content to rely on the traditional strategy of minimum deterrence. Instead, Chinese analysts argue that a shift to a more formidable deterrent posture is required to ensure strategic security and promote the stable external environment that Chinese leaders have identified as a necessary condition for continued economic development.<sup>6</sup> Moreover, Chinese writers have indicated that nuclear weapons could do more than simply fulfill the traditional missions of supporting the country's great power status and deterring nuclear attack. In the words of PLA National Defense University professor Wang Zhongchun, 'Nuclear weapons play multiple strategic roles.' Nuclear weapons underscore China's status as a great power and a permanent member of the United Nations Security Council, deter other countries from using nuclear weapons to attack or coerce China, and potentially 'can be used at a time when China's core national security and development interests are fundamentally undermined'.<sup>7</sup> Consequently, according to Wang, 'China should actively respond...to these increasingly serious nuclear challenges in order to obtain a peaceful long-term security environment.'<sup>8</sup>

### Chinese Missile Force Modernization

Much attention has been devoted to China's massive build-up of SRBMs opposite Taiwan, but Beijing is making equally impressive strides in the modernization of its theater and strategic conventional and nuclear missile forces. Most notably, China became only the third nation to demonstrate a direct ascent anti-satellite capability on 11 January 2007, when a mobile missile lofted a kinetic kill vehicle (KKV) payload into low earth orbit in order to physically destroy the aging Chinese weather satellite *Feng Yun 1C*,<sup>9</sup> at an altitude of approximately

<sup>6</sup>Wang Zhongchun, 'Nuclear Challenges and China's Choices', *China Security* 5 (Winter 2007), 52–65.

<sup>7</sup>Ibid., 61.

<sup>8</sup>Ibid., 60.

<sup>9</sup>For the perspective of a senior fellow at China's Academy of Military Sciences, see Bao Shixiu, 'Deterrence Revisited: Outer Space', *China Security* 5 (Winter 2007), 2–11.

865 km.<sup>10</sup> China is also developing conventionally armed missiles that could provide the PLA with a potent capability against regional bases and US aircraft carriers operating in the vicinity of Taiwan. Beijing is likewise determined to modernize its strategic nuclear forces. China is deploying road-mobile intercontinental ballistic missiles (ICBMs) and developing new nuclear-powered ballistic missile submarines (SSBNs) and submarine-launched ballistic missiles (SLBMs).<sup>11</sup>

Chinese analysts assess that the deployment of SSBNs and land-based mobile missiles will 'fundamentally ensure the reliability and credibility of China's nuclear force'.<sup>12</sup> As part of this ambitious missile and nuclear force modernization program, in recent years, the People's Republic has accelerated the pace of medium- and long-range missile tests.<sup>13</sup> According to one observer, the heightened activity represents an 'unprecedented surge' in the national ballistic missile flight test program.<sup>14</sup> Others state that this testing program surpasses anything seen since the 1960s-era Soviet missile buildup.<sup>15</sup> This surge in flight testing includes four types of missile launch activities.<sup>16</sup> China is not only developing and testing several types of cruise and ballistic missiles, but also forming new missile units, converting some previously

<sup>10</sup>Caitlin Harrington, 'Chinese ASAT Test Rekindles Weapons Debate', *Jane's Missiles and Rockets*, 1 Mar. 2007, Jane's Information Group, <www.janes.com>.

<sup>11</sup>Office of the Secretary of Defense, *Annual Report to Congress, Military Power of the People's Republic of China 2008*, 25.

<sup>12</sup>Wang Zhongchun, 62.

<sup>13</sup>Craig Covault, 'China Accelerating Ballistic Missile Tests', *Aviation Week & Space Technology*, 6 Apr. 2007, <www.aviationweek.com/aw/generic/story.jsp?id=news/CHINA04077.xml&headline=China%20Accelerating%20Ballistic%20Missile%20Tests&channel=space>.

<sup>14</sup>Craig Covault, 'DSP Satellites See Aggressive New Chinese Missile Testing', *Aviation Week & Space Technology*, 8 Apr. 2007, <www.aviationweek.com/aw/generic/story.jsp?id=news/aw040907p1.xml&headline=DSP%20Satellites%20See%20Aggressive%20New%20Chinese%20Missile%20Testing&channel=defense>.

<sup>15</sup>John Pike, quoted in Covault, 'DSP Satellites See Aggressive New Chinese Missile Testing'.

<sup>16</sup>Three of these are part of the developmental flight testing process. According to Chinese military media reports, before a new ballistic missile is deployed with China's Strategic Rocket Forces, it must undergo a series of experimental flight tests [试验发射], design finalization flight tests [定型发射], and batch production inspection flight tests [批抽检发射]. In addition, Second Artillery units launch ballistic missiles for training purposes. See '解放军新导弹试验成功 开始装备战略导弹部队' [PLA's New Missile Tested Successfully and Begins to Equip Strategic Rocket Forces], *解放军报* [Liberation Army Daily], 16 Oct. 2006, <http://9link.116.com.cn/node/7399>.

established units to new types of missiles, and training officers, soldiers, and technicians so that they will be ready to operate the new missiles.<sup>17</sup> China is also upgrading some of its older missiles and developing missile defense countermeasures.<sup>18</sup> In addition, Beijing is modernizing its command and control system, presumably to enhance the survivability and robustness as well as the flexibility and responsiveness of the missile force.

The transformation of the Second Artillery Corps – the arm of the PLA responsible for most conventional and nuclear ballistic missiles – is one of the centerpieces of China's military modernization program. 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.'<sup>19</sup> The number of SRBMs in China's inventory has increased dramatically in recent years, posing an increasingly potent threat to Taiwanese and US forces in parts of the region. By late 2007, China had deployed about 990–1,070 DF-11 (300 km range) and DF-15 (600 km range) mobile SRBMs to garrisons opposite Taiwan. The newer variants of these missiles feature longer ranges and improved accuracy.<sup>20</sup> The PLA's SRBMs could render Taiwan's airfields inoperable and destroy critical command and control and infrastructure nodes. According to one recent Chinese article, the Second Artillery now has 'an advanced, automated command system' that links individual launch units to brigade commanders and more

<sup>17</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China* 2007, 3.

<sup>18</sup>Ibid.

<sup>19</sup>王永孝, 曹建兵, 陶社蘭 [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], 中国新闻社 [China News Agency], 23 Jul. 2007, OSC# CPP20070723718001.

<sup>20</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China* 2008, 24, 56. According to the 2008 Pentagon report, 'China's Second Artillery maintains at least five operational SRBM brigades; an additional two brigades are subordinate to PLA ground forces – one garrisoned in the Nanjing MR and the other in the Guangzhou MR.' China's recent development of the world's foremost sub-strategic mobile missile force, which is continuing to grow at a rate of about 100 missiles per year, is particularly striking given that the PLA had no conventional ballistic missile capability until the Second Artillery added conventional strikes to its mission in the early 1990s.

senior leaders at higher levels.<sup>21</sup> China is also developing potent conventional theater missile capabilities. In particular, Chinese medium-range ballistic missiles (MRBMs) with maneuvering reentry vehicles (MaRVs) and terminal seekers will allow the PLA to threaten targets such as airbases, command and control centers, and even US aircraft carriers, thereby introducing unprecedented complications for American planners and strategists.

Backstopping the PLA's short-range and theater conventional missile forces are its theater and strategic nuclear missile forces, which provide the ultimate escalatory or counter-escalatory threat. Beijing is modernizing its strategic and theater nuclear forces to enhance their striking power and survivability. According to the US 2005 Department of Defense report to Congress on Chinese military power, 'China is qualitatively and quantitatively improving its strategic missile force. This could provide a credible, survivable nuclear deterrent and counter-strike capability.'<sup>22</sup> China currently has about 20 silo-based, liquid-propellant DF-5 ICBMs capable of striking targets in the continental United States and some older missiles that are more limited in range and serve primarily as a regional nuclear deterrent.<sup>23</sup> As China's nuclear force modernization continues, its strategic nuclear forces will consist of DF-5A ICBMs (longer-range—up to 13,000 km<sup>24</sup>—versions of the older, silo-based, liquid-fueled DF-5 ICBMs), road-mobile, solid-fueled DF-31 (7,250 km range)<sup>25</sup> and DF-31A ICBMs (11,270 km range),<sup>26</sup> and JL-2 SLBMs (8,000–12,000 km range), which will be deployed on China's new *Jin*-class ballistic missile submarines (SSBNs). The deployment of road-mobile ICBMs will improve the survivability of Chinese nuclear forces by making them more challenging to locate, while the addition of SLBMs will provide a sea-based nuclear retaliatory capability. China also reportedly has the capability to

<sup>21</sup>Wang, Cao, and Tao. Consequently, 'Today, a brigade commander can directly command individual launch platforms using an advanced, automated command system.'

<sup>22</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2005*, 28.

<sup>23</sup>See United States House of Representative Select Committee on US National Security and Military/Commercial Concerns with the People's Republic of China [Cox Report], 183, <[www.house.gov/coxreport/](http://www.house.gov/coxreport/)>. In the early 1980s, China deployed its first two silo-based ICBMs capable of reaching the continental United States. The PRC deployed about 18 more CSS-4 ICBMs in the 1990s, bringing the total size of its silo-based ICBM force to approximately 20 missiles.

<sup>24</sup>'CSS-4 (DF-5)', *Jane's Strategic Weapon Systems*, 3 May 2006, Jane's Information Group, <[www.janes.com](http://www.janes.com)>.

<sup>25</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2006*, 27.

<sup>26</sup>*Ibid.*



deploy a multiple independently targeted reentry vehicle (MIRV)<sup>27</sup> system for the DF-5 ICBM.<sup>28</sup> In addition to upgrading its strategic nuclear forces, the PRC will also continue to maintain nuclear-armed, solid-propellant, road-mobile DF-21 2,500 km range MRBMs as the cornerstone of its regional nuclear deterrence capabilities.<sup>29</sup>

The nuclear force modernization programs that are currently underway represent a dramatic departure from China's traditional 'minimum deterrence' force posture. Accompanying these improvements in force modernization are advances in training and changes in doctrine. Taken together, these developments are greatly increasing the operational capability of the conventional missile force and strengthening the deterrence posture of the nuclear missile force.

As a result of these dramatic developments, China appears to be on the verge of reconciling the previously significant divergence between the Second Artillery's once largely aspirational doctrine and its actual capabilities.<sup>30</sup> Whereas Chinese strategists were once severely constrained by technological limitations,<sup>31</sup> they now may have increasing choices regarding the development, deployment, and use of PLA missiles.

<sup>27</sup>MIRVs can be placed in different trajectories by a bus platform that changes position slightly as it launches them in succession. Even more sophisticated, MaRVs are capable of independently altering their trajectory even in terminal phase. Warhead miniaturization, a process which the Cox Report states is well within China's capability, decreases the infrared (IR) signal of a reentry vehicle, so that it is much harder for a missile defense interceptor to target. Miniaturization could also permit the use of multiple reentry vehicles (MRVs) and MIRVs. MRVs are easier to develop than MIRVs. See He Yingbo and Qiu Yong, 'THAAD-Like High Altitude Theater Missile Defense: Strategic Defense Capability and Certain Countermeasures Analysis', *Science and Global Security* 11/2–3 (2003), 179.

<sup>28</sup>Robert M. Walpole, National Intelligence Officer for Strategic and Nuclear Programs, 'Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015', Statement before the Senate Subcommittee on International Security, Nonproliferation, and Federal Services, 11 Mar. 2002, <<http://hsgac.senate.gov/031102witness.htm>>.

<sup>29</sup>'CSS-5 (DF-21)', *Jane's Strategic Weapon Systems*, 3 May 2006, Jane's Information Group, <[www.janes.com](http://www.janes.com)>.

<sup>30</sup>On Chinese doctrinal debates in the 1990s, see Alistair Iain Johnston, 'China's New "Old Thinking": The Concept of Limited Deterrence', *International Security* 20/3 (Winter 1995/96), 5–42 and, 'Prospects for Chinese Nuclear Force Modernization: Limited Deterrence Versus Multilateral Arms Control', *China Quarterly*, Jun. 1996.

<sup>31</sup>Limitations for nuclear systems have included 'a relatively small number of warheads, technically and numerically limited delivery vehicles, an overwhelming reliance on land-based systems, persistent concerns over the arsenal's survivability, reliability and penetrability, and a limited program of research, development, and testing'. Bates Gill, James Mulvenon, and Mark Stokes, 'The Chinese Second Artillery Corps: Transition to Credible Deterrence', in James C. Mulvenon and Andrew Yang (eds.), *The People's*

This historical breakthrough applies to three different mission levels. Beyond the deployment of an increasingly lethal warfighting capability for the Second Artillery's short-range conventional ballistic missile forces, Beijing is deploying a more robust and diversified nuclear and conventional medium-range ballistic missile force at the theater level and a more formidable and survivable intercontinental force capable of 'counter-coercion' missions at the strategic nuclear level.<sup>32</sup> The following sections provide more detailed assessments of recent developments in theater and strategic missile force structure, training, and doctrine.

*Force Structure Developments: Growing Striking Power and Increasing Survivability*

This section presents an overview of China's evolving conventional and nuclear missile force structure. The DF-5 (NATO Designator CSS-4) ICBM has been the mainstay of China's intercontinental nuclear deterrence force since the 1980s. China currently deploys about 20 of the liquid-fueled, silo-based missiles, which have a range of at least 12,900 km, enough to strike targets throughout the continental United States.<sup>33</sup> The US Intelligence Community has judged for several years that China is capable of deploying a MIRVed version of the liquid-fueled, silo-based DF-5 ICBM.<sup>34</sup> Indeed, researchers affiliated with China's Second Artillery and missile and aerospace industry have published several studies on MIRV-related research in the past few years, suggesting that this MIRV development program is progressing at an impressive rate.<sup>35</sup> According to noted American PLA expert Paul

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*Liberation Army as Organization*, Reference Volume v1.0 (Santa Monica, CA: RAND 2002), 536.

<sup>32</sup>The division into three levels is drawn from *ibid.*, 512.

<sup>33</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 18–9.

<sup>34</sup>Robert M. Walpole, 'Foreign Missile Developments'; and Mark A. Stokes, 'Chinese Ballistic Missile Forces in the Age of Global Missile Defense: Challenges and Responses', in Andrew Scobell and Larry M. Wortzel (eds.), *China's Growing Military Power: Perspectives on Security, Ballistic Missiles, and Conventional Capabilities* (Carlisle, PA: US Army War College 2002), 133, <[www.strategicstudiesinstitute.army.mil/pdf/PUB59.pdf](http://www.strategicstudiesinstitute.army.mil/pdf/PUB59.pdf)>.

<sup>35</sup>See, for example, Tan Shoulin, Zhang Daqiao, and Yu Zhijun, '分导式多弹头导弹子弹头分导顺序优化与评估' [The Optimization and Evaluation of the Warhead Separation Sequence of Multiple Independent Reentry Vehicle Missiles], *弹道学报* [Journal of Ballistics] No.3 (2006); Wang Chen and Wang Shicheng, '分导式多弹头变轨控制稳定性分析与仿真' [Analysis and Simulation of the Control Stability of Multiple Independently Targeted Reentry Vehicles], *计算机仿真* [Computer Simulation] 22/6 (2005), 40–2; Wang Chen and Wang Shicheng,

Godwin, 'It should probably be assumed that MRV, and quite possibly MIRV... research and development has been under way for some time [in China], and that the question of force size is being seriously... debated within Beijing's community of security strategists.'<sup>36</sup> Indeed, Li Bin claims, 'China has the capability to develop... MIRVs... but has not done so.'<sup>37</sup> There is ample reason to believe that China will do so, however, and perhaps quite soon.<sup>38</sup>

Converting the DF-5s to a MIRV configuration would dramatically increase the number of warheads China could deliver against 'soft targets' (such as major cities and large military installations) in the continental United States. According to one analyst, 'Chinese military experts also talk increasingly frequently about a deployment of five to seven warheads atop the existing silo-based missiles as a counter to US missile defense. Steps such as these could result in an increase from 20 to 100 or more nuclear weapons deployed by China capable of reaching the United States.'<sup>39</sup> Whatever the exact numbers of warheads carried by each missile, MIRVing the DF-5 ICBMs would clearly represent a major increase in strategic nuclear capability.

Not content to simply modernize and perhaps MIRV its silo-based forces, neither of which enhances force survivability, China is also

'多头分导式子弹头圆概率误差估算方法研究' [The Estimation of the Circular Error Probability of Multiple Independently Targeted Reentry Vehicles], *弹道学报* [Journal of Ballistics] 1 (2005); and Wei Qiyong, '多弹头对陆基战略导弹突防效果和有效性的影响' [The Influence of Using MIRVs on Penetration Capability and System Effectiveness for Land-Based Strategic Missiles], *导弹与航天运载技术* [Missiles and Space Vehicles] 270 (2004), 1–6.

<sup>36</sup>See Paul H.B. Godwin, 'The PLA Faces the Twenty-First Century: Reflections on Technology, Doctrine, Strategy, and Operations', in James R. Lilley and David Shambaugh (eds.), *China's Military Faces the Future* (Washington DC: American Enterprise Institute 1999), 58.

<sup>37</sup>See Li Bin, 'The Impact of US NMD on Chinese Nuclear Modernization', Working Paper, Pugwash Workshop on East Asian Security, Seoul, South Korea, Apr. 2001.

<sup>38</sup>At least one Chinese analyst has argued that developing the capability to salvo launch road-mobile ICBMs with single warheads is a more efficient and survivable option than deploying missiles with MIRVs. See Wei Qiyong, 'The Influence of Using MIRVs on the Penetration Capability and System Effectiveness of Land-Based Strategic Missiles' [多弹头对陆基战略导弹突防效果和有效性的影响], *Missiles & Space Vehicles* [导弹与航天运载技术], 3 (2004), 1–6. Wei, a researcher at the Chinese Academy of Launch Technology [中国运载火箭技术研究院] in Beijing, argues that the survivability gains associated with the deployment of land-mobile missile systems are much more important than the increased striking power offered by MIRVs, especially for small and medium-sized nuclear powers. Nonetheless, the authors expect China to pursue both of these technological paths to enhancing its nuclear and missile forces.

<sup>39</sup>Brad Roberts, 'Book Review: Nuclear Minimalism', *Arms Control Today*, May 2007, <[www.armscontrol.org/act/2007\\_05/BookReview.asp](http://www.armscontrol.org/act/2007_05/BookReview.asp)>.

developing and deploying two road-mobile ICBMs, the DF-31 and DF-31A. The DF-31 is a three-stage, solid propellant, road-mobile ICBM with a range of at least 7,250 km.<sup>40</sup> The DF-31 is probably intended to replace China's aging 4,500–7,000 km range<sup>41</sup> DF-4 missiles and will be deployed on a mobile erector launcher (MEL). It is likely intended mainly to cover targets in Russia and Asia, but the missile's range is sufficient to reach US missile defense sites in Alaska, US forces in the Pacific, and targets in parts of the Western United States.<sup>42</sup> After a protracted development history that began in the 1980s, China conducted the first developmental flight test of the DF-31 in August 1999.<sup>43</sup> After this initial flight test, the system remained under development for several more years, despite numerous predictions that its deployment was imminent. The Cox Committee report, for instance, incorrectly predicted that the Second Artillery would begin deployment of the DF-31 in 2002.<sup>44</sup>

The DF-31 road-mobile ICBM finally reached initial threat availability (ITA)<sup>45</sup> status in 2006.<sup>46</sup> The 2007 US Department of Defense report on Chinese military power indicated that the DF-31 would likely achieve

<sup>40</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 18–9.

<sup>41</sup>'DF-4 [the 'Chingyu' missile]', *Federation of American Scientists*, <[www.fas.org/nuke/guide/china/theater/df-4.htm](http://www.fas.org/nuke/guide/china/theater/df-4.htm)>.

<sup>42</sup>Robert D. Walpole, 'Statement for the Record to the Senate Subcommittee on International Security, Proliferation, and Federal Services on the Ballistic Missile Threat to the United States', 9 Feb. 2000, <[www.cia.gov/news-information/speeches-testimony/2000/nio\\_speech\\_020900.html](http://www.cia.gov/news-information/speeches-testimony/2000/nio_speech_020900.html)>.

<sup>43</sup>Ibid.

<sup>44</sup>See Cox Report, 186.

<sup>45</sup>ITA means that a missile has been successfully tested and is thus available for military operations if needed, even though it may not yet have been fully deployed. To achieve initial operational capability (IOC), a missile would have to be more fully integrated into the force structure and possess the requisite supporting personnel and equipment. For more on these distinctions, see Walpole, 'The Ballistic Missile Threat to the United States'.

<sup>46</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 3. The use of the phrase 'initial threat availability' confused some observers, prompting US Dept. of Defense officials to issue the following explanation during a 25 May 2007 background briefing: 'This year's report highlights the initial threat availability of the DF-31 ICBM. We do not say with certainty that the DF-31 has achieved its formal initial operational capability, but we do say that it has reached a stage of development such that it could be employed in actual military operations.' See US Dept. of Defense, Office of the Assistant Secretary of Defense (Public Affairs), 'DoD Background Briefing with Defense Department Officials at the Pentagon', 25 May 2007, <[www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3971](http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3971)>.

operational status soon and raised the possibility that it had already been deployed at least on a limited basis.<sup>47</sup> Moreover, the report stated that the longer-range DF-31A road-mobile ICBM would likely achieve initial operational capability (IOC) sometime in 2007. The DF-31A's greater range of at least 11,270 km will allow it to reach targets throughout the continental United States.<sup>48</sup> China may also be developing at least two other ICBMs: the DF-41 and DF-51. Rumors about a possible DF-41 ICBM program have been in circulation for many years.<sup>49</sup> In addition, a Hong Kong magazine recently reported that China is 'speeding up' the development of a new DF-51 ICBM.<sup>50</sup>

In addition to its road-mobile strategic nuclear forces, China also maintains a variety of land-based theater nuclear systems. According to the 2007 Department of Defense report on Chinese military power, the PLA has about 40–50 nuclear-armed CSS-5 Mod 1 and CSS-5 Mod 2 MRBMs. These solid-fueled, road-mobile missiles with a range of more than 1,770 km constitute the bulk of China's regional nuclear deterrence capability.<sup>51</sup> In addition, the PRC still has about 16–24 of its older and shorter range, liquid-fueled CSS-3 ICBMs with a range of more than 5,470km, and 14–18 liquid-fueled CSS-2 IRBMs with a range of at least 2,790km.<sup>52</sup> The Department of Defense assesses that China is also developing new air-launched and ground-launched cruise missiles that could be capable of performing theater nuclear missions.<sup>53</sup>

China also appears to be on the verge of adding a sea-based capability to its nuclear posture. After a protracted and ultimately disappointing attempt to take its deterrent force to sea with the *Xia* SSBN and JL-1 SLBM, China is developing a potentially much more capable sea-based deterrent in the *Jin*-class SSBN and JL-2 SLBM. China's 2004 Defense White Paper states that a 'capability of nuclear counter-attacks [has been]...enhanced' in the naval realm.<sup>54</sup>

<sup>47</sup>Ibid.

<sup>48</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 18–9.

<sup>49</sup>See, for example, Pamela Pun, 'Experts: DF-41 Could Force US to Adjust its Strategy', *Hong Kong Standard*, 15 Oct. 1999, 6.

<sup>50</sup>Chin Chien-li, '二炮政委彭小枫上将评传' [A Critical Biography of General Peng Xiaofeng, Political Commissar of the Second Artillery Corps], 前哨 (Frontline) 90 (Dec. 2006), 64–7.

<sup>51</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 18–9.

<sup>52</sup>Ibid.

<sup>53</sup>Ibid., 19.

<sup>54</sup>PRC Ministry of Defense, 'China's National Defense in 2004', <[http://www.chinadaily.com.cn/english/doc/2004-12/28/content\\_403913\\_4.htm](http://www.chinadaily.com.cn/english/doc/2004-12/28/content_403913_4.htm)>.

According to a major PLA publication, 'Submarines are the submerged launching platforms of "our side's" long-range striking weapons. They make up the major force of [strategic] counterstrike against the enemy's air raids originating from the enemy's own territory.'<sup>55</sup> China launched a single *Jin*-class (Type 094) SSBN in 2004, which has reportedly been undergoing sea trials since early 2006, with the platform potentially operational in mid-2007 and the ballistic missiles by 2008–9.<sup>56</sup> In late 2006, a 'Quickbird' commercial satellite photographed a Type 094 SSBN at Xiaopingdao naval base south of Dalian, China.<sup>57</sup> A second 094, reportedly launched in 2006, may be commissioned in 2010. Indeed, Internet photos of unusually high resolution have emerged of one 094 in port Xiaopingdao, two at Huludao,<sup>58</sup> and one at a newly constructed submarine facility at Yalong Bay near Sanya on Hainan Island.<sup>59</sup> To what extent these are the same submarines remains unclear. The photo of the 094 at Yalong Bay suggests quite strongly that the facility will be an SSBN base. *Jane's* asserts that two other hulls are probably under construction and might be launched in 2008/10 and commissioned in 2012/14 respectively. The 094 is forecast to be outfitted with 12 42-ton JL-2 (CSS-NX-5) submarine launched ballistic missiles (SLBMs),<sup>60</sup> which are equipped

<sup>55</sup>Cui Changqi *et al.*, *Air Raid and Anti-Air Raid in the 21st Century* (Beijing: PLA Press 2002), 181, 271.

<sup>56</sup>Unless otherwise specified, data for this paragraph are derived from 'Jin class (Type 094) (SSBN)', *Submarines – Strategic Missile Submarines*, China, *Jane's Fighting Ships*, 29 Jan. 2007, Jane's Information Group, <www.janes.com>.

<sup>57</sup>'China's New Missile Submarine Seen by Satellite', Reuters, 6 Jul. 2007; Hans M. Kristensen, 'New Chinese Ballistic Missile Submarine Spotted', *Strategic Security Blog*, 5 Jul. 2007, <www.fas.org/blog/ssp/2007/07/new\_chinese\_ballistic\_missile.php>.

<sup>58</sup>Hans M. Kristensen, 'A Closer Look at China's New SSBNs', 15 Oct. 2007, <www.fas.org/blog/ssp/2007/10/post\_4.php#more>; 'Two More Chinese SSBNs Spotted', *Strategic Security Blog*, 10 Oct. 2007, <www.fas.org/blog/ssp/2007/10/two\_more\_chinese\_ssbn\_spotted.php>; 'New Chinese Ballistic Missile Submarine Spotted', 5 Jul. 2007, <www.fas.org/blog/ssp/2007/07/new\_chinese\_ballistic\_missile.php#more>.

<sup>59</sup>'今日二炮最猛图: 094 在三亚出现 考古曾经的泄密手画被证实' [The Second Artillery's Most Dramatic Picture Today: A (Type) 094 (SSBN) Appears in Sanya, Confirming that a Secret Has Already Been Divulged], 21 Dec. 2007, <www.wforum.com/specials/articles/03/37321.html>.

<sup>60</sup>For Chinese discussion of the undersea leg of the nuclear triad, including its relationship to the land-based leg, see 林长盛 [Lin Changsheng], '我国核潜艇的战力' [The Combat Power of China's Nuclear Submarines], *世界航空航天博览* [World Aerospace Digest] 103 (Sept. 2004), 31–3; 简杰 [Jian Jie], "神话中德双子座: 传说中的中国 21 世纪军事安全的海上长城——西方媒体报道中国下一代核潜艇" [The Legend of the Virtuous Twins: Discussion of China's 21st Century Military Security Maritime Great Wall – The

with penetration aids and have an estimated maximum range of over 8,000 km. The Type-094 and JL-2 SLBM will likely achieve IOC sometime between 2007 and 2010.<sup>61</sup> According to the US Navy's Office of Naval Intelligence (ONI) 'a fleet of probably five Type 094 SSBNs will be built in order to provide more redundancy and capacity for a near-continuous at-sea SSBN presence'.<sup>62</sup> If operationally successful, the 094 would represent a substantial improvement over China's single first-generation Type 092 *Xia*-class SSBN, which, though equipped with 12 JL-1 SLBM missiles with range of 1,770km+,<sup>63</sup> is rumored to never have made an extended patrol, and therefore is unlikely to have ever represented an intercontinental nuclear deterrent. The Cox Committee Report states that the JL-2 will have range that 'would allow a significant change in the operation and tactics of the PRC's nuclear-powered ballistic missile submarines. Instead of venturing into the open ocean to attack the United States, the Type 094-class submarines could remain near PRC waters, protected by the PLA Navy and Air Force'.<sup>64</sup> Key issues include how many *Jin*-class SSBNs China will build, which will influence deterrence patrol patterns, and the range of the JL-2, which will influence patrol locations. China's plans for coping with the C2 and use control challenges associated with the deployment of a sea-based deterrent force also bear close scrutiny.

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Western Media Cover China's Next Generation Nuclear Submarine], 国际展望 [World Outlook] 448 (Aug. 2002), 22; 赵楚 [Zhao Chu], '与中国核潜艇之父面对面: 揭开共和国军备发展史上最神秘一页; 本刊副主编独家专访我国第一代核潜艇总设计师彭士禄院士' [Face to Face with the Father of China's Nuclear Submarine: Revealing the Most Mysterious Page in the History of the Republic's Weapons Development; This Journal's Deputy Chief Editor's Exclusive Interview With Peng Shilu, Chief Designer of China's First Generation Nuclear Submarine], 国际展望 [World Outlook] Issue 448, No.15 (Aug. 2002), 18-9; 长风 [Zhang Feng], 核潜艇与中国海军 [Nuclear Submarines and China's Navy], 舰船知识 [Naval & Merchant Ships] (Mar. 2005), 12; 吴毅平, 刘江平 [Wu Yiping and Liu Jiangping], 多面杀手——现代核潜艇 [Multi-Faceted Assassin – The Modern Nuclear Submarine], 当代海军 [Modern Navy] 5 (2002), 27; 沈游 [Shen You], 新世纪潜艇创新发展前瞻 [Looking Ahead at the New Century's Nuclear Submarine Development and Innovation], 现代舰船 [Modern Ships] 5 (2005), 15-6; '中国海上威慑: 将进入一个崭新时代——093型、094型核潜艇最新消息' [China's At Sea Deterrent: Entering a Brand New Era – The Latest Information on China's Type 093 and 094 Submarines], 军事纵横 [Military Overview] 101 (2003), 53.

<sup>61</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China* 2007, 3.

<sup>62</sup>'Seapower Questions on the Chinese Submarine Force', US Navy, Office of Naval Intelligence, 20 Dec. 2006, <[www.fas.org/nuke/guide/china/ONI2006.pdf](http://www.fas.org/nuke/guide/china/ONI2006.pdf)>.

<sup>63</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China* 2007, 42.

<sup>64</sup>Cox Report, 187.

Beyond moving toward more survivable systems and enhancing striking power, China is also responding actively to the development and deployment of the US missile defense system. Chinese strategists recognize that an effective deterrence posture requires not only that the PLA's strategic missiles must be able to survive a conventional or nuclear first strike, but also demands that they must be able to penetrate, overwhelm, or otherwise neutralize US missile defense systems. Chinese analysts view US pursuit of a missile defense system as a particularly serious threat to the viability of China's nuclear deterrent. According to Wang Zhongchun, 'Once the system is completed, the United States will obtain a strategic deterrent force with both offensive and defensive capabilities, which could pose serious challenges to the limited nuclear deterrent capabilities of medium-sized nuclear countries.'<sup>65</sup>

The People's Republic could deploy a wide variety of counter-measures to enhance its nuclear weapons' post-launch survivability.<sup>66</sup> Countermeasures Chinese scientists and engineers have discussed in open publications include decoys, maneuvering warheads, multiple warhead systems, 'enveloping balls', and preemptive strikes.<sup>67</sup> Penetration aids have been, and will likely continue to be, a focus of PRC anti-ballistic missile defense (BMD) efforts. According to three Chinese experts, penetration aids 'are inexpensive and they have a low political cost. Further, it is technically unlikely that a US defense system would ever work so well that it could sort out penetration aids from warheads. That would ensure that China's retaliatory force would remain viable.'<sup>68</sup>

<sup>65</sup>Wang Zhongchun, 61.

<sup>66</sup>Counter-intercept measures [反拦截], which are designed to prevent interceptor target engagement, include multiple warheads placed on MRVs or MIRVs, MaRVs, and the hardening and/or spinning of ballistic missiles. Spinning and rolling (spinning off center) ballistic missiles makes a specific portion of the missile more difficult to target, a process that is particularly relevant to lasers that may need to focus on an object for several seconds in order to destroy it. Laser cladding involves the use of protective coatings in order to harden missile exteriors against laser beams. Lasers are also vulnerable to smoke, which can be emitted from a canister on the missile itself. See Stokes, 'Chinese Ballistic Missile Forces', 132, 134.

<sup>67</sup>For example, see He Linshu and Wang Shuhe, 针对 NMD 的几种可能的突防措施 [Several Possible Penetration Measures to Counter the NMD System], 导弹与航天运载技术 [Missiles and Space Vehicles] 257 (2002), 23–6.

<sup>68</sup>See Li Bin, Zhou Baogen, and Liu Zhiwei, 'China Will Have to Respond', *Bulletin of the Atomic Scientists* 57/6 (Nov./Dec. 2001), 25–8.



China has already begun to develop and test decoys,<sup>69</sup> various combinations of which could complicate US intercept.<sup>70</sup> As Li Bin states, 'Decoy technology is not too complicated for China. This means that the deployment of decoys is a much more efficient and simple way than MIRVs for China to defeat the NMD [National Missile Defense] system.'<sup>71</sup> Previous Chinese missile flight tests have apparently employed a variety of penetration aids, including various types of decoys.<sup>72</sup>

Other post-launch countermeasures include trajectory manipulation and infrared stealth.<sup>73</sup> Trajectory manipulation includes depressed trajectory [压低轨道] and [高弹道] lofted trajectory.<sup>74</sup> Chinese testing and modeling indicates that the trajectory of the DF-31 ICBM could be depressed from its nominal apogee of 330 miles to 60 miles, albeit with a significant loss in range.<sup>75</sup> Lofted trajectory involves increasing apex altitude to increase reentry speed. Infrared stealth 'can be implemented

<sup>69</sup>Of two major decoy variants, the simpler saturation decoys [诱饵] (such as balloons) are designed to overwhelm mid-course or terminal defenses. Deception decoys [饱和] (such as fast-burn motors [速燃助推器] and boost-phase maneuvering) are designed to evade interceptor vehicles by complicating prediction of their flight trajectory. See Stokes, 'Chinese Ballistic Missile Forces', 132. Decoys can mimic the warhead's visual appearance or infrared signature. They can utilize active electronic countermeasures, such as by emitting an electronic radar-jamming signal. They can even physically protect the warhead from an interceptor. Exo-atmospheric decoys accompany the warhead during midcourse, but their light weight makes them separate upon reentry. Endo-atmospheric decoys reenter the atmosphere with the warhead.

<sup>70</sup>Chinese ICBMs could be designed to discharge 'chaff just prior to releasing decoys and warheads – to prevent radars from seeing what happens during the release – or by [developing] a more sophisticated release mechanism that makes decoys and warheads indistinguishable even at the moment of separation from the bus. It is for these reasons that the decoy problem is acute, and possibly not solvable for the foreseeable future, in the case of midcourse defenses.' See James M. Lindsay and Michael E. O'Hanlon, *Defending America: The Case for Limited National Missile Defense* (Washington DC: Brookings Institution Press 2002), 47.

<sup>71</sup>See Li Bin, 'The Impact of US NMD', 9.

<sup>72</sup>See Andrew M. Sessler et al., 'Countermeasures', 37; 'DF-31', <[www.globalsecurity.org/wmd/world/china/df-31.htm](http://www.globalsecurity.org/wmd/world/china/df-31.htm)>; Robert S. Norris and Hans M. Kristensen, 'Chinese Nuclear Forces, 2003', *Bulletin of the Atomic Scientists* 59/6 (Nov./Dec. 2003), <[www.thebulletin.org/article\\_nn.php?art\\_ofn=nd03norris](http://www.thebulletin.org/article_nn.php?art_ofn=nd03norris)>.

<sup>73</sup>Cold launch, also known as 'ejection', or 'soft launch' is a means of reducing the infrared signature of a missile by propelling it out of the silo using compressed air or other gas before actual engine ignition.

<sup>74</sup>Depressed trajectory involves flattening the arc of a missile from the normal apex of 1,200 miles to as low as 60 miles in order to minimize its time outside the atmosphere and its consequent exposure to space-based and mid-course defenses.

<sup>75</sup>See Stokes, 'Chinese Ballistic Missile Forces', 135.

by several means, such as using low-emissivity coatings or a cooled shroud'.<sup>76</sup> Fast burning motors shorten the duration of boost phase, which compresses detection and reaction times, thereby complicating intercept efforts. Aside from the challenges of fast burning motors, a boost-phase system would also have extreme difficulty in defending 'against missiles launched from large countries such as...China' because of the difficulty of getting American interceptor platforms sufficiently close to launch sites in the continental power's massive interior.<sup>77</sup>

China might also consider targeting the US BMD system's structure directly, through ASAT attacks, direct attack on ground-based radars, and indirect electronic attack on elements of the supporting C4ISR infrastructure. The PRC has conducted extensive research concerning US military satellites and ASAT weapons. It could exploit a variety of options to defeat space-based interceptors (e.g. a space-based laser, SBL), such as pellet clouds, ground-based rockets, direct ascent nuclear ASATs, or space mines.<sup>78</sup> According to PRC countermeasures expert He Linshu, 'using a "suicide satellite" [寄生星]...to destroy both SBIRS-high and SBIRS-low on the NMD system would paralyze its early warning and surveillance capabilities. Then preemptive attacks can be launched at each component of the defense system'.<sup>79</sup>

Electromagnetic pulse (EMP) weapons could disable US radars. Active electronic countermeasures include the use of devices to jam US X-Band and upgraded early-warning (UEWR) radar systems. US BMD ground stations are themselves vulnerable to attack. China's growing submarine force may permit it to use SLBMs and submarine-launched cruise missiles (SLCMs), against US radars and support facilities. China is making a concerted effort to develop the *Chang Feng* and *Hong Niao* series land-attack cruise missiles (LACMs).<sup>80</sup> Even the best BMD system is incapable of defending US land targets against SLCMs and LACMs. A Chinese source argues for the potential of such weapons and

<sup>76</sup>See He and Qiu, 'THAAD', 177.

<sup>77</sup>See Sessler *et al.*, 'Countermeasures', 117.

<sup>78</sup>See Richard L. Garwin, 'Holes in the Missile Shield', *Scientific American* (Nov. 2004),

<sup>79</sup>See He Linshu and Wang Shuhe, '针对 NMD 几种可能的突防措施' [Several Possible Penetration Measures to Counter the NMD System], *导弹与航天运载技术* [Missiles & Space Vehicles] 257/3 (2002), 23–6.

<sup>80</sup>See Huang Dong, 'China Succeeds in Test-Firing Hongniao Cruise Missile,' *广角镜* [Wide Angle] 384 (16 Sept. 2004), 55, OSC # CPP20040920000029.

adds that 'special forces may be trained to effectively infiltrate and destroy the stations'.<sup>81</sup>

Another counter-MD option that cannot be ruled out is a large-scale increase in the size of China's strategic nuclear force. Chinese analyst Shen Dingli projects that a ninefold increase in Chinese ICBMs capable of hitting US targets would defeat even a BMD system with a 90 percent interception rate at the manageable cost of several billion dollars over one or two decades.<sup>82</sup> According to Li Bin:

Although the costs could be large, the buildup option cannot be ruled out. The reason for this is that the buildup option is so mathematically simple to understand and so certain to work. So, in the Chinese debate this idea would easily win some support from non-technical people. Another advantage is that the buildup would be visible to the outside and would therefore help discourage any first strike against China.<sup>83</sup>

Moreover, a large-scale Chinese missile buildup would facilitate, among other things, potential wartime launch of strikes incorporating the use of different types of missiles in 'synchronized launches from a wide range of azimuths in order to stress active missile defenses and associated battle management systems'.<sup>84</sup>

Important force structure improvements are also under way at the theater conventional level. China is developing conventionally armed ballistic missiles to bolster its regional strike and 'anti-access' capabilities. Potential missions for these new systems include attacks against land-based targets and aircraft carriers. China is also improving the command and control, communications, and intelligence, surveillance and reconnaissance (ISR) capabilities required to successfully execute ballistic missile strikes against such targets and 'is currently developing a number of new mobile conventional medium-range systems'.<sup>85</sup> The US Director of National Intelligence stated in

<sup>81</sup>Chen Xuejun and Lang Daqiang, 'GPS 反制之道' [Methods for Defeating GPS], *军事文摘* [Military Digest] (Nov. 2004), 52–3, OSC# CPP20041109000197.

<sup>82</sup>See Kori Urayama, 'China Debates Missile Defence', *Survival* 46/2 (Summer 2004), 132.

<sup>83</sup>See Li Bin, 'The Impact of US NMD', 9.

<sup>84</sup>See Stokes, 'Chinese Ballistic Missile Forces', 115.

<sup>85</sup>Lt. Gen. Michael D. Maples, US Army, Director, Defense Intelligence Agency, 'Current and Projected National Security Threats to the United States', Unclassified Statement for the Record, Senate Armed Services Committee, 27 Feb. 2007, 16.

February 2007 that China is 'developing more capable long-range conventional strike systems and short- and medium-range ballistic missiles with terminally guided maneuverable warheads able to attack US carriers and airbases'.<sup>86</sup>

Force modernization trends and non-official Chinese publications suggest that developing the capabilities required to conduct ballistic missile attacks against surface ships such as aircraft carriers (e.g., using the DF-21 with its 500–600 kg warhead<sup>87</sup>) is an especially high priority for the PLA. 'China is equipping theater ballistic missiles with maneuvering reentry vehicles (MaRVs) with radar or IR seekers to provide the accuracy necessary to attack a ship at sea', according to a recent unclassified ONI assessment.<sup>88</sup> According to the Department of Defense's 2007 report on Chinese military power: 'One area of apparent investment emphasis involves a combination of medium range ballistic missiles, C4ISR for geo-location of targets, and onboard guidance systems for terminal homing to strike surface ships on the high seas or their onshore support infrastructure.'<sup>89</sup> If supplied with accurate real-time target data, from China's growing family of terrestrial and space-based sensors, terminal seekers and maneuvering warheads might enable Chinese ballistic missiles to complicate or negate US BMD efforts to hold such targets at risk.<sup>90</sup> If viable, they would be extraordinarily difficult to defend against.

Taken as a whole, these changes will offer China new capabilities at the strategic and theater nuclear levels and new options at the regional conventional warfighting level. First, the changes underway at the strategic level are giving China, perhaps for the first time, a highly survivable strategic nuclear force. In contrast to the assessment by Lieber and Press of the vulnerability of China's silo-based strategic missiles, Chinese strategists appear to believe that some silo-based missiles would likely survive a first strike. Deterrence works at least in part because the United States could not be completely confident in its ability to locate all of the silo-based ICBMs. As Li Bin points out,

<sup>86</sup>J. Michael McConnell, Director of National Intelligence, 'Annual Threat Assessment of the Director of National Intelligence for the Senate Armed Services Committee', Unclassified Statement for the Record, 27 Feb. 2007, 15.

<sup>87</sup>Robert Hewson, 'Dragon's Teeth – Chinese Missiles Raise Their Game', *Jane's Navy International*, 1 Jan. 2007, Jane's Information Group, <www.janes.com>.

<sup>88</sup>'Seapower Questions on the Chinese Submarine Force', US Navy, Office of Naval Intelligence, 20 Dec. 2006, <www.fas.org/nuke/guide/china/ONI2006.pdf>.

<sup>89</sup>*Ibid.*, 16.

<sup>90</sup>See, for example, Rear Adm. Eric A. McVadon, US Navy (Ret.), 'China's Maturing Navy', *Naval War College Review* 59/2 (Spring 2006), <http://www.nwc.navy.mil/press/Review/2006/spring/art4-sp06.htm>.

'because China has never confirmed nor denied any outside estimates about the size of its long-range nuclear force, it is difficult for the US to rule out some errors in its estimate'.<sup>91</sup> According to Li Bin, 'Technically speaking, it is a relatively simple countermeasure for China to conceal a few actual ICBMs and to deploy decoy missiles given the large size of Chinese territory.'<sup>92</sup> Chinese strategists have even better reasons to doubt that potential adversaries would be able to locate and destroy the Second Artillery's new road-mobile nuclear forces. Indeed, the difficulties the US has encountered in its previous efforts to locate and destroy elusive ground targets, most notably the 'Scud-hunting' campaign in the 1991 war with Iraq, suggest that it would be very difficult to locate and strike China's road-mobile missiles.<sup>93</sup> Moreover, these largely unsuccessful attempts to neutralize mobile targets took place under circumstances far less challenging than those the US would likely encounter in a conflict with China.

These force structure developments are also giving the PRC options to threaten to use or perhaps actually employ nuclear weapons below the strategic level. Indeed, the communist state may now have access to several rungs on the escalatory ladder that it previously lacked.<sup>94</sup> While there is only limited open information regarding China's development of sub-strategic nuclear weapon systems, the PLA now has possession of both appropriate dual-capable weapon systems and the technological capacity to research, develop, and introduce suitable nuclear warheads into such systems. It is not without precedent for the PLA to link technological nuclear warhead development to operational needs. According to Zhao Qizheng, director of the State Council Information Office, China 'mastered' neutron bomb technology in the 1970s and 1980s,<sup>95</sup> and this admission is generally believed in the academic

<sup>91</sup>Li Bin, 'The Impact of US NMD', 2.

<sup>92</sup>Li Bin, 'Paper Tiger with Whitened Teeth,' *China Security* (Autumn 2006), 81.

<sup>93</sup>Alan Vick, Richard Moore, Bruce Pirnie, and John Stillion, *Aerospace Operations Against Elusive Ground Targets* (Santa Monica, CA: RAND 2001); William Rosenau, *Special Operations Forces and Elusive Enemy Ground Targets: Lessons from Vietnam and the Persian Gulf War* (Santa Monica, CA: RAND 2001).

<sup>94</sup>By 'access' what is implied is both the technical capability to produce relatively small nuclear warheads and, separately, a force structure that includes tactical weapon systems particularly well-suited to a dual capability (such as cruise missiles). What is not implied is the intent to actually couple these two elements.

<sup>95</sup>Tsao Kuo-chung, 'Mainland Can Attack Taiwan with Miniaturized Nuclear Warheads', *Tai Yang Pao*, 19 Jul. 1999, p. A19, OSC# FTS19990719000258; 'Cox Report Hurts Sino-US Relations', *China Daily*, 9 Aug. 1999, <<http://app1.chinadaily.com.cn/static/reportchina/990809/politics.htm>>.

community. The only reasonable rationale, however, for such an early development of an advanced warhead would have been halting Soviet troops and armor in a potential invasion. The PLA faces similarly severe operational challenges today when viewing the potential of armed conflict against US forces.

Recent Chinese publications have advocated expanding the traditionally limited scope of China's nuclear forces. Zhao Xijun, Deputy Commander of the Second Artillery Corps in 1996–2003, states, 'one should have not only strategic nuclear forces but also campaign and tactical nuclear forces, and have not only ground-based strategic nuclear forces but also sea-based and air-based strategic nuclear forces'.<sup>96</sup> Given these assertions and the PLA's rapid development of suitable weapon systems (e.g., variously-launched cruise missiles, ASATs, and torpedoes), it is possible that China is also actively pursuing the development of tactical nuclear weapons in order to ensure the credibility of its deterrent posture at all levels of war. In fact, Zhao mentions that the missiles of the tactical missile force already 'can carry a nuclear warhead or a special warhead according to the needs of the task and strike targets'.<sup>97</sup>

Finally, development of conventional MRBMs for regional strike missions and a mobile KKV ASAT weapon may also afford Beijing the opportunity to achieve strategic effects without resort to the use of nuclear weapons, although some of these options – such as strikes against regional airbases, aircraft carriers, and especially satellites – would create serious risks of horizontal and vertical escalation in a conventional conflict.

### **Chinese Conventional and Nuclear Missile Force Training: From the 'Boudoir' to the Battlefield**

The PLA attaches increasing emphasis to improved training to help prepare for modern, high-intensity, information-centric conflicts, as directed by President Hu Jintao in his speech to the 2006 All Army Training Conference. Hu highlighted the importance of making training more realistic, shifting from 'military training under mechanized conditions' to 'military training under informatized conditions' as

<sup>96</sup>Zhao Xijun (ed.), *Coercive Deterrence Warfare: A Comprehensive Discussion on Missile Deterrence* (Beijing: National Defense UP May 2005), 160. See also 于际训 [Yu Jixun], 中国人民解放军第二炮兵 [People's Liberation Army Second Artillery Corps], 第二炮兵战役学 [The Science of Second Artillery Campaigns] (Beijing: 解放军出版社 [PLA Press] 2004).

<sup>97</sup>Zhao, 17.

well as strengthening joint training.<sup>98</sup> The PLA General Staff Department's 2007 Training Guidelines, which were highlighted in the 12 January 2007 edition of *Liberation Army Daily*, also reflect this growing emphasis on enhanced training to better prepare the PLA for the challenges it would face in a high-intensity, information-centric conflict against a technologically advanced adversary like the United States.<sup>99</sup> Most importantly, the 2007 GSD Training Guidelines designate 'promoting the transformation from military training under mechanized conditions to military training under informatized conditions' as the main theme governing military training. Although many of the training documents issued over the last few years mentioned the importance of training under 'informatized conditions', they did not identify it as the main theme that should guide training.<sup>100</sup> This stronger emphasis on training under informatized conditions in the 2007 GSD training guidelines echoes the military training section in China's 2006 defense white paper, which states that the PLA is taking 'vigorous steps to accelerate the transition from military training under conditions of mechanization to military training under conditions of informationization'.<sup>101</sup>

Beyond elevating the transformation to training under informatized conditions to 'main theme' status, the latest training guidelines underscore the PLA's determination to increase the realism of military training, incorporate opposing forces into exercises, conduct more sophisticated joint and integrated training, and prepare to operate in a 'complex electromagnetic environment' [复杂电磁环境]. The guidelines also discuss improving the skills of commanders and their staffs through various types of exercises. In addition, the 2007 training

<sup>98</sup>Wang Siwei and Zhang Yanzhong, '四总部分别传达学习胡主席在全军军事训练会议上的重要讲话精神' [Four PLA General Departments Hold Respective Meetings to Convey and Study the Gist of CMC Chairman Hu Jintao's Important Speech Delivered at All-Army Conference on Military Training], *解放军报* (Liberation Army Daily), 1 Jul. 2006, 3.

<sup>99</sup>Liu Chujiang and Liu Xing'an, '总参部署新年度军事训练工作强调积极推进军事训练向信息化条件下转变' [General Staff Department Issues New Year Military Training Work Guidelines and Emphasizes Promoting the Transformation to Military Training Under Informatized Conditions], *解放军报* (Liberation Army Daily), 12 Jan. 2007, 1.

<sup>100</sup>For example, the GSD's 2006 training guidelines stated that the main tasks for training were using more realistic combat scenarios, standardizing training across the PLA, and studying improving integrated training. See Yang Huicheng and Liu Xingan: 'GSH Makes Arrangements for Military Training in 2006', *Liberation Army Daily*, 18 Jan. 2006.

<sup>101</sup>State Council Information Office, *China's National Defense in 2006* (Beijing: PRC Dec. 2006), <[http://english.people.com.cn/whitepaper/defense2006/defense2006\(4\).html](http://english.people.com.cn/whitepaper/defense2006/defense2006(4).html)>.

guidelines underscore the importance of standardizing examination procedures and making the evaluation of military training more stringent.

This emphasis on enhancing training is much more than rhetorical flourish. Indeed, the PLA has implemented a series of training reforms and many units are engaging in much more frequent, realistic, and challenging training. Moreover, as part of its training reforms, the PLA is beginning to employ more rigorous standards of evaluation to improve the quality and effectiveness of training. The PLA is also conducting more joint service exercises as part of its training reforms. In recent years, the PLA has conducted numerous multi-service exercises, providing considerable opportunities to improve its familiarity with the conduct of joint operations and joint C2. For example, the PLA conducted a joint exercise that featured two ground force divisions, PLA Air Force (PLAAF) assets, and Second Artillery units.<sup>102</sup>

Chinese military media reports suggest that Second Artillery training is also growing in realism and complexity. In particular, as part of the PLA's broader program of training reforms, the Second Artillery is making progress in areas such as training under more realistic combat conditions, incorporating 'blue forces', electronic warfare, nighttime training, air defense and counter-ISR tactics, and more rigorous training evaluations. This represents significant progress. As one *PLA Daily* article acknowledges: 'In the past, strategic missiles with their concentration of science and technology and their expense to manufacture were treated like pampered ladies who seldom emerged from their boudoirs.'<sup>103</sup> While this once may have been true, it is clearly no longer the case.

This is in keeping with a theme that has been given a considerable amount of attention in recent years, particularly in the 2007 GSD guidelines, which indicate that training scenarios must approximate actual combat conditions as much as possible.<sup>104</sup> The Second Artillery 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. For example, some recent exercises have simulated loss of communications links, forcing units to

<sup>102</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, 24.

<sup>103</sup>Wang Yongxiao and Li Yongfei, 'Second Artillery Base Achieves New Leap in Missile Strike Capability Under Complex Conditions', *解放军报* [Liberation Army Daily], 21 Sept. 2006, 1, OSC# CPP20060921710009.

<sup>104</sup>The PRC's 2006 Defense White Paper also emphasizes the importance of training under realistic circumstances, which helps to 'temper troops in a near-real war environment'.



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. Second Artillery units frequently conduct opposing force exercises as part of this drive to train under more realistic and challenging conditions. The 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.<sup>105</sup>

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. According to a June 2006 *PLA Daily* article, 'The objective of this type of training is to break free of the formulaic training exercise patterns of the past...and temper the ability of the commander and his staff to assess the enemy situation, plan independently, and change their plans as needed.'<sup>106</sup> Along these lines, Second Artillery units have practiced moving to alternate launch sites and erecting temporary launch pads when primary launch positions are 'destroyed' during exercises.<sup>107</sup>

Since the late 1990s, Second Artillery training has also emphasized inter-theater deployments, which entail considerable operational and logistical challenges. According to one official PLA media report, 'starting at the end of the last century, China's strategic missile force has gone all-out with inter-theater training, and one after another, crack missile units have been rushing to areas far away'.<sup>108</sup> The same report emphasizes that long-distance, inter-theater movement repre-

<sup>105</sup>Opposing force training refers to exercises in which some specially trained troops play the role of enemy units. Such exercises are common practice in most modern militaries. In the US military, the 'red force' represents a potential adversary. In China, however, the PLA is the 'red force' and the opposing force is the 'blue force'.

<sup>106</sup>Pan Li and Wang Yongxiao, '走进中国战略导弹部队来自第二炮兵部队训练场的报告' [Visiting China's Strategic Missile Force: Report from the Training Ground of the Second Artillery], *解放军报* [Liberation Army Daily], 28 Jun. 2006, 3.

<sup>107</sup>Yu Juncheng, '临时发射场即刻建成' [Temporary Launch Pad Established Immediately], *火箭兵报* [Rocket Forces News], 20 May 2006, 1.

<sup>108</sup>Pan and Wang, 3.

sents 'a test of a unit's ability to maneuver, as well as a test of its combat capabilities'.<sup>109</sup> Chinese military media reports indicate that Second Artillery units are also conducting nighttime maneuver training.<sup>110</sup>

The Second Artillery has also practiced a variety of techniques to counter enemy ISR, precision strike, jamming, and electronic warfare attacks.<sup>111</sup> In keeping with the emphasis on training in a 'complex electromagnetic environment' contained in the most recent GSD training guidelines, this is intended to improve the PLA's ability to operate in an electronic warfare environment, and to allow military units to practice various types of counter-reconnaissance, electronic warfare, and counter-EW techniques. The Second Artillery has followed these guidelines by conducting exercises that emphasize electronic warfare training, according to recent Chinese military media reports.<sup>112</sup> 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 Second Artillery is conducting exercises that test its ability to employ increasingly sophisticated decoys and camouflage methods to counter adversary airborne and space-based intelligence, surveillance, and reconnaissance capabilities, including optical, infrared, and radar imagery systems.<sup>113</sup>

The PLA has also conducted numerous multi-service exercises in recent years, providing considerable opportunities for the Second Artillery to improve its experience with the conduct of joint operations

<sup>109</sup>Ibid.

<sup>110</sup>Ma Zhongbo, '全员全装全要素, 多路多向多课题: 某旅每月一次锤炼机动作战' [All-Personnel, All-Equipment, and All-Element Exercise Involving Multiple Approaches, Directions, and Subjects: A Certain Brigade Conduct Monthly War Preparedness Maneuver Training to Strengthen its Mobile Combat Proficiency], 火箭兵报 [Rocket Forces News], 1 Aug. 2006, 2.

<sup>111</sup>Ministry of National Defense, ROC, 2004 *National Defense Report, Republic of China* (Taipei, Taiwan: Government Information Office 2005), 32.

<sup>112</sup>'二炮红蓝军对抗演习重点演练复杂电磁环境' [Second Artillery Red-Blue Force Confrontational Exercise Emphasizes Training in a Complex Electromagnetic Environment], 解放军报 [Liberation Army Daily], 26 Aug. 2006.

<sup>113</sup>Wang Tie and Wu Yanbing, '全军伪装专业组副组长王向伟: 我的事业就是弄虚作假' [All-Army Camouflage Specialty Group Deputy Head Wang Xiangwei: My Profession is 'Fraud and Deception'], 中国青年 [China Youth], 1 Oct. 2003, 24–6. This article also provides a profile of Wang Xiangwei, who is the deputy head of the PLA's All-Army Camouflage Specialty Group and Deputy Director of an office at a Second Artillery research institute in Beijing, where he specializes in camouflage and concealment of missile systems and Second Artillery installations.

and joint command and control.<sup>114</sup> For example, in summer 2006, the PLA conducted the 'North Sword-07' exercise, in which Second Artillery units operated alongside two ground force divisions, PLAAF units, and People's Armed Police troops.<sup>115</sup>

The Second Artillery is also making greater use of simulations, computer wargames, and command post exercises to improve the planning and decisionmaking skills of commanders and their staffs. These are relatively low-cost techniques that allow officers and soldiers to accumulate valuable experience at lower expense and risk than live-fire exercises.<sup>116</sup> The Second Artillery has been employing simulators to prepare its forces to operate developmental missile systems before they are deployed. This is in keeping with PLA-wide guidance that it is 'better to have trained personnel waiting for equipment than to have equipment waiting for trained personnel' [宁让人才等装备, 不让装备等人才].<sup>117</sup>

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 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. For its part, the Second Artillery has issued a series of regulations intended to standardize training practices and promulgated a new 'Outline for Military Training and Evaluation' [军事训练与考核大纲] to promote more robust testing and evaluation of nuclear and conventional missile force units.<sup>118</sup> Chinese

<sup>114</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2006*, 16.

<sup>115</sup>Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People's Republic of China 2007*, May 2007, 24. The exercise scenario involved long-distance maneuver, intelligence collection, and mobile counter-attack operations, according to the Dept. of Defense report.

<sup>116</sup>Dennis J. Blasko, Philip T. Klapakis, and John F. Corbett Jr, 'Training Tomorrow's PLA: A Mixed Bag of Tricks', in David Shambaugh and Richard H. Yang (eds.), *China's Military in Transition* (Oxford: OUP 1997), 224–60.

<sup>117</sup>'解放军新导弹试验成功 开始装备战略导弹部队' [PLA's New Missile Tested Successfully and Begins to Equip Strategic Rocket Forces], 解放军报 [Liberation Army Daily], 16 Oct. 2006, <<http://9link.116.com.cn/node/7399>>.

<sup>118</sup>Zhang Ligang, He Tianjin, and Kang Fashun, '第二炮兵军事训练会议在某基地召开' [Second Artillery Military Training Conference Held at a Certain Base], 火箭兵报 [Rocket Forces News], 15 Aug. 2006, 1.

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.

The picture is somewhat less clear when it comes to PLA Navy training for sea-based nuclear deterrence missions. Indeed, a critical question concerning the reliability of China's sea-based deterrent concerns the training of its SSBN force. Based on photos and anecdotal evidence, Chinese submarines go to sea frequently, if not usually for extended periods. A brief report by Federation of American Scientists contends that China's 'submarine crews have very little operational experience and therefore presumably limited skills in operating their boats safely and competently.... the tactical skills that would make the Chinese submarine force effective in a war are limited'. This conclusion is based on US Navy data that the 'entire Chinese submarine fleet conducts less than three patrols per year on average' and 'only two patrols in 2006'. However, as the report itself acknowledges, 'interpretation of the data comes with a great deal of uncertainty' because the term 'patrol' is not defined. If a patrol is defined as being of significant duration (e.g., 45 days or longer), then 20-day trips would not count as patrols, yet considerable training could be done during that time, or in at-sea periods of even shorter duration (as opposed to mere one-day trips).<sup>119</sup> Moreover, indications are emerging of significant efforts to improve submarine training.<sup>120</sup> China's submarine force, prioritized for development, seems set to range ever further afield. According to ONI, 'the growing technological capabilities of the PLA(N) submarine force and China's evolving maritime strategy, which calls for an operational capability beyond the littoral in support of an anti-access mission, create the conditions for Beijing to opt for an increased submarine presence in the Western Pacific Ocean east of the Ryukyu Island chain.'<sup>121</sup>

<sup>119</sup>See Hans Kristensen, 'China's Submarine Fleet Continues Low Patrol Rate', Federation of American Scientists, Strategic Security Blog, 6 Feb. 2007, <<http://www.fas.org/blog/ssp/2007/02/>>.

<sup>120</sup>See, for example, 'An East Sea Fleet Submarine Detachment Establishes a Forum to Discuss Training Problems and Solutions', *Liberation Army Daily*, 16 Jul. 2007.

<sup>121</sup>Scott Bray, 'Seapower Questions on the Chinese Submarine Force', US Navy, Office of Naval Intelligence, 20 Dec. 2006, <<http://www.fas.org/nuke/guide/china/ONI2006.pdf>>.

**China's Evolving Nuclear Doctrine: Beyond 'Minimal Deterrence'**

As significant as the wholesale changes in force structure and training are, indications that PRC nuclear doctrine and weapon employment policy may also be changing are potentially even more important. While much remains similar to what is known of historical Chinese nuclear doctrine, particularly as this relates to assured second-strike operations, there seems to be an evolution in thinking regarding the use of tactical nuclear weapons, particularly in a non-retaliatory manner. In doctrinal discussions of the nuclear counterstrike campaign, the prerequisites, elements, goals, and targets all seem quite in accord with historical doctrine. The principal prerequisite, of course, derives from the no-first-use (NFU) policy: 'According to China's principled position of "no-first-use of nuclear weapons", the nuclear counterattack campaign of the Second Artillery will be conducted under the circumstances when an enemy has launched a nuclear attack on us.'<sup>122</sup> The campaign elements of centralized command at the highest level, rapid response, dedicated protection of strategic assets, and key point targeting all also fit well into China's legacy doctrine.<sup>123</sup> While the element of 'rapid response' has the appearance of being a newer feature of the PRC's assured second-strike doctrine, in reality it only reflects the qualitative change in the composition of the force, which itself is a response to enhance survivability in the face of modern precision warfare. Additionally, the goals and targets of the nuclear counterattack campaign do not seem to have deviated much from historical values, driven by the guiding objective 'to implement a nuclear counterattack on the enemy's important strategic and campaign objectives, set back the enemy's strategic intention, shake the enemy's willpower of war, paralyze the enemy's command system, delay the combat movement of the enemy, weaken the enemy's war potential, and contain the escalation of nuclear war'.<sup>124</sup> Thus, while most of the doctrinal details that have recently come to light may not have been well understood by Western analysts, nothing in the assured second-strike doctrine has the flavor of representing a novel discontinuity with past doctrine. Assured second-strike retaliation, as a doctrine, seems to have followed a logical evolution along the lines required in going from a small, silo-based, relatively static intercontinental force to a larger, more survivable mobile one.

<sup>122</sup>Wang Houqing *et al.*, 战役学 [The Science of Campaigns] (Beijing: National Defense UP 2000), 334.

<sup>123</sup>*Ibid.*, 335–6.

<sup>124</sup>薛兴林 [Bi Xinglin] (ed.), 战役理论学习指南 [Campaign Theory Study Guide] (Beijing: 国防大学出版社 [National Defense UP] 2002), 384.

Where the groundwork is possibly being prepared for making substantive modifications to historical PRC nuclear doctrine and nuclear use policy is in the areas of tactical and theater nuclear warfare and the provisos being proposed against NFU. In his recent, extensive treatment of the subject, Zhao Xijun states, much in agreement with established doctrine, that the goal of China's deterrent missile force is to 'shake the enemy psychologically, vacillate the enemy's war volition, weaken the enemy commander's operational determination, disturb the enemy psyche and public psyche, and achieve [the objective of] "conquering without fighting"'.<sup>125</sup> Additionally, however, Zhao states, 'the goal of wartime deterrence is to prevent conventional war from escalating into nuclear war, and to prevent low-intensity nuclear war from further escalating'.<sup>126</sup> Thus conceived, credible deterrence imposes stringent requirements on the Chinese nuclear posture, including an adequate force size and composition, survivability, plausible targeting, and highly reliable (and survivable) nuclear command and control. Moreover, Zhao states that a 'flexible application' of deterrence across all levels of war, from the strategic down to the tactical, is 'indispensable [for] effective and credible deterrence'.<sup>127</sup>

Similarly, another Chinese doctrinal publication makes a deliberate distinction between a large-scale nuclear and a small-scale nuclear counterattack campaign.<sup>128</sup> Such a view approaches a limited view of nuclear warfighting (not minimum deterrence),<sup>129</sup> particularly since low-intensity nuclear war and de-escalatory measures are mentioned. Indeed, recent articles in Chinese military journals have discussed a wide variety of nuclear deterrence strategies, with some authors using the term '有效反核威慑' [effective counter-nuclear deterrent] to describe the more capable posture required to make nuclear deterrence effective in a missile defense environment.<sup>130</sup>

In conceiving of warfighting with nuclear assets, a principal impediment for the PLA would be a strict adherence to its oft-repeated

<sup>125</sup>Zhao Xijun, 47.

<sup>126</sup>Ibid.

<sup>127</sup>Ibid., 78.

<sup>128</sup>Bi Xinglin, 384.

<sup>129</sup>Minimum deterrence rests on the general principle of deterrence through punishment, whereas any discussion of 'tactical' nuclear forces implies a warfighting strategy – well beyond threat of punishment.

<sup>130</sup>See, for example, Lt. Col. Li Shaohui and Major Tao Yongqiang, '核威慑的实力基础和策略空间' [The Force Foundations and Strategic Space of Nuclear Deterrence], *军事学术* [Military Art] 6 (2006) 55–7. Both officers were studying at the Second Artillery Command Academy when the article was written.

pledge not to use nuclear weapons first at any time, under any circumstances, and not to use nuclear weapons on non-nuclear nations and regions.<sup>131</sup> However, not only are certain exceptions to this pledge made from time to time in unofficial remarks, but there is currently an intellectual debate in China as to the damage a policy of NFU inflicts on the credibility and effectiveness of deterrence. Some strategists appear to view the NFU policy as an unnecessary self-imposed strategic constraint: 'China should learn how to maintain necessary flexibility without being fettered by responsibilities and obligations at the level of strategic deterrence.'<sup>132</sup> Certainly, the debate within China on 'no first use' is real, with the later generation of officers, diplomats, and scholars leaning significantly farther forward toward modifying or jettisoning such a declaratory policy.<sup>133</sup>

Beyond this ongoing debate, the most recent work from former Deputy Commander of the PLA's Second Artillery Corps Zhao seems to indicate that at least some who influence the debate have already considered at least three scenarios under which Beijing would discard the traditional NFU policy.

*Scenario One: Retaliation for conventional strikes on strategic and/or nuclear targets/facilities.* According to Zhao, 'In a conventional war, when the enemy threatens to implement conventional strikes against one's major strategic targets, such as the nuclear facilities; in order to protect the nuclear facilities, prevent nuclear leakage, and to *arrest the escalation* of conventional war to nuclear war, one should employ nuclear weapons to initiate *active nuclear deterrence* against the enemy.'<sup>134</sup> Zhao is describing here what seems to be a planned, 'retaliatory', de-escalatory first use of nuclear weapons in response to conventional attacks upon particularly sensitive targets.<sup>135</sup> Obviously,

<sup>131</sup>According to China's 1998 National Defense White Paper, for example, 'From the first day it possessed nuclear weapons, China has solemnly declared its determination not to be the first to use such weapons at any time and in any circumstances, and later undertook unconditionally not to use or threaten to use nuclear weapons against non-nuclear-weapon states or nuclear-weapon-free zones.' See *China's National Defense*, Information Office of the State Council, People's Republic of China, 27 Jul. 1998, <[www.china.org.cn/e-white/5/index.htm](http://www.china.org.cn/e-white/5/index.htm)>.

<sup>132</sup>Wang, 'Nuclear Challenges and China's Choices', 62.

<sup>133</sup>Larry M. Wortzel, *China's Nuclear Forces: Operations, Training, Doctrine, Command, Control, and Campaign Planning* (Carlisle, PA: US Army War College 2007).

<sup>134</sup>Zhao, 173 (*italics added*).

<sup>135</sup>While the term 'employ' is used elsewhere in Zhao's work in other contexts, not all of which indicate actual 'use', here it seems to indicate actual explosive use. 'Deterrence operations' is the generic term used throughout his edited work for all types of operations, encompassing the full range of nuclear force activities, from non-use

planned nuclear retaliation for conventional attacks abrogates NFU. Moreover, it is not entirely clear what China would consider a 'major strategic target' or even a 'nuclear facility', thus leaving a disconcerting amount of (presumably deliberate) ambiguity. For example, in a 2006 discussion with a high-ranking PLA officer, one of the authors asked what China's response would be to the US *unwittingly* striking a vital nuclear command and control node. His response was that China would likely begin a nuclear counter-attack of some sort, presumably because it would be interpreted as a first strike on its strategic forces.

*Scenario Two: Crisis-driven declaratory change in nuclear policy.* In Zhao's words, 'The military deterrence of the nuclear guided missile troops is conducted in a state of non-nuclear warfare through propaganda, posturing, shows of force, launch drills, nuclear tests, *lowering of the nuclear threshold*, and other actions.'<sup>136</sup> Specifically, Chinese authors have suggested that Beijing could lower the nuclear threshold to deter intervention in a Taiwan crisis or conflict. According to an author writing in an internal Chinese military journal, 'When we are under the pressure of circumstances to use military force to reunify the motherland's territory, we may even lower the threshold of using nuclear weapons to deter intervention by external enemies.'<sup>137</sup> Strict NFU policy is non-categorical; the threshold for nuclear use is the explosive use of nuclear weapons by an adversary upon one's own sovereign assets or territory. Zhao's inclusion, then, of 'lowering the nuclear threshold' seems to imply that at a certain point in a crisis or conflict, China reserves the right to make various caveats to NFU, thus declaratorily setting the stage for actual first use. Nonetheless, it is possible that Zhao's intent in stating this deterrence method merely corresponds to the analogous lowering of the Defense Condition level in US nuclear operations. This ambiguity requires clarification.

*Scenario Three: Territorial integrity is at stake.* Zhao writes, 'The goal... is to deter the enemy's nuclear threat on us, and show that we have sufficient nuclear retaliation capability to inflict heavy loss on the strong enemy; prevent the strong enemy from implementing medium and higher power conventional strikes on our important strategic targets and nuclear facilities; and to maintain the unity of the nation,

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through use. However, in accordance with the concepts outlined in his work, 'deterrence operations' would have begun long before adversarial strikes upon homeland targets, the point in question here; thus, 'initiating' active nuclear deterrence seems strongly to imply escalation to operations beyond non-use.

<sup>136</sup>Zhao, 88 (*italics added*).

<sup>137</sup>张培敏 [Zhang Peimin], '如何发展战略威慑手段' [How to Develop the Means of Strategic Deterrence], *军事学术* [Military Art] (Feb. 2004), 34.



territorial integrity, and national dignity.’<sup>138</sup> While the first goal stated is the long-standing one of assured retaliation, the second and third clearly imply nuclear first-use ‘retaliation’ in response to a significantly broader set of conditions. Zhao seems to open up the first use possibilities to include conditions where utter military defeat of the PLA is envisioned – in fact, his statement seems to imply that such use may already be part of Chinese planning.

### Implications for the United States

This section addresses the implications for the United States in the areas of the defense of Taiwan, deterrence stability, crisis management, and escalation control. The synergy between force modernization, increasingly advanced training, and China’s evolving nuclear and conventional missile force doctrine is enhancing the capabilities of the Second Artillery Corps in ways that pose serious challenges for the United States. This is especially so with regard to the defense of Taiwan. The Second Artillery’s conventional force modernization is focused on developing the capabilities required to rapidly degrade Taiwan’s defenses and deter, delay, or otherwise complicate US military intervention in a cross-Straits conflict. What has drawn the most attention is the rapid expansion of the Second Artillery’s arsenal of short-range missiles from approximately 30–50 relatively inaccurate SRBMs in the mid-1990s to at least 900 much more accurate and lethal SRBMs today. This quantitative and qualitative improvement represents a severe threat to Taiwan, and also to regional US forces. Indeed, as a result of the rapid growth in numbers and improvements in accuracy, China could paralyze Taiwan’s communication links, command centers, airbases and ports with five waves of strikes in as little as 10 hours, according to Taiwan Ministry of National Defense official Lieutenant Colonel Chen Chang-hua.<sup>139</sup>

Although such an attack would pose serious challenges for Taiwan, active and passive defenses against Chinese missile strikes could enable Taiwan to mitigate the effects of such a bombardment. Nonetheless, this raises serious questions regarding whether Taiwan’s military possesses the capability to hold out in the event of a cross-Straits conflict until the US military could intervene decisively. Perhaps even more important than the increasing number of SRBMs is China’s development of new MRBMs and LACMs, which is enhancing its regional conventional strike capabilities and has the potential to complicate US

<sup>138</sup>Zhao, 42–3.

<sup>139</sup>‘China Now has 784 Missiles Targeting Taiwan: MND’, Central News Agency, 7 Mar. 2006.

intervention in a future cross-Strait crisis or conflict by threatening US air bases in Japan and surface ships operating in the region.

At the strategic level, China's nuclear force modernization is focused on improving survivability to make its nuclear deterrence posture more credible, a task that has taken on increased urgency as a result of growing concerns regarding US nuclear preeminence, missile defense plans and conventional precision strike capabilities. China is moving toward a much more survivable, and thus more credible, strategic nuclear posture with the development of the road-mobile DF-31 and DF-31A ICBMs and the JL-2 SLBM. Indeed, as experts have highlighted, the introduction of road-mobile strategic missiles and SSBNs will allow China to achieve 'a degree of credible minimal deterrence vis-à-vis the continental United States'.<sup>140</sup> The modernization of Chinese nuclear forces and the transition from silo-based to road-mobile nuclear missiles and SSBNs might thus enhance strategic deterrence stability. Indeed, deterrence theory suggests that a more secure second-strike capability should enhance stability by causing both the United States and China to behave much more cautiously. The United States, for its part, should not be tempted to contemplate a preemptive counterforce strike against China's strategic missiles, since US planners and decisionmakers would know that China would still be capable of launching a damaging retaliatory strike against the United States or its allies. At the same time, China's ability to launch a damaging retaliatory blow even after absorbing a preemptive counterforce attack should enable it to avoid becoming trapped in a desperate, 'use it or lose it' situation – one in which the party without a secure second-strike capability would theoretically be tempted to strike first, before an adversary could eliminate its vulnerable nuclear forces.

At the same time, however, there are reasons to be concerned that the transition to a more secure second-strike capability will not necessarily translate immediately or automatically into greater stability. Indeed, it is entirely possible that these developments could in fact decrease crisis stability under certain circumstances, particularly if China's growing nuclear and missile capability tempts Beijing to behave more assertively, the undersea environment becomes a point of uncomfortably close approach between US attack submarines and Chinese SSBNs, changes in force posture or technological developments result in heightened insecurity, or the alerting and de-alerting of strategic forces creates a temporary state of increased vulnerability.

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<sup>140</sup>Gill, Mulvenon, and Stokes, 'The Chinese Second Artillery Corps: From Transition To Credible Deterrence', 512.

Some observers have suggested that a more secure second-strike capability will embolden Beijing to act more aggressively. For example, former Taiwan deputy defense minister Lin Chong-pin predicts that China's road-mobile ICBMs will enable its leaders to adopt a more assertive foreign policy stance. According to Lin, 'China's heightened nuclear status, as perceived by the world, will serve as the backbone of what Beijing has announced to be its "independent foreign policy": increasingly assertive in an emerging, multipolar world.'<sup>141</sup> Some analysts have even speculated that China's more robust nuclear posture could lead to a US-China conflict, possibly by making its leaders overconfident of their ability to achieve intra-war nuclear escalation control, an explicit mission of the Second Artillery,<sup>142</sup> and thereby undermine crisis communication and management. This is true, to a lesser extent, at the conventional level where the Second Artillery is charged with 'conducting missile deterrence operations' to 'contain the enemy's sinister strategic intentions or significant military misadventures' with its 'long-range, precise, fast, and powerful' surface-to-surface missiles, thereby 'profoundly influencing the overall situation of political, diplomatic, and military struggles' at the strategic level.<sup>143</sup> One proponent of this view is Su Tzu-yun, a former adviser to Taiwan's National Security Council. In Su's words, 'With these new tools, the PLA is like a teenager eager to show off and potentially drag China into a military misadventure with the US.'<sup>144</sup> At the same time, however, Beijing would still have good reason for caution, given that it would still be dealing with a vastly more capable nuclear power.

An additional aspect of China's evolving nuclear doctrine that bears careful thought relates to the operation of the new *Jin*-class SSBNs as they come on line. Conventional wisdom holds that the development of

<sup>141</sup>Lin is quoted in Wendell Minnick, 'China Speeds ICBM plans', *Defense News*, 10 Jul. 2006, <[http://cisac.stanford.edu/news/experts\\_judge\\_likely\\_effects\\_of\\_new\\_icbm\\_on\\_chinas\\_nuclear\\_policies\\_20060807/](http://cisac.stanford.edu/news/experts_judge_likely_effects_of_new_icbm_on_chinas_nuclear_policies_20060807/)>. Lin and other analysts have also raised the possibility that China's strengthened nuclear posture – particularly its highly survivable road-mobile ICBMs – will make Washington think twice before intervening in a cross-strait or Sino-Japanese crisis. In Lin's words, 'the DF-31A will throw a monkey wrench into Washington's decision-making process when there is a crisis in the Pacific'.

<sup>142</sup>For a source that lists intra-war escalation control as a Second Artillery mission, see 'Second Artillery Campaign', Ch.14 in 主编 王厚卿, 张兴业 [Lt. Gen. Wang Houqing and Maj. Gen. Zhang Xingye, chief eds.], 战役学 [The Science of Campaigns] (Beijing: 国防大学出版社 [National Defense UP] 2000), 373.

<sup>143</sup>Ibid., 379.

<sup>144</sup>Su is also quoted in Minnick, 'China speeds ICBM plans' 2006. Similarly, Su Tzu-yun assesses that China's growing nuclear capabilities will 'influence decisionmaking within the White House'.

such a secure, second-strike, strategic force increases strategic stability, theoretically restraining response options on both sides in the event of a crisis. While such an assumption may hold during peacetime, the movement, maneuver, and alerting of nuclear forces in the transition to crisis holds the threat of grave miscalculation. The alert operation of SSBNs by China during a crisis (to include full or partial sailing of the force out of port) may actually significantly decrease the stability of the situation, since it is unlikely that the United States will forgo the option to conduct trailing and surveillance operations in support of strategic anti-submarine warfare (ASW) against those assets. Depending upon the aggressiveness of the strategic ASW operations and PLAN countermeasures, such a situation has the potential to dramatically and unexpectedly escalate the crisis. In fact, the ensuing undersea battlespace will likely be first and closest point of approach between US forces and PLA nuclear forces. Moreover, the crisis could easily escalate beyond mere conventional or even theater warfare. Thus, this undersea interaction should become a point of intense interest, and perhaps discussion, for both sides.

The unintended consequences of interaction between force posture changes and technological developments in the Chinese and US militaries may also contribute to greater instability in the event of a future crisis or conflict. This could happen in at least four different ways. First, China will likely attempt to expand its longer-range conventional theater missile capabilities as the US military strengthens its presence in the Pacific. For example, the more heavily the Pentagon relies on Guam to bolster its presence in the Pacific, the greater the incentive China will have to develop conventional ballistic missiles capable of reaching Guam. Beijing may believe that it needs a conventional missile capability with the range to strike targets on Guam to avoid being faced with a choice between crossing the nuclear threshold or allowing the US military to use Guam as a sanctuary. This could result in the geographic expansion of a conflict over Taiwan or in vertical escalation if China launches missile attacks against US territory.

Second, intercontinental conventional strike capabilities could further undermine strategic stability or lead to unintended escalation. China faces a fundamental strategic asymmetry in any conflict with the United States. The US military already has the ability to carry out conventional attacks on Chinese territory, potentially including strikes against strategic targets, but the PLA currently has no ability (except, perhaps, some limited special forces capability) to strike targets in Hawaii, Alaska, or the continental United States without using nuclear weapons. The US may increase its dominance in intercontinental conventional strike capabilities with the potential future deployment of

conventionally armed SLBMs or other long-range conventional strike systems.<sup>145</sup> Chinese analysts express concern about such developments, particularly about potential US plans to place conventional warheads on SLBMs. An unidentified author writes that highly accurate conventionally armed SLBMs would give the United States the ability to destroy strategic point targets without resorting to the use of nuclear weapons, which might raise the risk of war or escalation.<sup>146</sup>

In the longer-term, China may want to respond to this imbalance and the associated perceived vulnerabilities by developing longer-range conventional strike capabilities of its own that would allow it to threaten at least a limited number of critical targets in Hawaii, Alaska (i.e., missile defense installations), and the continental United States. Although there has not been any evidence of Chinese interest in pursuing extremely long-range conventional strike capabilities to date, a limited strategic conventional strike capability might prove attractive to the Chinese to fill the gap between conventional theater capabilities and strategic nuclear forces. There would also be possible benefits from accentuating the risks of conventional operations against the Chinese mainland, since conventional retaliation would appear more credible than the threat of a nuclear first strike in response to US conventional attacks on the Chinese homeland.<sup>147</sup> This could be destabilizing in a conflict. It is possible that employing conventional intercontinental strike capabilities, or perhaps even simply placing such assets on higher alert levels, would result in miscalculation if either side interpreted such moves as preparations for a nuclear first strike.

A third and perhaps equally important uncertainty is how the American ballistic missile defense (BMD) architecture will evolve, and the extent to which China will develop corresponding countermeasures to preserve its nuclear deterrent, perhaps including options to destroy or degrade US missile defense capabilities. Indeed, China can be expected to pursue such capabilities since strategists appear to view the

<sup>145</sup>Quadrennial Defense Review Report, US Dept. of Defense, 6 Feb. 2006, 6, <[www.defenselink.mil/qdr/report/Report20060203.pdf](http://www.defenselink.mil/qdr/report/Report20060203.pdf)>.

<sup>146</sup>Both quotes in this paragraph are from 董露, 郭纲, 李文胜 [Dong Lu, Guo Gang, and Li Wensheng], '析美国战略导弹常规改装的动因及影响' [Analysis on the Motives and Effects of US Strategic Missiles Armed with Conventional Warheads], 中国宇航学会 [China Space Institute], paper distributed but not presented at Tenth PIIC Beijing Seminar on International Security, Program for Science and National Security Studies and Institute of Applied Physics and Computational Mathematics, Xiamen, China, 25–28 Sept. 2006.

<sup>147</sup>James C. Mulvenon, Murray Scot Tanner, Michael S. Chase, David R. Frelinger, David C. Gompert, Martin C. Libicki, and Kevin L. Pollpeter, *Chinese Responses to US Military Transformation and Implications for the Department of Defense* (Santa Monica, CA: RAND 2006), 102.

ability to negate missile defense as necessary to prevent the United States from occupying a position that would permit it to coerce China with nuclear threats. In particular, Chinese strategists are concerned that US deployment of an effective missile defense system would undermine China's nuclear retaliatory capability, especially if its strategic forces were partially destroyed in a conventional or nuclear counterforce strike, thereby enabling the United States to challenge vital Chinese interests without fear of nuclear retaliation.<sup>148</sup> This clear linkage, with its disturbing potential to produce miscalculation and lead to unintended consequences that might leave both Beijing and Washington less strategically secure, merits thoughtful consideration by policymakers in both nations.<sup>149</sup>

On the US side, the debate remains unresolved. Some have argued that, were it even possible to do so,<sup>150</sup> the United States should be extremely cautious about deploying any missile defense system that would be able to negate China's second-strike capability. Even if China was not the main intended target of such a system, according to this line of argument, its deployment would be problematic in two ways: (1) it would be detrimental to strategic stability in peacetime, and (2) it could contribute to escalation pressures in a crisis.

First, in peacetime, it would almost certainly lead to an offense-defense arms race between China and the United States, a competition in which the offense would likely have the advantage. Simply put, if China perceived a US missile defense system as capable of intercepting the number of ICBMs it would expect to have left following a first strike against its strategic forces, it would almost certainly commit whatever resources it deemed necessary to overwhelm the system by further increasing the number and sophistication of ICBMs in its arsenal.

Second, in a crisis situation, it would be enormously destabilizing if the Chinese believed that the missile defense system would allow the United States to bully China with nuclear threats or even contemplate launching a counterforce attack without fear of retaliation. This asymmetry could spark escalation in a crisis because the presence of a

<sup>148</sup>Ibid., 99.

<sup>149</sup>Intelligent discussion of this well-known problem can be found in Glenn A. Kent *et al.*, *A Calculus of First-Strike Stability (A Criterion for Evaluating Strategic Forces)* (Santa Monica, CA: RAND 1988), <[www.rand.org/pubs/notes/N2526/](http://www.rand.org/pubs/notes/N2526/)>.

<sup>150</sup>For an argument that US BMD cannot contain China's nuclear deterrent, see Andrew Erickson, 'China's Ballistic Missile Defense Countermeasures: Breaching America's Great Wall in Space?', in Lyle Goldstein and Andrew Erickson, *China's Nuclear Force Modernization*, Naval War College Newport Paper No.22, (Newport, RI: USNWC 2005), 65–91.

missile defense system capable of intercepting the number of Chinese strategic missiles that would likely survive a first strike would put considerable pressure on Beijing to attempt to eliminate that perceived unilateral advantage by launching a preemptive attack against either the missile defense system itself or its supporting space-based warning systems. Trying to level the playing field in this way would be an extraordinarily risky move on China's part, but it is a possibility that could not be ruled out if the Communist Party leadership believed its core interests were at stake, as they probably would in a showdown over Taiwan.

Third, on the other hand, some observers have argued that the pressure induced by a highly effective missile-defense architecture would introduce large uncertainties into PRC escalation calculations, resulting in a favorable situation for the United States. By deploying and operating an effective missile defense, the US would be attempting to demonstrate the uncertainty of China's assured retaliatory force, thus inducing caution on Beijing's part at all levels of conflict below that, lest the conflict escalate on terms unfavorable to the PRC. This downward pressure on escalation logic is proportional to the perceived effectiveness of missile defense to attrite a substantial number of incoming reentry vehicles, though. The perceived capability of the missile defense architecture to intercept a couple of reentry vehicles does not exert such a downward pressure, and while it is uncertain at what point the defense effectiveness would exert that type of psychological pressure, it seems that even a relatively small probability of intercepting a large fraction of the incoming strike would be sufficient to begin inducing escalation dampening pressures. Since such a condition only accrues at the robust end of the spectrum of missile defense architectures, with a window of potentially diminished stability as the architecture evolves, an argument could be made for the acceleration of missile defense programs, to include even the incorporation of nuclear interceptor options if this would significantly enhance system effectiveness.

Fourth, the transition to land-mobile and sea-based systems will introduce new C2 challenges for the Second Artillery and PLAN. While the addition of such mobile strategic forces allows for significantly enhanced survivability, thereby assuring second-strike capability, such fully-mated, alert forces are an entirely new command and control challenge for the PLA. The risks during crisis of such C2 nightmares as inadvertent launch, unauthorized launch, and terrorist (or special forces) overrun will become operational concerns for all PLA forces in which alert forces are postured. Both out-of-garrison exercises for road-mobile, nuclear strategic missiles and extended 'deterrent patrols' for Type 094 SSBNs will carry with them risks of accidents, as well. While

the United States and Russia have long experience with alert forces and the need for exceedingly reliable C2, China's C2 will now be challenged to cope with an entirely differently postured and composed nuclear force. The possibilities of misstep during the next decade of force posture transition, whether in peacetime or crisis, are much enhanced and the potential ramifications severe. Moreover, though conventional wisdom holds that the CMC would be highly unlikely to pre-delegate release authority of nuclear weapons, similar conventional wisdom was proved wrong in the case of the former Soviet Union. Any such pre-planned operational flexibility or pre-delegation could give rise to an extremely unstable situation in a crisis.

Another potential complication could arise following the resolution of a US-China crisis. China would need to return its alert forces to a de-alerted state without making them vulnerable to a US preemptive strike. The de-escalatory transition from an alert posture to a de-alerted state is seen as a window of high vulnerability, particularly for smaller nuclear powers.<sup>151</sup>

Even if enhanced strategic capabilities do not embolden Chinese leaders to behave more assertively and China and the United States manage to avoid a potentially destabilizing competition between offensive and defensive strategic capabilities, escalation control will remain an extremely serious concern in the event of a high-intensity conventional cross-Strait conflict. Specifically, US military planners and decisionmakers would need to carefully manage a conventional war with China to avoid the risk of unintended escalation, which could lead to a nuclear conflict that would be incredibly devastating for both sides.<sup>152</sup> Chinese strategists have suggested that attacks on command and control nodes intended to degrade China's conventional warfighting capabilities would be interpreted as the prelude to a nuclear first strike if they also diminished the country's ability to command and control its nuclear forces.<sup>153</sup>

In the event of a US-China conflict, especially one over Taiwan, the United States would have to exercise caution at the operational and strategic levels. First, Washington would need to consider escalation control very carefully when conducting conventional operations against Chinese forces. Given the risks of escalation, US decisionmakers would not only need to avoid striking strategic systems, but also to think very

<sup>151</sup>Joseph Nation (ed.), *The De-escalation of Nuclear Crises* (New York: St Martin's Press 1992).

<sup>152</sup>On the possibility that a conventional conflict between two nuclear powers could result in inadvertent nuclear escalation, see Barry Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell UP 1992).

<sup>153</sup>Interview, senior military officer, China, 2006.



carefully about the potential implications of strikes against related targets such as leadership and command and control facilities, strategic communications networks, and air defense systems. Under certain circumstances, US decisionmakers might need to consider not only withholding strikes against potentially sensitive targets, but perhaps forgoing kinetic strikes against targets on the mainland altogether. For this to be a realistic option, however, China would need to do its part to keep the geographic scope of the conflict limited by refraining from striking US bases in Japan and Guam and other high-value assets such as aircraft carriers. Whether or not it strikes targets on the mainland, the United States would also need to exercise caution at the strategic level by refraining from forcing China's leaders into a position where they would face a choice between further escalation and a humiliating and perhaps politically catastrophic defeat. This would mean leaving China's leaders a way out of the conflict that allowed them to keep what they perceived as their nation's core interests – and their own – reasonably intact.

At the same time, however, Washington would likely also need to prevent Beijing from using nuclear threats to achieve its political objectives, since some Chinese analysts have suggested nuclear weapons might be used to deter – or at least limit – US military intervention in a cross-Straits conflict. What little evidence is available on the role Chinese strategists would expect nuclear weapons to play in a Taiwan conflict suggests that this remains a subject of debate within the PRC. At least one prominent Chinese analyst has argued that nuclear weapons are virtually unusable in a conflict over Taiwan. According to Li Bin, 'The nuclear taboo means that whichever side encounters setbacks or reversals in a conventional conflict over Taiwan will be unable to employ nuclear weapons to change the conventional situation.'<sup>154</sup> Nonetheless, other Chinese analysts contend that China's unconditionally stated policy of no-first-use (NFU) would not necessarily hold if the country was on the verge of suffering a catastrophic conventional military defeat in a Taiwan scenario.

This apparent debate over the potential utility of nuclear weapons in a Taiwan scenario highlights some emerging doctrinal tensions that could also undermine stability in a crisis. The debate over NFU exemplifies the strategic options that Chinese planners may gain from recent improvements in technology and human capital. The credibility of NFU, or at least a restrictive interpretation thereof, appears to be increasingly uncertain, particularly given China's stake in a Taiwan contingency and sovereignty over the island, the possibility of a strike

<sup>154</sup>Li Bin, '中国核战略辨析' [Identifying China's Nuclear Strategy], *世界经济与政治* [World Economics & Politics] (2006), 9.

on China's strategic infrastructure with conventional precision guided munitions (PGMs), the development and deployment of foreign BMD, the potential for launch on warning, and the exigencies of war. Recent scholarship suggests that this policy may well be under debate in Beijing.<sup>155</sup> Indeed, some Chinese analysts appear to interpret China's current doctrine of 'active defense' as supporting preemption when an enemy is preparing to strike, or perhaps even as soon as an adversary has revealed its intent to attack China. Also uncertain is the extent to which Chinese strategists have factored in the possibility that their American counterparts have already assumed Chinese NFU to be unreliable, perhaps to be supplemented by policies of launch-on-warning or launch-under-early-attack.<sup>156</sup> This potential ambiguity is supported by Chinese military doctrinal writings, one of which states that 'When we find out that the enemy is going to launch a surprise attack, especially a possible enemy nuclear attack, we should quickly and rapidly warn our troops and order troops to get ready for countering the enemy surprise attack.'<sup>157</sup>

The United States also must contend with a general Chinese perception that the overall objective most likely to be at stake in a conflict (Taiwan's status) is more important to China than to the United States. Since intervention in a Taiwan-related conflict would represent a war of Washington's choosing as opposed to one in defense of a core national security interest, efforts on Beijing's part to make its participation in a conflict more credible would be thought to make Washington think more carefully about intervening militarily, or even engaging in Phase Zero activities deemed against China's interests. Beyond that, if such a crisis escalated into conflict between China and the United States, both parties would be seeking to demonstrate resolve and commitment, possibly including saber rattling at or near the nuclear threshold. As one expert has recently put it, 'actions taken to demonstrate resolve and credibility may induce not restraint by the enemy but an intensification of conflict'.<sup>158</sup> This could create a cycle of

<sup>155</sup>Wortzel, *China's Nuclear Forces*.

<sup>156</sup>Gill, Mulvenon, and Stokes, 516.

<sup>157</sup>'Second Artillery Campaign', Ch. 14, in Wang Houqing and Zhang Xingye, 战役学 [The Science of Campaigns], 370. This statement appears to indicate interest in a launch under attack or a launch on warning capability, but is not necessarily inconsistent with a ride-out posture.

<sup>158</sup>Brad Roberts, 'The Nuclear Dimension: How Likely? How Stable?', in Michael Swaine, Andrew Yang, Evan Medeiros, and Oriana Mastro (eds.), *Assessing the Threat: The Chinese Military and Taiwan's Security* (Washington DC: Carnegie Endowment for International Peace 2007), 235.

escalation with the distinct potential of including nuclear posturing on both sides.

### Conclusion

As China continues to modernize its nuclear and missile forces, problems of strategic stability appear poised to become much more important aspects of the US–China security relationship in the coming years. Although China’s nuclear and missile force modernization may contribute to greater strategic stability in the long run, neither China nor the United States should assume that this outcome will result automatically from the deployment of a relatively secure second-strike capability. Indeed, successfully managing what could become a potentially dangerous balancing act, especially in a crisis over Taiwan, will require much of both parties. The United States will need to exercise considerable self-restraint given the asymmetries that will continue to characterize the US–China nuclear balance despite China’s recent enhancement of its nuclear and missile capabilities. Planners and decisionmakers in the United States will also need to have an in-depth understanding of Chinese views on nuclear signaling, crisis management and escalation control, particularly in the context of a conflict over Taiwan. Chinese planners and decisionmakers will need to have a similarly realistic understanding of US views. This underscores the need for greater US–China dialogue and engagement on strategic issues, which in turn will require Beijing to deal with a dilemma in which continued lack of Chinese transparency concerning nuclear weapons development may complicate its own nuclear strategy.<sup>159</sup> Indeed, as China continues to improve its conventional and nuclear missile capabilities, it will almost certainly need to become at least somewhat more transparent in order to help safeguard shared interests in strategic and crisis stability.

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<sup>159</sup>Evan Medeiros highlights ‘an explicit tension in Chinese writings...between maintaining secrecy about capabilities’ and ‘revealing China’s will and determination to use nuclear weapons in a crisis’. Paul J. Bolt and Albert S. Willner (eds.), *China’s Nuclear Future* (Boulder, CO: Lynne Rienner 2006), 68.

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