

## CHAPTER 2

### CHINA'S ACTIVITIES DIRECTLY AFFECTING U.S. SECURITY INTERESTS

#### SECTION 1: CHINA'S GROWING AIR AND CONVENTIONAL MISSILE CAPABILITIES

##### **Introduction**

In 2010, the Commission continued to investigate an issue of growing concern to the United States: China's improving capabilities to challenge the U.S. military's freedom of access in East Asia. As Admiral Robert F. Willard, commander of the U.S. Pacific Command, described to Congress in March 2010:

*China's rapid and comprehensive transformation of its armed forces is affecting regional military balances and holds implications beyond the Asia-Pacific region. Of particular concern is that elements of China's military modernization appear designed to challenge our freedom of action in the region.<sup>1</sup>*

For almost two decades, China has been modernizing its military from one with an outdated air force and limited conventional missile strike capability to one with modern aircraft and air defenses and a large, growing arsenal of conventional ballistic and land-attack cruise missiles. In its 2010 report to Congress, the Department of Defense wrote that China's Air Force "continues its conversion from a force for limited territorial defense to a more flexible and agile force able to operate off-shore in both offensive and defensive roles ..."<sup>2</sup> Expert witnesses testified to the Commission that by 2020, China's Air Force will have transformed from a poorly equipped and trained service into one of the foremost in the world.<sup>3</sup> Similarly, China's conventional missile capabilities have greatly improved in recent years. Over the past two decades, China's missile forces have evolved from "operating and maintaining China's small nuclear deterrent to fielding a seemingly ever-expanding conventional ballistic and cruise missile inventory."<sup>4</sup> Improved air and missile capabilities increasingly allow China's military to conduct combat operations along China's periphery, reaching regional U.S. allies such as Japan, and possibly endangering U.S. forces based in the region. China appears to be in the final stage of developing an antiship ballistic missile capable of targeting large ships at sea, such as U.S. aircraft carriers. Summarizing the threat from China that U.S. forces in Asia could face, Secretary of Defense Robert M. Gates told Congress in 2009 that China's military modernization

“could threaten America’s primary means of projecting power and helping allies in the Pacific: our bases, air and sea assets, and the networks that support them.”<sup>5</sup>

This section discusses the modernization of China’s air and missile forces and the implications for the United States. Although air assets are found throughout China’s military, this Report will solely focus on China’s Air Force.\* In addition, when describing China’s missile forces, this Report will limit its discussion to China’s conventional ballistic and cruise missile capabilities and not discuss developments in China’s nuclear missile capabilities.

## **The People’s Liberation Army (PLA) Air Force**

### **Overview**

The main air service in the PLA is the People’s Liberation Army Air Force (PLA Air Force). The PLA Air Force is one of four major services and arms in the PLA† and is responsible for conducting offensive and defensive air operations in and around China. With over 1,600 combat capable aircraft,‡ it is the third-largest air force in the world (after the United States and Russia) and the largest in Asia.§ PLA Air Force unit types include aviation, surface-to-air missile, antiaircraft artillery, airborne, communications, radar, electronic countermeasure, chemical defense, and technical reconnaissance units.<sup>6</sup>

The PLA Air Force is in the midst of a large-scale modernization process and transformation. These efforts are part of Beijing’s broader attempt to field a military capable of fighting and winning a modern, technology-intensive war.<sup>7</sup> As Michael Schiffer, deputy assistant secretary of Defense for Asian and Pacific Security, testified to the Commission in March 2010:

*The People’s Republic of China is pursuing a long-term, comprehensive transformation of its armed forces from a mass army designed for attrition warfare on its own territory to one capable of fighting and winning short-duration, high-intensity conflict along its periphery against high-tech adversaries.*<sup>8</sup>

\* In addition to the PLA Air Force, military aircraft are also present within the Chinese navy and the ground forces. China’s naval air assets consist of approximately 800 aircraft, most of which are combat aircraft. Although all services in the PLA are outfitted with helicopters, the majority are located within the ground forces. Currently, the ground forces have approximately 400 helicopters. Air defense forces are also found in both the ground forces and the PLA Navy. The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), pp. 400, 402.

† The PLA consists of three services: the ground forces (army), the navy, and the air force. In addition, the PLA has an independent, service-level arm responsible for tactical and strategic missiles, the Second Artillery (Strategic Rocket Forces). For information on developments in the Chinese Navy, see chapter 2, section 2, of the U.S.-Economic and Security Review Commission’s *2009 Report to Congress* (Washington, DC: U.S. Government Printing Office, 2009). [http://www.uscc.gov/annual\\_report/2009/chapter2\\_section\\_2.pdf](http://www.uscc.gov/annual_report/2009/chapter2_section_2.pdf).

‡ The term “combat capable aircraft” is a broader term than “combat aircraft,” and also includes training and reconnaissance aircraft that are capable of conducting air-to-air or air-to-ground operations. Therefore, China has more combat capable aircraft than combat aircraft. See The International Institute for Strategic Studies, *The Military Balance: 2009* (London: Routledge, 2009), p. 11.

§ By way of comparison, the next five largest air forces in Asia (by rank order of combat capable aircraft) are India (632); North Korea (620); South Korea (490); Taiwan (477); and Pakistan (383). The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), pp. 362, 369, 413, 415, and 429.

According to the 2008 version of China's authoritative defense white paper:

*[T]he Air Force is working to accelerate its transition from territorial air defense to both offensive and defensive operations, and increase its capabilities for carrying out reconnaissance and early warning, air strikes, air and missile defense, and strategic projection, in an effort to build itself into a modernized strategic air force.<sup>9</sup>*

In order to achieve this goal, the PLA Air Force has sought to improve its capabilities through materiel, institutional, and doctrinal reforms. Each of these categories will be discussed briefly in the following subsections.

### ***Materiel Reforms***

For at least the past 10 years, the PLA Air Force has been modernizing its aircraft, weapons, and equipment. As stated in China's 2008 defense white paper:

*To satisfy the strategic requirements of conducting both offensive and defensive operations, the [PLA] Air Force attaches importance to developing new types of fighters, air and anti-missile defense weapons, and command automated systems. It has deployed some relatively advanced computerized equipment, and air-to-air and air-to-ground precision-guided munitions, upgraded the electronic information systems of the equipment on active service, and improved the basic networks for intelligence and early warning, command and control, and communications. It has in the main established a major battle weaponry and equipment system with [4th] generation aircraft and ground-to-air missiles as the mainstay, and modified [3rd] generation aircraft and ground-to-air missiles as the supplement.<sup>10</sup>*

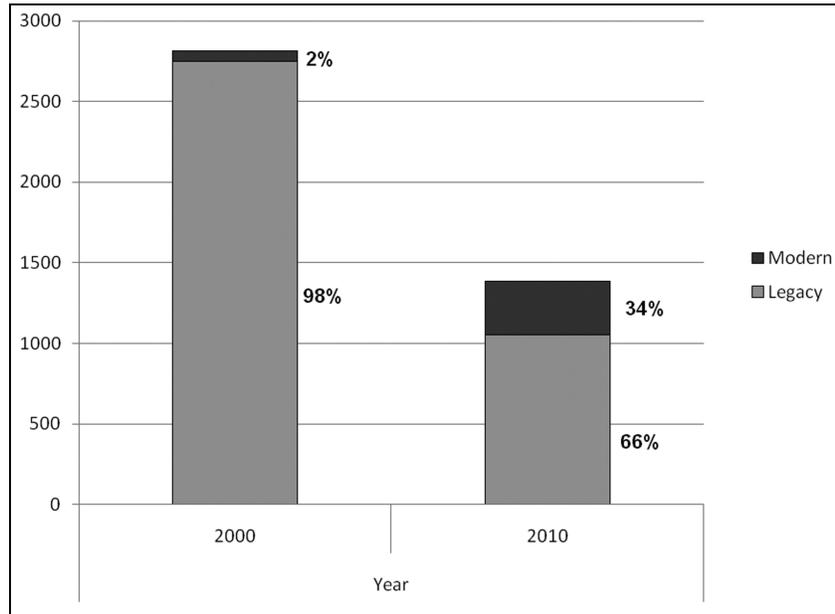
Specifically, the PLA Air Force has modernized and improved the following platforms, weapons, and equipment:

*Fighters:* Over the past decade, the PLA Air Force has simultaneously decreased the overall size of its fleet while increasing the number of modern fighters. Since 2000, the air force has shrunk its fighter fleet by half (see figure 1 below).<sup>11</sup> This decrease in size is primarily due to China phasing out its older, 1950s-era fighters, such as the J-6.<sup>12</sup>\*

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\* Depending on the source, Chinese aircraft model designations are distinguished using either English transliterations of Chinese designators or North Atlantic Treaty Organization (NATO) designators (such as an "F" for fighter, or "B" for bomber). As a result, China's J-10 fighter is also labeled the F-10. In order to keep it simple—as well as to avoid confusion with U.S. fighters such as the F-16—this report will use English transliterations of Chinese designators throughout.

**Figure 1: Comparison of Modern and Legacy PLA Air Force Fighters, 2000 vs. 2010\***



Sources: U.S. Economic and Security Review Commission (USCC) staff-created chart extrapolated from The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), p. 404; and The International Institute for Strategic Studies, *The Military Balance: 2000-2001* (London: Routledge, 2000), p. 197.

At the same time, the PLA Air Force has made significant progress in increasing the number of modern fighters. According to the U.S. Department of Defense, in 2000 only 2 percent of China's combat fighters were considered modern, 4th and improved 3rd generation fighters. Today, the percentage has climbed to almost 25 percent.<sup>13</sup> As Admiral Willard testified to Congress, "China fields a growing number of sophisticated multi-role fighter aircraft, including the SU-27 and SU-30 purchased from Russia and indigenously produced 4th generation aircraft."<sup>14</sup> Domestically produced modern fighters include the J-10, the J-11 (a licensed copy of the Russian Su-27), and the J-11B (an unlicensed copy of the SU-27).<sup>†</sup> In addition to new aircraft, the PLA Air Force has continued to upgrade its older airframes. Over the past decade, China has improved upon all models, but not all airframes, of its older aircraft.<sup>15</sup>

\* Here modern fighter aircraft include 4th generation fighters, such as China's SU-27, SU-30, J-10, and J-11, as well as older-generation fighters that have been outfitted with modern components, such as advanced radar or avionics. Examples include recently improved variants of the J-7, the J-8, and the JH-7.

† For more on China's military aviation projects, as well as additional information on China's aviation manufacturing sector, see chapter 2, section 2, of this Report.

### Fighter Aircraft Generations

Jet engine combat fighters are usually categorized by “generations.” International norms generally use five or six categories, loosely based upon the prevalent set of capabilities at the time of the aircraft’s development: \*

**1st generation:** c. 1945 to 1955, this generation includes the original jet fighters powered by turbojet engines.

**2nd generation:** c. 1955 to 1960, these fighters generally had a higher top speed and were outfitted with radar and guided air-to-air missiles.

**3rd generation:** c. 1960 to 1970, in addition to having increased overall capabilities, these fighters also were the first to be capable of both air defense and ground attack missions.

**4th generation:** c. 1970 to 1990, these multirole fighters were equipped with increasingly sophisticated avionics and weapon systems. A key area of emphasis was maneuverability rather than speed.

**4th+ (or 4.5) generation:** c. 1990–2000, a concept that not everyone agrees exists, implies some combination of advanced capabilities and upgrades to a normal 4th generation airframe.

**5th generation:** These fighters have a combination of stealth, high altitude, maneuverability, advanced radar, high-capacity data links, “plug and play” avionics, and supercruise capabilities.<sup>16</sup>

China is also developing its first 5th generation fighter, the J-XX, and is expected to deploy it by 2018.<sup>17</sup> Experts disagree on whether this plane will be as capable as the U.S. Air Force’s F-22, currently the world’s only deployed 5th generation fighter.<sup>18</sup>

Table 1: PLA Air Force Fighters

Model (including variants)	Type	Number
<i>Older Fighters</i>		
J-7	Fighter	552
J-8	Fighter	312
Q-5	Fighter-Ground Attack	120
JH-7A	Fighter-Ground Attack	72

\* Chinese categories for fighter aircraft generations differ from accepted international norms. Normal conventions identify fighters based upon the decades of the fighter’s inception and its relevant capabilities. China, however, identifies its aircraft according to when they are inducted into the air force. Because of this difference, Chinese analysts regard China’s new fighter projects as “3rd generation” aircraft, while U.S. analysts use international norms, calling these same planes “4th generation.” In order to avoid confusion, this Report will follow the international naming norm. Office of Naval Intelligence, *China’s Navy 2007* (Suitland, MD: Department of the Navy), pp. 47–48.

**Table 1: PLA Air Force Fighters—Continued**

Model (including variants)	Type	Number
<i>4th Generation Fighters</i>		
SU-30MKK (Russian)	Fighter-Ground Attack	73
J-11/SU-27 (Russian)	Fighter	116
J-11B (SU-27 illegal copy)	Fighter-Ground Attack	18+
J-10	Fighter-Multirole	120+
<i>5th Generation Fighters</i>		
J-XX	Fighter	In development
	<b>Total</b>	<b>1,383+</b>

Source: The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), p. 404.

*Bombers:* The PLA Air Force is also improving its current fleet of H-6 long-range bombers. Improvements include increasing the ranges of its current bombers and arming them with long-range cruise missiles, providing the PLA Air Force with a nascent stand-off strike capability.<sup>19</sup> According to the testimony of Wayne A. Ulman, China issue manager at the U.S. National Air and Space Intelligence Center, when the latest variant of the bomber is operational, China will be able to strike targets as far away as Guam, to include the U.S. military bases on the island.<sup>20</sup>

**Table 2: PLA Air Force Bombers**

Model (including variants)	Number
H-6	82

Source: The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), p. 404.

*Transports:* China has made little progress in modernizing its air transport fleet since its last effort in the early 1990s when it bought 18 Russian-made IL-76s.<sup>21</sup> China currently is designing a 200-ton transport aircraft, which, when completed, is to be comparable to the U.S. Air Force C-130.<sup>22</sup>

*Aerial refueling tankers:* In an effort to expand its limited air refueling capabilities, China was reportedly in negotiations to purchase eight Russian IL-78 aerial refueling tankers, a deal that has since been cancelled.<sup>23</sup> Currently China has only a small fleet of 10 indigenous H-6U tankers acquired in the mid-1990s, which provide limited power projection capabilities at best.<sup>24</sup>

**Table 3: PLA Air Force Transports and Aerial Refueling Tankers**

Model	Number	Notes
<i>Large Military Transports</i>		
IL-76 (Russian)	18	30 more ordered
Y-9	N/A	In development
<i>Refueling Tankers</i>		
H-6U	10	Refuels the J-8 and J-10 only

Source: The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), p. 404.

*Airborne early warning aircraft:* The PLA Air Force has made acquisition of an aerial early warning capability a key focus over the past decade. Lacking airborne early warning aircraft in 2000, the PLA Air Force now deploys seven of them, split among two models: the KJ-2000 and the KJ-200. China has also created a new air intelligence radar network, which, when coupled with the new aerial early warning aircraft, greatly improves China's airborne surveillance capabilities.<sup>25</sup> Despite improvements, however, China's airborne early warning aircraft are insufficient in numbers for the size of China's territory.<sup>26</sup>

**Table 4: PLA Air Force Airborne Early Warning Aircraft**

Model	Number
KJ-2000	4
KJ-200	3

Source: The International Institute for Strategic Studies, *The Military Balance: 2010* (London: Routledge, 2010), p. 404.

*Unmanned aerial vehicles:* \* The PLA Air Force has deployed several types of unmanned aerial vehicles for both reconnaissance and combat purposes.<sup>27</sup> In addition, China is developing a variety of medium- and high-altitude long-endurance unmanned vehicles,<sup>28</sup> which when deployed, will expand the PLA Air Force's "options for long-range reconnaissance and strike."<sup>29</sup>

*Airborne weaponry:*

- *Air-to-air missiles:* Complementing its new aircraft are new, highly capable missiles used to engage other aircraft. Roger Cliff, senior political scientist at the RAND Corporation, testified to the Commission that in 2000, only the PLA Air Force's Russian-made SU-27s were capable of firing beyond-visual-range missiles, a necessity for modern air combat.<sup>†</sup> Today, many, but not all, of China's fighters can fire beyond visual range missiles.<sup>30</sup> Like China's fighter fleet, the PLA Air Force's

\* Unmanned aerial vehicles are remotely piloted or self-piloting aircraft that can be outfitted with a wide variety of payloads, to include cameras, communication equipment, sensors, or weapons.

<sup>†</sup> By comparison, in 2000, all U.S. combat aircraft carried beyond visual range missiles. See U.S.-China Economic and Security Review Commission, *Hearing on China's Emergent Military Aerospace and Commercial Aviation Capabilities*, written testimony of Roger Cliff, May 20, 2010.

advanced air-to-air missiles are a diverse collection of Russian-purchased and indigenously developed missiles.<sup>31</sup>

- *Air-to-surface weaponry*: China’s Air Force is also strengthening its capability to strike ground and maritime targets from the air. According to the Department of Defense, “the PLA has a small number of tactical [air-to-surface] and precision-guided munitions, including all-weather, satellite- and laser-guided bombs, and is pursuing improved airborne antiship capabilities.” The PLA Air Force also is improving its ability to target enemy radars using antiradiation missiles.<sup>32</sup>

*Air defense systems*: Strengthening China’s air defense capabilities is a priority for Beijing.<sup>33</sup> Since 2000, the PLA Air Force’s air defense forces have significantly improved, possibly more so than any other component of the air force.<sup>34</sup> Many of the improvements are directly due to purchases from Russia of advanced, long-range, surface-to-air missile systems. Currently roughly half of China’s modern surface-to-air missile systems are Russian. According to the Department of Defense, these modern air defense systems potentially have limited ballistic and cruise missile defense capabilities as well.<sup>35</sup> China has also begun to develop its own highly capable surface-to-air missile systems, such as the HQ-9 and the HQ-12. Complementing the purchase and development of these new systems are improvements in China’s national air defense network, which, since 2007, spans the entire country.<sup>36</sup> Together, these developments provide China with one of the world’s best ground-based air defense networks and, in the view of the then Deputy Under Secretary of the Air Force for International Affairs Bruce S. Lemkin, would “pose a difficult challenge for even the most modern air forces in the region.”<sup>37</sup>

**Table 5: China’s Modern Surface-to-Air Missile Launchers**

Launch System	Numbers
<i>Russian-purchased</i>	
SA-10B (S-300 PMU)	32
SA-20 (S-300 PMU1)	64
SA-20 (S-300 PMU2)	32
<i>Indigenous</i>	
HQ-9	64
HQ-12	60

Source: Office of the Secretary of Defense, *Annual Report to Congress: Military Power of the People’s Republic of China, 2009* (Washington, DC: U.S. Department of Defense, 2009), p. 66.

*Electronic warfare equipment and capabilities*: In recent years, China has substantially improved its ability to wage electronic warfare.<sup>38</sup> According to the Department of Defense’s 2009 report to Congress, improvements to the PLA Air Force’s electronic warfare capabilities consist of efforts to harden China’s command, control, communication, computer, intelligence, surveillance, and reconnais-

sance (C4ISR) systems as well as the development of offensive measures to degrade the electronic warfare capabilities of others.<sup>39</sup>

### **Role of Electronic Warfare in Modern Combat**

In modern warfare, military forces are heavily dependent upon access to the electromagnetic spectrum for successful operations. Communications with friendly forces and detection, identification, and targeting of enemy forces (among other tasks) are all reliant upon the ability to operate unhindered in this spectrum. For this reason, control of the electromagnetic spectrum (the ability to operate freely in the electromagnetic spectrum while denying an adversary the same ability) is considered essential to carrying out a military operation at all levels of conflict. As the U.S. Air Force points out, “[U]nfettered access to selected portions of the electromagnetic spectrum is critical for weapon system effectiveness and protection of critical air assets.”<sup>40</sup>

Although electronic warfare has various definitions, its most basic content is any military action that involves the use of the electromagnetic spectrum. Electronic warfare can be divided into three main components:

*Electronic attack:* the use of electronic countermeasures such as jamming, antiradiation missiles, computer network operations, counterspace operations, and directed energy weapons (such as lasers, radio frequency weapons, and particle beams) to attack personnel, facilities, or equipment that supports electromagnetic spectrum operations.

*Electronic protection:* also referred to as “electronic counter-countermeasures,” it includes actions taken to protect personnel, facilities, and equipment from any electronic warfare employment, as well as the use of frequency hopping (rapidly changing radio frequencies), landline and fiber optic communications, and radars that are more difficult to jam, such as active phased array radars.

*Electronic support:* real-time information support provided to on-the-ground commanders in order to improve their situational awareness. It can include radar warning receivers (which tell and prioritize for a pilot the missile and air defense threats), communication intelligence, and electronic intelligence.<sup>41</sup>

### ***Institutional and Doctrinal Reforms***

In order to better operate these new weapons and equipment, the PLA Air Force has also made efforts to institute training, personnel, organizational, and doctrinal reforms, each of which are discussed below.

*Training Reforms:* Over the past decade, the PLA Air Force has improved the quality of training for its pilots. Previously training lacked effectiveness since pilots averaged only a minimal number of flight hours per year and exercises were highly scripted with outcomes predetermined.<sup>42</sup> Expert witnesses told the Commission

that they now consider China's pilots to be well trained and, in some areas, China's training standards are on a par with western training standards.<sup>43</sup> Admiral Willard recently testified to Congress that "the PLA Air Force [has] continued to focus on improving pilot and controller proficiencies in complex, multi-plane combat scenarios, including operations over water."<sup>44</sup> Other areas of emphasis include training with modern aircraft and equipment, training in complex electromagnetic environments,\* joint service training, and an increased use of opposition forces.<sup>45</sup> Despite these improvements, however, deficiencies still remain. For example, the quality of pilot training in the PLA Air Force varies with the type of aircraft: transport, bomber, and advanced fighter pilots receive the most training opportunities, while the pilots of older aircraft, still the bulk of the air force, receive significantly less flight time.<sup>46</sup>

*Personnel Reforms:* The PLA Air Force has sought in recent years to increase the quality of its personnel.<sup>47</sup> In order to improve its officer corps, the air force is seeking to expand the number of college-educated officers. Previously, PLA Air Force officers either graduated from military-run academies of questionable quality or were directly promoted from the enlisted force, without higher education.<sup>48</sup> Today, the PLA Air Force claims that 40 percent of its officers have a bachelor's degree, half of which were earned at more rigorous civilian universities.<sup>49</sup> The PLA Air Force is also trying to attract more college graduates to join the enlisted force, a trend that shows signs of slowly increasing.<sup>50</sup>

In order to develop a professional career enlisted force, in 1999 the PLA Air Force (along with the rest of the PLA) established a professional noncommissioned officer corps. Creation of this group of midlevel and senior enlisted personnel is an attempt to retain institutional knowledge and experience among its enlisted force, something not possible when China depended primarily on conscripts for its enlisted force.<sup>51</sup> According to Mr. Ulman, non-commissioned officers now constitute 60 percent of the air force's enlisted force.<sup>52</sup>

*Organizational Reforms:* Over the past decade, the PLA has greatly restructured its air force into a more flexible, streamlined organization. Dr. Cliff described how, since 2000, the air force has reduced its personnel size by 100,000, nearly 25 percent of its force.<sup>53</sup> In order to achieve these cuts, the PLA Air Force:

*abolished 50 . . . major general billets, downgraded four of its five air armies and six army-level bases two grades to division-level command posts, and merged administrative billets in division, brigade, and regiment headquarters. It also restructured several radar units, merged numerous administrative and functional officer billets in headquarters,*

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\*The push for training in complex electromagnetic environments stems from the PLA's belief that "any future combat environment will be conducted in a cluttered electromagnetic environment containing emissions from commercial and military systems, in addition to significant amounts of electronic warfare jamming." Therefore, it is important for the PLA exercises to be conducted with some level of opposed electronic warfare and cyber operations. U.S.-China Economic and Security Review Commission, *Hearing on China's Emergent Military Aerospace and Commercial Aviation Capabilities*, written testimony of Wayne A. Ulman, May 20, 2010; and Eric C. Anderson and Jeffrey G. Engstrom, *Capabilities of the Chinese People's Liberation Army to Carry out Military Action in the Event of a Regional Military Conflict* (McLean, VA: Science Applications International Corporation, March 2009), pp. 22–23.

*and replaced many junior officer billets with NCOs [non-commissioned officers].*<sup>54</sup>

*Doctrinal Reforms:* In 2004, the Central Military Commission, China's supreme military command, publicly announced a new strategy for the PLA Air Force, entitled "Integrated Air and Space Operations, Simultaneous Offensive and Defensive Operations."<sup>55</sup> The latter half of this strategy now directs the PLA Air Force to prepare for offensive operations along China's periphery, in addition to maintaining its traditional defensive missions.<sup>56</sup> Prior to this shift, the PLA Air Force was "mainly a territorial air defense force, responsible for the mission of defending China's air space, and cooperating with and supporting army and navy operations."<sup>57</sup> This limited air operations primarily to eliminating enemy forces *within* China's territory, because China "did not possess forces for external attacks."<sup>58</sup> Rebecca Grant, director of the Mitchell Institute of Airpower Studies, told the Commission that the shift to offensive operations entails extending the range of PLA air and missile attacks.<sup>59</sup>

There is much less known, however, about the first half of the new strategy, "Integrated Air and Space Operations." China's biennial defense white papers have yet to mention this component of the PLA Air Force's strategy. Both Dr. Cliff and Mr. Ulman testified to the Commission that it appears "Integrated Air and Space Operations" may be an aspiration, since the air force currently lacks any space assets.<sup>60</sup> † However, PLA Air Force writings indicate a "desire for the air force to integrate the use of space into their air operations," said Ulman.<sup>61</sup> It is possible that the air force's desire reflects an ongoing struggle between various PLA organizations over control of space assets.<sup>62</sup>

### **China's Conventional Missile Forces**

Although not an air force entity, China's conventionally armed missile forces have the capability to influence standard air operations. Within the PLA, strategic missiles fall primarily under the control of China's strategic rocket forces, the Second Artillery. According to China's 2008 defense white paper, the Second Artillery's mission is to conduct "medium- and long-range precision strikes against key strategic and operational targets of the enemy."<sup>63</sup> As such, the Second Artillery's arsenal includes nuclear strategic ballistic missiles, nuclear and conventional tactical ballistic missiles,

\*Although the Central Military Commission publicly announced this mission in 2004, it is likely that it, or at least the "Simultaneous Offensive and Defensive Operations" component, was in effect as early as the late 1990s. For example, just prior to the 50th anniversary of the PLA Air Force in 1999, then Chinese leader Jiang Zemin called upon the air force to be a "simultaneous offensive and defensive air force." Xinhua, "*Zhongguo Junshi Dashiji (1990 Nian—1999 Nian)*" (A Record of Events of China's Military (1990–1999)), July 26, 2004. [http://news.xinhuanet.com/ziliao/2004-07/26/content\\_1649800\\_1.htm](http://news.xinhuanet.com/ziliao/2004-07/26/content_1649800_1.htm). See also U.S.-China Economic and Security Review Commission, *Hearing on China's Emergent Military Aerospace and Commercial Aviation Capabilities*, written testimony of Roger Cliff, May 20, 2010.

†Although details on China's space program—especially its military components—are not openly available, China's military space assets appear to be primarily under the control of the General Armaments Department, one of four general departments responsible for administering the entire PLA. Dean Cheng and Peter Cugley, *The PRC [People's Republic of China] Space Program: An Open Source Examination* (Alexandria, VA: CNA, September 2008), p. X.

and land-attack cruise missiles. This part of the Annual Report will discuss China's conventional ballistic and cruise missiles.\*

The Second Artillery is rapidly expanding the number and type of conventional missiles that it deploys, allowing the PLA to rely increasingly on these missiles as an important component of its offensive strike options.<sup>64</sup> According to the Department of Defense, "China has the most active land-based ballistic and cruise missile program in the world."<sup>65</sup> Commission-sponsored research noted that "[o]ver the last 20 years the [Second Artillery] mission has evolved from operating and maintaining China's small nuclear deterrent to fielding a seemingly ever-expanding conventional ballistic and cruise missile inventory."<sup>66</sup>

Western observers posit at least four reasons why the PLA seeks to develop its conventional missile forces. First, used at the initial onslaught of a conflict, these missiles are an effective strike option against an enemy's critical assets in an effort to weaken the enemy's defenses and response capabilities. According to then-Deputy Under Secretary of the Air Force Lemkin, these missiles "provide China with a dual-pronged capability to strike almost any regional target, to include airfields, ports, ships, military bases, logistics nodes, command and control facilities, and industrial/economic centers."<sup>67</sup> Once the enemy is subsequently weakened, follow-on PLA military operations could then proceed with reduced costs. For example, Lt Col (retired, U.S. Air Force) Mark A. Stokes, executive director of the Project 2049 Institute, told the Commission that:

*[L]arge scale theater missile raids, combined with other enablers such as an electronic attack, directed against selected critical nodes within an opponent's command and control structure or air defense system can enable conventional air operations to be carried out at reduced risk and cost.<sup>68</sup>*

Similarly, Commission-sponsored research described a scenario involving Taiwan where the PLA could use its "relatively cheap inventory of short-range ballistic missiles (SRBM), land attack cruise missiles, and anti-radiation missiles to strike critical nodes as a means of 'softening' Taiwan's defenses."<sup>69</sup>

Second, ballistic and cruise missiles are difficult to defend against. Ballistic missiles, for example, fired from within Chinese territory would only take a matter of minutes to reach their target on China's periphery. This in turn would severely minimize the reaction time of a target. Furthermore, ballistic missiles are very difficult to intercept, even with formidable air and ballistic missile defenses in place.<sup>70</sup> Cruise missiles are also inherently difficult to de-

\*A ballistic missile can be launched from fixed and mobile land-based launchers or from submarines. Once fired, a ballistic missile flies in an arc to its target, usually exiting and reentering the earth's atmosphere along its path to the target. Ballistic missiles are generally classified according to their range, divided into short range (<1,000 km), medium range (1,000 – 3,000 km), intermediate range (3,000 – 5,500 km), and intercontinental ballistic missiles (>5,500 km). A fifth category, sea-launched ballistic missiles, includes all ballistic missiles launched from a submarine, regardless of its range. Cruise missiles, in contrast, are more akin to an unmanned, armed aerial vehicle and are categorized according to mission: land-attack cruise missiles and anti-ship cruise missiles. Capable of being fired from an aircraft, ship, submarine, or ground-based launcher, a cruise missile takes a more direct path to its target than a ballistic missile. Both ballistic and cruise missiles can be equipped with conventional or nuclear payloads. National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat* (Dayton, OH: April 2009).

fend against, since they have excellent accuracy and can oftentimes evade radar detection.<sup>71</sup>

Third, ballistic missiles are also inherently coercive in nature.<sup>72</sup> Because most of China’s neighbors lack adequate defenses against China’s ballistic missiles, China may enjoy coercive leverage against them.<sup>73</sup> Similarly, in 2009, the Department of Defense labeled these missiles “China’s primary instruments of coercion, not only of Taiwan but of other regional neighbors.”<sup>74</sup> This coercive nature allows China to deter its neighbors from taking certain actions without actually firing a shot.

Finally, developing China’s strategic missile forces may be an attempt to improve upon traditional air force capabilities and may even compensate for weaknesses in China’s Air Force. For example, according to Dr. Cliff:

*In the U.S. military, reduced warning time and assured penetration capability are provided by stealth aircraft. For a country that does not have stealth aircraft, however, conventional ballistic missiles are a logical way of achieving the same effects, at least against targets on its immediate periphery.*<sup>75</sup>

Echoing Dr. Cliff’s statement, Lt Col Stokes told the Commission how China “has relied on theater missiles to compensate for shortcomings in its conventional air forces.”<sup>76</sup>

### Conventional Ballistic Missiles

Since at least 2000, China has been improving its conventional ballistic missile capabilities. For example, ten years ago, China had only one brigade of conventional short-range ballistic missiles (roughly 24–36 launchers). Today, the number has increased to seven.<sup>77</sup> In addition to increasing the number of missiles, China is also extending their range, improving their accuracy, and increasing their payload.<sup>78</sup> China’s conventional ballistic missiles can be divided into two types: short-range ballistic missiles and medium-range ballistic missiles.

**Table 6: PLA Conventional Ballistic Missiles**

Missile Name	Number of Missiles	Number of Launchers	Estimated Range
<i>Short-Range Ballistic Missiles (&lt;1,000 km range)</i>			
DF-11	700–750	120–140	300 km
DF-15	350–400	90–110	600 km
<i>Medium-Range Ballistic Missiles (1,000 km to 3,000 km range)</i>			
DF-3	15–20	5–10	3,000+ km
DF-21C	85–95	75–85	1,750+ km
DF-21D	Under development		1,750+ km

Sources: USCC staff compilation, based upon the following sources: Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China 2010* (Washington, DC: U.S. Department of Defense, 2010), p. 66; and Global Security.org, “Weapons of Mass Destruction—China—Theater Missile Systems.” <http://www.globalsecurity.org/wmd/world/china/theater.htm>.

*Short-Range Ballistic Missiles:* China currently fields “the world’s largest and most lethal short range ballistic missile force in the

world.”<sup>79</sup> This force is made up of two different missiles, the DF-11 and the DF-15.<sup>80</sup> In its most recent report to Congress, the Department of Defense stated that China had currently deployed between 1,050 and 1,150 short-range ballistic missiles opposite Taiwan.<sup>81</sup> All of these missiles are road mobile, increasing their ability to evade detection and thus improve their survivability in the event of a conflict.<sup>82</sup>

*Medium-Range Ballistic Missiles:* The Second Artillery now also deploys a conventional medium-range ballistic missile based upon an older nuclear missile, the DF-21. The conventional missile, the DF-21C, has a range of over 1,750 kilometers (km), and, depending on where it is launched, is capable of hitting targets throughout Japan, most of Southeast Asia and India, and portions of Central Asia and eastern Russia.<sup>83</sup> In its 2010 report to Congress, the U.S. Department of Defense stated that China currently had between 85 and 95 DF-21C missiles and 75–85 launchers.<sup>84</sup> While China’s missile industry is expanding its medium-range ballistic missile infrastructure, it is doing so at a limited rate. Both the industry and the Second Artillery could produce significantly more if necessary.<sup>85</sup>

Beijing is also developing a medium-range ballistic missile capable of engaging large, moving surface ships, such as U.S. aircraft carriers. Describing this missile, the DF-21D, in its *2009 Report to Congress*, the Commission stated:

*[T]his missile is intended to deny regional access to surface ships of the opposing side. When combined with appropriate surveillance and targeting sensor systems, this missile could have the potential to destroy or disable aircraft carriers and their associated battle groups while in transit.*<sup>86</sup>

While not yet operational, the DF-21D antiship ballistic missile is already in the testing phase, as Admiral Willard testified to Congress in March 2010.<sup>87</sup> Lt Col Stokes testified to the Commission that the manufacturing facilities for the DF-21D were completed in 2009 and that at least one brigade is “earmarked for initial introduction” of the missile when completed.<sup>88</sup> According to his most recent research, the PLA may be preparing to deploy this missile in southeast China’s Guangdong Province.<sup>89</sup> If true, this would provide the PLA with the ability to strike surface ships in both a Taiwan- and a South China Sea-related contingency.

### ***Land-Attack Cruise Missiles***

China is also expanding its land-attack cruise missile capabilities. The PLA has two types of land-attack cruise missiles, both first deployed within the last ten years. The first, the Second Artillery’s DH-10, is China’s premier long-range cruise missile, with an estimated range of over 1,500 km.<sup>90</sup> In its 2010 report to Congress, the Department of Defense estimated that China had between 200 and 500 DH-10 missiles, roughly a 30 percent increase over the Department of Defense’s estimate in 2009.<sup>91</sup> In addition, the PLA Air Force employs a new, air-launched, land-attack cruise missile, the YJ-63. This missile arms the air force’s H-6 bomber, giving the air force a nascent stand-off strike capability.<sup>92</sup> The range of the

YJ-63 is unclear, although one source claimed that it could reach targets in excess of 200 km.<sup>93</sup>

**Table 7: PLA's Advanced Cruise Missiles**

Missile	Type	Number of Missiles	Number of Launchers	Estimated Range
DH-10	Ground Launched	200-500	45-55	1,500+ km
YJ-63	Air Launched	unknown	unknown	200+ km?

Sources: Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2010* (Washington, DC: U.S. Department of Defense, 2010), p. 66; Eric C. Anderson and Jeffrey G. Engstrom, *Capabilities of the Chinese People's Liberation Army to Carry out Military Action in the Event of a Regional Military Conflict* (McLean, VA: Science Applications International Corporation, March 2009), pp 48-49; and National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat* (Dayton, OH: April 2009), p. 29.

### Implications for the United States

The main implication of China's improved air and conventional missile capabilities is a dramatic increase in the PLA's ability to inhibit U.S. military operations in the region. Frequently referred to as an "anti-access and area-denial strategy,"\* it seeks to hinder or deny enemy forces the ability to operate effectively along China's periphery and deter third parties from intervening in a conflict between China and Taiwan. In its 2009 report to Congress, the Department of Defense noted that "[s]ince 2000, China has expanded its arsenal of anti-access and area-denial weapons, presenting and projecting increasingly credible, layered offensive combat power across its borders and into the Western Pacific."<sup>94</sup> An anti-access and area-denial strategy benefits China, because such a strategy would have a geographical advantage against the United States in the event of a conflict. Said Dr. Grant:

*China will have what a 20th century strategist called strong lines of communication. In contrast, the [United States] must reach across the Pacific with the more difficult aim of holding access open through a credible ability to withstand Chinese attacks and to hit key targets on China's mainland.<sup>95</sup>*

Although several definitions of an anti-access strategy exist, at its basic level it implies two interrelated concepts. *Anti-access* refers to an attempt to prevent enemy forces from operating from bases in a region. Describing the growing threat of non-China-specific anti-access capabilities as far back as 1996, General Ronald R. Fogleman, then U.S. Air Force chief of staff, stated that:

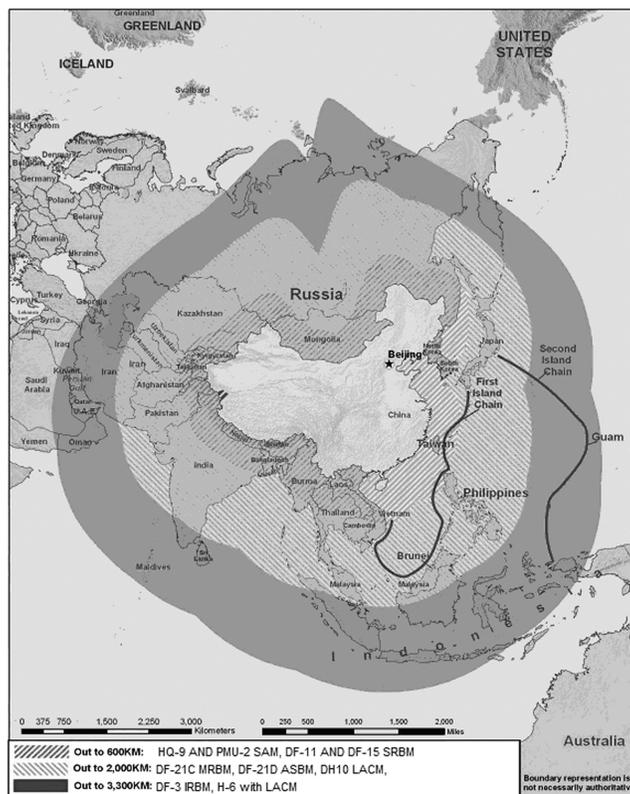
*Saturation ballistic missile attacks against littoral forces, ports, airfields, storage facilities, and staging areas could make it extremely costly to project US forces into a disputed theater, much less carry out operations to defeat a well-armed aggressor. Simply the threat of such enemy missile attacks might deter US and coalition partners from responding to aggression in the first instance.<sup>96</sup>*

\*It should be noted that the terms "anti-access" and "area-denial" are western constructs that attempt to capture the essence of China's military strategy and not a direct translation from Chinese military strategy.

Although not traditionally included, given the role that U.S. aircraft carriers play as floating air bases, attacks against aircraft carriers could also be construed as anti-access operations.

The second component, *area-denial*, seeks to prevent the freedom of action of U.S. forces in a certain region.<sup>97</sup> They can “include actions by an adversary in the air, on land, and on and under the sea to contest and prevent US joint operations within their defended battlespace.” As Jeff Hagen, senior engineer at the RAND Corporation, told the Commission, the concept of area-denial seeks to “capture the sense of portions of a battlespace being made too risky for U.S. operations.”<sup>98</sup>

The PLA has strengthened its anti-access and area-denial capabilities over the years due to its improved air and missile assets, as well as its organizational and doctrinal reforms. China’s advances in its short- and medium-range ballistic missiles, ground and air-launched cruise missiles, and advanced aircraft with precision strike capabilities have greatly improved China’s ability to carry out anti-access operations.<sup>99</sup> Similarly, China’s improved integrated air defense systems; advanced fighter aircraft; air refueling capabilities; and airborne early warning systems all further China’s ability to conduct area-denial operations.<sup>100</sup> Furthermore, the PLA’s future deployment of an antiship ballistic missile will also strengthen both China’s anti-access and area-denial capabilities. Essential reforms of the air force’s organizational, training and personnel systems ensure that its newly-acquired platforms, weapons, and equipment are utilized to their maximum capacity.

**Figure 2: China's Conventional Anti-Access Capabilities**

Source: Adapted from Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China, 2010* (Washington, DC: U.S. Department of Defense, 2010), p. 32.

The combination of China's improving anti-access and area-denial capabilities poses a significant challenge to U.S. military forces operating in the region. According to Mr. Hagen, the crux of the problem is the PLA's increasing ability to threaten U.S. military bases in the region in the event of a crisis:

*The root of the issue is the looming mismatch between U.S. basing options in the region and Chinese base attack capabilities. If aircraft carriers near Taiwan and airbases in Japan and South Korea can be attacked (or threatened to the extent that the U.S. is politically unable to utilize them) to the extent that sorties generated from them are significantly limited, operations from more distant locations such as Guam become the only remaining option.<sup>101</sup>*

The PLA's current missile force alone may be sufficient to close down U.S. air bases in the region in the event of a conflict between China and the United States. According to Mr. Hagen's research, only 30–50 missiles would be necessary to "overload and kill air de-

fenses, cover all of the open parking areas with submunitions to destroy aircraft parked there, and crater runways such that aircraft cannot take off or land.” The addition of a similar amount of cruise missiles would complicate the air defense scenarios, destroy aircraft shelters, and damage fuel and maintenance facilities.<sup>102</sup> As table 8 below shows, the PLA currently has the capability to attack with its conventional missile capabilities five of the six main U.S. air bases in East Asia.\* In addition, improvements to the PLA Air Force’s bomber fleet soon could allow it to target Guam, where the sixth U.S. Air Force base is located.

**Table 8: PLA Conventional Missile Capabilities Against U.S. Air Force Bases in East Asia**

Base	Distance from China	PLA Nonnuclear Missile Capabilities †
Osan Air Base, South Korea	400 km	480 theater ballistic missiles; 350 ground launched cruise missiles.
Kunsan Air Base, South Korea	400 km	480 theater ballistic missiles; 350 ground launched cruise missiles.
Kadena Air Base, Japan	650 km	80 theater ballistic missiles; 350 ground launched cruise missiles.
Misawa Air Base, Japan	850 km (1,000 km without overflight rights from Russia)	80 theater ballistic missiles; 350 ground launched cruise missiles.
Yokota Air Base, Japan	1,100 km	80 theater ballistic missiles; 350 ground launched cruise missiles.
Andersen Air Force Base, Guam	3,000 km	Currently free from theater ballistic missile threats; could face threats from medium-range ballistic missiles, submarine-launched ballistic missiles, and air-launched cruise missiles.

Source: USCC staff, based upon testimony of Jeff Hagen. U.S.-China Economic and Security Review Commission, *Hearing on China’s Emergent Military Aerospace and Commercial Aviation Capabilities*, written testimony of Jeff Hagen, May 20, 2010.

Not only would U.S. bases be threatened in the event of a conflict with China, but so too would U.S. deployed aircraft. Dr. Grant described to the Commission a worst-case scenario that might confront U.S. fighters in the event of an air battle with the PLA Air Force. After air and missile attacks against U.S. bases and aircraft carrier strike groups, any U.S. “fighters that do launch from land or sea bases will immediately confront the integrated air defense and superior number of the [PLA Air Force].” U.S. fighters beyond the range of the PLA’s surface-to-air missiles “would encounter large numbers of [China’s] fighters on combat air patrol.” Dr. Grant also pointed out that, while not on a par with more advanced U.S. fighters, the sheer superiority in the number of PLA Air Force fighters could be enough to degrade U.S. air operations.<sup>103</sup>

\* It should be noted that whether the PLA would attack U.S. bases in the event of a crisis is not known. This Report solely looks at what would occur *if* the PLA did indeed attack.

† The number of missiles represented in this table is not cumulative, and does not take into consideration the effect of depletion. In other words, any missiles fired at one base in the event of a crisis would draw down a corresponding number of missiles threatening other U.S. bases.

**Conclusions**

- Over the past decade, as part of its overall military modernization, China has significantly modernized its air and missile capabilities. This modernization process is across the board, to include foreign purchases and indigenous production of aircraft, weapons, and equipment. In addition, institutional changes such as organizational, personnel, and training reforms continue to improve the PLA Air Force's capacity to conduct operations.
- Augmenting its modernization efforts, Beijing has expanded the PLA Air Force's focus in recent years from solely concentrating on territorial defense operations, to now include extraterritorial offensive operations.
- Simultaneous with the modernization of China's Air Force, Beijing has also strengthened the PLA's ability to conduct conventional missile strikes. Improvements include fielding increased numbers and types of more accurate conventional ballistic and land-attack cruise missiles.
- As China's air and missile modernization efforts progress, Beijing's ability to threaten U.S. forward deployed forces and bases in the region is improving. Any PLA missile strikes and air raids against U.S. bases, if successful, could force the temporary closure of regional U.S. bases and inhibit the U.S. military's ability to operate effectively in East Asia. In addition, the future deployment of an antiship ballistic missile could seriously interfere with the U.S. military's freedom of access to the region.