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President Hu Jintao

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In a Fortnight

HU EMPHASIZES STABILITY DURING LUNAR NEW YEAR PILGRIMAGE

By L.C. Russell Hsiao

On the eve of the Lunar New Year, Chinese Communist Party (CCP) Chief and President Hu Jintao visited the prefecture-level city of Baoding in Hebei province (Xinhua News Agency, February 3). The annual spring festival pilgrimage has been used by Chinese leaders as a national platform for speaking to the Chinese people and an opportunity to hone in on important political messages. These appearances are loaded with political symbolisms that offer insight into the administration's concerns in the year ahead. This year was no exception.

For instance, at the outset of 2010 as negotiators from China and Taiwan were in the process of finalizing plans for the Economic Cooperation Framework Agreement (ECFA), Hu used the occasion to meet with Taiwanese businesspeople working in China's agricultural sector. This move was widely seen as a shot across the bow to assuage Taiwanese farmers' concern about the impending deal (See "Hu's New Year Charm Offensive toward Taiwan," *China Brief*, February 18, 2010).

Coming on the heel of Hu's much-touted state visit to the United States in late January, Hu's pilgrimage to Baoding was no less short of symbolism than in previous

years. A point not lost on the two sides during Hu's visit was the emphasis on stability. In reference to Sino-U.S. relations, President Obama noted: "That is something that can help create stability, order, and prosperity around the world, and that's the kind of partnership that we'd like to see." A catch not alluding observers is in the name of the city that Hu visited, *Baoding*, which includes the Chinese characters that stand for "maintaining stability" (*United Daily News* [Taiwan], February 8).

Hu's decision to spend the New Year in Baoding is also highlighted by the fact that he did not visit the provincial capital, Shijiazhuang. While Hu's itinerary was simple—it reportedly included a visit to a bus station, ostensibly to bless spring festival travels; a People's Armed Police unit to display the chairman's concern for Chinese forces; and the base of Wolf's Tooth Mountain (*langya shan*) to reinforce political staunchness—all these calculated appearances seem to reinforce Hu's message about maintaining stability (*United Daily News*, February 8).

According to some observers, the backdrop of the crisis unfolding throughout the Middle East and North Africa, as well as the destabilizing situations closer to home in Zhejiang province and Hubei province may have also prompted the supremo to decide to spend his new year in Baoding. To be sure, Baoding is situated along the outskirts of Beijing municipality, and the home of the military's elite force, the 38th Mechanized Group Army, which is the closest military unit protecting the nerve center of the party headquarters; in addition to the PAP's 113th division, which also serves Beijing (*United Daily News*, February 8).

President Hu's emphasis on stability in the annual New Year pilgrimage is also happening against the backdrop of growing calls for political reforms. Party leaders appear to be seriously thinking about the changes needed to cope with the very rapid socio-economic changes in Chinese society. Indeed, there is widespread public resentment over inequalities that have deepened in recent years within China.

In late January, a group called the Yanan Children Association (*yaan ernui lianyihui*), whose members include children of senior party officials who joined the party before 1949, convened a rare public meeting and issued a letter to the 18th National Congress calling on it to initiate

political reforms and hold direct elections within the party for some low-ranking and high-level positions, as well as politburo committees (*China Times* [Taiwan], February 7; *United Daily News*, February 7). According to unconfirmed reports, the association's president is Hu Muying, who is the daughter of Hu Qiaomu, and members include Chairman Mao's daughter Li Min, Zhou Enlai's niece Zhou Bingde, Ren Bishi's daughter Ren Yuangfang, Lu Dingyi's son Lu Jianjian, Guo Morou's daughter Guo Shuying, among many others.

As the 18th Party Congress approaches (scheduled for the fall of 2012), the wholesale personnel changes will have important implications on the orientation of the party, given that more than 60 percent of the Central Committee and about half of the Politburo are expected to vacate their seats for newcomers at the congress. As recent events suggest, the jockeying for power and influence is underway and progressive-minded as well as anti-reform factions within the CCP are engaged in a struggle. President Hu's lunar New Year message underscores this growing concern among the Chinese leadership that instability is on the rise. How that might translate into meaningful political reforms in the year ahead remains to be seen.

L.C. Russell Hsiao is the Editor of China Brief at The Jamestown Foundation.

Beijing Wary of "Color Revolutions" Sweeping Middle East/North Africa

By Willy Lam

The chances are low that an Egyptian-style "color revolution" is about to flare up in China any time soon. Yet it is a reassertion of the Chinese Communist Party (CCP) administration's seemingly lack of confidence that it has gone to great lengths to minimize the spillover effect that the dramatic events in Tunisia, Egypt, Jordan and Yemen may have on China. Apart from controlling news coverage of Egypt's "Lotus Revolution," the authorities are trying to steer the debate toward the unsuitability of the "Western democratic model" for developing countries. Top cadres including Premier Wen Jiabao are pulling out all the stops to convince China's underclasses that Beijing will be spending more on social-welfare benefits, in part ostensibly

to stem popular unrest. Should the CCP leadership fail to address long-festering sores such as the rich-poor gap and citizens' lack of freedom of expression, however, the possibility of the country's disadvantaged population emulating feisty Tunisian and Egyptian protestors cannot be ruled out.

Beijing, which observed a seven-day Lunar New Year vacation last week, has not responded to requests from foreign reporters to comment on whether an Egypt-like insurrection would be imminent in China. All that the Chinese Foreign Ministry Spokesman Hong Lei said on this topic was that "we hope Egypt will restore social stability and normal order as soon as possible" (FMPRC.gov.cn, January 30; AFP, February 2). Yet, the authorities took resolute steps late last month to restrict media coverage on the color revolutions in North Africa and Middle East – and to bar discussion by Netizens on social-networking and micro-blogging sites. Chinese editors have been told by the CCP Propaganda Department that they can only use news dispatches by the official Xinhua News Agency (Christian Science Monitor, February 1). Moreover, Netizens and bloggers are not allowed to talk about Egypt on the Chinese equivalents of Facebook or Twitter. Egypt-related searches on various micro-blogs, such as Sina.com, Netease.com and Weibo have produced either no results or error messages. This is despite the fact that with the availability of more "firewall-climbing" software, a sizeable proportion of China's 450 million Netizens has been able to gain access to foreign reports about the color revolutions (Reuters, January 30; The Economist, February 3; France24.com, February 3).

The Hu Jintao administration has attempted to divert public attention by focusing on the speed and efficiency with which Beijing dispatched chartered flights to send home a thousand-odd Chinese (including tourists from Hong Kong) stranded in various Egyptian cities. More significantly, official commentators have focused on the alleged deficiencies of Western-style democracy. An editorial in the *Global Times* pointed out that American and European institutions and norms ill-suited the people of Africa and the Middle East. "Color revolutions will not bring about real democracy," said the *Times*, which is a *People's Daily* subsidiary. "Democracy has a strong appeal because of the successful models in the West," the *Times* added. "But whether the system is applicable in other

countries is in question, as more and more unsuccessful examples arise" (*Global Times*, January 30; Reuters, January 31).

Other academics and experts have dwelled on the fact that given the quasi-alliance relationship between Egypt and the United States, upheaval in Egypt will only spell trouble for Washington's interests in the Middle East. For instance, Shanghai-based international relations expert Li Shimo noted that if real elections were to take place in Egypt and neighboring countries, the ballot box could produce Muslim leaders who would not only spurn U.S.-style democracy but also threaten America's oil supplies. "From the Iranian revolution onward, almost all democratic elections in the Islamic world have resulted in Islamist administrations that are against the West and Israel," he wrote (Huanqiu.com, February 1; Sina.com, February 1). It is interesting that Beijing also raised objections to Washington's alleged attempts to support pro-democracy demonstrations in Iran in 2009. The official *China Daily* pointed out in an editorial at the time that "attempts to push the so-called color revolution [in Iran] toward chaos will prove very dangerous." "A destabilized Iran is in nobody's interest if we want to maintain peace and stability in the Middle East, and the world beyond," it added (*China Daily*, June 18, 2009; Asia Times, June 20, 2009).

Yet a number of respected Chinese intellectuals have called attention to the fact that irrespective of the element of "outside interference," there are similarities between China and Egypt regarding the multitudinous grievances of the underclasses. Popular commentator and blogger Sima Nan noted that "China's social problems are not one whit less than those in Egypt." Sima indicated that in areas such as cost of living, property prices, high medical and education fees as well as corruption, the "trigger point" for Chinese masses copying the tactics of Egyptian protestors "is not that far away." Yuan Weishi, a well-regarded historian at Guangzhou's Zhongshan University, pointed out that if the Chinese economy were to slow down, the country would "very likely see turmoil again with widespread discontent with the government," "The Chinese public now has strong awareness of their rights and can never return to the old days when they were subject to manipulation and had no rights to voice their criticism," he added (Wyzxsx.com [Beijing], January 30; *South China Morning Post*, February 1).

In an apparent attempt to forestall social unrest, the CCP leadership has in the past several weeks, spotlighted the “close-to-the-masses” persona of senior cadres. Premier Wen paid a visit to the State Bureau of Letters and Petitions late last month to talk to disgruntled residents who were trying to lodge complaints against governments of different levels. “Our power is entrusted by the people,” Wen told the petitioners. “We should use our power to seek benefits for the people and we should responsibly tackle the difficulties faced by the people.” It was the first time that a senior official had ever talked to petitioners, who are regularly harassed and even imprisoned by police and state-security personnel. During the Lunar New Year period, Wen and President Hu mingled with the masses during inspection tours to Hebei and Shandong Provinces respectively. Both leaders pledged the government would pay more attention to the people’s livelihood particularly at times of inflation (China News Service, January 25; Xinhua News Agency, February 4).

Official newspapers have played up substantial boosts in social-security expenditures in the government’s 12th Five Year Plan (2011 to 2015). For example, annual increases in unemployment payouts, old-age subsidies and other benefits will by the middle of the decade be pegged to the rate of inflation. In response to widespread gripes about the real-estate bubble, the central government has pledged to build more subvented and low-cost housing in the coming five years. The target for 2011 is 10 million subsidized flats, a rise of 70 percent over last year’s figure (China News Service, January 6; *People’s Daily*, January 7). On top of the 22.8 percent increase in minimum wages across China last year, different cities have already announced salary hikes of around 15 percent to help workers cope with fast-rising living costs. While the official CPI jumped 4.6 percent last December, most Chinese economists reckon that food prices alone have gone up by at least 10 percent the past year. Partly owing to poor weather conditions nationwide, the government will be hard put to tackle the spiraling prices of rice, wheat, vegetables and meat (AFP, January 21; *People’s Daily*, January 26).

Much more significant, however, is the fact that in trying to prevent social upheaval, the CCP leadership seems unwilling to go beyond public-relations gestures. Take, for example, Wen’s brief encounter last month with eight petitioners, who complained to the premier about

issues such as the illegal confiscation of properties by local authorities. Even the official media has reported that while relevant government cadres had contacted the grievance bearers, the majority of their problems had not been solved. The officials also claimed that the petitioners had not been telling the truth. As Beijing University of Science and Technology Professor Hu Xingdou pointed out, the phenomenon of petitioners itself demonstrated grave institutional problems such as the ineffectiveness of the legal and judicial systems. “The only solution to the issue of petitioners is the independence of the judiciary, so that there would be adequate scrutiny of various levels of governments,” said the famous social critic (*Southern Metropolitan News* [Guangzhou] February 1; *Wen Wei Po* [Hong Kong], February 2; *Ming Pao* [Hong Kong] January 27).

According to political scientist Liu Junning, the rise of people power in the Middle East has highlighted the “crisis of authoritarianism” in China. “The authorities must begin deep-seated, systemic changes in the political field,” he said. “Steps such as boosting social-welfare payouts are only superficial, stop-gap measures.” Liu, however, does not see any sign that the CCP leadership is willing to contemplate political changes [1]. He and other observers think that the Hu leadership is bent on beefing up China’s already formidable public-security apparatus so as to crack down on destabilizing and “disharmonious” elements in society.

After neighboring Kyrgyzstan, which shares a border with the Xinjiang Autonomous Region, underwent a color revolution in 2005, President Hu issued instructions to bolster control over the nation’s dissidents and NGOs, especially those which maintain contact with Western organizations (See “Hu’s recent crackdown on political dissent,” *China Brief*, June 7, 2005). Several thousand dissidents, human-rights lawyers and NGO activists have been detained or harassed since then. Moreover, high-tech spy equipment has been installed throughout the country. For example, 1 million surveillance cameras have been set up in Guangdong Province, and 50,000 in Urumqi, the capital of Xinjiang (*The Guardian*, January 25; *New York Times*, August 2, 2010).

In an apparent attempt to persuade the masses not to succumb to the proverbial sugar-coated bullets of the capitalist West, patriotic scholars have issued new warnings

against an alleged “Western conspiracy” to undermine China’s rise through means ranging from military containment to spreading democratic ideals. For example, Peking University international affairs scholar Yu Wanli asserted in an article last week entitled “Concocting fears about China is an American strategic lever,” that Washington is using weapons including “its value systems and superior soft power” to discredit and rein in China. Zhou Jimo, a researcher at the China Center for International Economic Exchanges pointed out that “Western countries will pull out all the stops to suppress the Chinese economy” (Huanqiu.com, February 4; Sina.com, January 30). It remains to be seen, however, whether the CCP’s propaganda offensive, in addition to its time-tested carrot-and-stick approach of mixing economic inducements for its citizens with repressive measures can keep the lid on now that the winds of change are even sweeping through the far reaches of Africa and the Middle East.

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Notes:

1. Author’s interview with Liu Junning, February 5, 2011.

Assessing the PLA Air Force’s Ten Pillars

By Kenneth W. Allen

During Secretary of Defense Robert Gates’ visit to China in January 2011, he stressed the importance of solid military-to-military relations. As a result of his visit, the U.S. Air Force (USAF) and People’s Liberation Army Air Force (PLAAF) will hopefully engage each other through military exchanges across a wide range of issues

rather than in combat. Unfortunately, his emphasis on the resumption of military dialogue was overshadowed by the timing of China’s first flight test of its J-20 stealth aircraft at the Chengdu Aircraft Corporation during his visit. While the implications of the timing of the flight test are debatable, the USAF now has a window into understanding more about the aircraft, as well as an opportunity to discuss it openly with the PLAAF and aviation industry personnel.

Although most PLAAF analysis focuses on the impressive array of advanced weapon systems it has fielded over the past decade and is planning to field over the next decade, including the J-20, it is important to examine the PLAAF from a broad perspective by pointing out some of its strong and weak points beyond its weapons and equipment. Indeed, analyzing the weak points, as well as the strong points, could provide significant clues about the PLAAF’s overall capabilities in combat.

The purpose of this article is to help analysts at different levels (tactical, operational, and strategic) examine and engage the PLAAF using the Ten Pillars as a base. The Ten Pillars include organizational structure, leadership, doctrine, officer corps, enlisted force, education, training, logistics and maintenance, and foreign relations [1]. The article also provides information about the key joint billets PLAAF, PLA Navy (PLAN), and Second Artillery officers hold within the PLA’s joint leadership structure. Although the Army still dominates the leadership structure, patterns are emerging for permanent PLAAF, PLAN, and Second Artillery billets as Deputy Chiefs of the General Staff. These are important clues for examining the future commanders for each organization as the Chinese Communist Party’s 18th Party Congress in 2012 approaches.

KEY FINDINGS

Based on an assessment of the pillars, the following key findings are made:

1. The PLAAF and USAF are different. What works for one doesn’t necessarily work for the other. Analysts need to examine the PLAAF through its eyes without always comparing it to the USAF.
2. Assessing the PLAAF requires understanding how all Ten Pillars fit together, which includes assessing all

four branches (aviation, surface-to-air missiles, anti-aircraft artillery, and airborne) and five specialty forces (technical reconnaissance, electronic countermeasures, communications, chemical defense, and radar), as well as the education and training system.

3. The PLAAF is rapidly moving ahead technologically, especially through the deployment of new equipment, weapon systems, and information technology (e.g. informatization) with the goal of achieving integrated joint operations with the Army, Navy, and Second Artillery, but some advances are being held back by its historical culture and an Army-dominated leadership structure (See further discussion on this topic below). The PLAAF is also moving forward in its training capabilities. Key tactics training areas include unscripted, opposition force, jamming, night, all-weather, over water, minimum altitude, dissimilar aircraft, and aircraft-SAM/AAA de-confliction training, but the training is still not at the highest levels in several areas.
4. The PLA is a long way from becoming a truly joint military that incorporates senior PLAAF and PLAN officers in the highest-level organizations. The PLAAF remains underrepresented in the highest echelons, including the second and third tiers, of the Chinese Communist Party (CCP) Central Committee's Military Commission (CMC), the four General Departments—General Staff Department (GSD), General Political Department (GPD), General Logistics Department (GLD), and General Armament Department (GAD)—and the Military Region (MR) Headquarters.
5. Although the PLAAF recognizes that its capabilities, doctrine, and training must still evolve considerably in order to challenge U.S. power projection capabilities, it is exhibiting a growing sense of confidence in just about everything it is doing.
6. The PLAAF acknowledges that its training management and support systems are not adequate. In addition, the PLAAF recognizes that its operators are not granted sufficient autonomy to perform optimally in complex, dynamic operational environments. Centralized control remains a persistent and unresolved problem.

Although the PLAAF uses tactics training coordination zones for combined-arms and joint training, most training is opposition force.

7. The PLAAF's annual training cycle revolves around two key periods: all new officers arrive at their unit between July and September during the peak exercise season; and one-half of the PLAAF's conscripts/recruits turnover and all enlisted personnel who are not promoted to the next grade are demobilized during November through January.
8. The PLAAF's officer corps is changing, but not in all areas. Whereas PLAAF college graduates receive their technical training as a cadet, civilian college graduates, who comprised a high percentage (possibly 60 percent) of all new officers in 2010, may or may not receive any technical training prior to assuming their new billets. In addition, officer intermediate and advanced professional military education (PME) is separated by the five career tracks, each of which is taught in a different location.
9. The PLAAF's enlisted force is gradually evolving from a conscript force based primarily on new personnel having only a ninth grade education to a force recruited from high school graduates, college students, and college graduates. The goal is to build a more highly skilled noncommissioned officer (NCO) corps.
10. The PLAAF has been heavily involved in domestic disaster relief operations the past few years, which have provided opportunities for real-world, unopposed experience and has highlighted a critical lack of airlift assets.
11. The PLAAF is increasing its engagement with foreign air forces through functional and educational exchanges, as well as joint exercises, but foreign contact and exposure remains tightly constrained by PLA guidelines. For example, the PLAAF commander and political commissar are restricted to one foreign trip annually, and the PLAAF posts military attachés to only a few foreign countries.

THE PLA AF AND JOINTNESS

As China's economic center of gravity continues to shift from the interior to the coast, the role of the PLA AF, PLAN, and Second Artillery in terms of protecting sea lines of communication and territorial integrity through joint integrated operations will grow in relation to the Army. One indicator of the PLA AF's shifting role, as well as that of the PLAN and Second Artillery, in joint integrated operations concerns how it is, or is not, integrated into the PLA's "joint" leadership structure. The leadership structure, which is responsible for overseeing the entire PLA's ten pillars, consists of the Chinese Communist Party (CCP) Central Committee's Military Commission (CMC), the four General Departments—General Staff Department (GSD), General Political Department (GPD), General Logistics Department (GLD), and General Armament Department (GAD)—the Academy of Military Science (AMS), National Defense University (NDU), and the seven military region (MR) headquarters [2].

Although the PLA AF commander has been a member of the CMC since 2004, it is the author's opinion that the PLA AF does not, and will not for the foreseeable future, play a major role in the Army-dominated PLA leadership structure [3]. Specifically, there is debate about whether the current PLA AF commander, General Xu Qiliang, will become the Minister of Defense and/or a CMC vice chairman during the 18th Party Congress, which will be held in late 2012. Those arguing that he will move to one or both of these positions cite his age and seniority on the CMC and the grooming of General Ma Xiaotian as the next PLA AF commander [4]. Ma is currently one of the Deputy Chiefs of the General Staff (DCGS) and would have to retire if he does not become PLA AF commander. Those arguing against this cite the Army's historical domination of those positions. That said, however, it is the author's opinion that even if Xu does assume one or both of those billets, he will wear an Army uniform.

Concerning the PLA AF's, PLAN's, and Second Artillery's role in the four General Departments, the key to remember is that the General Departments serve not only as the joint command but as the Army Headquarters [5]. As such, the directors have always been, and will most likely always be, Army officers. As shown in Figure 1, within the four General Departments, PLA AF officers have served continuously

since 2004 as one of the DCGSs, and since 2005 as one of the deputies in the GPD. As such, it appears that the GSD and GPD now have permanent PLA AF deputy billets. It does not appear, however, that the GLD has a permanent PLA AF deputy billet.

No PLA AF, PLAN, or Second Artillery officers have ever served as a deputy in the GAD, which indicates it is less joint than the GSD, GPD, and GLD. Furthermore, it appears that only Army officers have served as the director for any second-level departments, such as the Operations, Intelligence, Cadre, Propaganda, Transportation, and Finance Departments.

TABLE 1: PLAAF, PLAN, AND SECOND ARTILLERY OFFICERS IN KEY JOINT BILLETS IN THE 2000s

Billet	PLAAF Officers	PLAN Officers	Second Artillery Officers
CMC Member (7-8)	Qiao Qingchen (2004-2007) Xu Qiliang (2007-Present)	Zhang Dingfa (2004-2006) Wu Shengli (2007-Present) [6]	Jing Zhiyuan (2004-Present)
Deputy, GSD (5)	Xu Qiliang (2004-2007) Ma Xiaotian (2007-Present)	Wu Shengli (2004-2006) Sun Jianguo (2009-Present)	Wei Fenghe (2010-Present) [7]
Deputy, GPD (4)	Liu Zhenqi (2005-Present)	Tong Shiping (2009-Present)	None
Deputy, GLD (3)	Li Maifu (2006-2009)	None	None
Deputy, GAD (4-5)	None	None	None
AMS Commandant	Zheng Shenxia (2003-2007) Liu Chengjun (2007-Present)	Zhang Dingfa (2002-2003)	None
NDU Commandant	Ma Xiaotian (2006-2007)	None	None
NDU Political Commissar	Liu Yazhou (2009-Present)	Tong Shiping (2007-2009)	None
Deputy, MR Hq (5)	7 MRAF commanders (1988-Present)	3 Fleet commanders (1988-Present)	None

Each MR Headquarters, which “exercises direct leadership over the Army units within its area of responsibility,” has an average of five deputy commanders [8]. Since 1988, each Military Region Air Force (MRAF) commander and Fleet commander has served concurrently as an MR deputy commander; however, all of the other MR deputy commanders who serve full time on the staff are Army officers. Furthermore, like the four General Departments, no PLAAF officers have served as the director of an MR first-level department and only a few PLAAF personnel apparently hold positions in any of the departments.

There are no indications this situation will change unless the PLA completely reorganizes the, CMC, General Departments, and MR Headquarters.

CONCLUSIONS

The USAF and PLAAF are different and will employ their assets differently in combat. As such, one should not necessarily compare the two using the same criteria. While it is important to focus on the PLAAF’s weapon systems, it is also important to examine the PLAAF as a whole to see where it is moving forward and where it is not in terms of its goal of achieving integrated joint operations with the Army, Navy, and Second Artillery.

There is no doubt but that the PLAAF is modernizing its force with new weapon systems and equipment, including combat aircraft, air-to-air missiles, air-to-surface missiles,

surface-to-air missiles, and ground-based radar systems. It is also trying to conduct more realistic training with the new equipment with the goal of eventually implementing integrated joint operations with the Army, Navy, and Second Artillery. That said, however, the PLAAF is lagging behind in many areas that affect how it can use these new systems to the best of their abilities, especially during sustained offensive and defensive operations. One of the biggest areas of concern is the lack of sufficient airlift assets and the ability to coordinate between fighters and SAMs inside an air defense zone. In addition, it is dealing with trying to recruit, train, and retain a more educated enlisted force and officer corps to be able to operate and maintain these new systems.

One of the biggest reason the PLAAF is not moving forward as rapidly as it could across the board is that it is being held back by its historical culture, including subservience to the Army's dominance in the CMC, General Departments, and Military Region Headquarters, and its inability to push command decisions down to lower levels. As such, there are no indications this situation will change in the near future.

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NOTES:

*The article is a shortened version of the full paper that will be published by The Jamestown Foundation. This article provides the 11 key findings and conclusion sections from the full paper. Although weapon systems and equipment, including the new J-20, is one of the pillars, the U.S. Government and media cover this topic in depth, so the topic is discussed only briefly in the paper

1. The concept of the "ten pillars" is based on the US military's concept of DOTMLPF, which stands for Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities; however, the author adjusted it for the PLAAF by including logistics and maintenance and foreign relations. See Department of Defense Dictionary of Military and Associated Terms (JP 1-02), April 12, 2001, Appendix A, 44.

2. See Kenneth W. Allen, "Assessing the PLA's Promotion

Ladder to CMC Member Based on Grades vs. Ranks," Jamestown Foundation *China Brief*: July 22, 2010, Volume 10 Issue 15 (Part 1); August 5, 2010, Volume 10 Issue 16 (Part 2). These can be found at www.jamestown.org/programs/chinabrief/archivescb/cb2009/?tx_publicationsttnews_pi2%5Bissue%5D=15. The AMS and NDU commandant billets, along with the DCGS billet, are MR leader-grade billets, and, as such, are a stepping stone to the PLAAF commander position.

3. Altogether, four of the PLAAF's ten commanders—Liu Yalou, Zhang Tingfa, Qiao Qingchen, and Xu Qiliang—have been CMC members.

4. See Cheng Li, *China's Midterm Jockeying: Gearing Up for 2012 (Part 3: Military Leaders)* and Alice L. Miller, "The 18th Central Committee Politburo: A Quixotic, Foolhardy, Rashly Speculative, but Nonetheless Ruthlessly Reasoned Projection," in *China Leadership Monitor*, June 28, 2010, Issue 33, which is available at <http://www.hoover.org/publications/china-leadership-monitor>. See also Joseph Y. Lin, "Reorientation of China's Armed Forces: Implications for the Future Promotions of PLA Generals," *China Brief*, Vol X, Issue 13, June 24, 2010, 7-10, which is available at http://www.jamestown.org/uploads/media/cb_010_64.pdf.

5. Hu Guangzheng, ed. *Modern Military Organizational Reform Research* (Beijing: Military Science Publishing House, October 2007), 96.

6. Wu Shengli was not appointed as a CMC member until 14 months after he became the commander.

7. Wei Fenghe took office on 31 December 2010 and raised the total from four to five DCGSs. This promotion makes him the front runner to replace Gen. Jing Zhiyuan as the Second Artillery commander at the 18th Party Congress in 2012.

8. Hu Guangzheng, ed. *Modern Military Organizational Reform Research* (Beijing: Military Science Publishing House, October 2007), 96.

Taiwan's Ballistic-Missile Deterrence and Defense Capabilities

By Ed Ross

Even as the Obama administration appears to be holding back on U.S. arms sales to Taiwan, seeking to build

better relations with Beijing, and while cross-strait relations continue to improve, Taiwan is moving slowly toward the acquisition of a credible missile-defense capability to deter and defend against a People's Republic of China (PRC) ballistic-missile attack. To be sure, Taiwan will not have all the critical elements in place for a few more years, but major U.S. Foreign Military Sales (FMS) to Taiwan necessary for a missile-defense system have been approved by Congress, the Letters of Offer and Acceptance (LOAs) have been implemented [1], and contracts with U.S. defense industries have been signed or soon will be. All that is required, once Taiwan's recent purchases have been delivered, for it to complete the system is full integration of Taiwan's Patriot missile firing batteries with its early warning and command and control systems.

THE PRC MILITARY THREAT TO TAIWAN

The PRC military threat to Taiwan has increased dramatically over the years as China has deployed approximately 1500 short- and medium-range ballistic missiles along the Taiwan Strait [2]. While China's ability to coerce or attack Taiwan with its increasingly sophisticated fighter aircraft and submarine fleets are ever-increasing threats, in the absence of a comprehensive Taiwan missile-defense system, the military and political risk for China of a missile attack remains significantly less than that of air strikes or a blockade. Moreover, China's ability to launch an amphibious invasion of Taiwan remains limited by its sea lift and amphibious attack capabilities [3].

Since 2002, the U.S. government has assessed that Taiwan no longer has the capability to maintain air dominance over its territory [4]. Taiwan's ground-based air defenses—its U.S.-supplied Patriot and I-Hawk missiles, its domestically produced Tien Kung I and II (Sky Bow) missiles [5], and its air force still pose a major risk for Chinese fighter and bomber aircraft. How long would it take for China to overcome Taiwan's air defenses, what losses China would incur in achieving that goal, and how long would it take the U.S. Pacific Fleet to come to Taiwan's defense are part of a dynamic deterrence equation that has been shifting in China's favor for at least the past decade [6]. Operational deployment of China's recently unveiled J-20 "stealth" fighter [7] remains several years away. Its introduction certainly would further tip the balance of power toward China and gives further arguments for the sale of new

F-16C/D fighters to Taiwan.

Sustaining a military blockade of Taiwan is also not without risk for China. It risks igniting a broader conflict; and if Taiwan sunk just one PRC warship in response, it would be an embarrassment for the People's Liberation Army (PLA). It is not clear how Taiwan's major trading partners, Japan and the United States, would react should the PRC take military action against an American or Japanese flagged ship attempting or perceived to be attempting to challenge the blockade. They and the United Nations would have plenty of time to condemn China and take other actions to mitigate the result a blockade was intended to produce.

A missile attack on Taiwan, in the absence of an adequate missile-defense, however, poses little risk for China beyond the international condemnation that would follow. How the international community would react to a ballistic-missile attack on Taiwan depends largely on the events leading up to it. From a purely military perspective, however, no aircraft, ships, or PRC military personnel would be at hazard. Certainly, Taiwan could attack targets on the Chinese mainland in retaliation, but Taiwan's capability to do that with missiles and aircraft is limited, and the systems and bases Taiwan would use for such attacks would be among the primary targets of a PRC ballistic-missile strike.

EFFECTIVE MISSILE DEFENSE

For Taiwan to deter and effectively defend against a ballistic-missile attack, its missile defenses would have to be capable of intercepting a large percentage of PRC missiles. Certainly, many would get through, but the ability to intercept 40, 50, or even 60 percent of them would constitute a major deterrent, and should deterrence fail, it would greatly mitigate the effect of such an attack [8]. Furthermore, just as Americans were surprised and buoyed by television images of U.S. Patriot missiles intercepting Saddam Hussein's Scud missiles during the First Gulf War, the citizens of Taiwan would also be encouraged by images of Taiwan's Patriot missiles intercepting large numbers of PRC ballistic missiles. China's ability to coerce and induce panic among the population would be decreased.

What then, does Taiwan require to achieve such a result? Despite the ability of the AN/MPQ-53/65 patriot radars to track and engage large numbers of targets simultaneously,

Patriot missile batteries alone are insufficient. Details of the capabilities and vulnerabilities of the Patriot PAC-3 (hit-to-kill) missile [9] or the PAC-2 Guidance Enhanced Missile (GEM) [10] and their associated radars and systems are classified. But it is not necessary to have access to that information to understand why Patriot batteries are only one element of a complete missile-defense system. The radars have a range of approximately 170 kilometers [11], insufficient to detect the majority of PRC missiles in the boost phase on the Chinese mainland. Moreover, even though the PAC-3 missiles were designed specifically for missile-defense, unless they are tied into an integrated command, control, communications, computers (C4) system that provides for early warning missile detection, tracking and the prioritization of incoming threats, the number of ballistic missiles they are likely to intercept in a large-scale attack would be greatly reduced.

The optimal deployment of Taiwan's missile batteries is also important. Taiwan's existing three Patriot batteries are currently deployed in the greater Taipei area [12]. Will China attack population centers, or will it concentrate on military targets? Will China conduct a mass missile attack at many targets all at once or will it saturate priority targets in order to insure their destruction? If Taiwan chooses to defend the wrong targets, the effectiveness of its missile defense system is diminished. These are not questions that are difficult to answer from a military perspective. They can be difficult to answer from a political one. Taiwanese politics may demand that Taiwan defend its population centers at the expense of military targets that are more likely to be threatened. Would Beijing target other Chinese civilians, or would it choose to destroy Taiwan's defenses as quickly as possible to bring Taiwan to the peace table before a possible U.S. intervention became a factor?

Taiwan is now in the process of acquiring seven additional Patriot firing batteries and PAC-3 missiles, and it is upgrading the existing three batteries acquired in late 1990s to fire both PAC-2/GEM and PAC-3 missiles. Three additional batteries were notified to Congress in October 2008 during President George W. Bush's administration [13], and four were notified in January 2010 during President Barack Obama's administration [14]. When all deliveries are complete, sometime around the mid-decade, Taiwan will have a total of 10 batteries capable of firing either PAC-2/GEM or PAC-3 missiles. One launcher can

hold four PAC-2/GEM or 16 PAC-3 missiles. Each battery has eight launchers. That puts 32 active PAC-2/GEMs in a battery or as many as 128 PAC-3s. U.S. Army doctrine is to mix them for optimal defense against ballistic-missile and air-breathing threats. Taiwan will do the same.

Even with two or more Patriots of both types fired at each incoming ballistic missile, provided Taiwan maintains sufficient reloads, the Taiwanese military could have an adequate number of missiles to intercept a large percentage of incoming PRC missiles. Provided its missile early-warning, tracking, target prioritization and C4 systems are up to the job, Taiwan's missile-defense capability would be a formidable one.

The long range early warning Surveillance Radar Program (SRP) [15], provides Taiwan with one phased array radar similar to the U.S. PAVE PAWS system and two missile warning centers. Taiwan originally requested two radars, but the Legislative Yuan (LY) during the Chen Shui-bien administration, when defense-budget battles between the president's Democratic Progressive Party (DPP) and the Nationalist-Party (KMT) controlled LY prevented fully funding both radars, only provided funding for one. Construction of the remaining radar has been plagued with delays and cost increases due to the difficulty of construction at its mountain-top location. In addition, the original program was not scoped to fully integrate it with Taiwan's Patriot batteries or the Syun An C4 system [16]. When the SRP will be fully operational and fully integrated is difficult to say; however, it should be operational by the time all Patriot missile batteries have been delivered.

The Syun An C4 system, the result of Phase I of the Po Sheng C4ISR FMS program completed in December 2009, was also reduced in scope by the LY and does not currently include missile defense integration [17]. Taiwan must expand it to incorporate missile defense command and control and target prioritization before its missile defense program can reach its full potential. This is not difficult to do, nor would it take a long time. All that is required is funding from the LY and a Letter of Request to the U.S. government.

MISSILE DEFENSE VULNERABILITIES

Critics of Taiwan's missile defense system point out its

vulnerabilities, specifically the vulnerability of the SRP radar. Certainly the long-range radar would be among the first targets of a PRC ballistic-missile or anti-radiation missile attack. Taiwan would have to dedicate some portion of its Patriot and other air-defense resources to defend it. A second SRP radar was intended to provide Taiwan with 360° cruise missile coverage as well as redundancy and survivability of its ballistic missile early warning, detection and tracking capability. A second SRP would make Taiwan's missile defense system more survivable and more effective. Taiwan also has other intermediate range radars that if fully integrated into the overall system provide complimentary and back up capability.

In a crisis, and should the SRP radar be destroyed, the United States could also provide satellite early warning and tracking via direct data transfer as it does for its own forces. Yet, that would require providing a means to integrate that information with Taiwan's C4 system and a cryptographic interface in advance. A PRC ballistic missile attack on Taiwan would not come as a bolt from the blue. A deterioration of China-Taiwan relations and a period of rising tension would likely precede it, providing the U.S. and Taiwan some period of time to put satellite early-warning data transfer in place. The United States currently operates a less sophisticated Shared Early Warning System (SEWS) that provides missile launch warning information to friendly and allied countries [18].

Critics also argue that all China has to do is produce and deploy more missiles until it has enough to completely overwhelm any quantity of Patriots Taiwan may possess. While this point is valid, all that does is reduce the percentage of PRC missiles that Taiwan can intercept. Beijing can not know in advance what that percentage might be or what targets it might fail to destroy, and, therefore, it cannot completely discount the deterrent value of Taiwan's missile defense system. Moreover, what if a ballistic missile attack precedes an attack by China's fighters and bombers—as it likely would? Taiwan would expend most, if not all of its PAC-3 missiles at ballistic-missile targets leaving a few remaining PAC-2/GEM along with I-Hawk, and Tien Kung missiles to deal with them. While this strategy diminishes the effectiveness of Taiwan's overall air-defense system, it does not diminish the effectiveness of Taiwan's ballistic-missile deterrence and defense capability.

CONCLUSION

As the United States and China continue to improve political, economic, and military ties, U.S. arms sales to Taiwan will remain a principal irritant to the relationship. Whether the Obama administration will move forward on major new arms, sales such as F-16C/Ds, remains an open question. Taking the final steps necessary to complete Taiwan's missile defense system, however, will go a long way toward shoring up Taiwan's lagging military capabilities. A robust Taiwan missile-defense system makes eminent military and political sense for Taiwan and for the United States. It contributes to peace and stability in the Taiwan Strait and strengthens Taipei's hand as it strives to improve relations with Beijing. Taiwan is slowly acquiring the necessary components of a missile-defense system that will deter a PRC ballistic-missile attack should China-Taiwan relations deteriorate, and it will enable Taiwan to effectively defend against a ballistic-missile attack should deterrence fail. All that is necessary for Taiwan to achieve the systems full potential is for Taiwan to submit and for the United States to accept a Letter of Request (LOR) and approve a LOA for the complete integration of the Patriot, SRP, and Syun An C4 systems.

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NOTES:

1. An FMS case is "implemented" when a government-to-government Letter of Offer and Acceptance (LOA) has been signed and countersigned and the purchasing country has made its initial payment.
2. "The Balance of Air Power in the Taiwan Strait," (U.S.-Taiwan Business Council, May 2010): 9.
3. DoD, Military and Security Developments Involving the People's Republic of China 2010, http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf.

4. DoD, China Military Power Report 2002.
5. Janes Strategic Weapon Systems, <http://www.janes.com/articles/Janes-Strategic-Weapon-Systems/Tien-Kung-1-23-Sky-Bow-Taiwan.html>.
6. The U.S. has no legal or treaty obligation to come to Taiwan's defense in the event of a military attack by China, but since the U.S. formally recognized the PRC and derecognized Taiwan in December 1979 the U.S. has maintained the sale of defense articles and services to the Taiwan armed forces, and it has maintained operational plans to come to Taiwan's defense should it be necessary and ordered by the President of the United States.
7. James Dunnigan, "Chinese Stealth Fighter Sighted," StrategyPage.com, January 20, 2011, <http://www.strategypage.com/dls/articles/Chinese-Stealth-Fighter-Sighted-1-20-2011.asp>.
8. It is extremely unlikely that China would arm missiles fired at Taiwan with chemical or biological warheads; and the effects of convention explosive warheads are no different than equivalent-sized bombs dropped from aircraft.
9. Patriot PAC-3 missiles are manufactured by the Lockheed Martin Corporation.
10. Patriot PAC-2 Guidance Enhanced Missiles are manufactured by the Raytheon Corporation.
11. The ranges of Patriot radars are classified. Open source information varies, but not much. AN/MPQ-53/65 multifunction phased array radar Patriot MIM-104, http://www.armyrecognition.com/patriot_mim-104_vehicles_systems_us_army_uk/an_mpq-53_patriot_radar_search_detection_illumination_data_sheet_specifications_information_uk.html.
12. As the Principle Director for Operations in the Defense Security Cooperation Agency the author over saw all U.S. Foreign Military Sales programs to Taiwan, travelled to Taiwan frequently and visiting the Patriot sites.
13. Defense Security Cooperation Agency, 36(b) Major Arms Sales, Press Release, October 3, 2008, http://www.dsca.osd.mil/PressReleases/36-b/2008/Taiwan_08-56.pdf.
14. Defense Security Cooperation Agency, 36(b) Major Arms Sales, Press Release, January 29, 2010, http://www.dsca.osd.mil/PressReleases/36-b/2010/Taiwan_09-75.pdf.
15. Taiwan Air-Defense Overview, GlobalSecurity.org <http://www.globalsecurity.org/military/world/taiwan/air-defense-over.htm>.
16. Syun An, originally known as the Po Sheng C4ISR

FMS Program, is the name Taiwan gave to the data-link (TADLS) program when, in 2002, it combined data-link with the Taiwan Command and Control System (TCCS) recommended in DSCA C4ISR Architecture Study, it became synonymous with Taiwan's overall C4ISR efforts.

17. Syun An, provides Taiwan with several operational advantages. It distributes near real-time common tactical picture. It provides commanders accurate, timely information for improved situational awareness. It maximizes unit, sensor and weapon employment. It optimizes weapon-target pairing for layered defense. And its automation increases operator efficiencies, reduces errors. However, numerous platforms have not yet been equipped with data-link terminals. Improving Taiwan's Military Capabilities, C4ISR Integration, by Edward W. Ross, U.S.-Taiwan Business Council Defense Conference 2009, September 27-29, 2009 Boars Head Inn Charlottesville, Virginia, http://ewrossinternational.com/taiwan_c4isr.pdf.

18. "Shared Early Warning System Begins Mission at Peterson," June 22, 2003, http://www.spacewar.com/reports/Shared_Early_Warning_System_Begins_Mission_At_Peterson.html.

Satellites Support Growing PLA Maritime Monitoring and Targeting Capabilities

By Andrew S. Erickson

New satellites are enhancing Chinese command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities. These systems will enable the Chinese military to strengthen cueing, reconnaissance, communications, and data relay for maritime monitoring and targeting. The successful achievement of high quality real time satellite imagery, target-locating data and fusion, as well as reliable indigenous satellite navigation and positioning would facilitate holding enemy vessels at risk via devastating multi-axis strikes involving precision-guided ballistic and cruise missiles. Emerging space-based C4ISR capabilities could thus greatly increase China's capability to use military means to assert its interests along its contested maritime periphery.

Beijing's satellite capabilities, while still far from cutting-edge in many respects, are improving rapidly. China today has only a fraction of the overall space capability of the United States, retains major gaps in coverage in every satellite application, and relies to a considerable extent on technology acquired through non-military programs with foreign companies and governments. Beijing will likely purchase supplementary "high-resolution, electro-optical and synthetic aperture radar commercial imagery," according to the U.S. Department of Defense (DoD), until it is able to deploy a more advanced set of reconnaissance satellites in the coming decade. The current sources of Chinese space imagery include "all of the major providers including Spot Image (Europe), Infoterra (Europe), MDA (Canada), Antrix (India), GeoEye (United States), and Digital Globe (United States)" [1].

Yet, Beijing is combining foreign knowledge with increasingly robust indigenous capabilities to produce significant advances in maritime C4ISR. High-resolution satellites, launchers, and launch infrastructure are prioritized. China is developing and acquiring relevant technologies via all available means, with satellite-specific "thermal insulation blankets" and "traveling wave tubes" cited by DoD as particular areas of foreign collection [2]. Chinese satellite developers are implementing a competitive workplace culture that emphasizes modern management, standardization, quality control (including ISO 9000 management initiatives) and emerging mass production ability—part of a larger trend in China's dual-use military-technological projects [3]. China's in-orbit assets are growing rapidly. Near/real-time C4ISR is facilitated increasingly by China's integrated *Qu Dian* system and related networks and data links, which include secure People's Liberation Army (PLA) voice/data communications provided by *Fenghuo/Zhongxing/Shentong* comsats [4].

DETECTION AND TARGETING FROM SPACE

These advances are greatly improving China's ability to monitor and threaten force deployments on its periphery. According to VADM David Dorsett, Deputy Chief of Naval Operations (CNO) for Information Dominance, "Ten years ago if you looked at their C4ISR capabilities they did not have an over-the-horizon radar. They had virtually [...] no ISR satellites. They now have a competent

capability in ISR and over-the-horizon radars, but the years from now we expect a much greater increase in the numbers of satellites they have in orbit and their capability to fuse information" [5]. Specifically, DoD added that: "The PLA Navy is improving its over-the-horizon (OTH) targeting capability with Sky Wave and Surface Wave OTH radars. OTH radars could be used in conjunction with imagery satellites to assist in locating targets at great distances from PRC shores to support long range precision strikes, including by anti-ship ballistic missiles" (ASBM) [6]. A wide range of Chinese technical sources concur with the DoD's assessment. According to two researchers affiliated with the PLA Navy Aviation Engineering Academy: "Through the integration of the data obtained via a number of different satellites, and with the addition of processing and data fusion, [one could] guarantee missile guidance requirements for all types of target information for a long-range ASBM strike" [7].

Satellites are already a key emerging link in ISR architecture that the PLA needs to detect, track, and—in a worst-case scenario—strike foreign surface vessels on its contested maritime periphery. China is developing a wide variety of precision weapons, including the initial operational capability-equivalent (IOC) DF-21D ASBM, which would benefit greatly from improved ISR capabilities. According to VADM Dorsett, while data fusion probably remains a challenge and China's ASBM has yet to be tested against sea-based maneuvering targets, "China likely has the space based intelligence, surveillance and reconnaissance (ISR), command and control structure, and ground processing capabilities necessary to support DF-21D employment. China operates a wide spectrum of satellites, which can provide data useful for targeting within its maritime region." Moreover, "China's non-space based ISR could provide the necessary information to support DF-21D employment. This includes aircraft, UAVs, fishing boats, and over-the-horizon radar for ocean surveillance and targeting" [8]. This is significant, as many previous Chinese and foreign open source assessments claimed that the lack of satellite/C4ISR infrastructure precluded effective ASBM employment. Demonstrated Chinese ASBM capability to strike a moving maritime target would not only suggest the potency of a new, unique weapons system, but also serve as a bellwether of emerging C4ISR-supported anti-access/area denial (A2/AD) capabilities.

China's ~15 reconnaissance-capable satellites include electro-optical, multi- and hyper-spectral, and radar, especially synthetic aperture radar (SAR). Several satellite series are particularly relevant to maritime monitoring.

HAIYANG AND *HUANJING*: PIONEERING OCEAN SURVEILLANCE

Maritime surveillance, a significant focus of PRC satellite development, has been prioritized at the national level as one of eight key areas specified by China's 863 State High-Technology Development Plan [9]. China's first series of dedicated maritime monitoring satellites is designed and developed by China Academy of Space Technology (CAST) and administered by the State Oceanic Administration (SOA).

China launched its first maritime observation satellite, *Haiyang-1A*, on 15 May 2002. This satellite, which monitored ocean water color and temperature, had military applications; an official publication states that 12 percent of *Haiyang-1A*'s 2003 "satellite data distribution" was "military." HY-1B, with a 3X faster ocean color scanner (permitting a one day revisit period), was launched in April 2007 to survey China's maritime periphery, including the East and South China seas. Fully operational versions are scheduled to follow: HY-1C, -1D, and -2A in 2011, and HY-3 in 2012 [10].

A total of 15 further *Haiyang* ocean monitoring satellites are planned, in three sets. The HY-1 series will monitor ocean color with an optical radiometer and sea surface temperature with a medium spatial resolution optical sensor. Eight satellites, designated HY-1C -J, will be launched in pairs every three years between 2011 and 2019. Four satellites, HY-2A -D, will be launched every three years over the same period. The HY-3 series will use synthetic aperture radar (SAR) sensors with 1-10 m resolution and X-band radar to monitor maritime resources, pollution, and coastal zones. Three satellites will be launched in 2012, 2017, and 2022 respectively.

Likewise relevant to maritime surveillance will be China's *Huanjing* disaster/environmental monitoring constellation, envisioned to contain eleven satellites capable of visible, IR, multi-spectral, and SAR imaging. Two initial satellites in the series, *Huanjing-1A* and -1B, provide real time multi-

and hyper-spectral imaging respectively, to a resolution of 30 m. *Huanjing-1C* and -1D are reportedly scheduled for launch in 2011. The full constellation is designed to form a complete image on China every 12 hours [11].

YAOGAN: OPENING SHARPER EYES FOR ISR

China's *Yaogan* series of advanced SAR and electro-optical remote sensing satellites, while officially civilian in mission, operate from "similar, near-polar, Sun-synchronous orbits," suggesting that they "provide multi-wavelength, overlapping, continuous medium resolution, global imagery of military targets" [12]. It may build on the *Ziyuan/Jianbing* series, China's equivalent of the China-Brazil Earth Resources series, which conducts real time digital photoreconnaissance. It may also be related to the *Tianhui-1* stereotopographic mapping satellite.

Yaogan 1, launched on 27 April 2006, has since completed its mission. *Yaogan 2-11* were launched between 25 May 2007 and 22 September 2010, for a total of 12 satellites currently operational in orbit. The rapid pace of recent launches (7 since 9 December 2009) suggests that this is a particularly high priority for China. *Yaogan 12* is reportedly scheduled for launch in March 2011; further launches could rapidly consolidate coverage of China's maritime periphery. Table 1 details *Yaogan* satellites launched to date.

Of particular interest with respect to potential for cueing of ASBMs and other precision weapons is the launch of *Yaogan 9A*, B, and C together on March 5, 2010 to coincide with the first day of China's National People's Congress. These satellites fly in triangular formation in similar orbits at identical inclination, apparently as a type of Naval Ocean Surveillance System (NOSS). According to *Jane's*, "Yaogan-9 reportedly carries millimetre-wave [*sic*] radar to help the trio stay in close orbital formation, infra-red sensors to detect ships, and antennas to pick up electronic emissions. They are thought to be able to find and track major Western warships, providing accurate positional data for targeting by land-based [ASBM] systems" [13]. The U.S. Navy reportedly deployed such a system, White Cloud, beginning in the early 1970s, apparently to detect surface vessels by sensing their electronic emissions and locating them using time distance of arrival [14].

China uses a variety of other satellites to link these sensors

to shooters, and support related network functions. Its first data relay satellite, *Tianlian-1*, facilitates near-real-time communication between satellites and ground control, complementing China's > 10 ground stations and 4 operating *Yuanwang* space event support ships. *Tianlian-2* will reportedly be launched in June 2011. To enhance weapons guidance accuracy, China's *Beidou-2/Compass* navigation/positioning system will distribute positional data [15].

COMPASS: PROVIDING POSITIONING AND COMMUNICATIONS

A central challenge for Chinese weapons employment is guaranteeing access to global positioning information without depending on the U.S. Global Positioning System (GPS) constellation, the signals of which Beijing fears the United States might restrict during wartime. A retired senior PLA official alleges that PLA analysis concluded that unexpected GPS disruption likely caused the PLA to lose track of the second and third missiles of a three-missile salvo being fired into the East China Sea 18.5 km from Taiwan's Keelung naval port in March 1996, as part of a larger effort to deter what Beijing perceived to be pro-Taiwan independence moves. "It was a great shame for the PLA ... an unforgettable humiliation. That's how we made up our mind to develop our own global [satellite] navigation and positioning system, no matter how huge the cost. "Beidou is a must for us. We learned it the hard way." Retired PLA general Xu Guangyu adds that China's *Beidou* and *Yuanwang* systems guarantee that "There is no chance now for the US to use its GPS to interfere in our operations at all" [16].

Satellite navigation facilitates the monitoring of friendly forces and the targeting of enemy forces by offering reliable positioning signals. It supports command and control by providing basic communications functions. At present, China uses the U.S. GPS and Russia's GLONASS satellite navigation systems as well as its own indigenous *Beidou* satellite navigation system [17]. Beijing has had only limited access to receiver technology and was denied access to the military mode of Europe's nascent Galileo system, apparently intensifying existing Chinese efforts to develop *Beidou* further [18].

China deployed its own three-satellite *Beidou-1* navigation

constellation in 2007, but it is limited to providing service from 70 to 140 degrees east longitude and from 5 to 55 degrees north latitude and navigation coverage accurate to within ~20 m. This enables *Beidou-1* to support operations on China's immediate maritime periphery, but not further afield. To ensure reliable independent access in the future, and to support broader operations, China is deploying a 35-satellite (5 geostationary, 30 medium earth orbit) constellation—called *Beidou-2/Compass*—that would provide much-improved accuracy, with regional navigation and communications coverage anticipated by 2011 and global navigation and communications coverage by 2015-20 [19]. Seven satellites have been launched thus far; four remain fully operational. Table 2 details *Beidou* satellites launched to date.

CONCLUSION

With China's rapid progress in independent systems, or "hardware," the biggest limitations on Chinese maritime surveillance and targeting lie in systems integration and "software." As Admiral Dorsett states, "They don't have a great ISR, integrated ISR capability. [...] They don't demonstrate a level of sophistication and joint warfighting, [...] while they're delivering technology and capabilities, they are at the early stages of operational proficiency across the board" [20]. Integration challenges involving software processing and data management and transfer reportedly plagued the PLA following Sichuan's 2008 Wenchuan Earthquake, although its response to the 2010 Yushu Earthquake—which relied in part on satellites, e.g., *Beijing 1*—reflected significant "lessons learned."

The sprawling, stovepiped nature of the many military services and organizations that control satellite/C4ISR architecture further complicates the horizontal/vertical inter-service, inter-level, military-civilian bureaucratic coordination necessary for real time data fusion to support kinetic operations. Institutional wrangling for control of China's space assets continues among such organizations as the General Armaments Department, the General Staff Department, and PLA Air Force—and even the Second Artillery and PLA Navy to some extent. GAD controls all orbital satellite operations, yet lacks a combat role. The PLAAF has developed extensive space-related theoretical research and has an officially approved doctrine of "integrated air and space, using both offense and defense"

[21], yet currently is not known to control any space assets. There are additionally rumors of a future Space Force [22]. Ownership and operational control of some satellites and applications are divided among more than a dozen governmental, university, and civil organizations, with 75 percent of satellites normally run by nonmilitary organizations and peacetime/wartime authority transfer dynamics remain unclear [23].

Despite these ongoing challenges, however, China's surveillance satellites—together with the supporting infrastructure, human and otherwise—is improving rapidly. Beijing has a clear strategic rationale to master the relevant capabilities, particularly for A2/AD operations in its Near Seas (Yellow, East, and South) and their approaches. Doing so could finally enable the PLA to translate its traditional approach of achieving military superiority in a specific time and area even in a context of overall inferiority (*yilie shengyou*) into the maritime dimension.

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NOTES:

1. DoD, Military and Security Developments Involving the People's Republic of China 2010, 36, http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf.
2. DoD (2010), 46.
3. "Hangtian Tsinghua Satellite Co. Approaches Satellite Market," China Space News, May 28, 2004: 4.
4. "Feng Huo," Jane's Space Systems and Industry, May 5, 2010.
5. Defense Writers Group (DWG), Vice Admiral David J. Dorsett, Deputy CNO for Information Dominance (N2/N6), Transcript of Q&A, January 5, 2011, <http://www.airforce-magazine.com/DWG/Documents/2011/January%202011/010511dorsett.pdf>.
6. DoD (2010), 2.
7. Pan Changpeng et al., "An Analysis on the Capabilities of Military Satellites to Support Anti-Ship Missiles in Offense and Defense Operations," *Winged Missiles Journal*, 5 (2006): 13. Op cit. Ian Easton and Mark Stokes, "China's Electronic Intelligence (ELINT) Satellite Developments," Project 2049 Institute, February 2011.
8. N2/N6 Public Affairs Office, January 3, 2011.
9. Mark Stokes, "China's Evolving Conventional Strategic Strike Capability" (Arlington, VA: Project 2049 Institute, September 14, 2009), 14.
10. For all launch schedule predictions, see "Chinese Launch Record," <http://www.sworld.com.au/steven/space/china-rec.txt>; www.forum.nasaspaceflight.com.
11. "Satellites Will Help Predict Disasters," China Daily, March 31, 2009, www.chinaview.cn.
12. "Yaogan Series," Jane's Space Systems and Industry, August 18, 2010.
13. Jane's.
14. Su Jianwei et al., "Electronic Reconnaissance Effectiveness Analysis of Ocean Surveillance Satellite to Surface Ship," *Shipboard Electronic Countermeasures* (August 2009): 51. Op. cit. Easton and Stokes.
15. "Beidou/Compass Series," Jane's Space Systems and Industry, August 18, 2010.
16. Minnie Chan, "'Unforgettable Humiliation' Led to Development of GPS Equivalent," South China Morning Post, November 13, 2009, <http://www.asiafinest.com/forum/index.php?showtopic=217363>.
17. DoD (2010), 36.
18. Peter B. de Selding, "European Officials Poised to Remove Chinese Payloads From Galileo Sats," 12 March 2010, <http://www.spacenews.com/policy/100312-officials-poised-remove-chinese-payloads-galileo.html>.
19. DoD (2010), 36.
20. DWG.
21. "China's PLA Eyes Future in Space and Air: Air Force Commander," People's Daily Online, <http://english.peopledaily.com.cn/90001/90776/90786/6799960.html>.
22. For an apparent official Chinese denial of this possibility, see "China Grounds 'Space Force' Talk," People's Daily Online, November 6, 2009, <http://english.peopledaily.com.cn/6805305.html>.
23. Eric Hagt and Matthew Durnin, "China's Antiship Ballistic Missile: Developments and Missing Links," Naval

War College Review, Vol. 62, No. 4 (Autumn 2009): 87-115, A1-2.

TABLE 1: YAOGAN SATELLITES LAUNCHED TO DATE—
NOTIONAL SPECIFICATIONS

Satellite	Military Designation	NORAD ID	Int'l Code	Contractor	Launch Date (UT)	Launch Site	Launch Vehicle	Orbit (Perigee X Apogee km, inclination)	Type
<i>Yaogan 1</i>	JB-5-1	29092	2006-015A	SAST	2006.04.26	Taiyuan	CZ-4B	634 X 636, 97.9° (since decayed)	SAR
<i>Yaogan 2</i>	JB-6-1	31490	2007-019A	CAST	2007.05.25	Jiuquan	CZ-2D	640 X 669, 97.9°	EO
<i>Yaogan 3</i>	JB-5-2	32289	2007-055A	SAST	2007.11.11	Taiyuan	CZ-4C	634 X 637, 97.8°	SAR
<i>Yaogan 4</i>	JB-6-2	33446	2008-061A	CAST	2008.12.01	Jiuquan	CZ-2D	643 X 666, 97.8°	EO
<i>Yaogan 5</i>	JB-8-1?	33456	2008-064A	CAST	2008.12.15	Taiyuan	CZ-4B	478 X 498, 97.3°	SAR
<i>Yaogan 6</i>	JB-7-1?	34839	2009-021A	SAST	2009.04.22	Taiyuan	CZ-2C	514 X 517, 97.6°	SAR
<i>Yaogan 7</i>	JB-6-3	36110	2009-069A	CAST	2009.12.09	Jiuquan	CZ-2D	635 X 674, 97.9°	EO
<i>Yaogan 8</i>	JB-7-2?	36121	2009-072A	SAST	2009.12.15	Taiyuan	CZ-4C	1200 X 1212, 100.4°	SAR
<i>Yaogan 9</i> A/B/C	?	36413, 36414, 36415	2010-009A, 2010-009B, 2010-009C	CAST	2010.03.05	Jiuquan	CZ-4C	1068 X 1127, 63.4°	ELINT
<i>Yaogan 10</i>	JB-5/7-3?	36834	2010-038A	SAST	2010.08.09	Taiyuan	CZ-4C	634 X 637, 97.8°	SAR
<i>Yaogan 11</i>	JB-6-4?	37165	2010-047A	CAST	2010.09.22	Jiuquan	CZ-2D	633 X 676, 98.0°	EO

Sources: “Real Time Satellite Tracking,” <http://www.n2yo.com>; “Yaogan (Jianbing 5/6/7),” www.sinodefence.com/space/military/yaogan.asp.

TABLE 2: BEIDOU/COMPASS SATELLITES LAUNCHED TO DATE—NOTIONAL SPECIFICATIONS

Satellite	NORAD ID	Int'l Code	Contractor	Launch Date (UT)	Launch Site	Launch Vehicle	Orbit	Status
<i>Beidou-1A</i>	26599	2000-069A	CAST/CASC	2000.10.30	Xichang	CZ-3A	GEO, 140°E è 58.7°E (as of 2010.11.28)	Usefulness Uncertain
<i>Beidou-1B</i>	26643	2000-082A	CAST/CASC	2000.12.20	Xichang	CZ-3A	GEO 80.5°E	Operational
<i>Beidou-1C</i>	27813	2003-021A	CAST/CASC	2003.05.24	Xichang	CZ-3A	GEO 110.5°E	Operational
<i>Beidou-1D</i>	30323	2007-003A	CAST/CASC	2007.02.02	Xichang	CZ-3A	GEO 58.75° è Disposal Orbit (as of 2009.02.18)	Not Operational
<i>Beidou-2/ Compass-M1</i>	31115	2007-011A	CAST/CASC	2007.04.13	Xichang	CZ-3A	MEO, period 1.289 hours	Experimental
<i>Beidou-2B/ Compass-G2</i>	34779	2009-018A	CAST/CASC	2009.04.14	Xichang	CZ-3C	GEO drifting; 84.5°E è Librating ~ 75°E libration point (as of shortly after launch)	Not Operational
<i>Beidou-2C/ Compass-G1</i>	36287	2010-001A	CAST/CASC	2010.01.16	Xichang	CZ-3C	GEO 160.0°E è 144.5°E (as of 2010.02.22)	Operational
<i>Beidou-2D/ Compass-G3</i>	36590	2010-024A	CAST/CASC	2010.06.02	Xichang	CZ-3C	GEO 84°E	Operational
<i>Beidou-2/ Compass-IGSO-1</i>	36828	2010-036A	CAST/CASC	2010.07.31	Xichang	CZ-3A	IGSO 118°E, 55.0°E incl.	Operational
<i>Beidou-2E/ Compass-G4</i>	37210	2010-057A	CAST/CASC	2010.10.31	Xichang	CZ-3C	GEO 160°E	Operational
<i>Beidou-2/ Compass-IGSO-2</i>	37256	2010-068A	CAST/CASC	2010.12.17	Xichang	CZ-3A	GEO	Operational

Sources: “Real Time Satellite Tracking,” <http://www.n2yo.com>; NASA, <http://nssdc.gsfc.nasa.gov/nmc/SpacecraftQuery.jsp>; www.gpsworld.com.
