

**EVOLVING CAPABILITIES
OF
THE CHINESE PEOPLE'S LIBERATION
ARMY:**

*CONSEQUENCES OF COERCIVE AEROSPACE POWER
FOR
UNITED STATES CONVENTIONAL DETERRENCE*



PROJECT
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INSTITUTE

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EXECUTIVE SUMMARY

Key elements of a strategy to enable the United States' to secure long-term, enduring interests in the Asia-Pacific region are to assure allies and friends, dissuade potential adversaries, deter and defeat aggression, and counter coercive uses of force. America's favorable position in Asia is sustained by acquiring the capabilities required for the aforementioned elements, and by its alliances and partnerships which remain essential to a region that is peaceful, prosperous, and free.

The People's Republic of China (PRC) has the greatest potential to compete militarily with the United States in the Asia-Pacific region, and field disruptive military technologies that could over time offset traditional U.S. military advantages.

How the PRC could apply force as an instrument of national power may be more significant than specific technical capabilities it develops and fields. An increasingly sophisticated arsenal of advanced weapon systems serves as an enabler for the PRC to expand its range of options for exercising coercive uses of force to resolve differences with democracies in the region.

Distinct from and more likely than attempts at annihilation of an opposing regime and physical occupation, coercive strategies present new and complex challenges for conventional deterrence. Aerospace power – the integrated application of conventional air assets, missiles, and electronic attack – is among the most flexible and effective coercive tools. Should the PRC prove capable of dominating the skies over allies and friends around its periphery, the credibility of U.S. conventional deterrence may diminish over time.

The PRC's confidence in its ability to conduct a coercive aerospace campaign likely will grow as the range and payload of PLA combat aircraft improves, land-attack cruise missiles are fielded in greater numbers, and the size, lethality, and accuracy of PLA theater ballistic missile force increases. The ability to deliver precise firepower rapidly and at extended ranges into the heart of neighboring countries presents a new and dangerous condition for democracies in the region.

The PRC's ability to successfully conduct a coercive aerospace campaign would present significant challenges to the United States in meeting its legal obligations under the [Taiwan Relations Act](#) (TRA). If confident in its ability to conduct a coercive aerospace campaign, the PRC may rationally see resolution of the Taiwan issue as achievable with acceptable risks.

Should Taiwan be coerced into a settlement with the PRC, regional allies may question the credibility of America's political commitments, as would other young democracies around the world. PRC control of Taiwan could effectively deny the United States and its allies access to critical sea lanes during conflict, and also significantly extend the reach of the People's Liberation Army (PLA) in the Asia-Pacific region.

The challenge extends beyond Taiwan. Trends indicate that the same set of capabilities could be applied to other potential adversaries around the PRC's periphery. If confident of its abilities to dominate the skies over Japan, the PRC also may view coercive uses of force as an increasingly viable option to resolve disputes.

To sustain an ability to deter PRC use of force, the United States, its allies and *ad hoc* coalition partners, should maintain the capacity to deny the PRC its political and military objectives in a coercive aerospace campaign. Conventional deterrence requires a demonstrated and credible ability to swiftly defeat PRC use of force and compel a cessation of hostilities on terms favorable to the United States and its allies.

U.S. forces are being shaped to respond to threats at the lower end of spectrum, such as countering terrorism and the proliferation of weapons of mass destruction. Despite the imperatives of addressing such challenges, the prospect for high-end conflict in the Asia-Pacific can not be ignored.

The U.S. must maintain an adequate and advanced force-in-being in the region, equip allies with necessary defense articles and services, and be able to project and sustain forces into the area of operations with sufficient alacrity to preclude a *fait accompli* in the face of a concerted PRC coercive aerospace campaign.

Deterring PRC use of coercive force requires unrivaled dominance in the information and aerospace domains. Information dominance and air superiority are prerequisites for all modes of combat. Conventional deterrence would be enhanced through investment in an interoperable, theater-wide architecture of survivable, persistent, and pervasive sensors; and a survivable and effective command, control, and communications system able to respond to a range of contingencies.

Exclusive reliance on interception of PLA air assets and ballistic and land attack cruise missiles in flight would be insufficient to counter a concerted coercive aerospace campaign. If left unchallenged on the ground, the PRC would be able to conduct air and missile strikes against neighbors with impunity.

Preventing the launch of PLA aircraft and missiles prior to employment would be the most cost effective and efficient means of countering a PRC coercive aerospace campaign. Attack operations would reduce the level of the threat that defensive forces must face. By holding critical nodes at risk, the U.S. and allies would limit the PRC's strategic options and shore up the credibility of conventional deterrence.

Assured air dominance would require suppression of the PLA's increasingly sophisticated integrated air defenses. Advanced air defenses pose risks to pilots in aircraft that are not stealthy or shielded from detection by sophisticated radar systems.

Among the range of options, forward deployed F-22A fighters may offer the best means for deterring PRC coercive uses of force for the foreseeable future. Anything less may subject U.S. and allied forces to an unacceptable level of risk. Greater investment into passive defenses, such as rapid runway repair and hardening, more diverse basing options, and active missile defenses would enable fighter operations from bases within range of PLA aerospace assets.

To ensure America's ability to deter Chinese use of force and assist allies and friends to resist coercion, restrictions on the transfer of the F-22A to our closest allies in the region – Japan and Australia – appear outdated. Release of the F-22A would reflect the seriousness with which America takes its alliances, enhance interoperability, and grant allies greater responsibility in a common cause.

INTRODUCTION

Key elements of a strategy to enable the United States to secure long-term, enduring interests in the Asia-Pacific region are to assure allies and friends, dissuade potential adversaries, deter and defeat aggression, and counter coercive uses of force. America's favorable position in Asia is sustained by acquiring the capabilities required for the aforementioned elements, and by its alliances and partnerships that remain essential to a region that is peaceful, prosperous, and free.¹

The increasingly ambitious military modernization program of the Chinese People's Liberation Army (PLA) should give pause to those concerned about the future regional security environment. The recent U.S. [Department of Defense \(DoD\) report on PRC military modernization](#) is a useful reminder of the challenges posed by China's rise as a regional power.² As noted in the [2006 Quadrennial Defense Review Report](#), China "has the greatest potential to compete militarily with the United States and field disruptive military technologies that could over time offset traditional U.S. military advantages."³

How the PRC could apply force as an instrument of national power may be more significant than specific technical capabilities it develops and fields. An increasingly sophisticated arsenal of advanced weapon systems serves as an enabler for the PRC to expand its range of options for exercising coercive uses of force to resolve differences with democracies in the region. Founded upon a solid base of operational theory and increasingly ambitious force modernization program, a future conflict in the Taiwan Strait and elsewhere in the Asia-Pacific region may less likely to be a contests of military strength, but ones involving a competition of national will, endurance, obstinacy, and willingness to absorb costs. It is for this reason that discussion of a "military balances" are interesting, but of limited utility. Balance of deterrence or intentions in some ways is more important, albeit subjective, than an objective calculation of military capabilities. Military competition in the Taiwan Strait involves a balance of resolve and deterrence, rather than an equilibrium of forces. The same can be said of other possible contingencies in East Asia where conflict between the United States and China may be possible.

As the United States remains focused on important non-traditional security threats, the PLA's growing capacity to coerce its neighbors should give observers cause for concern. To ensure America's ability to deter Chinese use of force and assist allies and friends to resist coercion, a re-examination of force modernization priorities, particularly in the realm of air power, appears warranted. Likewise, export control policies that restrict transfer of advanced defense articles such as the F-22A to our closest allies in the region – Japan and Australia – appear outdated. One viable option for ensuring the credibility of deterrence would be the release of F-22A fighters to key allies in the region, specifically Japan and Australia. Besides being a visible manifestation of the trust we place in our allies, the F-22A's combination of stealth, super-cruise, and integrated avionics would ensure the community of democracies in the region are positioned to respond quickly to contingencies and enjoy unimpeded air superiority well into the future.

Along these lines, what are the most significant developments related to PLA modernization in terms of real war-fighting capabilities? In addition to military acquisitions, how are combat training and doctrine evolving? What would a People's Republic of China (PRC) coercive aerospace campaign likely look like? How can the United States and its allies best position themselves to counter the evolving threat from China? What military capabilities are essential to deter, dissuade, and if necessary, defeat China in a variety of scenarios (with an emphasis on a possible coercive air campaign)? Given developing PLA capabilities, should the US and allies develop a different conceptual framework for "deterrence" (in such a thought exercise, it seems reasonable to suggest conventional non-nuclear deterrence would not emanate from the US demonstrating capability to defeat the PLA in the traditional sense, but rather, deterrence would emanate from a clear understanding on the part of Beijing's civilian leadership that its political objectives cannot be obtained through military means). If our conceptual framework for deterrence changes, would this suggest different requirements in terms of capabilities for the United States and its allies?

This study attempts to determine how evolving war fighting capabilities and associated doctrine could contribute to successful PLA coercion; under what circumstances it could be most successful; and what capabilities could best deter and defend against a PRC coercive aerospace campaign. More specifically, the study:

- Briefly outlines theories on coercive strategies to compare and contrast PRC views on deterrence and coercion;
- Examines PLA theory on the conduct of joint campaigns;
- Addresses theoretical issues associated with three essential components of aerospace power – information, conventional air, and theater missile operations;
- Outlines the potential application of a coercive air campaign in the Taiwan Strait context;
- Assesses conventional deterrence challenges for the U.S. associated with PRC use of force against Taiwan, as well as other potential contingencies;
- Provides a detailed outline of a range of capabilities that the U.S., Taiwan, Japan, and others in the region could require in order to deter and defend against the evolving PLA threat.
- Assesses whether capabilities and war fighting doctrine change if our conceptual framework for conventional deterrence evolves. Assess what will be required of the United States and its allies to credibly communicate to the PRC that its political objectives cannot be achieved through military means, even in the event of a lengthy campaign.

DETERRENCE, ANNIHILATION, AND COERCION

The Asia-Pacific region is enjoying an unprecedented level of peace, prosperity, and stability. By almost any objective measure – size of populations, size and strength of militaries, size and dynamism of economies, amount of energy consumed, and/or amount of greenhouse gases

emitted – the Asia-Pacific increasingly represents the center of gravity of human activity. Yet despite reason for optimism, the potential for conflict, miscalculation, accidents, and challenges to democratic systems of government will remain a cause for concern well into the future. No where are the uncertainties as great as with the possible emergence of China as a regional power. And with power comes the capacity to exert control the behavior of other states in accordance with its own ends.

The United States is likely to maintain a comparative advantage over the PRC in the technological quality of its armed forces well into the 21st century. However, two converging trends appear likely to diminish America’s ability to deter PRC use of force as an instrument of national power. First is a narrowing of the gap in relative capabilities between the PRC and the U.S. and its allies. The second is an adjustment of strategy toward limited, coercive uses of force to attain limited political objectives, rather than full scale attempts to occupy neighboring territory and replace an opposing leadership with one more to its liking.

The narrowing of the gap in capabilities does not necessarily mean that the PRC would overcome the U.S. technologically, at least in the near future. Yet a diminishment in the relative advantage that the U.S. and its allies have enjoyed over the decades would increase the chances that the PRC could be successful in achieving its political goals through use of military force. As former Deputy Assistant Secretary of State Tom Christensen adroitly remarked in a classic 2001 article, “ with certain new equipment and certain strategies, China can pose major problems for American security interests, and especially for Taiwan, without the slightest pretense of catching up with the United States by an overall measure of national military power or technology.”⁴

How the PRC could apply force as an instrument of national power may be more significant than specific technical capabilities it develops and fields. An increasingly sophisticated arsenal of advanced weapon systems serves as an enabler for the PRC to expand its range of options for exercising coercive uses of force to resolve differences with democracies in the region.

The objective of most military conflict is to change an opposing government's behavior through means of deterrence and coercion. As Carl Von Clausewitz noted, “war is thus an act of force to compel our enemy to do our will.” Political considerations are bringing increased pressure on military leaders to achieve national goals at minimal cost. Distinct from and more likely than attempts at annihilation of an opposing regime and physical occupation, coercive strategies present new and complex challenges for conventional deterrence. In thinking about potential PRC use of force, a starting point would be to differentiate between deterrence, annihilation, and coercion.

Deterrence involves dissuading an adversary from taking an action not yet initiated by demonstrating that the costs or risks of that action outweigh the benefits. Deterrence discourages use of force through fear of consequences. It involves communicating national interests and resolve, then waiting in a reactive mode. Deterrence focuses on an enemy’s intentions in that the intended effect is to reduce the likelihood that an enemy will use force. Deterrence is primarily a peacetime objective involving political psychology to affect the cost-benefit calculus of an opposing leadership. However, deterrence also functions after initiation of hostilities in that eventually one side is deterred from continuing a conflict by the realization that continued fighting can only generate additional costs without the prospect of any gain.⁵ In contrast to

deterrence, defense involves reducing one's own prospective costs and risks in the event that deterrence fails.

To be effective, deterrence is generally viewed as having number of required conditions. For example, a deterrent force must be credible. In many cases, deterrence fails if potential aggressors believe they have a military option that promises a quick, decisive victory—a “blitzkrieg” – that would entail relatively low costs. An effective military deterrent often involves the capacity of the defender to repulse an attack and deny the adversary its military objectives at the outset and early stages of an armed confrontation, implying the need for a strong “force in being” that is ready to respond quickly and decisively. Deterrence often fails when a stronger power is perceived to be vulnerable, even temporarily so. Potential aggressors often are influenced by perceived opportunities in the local environment and fail to consider the full weight that intervening forces could bring to bear against them. Proximity, “forces-in-being,” and the ability to respond rapidly strengthen the credibility of conventional deterrence. Finally, deterrence generally succeeds if it can be demonstrated that a defender has the capacity to deny an aggressor a *fait accompli*.⁶ The track record demonstrates that deterring China may be more difficult than most. One RAND study concluded that deterring China often requires “the threat of very high levels of violence or a serious threat to the regime’s internal stability or control of the country.” Yet deterrence would be strongest in cases where there is “a clear U.S. capability to deny the Chinese the objective for which they might be willing to use force.”⁷

Annihilation involves brute force attempts to impose a leadership’s will upon a vanquished adversary through physical occupation. Espoused by influential German theorists such as Hans Delbrueck and Clausewitz, total war calls for first annihilating or exhausting the opposing force and then imposing political demands on a defenseless victim. In a campaign of annihilation, such as the recent U.S. campaigns in Afghanistan and Iraq, the defeated government and its military are neutralized or brought to a point where organized forces are no longer capable of impeding the victor’s operations.⁸ Many assessments of PRC use of force against Taiwan, for example, are placed in a annihilative context involving PRC intent to physically occupy the island.⁹

Military coercion is the use of limited force to induce an adversary to behave differently than it would have otherwise. It differs from deterrence in that it seeks to persuade rather than dissuade. In combat, coercion is used to obtain favorable conditions to end the fight without a total military victory over the adversary. Coercion succeeds when an adversary still has the power to resist. Coercive solutions seek to change the behavior of the target government that still has capable forces under its command.¹⁰ Successful coercion, therefore, is usually less costly than total military victory or annihilation. Coercive use of force seeks to affect national will, morale, and resolve, or through manipulating a leader’s decision calculus by ensuring he understands that the costs of continuing a particular course of action outweigh the benefits. In a coercive campaign, such Operation Allied Force in Yugoslavia, an adversary must still have the capacity for organized violence but choose not to exercise it. Both coercion and annihilation may pursue the same goals, but how they attain them are different¹¹

Coercive military strategies seek to link a desired political outcome and the application of force with a mechanism or strategy that can achieve the greatest effective with the least effort and risk. or doing so. The political outcome sought may be explicit policy changes, shifts in public

opinion, or changes in an economy. The opposing leadership is usually the center of gravity in a coercive campaign. Calculations regarding the proper mechanism involve a determination of how much force is necessary to cross a threshold and compel an adversary to assent to the coercing party's demands. Among the strategies generally link application of force with the desired end state include:

- *Punishment* strategies that target a general population in order to create pressure on an opposing leaders to concede to an aggressors demands.
- *Denial* strategies that seek to undermine the enemy's capacity for military operations in the hope that the opposing regime would give in to demands to avoid further loss or to avoid futile expenditure of resources.
- *Strategic paralysis* strategies that seek to break an opponent's national will through attacking national-level targets that are most closely associated with governing or defending a country or territory.

Aerospace power – the integrated application of conventional air assets, missiles, and electronic attack – is among the most flexible and effective coercive tools. Aerospace power seeks to achieve effects at the strategic, theater, or tactical level. Unlike surface warfare, airpower is usually concentrated to directly achieve objectives with theater-wide significance, bypassing tactical objectives. Airpower, if used properly, can serve political as well as military objectives. A single airstrike may have strategic significance, in that it can produce a political outcome. In measuring the effectiveness of a coercive air campaign, one relies more on judgments of strategic, rather than on tactical effectiveness, i.e. how well bombs, missiles, and electronic attack effects targets. Strategic effectiveness describes how the destruction of target sets attains political goals.

Aerospace power is an important tool that can be used along the entire continuum from deterrence through coercion to annihilation. However, history has demonstrated that aerospace power is especially important in the context of military coercion. The 1967 Arab-Israeli conflict, the 1991 Gulf War, and the Allied Force campaign of 1999 are examples of military coercive campaigns in which aerospace power was decisive in influencing the ultimate outcomes. The success of coercive airpower depends upon strategic effectiveness, which in turn depends on assumptions about how military force translates into political outcomes.

In summary, deterrence is distinguished from annihilation and coercion. Deterrence seeks to dissuade an adversary from taking an action not yet initiated by demonstrating that the costs or risks of that action outweigh the benefits. Coercion involves the use of limited force to induce an adversary to behave differently than it would have otherwise. Aerospace power, used independently or in conjunction with other coercive instruments, often is the most flexible and effective coercive tool available. Annihilation involves brute force efforts to occupy land and impose one's will upon the vanquished. Planners often assume worst case scenarios involving attempts by a potential adversary to annihilate and physically occupy an adversary. Because of the level of violence involved, and the costs high, full scale wars, while easier to plan for, are less likely to occur. On the other hand, coercive uses of force are limited in nature, often involving less risk, and therefore more likely to be used. Detering and defeating future Chinese

attempts at coercive uses of force likely would require credible and overwhelming force that would be certain to deny Beijing its political and military objectives.

THE PLA JOINT AEROSPACE CAMPAIGN

PRC military technological advancements, guided by evolving doctrine and joint-campaign theory, have made aerospace coercion a viable option for use of force. The PRC's confidence in its ability to conduct a coercive aerospace campaign likely will grow as the range and payload of PLA combat aircraft improves, land-attack cruise missiles are fielded in greater numbers, and the size, lethality, and accuracy of PLA theater ballistic missile force increases. The ability to deliver precise firepower rapidly and at extended ranges into the heart of neighboring countries presents a new and dangerous condition for democracies in the region.

The PLA has a well-established theoretical framework for the application of aerospace power in a joint environment. PLA analysts view an aerospace campaign as an integral component of "firepower warfare" (*huolizhan*) involving the coordinated use of PLA Air Force strike aviation assets, Second Artillery conventional theater missiles, and information warfare. Although the military leadership in Beijing appears to be developing a range of options at all levels of conflict, the PLA is most disposed toward a denial strategy with a particular focus on achieving operational paralysis as a means to compel an adversary to heed Beijing's will.

PLA campaign theory stresses pre-emption and surprise as necessary to offset advantages that an defending force may enjoy. Under the guiding principle "comprehensive operations, striking key points," PLA strategists stress the supremacy of "people's warfare," the inseparability of military action and political objectives, and the application of all elements of national power – military diplomatic, economic, and political. Comprehensive operations involve the destruction or paralysis of the enemy's overall operational system. A concentration of the PLA's most capable forces must target critical nodes within an enemy's operational system at the most propitious moment. Effective concentration of power requires a comprehensive understanding of the enemy as a system. Gaining the initiative at the outset of a conflict is best achieved through preemption.¹²

Surprise can also involve new or unexpected operational methodologies that exploit strategic and/or operational vulnerabilities. A surprise attack is intended to inflict a striking defeat that sharply alters the military situation and determines the outcome of a conflict by delivering a shock from which an adversary may not be able to recover. PLA writings indicate a number of methodologies that could enhance the success of surprise, including strategic and operational deception, electronic warfare, and wearing down or desensitizing Taiwan's political and military leadership.

The primary components of a coercive aerospace campaign would include: 1) the joint command and control system; 2) the PLA Air Force (PLAAF); 3) the Second Artillery conventional missile force; and 4) information operations units.

Joint Command and Control System

A coercive campaign would require highly centralized strategic and operational command and control system that would be linked tightly with the political leadership. The Joint Theater

Command would be responsible for operational-level command and control for a coercive aerospace campaign. The Central Military Commission's oversight of and integration with the Joint Theater Command ensures an orchestrated political-military strategy. With the primary command post as the critical node directing operations, other supporting centers would include a communications center, a Firepower Coordination Center, intelligence information center, electronic countermeasures command center and a weather center. Disruption of the Joint Theater Command system, whether physically or through interfering with its communications networks, likely would have significant effects on the PLA's ability to achieve its political and military campaign objectives.¹³

The PLA's Joint Theater Command structure manages one of the most significant conceptual frameworks related to aerospace operations and joint campaign theory -- "firepower warfare" (*huolizhan*). Management of integrated firepower warfare, consisting of strike aviation, theater missiles, and/or long range artillery, resides at the theater level. Joint theater-level firepower, supported by information operations, is intended to "destroy the enemy's warfighting capability and basic infrastructure, destroy or paralyze the enemy's operational system, and create conditions for decisive achievement of strategic and theater-level objectives." Firepower warfare inflicts a striking defeat that sharply alters the military situation and potentially determines the outcome of the conflict. Firepower warfare would dominate the preliminary phase of a campaign and, under certain conditions, could *independently* achieve strategic objectives of the PRC.¹⁴

The Firepower Coordination Center would coordinate an air and theater missile campaign against key targets in order to achieve strategic and theater objectives. Cells would contain Air Force, Second Artillery (China's ballistic missile force), special operations, and ground force elements that would carry out necessary liaison with their respective corps-level service headquarters. Limited firepower assets would be intended to use against targets whose destruction or suppression can achieve the greatest effects. Primary targets for the application of firepower include command and control system and associated communications; strategic infrastructure; the most advanced capabilities of the opponent, including the air defense system; defense industries; and airbases and ports. From the PLA's perspective, air and conventional theater missile strikes are the most important means of firepower against deep targets.

With air and missile assets controlled at the theater level, a coercive air or "firepower warfare" campaign would seek to achieve systemic paralysis at the operational level through use of elite forces, deep strikes, surprise, and shock. "No-contact warfare" seeks to avoid ground force engagements that could lead to a costly, protracted conflict. In theory, an effective air campaign would degrade an adversary's capabilities to such an extent that success looks impossible, defeat looks inevitable, further resistance appears futile, and the costs of continuing to resist outweigh the costs of surrendering.

The PLA Air Force

The Joint Theater Command would direct the operations of PLA Air Force (PLAAF) units assigned to it. The PLAAF has been diversifying its roles and missions, moving away from a force that once was almost exclusively responsible for air defense, interdiction, and close air support for ground forces toward a service whose primary mission is deterrence and strategic attack. The PLAAF's diversification is grounded in a body of theory that stipulates a potential

firepower warfare campaign that independently could support national objectives. The predominant strategic focus of the PLA Air Force is on denial – paralyzing an adversary’s capabilities to such an extent that further resistance appears futile and the costs of continuing to resist outweigh the costs of surrendering.

The PLAAF, with over 700 fighters based within range of Taiwan, is preparing to be able to enforce an air blockade or “no-fly-zone” to compel an adversary such as Taiwan, or perhaps even Japan in the future. PLAAF doctrine stresses rapid mobility, concentration of its best assets, surprise, and pre-emption. To close the gap between its doctrinal aspirations and capabilities, the PLAAF is acquiring a new generation of multi-role fighters and associated air-to-ground munitions from Russia, fielding a new multi-role fighter, and converting a number of existing air superiority fighters to multi-role platforms. At the same time, ground-based air defenses are improving their ability to defend against air and missile strikes. In pursuit of national objectives, the PLAAF could operate independently or in conjunction with other firepower elements, such as the Second Artillery.

The PLAAF also controls the theater air defense system. Over the last 15 years, the PLA has invested significant resources into enhancing its air defenses through acquisition of advanced Russian double digit surface-to-air missile (SAM) assets, such as the SA-10B (likely four battalions with eight launchers per battalion), SA-20 PMU1 (eight battalions with eight launchers per battalion) and SA-20 PMU2 systems, as well as the SA-15. The PLA also has been developing indigenous systems, such as the HQ-9. The PLA deployed four battalions of upgraded Russian SA-20 PMU-2 long-range (200km) SAM systems in July 2007 (total of 32 launchers), with another four expected to be delivered in 2008. With an advertised intercept range of 200 km, the effective envelope of the PRC’s air defense network has been extended out well into the western Pacific. China also has been engaged in research and development of bistatic, multi-static, and ultra-wideband (UWB) radar systems that could reduce the effectiveness of older stealth airframes, such as the F-117 and B-2.

The Second Artillery

Working in conjunction with the PLAAF, the Second Artillery, China’s strategic and theater surface-to-surface missile force, would be a key player in a joint PLA aerospace campaign. PLA doctrine for use of ballistic and land attack cruise missiles against Taiwan highlights a range of potential applications. These missiles, China’s answer to stealth in the sense that their primary mission is to suppress enemy air defense, could be a critical enabler for a dominating the skies around its periphery, and targeting command centers, airfields, naval facilities, logistics depots, and critical infrastructure. In a Taiwan scenario, the intent likely would be to disrupt the island’s political and military leaders’ ability to control forces under their command, disrupt communications, and rapidly attain air superiority and sea control. PLA doctrinal writings stress surprise and pre-emption, multi-axis attacks, combining ballistic and airbreathing threats, and use of deception and concealment.

The PRC’s ballistic missile forces could operate independently in support of a deterrent or coercive campaign or in support of air, maritime, or information operations. The Second Artillery’s most important mission likely would be for suppression of enemy air defenses in order to facilitate air superiority and follow-on air strikes. Centrally commanded and controlled

at the theater level, the Second Artillery's basic principles stress surprise and pre-emption, concentration of resources, and rapid reaction. The Second Artillery's force modernization program requires a significant increase in accuracy and increased numbers of ballistic missiles. At the same time, they are developing sophisticated warheads that could increase the destructiveness of their ballistic missile force.¹⁵

Based on technical writings over the years, a number of warhead options may be available, including runway cratering submunitions, penetration warheads for hardened targets, and fuel air explosives. Observers in Taiwan have expressed concern over the possible outfitting of a ballistic missile with a low-yield nuclear high-altitude electromagnetic pulse (EMP) warhead, and there are signs of PRC interest in weaponizing a non-nuclear EMP payload. If detonated at a precise location and altitude, both theoretically could have the potential to shut down enemy electric power sources. The precision of PRC conventional missiles are improving as well. At least 10 years ago, PRC missile engineers had been tasked to meet an accuracy requirement of below 50 meters circular error probability (CEP).

SRBMs and MRBMs, combined with certain types of countermeasures, present missile defense planners with significant challenges. The potential for large-raid sizes, the short flight time of SRBMs (approximately seven minutes for the 600-kilometer DF-15), wide range of attack azimuths, and combination of simultaneous airbreathing and ballistic strikes would stress any missile defense architecture. Second Artillery conventional doctrine emphasizes synchronized, multi-axis strikes as a fundamental doctrinal principle. Deception and timing measures could ensure penetration of at least a large portion of a salvo. Another methodology includes closely spaced salvos that could take advantage of requirement for rapid reload of missile defense interceptors, a first raid to "screen" missile defenses, the second to saturate them.¹⁶

Information Operations

In addition to conventional air and theater missile assets, the PRC views information operations as integral to a successful joint aerospace campaign. Coercive military operations ultimately are intended to affect the decision calculus and morale of opposing civilian and military leaders. Perceptions and decisions of an opposing leadership are shaped the quality and amount of information in which they possess. Effective military operations rely upon the ability to defend one's sources of information while exploiting and assaulting an opponent's information structure. The focus of information operations is the enemy's command system. The command system, known as the "vital point" (*yaoxue*) of the enemy's entire operational system, consists of policymakers at the strategic level, the operational military command, and supporting command, control, and communications systems.

Intelligence warfare, electronic warfare, and psychological operations are force multipliers that can enhance the effectiveness of air and missile operations in the successful attainment of limited political objectives. These capabilities are intended to confuse an adversary and increase the chances of strategic or operational surprise. From a psychological perspective, information operations can magnify the effects of air strikes with detrimental effects on an enemy leadership's morale and national will. Electronic attack and electronic defense are integral aspects of a PLA joint air campaign.

Centrally coordinated within the theater command system, the PLA's senior leadership understands that electronic warfare can powerfully affect the results of a military campaign and theater offensives, and perhaps help determine the outcome of a war. The PLA also has been developing a computer network attack capability. The most likely target would be automation systems, often referred to as process control systems (PCS) or supervisory control and data acquisition (SCADA) systems, which are critical to the safe, reliable, and efficient operations of critical infrastructure. PCS is used extensively in managing electric power, water, petroleum, natural gas, as well as communications systems. If a PCS system could be affected, there may be no need for physical destruction. For electronic defense, the PRC is investing heavily into command automation, tactical data links, electronic attack, and space-based reconnaissance and communications systems.

In summary, a PLA aerospace campaign intended to coerce an adversary would emphasize pre-emption, surprise, and concentration of its most advanced assets to achieve a measure of shock. In order to effectively guide a campaign, command and control would be centrally planned and executed the Joint Theater Command, and supported by other joint command systems, including a joint Firepower Command Center, as well as command centers that would oversee component operations of the PLAAF and the Second Artillery. The PLAAF, while technologically behind the U.S. Air Force and others, is evolving into a force capable of dominating the skies around its periphery with support from the Second Artillery and information warfare assets.

COERCIVE AEROSPACE POWER IN THE TAIWAN STRAIT AND BEYOND

Adoption of coercive strategies and PLA advances in aerospace power presents new and complex challenges for U.S. policymakers. Most challenging will be deterring use of force as an instrument to of national power and meeting legal requirements under the Taiwan Relations Act (TRA). The TRA states that it is the policy of the United States "to maintain the capacity of the United States to resist any resort to force or other forms of coercion that would jeopardize the security, or the social or economic system, of the people on Taiwan." Planning for a counter-coercive campaign is complex. Among other requirements, it requires decisive political judgment and the ability to respond rapidly in a crisis situation. In order to maintain the capacity to resist PRC use of force, U.S. and allied forces should be equipped with assets that could best neutralize the PRC's growing ability to conduct a coercive aerospace campaign against its neighbors.

Without a commensurate rise in the military capabilities of the U.S. and its allies, trends indicate that the PRC may be increasingly capable of imposing its will on adversaries in the region. Among the options for coercive uses of force, aerospace power will become an increasingly powerful tool as the range and payload of PLA aircraft improves, as land-attack cruise missiles are fielded in greater numbers, and as the size, lethality, and accuracy of PLA theater ballistic missile force increases. Aerospace power can:

- Raise concerns within an adversary regime over internal stability by striking economic targets and population centers;
- Neutralize an adversary's strategy for victory by attacking its fielded forces and the logistics upon which they depend;

- Bolster the credibility of other threats, such as a ground invasion, and prevent an adversary from inflicting costs back on the coercive power by undermining domestic support.

Driven largely by the desire to stem further steps toward Taiwanese autonomy and complicate third party intervention, Beijing is prioritizing aerospace power as its primary tool of choice. PRC use of force in the Taiwan Strait would most likely involve infliction of sufficient pain and destruction of things of value in order to coerce Taiwan's leadership to agree to talks, a timetable for unification, or political integration with the PRC.

Advances in hardware are in large part being driven by the development of a theoretical foundation to drive modernization; increases in defense spending; innovation in joint command structures; investment in advanced command, control, communications, and intelligence systems; acquisition of new hardware; and increased emphasis on training. PLA joint aerospace campaign theory envisions mutual cooperation between information assets and long-range firepower, including those of the PLA Air Force and the Second Artillery.

Prominent PLA political analysts believe coercive approaches offer the optimal solution to minimize international repercussions in the wake of using force against Taiwan to achieve limited political objectives. Brute force attempts at physical occupation to achieve unification, at least according to one PLA observer, "will entail a very high mid- to long-term price and therefore is not advisable." One important deterrent to a brute force strategy is that "the largest scale and most violent military operation that hopes to achieve unification in one stroke will be the most likely operation to cause the most serious U.S. military intervention." While confident China could prevail in a determined attempt to occupy the island, even in the face of limited U.S. military intervention, observers believe that the likelihood of a new Cold War in the Asia-Pacific region would be the costly consequence of a brute force solution. Such a situation would imperil China's goal of becoming a world power.¹⁷

Chinese history is replete with examples of use of limited force as a means to coerce an adversary to heed its will. Chinese strategic culture has emphasized surprise, deception, and stratagem. Surprise not only entails military advantages, but has additional psychological effects that may in themselves prove critical in achieving political objectives. This shock effect is especially important in militaries that have limited ability to sustain operations. An adversary may become disheartened or defeatist as a result of sudden violent action.

The PRC may seek a number of political outcomes in a conflict with Taiwan, each potentially requiring greater levels of violence. Among these, the PRC may seek to deter Taiwan from moving closer toward *de jure* independence or from taking any other action that the PRC perceives inimical to its interests. Limited use of force would be intended to demonstrate the consequences of a particular course of action. Should Taiwan overstep some ill-defined red line, the PRC may seek to coerce Taiwan into stepping back or reversing a particular policy. Today, every day, Beijing threatens the use of force against Taiwan as a means to deter the Taiwan leadership against further steps toward *de jure* independence. At some point in time, triggered by the crossing of some ill-defined red line or by some incident, Beijing may believe that it must compel Taipei into accepting Beijing's definition of "One China," negotiating a timetable for unification, or immediate political integration into the PRC.

On the other hand, the political and military leadership in Beijing may have doubts about the viability of a coercive campaign and could seek the annihilation of Taiwan's political regime and physically occupy the island. An invasion would be the most difficult and costly option for the PRC, and there is significant debate regarding the extent of Beijing's ability to physically occupy the island. However, as noted in DoD reports to Congress, the PRC would eventually prevail barring third party intervention and if willing to accept high costs.

PRC military action most likely would seek to manipulate the cost-benefit calculus of policymakers in Taiwan, Japan, the United States, or other potential adversaries. The strategic center of gravity in a coercive campaign is the opposing leadership. Coercive force seeks to affect the amorphous and unquantifiable variable of national will, morale, and resolve, or through manipulating a leader's decision calculus by ensuring he understands that the costs of continuing a particular course of action outweigh the benefits. The challenge is to shatter the will and morale of an opponent or affect his decision calculus.

The predominant strategic focus of the PLA aerospace forces is on denial – paralyzing an adversary's capabilities to such an extent that further resistance appears futile and the costs of continuing to resist outweigh the costs of surrendering. PRC sources indicate the PLA relies heavily upon extensive, well-planned preemptive strikes as a means to shock an opponent, paralyze his ability to conduct operations, and to force a political solution soon after initiation of hostilities. The first strike consists of multiple waves and seeks to suppress enemy airpower. This includes preventing key enemy aviation assets from taking off, effectively preventing ground based air defenses from organizing resistance along specific corridors, and eliminating enemy early warning assets. Achieving air superiority will facilitate follow-on air activity or landing operations.¹⁸

PLA observers tend to divide an offensive air campaign into two general phases: first strikes and follow-on strikes. PLA first strike operations would involve the concentration of the PLAAF's best assets, as well aviation assets from other services. Force should be concentrated against those targets whose destruction or suppression would have the greatest strategic and operational effects. However, planning should take into consideration neutralization of targets that would permit a more permissive environment for follow-on strikes. Follow-on strikes should capitalize on the success of first strike operations. Flexibility is important, requiring a capable and timely reconnaissance network that can evaluate results of the first strike. In general, fewer aircraft are needed for follow-on strike operations.¹⁹

In many circumstances, an offensive air campaign would be the precursor to establishment of a coercive "air blockade." As a relatively new mission, authoritative PRC sources view air blockades as an effective means to compel an adversary to accede to Beijing's demands. A blockade would be intended to "create internal struggles and societal collapse." Air blockades involve strikes against ports and navigation routes to shut down air and maritime traffic and cut off contact with the international community as a means to achieve specific political or military objectives. Operations also include efforts to counter an enemy's attempt to break the blockade. An air blockade can weaken an enemy's capacity for operations, or compel him to accede to Beijing's demands short of war. An air blockade can take many forms, including suppressing air and naval bases, halting land transportation, or cutting off traffic in the Taiwan Strait. An air blockade can be carried out in conjunction with a maritime blockade or quarantine.

PLA authorities note that air superiority is a necessary condition of an air blockade, generally first requiring neutralization of airbases and ground based air defenses. Airpower can also effectively enforce a no-fly-zone, an effective a form of air blockade. PLAAF officers note that in carrying out this type of operation, the PLA must work closely with policymakers.⁵⁶⁸ PLA representatives note that airpower can support blockade or area denial operations. For example, air patrols can provide cover along submarine transit routes and provide targeting data for countering “large ship formations” or enemy ASW operations.⁵⁶

In a Taiwan scenario, Beijing could affect national resolve in a number of ways. It could seek to deny Taiwan international political and military support, isolate it from the international community, undercut or deny its military capabilities, spark a severe downturn in economic health, sow dissent within the domestic polity, or attempt a physical neutralization of Taiwan’s political leadership. These actions would be intended to raise the costs to Taiwan’s political and military leadership of continuing a particular course of action. Such measures could directly prompt Taiwan’s leadership to accede to Beijing’s demands or reduce civilian morale sufficient to foment a political movement to remove the regime or force concessions.

Beijing appears guided by a strategy of denial, which would be intended to force Taiwan’s political leadership to lose confidence in the military’s ability to defend the island, thus compelling a shift in policy in line with Beijing’s desires. A punishment strategy, which could involve a blockade or strikes against civilian targets, seeks to inflict sufficient pain on the population to spark a political movement to either remove the regime from power or at least force them to give in to Beijing’s demands. A blockade would be necessary should the PRC want to carry out an amphibious invasion. While Beijing certainly could opt for a punishment strategy that involves a blockade, the literature indicates that the PLA thinks more in terms of denial.

Based on a broad survey of PRC literature, PLA air, missile, and electronic attack assets during the initial phase of a campaign appear to be focused on at least six key target sets, including military command and control centers, early warning facilities, communications facilities, ground-based air defense, air bases, and surface-to-surface missile sites. Important but lesser priorities appear to include naval bases, electrical power grids, and logistics centers, particularly POL facilities. In subsequent phases of a campaign, other targets, including maritime reconnaissance, missile sites, and transportation nodes, assume a greater importance.

However, the challenge extends beyond Taiwan. Trends indicate that the same set of capabilities that are being developed to coerce Taiwan and counter intervening forces could be applied to other potential adversaries around the PRC’s periphery, such as Japan. Without a commensurate rise in the military capabilities of the U.S. and its allies, trends indicate that the PRC may be increasingly capable of coercing adversaries in the region through an aerospace campaign.

CONVENTIONAL DETERRENCE AND U.S. INTERVENTION

To sustain an ability to deter PRC use of force, the United States, its allies and ad hoc coalition partners, should maintain the capacity to deny the PRC its political and military objectives in a coercive aerospace campaign. Conventional deterrence requires a demonstrated and credible

ability to swiftly defeat PRC use of force and compel a cessation of hostilities on terms favorable to the United States and its allies. U.S. forces are being shaped to respond to threats at the lower end of spectrum, such as countering terrorism and the proliferation of weapons of mass destruction. Despite the imperatives of addressing such challenges, the prospect for high-end conflict in the Asia-Pacific can not be ignored.

PRC coercive strategies present particular challenges to the United States' ability to fulfill its legal obligations under the Taiwan Relations Act (TRA). If confident in its ability to conduct a coercive aerospace campaign, the PRC may rationally see resolution of the Taiwan issue as achievable with acceptable risks.

China is devoting considerable resources toward preparing for potential conflict with the United States, especially over Taiwan. Chinese analysts have concluded the U.S. military has growing vulnerabilities which could be exploited. For example, the United States continues to rely on a few fixed bases from which to project power into the region in a contingency situation. Heavy concentrations of aircraft flowing into bases will become increasingly easy to identify, as will aircraft carrier battle groups operating within the first island chain. Communications and intelligence assets, to include critical nodes in space, would be monitored as well.

Chinese publications have assessed that the United States may no longer be able to sustain combat operations in defense of Taiwan. Analysts have been meticulous in evaluating vulnerabilities in U.S. aircraft carrier battle groups, including their prominent signature, tendency for bad weather to degrade operational capabilities, reliance on complex logistics, poor ASW and anti-mine capability, and difficulties in rapidly repairing damaged flight decks. Ways to counter aircraft carriers include mine laying, submarine operations, electronic warfare, attacking carrier-borne AEW assets, employment of large numbers of UAVs, and night operations. Aircraft carrier battle groups, say Beijing-based publications, are too reliant on highly vulnerable logistics ships. Disruption of supply lines will force withdrawal of the carriers. Analysts have also examined employment of ballistic missiles against carriers.

The PLA does not limit vulnerability assessments to the U.S. Navy. USAF operations out of Okinawa's Kadena Airbase, Chinese writers say, would be hampered by the distance between Okinawa and Taiwan. Deploying USAF assets to Taiwan would open them up to attack by highly accurate ballistic and cruise missiles. Resupplying Taiwan by air or ship would be increasingly risky.

In short, China's force modernization is increasingly focused on being able to counter U.S. ability to intervene in a cross-Strait conflict. The PLA's anti-access strategy is centered on targeting operational centers of gravity, including command and control centers, airbases, and aircraft carrier battle groups operating in the area of operations. The PLA's expanded capacity for intelligence, surveillance, and reconnaissance would enable it to monitor U.S. deployments and facilitate targeting of critical nodes in the Western Pacific in order to complicate or delay U.S. intervention in a Taiwan scenario.

Due to the PRC's heavy reliance on deception and stratagem, the U.S. and Taiwan may become increasingly vulnerable to strategic and operational surprise. The PLA believes that surprise is crucial for the success of any future campaign, and would likely not be willing to initiate any military action unless assured of a significant degree of operational surprise. The side that strikes

first against an unready opponent in this scenario will have a substantive advantage. In fact, even an enemy possessing considerable advantages and means to counter an attack may be unable to employ them if caught unaware. With no apparent political prohibitions against preemption, the PLA requires surprise as a force multiplier to catch Taiwan or another potential adversary such as the United States, standing down. As the gap in capabilities widens, successful use of overwhelming force through preemptive strikes to quickly resolve the Taiwan issue could preclude U.S. intervention by presenting Washington and the international community with a fait accompli.

In many ways, the dangers of surprise are greater than any asymmetries in the balance of forces. The PLA draws upon a rich tradition of strategy, deception, and doctrinal concepts that could, under certain circumstances, compensate for their technological shortcomings. One must calculate the effects of surprise, deception, detailed planning, intelligence preparation of the battlefield, and doctrine development on the PLA's ability to prevail in a Taiwan scenario, even with U.S. intervention.

The PRC's growing ability to exercise use of force around its periphery and beyond presents significant challenges for U.S. conventional deterrence. Political and physical constraints, as well as the PRC's increasingly sophisticated ballistic missiles, information operations, and submarine modernization programs, may complicate U.S. military operations in region. Assuming a rational actor model, effective deterrence requires identifying who matters, what is of most value, and how to influence the cost/benefit calculus. However, the most assured means of deterring PRC coercive uses of force would be an ability to deny Beijing successful attainment of its military objectives.

Aerospace assets offer the best means to deny Beijing the successful attainment of its strategic and operational objectives. Encumbered by the forces of gravity, aircraft carrier battle groups are slow to respond. And the PLA has been developing the means to deny surface battle groups access to the area of operations. The opening salvo of a PRC aerospace campaign would require an immediate and visible U.S. response. The September 2001 Quadrennial Defense Review highlights the need not only to project and sustain U.S. forces in distant anti-access or area-denial environments, but also to defeat anti-access and area-denial threats. In the face of the PRC's growing ability to apply force in a coercive context, a U.S. military response must be measured in terms of hours, not days or weeks. In this context, the rapid deployment of expeditionary aerospace forces, global strike task forces, and use of existing assets in the region will be critical to the defense of Taiwan. Yet perhaps even more important could be equipping U.S. allies in the region with the means to defeat PRC use of military force.

The PRC's increasingly ambitious force modernization program is significant but not insurmountable. PRC air assets and ballistic and land-attack cruise missiles may be able to hold at risk unprotected, unhardened facilities, such mobile command centers, airfields, naval facilities, and logistics centers. Use of ballistic missiles against Taiwan in a coercive or minimum warning invasion scenario complicates U.S. planning. Large scale, minimum warning raids against key facilities on Taiwan has the potential to paralyze Taiwan's armed forces and could facilitate the insertion of a sizable PLA force onto the island before U.S. forces could be brought to bear in the area of operations. Assuming it has the means of tracking and targeting ships at sea, successful deployment of the DF-21C missile and extended range SRBMs with maneuvering re-entry vehicles could hold at risk U.S. carrier battle groups intervening in a crisis.

They also could hamper U.S. air operations from Okinawa and other facilities on Japanese territory.

In the event of a crisis in the Taiwan Strait, the PLA likely would avoid a force-on-force confrontation with intervening U.S. military forces. Rather, it likely would strike decisively at U.S. vulnerabilities. Seizing the initiative at the outset of a conflict is viewed as key to defeating a technologically superior opponent. As a result, Chinese writings emphasize surprise attack or preemption, suggesting that Chinese leaders might resort to preemptive measures against U.S. forces as they are deploying to a region in what U.S. policymakers intend as an action to deter a conflict.²⁰

Success of a U.S. and allied campaign to deny the PLA its operational objectives in a coercive aerospace campaign would be dependent upon a number of factors. First, and most important, would be sufficient intelligence that would identify vulnerabilities or critical nodes within the Joint Theater Command, or Second Artillery or PLA Air Force juntuan-level command structure. Neutralization of even a few critical nodes could have significant political and operational effects. A second requirement would be to survive initial strikes and reconstitute an operational capability. Sufficient warning would be needed to disperse assets and implement concealment or deception measures. Defenders may seek to blunt the severity of the initial PRC attacks, with a special focus on attriting the PLA's most prized assets that, in accordance with the jingbing zhisheng principle, would play a prominent role in the initial phase of an offensive aerospace campaign. It also would require an effective means to suppress the PLA's increasingly sophisticated air defense system deployed opposite Taiwan. It also would need the means to deliver munitions against the critical nodes that had been identified and to assess the damage to the intended targets.

EVOLVING MILITARY REQUIREMENTS

With the foregoing in mind, the U.S. must maintain an adequate and advanced force-in-being in the region and be able to project and sustain forces into the area of operations with sufficient alacrity to preclude a *fait accompli* in the face of a concerted PRC coercive aerospace campaign. Deterring PRC use of coercive force requires unrivaled dominance in the information and aerospace domains, and properly equipping our allies. In the information realm, an architecture of survivable, persistent, and pervasive sensors; a survivable and effective command, control, and communications system able to respond to a range of contingencies; and the ability to deny the PLA access to its C4ISR all would contribute to deterrence. In addition, the credibility of deterrence would be enhanced through release of F-22A fighters to key allies in the region, specifically Japan and Australia. Besides being a visible manifestation of the trust we place in our allies, the F-22A's combination of stealth, super-cruise, and integrated avionics would ensure the community of democracies in the region are positioned to respond quickly to contingencies and enjoy unimpeded air superiority well into the future.

Competition for Information Dominance

The key to survival in a future armed conflict, or any emergency for that matter, is sustaining a cognitive advantage. Information dominance and air superiority are prerequisites for all modes of combat. Conventional deterrence would be enhanced through investment in an interoperable, theater-wide architecture of survivable, persistent, and pervasive sensors; and a survivable and

effective command, control, and communications system able to respond to a range of contingencies.

Recognizing the growing importance of information dominance, the PRC is preparing to compete in the information domain. The PLA has made significant strides in its efforts to deny an adversary access to sensors and disrupt command, control, and communications systems. U.S. and allied superiority in exploitation of space and the radiofrequency spectrum can no longer be taken for granted. The burden is on to defend its sensors, computer systems, and an ability to reconstitute space- and ground-based networks that have been attacked or partially destroyed. In addition to denying an adversary information on its capabilities, intentions, and disposition of forces, the PLA seeks to disrupt, paralyze, or exploit vulnerabilities in an adversary's C4ISR structure, including computer networks. In a Taiwan scenario, central to PRC strategy would be exploitation of vulnerabilities in Taiwan's national- and operational-level command-and-control and associated information networks. Beijing may seek to isolate or neutralize Taiwan's political and military leadership, denying effective communication between strategic and military leadership. In doing so, the PLA would seek to disrupt the ability of Taiwan's armed forces, which are highly dependent upon centralized command and control to mount a successful defense.

A cost effective C4ISR architecture can serve as a force multiplier, enhancing the ability of Taiwan emergency response forces to respond to contingencies and adding value to existing weapon systems. As noted by John Osterholz, Director, Architecture & Interoperability DoD Chief Information Officer, "the two truly transforming things might be in information technology and information operation and networking...connecting things in ways that they function totally differently than they had previously. And if that's possible... then possibly the single most transforming thing in our force will not be a weapon system, but a set of interconnections and a substantially enhanced capability because of that awareness."

A credible deterrent would include: 1) an architecture of survivable, persistent, and pervasive sensors; 2) a survivable and effective command, control, and communications system able to respond to a range of contingencies; and 3) the ability to deny the PLA access to its C4ISR.

Sensors. Situational awareness requires a variety of space-, air-, and ground-based sensors. Wide area surveillance, capable of detecting and tracking cooperative and non cooperative targets in all domains, could include coastal and over the horizon maritime surveillance assets, access to a common maritime traffic database, undersea surveillance assets, common access to global air traffic control information, and digital maps and imagery, among other things.

The United States, Japan, and Taiwan could benefit from the pooling of dual-use space-based electro-optical (EO) and synthetic aperture radar (SAR) reconnaissance satellites and associated transmission and ground processing systems. The PLA's proven direct ascent anti-satellite (ASAT) capability places a premium on a distributed, survivable EO/SAR small satellite architecture.

Airborne sensors, included stealthy manned reconnaissance aircraft and unmanned aerial vehicles (UAVs) offer some of the most promising opportunities for persistent surveillance of the operational environment. For Taiwan, relatively low cost UAVs could be mounted with

many different types of sensor packages, including electro-optical, infrared, synthetic aperture radar imaging payloads as well as signals intelligence receivers. Able to launch from a variety of modes, UAVs could operate day and night to monitor maritime activity and provide targeting data for strike assets.

An integrated undersea surveillance would be important to provide strategic cueing for anti-submarine warfare (ASW) assets and detection of underwater swimmers, explosives, and mines. Over-the-horizon radar could contribute to a shared global maritime domain awareness network. Access to a U.S. maritime domain awareness database could allow Taiwan to fuse its own surveillance with data bases describing the nature of all ships, including those to the PRC, which are transiting through the Bashi Channel, perhaps the busiest sea lane in the world.

Command, Control, and Communications. Information from sensors must be communicated to decision makers to respond to emergency situations. Trends are pointing toward increased reliance on commercial off the shelf (COTS) information and communications technology (ICT), with only the most sensitive, core functions met with military-specific technologies. The United States, Japan, and Taiwan are global ICT powerhouses. Therefore, a concerted effort could result in the world's most advanced, survivable, and cost effective C4ISR infrastructures in the world. In a Taiwan scenario, one could expect the RF environment to be complex, with a real risk of fratricide. Interoperability, or at de-confliction, would be key for effective and efficient use of the RF spectrum in a hostile environment.

Taiwan, supported by U.S. and other partners, could design, develop, install, and assist in maintenance of a next generation, survivable, and open national and defense communications architecture in order to ensure Taiwan's continuity of government/operations, synchronize joint operations, support emergency response teams, and maintain links with the international community under all circumstances. In fact, if the U.S., working with Taiwan as a partner, could resolve issues associated with efficient use of the radio frequency spectrum, frequent earthquakes that simulate PRC attacks on undersea cables, and dedicated electronic attack, it could solve the problem anywhere.

Information Assurance. Communications are the glue that binds strategic and operational-level command and control structure. Without effective command, a military organization – or any another emergency response system -- is nothing more than a rabble. Destruction or paralysis of any level of command can have serious or fatal effect on its subordinate elements. Obviously, command, along with its associated intelligence and communications functions, is a standard operational center of gravity, and has been so since ancient times. The primary challenge is locating the key command facilities that contain not only the commander, but also perhaps more importantly, the staff supporting the conduct of military operations.

Defending access to our own C4ISR system could be a daunting challenge in light of PRC advances in electronic attack. An EMP attack against Taiwan could present one of our greatest challenges.²¹ The PRC has been working on nuclear and non-nuclear electro-magnetic pulse (EMP) devices for at least a decade and is making rapid advances. Leaders in Beijing may regard a high altitude EMP (HEMP) attack against Taiwan as a legitimate use of nuclear weapons since it would inflict few if any civilian casualties. Since the mid-1990s, the PRC is said to have received assistance from Russian scientists who are considered the leading experts in the world on nuclear and non-nuclear radiofrequency weapons. Shortly after the test of a

1KT nuclear device in 1996, a senior PRC official asserted that its no-first-use policy of nuclear weapons does not apply to Taiwan.

As information technology-intensive societies, the risk of attacks against U.S., Japanese, and Taiwanese computer networks is high. Before and during war, in a kind of “Electronic Pearl Harbor,” or perhaps even in peacetime, China’s growing cadre of civil and military cyber-warriors could attempt to infiltrate computer networks, disrupt its deployment and logistics infrastructure, control or destroy the transportation. Computer network attacks and dissemination of false information could have significant effects on the effective and efficient functioning of Taiwan’s government and social order. Taiwan may serve as an important partner as its moves toward more sophisticated and innovative levels of ICT design and production.

Electronic Attack. Denying or disrupting the PLA’s sensing and communication functions could play a critical role in defense of the island. In the event of PRC use of force, maintaining control over the electromagnetic environment could be crucial. Electronic warfare, both electronic countermeasures and information assurance, and frequency management would be key components. Countering the PLA’s use of space could complicate offensive operations against the island. This includes SATCOM jammers and other assets that could hinder the PLA’s space-based reconnaissance. Deployment of a U.S. ASAT capability may deter PRC use of its ASAT assets, or destroy PLA satellites after initiation of conflict.

Gain and Maintain Air Superiority

To ensure an ability to deny the PLA control of skies around its periphery, the United States, Japan, and Taiwan require an integrated air and missile defense capability that would ensure early detection, air battle management, and engagement of the full spectrum of aerospace threats. The release of next-generation, penetrating, long-range surveillance and strike aircraft to key allies in the region would increase U.S. options in a conflict, and increase America’s ability to dissuade and deter a range of potential adversaries. Expanded basing options also are required to expand our ability to conduct air operations in the region.

An integrated approach to deterring and defeating PRC aggression requires a range of sensors, ballistic and cruise missile defenses, and an assured means to hold at risk the PLA’s theater command authorities and the offensive forces under their control. Preventing the launch of PLA aircraft and missiles prior to employment would be the most cost effective and efficient means of countering a PRC coercive aerospace campaign. Attack operations would reduce the level of the threat that defensive forces must face. By holding critical nodes at risk, the U.S. and allies would limit the PRC’s strategic options and shore up the credibility of conventional deterrence. Assured air dominance would require suppression of the PLA’s increasingly sophisticated integrated air defenses. Advanced air defenses pose risks to pilots in aircraft that are not stealthy or shielded from detection by sophisticated radar systems.

Ballistic Missile Defense. The PRC’s growing arsenal of increasingly accurate and lethal conventional ballistic and land cruise missiles presents American, Japanese, and Taiwanese defense establishments with a vexing operational problem. Conventionally armed short range ballistic missiles (SRBMs) have become a key tool of PRC statecraft. As widely addressed in the public record, the PRC’s expanding SRBM inventory is intended to deter or coerce neighbors such as Taiwan. The newest generation of conventional ballistic missile may include the DF-

21C, a missile that has been under development since 1995. It may be equipped with a terminal guidance system that could preclude engagement by terminal missile defenses. It also could also reach U.S. bases in the region, and, armed with a maneuvering payload, could complicate the U.S. carrier operations in the western Pacific.²²

Should Beijing resort to the use of force, conventionally armed ballistic missiles under the Second Artillery, operating jointly with the PLA Air Force and other branches of its armed services, could serve as critical enablers in gaining information dominance, as well as air and naval superiority. Second Artillery conventional doctrine stresses surprise and disarming first strikes to gain the initiative in the opening phase of a conflict.

With their increasing numbers, ballistic missile warheads could be viewed in a similar light as conventional artillery. To counter their utility and psycho-political and coercive effects, a ballistic missile defenses to defend military facilities, including U.S. carrier battle groups and key air bases in the region, appears warranted. Mid-course interceptors could augment terminal systems coming on line in the next few years. For Taiwan, while a limited architecture is required for counter-coercive purposes, deployment of a leak-proof system that could defend against a large salvo may be cost prohibitive and possibly vulnerable.²³ However, exclusive reliance on active missile defense interceptors would be insufficient – attacking air and missile operations at their source is the most efficient and effective means of defense.

A limited integrated approach to missile defense could consist of sensors able to detect missile shortly after launch; a viable command, control, and communication system; active ballistic missile defenses; passive defenses such as hardening; and attack operations against key nodes in the PLA Second Artillery's theater command and logistics systems.

The military effects of the missile deployments opposite Taiwan could be significant but not insurmountable. PRC ballistic and land attack cruise missiles may be able to hold at risk unprotected, unhardened facilities, such mobile or unhardened command centers, airfields, naval facilities, and logistics centers. Use of ballistic missiles against Taiwan in a coercive or minimum warning invasion scenario complicates U.S. planning. Large scale, minimum warning raids against key facilities on Taiwan has the potential to paralyze its armed forces and could facilitate the insertion of a sizable PLA force onto the island before U.S. forces could be brought to bear in the area of operations. Assuming it has the means of tracking and targeting ships at sea, successful deployment of the DF-21C and extended range SRBMs with maneuvering re-entry vehicles could hold at risk U.S. carrier battle groups intervening in a crisis.

Cruise Missile and Traditional Air Defense. While having some elements common to a ballistic missile defense system, approaches to countering land attack cruise missiles, UAVs, and other manned and unmanned air breathing threats could be different. In the years to come, Taiwan and Japan may face the most daunting land attack cruise missile challenge in the world. With a low radar cross section, a variety of launch modes, low level of flight, and varying routes of attack, land attack cruise missiles can be especially difficult to counter. Means of detection could be the highest priority, with requirements including an elevated network of sensors able to detect low observable targets at extended ranges and in a cluttered environment. The PLA is acquiring large numbers of highly accurate cruise missiles, such as the domestically produced air launched YJ-63 and the 2000-kilometer range ground-launched DH-10 land attack cruise missile (LACM).

In assessing the implication of the PLA's LACM deployments, a DoD-affiliated research center concluded that:

An attack by 75 cruise missiles equipped with runway-cratering submunitions would be sufficient to provide a 90 percent probability of temporarily closing the main runways and parallel taxiways at Taiwan's three primary air bases as well as the one that houses Taiwan's airborne surveillance aircraft. An additional 10 or so cruise missiles could disable Taiwan's Patriot air defense radars. The 1,500 km range attributed to China's DH-10 cruise missile would permit it to fly circuitous flight paths and strike targets from all azimuths, greatly complicating the task of defense.²⁴

LACMs are augmented by other unmanned systems, including UAVs, UCAVs, and ARMS. The PLA's HARPY unmanned combat aerial vehicle, Kh-31P ARMs acquired from Russia, and the domestic YJ-91 are intended to neutralize radars. Most likely affected could be systems operating in the L- and S-Bands, including surveillance radars, and probably PATRIOT, TK, and future AEGIS fire control radar systems. Adding in decoys to the LACM, UAV, and ARM mix would make an already complicated problem even more challenging.

Cruise missile defense involves searching, detection, tracking, prediction, and interception. Unlike ballistic missiles, which are relatively easy to detect via radar systems with a ballistic missile tracker and Defense Support Program satellites that detect the missile's infrared signature after it breaks cloud cover, LACMs could be mistaken for aircraft due to similarities in their flight characteristics. LACMs' low radar cross section (RCS) and low infrared (IR) signature also complicates wide area search, detection, and tracking. Their low RCS, linked with their low altitude, could mean that detection may not happen until a cruise missile is within a dozen kilometers of the shoreline, requiring an extremely fast and perhaps futile response.

To defend against LACMs and other low observable challenges, a series of capabilities are required to form a kind of kill chain. This first is detection of low observable LACMs and other airbreathing threats at extended ranges, such as 100 kilometers, via surveillance radars and other sensors in order to provide shooters sufficient time to prepare to engage. To meet this requirement, surveillance assets must be elevated in order to overcome line of sight limitations. The vehicle must be continuously tracked along its course, a process complicated by an elusive, non-linear flight path. Next, the flight vehicle must be identified and confirmed that it's a LACM, or a friendly or neutral aircraft. This combat identification is important to avoid fratricide in a target rich environment. After a LACM threat is identified, an air battle manager must decide how best to engage the LACM or other unmanned aerial vehicle. The final step of the kill chain is to launch an interceptor or other means to neutralize the incoming vehicle.

While a range of capabilities could meet these requirements, most pressing would be elevated sensors, rapid integration of information for engagement decisions, and then engagement of the missile in flight. Having all these requirements combined into one fighter platform appears to be the optimum solution. But neutralizing the commanders directing the use of ballistic and land attack cruise missiles, the logistics infrastructure upon which a sustained strike campaign depends, and the platforms launching the missiles may offer the greatest opportunities for defense.

Attack Operations. In classical land warfare, the defense generally has the advantage. In air warfare, the opposite is true, particularly given trends in the accuracy and lethality of conventional

ballistic missiles. As John Warden noted in his landmark 1988 book *The Air Campaign*, engaging in a war of attrition with the PLA through an exclusively defensive counter air campaign is a losing proposition. Such an approach ensures loss of air superiority – the only question would be how long forward deployed forces could deny the PLA command of the skies. Attack operations would be the most cost effective and efficient means of defending against PRC coercive uses of force. Exclusively defensive counter air operations are possible, but normally requiring a greater ratio of interceptors to attacking aircraft, passes the initiative to the enemy, making concentration of forces difficult unless early warning is sufficient to permit time to amass defensive fighters. A defending air force must devise means to get aircraft off the ground quickly.²⁵

Disrupting the ability of the PLA's Joint Theater Command to manage forces under its control could be the single most important task in an armed conflict with China. Attack operations also would be necessary to successfully defend against the PLA's growing arsenal of increasingly accurate and lethal conventional ballistic and land attack cruise missiles. Active ballistic and land attack cruise missile defenses, including terminal defenses such as PAC-3 and mid-course interceptors such as the SM-3, likely would be insufficient to counter the PLA theater missile threat. Furthermore, strikes against airbases, naval facilities, and logistical depots supporting PLA offensive operations would be of paramount importance in ensuring air superiority and sea control. Success in the air requires striking threats at their source, before they are launched. Such a task would require persistent surveillance, targeting, suppression of enemy air defenses, long range precision strikes, and accurate battle damage assessments.

Gaining and maintaining air superiority as quickly as possible is needed to allow friendly forces to operate without prohibitive interference from anti-aircraft artillery (AAA) and enemy air and missile threats while denying the enemy the same freedom of action. Attack operations would seek to prevent the launch of PLA aircraft and missiles by destroying them and their overall supporting infrastructure prior to employment. Such operations would reduce the level of the threat that defensive forces must face. Given the severe nature of the PLA conventional ballistic and land attack cruise missile threat, attack operations appears to be imperative.

However, the proliferation and sophistication of hostile air defense systems are making attack operations increasingly risky. In order to defend against PRC offensive air and theater missile attacks, suppressing PLA air defenses along the coast could be a critical capability. Over the last decade, the PLA has deployed an advanced air defense system that poses challenges for strike operations. The deployment of these air defenses may present unacceptable risk for unstealthy aircraft and high performance electronic attack and protection systems.

In a defensive suppression campaign against PLA offensive forces, targets would include air defenses opposite Taiwan, critical nodes within the PLA's theater command system that control offensive air and missile operations against Taiwan, airbases, staging areas, and logistics centers. In a Taiwan Strait scenario, and in light of U.S. policy that limits Taiwan's ability to strike targets on the mainland, responsibility for attack operations likely would fall on U.S. and allied shoulders. While striking targets on the mainland presents challenges for escalation control, limiting operations against those forces directly involved in a coercive campaign would be reasonable.²⁶

As a result, advanced stealth aircraft, deployed together with land attack cruise missile and supported by space-, air-, and ground-based sensors, may be the most viable alternative to maintain this capability. Fighter aircraft that provide stealth, speed, agility, and the fusion of sensors and avionics are optimal to counter PLA air defenses and conduct the range of interdiction missions and force a cessation of hostilities on terms favorable to the United States, its allies, and *ad hoc* coalition partners. It would not be an overstatement to say that this capability is a critical enabler for air superiority in the Taiwan Strait, and other possible conflict areas.

Sea Control. Aerospace operations may be linked with attempts to control the maritime domain around Taiwan and areas surrounding Japan. To ensure an ability to operate in littoral area to the north, east, and south of Taiwan, it would be necessary to leverage new concepts and advanced technologies for wide-area surveillance, detection, localization, tracking and other capabilities to counter PLA submarines operating in a noisy and cluttered shallow water environment. In a broader sense, a starting point could be an integrated maritime surveillance network that could detect activity out into the open ocean. Such a network could not only support military operations, but also could be invaluable for a broad range of other missions, including border control, disaster warning, counter-trafficking, and scientific research.

Among the range of options include undersea and coastal surveillance, a network of low probability of intercept coastal surveillance radars,²⁷ over the horizon (OTH) surface wave radars for extended range surveillance, unmanned aerial vehicles, maritime patrol aircraft, as well as multi-purpose submersibles for border control, scientific research, and situational awareness. An undersea surveillance network has potential civil and military applications. Among the civilian uses include monitoring of earthquake and related tsunamis, volcanic activity, oceanographic research, and fish migrations. They also could be useful as stealthy assets for purposes of maritime surveillance in support of counter-trafficking and border control.

Equipping Allies and Ad Hoc Coalition Partners

Deterrence of a PRC aerospace campaign requires a “force in being” that is able to respond quickly and decisively. More could be done to assist allies and coalition partners in the region, including Japan and Taiwan, to modernize forces. Greater combined planning, even if on an *ad hoc* basis, is necessary to better prepare for a possible regional contingency. This includes a scrub of export controls and other restrictions in place on a range of defense articles and services.

The F-22A Raptor, fielded in sufficient numbers and in the inventory of the air forces of forward-based allies, could dissuade a PRC coercive campaign. Incorporating a shaped airframe with extensive use of radar absorbent materials, embedded antennas, and equipped with an active electronically scanned array (AESA) radar enable a significant reduction in radar signature that is needed to operate in a dense, advanced air defense environment. High sustained speeds, linked with stealth, would reduce or negate the ability of PLA air defenses to detect, track, and target friendly fighters. Rapid and stealthy penetration, along with air-to-ground munitions capable of destroying air defense systems, may allow the F-22 to disrupt or destroy an enemy air defense network in support of follow-on friendly forces entering enemy airspace on strike missions.

Stealth is only part of the story. New fighter engines are able to push a fighter to supersonic speeds above Mach 1.4 even without the use of afterburner, which gives the fighter a greater operating range and allows for stealthier flight operation. Furthermore, new fighters may be capable of achieving high levels of maneuverability while in supersonic flight, even at high altitudes. New fighters also are going to be important for establishing a near real time electronic order of battle, which would be needed to create situational awareness for allies and friends, for electronic attack and identifying and targeting aircraft and other objects for conventional aircraft.

Integrated avionics provide a further advantage. The ability to fuse information improves cockpit automation, thereby improving the speed and accuracy of assimilation of information by the pilot, and reduces the pilot's workload by combining many sensors and their information onto an integrated display. Sensors, such as active radar antennas and passive electronic support equipment, are integrated into a single sensor fusion suite. A sophisticated sensor suite should allow the pilot to track, identify, shoot and kill air threats before being detected. The active electronically scanned array radar system not only would ensure allies and friends would be able to see and shoot faster than their PLA counterparts, but also would be needed to counter a PLA integrated electronic warfare campaign. The absence of moving parts also increases reliability and reduces the logistics tail. Such a capability also offers perhaps the most viable means to counter the increasingly sophisticated land attack cruise missile threat.

This capability, if deployed in sufficient numbers as part of a global strike task force, could be the most effective means to deter a PLA coercive campaign directed against Taiwan or other potential adversaries. It may be the only means to suppress air defenses, paralyze theater command and control, and disrupt if not shut down PLA air, missile, and naval operations. Attack operations would be a necessary mission for any defensive counter-coercive campaign.

However, an advanced fighter capability could best be employed by U.S. allies, specifically Japan and Australia, who would be well-positioned to react with the greatest alacrity to counter PLA use of force against Taiwan or other neighbor in the Pacific. Because these capabilities have been fielded for some time now, a reasonable expectation exists that technology transfer concerns and risks to U.S. national security could be mitigated.

Furthermore, in light the PLA's increasingly ambitious military modernization program, release of the F-22 to allies would be consistent with the spirit of the Taiwan Relations Act, which requires policymakers "maintain the capacity of the United States to resist any resort to force or other forms of coercion that would jeopardize the security, or the social or economic system, of the people on Taiwan." Release of the F-22 to allies would reflect the U.S. commitment to security cooperation, support common strategic objectives, and enhance interoperability between the U.S. and allies.

This forward deployed capability by itself would be insufficient however to ensure a sustained ability to conduct attack operations. Airfields within range of Chinese conventional ballistic and land attack cruise missile threats (ie., out to 1700 kilometers in the case of the DF-21C MRBM and 2000 kilometers with the DH-10), such as Kadena AB in Okinawa, are said to be easy to attack and damage. However, the threat of air base attacks against facilities in Japan and the Philippines are much less severe than the challenges that U.S. and NATO air bases faced during the Cold War. At the time, new generation of Soviet short-range, conventional, tactical ballistic

missiles (FRGO, SS-1, SS-12, SS-21, SS-22, SS-23) threatened US/NATO air bases in Central Europe.²⁸

Keeping air bases closed requires repeated and continual attacks, assuming the defender has a strong airfield recovery capability. Light, one time attacks probably will not eliminate an airfield. However, they may, for a limited period, keep aircraft on the ground. Runways, control towers, and even barracks housing pilots likely could be primary targets in airbase attacks. Because their supply is limited and fragile, pilots or highly skilled maintenance technicians are as valuable of a target as the aircraft themselves. However, because they can be repaired within hours, missile strikes may have only temporary effects. For sustained disruption of air operations, salvos would need to be timed perfectly to strike runways in the right places just after repairs and before strike assets are able to take off to interdict PLA Second Artillery facilities on the ground.

Airbase defense measures include hardening, active missile defenses, attack operations, and expanding the range of basing options. Hardening could be accomplished through expanding existing inventories of rapid runway repair kits, concrete bunkers for aircraft, burying POL, could be near term measures. Diversifying basing options, for example, using a number of airbases in the Ryuku Islands or northern Luzon, could help ensure air operations could be sustained. Active missile defenses, such AEGIS-based SM-3, THAAD, and perhaps PAC-3 could thin out larger salvos, thus reducing the damage to runways and other facilities. Finally, once recovered from initial strikes, attack operations may be able to complicate or rule out follow-on strikes.²⁹

Finally, by definition, military actions initiated by the PRC to coerce its neighbors, regardless of the political trigger, are strategically offensive. By extension, actions and associated weapon systems that are intended to counter PRC coercion are defensive, even if those actions necessitate expansion of the battlespace into southeast China. Effective self-defense, particularly against the growing air and missile threat, may *require* strikes against PRC offensive forces, and the command and control and logistics infrastructure upon which they depend. With the foregoing in mind, conventional weapons that facilitate expansion of the battlespace are of a defensive character.

A key challenge in any counter-coercion campaign would be to affect PLA centers of gravity while controlling escalation. Because most decisions to escalate are conscious and calculated, escalation can be controlled. The key is to avoid an open ended action-reaction cycle. Both sides of the Taiwan Strait may desire to establish stable limits as early as possible in the conflict. Understanding sensitivities is an important aspect of controlling escalation. Normally, the failure of decision makers in one country to assess how the world looks to the adversary decision maker can lead to conceptual failures and loss of escalation control. The decision maker that escalates hopes that new limits will stick. However, an element of uncertainty is involved, since the escalation might spark an open ended action-reaction cycle.³⁰

Target selection can have a direct influence on unintended escalation. In a war with limited objectives, striking targets of high strategic value will be viewed as potentially indicating the political objectives have changed. Targets that are most sensitive include national leadership and C₂, strategic forces, and space-based ISR assets supporting national command centers. Others

include industrial centers, communication centers, and urban areas not in the theater of operations. Acceptable targets include general purpose forces, military headquarters and command and control centers, conventional missiles, air defenses, and infrastructure directly related to the theater of operations.³¹

**CONCLUSION:
IMPLICATIONS OF PRC'S GROWING MILITARY POWER ON U.S.
CONVENTIONAL DETERRENCE**

Adoption of coercive strategies and PLA advances in aerospace power may present new and complex challenges for U.S. policymakers as well as U.S. allies and friends in the region. Most challenging would be meeting legal requirements under the Taiwan Relations Act (TRA). The TRA states that it is the policy of the United States “to maintain the capacity of the United States to resist any resort to force or other forms of coercion that would jeopardize the security, or the social or economic system, of the people on Taiwan.” Use of force in a coercive context introduces a high degree of political, economic, and military complexity requiring acute political judgment and the ability to respond rapidly in a crisis situation.

Should Taiwan be coerced into a settlement with the PRC, regional allies may question the credibility of America’s political commitments, as would other young democracies around the world. America’s favorable position in Asia is sustained by its alliances and partnerships, and it needs their assistance to keep the region peaceful, prosperous, and free. A coerced settlement against the wishes of the Taiwanese may carry even greater strategic significance over the long term. Chinese control of Taiwan could effectively deny the United States and its allies access to critical sea lanes during conflict. Mainland control of Taiwan would also significantly extend the reach of the People’s Liberation Army (PLA) in the Asia-Pacific region.

The PRC’s growing ability to execute coercive strategies against Taiwan -- and potentially elsewhere in the region -- presents the U.S. with conventional deterrence challenges. As China becomes increasingly capable of using force with sufficient alacrity in order to force a collapse of national and/or political will in Taiwan, or impact political decision-making elsewhere in Asia, the U.S. and allied ability to respond quickly enough to force a cessation of hostilities and prevent a *fait accompli* becomes increasingly tenuous.

The United States and its allies require the ability to credibly communicate to the PRC that its political objectives cannot be achieved through military means, even in the event of a lengthy campaign. As the PLA progresses in its military modernization program, Washington's capacity to deter China may diminish over time. With a range of viable coercive options for use of force, the Chinese may rationally see resolution of the Taiwan issue as achievable with an acceptable level of risk.

Since deterrence primarily relies on the *threat* of future harm, credibility is the key to success. Among the many factors, one of the most important is symmetry or asymmetry of stakes involved. It is often noted that Taiwan is a “regime survival” issue for China, and that U.S. interests in peaceful resolution of differences between the two sides of the Taiwan Strait are peripheral. Both are questionable assumptions. Most important, the stakes for Taiwan are perhaps the highest since in a worst-case invasion/annihilation scenario, the survivability of the regime is almost certainly at risk.

Regardless, asymmetries in the stakes, skepticism in Beijing regarding U.S. willingness to absorb costs and run risks are all likely to undermine the effectiveness of U.S. deterrence threats. For credible deterrence, the United States needs to demonstrate that it has the will and ability to deny the Chinese their military objectives against Taiwan, and in its ability to project force in the region. The U.S. would need to be viewed as capable of intervening decisively to prevent China from forcing a capitulation of national will. In short, a denial strategy would be geared toward defeating the PLA while limiting friendly losses. In doing so, the stakes for the United States would be balanced with the costs and risks involved in a conflict with China.³²

The U.S. policy of “strategic ambiguity” is designed to deter Chinese use of force against Taiwan without committing the United States to react in any given case and without running the risk of encouraging the Taiwanese to take actions that the Chinese would see as provocative. Such a policy reduces our ability to deter PRC use of force. In order to maintain a conventional deterrent, the United States must be able to deny the PRC its ability to achieve its military objectives. A clear U.S. capability to deny the Chinese the objective for which they might be willing to use force against Taiwan would probably be the most reliable method of deterrence. Deterrence through denial, however, in the case of full scale minimum warning invasion scenario may prove easier than deterring lower levels of violence associated with coercive strategies. It also should be acknowledged that the PRC often sees value in crisis and tension to distract attention from domestic problems. This type of behavior may be difficult to deter.

Among the range of options, forward deployed F-22A fighters may offer the best means for deterring PRC coercive uses of force for the foreseeable future. Anything less may subject U.S. and allied forces to an unacceptable level of risk. Greater investment into passive defenses, such as rapid runway repair and hardening, more diverse basing options, and active missile defenses would enable fighter operations from bases within range of PLA aerospace assets.

To ensure America’s ability to deter Chinese use of force and assist allies and friends to resist coercion, restrictions on the transfer of the F-22A to our closest allies in the region – Japan and Australia – appear outdated. Release of the F-22A would reflect the seriousness with which America takes its alliances, enhance interoperability, and grant allies greater responsibility in a common cause.

Beyond deterrence through denial, the United States may be able to raise the threshold for use of force by reserving the right to retaliate in carefully selected ways, to include inflicting serious economic loss by interfering with shipping and air routes in answer to a PRC blockade of Taiwan. Non-military forms of retaliation include economic sanctions or downgrading of diplomatic relations. Success could depend on the ability to garner international support for imposing similar restrictions on trade with the PRC.

The United States has a policy of ambivalence regarding the outcome of a negotiated settlement between the two sides of the Taiwan Strait, only that the process is peaceful. The implications are that the U.S. would accept the strategic consequences of Taiwan’s political integration with the PRC, even if the island were occupied militarily. As a result, U.S. deterrence is weakened since it has to convince China that regardless of outcome, its interest in the process is significant enough to warrant a high degree of risk.³³

ENDNOTES

¹ See *National Defense Strategy of the United States*, Department of Defense, June 2008; and *The National Security Strategy of the United States of America*, White House, March 2006.

² *Military Power of the People's Republic of China*, Annual Report to Congress, Department of Defense, released March 3, 2008. Section 1202, "Annual Report on Military Power of the People's Republic of China," of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65, provides that the Secretary of Defense shall submit a report "on the current and future military strategy of the People's Republic of China. The report shall address the current and probable future course of military-technological development on the People's Liberation Army and the tenets and probable development of Chinese grand strategy, security strategy, and military strategy, and of the military organizations and operational concepts, through the next 20 years."

³ *Military Power of the People's Republic of China*, Report to Congress Pursuant to the National Defense Authorization Act Fiscal Year 2000, Department of Defense, March 2007; and Quadrennial Defense Report, Department of Defense, February 6, 2006.

⁴ Thomas J. Christensen, "Posing Problems without Catching Up: China's Rise and Challenges for U.S. Security Policy," *International Security*, Vol. 25, No. 4 (Spring 2001), p. 11.

⁵ Glenn H. Snyder, *Deterrence and Defense: Toward a Theory of National Security*, Princeton: Princeton University Press, 1961, pp. 3-109; Huth, Paul K. and Bruce Russett. "What Makes Deterrence Work? Cases from 1900 to 1980," *World Politics*, 1984; Barry Wolf, *When the Weak Attack the Strong: Failures of Deterrence* (Santa Monica: RAND, 1991); and George, Alexander L. and Richard Smoke, *Deterrence in American Foreign Policy: Theory and Practice* (New York: Columbia University Press, 1974).

⁶ John J. Mearsheimer, *Conventional Deterrence*, (Ithaca, NY: Cornell University Press, 1983).

⁷ Abram N. Shulsky, *Deterrence Theory and Chinese Behavior*, (Santa Monica, CA: RAND, 2000).

⁸ See for example, Merrick E. Krause, "Integrated Coercive Strategies and The Role Of The Air Component," *Joint Forces Quarterly*, Issue 41, 2nd Quarter 2006, p. 68.

⁹ See, for example, Michael O'Hanlon, "Why China Cannot Conquer Taiwan," *International Security*, Vol. 25, No. 2 (Fall 2000), pp. 51-86.

¹⁰ The most prominent works on coercion theory include Thomas Schelling, *Arms and Influence*, New Haven, CT: Yale University Press; Alexander L. George and William E. Simons, ed., *The Limits of Coercive Diplomacy*, Boulder: Westview Press, 1994; Robert A. Pape, *Bombing to Win: Air Power and Coercion in War*, Ithaca: Cornell University Press, 1996; Daniel L. Byman, Matthew C. Waxman, Eric Larsen, *Air Power as a Coercive Instrument*, Santa Monica, CA: RAND Corporation, MR-1061, 1999; Stephen J. Cimbala, *Coercive Military Strategy*, College Station, TX: Texas A&M University Press, 1998; and Daniel Byman and Matthew Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might*, Cambridge, United Kingdom: Cambridge University Press, 2002.

¹¹ Schelling, *Arms and Influence*, pp. 2-18; George and Simons, pp. 2-3; Byman, et.al, *Air Power as a Coercive Instrument*, pp. 10-15; and Byman and Waxman, "Kosovo and the Great Air Power Debate," pp. 5-38. Also see Pape, p. 12.

¹² This operational principle is known as "controlling the enemy by striking first" (*xianji zhidi*). See Liu Jingsong, "Zhanqu kangdi jubu ruqin lianhe zhanyi zhanfa yaoze [Joint campaign operational methodologies for opposing limited enemy invasion in a war zone]," *Guofang daxue xuebao* [NDU journal], May 1997, pp. 36-41.

¹³ The Joint Theater Command (*lianhe zhanyi zhihuibu*) in most circumstances would be the leading authority for a joint campaign. The Joint Theater Command would be responsible for establishing a primary command post, as well as back up facilities. Supporting the primary command post would be a communications center (*tongxin zhongxin*), a firepower coordination center (*huoli xietiao zhongxin*), intelligence information center (*qingbao xinxi*

zhongxin), electronic countermeasures command center (*dianzi duikang zhihui zhongxin*) and a weather center (*qixiang zhongxin*). At least two corps-level service branches would make up the second echelon in a theater command and control structure. PLA writings indicate concern over the survivability of their command and control structure. Theater communications authorities are responsible for establishing a joint operational command communications network to support the command structure outlined in the campaign resolution. Senior military region communications note that command posts are communications hubs that must be protected.

¹⁴ The mission of firepower warfare is three-fold. First and most important, air strikes and theater missile operations, supported by information operations, are intended to create the conditions necessary for a decisive attainment of strategic and theater objectives. These conditions include the achievement of the “Three Superiorities” (*sanquan*): information dominance, air superiority, and sea superiority. Achievement of the three superiorities could, in and of itself, create the necessary conditions for termination of conflict on the PRC’s terms. The second mission of firepower warfare is to support large-scale ground force operations through annihilation of or paralyzing the enemy’s effective strength. The final function involves independent firepower operations in direct support of strategic and theater objectives. Independent missions involve demonstrations of force or resolve, “strategic deterrence” missions, punishment through long-range air strikes, or a series of Second Artillery strikes that are intended to achieve limited strategic or operational objectives.

¹⁵ According to the most recent DoD *Report to Congress on PRC Military Modernization*, by the end of 2007, the PLA had deployed between 990 and 1,070 CSS-6 and CSS-7 short range ballistic missiles (SRBM) to garrisons opposite Taiwan, and increasing the size of this force at a rate of more than 100 missiles per year. These include variants with improved ranges, accuracies, and payloads. These missiles are distributed among at least five operational Second Artillery SRBM brigades, with an additional two brigades are subordinate to PLA ground forces (one garrisoned in the Nanjing MR and the other in the Guangzhou MR). Between 315-355 DF-15s are assigned to between 90-110 launchers, and between 675 and 715 are distributed between 120-140 launchers. Operations of launchers likely would be highly centralized in each brigade’s command and control center, with communications between the C2 center and individual launchers probably routed through fiber optic link. The newest generation of conventional ballistic missile may include the 1700-kilometer range DF-21C, a missile that has been under development since 1995. It may be equipped with a terminal guidance system that could preclude engagement by terminal missile defenses. It also could also range U.S. bases in the region, and, armed with a maneuvering payload, could complicate the U.S. carrier operations in the western Pacific.

¹⁶ After allegedly acquiring U.S. missile defense technology to calibrate an auxiliary propulsion system on the DF-15, China’s aerospace industry is said to have concluded that terminal-phase maneuvering is a viable means to reduce land-based lower tier missile defense systems’ probability of kill. In addition to technology-based approaches, a range of other countermeasures have been under consideration, including lofted trajectories that increase speed and reduce the defended area of a missile defense system, use of high altitude EMP (HEMP) bursts to knock out radars, and multi-axis strikes.

¹⁷ See Shi Yinhong, “Several Grand Strategy Issues Concerning Taiwan Require Facing Up To,” *Zhanlüe yu guanli* [Strategy and management], 30 April 2000, pp. 27-32 (FBIS: CPP20000517000170). Shi Yinhong is Director of the Institute of International Strategic Studies of the PLA’s Nanjing Institute of International Relations.

¹⁸ Cao Kuofa, “Denglu zhan yizhong kongjun zuozhan yunyong de jige wenti” [Issues concerning the application of air power in landing operations], *Research on Campaign Theory*, pp. 115-120.

¹⁹ *Zhanyixue*, p. 356.

²⁰ Roger Cliff, Mark Burles, Michael S. Chase, Derek Eaton, and Kevin L. Pollpeter, *Entering The Dragon’s Lair : Chinese Anti-Access Strategies And Their Implications For The United States*,” RAND Corporation, 2007.

²¹ For one of the earliest and most detailed assessments, see Chung Chien, “High Tech War Preparation of the PLA: Taking Taiwan Without Bloodshed, *Taiwan Defense Affairs*, Vol. 1, October 2000, pp. 141-162.

²² There are indications that the technical characteristics of these missiles are becoming increasingly sophisticated. Based on technical writings over the years, a number of warhead options may be available, including runway

cratering submunitions, penetration warheads for hardened targets, and fuel air explosives. Observers in Taiwan have expressed concern over the possible outfitting of a ballistic missile with a low yield nuclear high altitude electro-magnetic pulse (EMP) warhead, and there are signs of PRC interest in weaponizing a non-nuclear EMP payload. If detonated at a precise location and altitude, both theoretically could have the potential to shut down electric power sources on the island. The precision of PRC conventional is improving as well. At least 10 years ago, PRC missile engineers had been tasked to meet an accuracy requirement of below 50 meters circular error probability (CEP).

²³ At least one purpose of deploying a sizable ballistic missile force opposite Taiwan has been to send a visible signal to the people on Taiwan that in the event an ill-defined red line is crossed, the PRC is prepared to use violence against them and their duly elected government representatives. Beijing has grasped an asymmetrical advantage it has over Taiwan, and has placed the leadership and other residents on the island within seven minutes of destruction. Political authorities in Beijing have threatened and cajoled officials in the Clinton and Bush Administrations not to assist Taiwan through provision of early warning or any other measure that could provide some relief from the psychological intimidation that these missiles are intended to pose. Beijing has feared that linking Taiwan into a U.S.-led missile defense network would in effect constitute a virtual alliance. From Beijing's perspective, such an act would not only violate the 1982 Communiqué, which was intended to curtail the provision defense articles and services to Taiwan, but also the 1979 Communiqué, which called for the abrogation of the 1979 US-ROC Mutual Defense Treaty.

²⁴ Thomas G. Mahnken,, *The Cruise Missile Challenge*, Center for Strategic and Budgetary Assessments, March 2005.

²⁵ John Warden III, *The Air Campaign: Planning for Combat*, Lincoln: Excel Publishers, 2000.

²⁶ Over the last decade, the PLA has deployed an advanced air defense system that poses challenges for strike operations. Surface-to-air missile (SAM) assets include the indigenous HQ-9, the Russian SA-10, SA-20 and the extended-range SA-20 PMU2. In addition to SA-10s, the PLA deployed four battalions of upgraded Russian SA-20 PMU-2 long-range (200km) SAM systems in July 2007. Another four battalions are expected to be delivered in 2008. The SA-20 system, which holds Taiwan fighters operating in the Taiwan Strait at risk, reportedly provides limited ballistic and cruise missile defense capabilities.

²⁷ The definition of coastal radar is often subject to debate, but it generally it covers a significant section of coastline with ranges extending from the shore to close to the horizon. It may include monitoring of air and sea targets or be dedicated to surface targets alone.

²⁸ The DH-10 has a range of at least 2000 kilometers. Depending on where the DH-10 brigade is based, the conventional land attack cruise missiles likely would be able to strike air defense command and control facilities, radar systems, and air bases throughout Japan. If subordinated to the 52nd Base in southeast China, the DH-10 could reasonably reach as far as Tokyo and Cebu in the Philippines. Between 50 and 250 DH-10 LACMs supported by 20-30 launchers are currently in the PLA inventory, a number that could grow significantly over time.

²⁹ Among numerous sources, see David T. Orletsky and John Stillion, *Airbase Vulnerability to Conventional Cruise-Missile and Ballistic-Missile Attacks: Technology, Scenarios, and U.S. Air Force Responses*, Santa Monica, CA, 1999; Price Bingham, LtCol (USAF), "Air Base Survivability: An Essential Element of Theater Air Power," *Amphibious Warfare Review*, Spring 1986, pp. 8-13; Joseph DiLullo, "Forward Airbases: Vulnerable but Survivable," *Navy Institute Proceedings*, Jan 1989, pp. 112-114; and Tidal W. McCoy, "Task One: Airbase Operability," *Armed Forces Journal International*, Sept 1987, pp.53-56.

³⁰ Richard Smoke, *War: Controlling Escalation*, Cambridge: Harvard University Press, 1977.

³¹ Herman Kahn, *On Escalation: Metaphors and Scenarios*, Greenwood Press, 1965.

³² For a good overview of this argument, see Keith B. Payne, "Post-Cold War Deterrence and a Taiwan Crisis," *China Brief*, Volume 1, Issue 5, September 12, 2001.

³³ For an assessment of this argument, see Abram N. Shulsky, *Deterrence Theory and Chinese Behavior*, (Santa Monica, CA: RAND, 2000).