

Rise of China's Aerospace Power: Doctrine, Strategies and Capabilities

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In November, 2009, General Xu Qiliang, commander of the People's Liberation Army Air Force (PLAAF), proclaimed that the PLAAF's current development strategy is to become an air force with integrated capabilities for both offensive and defensive operations (*kongfang jiebei*) in the air as well as in space (*kongtian yiti*) with a focus on the improvement of its detection and early warning, air strike, antimissile air defense, and strategic delivery capabilities.^[1] Since its establishment, the PLAAF's aircraft acquisitions, personnel training, and doctrine focused on defensive air operations. This proclamation suggests that the PLAAF is transforming both doctrinally and technologically. This presentation attempts to explain how the PLAAF makes efforts to revise strategic, operational, and tactical doctrine; and revamp training programs in order to be capable of both offensive and defensive operations and what challenges the PLAAF will face at present and in coming years as well.

First all, I would like to point out that the PLAAF has never included the term doctrine in its dictionary. Instead, it has used the words military thought to represent official beliefs, warfighting principles, and terminology for use by the air force in military operations. Second, there has been a political culture for the PLAAF to use the central leadership's instructions and directives concerning the construction and use of the air force to argue that this was Mao's, Deng's and Jiang's military thought on the air force. Historically, the PLAAF utilized leadership's military thought and instructions as theoretical guidance while looking at nothing else but the PLA's fine traditions and the PLAAF's experience as reference.

The PLAAF, like most of the world's air power nations, regarded command of the air as the air force's primary mission, stating that during its engagement in the struggle for the command of the air, the air force should keep a lookout over the major airspace, and seize and maintain command of the air at critical moments over certain areas. The major difference was that such command of the air was exclusively over China's own airspace, and the air force's critical role was to protect vital domestic objectives and for the main military forces not to be subjected to the enemy's systematic air attacks.^[2] Perceiving that China still faced the danger of a large-scale invasion by powerful enemies, the PLA strategy required the air force to, first, participate in resistance against the enemy's strategic surprise attacks to shield the nation's peacetime to wartime transition; provide air cover for the strategic deployment of mass troops; and enhance domestic air defense with the air defense of strategic points as a center, while providing support in land and naval battles.^[3]

The PLAAF traditionally specified operational principles, consisting of the following main points: (i) the air force should try to gain the initiative with a counteroffensive to seize air superiority; (ii) the entire air force should be used in a concentrated fashion instead of dividing the forces; (iii) the air force should operate in a surprising and concealed manner, and with a flexible strategy and tactics; (iv) careful planning and total preparation should be made before each operation; (v) the air force should implement positive measures to enhance its protection in order to sustain combat capability; and (vi) the air force should maintain a brave and tenacious combat style, and a perfect mastery of combat skills to be able to defeat the enemy.^[4]

Based on these principles, the PLAAF furthermore summarized its thinking on the use of air power with three eye-catching phrases: integrated resistance (*zhengti kangji*), active counterattack (*jiji fanji*), and close protection (*yanmi fanghu*).^[5] The essence of these integrated air defense operations was to weld fighter aircraft, surface-based defense, and command, control, communication, and intelligence elements into an efficient defensive network to fend off the enemy's air attacks, while seeking opportunities to launch counterattacks against the enemy's airfields and air forces in order to weaken its air strength to wage further attacks. Because PLAAF airfields and air bases were important targets for the enemy, it underlined the employment of positive measures to enhance the protection of aircraft, troops, and all types of facilities, which was critical for maintaining its defensive capabilities. For the same purpose, the air force, maintained as a general rule, would only launch counterattacks at the right times to strike the enemy's key positions, namely, when its warning and defense systems appeared weak. Apparently, for several decades, the PLAAF thought of itself as a defensive air force and recognized China's technological disadvantage. It, however, never seemed to realize that new aviation technology had, to China's disadvantage, widened the technology gap to a shocking level.^[6]

The new role air power played in the 1991 Gulf War shattered the Chinese view of air power, which had been regarded primarily as an air defense force. For the first time, Chinese Air Force officers, watching television screens, witnessed how modern air power had rendered traditional air defense systems obsolete, thus making them recognize that China had fallen behind the West not only in technology, but also in doctrinal air power thinking. Time and space was no longer an ally of those who had been confident that China's existing air defense systems could prevent any attacks deep into the nation's heartland. There were serious doubts raised about the Chinese traditional interpretation of China's defense capabilities, including the common belief that an inferior force could overcome a superior enemy. Drawing on lessons learned from Iraq's defeat in the Gulf War, the Chinese central military leadership pointed out that "a weaker force relying solely on the defensive would place itself in the position of having to receive blows," and only "taking active offensive operations" would enable the weaker to seize the initiative.^[7] Following such a line of thinking, PLAAF strategists also looked to the West's writing for theoretical guidance, concluding that the PLAAF must shift from a purely defensive to a combined defensive-offensive posture by adding more offensive forces.^[8] All these discussions were confined by the traditional interpretation of people's war, taking tactically offensive action within a basically defensive strategy.

China's evolving security interests, with a potential confrontation with Taiwan, also facilitated the thinking of augmenting the PLAAF's offensive capabilities. Since 1993, Beijing has adopted a new military strategy placing an emphasis on fighting and winning a future regional war under high-technology conditions along China's periphery. The momentum of the independence movement in Taiwan had been simultaneously viewed as an increasingly serious challenge to China's sovereignty and security.^[9] The central military leadership made the proper readjustment to the air force's strategic missions, requiring it to maintain not only strong defensive, but also strong offensive operation capabilities. This new mission requirement included the air force's traditional tasks, such as securing air domination over China's own airspace, the support for the army and the navy, and commanding paratrooper operations as well as the independent air campaigns.

It also made a new demand for the air force to be able to launch attacks against the enemy's air assets on the ground in a potential local conflict along China's coast.^[10] Although the PLAAF did not possess any credible offensive capabilities at the time, the changing military and security environment in the region and in the world compelled the PLAAF to think of such a transformation.

While discussions on needing to enhance the PLAAF's offensive capabilities continued, the Chinese strategists had to face one cruel reality, namely, the impact of the air defense-oriented strategy on the air force since its establishment. The development of avionics and precision-strike weapons had made the PLAAF even more "short-legged" (*duantui*) and "shortsighted" (*jinshi*). China's aircraft, even the Chinese acknowledged, had short ranges and lacked airborne radars.^[11] The use of the air force in any contemplated offensive actions over the enemy's territory would be suicidal. China's current defense industry offered no immediate solution to correct this weakness because all existing programs aimed at air defense.^[12] The only stopgap measure appeared to be foreign purchases and assistance. The West had imposed its arms embargo on China following the June 1989 events at Tiananmen Square. Beijing again turned to Russia for assistance in modernizing its air force.^[13] Beginning in 1992, China bought three batches of Su-27s, a total of seventy-four aircraft along with their accessories. In 1996, China entered into an agreement with Russia on the licensed production of two hundred Su-27s at the Chinese aircraft factory in Shenyang.^[14] The Su-27 was one of the most modern aircraft with a state-of-the-art weapon system, but was a fighter with limited offensive capabilities. The decision to purchase the Su-27 was made mostly based on the Chinese impression of its aerobatic performance.^[15] In other words, the ongoing debate about increasing the air force's offensive capabilities had little influence on China's traditional thinking of war on the defensive.^[16]

For the air force, NATO's air campaign in Kosovo came as a real rude awakening. While the Gulf War brought the importance of air power, long-range precision strikes, and electronic warfare (EW) to the attention of the Chinese, they still found the actual effect of air power debatable. According to a 1991 report from the PLA Military Science Academy, the Americans themselves admitted that 70 percent of their bombs did not hit targets. Iraq's defeat in 1991 stemmed from its failure to put up effective resistance in the air as well as on the ground because its command systems had been destroyed, and its failure to organize a withdrawal because its leaders had been indecisive.^[17] Allied operations in Kosovo, furthermore, shocked the Chinese and drew their attention to the characteristics of the air strike. One senior air force researcher responded alarmingly, noting immediately that the air strike was a "war of all dimensions" (air, sea, space, electronics, and ground), air and space assets played a leading role throughout the war, and the control of information determined the victory.^[18] This analysis represented a dramatic change in the Chinese view that any future conflict, especially with the U.S., would be dominated by long-range precision strikes preceded by intensive overhead reconnaissance, and computer-network attacks.

Throughout the 1990s, the PLAAF's theoretical studies on air power flourished, with the publication of two major works, *Kongjun zhanyi xue* [Science of Air Force Campaigns] and *Kongjun zhanshu xue* [Science of Air Force Tactics],^[19] along with several other individual articles.^[20] Whether or not there was any connection between the NATO air strike against Serbia and the ongoing debate inside China about the role of the PLAAF, it

seemed that not until 1999 had Chinese thought on the air force been fully developed. For the first time, the air force was regarded as a strategic armed service to play a critical role in protecting national sovereignty and security. In early March 1999, Jiang Zemin, secretary-general of the CCP and president of China, spoke about the air force's strategic objective, namely, to gradually transform from a homeland air defense force to one that is capable of both offensive and defensive operations. He then called on the air force to be able to "bear the brunt of, and be employed throughout the entire course" of the conflict, and "to complete certain strategic missions independently."[\[21\]](#) In order to achieve these goals, later that year, a three-step strategy was adopted for the development of the air force for the next several decades.[\[22\]](#) According to China's defense white paper, China expects to lay a solid foundation for the development of the PLA into a more high-tech and more balanced network-centric joint force by 2010, to basically accomplish mechanization and make major progress in informatization by 2020, and to reach the goal of the modernization of national defense and the armed forces by the mid-twenty-first century.[\[23\]](#)

The immediate impact of this three-step strategy on the PLAAF was a new order placed for the purchase of Su-30s from Russia. The Chinese appeared very quickly to become dissatisfied with their existing fleet of Su-27s, which could not fire precision weapons and did not have adequate flight ranges. In late 1999, China concluded a \$1.85 billion contract with Russia to purchase thirty-eight Su-30MKK fighter bombers with upgraded avionics, larger weapon payloads, and air-refueling capabilities for the PLAAF. Thereafter, China placed two additional orders of thirty-eight aircraft for the air force and twenty-four Su-30 MK2s for the PLA naval aviation forces. The acquisition of these new Russian-made fighter bombers empowered the PLAAF with real long-range strike capabilities, and has inevitably tipped the military balance in East Asia.[\[24\]](#)

Nevertheless, the Russian-made fighter bombers did not considerably improve the PLAAF's precision-strike capabilities. The air force turned to the domestic aircraft manufacturer for the JH-7 fighter bomber, which the PLAAF had initially rejected in favor of the Su-30. The improved variation of the JH-7A has been upgraded with two more powerful domestic-made turbofan engines and a new fire control system capable of launching precision strikes using antiradiation missiles and laser-guided bombs.[\[25\]](#) Recent evidence also indicates that a new EW model aircraft provides an electronic escort for the attack group. The first batch of JH-7As entered service earlier in 2004. The PLAAF is reportedly very enthusiastic about this new multirole fighter which, as part of a rapid replacement program, is currently phase out the obsolete fleet of Q-5 attack aircraft.[\[26\]](#)

The effort to build an offensive and defensive air force has also focused on the development of early warning and control aircraft. One lesson learned from the NATO air operations in the former Yugoslavia was that the Serbian MiG-29 was not intrinsically inferior to NATO's fighters. NATO's airborne warning and control system (AWACS) aircraft put the MiGs at a decisive disadvantage, while its planes cut Serbian forces off from their sources of information, and prevented from organizing an effective defense. The development of AWACS and electronic aircraft has been at the center of the Chinese effort for modern air power. In 1999, the U.S. Government, however, successfully pressured Israel into canceling a sale of the Falcon AWACS system to China. This cancellation inspired China to gather its own talents and resources together to build its

own airborne warning and control system. The Chinese AWACS was developed in a high-low combination with the KJ-2000 based on the Russian IL-76MD airframe and the KJ-200 based on the Y-8F-200 transport platform. They were handed over to the PLAAF in 2005 and 2006, respectively. Simultaneously, five other different types of EW aircraft, the High New (Gaoxin) series, the Y-8 version, were developed and have gradually entered service since 2004.

When the PLAAF participated in the military parade in 1999 to celebrate the fiftieth anniversary of the founding of the People's Republic, the Russian-made Su-27 fighter was China's only third-generation warplane. Ten years later, the Chinese Air Force flew its domestic-produced third-generation fighter, the J-10,[\[27\]](#) over Tiananmen Square along with Chinese-made AWACS aircraft on October 1, 2009. China's air power today is not the same as a decade ago. Nevertheless, the PLAAF is still facing many challenges in order to reach its development goals.

Several key issues deserve attention in order to understand China's own claims about the development of the PLAAF and air and space power for the present and the near future. These issues include strategy, force structure, the officer corps, the enlisted force, unit training, logistics, and maintenance. The PLAAF's new strategic vision, calling for the development of a strategic air force with long-range capabilities and the active involvement of integrated air and space operations with information and firepower systems integration (*xinxi huoli yiti*), is modeled on the concept of U.S. practices. This strategic vision is different from USAF doctrine on counterspace operations for the purpose of space superiority. In the midst of its discussion on how to integrate air and space power from a broad perspective, the PLAAF continues to face constraints.[\[28\]](#) The most important constraint is perhaps the fact that the PLAAF does not possess any of its own space assets or strategic missiles. Instead, these systems remain under the control of the General Armament Department and the Second Artillery Force, respectively. Apparently, the PLAAF has continued to lose recent debates on whether these capabilities should be placed under its control.[\[29\]](#) The PLAAF has to concentrate on building facilities and institutions to receive satellite services for communication, weather, navigation, and global positioning. This will allow the PLAAF to go from being a traditional air force to one enabled by space-based information (communications; positioning; navigation; timing; and intelligence, surveillance, and reconnaissance [ISR]) capabilities.[\[30\]](#)

For the past several years, China has been making efforts to streamline and optimize the PLAAF's force structure. These efforts include the retirement of earlier generations of aircraft, a reduction in the number of troops, and the deployment of third-generation combat aircraft and ground-to-air missiles. Although the PLAAF has been modernized and its force size has been significantly reduced, it is still facing substantial replacement problems. While the older J-7 and J-8 fighters remain in service, the initially purchased Su-27s and the recently assembled Chinese J-11s appear to be incapable of fully supporting the mission requirements of the PLAAF which now places an increased emphasis on offensive vis-à-vis defensive roles.[\[31\]](#) Currently, the size of the Chinese Air Force and its offensive capabilities is limited until a significant number of J-10s and J-11Bs enter service in the next five years.[\[32\]](#) Even so, the PLAAF will continue to rely on upgrading second-generation aircraft to maintain a sizeable air force.

In 2005, the PLAAF established an additional transport division and one special aircraft division to enhance its long-range airlift and airborne early warning (AEW) capabilities. Russia's failure to deliver thirty-four IL-76MDs as scheduled in 2008 will keep this newly created transport division underequipped, with a limited number of Y-7s and Y-8s constituting the majority of airframes in the interim until the Chinese-designed Y-20 large transport enters service.^[33] There is also slow progress in the integration of support systems, such as AEW/AWACS, aerial-refueling tankers, intelligence collection platforms, and signal-jamming aircraft, which are all necessary to increase the effectiveness of combat aircraft and the warfighting capability.^[34] The PLAAF is still described as a mixed force of aviation, ground-air defense, airborne, signal, radar, electronic countermeasures (ECM), technical reconnaissance, and chemical defense. This mixed force structure will continue to complicate China's air and space decisions, particularly with regard to training and also in allocating roles and missions among services and branches and influencing resource allocations for Chinese Air Force modernization.

The PLAAF regards the recruitment of talented people as a key to transforming the Chinese Air Force into a force able to fight high-tech wars under informationalized conditions.^[35] Unlike the USAF, whose officers all have college degrees, with over half holding advanced degrees, only one-third of Chinese Air Force officers are college or university graduates and only five percent have a master's degree.^[36] The PLAAF reshuffled the officer corps of the units that had received new generation aircraft and equipment with the transfer of educated personnel from air force headquarters, research institutes, and universities to fill as much as 80 percent of leadership and technical positions in these units. Although these measures will improve the quality of the force, the PLA still does not have an effective assignment system to periodically rotate officers, both across and within their specialties. Likewise, the promotion of Chinese officers is still implemented at the unit level, where fraternization and departmentalism influence individual initiative and organizational success. Major challenges remain for the PLAAF in retaining highly educated personnel, encouraging capable officers to serve longer, finding those with the special expertise necessary to fill key technical positions, and recruiting young talent to join the service.^[37]

As previously discussed, Chinese aviation units are transitioning from older generational aircraft to new aircraft with significantly improved capabilities. The PLAAF is also enhancing its training, featuring new systems and methods, which increase the importance associated with technical and tactical training in complex environments, combined arms and aircraft-type training, and joint training under mission-oriented and confrontational conditions. The PLAAF has modernized flight training and created its own "Red Flag" training base modeled on the U.S. program at Nellis Air Force Base.^[38] Despite these changes, Chinese fighter pilots only fly an average of 120–130 hours per year compared with their U.S. counterparts who average 250–300 hours per year. Still, other discrepancies are shown in training requirements, where USAF fighter pilots will fly around fifty hours of air refueling, AWACS command and control, dissimilar air combat training, and night training before becoming operational. Instead, the Chinese flight training manual requires that a pilot who is to receive air-refueling training must have at least one thousand flying hours.^[39] This suggests that even though the PLAAF

has adopted a new pilot training guide, equipment, overall requirements, procedures, and methods are still not comparable to U.S. standards and quality of training.

The PLAAF has reportedly begun reorganizing its air logistics and maintenance systems to support deployed units for the conduct of mobile offensive operations, but many areas are still weak. Most PLAAF field stations were not built to support the multiple types of aircraft deploying to their airfields. Recently, a plan has been adopted to modernize airfields in batches with new equipment that can more efficiently move supplies from depots to the field and with integrating computers that can track spare parts, and logistics and maintenance support for individual weapons systems and units as a whole.^[40] One major challenge for the PLAAF is a shortage of qualified logistics and maintenance personnel with the knowledge and skills to serve in a variety of positions. While the PLAAF has also begun to convert some junior officer maintenance billets to noncommissioned officer (NCO) billets, it is not yet clear whether these actions have helped or hindered the PLAAF's overall maintenance capabilities.^[41] A second major logistics and maintenance challenge is that reform is still at the initial stages of experimentation and at local levels. This means new systems do not yet appear to be standardized across the air force.^[42] The final challenge for the PLAAF in logistics support is that its limited resources will primarily be focused on development units and new units receiving new equipment. Currently, the PLAAF enjoys the benefits of a favorable military spending policy, but budget challenges are likely. As long as the General Logistics Department continues to control military finance, a funding shortfall for the air force is inevitable for the years to come.^[43]

Conclusion

The predominant role played by air and space power in the conflicts since the 1991 Gulf War and Beijing's concern about a possible conflict in the Taiwan Strait have driven China to adopt a new strategy for the PLAAF to transform into a modern air force. These include developing advanced aircraft and integrating them with effective support systems; conducting offensive and defensive operations against ground- and sea-based targets; and relying heavily on informatized systems to employ air and space power effectively. The speed of Chinese air and space modernization has caused concern in the West but is likely to be always constrained by the Chinese defense industry's current technological limitations and by the resources needed to support modernization. Perhaps even more true is that this air and space transformation will continue to be tempered by inherent differences in the institutional cultures of the PLA ground forces and the PLAAF. While the PLA as a whole is transforming with the introduction of new advanced weapons, the real struggle it faces is against traditional concepts, older ways of doing things, outdated organizational structures, and limited funding. It will take a much longer period of time to cultivate an institutional culture to enable the PLAAF to embrace offensive and defensive capability as an independent strategic force. Nevertheless, an undeniable fact is that the PLA's warfighting potential has grown in tandem with China's economy. Assuming its economy continues along a steady trajectory, China will be able to commit further resources to more challenging aspects of the three-step strategy, such as informationization. Should these goals be realized, the United States and other powers face a genuine challenge in terms of preparing themselves for an increasingly powerful Chinese aerospace power in the coming decade.

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- [27] The United States and China do not use the same terminology when discussing generations of aircraft: the former's criterion is that the aircraft produced from 1970 to 1999 are the fourth generation, while the latter refers to them as the third generation.
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- [29] Dong Wenxian, *Xiandai kongjun lun (xubian)*, 327–328, 373, 389.
- [30] Cai Fengzhen et al., *Kongtian yiti zuozhan xue*, 287–301; Shan Jinsuo and Li Niguang, "Creative Development of the Party's Guiding Theory of Air Force Building," *Zhongguo junshi kexue*, vol. 20, no. 5, (2007), 45.
- [31] Chinese air power advocates internally argue that any efforts to continue emphasizing the air force's defensive role may cause the PLAAF to lose another opportunity to become an independent striking force. See Liu Yazhou, "Changing Our Air Force Strategy," 95–101.
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