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CHINA'S AIRCRAFT CARRIER DILEMMA

Andrew S. Erickson and Andrew R. Wilson

China's national leadership is facing a dilemma that has bedeviled many other powers in modern history. The challenge—an especially difficult one in an era of rapid technological change—is discerning when and how to spend finite military budgets on new technology, organization, doctrine, and force structure. The history of navies trying to anticipate and prepare for the next war is replete with both positive and negative analogies to which Beijing can turn. These include Germany's attempts prior to World Wars I and II to strike the right balance between fleet-on-fleet and *guerre de course* and missing on both counts; Japan's pattern prior to World War II of innovating with aircraft carriers and amphibious warfare but keeping the battleship firmly at the center of its naval doctrine; and even China's own naval embarrassments in the 1884–85 Sino-French War and the 1894–95 Sino-Japanese War, in which poor standardization, divided political and military leadership, and slow mobilization cost the Qing dynasty two very expensive fleets.

The numerous sources available suggest that these issues weigh heavily on China's naval strategists today. Getting the answers right in the near term will appropriately shape China's force structure and inform training and doctrine in anticipation of the most likely scenarios. Obviously, analyses regarding the nature of the next war, the relative strengths and weaknesses of the possible belligerents, and the characteristics of the likely theater will determine those answers. In other words, strategic focus and concentration on the nature of the next war can spur modernization. Taiwan scenarios certainly dominate Beijing's attention, but while they narrow the decision sets, they do not resolve the central dilemma facing China's maritime strategists.

Of the issues that confront Chinese naval modernization, the most comprehensive and far-reaching is the extent to which Beijing has faced a choice between a navy focused on large-deck aviation and one based fundamentally on submarines. The answer is the simplest possible—not at all. China has yet to confront the issue in any meaningful way, and that is so because its technology, assets, and facilities are far from a state that might force the issue.

Whether it makes sense now for China actually to develop an aircraft carrier has apparently been the subject of considerable debate in China.[1] Hong Kong's Phoenix Television has quoted Song Xiaojun, editor in chief of *Jianchuan Zhishi* (Naval & Merchant Ships), as stating that a PLA faction advocates aircraft carrier development but must compete with elements urging submarine and aerospace industry development.[2] One Chinese analyst states that Beijing, reflecting the interests of the submarine faction, is currently focused on developing new types of submarines in part precisely because they can attack carrier strike groups (CSGs), presumably those of the United States. Carriers present large targets and have weaker defenses than (and cannot easily detect) submarines. Submarines can attack CSGs with "torpedoes, sea mines, and missiles," thereby rendering sea lines of communications and seaborne trade itself vulnerable to undersea attack.[3] The analyst contends that China's Type 093 and 094 submarines will increase the sea-denial capabilities, strategic depth, coastal defense, and long-range attack capability of the People's Liberation Army Navy (PLAN).[4] In a recent meeting with the authors, a senior Chinese official elaborated that although he had "been an advocate of aircraft carriers for many years because we need them," until recently carriers had "not been the best use of national resources" because China "lacks an escort fleet," thereby making any carrier a vulnerable target. China has therefore invested instead in "submarines, mid-sized ships, and fighters [aircraft]."[5]

At the same time, however, dismissing China's carrier aspirations could be myopic, given its rapid development of all other major aspects of its navy over the past few years. Submarines currently dominate China's naval development, but they might not do so indefinitely. Contending that submarine force development is not a panacea for the PLAN, one Chinese analyst calls for "rethinking the theory that aircraft carriers are useless and [that one should] rely solely on assassin's maces," or asymmetric silver bullet–type weapons: "Allied ASW is very strong. . . . [T]he U.S. and Japan carefully monitor PLAN submarine activities. . . . PLAN submarines' 533 mm torpedoes are insufficient to constitute a strong threat to a U.S. aircraft carrier [and] PLAN submarine-carried guided missiles are insufficient to wound an aircraft carrier."[6]

The aforementioned Chinese official stated to the authors in 2006 that "China will have its own aircraft carrier" in "twelve to fifteen years." In 2004,

however, he had declared to a group of Western academics that there was an internal political and military consensus that China had no intention of developing an aircraft carrier. When asked to explain this apparent contradiction, the official stated that over the past two years the subject of aircraft carrier development has become a "heated internal debate" in Beijing as Chinese national interests have grown, sea lines of communication have become ever more important, the need to rescue Chinese citizens overseas has become increasingly apparent, and "air coverage" is viewed as an essential component of "balanced naval forces."[7]

Pierside view of ex-Soviet aircraft carrier *Kiev* at Binhai Aircraft Carrier museum in Tianjin, China.

China has made great progress in many dimensions necessary to support the development of aircraft carriers, though in some areas it is unclear whether substantial efforts have been made at all. The PLAN's submarine program is far ahead of its carrier (CV) program. In India, by contrast, the CV program is far ahead of the ballistic-missile submarine (SSBN) program; Spain, Japan, and Thailand have carriers though they lack SSBNs entirely, whereas the United Kingdom and France deploy both carriers and SSBNs. The Chinese literature notes all of these potential force structure models and the disparities in capabilities and experience between not merely the PLAN and the world's leading navies, but most notably between the PLAN and its regional peers, the Japan Maritime Self Defense Force (JMSDF) and the Indian navy. In that literature the discussion of submarines, both as machines and as operational and strategic platforms, is much more advanced and grounded in reality than that of carriers—which is still notional, if not romantic, and largely comprises rather generic analyses of possible ship-configuration options.[8] Certainly, there is logic, reinforced by the German and Japanese examples, in not playing to the adversary's strength. If the greater payoff is to be found in an asymmetric "silver bullet" or "assassin's mace" that SS/SSNs or mine warfare seem to offer, why should Beijing invest in a war-fighting specialty—that is, power-projection carrier operations—in which the PLAN is so clearly outmatched by the U.S. Navy and that appears ill suited to China's overall defensive posture?[9]

This, however, does not mean that the way ahead for the Chinese navy—which currently has a submarine-centered force structure and doctrine—is cast in stone or that the choice need be mutually exclusive. In fact, while submarines seem to be ascendant, the Chinese are still actively engaged with the carrier question and are reframing the terms of the debate. That debate, moreover, has been reinvigorated by recent events, notably the 2004 Southeast Asian tsunami, which the above-cited Chinese official averred had "definitely" changed Chinese thinking about the utility of aircraft carriers, and by the advent of China's eleventh "five-year plan," for the period 2006–10. This paper examines China's progress thus far, the road ahead, and a range of ways in which an aircraft carrier might ultimately fit into the PLAN's emerging order of battle.

CHINA'S CARRIER DEVELOPMENT HISTORY AND FUTURE OPTIONS

The aircraft carrier has long had determined, if not numerous, advocates at the highest levels of the Chinese military. Adm. Liu Huaqing, a student of Soviet admiral Sergei Gorshkov at the Voroshilov Naval Academy in Leningrad (1954–58), championed the aircraft carrier when he became chief of the PLAN (1982–88) and vice chairman of the Central Military Commission (1989–97). "Building aircraft carriers has all along been a matter of concern for the Chinese people," Admiral Liu insisted. "To modernize our national defense and build a perfect weaponry and equipment system, we cannot but consider the development of aircraft carriers."[10]

Liu has been credited with an instrumental role in modernizing China's navy and with conceiving ambitious goals for its future power projection, in the framework of "island chains."[11] Liu and others have defined the First Island Chain, or current limit of most PLAN operations, as comprising Japan and its northern and southern archipelagos (the latter disputed by China), South Korea, Taiwan, and the Philippines.[12] The Second Island Chain, which Liu envisioned as being fully within the scope of future PLAN activities, ranges from the Japanese archipelago south to the Bonin and Marshall islands, including Guam.[13] Some unofficial Chinese publications refer to a "Third Island Chain" centered on America's Hawaiian bases, viewed as a "strategic rear area" for the U.S. military.[14] The ultimate goal is a Chinese navy that can perform a mix of sea denial, area denial, and varying degrees of power projection within and out to these island chains.

In his 2004 autobiography, coverage of which by China's Xinhua press agency implies quasi-official endorsement, Admiral Liu described in some detail his association with, and aspirations for, efforts to develop an aircraft carrier.[15] As early as 1970, Liu "organized a special feasibility study for building aircraft

carriers as instructed by the higher authorities and submitted a project proposal to them."[16] In May 1980, Liu became the first PLA leader to tour an American aircraft carrier, USS *Kitty Hawk* (CV 63). This experience left him "deeply impressed by its imposing magnificence and modern fighting capacity."[17] Liu stated that he emphasized to the PLA General Staff the need to devote great effort to "two large . . . key issues" essential not only to "long range combat operations" in "wartime but also to deterrence power in peacetime": development of aircraft carriers and of SSBNs.[18]

Liu recalled that the question of Chinese aircraft development had weighed particularly heavily on him when he became PLAN commander in 1982. "With the development of maritime undertakings and the change in the mode of sea struggles, the threats from sea we were facing differed vastly from the past," Liu assessed. "We had to deal with SSBNs and ship-based air forces, both capable of long-range attacks. To meet that requirement, the strength of the Chinese Navy seemed somewhat inadequate. Despite our long coastal defense line, we had only small and medium-sized warships and land-based air units, which were merely capable of short-distance operations. In case of a sea war, all we could do was to deplore our weakness." But "by developing air carriers," Liu believed, "we could solve this problem successfully."

In early 1984, at the First Naval Armament and Technology Work Conference, Liu recalled stating, "Quite some time has elapsed since the Navy had the idea of building aircraft carriers. Now, our national strength is insufficient for us to do this. It seems that we have to wait for some time." In 1986, however, "when briefed by leaders of the Navy Armament and Technology Department," Liu revisited the issue. "I said that we had to build aircraft carriers," Liu recalled, and that "we must consider this question by 2000. At this stage . . . we need not discuss the model of carriers to be built, but should make some preliminary studies." The Gorshkov-educated Liu saw a historical analogue: "The Soviet Union spent 30 years developing carriers. At the beginning, there were different opinions about building carriers. The Central Committee of the Soviet Communist Party did not have a firm determination to do this, but the Soviet people wanted carriers. Shortly afterward, they started building carriers. Judging from our present situation, even for defense purposes only, we are in need of carriers." Following Liu's entreaty, "the leaders of the Navy Armament and Technology Department promptly passed my idea to the Naval Armament Feasibility Study Center. Then, the two departments teamed up to organize a feasibility study in this respect."[19]

Liu suggested that in 1987 China was finally on track to address the "key question" of the carrier platform and its aircraft.[20] On 31 March of that year, he reported to the PLA General Staff that Chinese aviation and shipbuilding

industry leaders and experts assessed that their country was "technologically capable of building carriers and ship-borne aircraft." Liu allowed that "with regard to some special installations, of course, there are questions that we must deal with seriously. But they can be solved." Liu suggested that China begin carrier development "feasibility studies in the Seventh Five-Year Plan period, do research and conduct preliminary studies of the platform deck and key questions on the aircraft during the Eighth Five-Year Plan period, and decide on the types and models in 2000."

Liu contended that "the annual spending for the present and the following years will not be too much" and that "technologically [the plan had] many advantages." These included catalyzing "the development of technologies required by the state and by national defense." Moreover, "through the preliminary studies, we can get a deeper understanding of the value of aircraft carriers and the need for their existence in war preparations. This understanding will be conducive to making a final scientific policy decision." Liu maintained that his "report had a certain effect on the PLA General Staff Department and the Commission of Science, Technology, and Industry for National Defense [COSTIND]. After that, the science research units concerned and the Navy's armament department started to make relatively in-depth feasibility studies for developing aircraft carriers under the auspices of [COSTIND]."

Throughout his vigorous promotion of aircraft carriers, Liu insisted, he weighed overall naval and national interests carefully. "During the feasibility studies . . . I stressed the need to make a combat cost comparison between using aircraft carriers and ship-borne aircraft and using land-based air divisions, aerial refuellers, and land-based aircraft," he continued. "Later, when I was working with the Central Military Commission, I continued to pay attention to this matter. I asked [COSTIND] and the Armament Department of the PLA General Staff Department to make an overall funding plan for developing carriers, including the funds needed for preliminary studies, research, and armament." Liu stated that the aforementioned plan "should be listed along with the plans for developing warships, aircraft, weapons, and electronic equipment rather than included in the aircraft carrier development program so as to avoid creating an excessively large project that the higher authorities could not readily study. I told them clearly that any plan they made should be discussed by the Central Military Commission."[21]

As for foreign technology, Liu reports,

> I gave approval for experts of the Navy and related industries to visit such countries as France, the United States, Russia, and Ukraine to inspect aircraft carriers. During that period, departments related to the national defense industry invited Russian carrier design experts to China to give lectures. Technical materials on carrier designs were introduced into our country, and progress was made in preliminary studies

> concerning key accessories aboard carriers. Under arrangements made by the PLA General Staff Department and [COSTIND], findings obtained from the inspection trips, materials introduced from abroad, and the results of our own preliminary studies were analyzed, studied, and appraised. This enabled many leaders and experts within and outside the military to enhance their understanding of the large systems engineering [required] for [developing] carriers and ship-borne aircraft.[22]

In his retirement Liu was to recall that he had "fulfilled [his] responsibility for making some plans for developing an aircraft carrier for China."[23] In 2005, retired vice admiral Zhang Xusan stated, "I certainly advocate having an aircraft carrier soon. . . . When I was [deputy commander of the PLA] Navy I advocated that, and at that time Commander . . . Liu Huaqing advocated it too, but for many reasons it was postponed. I believe that it will not be too long before we will have an aircraft carrier. When, what year, I can't say, because I'm not in charge of that matter now. But I feel we will have one in the not too distant future."[24]

It remains unclear to what extent Liu's advocacy of carriers, which he termed the "core of the Navy's combined battle operations" and considered a symbol of overall national strength that many other countries had already developed, has actually influenced PLAN development.[25] As Liu himself was careful to emphasize, "the development of an aircraft carrier is not only a naval question, it is also a major question of national strategy and defense policy. It must emerge from the exact position [of] and prudent strategy [concerning] comprehensive national strength and overall national maritime strategy."[26] In light, however, of both Beijing's determination to be respected universally as a great power and its growing maritime interests, the Chinese navy has clearly been contemplating various alternatives for developing aircraft carriers—research that provides critical indicators of Beijing's emerging maritime strategy.

Overseas New Construction

When it comes to obtaining a working carrier, China has several options, but each largely limits what the carrier could be used for. Buying a big-deck, Western strike platform akin to the *Enterprise* or *Nimitz* has apparently never been seriously considered. It would simply not be within the realm of the possible to acquire such a ship from the West—including, apparently, even Russia, which China reportedly approached in the early 1990s.[27] Moreover, operating a *Nimitz*-class aircraft carrier or equivalent is among the most complex tasks of modern warfare. Matching American or French expertise at large-deck power projection would involve incredible cost and many years of trial and error. China may be weighing the costs and benefits of vertical-and-short-takeoff-and-landing (VSTOL) and catapult aircraft carriers, the latter of which could support larger aircraft with greater payloads. Specialists at China's Naval Engineering University and Naval Aeronautical Institute have conducted research on

steam-powered catapults, but it appears to be theoretical in nature.[28] Only a few navies, notably those of the United States and France, have solved the perplexing mechanics and daunting upkeep of steam catapults or the subtleties of arresting gear, and they are unlikely to sell them to foreign powers. When it comes to aircraft for a conventional deck, only the United States and France have third-generation catapult-capable planes (we will return to aircraft below).

Another option for overseas purchase would be a small-to-midsized VSTOL-capable carrier from a European producer, such as Spain's Navantia, the builders of Thailand's ten-thousand-ton *Chakri Naruebet*.[29] In fact, there were some tentative moves in this direction in the mid-1990s, but nothing developed from them. Empresa Nacional Bazán, which merged with Astilleros Españoles S.A. (AESA) to form Navantia in 2000, reportedly attempted to market its SAC-200 and -220 light conventional-takeoff-and-landing (CTOL) designs to China in 1995–96, but apparently Beijing was interested in obtaining design plans, as opposed to a prebuilt carrier.[30] Given the continuation of the post-Tiananmen U.S.-European arms embargo on the People's Republic of China (PRC), the acquisition of operational carriers from overseas seems highly unlikely for the foreseeable future.

Notwithstanding all of this, however, buying a carrier undeniably saves time, trouble, and expense, by capitalizing on the expertise of others and securing a proven commodity, and it is notable how the Chinese debate has accommodated to this reality.

Indigenous New Construction

This approach would appear to offer a wider range of options and would allow the Chinese to take engineering and architectural clues from other navies and tailor the ship more closely to China's anticipated naval doctrine and aspirations. Nonetheless, start-up costs are very high, and the "delta" between plans and construction is large. China would confront such challenges as a long timetable and a lack of relevant experience. Prestige issues would seem to push China toward the biggest ship possible, but lately there have been signs of favoring a more modest ten-to-twenty-five-thousand-ton ship that would carry helicopters or VSTOL aircraft, like the British Harrier or newer versions of Russia's Yak-141. These discussions include some speculation that such a ship might even be nuclear powered, although conventional power seems more realistic. This proposal has drawn intense interest within China's navy and in the opinion of the authors is the most realistic course of action if the PLAN is to bring aircraft-carrying naval vessels into service in the near future.

However, according to sources of varying credibility, a more ambitious construction plan, sometimes referred to as "Project 9935," is under way that would produce

a large-deck, conventionally powered CTOL carrier in the fifty-thousand-ton range capable of launching and retrieving carrier-capable versions of Russian Su-30 aircraft, possibly within the next few years. While these aspirations are not to be lightly dismissed, Chinese-language sources reflect little attention to this program, far less than to smaller helicopter and VSTOL-carrying ships. If a vessel along the lines of the 9935 concept were to come down the ways in a Chinese shipyard, it would be likely to do so under the twelfth five-year plan, which will begin in 2011. In the near term, it is critical to monitor the purchase or production of support ships, aircraft, and shipboard systems that would be required to support an operational carrier strike group regardless of whether the notional 9935 carrier or some other vessel is to constitute its core.

Rebuilding

China has already purchased four decommissioned aircraft carriers, to considerable Western media speculation. In 1985, China purchased for scrap the Australian carrier HMAS *Melbourne,* from which it may have learned engineering principles—albeit limited and perhaps antiquated ones—when dismantling it. The ex-Russian *Minsk,* acquired by front companies in 1998, is now the centerpiece of a Chinese "military education" amusement park in Shenzhen.[31] A ship of the same class, *Kiev,* arrived in Tianjin in 2000;[32] it was subsequently renovated to attract tourists as the center of "China's largest national defense education base" and "the world's largest military theme park."[33] A visit to *Kiev* in June 2006 revealed a replica of a PRC J-10 aircraft, of which China may be developing a carrier-compatible version, below deck. The vessel itself, however, appeared to receive only cosmetic maintenance and is therefore likely in no condition to go to sea.[34] Finally, the Russian "heavy aircraft-carrying cruiser" *Admiral Kuznetzov*–class *Varyag* (purchased from Ukraine in 1998 for twenty million dollars and delivered in 2002) has attracted renewed international attention after having recently received a fresh coat of PLAN silver-gray paint, and possibly other renovations, at Dalian Shipyard.[35] The subject of much press speculation, *Varyag* is the most likely candidate if a decommissioned carrier is to be made operational. At the very least, its expensive acquisition and lengthy refurbishing seem to contradict the stated intention of its original buyer, Macao's Agencia Turisticae Diversoes Chong Lot Limitada, to use it as a floating casino. There have even been claims that by 2008 *Varyag* will be operational and based in Yalong Bay, Sanya City, on Hainan Island, to protect the Spratlys and the Taiwan Strait.[36] A senior Chinese official has told the authors that "some naval officers want" to refit *Varyag* and that "there is still a heated debate."[37] The significance of this insight is that operationalizing *Varyag* is not a dead letter in senior naval circles and that debate over its general utility and possible future roles continues.

Many of *Varyag*'s apparent disadvantages as a first carrier for China can be viewed in fact as advantages. *Varyag* was delivered without weapons, electronics suites, or propulsion, so though start-up costs would be high, the potential for customization is considerable. Further in its favor, *Varyag* is a very large ship, designed to displace 67,500 tons fully loaded; it can therefore be equipped with a variety of aircraft and shipboard systems. It is also a known quantity, in that the Soviets experimented with similar carriers and thought through related doctrinal issues. Finally, "off the shelf" aircraft, including helicopters, CTOL, and VSTOL, already exist that are known to work with the design and have been deployed aboard the *Varyag's* sister ship, *Admiral Kuznetzov*.

On the downside, and though the Chinese can build a conventional power plant as well as a shaft and screws sufficient to propel the *Varyag*, it seems unlikely that the reverse engineering this effort would entail could be easy or fast. In addition, a large conventionally powered carrier could not operate far from Chinese home waters without a combination of friendly foreign ports (to which access is presently uncertain) or a robust underway-replenishment capability. On this latter point, the PLAN regularly performs resupply and even repairs at sea and could obviously learn from the practice of navies that now deploy conventional carriers. The Chinese, no doubt, are closely watching Indian efforts at purchasing and eventually operationalizing the former Soviet *Kiev*-class VSTOL carrier *Admiral Gorshkov*. Since India has operated ex-British carriers for years, it already has a great deal of carrier experience, however, so China will inevitably start far behind India's level of expertise in actual carrier aviation and operation.

China's old carriers, especially *Minsk* and *Kiev,* were probably purchased as "cadavers" to be dissected to inform indigenous design. *Varyag*—while it will certainly serve that purpose, especially as it reflects the largest and most advanced Soviet carrier design—may ultimately also be used for pilot and deck crew training, as well as a "test platform" for general research and the development of catapults, arresting gear, and other ship-board systems.[38] To this end, *Varyag* may be retrofitted with a power plant, shafts, and screws so that it can go to sea under its own power, but training and equipment experimentation will likely be the extent of its capabilities in the near term. Further out, a modestly capable *Varyag* may become a centerpiece of Beijing's naval diplomacy by showing the flag and, in addition to training (following the model of the *Shichang,* discussed below), could potentially be used for humanitarian operations and disaster relief. But as with everything concerning *Varyag*, these projections are highly speculative.

COMMERCIAL CONVERSION

A final option would be to reconfigure a large commercial vessel as an aircraft carrier. A possible indication of austerity, flexibility, and commercial orientation is

apparent Chinese interest in Australian shipbuilding corporation INCAT's "Evolution One12." This wave-piercing catamaran is claimed to be "the world's largest diesel powered fast craft," a distinction corroborated by INCAT. INCAT has reportedly proposed a "multifunction" VSTOL and helicopter ship for the Royal Australian Navy.[39] Were it to pursue a parallel course of development, China could exploit its large and rapidly advancing shipbuilding sector, projected to become soon the world's largest.[40] China's shipbuilding industry appears to combine economic dynamism and broad-based Western technology assimilation with close military coordination.[41] Indeed, Shanghai's Jiangnan shipyard—China's largest and perhaps soon the world's largest—already contains both commercial facilities and others for advanced submarines and surface warships.

Indeed, while commercial technology is not directly applicable to military vessels—substantial modifications are necessary—China might prove more adept at this process than many other nations. It is conceivable that carrier-relevant research, development, and even production could proceed at one or more of China's major shipyards on a scale and with a rapidity that might surprise Western analysts. Certainly, however, there would be extraordinary challenges in converting a merchant ship into a combat-ready carrier. Producing a ship capable of ferrying helicopters would be comparatively straightforward, but even then the final result would likely be of minimal tactical utility and a tempting target for an adversary. Ultimately the aircraft carrier itself is simply a platform for air operations—the system of systems that allows for the projection of air power from the sea. The acquisition of a Chinese carrier vessel is simply one step, and a relatively simple one at that, along a complex continuum that may someday lead to a truly operational Chinese aircraft carrier. The subsequent steps involve hardware, software, and training.

The Carrier Hardware Package

All of these options would rely on conventional propulsion. While a theoretical possibility, nuclear propulsion makes little sense for the Chinese, who do not currently need surface combatants with the range of U.S. nuclear-powered carriers. Conventional propulsion is technologically much simpler and significantly more economical. Still, a carrier that can go to sea under its own power is one thing; a fully operational carrier is another matter entirely. As we have seen, there are many other technological and doctrinal questions to be answered.

Carrier operation demands a full complement of such elements as aircraft, deck elevators, radars, and defenses. Already, Chinese specialists have conducted extensive research in many major relevant areas. Experts at Beijing University of Aeronautics and Astronautics have studied carrier-aircraft landing gear.[42] Harbin Engineering University's Naval Architecture Department has examined the

structural demands of flight decks.[43] Other experts have analyzed "ski-jump" configurations (similar to those of *Kuznetzov* and some European VSTOL carriers)* and other takeoff issues, deck-motion compensation, wake turbulence, wave-off procedures, and landing decision aids, as well as aircraft-critical technologies and command and control.[44] In addition to detailed analyses of the requirements of current carrier operations, there is discussion of potentially revolutionary technologies that could be employed on next-generation carriers, including electromagnetic catapults and "integrated full electric propulsion" (IFEP).[45] Nearly all of this research appears to be theoretical in nature, however, and none of it proves that China has made actual progress in developing its own aircraft carrier—or even has made an official decision to do so. Rather, it seems to indicate that Chinese experts have followed closely major foreign aircraft carriers and are gaining increasing understanding of the systems and technologies that their navies employ. Moreover, much of the research is at least indirectly applicable to targeting enemy carriers more effectively.[46] In June 2006, a second Chinese official informed the authors that in PLA internal meetings, Taiwan scenarios and how to target U.S. carrier strike groups are often discussed.

With respect to carrier aircraft, pilot training would be particularly problematic for VSTOL and VTOL aircraft, given China's lack of relevant experience, if less so for helicopters, though rotary-wing operations are now very modest in the PLAN. In general, however, there has been incremental progress in Chinese naval aviation, albeit from a rather low baseline. The PLA Naval Air Force (PLANAF) is increasingly aggressive and confident in its basic homeland defense and interdiction missions, and its experience in nighttime over-water training and patrol is growing. Leading indicators of serious aircraft-carrier preparations include the development of special air control radars and reinforced landing gear. According to a 2004 article, Chengdu Aircraft Industry Corporation has been working on a carrier variant of the J-10 but still faces many technological shortfalls.[47] Another recent source claims that China may be seeking Russian thrust-vectoring-controlled AL-31FN engines to render the J-10 better capable of takeoff from a ski-jump deck and to reduce its landing speed.[48] However, additional large purchases or licensing agreements for naval variants of Russian aircraft suitable for carrier operations—such as the Yak-141, the Su-30MKK, or the Su-33 (the last an Su-27 variant designed for *Kuznetzov*-class carriers, and hence appropriate for *Varyag*)—would be one of the better indicators of where China's aircraft carrier program is moving.[49]

* A ramp, typically twelve degrees, at the bow, that helps impart lift and permits heavier aircraft to become airborne after a short takeoff run. This allows for greater range and weapon payload than nonramped vertical/short take-offs, but still not on a par with the range and payloads of aircraft launched by steam catapult.

Obtaining aircraft would not in itself, however, mitigate the lack of practical experience with them in a carrier environment. Great leaps forward in operational capabilities solely through acquisition are unlikely. More incremental improvements—akin to Japan's gradual approach to its helicopter-carrying *Osumi*-class, and next-generation, LSTs (which some speculate may deploy fixed-wing aircraft, possibly the Joint Strike Fighter)—are more realistic. In this regard, Thailand's acquisition of the Spanish-built *Chakri Naruebet* may serve as a tangible lesson. Bangkok acquired this fully outfitted, very expensive ship in 1997 but due to financial constraints and lack of experience has rarely deployed it.

Therefore, there are many reasons for the Chinese to pace themselves rather than rush to deploy an operational carrier. The most that a major purchase of new aircraft, such as the Russian two-seat Su-30MKK, or the Chinese version, the MK2, can offer the PLANAF is greater ability to perform its basic missions. Better weapons and more experience with air-to-surface attack can extend area-denial and interdiction incrementally, but significant growth of that envelope is unlikely without sea-based aviation and land-based, over-water, midair refueling capability, in addition to some means of coordination and defense (e.g., an AWACS* equivalent). Both of these capabilities appear to be high priorities for the PLAN. China purchased Russian A-50 AWACS-type aircraft in 2000, following cancellation of Israel's Phalcon sale amid mounting American pressure. China is also reportedly developing the KJ-2000, and indigenous AWACS-type aircraft.[50] "While the larger, more advanced" KJ-2000 is envisioned to conduct "long-range, comprehensive aerial patrolling and control roles," the smaller KJ-200/Y-8 airborne early warning (AEW) aircraft (nicknamed "Balance Beam" in the West), with an electronically steered phased array, offers "a less expensive platform for tactical airborne early warning and electronic intelligence missions."[51] Various sources report that a KJ-200 aircraft crashed on 4 June 2006, killing forty people and possibly setting back the program.[52] China is also reportedly considering Russia's Kamov Ka-31 helicopter for carrier-based AEW.[53] China still relies on Russian aerial refueling tankers (for instance, the Il-78) but is struggling to achieve domestic production capabilities even there.

If the experience of other navies is any measure, the Chinese also need to realize that getting carrier operations right will involve the loss of expensive aircraft and hard-to-replace pilots. In 1954 alone, in working to master jet aviation off carriers, the U.S. Navy lost nearly eight hundred aircraft. In 1999 the Navy lost only twenty-two, but these were the most advanced aircraft flown by the world's

* The U.S. Airborne Warning and Control System, carried by the E-3A aircraft.

most experienced aviators.[54] While the Chinese will certainly benefit from improvements in technology and will not be attempting a scale of operations even close to that of the United States during the early Cold War, they must realize that their learning curve will be costly in terms of blood and treasure. Moreover, the PLAN air force has traditionally been poorly funded and its pilots have only a fraction of the flying hours that their peers in the United States, India, and Japan have. These factors will make China's mastery of carrier aviation even more costly in human terms.

Quantum leaps forward are required not only in sea-based fixed-wing aviation and midair refueling but also in PLAN doctrine and antisubmarine warfare (ASW) as well as in PLANAF service culture if China's aerial power-projection capabilities are to be improved dramatically. Without major improvements in ASW, for instance, any Chinese CV would be an easy target for a diesel-electric or nuclear-powered attack submarine (SS/SSN). Chinese ASW capabilities, while slowly improving, cannot yet be counted on to provide a reasonable degree of security in open waters. In a crisis scenario, many air support tasks would be performed by the People's Liberation Army Air Force (PLAAF). This means that, unlike a U.S. carrier strike group, a Chinese CSG would not need to be wholly self-supporting. But it remains unclear how capable of joint coordination China's different services are in operations over water. Integrating operations between a highly regimented and rigidly structured PLAAF and an immature and sea-based PLAN contingent would require technological and service-culture innovations, as well as exercises less carefully scripted than has been usual, to develop the requisite interoperability and interservice coordination. Significant additional research is required to gauge how much coordination exists within the PLAN between its ground-based naval air and surface/subsurface assets. This is all the more critical as the type and degree of coordination will necessarily vary depending on maritime mission, (i.e., humanitarian, interdiction, area denial, sea control, or strike power projection).

View from the flight deck of the *Kiev*. There are no actual carrier aircraft present at this museum.

The Chinese navy must also determine what mix of surface vessels and submarines would be necessary to support a carrier. Here the evolution of the overall naval order of battle may offer insights. China might be unlikely to commit

itself to a militarily useful carrier until it could fill out the strike group without compromising its ability to fulfill other missions. Analysis here requires nuanced understanding of exactly what it takes to operate a carrier and what mixes of indigenous products and off-the-shelf technologies could be combined in a Chinese strike group. CVs are highly vulnerable even with supporting strike groups, especially from submarines of the United States and other regional competitors; the time and expense of deploying a carrier will be for naught if it cannot be protected.

As they currently stand, China's capabilities are sufficient to give the United States pause if a Taiwan conflict scenario were to erupt, but truly controlling the battle space against a determined and capable adversary remains a Chinese aspiration, not a demonstrated capability.

THE ROLE OF A CARRIER IN CHINESE NAVAL DOCTRINE

If China were to achieve any of the acquisition options outlined above and outfit a carrier, such a ship, while expensive and complicated, would indeed be a useful asset. It would have little role in a near-term Taiwan scenario, however, as land-based PLAAF and PLANAF aircraft could probably handle all of the required air operations across the narrow Taiwan Strait. Unless China is able to produce and incorporate a range of carriers in a cohesive and effective concept of operations, it is difficult to envision carriers as the centerpiece of Chinese naval doctrine in future decades. In his memoirs, Adm. Liu Huaqing described aircraft carriers as providing air coverage essential to offshore defense. An aircraft carrier would thus facilitate Chinese air operations in the Taiwan Strait by obviating the need for short-range fighters to sortie from land bases. This, Liu believed, would maximize the utility of China's existing aircraft.[55] However, Liu made these statements in 1987, before modern precision weaponry. Indeed, a concomitant shift in operational scenarios may at least partially explain apparent indecision in China concerning aircraft carrier development. Though periodically considered, it may have been repeatedly postponed in favor of submarines. Even Liu acknowledged that nuclear submarines are "one of the very most important pieces of naval equipment."[56] A senior Chinese official has further emphasized to the authors that "China will not try to compete with the U.S. in the open sea. Even twenty PRC carriers cannot compete with U.S. nuclear carriers."[57]

That said, there are two general categories of potential carrier roles in the PLAN. The first is as a discrete capability to support secondary missions. The second is as a complement to China's submarine-centered fleet. As to using carriers as a discrete platform, the most basic motivation is prestige—particularly for a great power still seeking to right the wrongs of its devastating national weakness since 1840. As one Chinese analysis emphasizes,

> The enterprise of China's ocean development has a splendid history dating back to [Ming Dynasty Admiral] Zheng He's seven voyages to the West. But its previous feudal rulers locked their doors against the world. They fettered the Chinese Nation's vigorous ocean-based development. This included especially the Ming and Qing [dynasties'] severe prohibition of maritime [focus] for over 400 years. This repeatedly caused the Chinese Nation to miss favorable opportunities [that would have stemmed from] developing civilization from the sea. Then the Western gunships bombarded their way through the gate that China's feudal rulers had locked. Thenceforth, a succession of wars of invasion from the sea visited profound suffering as well as galling shame and humiliation on the Chinese Nation. The beautiful, abundant ocean gave forth only sorrow and tears.[58]

Chinese interlocutors often tell Westerners that "a nation cannot become a great power without having an aircraft carrier." Lt. Gen. Wang Zhiyuan, deputy director of the PLA General Armament Department's Science and Technology Commission, stated in a 2006 interview that the PLA "will conduct research and build aircraft carriers on its own, and develop its own carrier fleet. Aircraft carriers are a very important tool available to major powers when they want to protect their maritime rights and interests. As China is such a large country with such a long coastline and we want to protect our maritime interests, aircraft carriers are an absolute necessity."[59] Zhang's conception of China as facing both challenges and opportunities from the sea is prevalent among Chinese analysts.[60]

Carrier acquisition can also be seen as part of regional power competition. When the Japanese deploy their larger version of the *Osumi*-class LST, or when the Indian navy puts a refurbished *Gorshkov* to sea, the Chinese may be compelled to accelerate their carrier program to maintain the appearance of a great power. But this is more than simply an issue of face. Showing the flag is important, but as Japan itself maintains, some form of carrier is needed for peacekeeping operations, as well as for humanitarian intervention and for defense of vital and lengthy sea lines of communication.

This unique role for aircraft carriers was demonstrated by the 2004 tsunami, after which the PLAN found itself on the outside looking in, especially compared to the U.S. Navy, but more painfully to the Indian navy and, even more unbearably, the Japan Maritime Self-Defense Force (JMSDF).[61] An article in the PLAN publication *Dangdai Haijun* (Modern Navy) assessed that Japan's "first dispatch of a warship overseas [for] search and rescue . . . demonstrated its status as a 'great power of disaster relief.'" The article noted that the U.S. "dispatched [the *Abraham Lincoln*] carrier battle group to the rescue" and that India's "navy served as the daring vanguard." It concludes, "The rescue activities following the Indian Ocean tsunami abundantly illustrated that the use of armed forces is not only to prevent conflict or to wage wars, but also brings into play the key actions

of national construction, disaster relief, and rebuilding." Aircraft carriers and helicopters, it suggests, are vital for such "non-combat military operations."[62]

The final category of potential Chinese carrier missions includes collective maritime security (e.g., sea-lane protection and counterpiracy). This collective-security force structure is obviously a secondary mission of the PLAN, and it would be oriented toward friends and rivals in the South China Sea and the Indian Ocean. Deployment of an aircraft carrier would enable modest force projection to assert Chinese claims in the South China Sea. In this vision, *Varyag* or an indigenous carrier in the mold of India's older *Viraat*, its new *Gorshkov*, Thailand's *Chakri Naruebet,* or Japan's *Osumi* would be all the Chinese would need. A more robust and capable carrier strike group might be needed properly to defend Chinese sea lanes and energy access through the Strait of Malacca to the Indian Ocean, but even an ability to show the flag in this fashion could have valuable psychological effects. In an important article in 1998, noted China Institute of Contemporary International Relations scholar Zhang Wenmu contended that America had historically pursued a strategy of monopolizing access to oil. Land-accessible energy resources in Central Asia offer an important hedge against Chinese reliance on sea-based energy supply, which is far easier for U.S. forces to control and disrupt.[63] But Zhang strongly believed that China must control its sea-based oil supplies as well:

> China is facing fierce competition overseas in obtaining its share of crude oil. . . . [U]nder globalization a nation's energy security is no longer an economic issue alone. Instead, it is also a political issue, as well as a military issue. . . . [It is therefore necessary to] build up our navy as quickly as possible. . . . We must be prepared as early as possible. Otherwise, China may lose everything it has gathered in normal international economic activities, including its energy interest, in a military defeat.[64]
>
> China should strive to develop its naval power. China should not only strengthen its naval power and defense to protect imported oil, but also expand its navy to achieve its influence over the offshore resources in the Asia Pacific region with [its] complex rights dispute[s]. [Sea] power has a permanent [significance for] the trade of coastal countries, and the backup of a country's [sea] power is its navy. Therefore, the long term approach toward ensuring open sea lane and potential ocean resources is to [develop] a modern oceangoing navy.[65]

For these reasons and others, Zhang strongly contended, China needs aircraft carriers—although nuclear submarines are even more important (at least at present).[66]

As to the issues of complementary capabilities in Chinese submarine doctrine, the Soviet model might be illustrative. Soviet deck aviation had an important ASW component. In the 1970s and 1980s, the Soviet navy considered bastion strategies of protecting SSBNs, performing area-denial and ASW

centered on helicopter carriers like *Minsk* and *Moskva*. The original approach was later supplemented by the *Kuznetzov*/*Varyag,* designed for force-on-force operations.[67] There is some evidence that China might follow this pattern of integrated air and undersea warfare doctrine, but like all carrier discussions, this is still very hypothetical.

In the near term, if China cannot solve the extended-deployment issue and its SSBNs have to stay close to home, there might be logic in the carriers' protecting an SSBN bastion in the Yellow Sea, Bohai Gulf, or South China Sea. But pursuit of such a strategy was arguably problematic for the Soviet Union. A bastion strategy might be even more counterproductive for China; forces devoted to supporting and defending a carrier are better spent elsewhere if fixed-wing ASW assets cannot be developed and deployed either from land bases or onboard ship. Even then, force protection, as it is in the U.S. Navy, would be a major drain. In an era in which long-distance precision strike has been emphasized—particularly by the U.S. military—it is far from clear how survivable Chinese aircraft carriers might be, particularly in a concentrated bastion, where they would offer dense targeting options for a wide variety of adversary platforms, although targeting the right vessel would still be a complex problem for the adversary.

A SMALLER HELICOPTER CARRIER: CHINA'S INTERIM COMPROMISE?

China already has some experience with a ship that can support multiple helicopters, albeit an extremely modest one. The multirole aviation training ship 0891A *Shichang* has a large aft helicopter deck, accounting for two-thirds of its 125-meter (410-foot) length. The deck has dual landing spots for Harbin Zhi-9A helicopters. Removing equipment containers (designed for rapid reconfiguration) aft could make space for a total of three helicopters. *Shichang* was conceived as both "China's first aerial service capacity ship" and "first national defense mobilization warship" as part of a larger plan to refit merchant vessels rapidly for defense mobilization.[68] This initiative apparently began in 1989, and was motivated in part by British and American use of commercial vessels in the Falklands War and later by Operation DESERT STORM, respectively.[69] *Shichang* is entirely indigenous in its development and production, and reportedly meets all relevant domestic and international standards.[70]

Shichang, which resembles the Royal Navy's Royal Fleet Auxiliary aviation training and primary casualty reception ship *Argus,* was launched on 28 December 1996 in Shanghai; it was dispatched to the Dalian Naval Academy in 1997 following rigorous sea trials, prioritized by the PLAN leadership, ranging as far away as the South China Sea.[71] According to an article that originally appeared in China's *PLA Daily*, *Shichang*, together with the naval cadet training ship *Zheng*

He, serves as an "at sea university," one that has trained two of every three current PLAN officers.[72] *Shichang*'s 9,500-ton displacement, 17.5-knot speed, crew of two hundred, and range of eight thousand nautical miles suggest a serious effort to develop some limited form of deck aviation.[73] It is at sea two hundred days per year, and its crew is accustomed to handling typhoons and thirty-degree rolls.[74] It supports "simultaneous operations of multiple helicopters," which "facilitates training for shipboard helicopter operations, as well as amphibious assault training."[75] *Shichang* "is widely regarded as the prelude to construction of a [true] helicopter carrier or amphibious assault vessel [presumably LPD- and LPH-type ships], and provides a basis for perfecting fixed-wing aircraft carrier operational concepts." With its helicopter module, it can serve as a "transfer station" for "a group of helicopters in wartime."[76] *Shichang* is also envisioned as having an ASW mission.[77]

A detailed 2005 analysis of China's prospects for developing a helicopter carrier states that "arrogant intervention of hostile great power(s) in the cross-Strait divide requires us to prepare for successful military struggle. Moreover, China still has some significant maritime territorial disputes with some peripheral countries." Its author believes that a coastal defense strategy is increasingly inadequate for China's future needs, which include "energy security, economic development, and political stability," all of which "are increasingly intimately connected with the international situation." Developing a helicopter carrier is therefore China's best "springboard" for such a "development strategy."[78]

> Considering funding, technology, and tactical issues, a helicopter carrier's displacement should be approximately 15,000 tons when fully loaded. It should be able to accommodate approximately 15 helicopters (12 ASW helicopters [and] 4 advance warning helicopters. . . .) The [hurdle] of 10,000 ton ship technology is small. China has previously constructed the "*Shichang*" training ship of around 10,000 tons. . . . As a result of limited tonnage, the equipment demands of a helicopter carrier are lower than those of a large or medium aircraft carrier, [helicopter carriers] can use [the] Commercial Off the Shelf Technologies (COTS) method in their construction, and [their] costs can be greatly reduced.[79]

Further, "China's opportunity, funding and technology for developing a helicopter carrier are all mature. Because the superpowers have encircled China's periphery, and the opportunity for developing a fixed-wing aircraft carrier is not mature, the author believes that firmly grasping the opportunity to develop a helicopter carrier is the correct choice. China's Navy should reasonably call [the carrier] its own '*Moskva*' class. I hope this day arrives soon!"[80] Among the models reportedly under consideration is a fifteen-to-twenty-thousand-ton LHD-like amphibious assault ship, featuring a large deck that can handle heavy transport helicopters and a mix of amphibious landing craft.[81]

The wide range of challenges inherent in developing a successful large-scale carrier and questions concerning its mission utility suggest that China may take a creative approach to carrier development, as it has done in other areas. Here it may be useful to examine other platform developments to seek patterns that would reveal PLA decision-making patterns and practices.

The *Kiev* museum at Tianjin contains photographs of other nations' aircraft carriers, perhaps implying that aircraft carriers are a natural part of all great-power navies.

One notable trend in PLAN development has been the production of single, or short-series, platforms. Examples include emulation of Soviet efforts to build a dedicated minelaying vessel.[82] China's initial *Xia* SSBN is another potential example. Some Western analysts might ascribe such activity to mere copying of Soviet failures or to a PLAN experiencing growing pains that reduced its ability to plan for and produce an effective fleet. But another interpretation, one that is supported by some Chinese sources, is that such small-scale experimentation deliberately facilitates learning independent of immediate combat relevance. Viewed in this light, the Chinese navy might attempt to retrofit *Varyag* to begin experimentation with naval aviation—perhaps with little or no intention of ever using the resulting platform in battle.[83]

Such a vessel might also be used to practice operations against foreign carriers. Chinese specialists are acutely aware of aircraft carrier vulnerabilities, having conducted a wide variety of research apparently directed toward threatening aircraft carriers with ballistic and cruise missiles, submarine-launched torpedoes, and sea mines.[84] One Chinese article emphasizes these "trump cards" as well as "neutron bombs [and] stealth missile ships."[85] China's rapidly developing navy might view a carrier-based force posture as entirely premature yet also see the need to begin preparing for a future in which China's maritime interests are more wide ranging and its capability to defend those interests greatly advanced. By that time, improvements in intelligence, surveillance, reconnaissance, and precision weaponry might conceivably have rendered aircraft carriers and other surface vessels ineffective for some missions—the "floating coffins" that Nikita Khrushchev foresaw.[86] But by cultivating a nascent capability, however modest, the PLAN would have hedged its bets.

A second trend has been to improvise and compromise. A case can be made that the PLAN has long recognized its limitations in capability and lived within

them. Some Western analysts appear to engage in "mirror imaging" in assuming that China will automatically emulate American and Soviet large-deck aviation trajectories. But even a serious Chinese carrier development program might look substantially different from that of the superpowers. In August 1986, Liu Huaqing recalled, "when I was briefed by the leaders of the Naval Armament and Technology Department and the Feasibility Study Center, I assigned them a task regarding the development of carriers. I said, 'The method of building an aircraft carrier is a matter of overall naval construction. Whether [we are to build] helicopter carrier(s) and escort carriers in different stages, or [to] directly build escort carriers [is a matter that we] must assess carefully.'"[87] Recently, the Chinese have been surprisingly open minded as to the definition of a "carrier," running as it does the gamut from amphibious warfare ships through helicopter and hybrid carriers, up to the U.S. supercarriers.[88] A senior Chinese official stated to the authors that "China will not develop *Nimitz*-class carriers but rather mid-sized carriers."[89] In this regard, France may be a model for China. According to one article, "Since the 1970s, China has dispatched a large number of military personnel to each of the French Navy's research institutes for exchange. [They] have conducted thorough analysis on aircraft-carrier-related technology. Many people follow France's aircraft carriers carefully, even learning from personal experience how to pilot carrier-based aircraft for deck landings."[90]

Numerous literature and analyses concerning Western helicopter "carriers" suggest that this might be a more logical arc for the PLAN.[91] These smaller, simpler carriers would be substantially easier to build and operate. Helicopter carriers might also better serve Chinese operational requirements, ranging from augmenting China's currently anemic airborne ASW capability to logistical support and even humanitarian missions.[92]

The major obstacle to successful Chinese development of helicopter carriers is the continuing backwardness of its rotary-wing aircraft development and inventory. The entire People's Liberation Army today possesses fewer than 350 helicopters (roughly three hundred in the PLA and forty in the PLAN). Most platforms in the PLA's disproportionately small fleet are either imports (for instance, Super Frelons) or copies of foreign models (like the Z-8 Super Frelon derivative). The only remotely capable versions are based on French platforms, such as the Dauphin (Z-9). China also operates some Russian imports, such as the Ka-28 Helix.[93] It is finally beginning to address this lack by entering into joint ventures with Eurocopter to produce more capable machines and to obtain related technology and expertise. Reportedly, China is developing its first indigenous assault helicopter, the WZ-10 attack variant.[94] For the foreseeable future, however, China may prefer to purchase European helicopters. One Chinese analyst expresses particular interest in acquiring the Anglo-Italian EH101 and the multirole NATO NH-90

helicopter, developed by a joint venture of Italian, French, German, Dutch, and Portuguese corporations.[95] This prospect would be greatly strengthened if Europe's post-Tiananmen arms embargo were to be further weakened or lifted in the near future. In any case, the state of China's rotary-wing capability and inventory will likely serve as a leading indicator of any substantial helicopter carrier initiatives.

The long PRC record of avowedly defensive military development, recently strained by China's rising comprehensive national power and Japanese nationalism, suggests that Beijing would carefully weigh the costs and benefits of deploying so explicit a concept of force projection as a large-deck aircraft carrier.[96] Other methods and platforms might accomplish many of the same ends without alienating neighboring countries. Submarines are less conspicuous than many other major naval platforms. Diesel submarines may be interpreted as defensive in nature. Sea mines, better still, are often invisible even to foreign militaries.[97] Perhaps that is one reason—aside from survivability and cost-effectiveness—why China has recently placed so much emphasis on these platforms. Aircraft carriers, by contrast, are impossible to hide; even to some Chinese leaders they connote gunboat diplomacy and imperialism, particularly in an East Asia still consumed by memories of Japan's bloody attempts to rule it.[98] In fact, it is for precisely these reasons that the Japanese refer to the *Osumi* as an LST. The Japanese public could also become alarmed by Chinese carrier development and be stimulated to support constitutional revision, increased military spending, and even nuclear weapons development. Any form of an arms race with so capable and strategically situated a nation as Japan is clearly something that China would prefer to avoid. These are not reasons why China would *never* develop aircraft carriers, but they do suggest that China will do so only cautiously and with full cognizance of opportunity and contingency costs.

No doubt these issues have engendered substantial debate within China's civilian and military leadership, debate reflected at least in part by the diverse opinions of Chinese analysts in open sources. Perhaps some of the rumors and activities that make the question of Chinese aircraft carrier development so fascinating can be ascribed to just such a process. If and when China does embark on an unmistakable course of acquisition, we can expect to see sophisticated attempts to explain why China's carriers are different from, and serve different purposes than, their Japanese, Soviet, and American predecessors or their Indian, Japanese, Thai, American, and European contemporaries. Whatever carrier China does manage to deploy will likely be framed within peaceful rhetoric. "Our purpose in manufacturing aircraft carrier(s) is not to compete with the United States or the [former] Soviet Union, but rather to meet the demands of the struggle [to recover] Taiwan, to solve the Spratly Islands disputes and to safeguard [China's] maritime rights and interests," Liu Huaqing emphasized in his memoirs. "In peace time,

[aircraft carriers] could be used to maintain world peace, thereby expanding our international political influence."[99] Like other aspects of Chinese maritime development, it will likely be imbued with shades of the Zheng He metaphor, "peaceful" voyages of discovery and goodwill commanded by the fifteenth-century eunuch admiral.[100] A recent series in China's official navy newspaper to commemorate the six hundredth anniversary of Zheng He's voyages emphasized precisely these factors.[101] In fact, Chinese commentators make the case that while China has historically been able to build great ships, it has never used them to dictate terms to others.[102] For instance, the senior Chinese official we interviewed in mid-2006 emphasized that "a Chinese aircraft carrier would not be used to seek hegemony."[103] While the merits of such claims are open to debate, they do hint at one way in which naval power is conceptualized in the contemporary PRC. In a more immediate sense, U.S., Japanese, Indian, and Thai operations in the aftermath of the 2004 tsunami have convinced many Chinese that good carriers make good neighbors and that they are a necessity if China's force structure available for deployment to Southeast Asia is to match and complement its diplomatic initiatives.[104]

The *Kiev* museum includes a display describing the carrier's distinctively large towed sonar body. This illustrates how Soviet carrier design developed very differently from its Western counterparts, raising the fundamental question of how such design elements have influenced Chinese thinking with respect to deck aviation platforms.

In May 1998, for instance, *Shichang* visited Sydney, Australia, with the destroyer *Qingdao* and the hospital ship *Nancang*.[105] This was part of a larger mission of *Shichang* and fellow training ship *Zheng He*—to "reveal the graceful bearing of a new generation of PLAN officers, spread the arena of friendship, understand the world, open the window of a [new] a field of vision, increase experience, [and become] a study platform" by visiting over sixty sea areas and ports, including Hawaii and Vladivostok.[106] *Shichang* has also visited New Zealand and the Philippines.[107] It is designed specifically to deploy to "disaster areas." Under Captain Wang Gexin, its hospital unit has also participated in domestic flood relief efforts.[108] Shichang conducted a "national defense mobilization drill" near Xiamen on 28 July 1999.[109] *Shichang* has proved capable of long-distance open-ocean navigation. In July–August 1999 "it carr[ied] out at-sea defense drills, [the] largest, furthest, and longest in PLAN history."[110] Perhaps *Shichang* was not deployed to help with tsunami relief in 2004 because it is indispensable to PLAN training. If that is the case, maybe China would

consider such a role in the future if its helicopter carriers become more sophisticated and numerous.

The logic Chinese sources outline for the utility of a small carrier for regional purposes raises the interesting ideas of both a naval "ecosystem" and a modern, regional basis for capital-ship calculations. Chinese calculations of a small carrier's utility in regional diplomacy vis-à-vis the Indian navy and the JMSDF are very similar to the logic that Alfred Thayer Mahan used when calculating how many battleships should be posted on America's West Coast vis-à-vis the Royal Navy, French, and German navies to prevent adventurism on the west coast of South America. In a Chinese context, the idea might be to complicate the calculations of others with claims to the Spratlys or other contested areas. The tactical utility of these platforms as disaster relief sea bases offers a positive spin-off for diplomacy. The idea of a regional naval ecosystem is of great potential importance to the development of a global maritime security network, as the U.S. Navy goes about rendering naval security assistance. All U.S. actions will have second and third order effects on these systems. Awareness of such ramifications will be essential for the conduct of effective Phase Zero (precursor) operations.[111]

A NEW GOLD STANDARD

In their excellent article in the Winter 2004 issue of this journal, You Ji and Ian Storey concluded that

> with the retirement of Liu in 1997. . . the aircraft carrier lost its champion in the Chinese navy. At the same time, the need to control the South China Sea as a strategic priority was downgraded as reunification with Taiwan hurtled to the top of Beijing's agenda. In that context, given the relative closeness of Taiwan and improvements in the capabilities of the Chinese air force and missile arsenal, aircraft carriers are not now considered vital.[112]

This and similar U.S. Defense Department assessments of recent years that China's carrier program was sidelined were correct and would likely be confirmed by senior Chinese officials at the time. Following the 2004 tsunami and especially with the advent of the eleventh five-year plan, however, those priorities seem to be changing. What even a modest carrier can do in the near term caught the Chinese by surprise in early 2005, when they watched in horror as Indian and Japanese carriers conducted post-tsunami relief operations. Thus, in reconceptualizing the PLAN carrier, China's two potential role models—and competitors—are not the United States and the former Soviet Union but rather India and Japan. Fixating on the global "gold standard" for aircraft carriers is no longer the only, or even the most appealing, option for China. Beijing's strategic focus on Taiwan militates against developing aircraft carriers, except for small

helicopter carriers serving as antisubmarine-warfare platforms, for that specific scenario. To China's south and southwest, however, especially along the lengthy sea lines of communication, aircraft carriers of all variations could play more useful operational and diplomatic roles. A carrier as a discrete capability fulfilling secondary roles, such as sea-lane security and humanitarian and disaster relief missions, is therefore the most likely trajectory.

Nevertheless, once China has multiple carriers in operation, there is no reason to think that new technologies and doctrines will preclude Beijing from linking the carrier to its more capable and far more numerous submarines. As many as twelve to fifteen helicopter carriers or a mix of modest carriers and somewhat larger variants would represent a significant shift in ASW capability and may better complement the submarine-centered navy, which China is clearly developing at present, than would large-deck fixed-wing alternatives. With the wealth of new models of carriers and operational concepts available to watch, the carrier discussion in China—while still theoretical—has matured. On paper at least, the Chinese have avoided the pitfall of spending too much on the wrong platforms at the wrong time. It remains to be seen, however, exactly what place aircraft carrier development will have in what has been a prolonged, publicized, and increasingly successful attempt by China to become a maritime power.

One thing is clear: Beijing will continually search for the most effective platforms with which to assert control over its maritime periphery. As a recent article in the *PLA Daily* emphasizes,

> We must absolutely no longer be the least bit neglectful regarding the "world without markers" of our vast sea area, our blue frontier. We must no longer customarily assert that the total area of our national territory is 9.6 million square kilometers. To that we must add our sea area of 3 million square kilometers, our blue frontier. Who will protect this vast blue frontier? How should it be protected? Those are questions which every Chinese person, and especially every member of the Chinese armed forces, must ponder carefully. During China's era of weakness and degeneration in the past, in the face of power backed up by gunboats, we lost many things which we should not have lost. It's a different era now. We must not lose anything. We must fight for every inch of territory, and never give up an inch of sea area! We must build a powerful Navy, and protect our coastal defenses, our islands, our vast blue frontier, and everything within the scope of our maritime rights and interests. Cherishing and protecting the seas and oceans is the sacred duty and responsibility of our republic's military personnel. Every intangible "boundary marker" and "sentry post" at sea must always be clearly visible in the minds of every one of us.[113]

NOTES

The photographs were taken by Dr. Erickson during a visit by the authors to the People's Republic of China in early 2006.

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1. See, for example, 王振文 [Wang Zhenwen, editor], "'明思克'号传奇" [The Legend of the *Minsk*], (南海出版公司 [South China Sea Publishing Company], 2002), p. 238. The works of such premier scholars as Tang Shiping of the Chinese Academy of Social Sciences (CASS) emphasize the need for China's leaders to focus on resolving domestic problems and to "make positive advances while not rushing forward blindly . . . to seek a balance between progress and prudence." This would seem to problematize a rapid large-deck carrier program. 唐世平 [Tang Shiping], "2010–2015 年的中国周边安全环境—决定性因素和趋势展" [China's Peripheral Security Environment in 2010–2015: Decisive Factors, Trends, and Prospects], 战略与管理 [Strategy & Management], no. 4 (2001), p. 37, Foreign Broadcast Information Service (FBIS) CPP20021017000169. See also 唐世平 [Tang Shiping], "再论中国的大战略" [Reconsidering China's Grand Strategy], 战略与管理 [Strategy & Management], no. 4, 2001.
2. "Observation Post of the Military Situation" program, Feng Huang Wei Shih Chung Wen Tai [Phoenix Television], 15 March 2006, FBIS CPP20060317515025. *Jianchuan Zhishi* is a monthly publication of the Chinese Society of Naval Architecture and Marine Engineering.
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4. Ibid.
5. Authors' interview, Beijing, June 2006.
6. 吴红民 [Wu Hongmin], "龙游五洋: 中国海军发展新论" [The Dragon Swims the Five Seas: New Ideas on China's Naval Development], 舰载武器 [Shipborne Weapons] (September 2005), p. 18.
7. Ibid.
8. For scholarship concerning China's carrier development, see Ian Storey and You Ji, "China's Aircraft Carrier Ambitions: Seeking Truth from Rumors," *Naval War College Review* 57, no. 1 (Winter 2004), pp. 77–93. This article has been translated into Chinese as 张宏飞 [Zhang Hongfei], "中国人为什么需要或不需要航母?—看清中国的航母雄心 外国专家从传言中探寻真相" [Why Do the Chinese People Need, or Not Need, an Aircraft Carrier?—Foreign Experts Seek from Rumors to Clearly See the Truth about China's Aircraft Carrier Ambitions], 国际展望 [World Outlook], no. 16 (August 2004), pp. 16–21.
9. This is not to imply that the Chinese have across-the-board advantages in either submarine or mine warfare, especially compared to the U.S. Navy, but rather that focused investments in these warfighting specializations seem to promise the highest rate of strategic return in the near term.
10. 刘华清 [Liu Huaqing], 刘华清回忆录 [The Memoirs of Liu Huaqing] (Beijing: People's Liberation Army, 2004), p. 481. All original quotations from Liu's autobiography were checked against the wording in the FBIS translation of Chapters 16–20, CPP20060707320001001. Wording different from the FBIS translation is used whenever the authors felt that it better reflected Liu's meaning or would be more comprehensible to the reader.
11. See Liu Huaqing, *Memoirs of Liu Huaqing,* p. 437; and Bernard D. Cole, *The Great Wall at Sea: China's Navy Enters the Twenty-first Century* (Annapolis, Md.: Naval Institute Press, 2001), pp. 165–68.
12. See "日本军舰跟踪我国科考船" [Japanese Warships Track Our Scientific Research Vessels], 世界新闻报 [World News Report], 17 May 2004, p. 24.
13. For a Chinese argument that the United States cooperates with Japan militarily to contain China, see "西太平洋美军'岛链'情结" [The U.S. Military's Strong "Island Chain" Sentiment in the Western Pacific], 中国国防报 [China National Defense News], 29 June 2004; and "武士刀出鞘: 日本对华政策硬化" [The Samurai Sword Is Out of Its Scabbard: The Hardening of

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15. "Memoir of Senior Military Leader Published," Xinhua, 8 October 2004, FBIS CPP20041008000177; "'刘华清回忆录' 已由解放军出版社出版" ["Memoirs of Liu Huaqing" (former Central Military Commission vice chairman) Published], *Jiefangjun Bao,* www.chinamil.com.cn/site1/xwpdxw/2004-10/03/content_28915.htm.
16. Liu Huaqing, *Memoirs of Liu Huaqing,* p. 477.
17. Ibid.
18. Ibid., p. 479.
19. This paragraph is drawn entirely from ibid., p. 478.
20. Ibid., p. 480.
21. Information from this and the preceding paragraph is derived from ibid., pp. 480–81.
22. Ibid., p. 481.
23. Ibid.
24. "Former Deputy Commander of the PLA Navy Vice Admiral Zhang Xusan Is Guest of Sina.com," *Jianchuan Zhishi* (Internet version), 11 July 2005, FBIS CPP20050713000187.
25. For the quote, Liu Huaqing, *Memoirs of Liu Huaqing,* p. 481. For symbolism, ibid., p. 477. For developments in other countries, ibid., p. 479.
26. Ibid., p. 481.
27. See "Aircraft Carrier Programme," *Chinese Defence Today,* available at www.sinodefence.com/navy/aircarrier/default.asp.
28. 余晓军, 高翔, 钟民军 [Yu Xiaojun, Gao Xiang, and Zhong Min], "蒸汽弹射器的动力学仿真研究" [Simulation of Dynamics of the Steam-Powered Catapult], 船海工程 [Ship & Ocean Engineering] 166, no. 3 (2005), pp. 1–4; and 贾忠湖, 高永, 韩维 [Jia Zhonghu, Gao Yong, and Han Wei], 航母纵摇对舰载机弹射起飞的限制研究 [Research on the Limitation of Vertical Toss to the Warship-Based Aircraft's Catapult-Assisted Take-off], 飞行力学 [Flight Dynamics] 20, no. 2 (June 2002), pp. 19–21.
29. The Thai carrier has a full-load displacement of 11,486 tons, making it one of the smaller operational aircraft carriers, if not the smallest. See "Chakri Naruebet Offshore Patrol Helicopter Carrier, Thailand," www.naval-technology.com/projects/chakrinaruebet/.
30. See "Aircraft Carrier Programme."
31. For "military education," 天鹰 [Tian Ying], "1979年中国海军迫近'明斯克'号" [In 1979 the PLAN Approached the Minsk Aircraft Carrier], 舰载武器 [Shipborne Weapons] (January 2005), pp. 87–89; and 区国义 [Ou Guoyi], "前苏联'明斯克'号航母的改装" [The Re-Equipping of the Soviet Aircraft Carrier "Minsk"], 中国修船 [China Ship Repair], no. 4 (2000), p. 15. Also, 吴伦楷 [Wu Lunkai], "'明思克'航空母舰成功系泊之所在" [The Reason of the Successful Mooring of the Aircraft Carrier "Minsk"], 船舶 [Ship & Boat], no. 6 (December 2001), pp. 54–57.
32. 李伟群 [Li Weiqun], "'基辅'号闯关记" [Record of the Retired Russian Aircraft Carrier "Kiev" Braving the Journey], 中国远洋航务公造 [China Ocean Shipping Monthly], no. 10 (2000), pp. 62–64.
33. For tourists, 张俊杰 [Zhang Junjie], "不露文章世已惊—扫描'基辅'航母世界" [Astonish the World before Publicity: A Glance over the Aircraft Carrier "Kiev"], 中国船检 [China Ship Survey] no. 8 (2001), pp. 26–27. Also, 安飞 [An Fei], "'基辅'号航母探秘" [A Probe into the Aircraft Carrier "Kiev"], 中国船检 [*China Ship Survey*], no. 10 (2003), p. 39.
34. Authors' visit, 滨海航母主题公园 [Binhai Aircraft Carrier Theme Park], June 2006.
35. Maubo Chang, Taiwan Central News Agency, 2

April 1998, FBIS FTS19980402001018. According to one source: "The contract with Ukraine stipulated that the buyer can't use the carrier for military purposes, and that any equipment that could be used to build other warships [be] removed from the craft." The extent to which this was a binding stipulation is unclear, especially as the company that originally purchased *Varyag* from Ukraine no longer exists. Moreover, whether "military purposes" includes training and experimentation is equally unclear. A close examination of the specifics of the contract as well as the larger legal issues of operationalizing the *Varyag* is definitely warranted but is beyond the scope of the current work. "Aircraft Carrier Project," GlobalSecurity.org, available at www.globalsecurity.org/military/world/china/cv.htm.

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37. Authors' interview, Beijing, June 2006.

38. For a Chinese claim that *Varyag* may be used for "training," see Wu Hongmin, "Dragon Swims the Five Seas," p. 20.

39. See 苏红宇 [Su Hongyu], "是航母? 还是" [Is It an Aircraft Carrier, Or . . . ?], 船舶工业技术经济信息 [Ship Building Industry Technological & Economic Information], no. 3 (2005), pp. 50–55; and "A Vessel of Choice," *INCAT News,* 22 May 2003, www.incat.com; Michael Lowe, "INCAT's Aircraft Carrier Plans," *Examiner,* 30 July 2003, available at www.examiner.com.au/story.asp?id=188186.

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76. Ibid. Addition of medical treatment and hospital ward modules allows *Shichang* to serve as a "true 'at-sea mobile hospital,'" with dimensions similar to a land-based equivalent. With its transport container, it can become a larger transport ship. *Shichang* boasts 108 rooms and compartments. Cao Jinping, "Visit and Operate National Defense Mobilization Ship."

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83. Taiwan military spokesman Liu Chih-chien is quoted as stating that the *Varyag* will be "used as a training ship in preparation for building an aircraft carrier battle group"; David Lague, "An Aircraft Carrier for China?" *International Herald Tribune,* 31 January 2006.

84. For ballistic missiles, "攻击航母的武器装备" [Weapons for Attack of Aircraft Carriers], 当代海军 [Modern Navy] (October 2004); 顾险峰, 钱建平, 马远良 [Gu Xianfeng, Qian Jianping, and Ma Yuanliang], "鱼雷武器远程精确打击导引模式和技术架构初步探索" [Preliminary Research on the Guidance Pattern and Technique Framework of Long-Range Accurate Attack Torpedo Weapons], 舰船科学技术 [Ship Science & Technology], March 2003; 催绪生, 关国枢, 周德善 [Cui Xusheng, Guan Guoshu and Zhou Deshan], "接受海战的历史教训—加强新世纪的鱼雷研制工作" [Draw Useful Lessons from History and Strengthen R&D of Torpedoes in the New Century], 舰船科学技术 [Ship Science & Technology] (March 2003); 李光普 [Li Guangpu], "美国航母的今昔及与其对抗问题的分析" [An Analysis of American Aircraft Carriers Past and Present and the Problems They Have Faced], 飞航导弹 [Winged Missiles Journal] (March 2002); 张国华, 袁乃昌, 庄钊文 [Zhang Guohua, Yuan Naichang, and Zhuang Zhaowen], "基于前元法的航母雷达散射截面计算" [Calculation of the Radar Cross Section of an Aircraft Carrier Based on the Plate-Element Method], 国防科技大学学报 [Journal of the National University of Defense Technology] 23, no. 5 (2001), pp. 79–83; and "海上霸王--航空母舰" [Maritime Hegemon: The Aircraft Carrier], *Science Initiation* (March 1996). For cruise missiles, 王剑飞, 武文军, 彭小龙, 熊平 [Wang Jianfei, Wu Wenjun, Peng Xiaolong, and Xiong Ping], "美军航母战斗群空袭火力及其效能分析" [Analysis on Effectiveness of the Air-Attack Firepower of a U.S. Carrier Fighting Group], 情报指挥控制系统与仿真技术 [Intelligence, Command, Control, and Simulation Technology] 27, no. 1 (February 2005), pp. 24–30; and 何文涛, 吴加武 [He Wentao and Wu Jiawu], "航母编队特点及对策研究" [A Study on Countering Aircraft Carrier Battle Groups], 现代防御技术 [Modern Defense Technology] 32, no. 5 (October 2004), pp. 18–20, 29. For submarines, [Qin Hang, Lin Hua, and Zhou Feng], "响潜艇战斗群作战性能技术因素分析" [Analysis of Some Technical Factors That Affect the Combat Characteristics of a Group of Submarines], 海军工程学院学报 [Journal of the Naval Engineering Academy] 89, no. 4 (1999), pp. 60–63. For torpedoes, 石敏, 刘晓亮, 逄妍立, 石勇 [Shi Min, Liu Xiaoliang, Pang Yanli, and Shi Yong], "反航母鱼雷远程制导技术的现状和发展" [The Present Situation and Development of Long-Range Homing Technology on Anti–Aircraft Carrier Torpedoes], 舰船科学技术 [Ship Science & Technology] 27, no. 1 (2005), pp. 17–20; and 顾险峰, 钱建平, 马远良 [Gu Xianfeng, Qian Jianping, and Ma Yuanliang], "鱼雷武器远程精确打击导引模式和技术架构初步探索" [Preliminary Research on Guidance Patterns and Technique Framework of Long-Range Accurate Attack Torpedo Weapons], 舰船科学技术 [Ship Science & Technology] 25, no. 3 (2003), pp. 7–11. For sea mines, 刘衍中, 李祥 [Liu Yanzhong and Li Xiang], "实施智能攻击的现代水雷" [Carrying Out Intelligent Attacks with Modern Sea Mines], 当代海军 [Modern Navy], July 2006, p. 29; Jiao Fangjin, "双头鹰的水中伏兵" [The Double-Headed Eagle's Ambush at Sea], 国防科技 [Defense Science] (July 2003), p. 91; Wang Wei, "历久弥新话水雷" [Enduring and Yet Fully Relevant: A Discussion of Sea Mines], 国防 [National Defense] (November 2002), p. 58; Fu Jinzhu, 水雷战 不容忽视 [Mine Warfare Must Not Be Ignored], 现代舰船 [Modern Ships], no. 156 (November 1998), p. 1.

85. 宜恒, 新华 [Yi Heng and Xin Hua], "航母煞星: 对付航母的六大撒手锏" [Six Trump Cards to Cope with Aircraft Carriers], 国际展望 [World Outlook], no. 3 (February 2001), pp. 60–61.

86. For a Chinese account of the influence of Khrushchev's "航空母舰棺材论" [aircraft carrier coffin theory], see Wu Hongmin, "Dragon Swims the Five Seas," p. 17.

87. Liu Huaqing, *Memoirs of Liu Huaqing,* p. 478. In a March 1987 report to the PLA General Staff, Admiral Liu offered possible clarification of what he meant by "escort carriers": "Our analysis shows that, without developing aircraft

carriers, the Navy still has to develop destroyers and escort ships in order to make up a mobile force at sea. If aircraft carriers are developed, these ships can serve as escorts for the aircraft carriers and also as mobile combat vessels." Ibid., p. 480.

88. The Chinese colloquial abbreviation for aircraft carrier, *hangmu,* is also used extensively to describe flagship enterprises and other great achievements. See, for example, 张权 [Zhang Quan], "打造锰业航母—做大做强锰业" [Build Up the Aircraft Carrier of the Manganese Industry and Make the Manganese Industry Stronger], 中国锰业 [China's Manganese Industry] 23, no. 3 (August 2005), pp. 54–55. For use of the term "aircraft carrier" metaphorically to describe a space station, see 卢天贶 [Lu Tiankuang], "居高临下的太空武器" [Space Weapons: Occupying Commanding Heights] (天津科学技术出版社 [Tianjin Science & Technology], 2003), p. 56. For use of the term "aircraft carrier" to symbolize an educational institution, see 顾明远 [Gu Mingyuan], "挑战与应答: 世纪之交的中国教育变革" [Challenges and Answers: A Century of Chinese Educational Transformation], (福建教育出版社 [Fujian Education], 2001), p. 96. These examples suggest a larger Chinese penchant for metaphorical writing that makes literal interpretation of interesting rumors problematic.
89. Authors' interview, Beijing, June 2006.
90. 克里斯蒂.曼巴尔. 丹杰. [Christie Manbar (as transliterated), France, trans. and ed. Dan Jie], "中国早期航空母舰设想" [China's Early Stage Conception of Aircraft Carrier(s)], 舰载武器 [Shipborne Weapons] (July 2005), pp. 18–21. For an article documenting a PLAN officer's attendance at a five-day exercise on the *Charles de Gaulle*, see 纪明周 [Ji Mingzhou], "我随'戴高乐'号出航" [I Set Sail with the 'Charles de Gaulle'], 舰船知识 [Naval & Merchant Ships] (November 2005), pp. 18–22.
91. For a Chinese analysis of the British ASW helicopter carrier HMS *Invincible* (R05), see 陈坚主 [Cheng Jianzhu], 武器装备完全图美册: 英国 [Complete Guide to Weapons: England], (广西人民出版社 [Guangxi People's Press], 2003), p. 74.
92. See 尹岭 [Yin Ling], "中国直升机航母前瞻" [The Outlook for a Chinese Helicopter Carrier], 舰载武器 [Shipborne Weapons] (August 2005), pp. 43–49.
93. See *Chinese Defence Today,* at sinodefence.com/airforce/helicopter/z9c.asp and sinodefence.com/airforce/helicopter/ka28.asp.
94. "WZ-10 Attack Helicopter," *Chinese Defence Today,* www.sinodefence.com/airforce/helicopter/wz10.asp.
95. 银河 [Yin He], 飞向大洋: 中国海军舰载直升机的发展与问题 [Flying toward the Ocean: The Development and Problems of the PLAN's Ship-Based Helicopters], 舰载武器 [Shipborne Weapons], no. 7 (July 2005), p. 30.
96. A third PLAN development trend has been careful consideration of the political impact of its development and deployment activities. China's leaders took great pains to characterize their successful detonation of an atomic bomb in 1964 as "prevention of nuclear blackmail" and the liberation of other developing nations by breaking a "superpower monopoly." In sharp contrast to Soviet expansionism, Chinese leaders insisted, China's military development was inherently defensive. Beijing went so far as to describe the 1978 invasion of Vietnam as a "defensive counterattack." As China has grown more powerful in recent years, Beijing has characterized its rapid military development as a "peaceful rise" designed merely to restore China to its former position of benevolent greatness. Even that slogan was recently deemed too provocative; it was replaced with the concept of "peaceful development."
97. See, for example, 林长盛 [Lin Changsheng], "潜龙在渊: 解放军水雷兵器的现状与发展" [The Hidden Dragon in the Deep: The Present Situation and Development of PLA Mine Weaponry], 国际展望 [World Outlook], no. 9 (May 2005), p. 22.
98. For acknowledgement of this issue, and a claim that it will not stop China from refitting the *Varyag* as an operational aircraft carrier, see "First Aircraft Carrier in Service Three Years from Now," *Tung Chou Kan*, no. 135, 28 March 2006, pp. 54–56, FBIS CPP20060403510006.
99. Liu Huaqing, *Memoirs of Liu Huaqing,* p. 479.
100. For an example of this differentiation, see Wu Hongmin, "Dragon Swims the Five Seas," pp. 12–21.
101. See (all in 人民海军 [People's Navy]), 虞章才, 李慧勇 [Yu Zhangcai and Li Huiyong], "闪光的航迹—郑和七下西洋的真实历程" [A Gleaming

Wake: The True Course of Zheng He's Seven Voyages to the West], 5 July 2005, p. 3; 林一宏 [Lin Yihong], "经略海洋—郑和下西洋对建立现代海洋观的启示" [The Inspiration of Zheng He's Voyages to the West in Establishing a Modern Maritime Outlook], 7 July 2005, p. 3; 陆儒德 [Lu Rude], "捍卫海上利益—郑和下西洋对海军建设的启示" [Defending Maritime Interests: The Inspiration of Zheng He's Voyages to the West in Naval Construction], 9 July 2005, p. 3; 吴瑞虎, 马晓静 [Wu Ruihu and Ma Xiaojing], "中国的'航海日'诞生了!" [China's "Navigation Day" Is Born!], 9 July 2005, p. 1; and 徐起 [Xu Qi], "敦睦友邻—郑和下西洋对中国和平崛起得启示" [A Friendly Neighbor Promoting Friendly Relations: The Inspiration of Zheng He's Voyages to the West in China's Peaceful Rise], 12 July 2005, p. 3.

102. Author's interviews, Beijing, December 2005.

103. Authors' interview, Beijing, June 2006.

104. Ibid.

105. Lonnie Henley, "PLA Logistics and Doctrine Reform, 1999–2009," in *People's Liberation Army after Next,* ed. Susan M. Puska (Carlisle, Pa.: U.S. Army War College, 2000), p. 67.

106. "Our Naval Academy Students Accomplish Practice of All Their Training Subjects on Training Vessels."

107. "'Shichang': China's Navy's New Type of Aerial Service Ship," p. 41.

108. Cao Jinping, "Visit and Operate National Defense Mobilization Ship."

109. Bian Ji, "China's Embryonic Aircraft Carrier," p. 59.

110. 韩学利, 李耸岩, 尹承宇 [Han Xueli, Li Songyan, and Yin Chengyu], "'世昌'舰海上卫勤演练中医疗救护的几点体会" [Several Realizations from Experience Concerning "Shichang" Medical Treatment during At-Sea Defense Drills], 海军医学杂志 [Journal of Navy Medicine] 22, no. 2 (2001), p. 139.

111. The authors are indebted to Professor Robert Rubel for the ideas expressed in this paragraph.

112. See Storey and You Ji, "China's Aircraft Carrier Ambitions," available at www.nwc.navy.mil/press/review/2004/Winter/art6-w04.htm.

113. Yu Xiao, "Pay Attention to a 'World without Markers,'" *Jiefangjun Bao,* 18 June 2006, p. 2, FBIS CPP20060619710001.