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For comments or questions about *China Brief*, please contact us at hsiao@jamestown.org

1111 16th St. NW, Suite #320
Washington, DC 20036
Tel: (202) 483-8888
Fax: (202) 483-8337

In a Fortnight

PLA Expands Network of Military Reconnaissance Satellites

By L.C. Russell Hsiao

On August 9, China launched the remote sensing satellite Yaogan-10 (military designation: Jianbing) into orbit from the Taiyuan Satellite Launch Center. Situated in the northwest of Shanxi Province, the site is a space and defense launch facility reportedly used for testing the Chinese military's intercontinental ballistic missiles and overland submarine-launched ballistic missiles (Globalsecurity.org). This event marks the sixth Chinese launch this year via the CZ-4C Chang Zheng-4C (Long March) launch vehicle and follows a surge in satellite launches that appear to reflect the Chinese determination to beef up its reconnaissance satellite network and end its dependence upon foreign satellite systems. While China's exact intentions are unknown, given the dual use-nature of remote sensing satellites, China is rapidly improving its diverse network of space-based Intelligence, Surveillance and Reconnaissance (ISR) sensors, which can bolster the Chinese military's expanding land, sea and air operations (Nasaspaceflight.com, August 9; Xinhua News Agency, August 10).

The state-run Xinhua News Agency reported that Yaogan-10 will conduct "scientific experiments, carry out land surveys, estimate crop yields and help respond to natural disasters" (Xinhua News Agency, August 10), yet there is evidence to suggest that the Yaogan satellite is also a military asset, with some models equipped with the synthetic aperture radar (SAR) system designed to observe locations in all weather and lighting conditions.

The Yaogan series is a new fleet of high-resolution optical and radar reconnaissance satellites in China's growing space-based sensor network. With alternating take

offs from the Taiyuan and the Jiuquan site, China has been launching this series of radar and electro-optical spy satellites into orbit since 2006. The launch of Yaogan-9, purportedly for ocean surveillance and targeting from the Jiuquan Satellite Launch Center in Inner Mongolia, on March 5 included three spacecraft (i.e. Yaogan-9A, Yaogan-9B, and Yaogan-9C), which are believed to be naval observation satellites. According to observers, three such satellites flying in formation in orbit form what appear akin to a type of Naval Ocean Surveillance System (NOSS)—and may be used for gathering intelligence derived from ships and aircraft by their radar and other electromagnetic radiation.

The development of a space-based SAR system has been a priority for the People's Liberation Army (PLA). Such a system is considered a critical component to the PLA's effort in achieving information dominance in future warfare. According to Andrew Erickson, associate professor at the China Maritime Studies Institute at the U.S. Naval War College, "Synthetic Aperture Radar [SAR] in particular offers wide coverage at sufficient resolution. Maritime surveillance, prioritized at the national level under China's 863 State High-Technology Development Plan, is receiving significant funding" (Asia Times, April 22).

"Of particular note are the five Yaogan satellites that China has launched in the past five months. Yaogan-7 and 8 were launched in December. Yaogan-7 is optical and Yaogan-8 appears to be equipped with SAR," said Erickson. "Yaogan 9A, 9B, and 9C, launched in March, share the same orbit, suggesting that they have a special mission to perform" (Asia Times, April 22).

According to the website Nasaspaceflight.com, the Chinese schedule for the rest of the year may include the launch of at least another remote sensing satellite, the Chinasat-6A communications satellite, the ST-1B Shen Tong-1B / ZX-20 (2) ZhongXing-20 (2) military communications satellite and two more Beidou (COMPASS) navigation satellites (Nasaspaceflight.com, August 9).

The main contractors for the SAR satellite system include China Academy of Science's Institute of Electronics, Shanghai Academy of Spaceflight Technology, 501 and 504 Institutes of China Academy of Space Technology, Nanjing Research Institute of Electronic Technology, Southwest Institute of Electronic Equipment and Beijing University of Aeronautics & Astronautics (BUAA).

To be sure, the launch of Yaogan-10 foreshadows the coming of age of China's second-generation SAR satellite system. According to a BUAA report, the development of a second-generation SAR Satellite program had been listed in China's 11th Five-Year Development Plan (2006-2010) (Sinodefence.com). The new system is expected to strengthen the PLA's all-weather-targeting applications for locating enemy assets in China's periphery. The space-based SAR system can penetrate multiple layers to detect targets on the ground or underground, and in the ocean. In addition, SAR satellites can be used for tracking moving targets (e.g. aircraft carrier) and military mapping requirements.

Whether the launch of Yaogan-10 represents a leap in China's space program remains to be seen. At the very least it is a continuation of China's concerted push to strengthen its space-based infrastructure. As China's missile program grows in number and sophistication, these developments suggest that the PLA is rapidly developing an employable capability that will assist it in achieving its operational and strategic objectives.

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

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Hawks vs. Doves: Beijing Debates "Core Interests" and Sino-U.S. Relations

By Willy Lam

An intriguing divergence of views has been exposed within China's foreign-policy establishment on how to handle the country's worsening ties with the United States that may highlight a growing dissonance between China's civilian and military establishments. Sino-American relations have taken a confrontational turn since Washington indicated last month that the resolution of sovereignty disputes in the South China Sea was a key American "national interest." This overture by Washington was widely seen as being made in response to Beijing's assertion a few months earlier that the whole South China Sea was a "core [Chinese] national interest" that brooked no outside interference. At the same time, war games that began on August 16 by the American and South Korean navies in the Yellow Sea have inadvertently confirmed Beijing's perception of Washington's "anti-China containment policy." Up until now, hard-line elements in the upper echelons of the Chinese Communist Party (CCP)—and particularly the People's Liberation Army (PLA)—have driven Beijing's high-decibel response to the American challenge. Yet, perhaps indicative of the fact that the Hu Jintao leadership is still weighing different options, flexible and even conciliatory approaches to defusing the

diplomatic crisis are being aired in the state media.

Given that a root cause of the Sino-American row was Beijing's decision to expand its definition of "core national interests" beyond traditional areas such as Taiwan, Tibet and Xinjiang, it is significant that the official press has held relatively moderate viewpoints on this sensitive issue. Han Xudong, a national security expert at the National Defense University (NDU), raised eyebrows when he indicated in late July that China should adopt a cautious attitude when staking out the country's *hexin liyi* or "core interests." Han pointed out that "our [China's] comprehensive national strength, especially military power, is not yet sufficient to safeguard all our core national interests." Thus, prematurely publicizing all of China's core interests might be counter-productive. Moreover, the noted strategist contended, excessive stress on "core interests" could result in China's diplomats and military personnel "putting emphasis only on core interests and neglecting non-core interests." Professor Han recommended that Beijing release China's list of *hexin liyi* in a phased, step-by-step fashion. "As China becomes stronger, we can publicize by installments those core interests that our country can effectively safeguard," Han added (*Outlook Weekly*, July 25; Xinhua News Agency, July 25).

More importantly, China Institute of Contemporary International Relations (CICIR) senior researcher Da Wei has warned against the "arbitrary expansion" of China's core interests. Da advocated a "minimalist definition" of *hexin liyi*, adding that "we must prevent the arbitrary extension of the parameters of *hexin liyi* in the wake of the rise of [China's] national power." The ranking expert on U.S. affairs indicated that a country should adopt a "broad and rough" rather than "narrow" interpretation of its core interests. He cited the issue of territorial integrity, which is considered of core interest for most countries. "When handling territorial disputes, many countries often adopt compromises such as exchanging [disputed] territories or recognizing the status quo," he pointed out. "Often, big powers may 'let go of' some disputed areas. This doesn't mean that such countries have forsaken their core interests" (People's Daily Net, July 27; *Global Times*, July 27).

The views of Han and Da, of course, beg the question of what constitutes the full array of Beijing's "core national interests." For example, given the CCP leadership's vehement objection to foreign countries conducting military maneuvers in international waters in the Yellow Sea that began on August 16, is this patch of water wedged between China and the Koreas also China's *hexin liyi*? It is little wonder that the South Korean media has recently been blasting Beijing for putting the entire Korean Peninsula into its sphere of influence (*Korea Times*, August 7; Global Times, August 9). While it is unlikely that Chinese authorities will publicize a full run-down of their core interests, it is significant that quite a few hardliners have been pushing for the broadest possible—and ever-expanding—definition of *hexin liyi*. In either case, however, this essentially means that as China becomes stronger—and requires more resources to sustain its march toward superpower status—its list of core interests will grow accordingly.

In an article published last year on "the boundaries of national interests," *PLA Daily* commentator Huang Kunlun noted that China's national interests had gone beyond its land, sea and air territories to include areas such as the vast oceans traversed by Chinese oil freighters—as well as outer space. "Wherever our national interests have extended, so will the mission of our armed forces," Huang wrote. "Given our new historical mission, the forces have to not only safeguard the country's 'territorial boundaries' but also its 'boundaries of national interests'." "We need to safeguard not only national-security interests but also interests relating to [future] national development," he added (*PLA Daily*, April 1, 2009; *Ming Pao* [Hong Kong], April 2, 2009). Caveats given by NDU's Ha—and particularly CICIR's Da—reflect fears on the part of moderate opinion-makers that theories such as Huang's will stoke the flames of the "China threat" theory—and deal a blow to the country's relations with its neighbors.

Of perhaps more practical relevance to tackling the South China Sea imbroglio is well-known academic Pang Zhongying's suggestion that Beijing should actively consider a *duobian*, or multilateralist strategy. In an early August article in *Global Times*, Pang, a veteran international relations professor at Beijing's Renmin University, argued that "there will be considerable difficulty for Beijing to maintain its 'bilateral' approach" to ironing out territorial rows with countries and regions including Vietnam, the Philippines, Malaysia, Brunei and Taiwan. Beijing has insisted for decades that sovereignty-related negotiations be conducted on a one-on-one basis between China on the one hand and individual claimants on the other. The CCP leadership has refused to consider options including China-ASEAN negotiations or "internationalized" talks involving third parties such as the United States. "In the past two decades, China has accumulated a lot of experience in multilateral [diplomatic] operations," Pang wrote, adding that the South China Sea issue could be resolved on a multilateral platform that involves parties including ASEAN, the United States, Japan and the United Nations. "Ruling out multilateralism will be tantamount to giving [China's] opponents pretexts to attack China," he indicated (*Global Times*, August 5; Sina.com, August 6).

Moreover, individual diplomats and scholars have in private cited the formula of "joint development while setting aside sovereignty" for solving the South China Sea imbroglio. This *modus operandi* was used during the theoretical accord reached between President Hu Jintao and then-Japanese Prime Minister Yasuo Fukuda in 2008 for settling sovereignty disputes over the East China Sea. Yet, Beijing and Tokyo have since failed to go one step further by formalizing the Hu-Fukuda agreement into a full-fledged treaty. One possible reason is opposition to the "joint development" formula expressed by Chinese nationalists as well as PLA generals (*China Daily*, August 4; Stratfor.com, February 22).

It seems evident that the hawkish views of PLA generals are having a dominant influence on Beijing's foreign and security policies toward the United States, the Korean Peninsula, Japan and the South China Sea. Military officers are vociferous supporters of the maximalist extension of the parameters of China's *hexin liyi*. The generals are also believed to be adamant supporters of the Kim Jong-Il regime. This is despite Pyongyang's continuation of its nuclear weapons program as well as its alleged role in sinking the South Korean warship Cheonan in late March. Other examples of hard-line military thinking influencing national policy include the denial of an invitation to Secretary of Defense Robert Gates to visit China while the latter was in Asia last June (*New York Times*, June 4; Time Asia Edition, July 22).

Typical of the hardliners' views are those of two PLA major-generals, who enjoy high exposure in the official media. Academy of Military Sciences scholar and strategist Luo Yuan was one of the first opinion-makers who spoke out against plans, first announced in June, that joint U.S.-South Korean exercises would be conducted in the Yellow Sea. The general gained national fame by using the earthy expression, "how can we let a stranger fall sound asleep just outside our bedroom?" to indicate Beijing's indignation at the maneuvers. General Luo ratcheted up the rhetoric when reacting to news that the Yellow Sea drills have now been scheduled for late summer. He quoted Chairman Mao's pugilistic dictum—"If people don't offend me, I won't offend them; if people run afoul of me, I will surely hit them back"—on the fact that Chinese military forces should take a strong stance against perceived manifestations of America's "hegemonism, gunboat diplomacy and unilateralism" (*PLA Daily*, August 12; *Ming Pao*, August 13).

Real Admiral Yang Yi, another much-quoted military commentator, has gone one step further by accusing Washington of double-dealing in addition to exacerbating its time-honored containment policy against China. "On the one hand, it [Washington] wants China to play a role in regional security issues," Yang wrote in the *PLA Daily* on August 13. "On the other hand, it is engaging in an increasingly tight encirclement of China and constantly challenging China's core interests." General Yang added that American-led military drills in the region were aimed at provoking "enmity and confrontation in the Asia-Pacific region—and that the Chinese must make a firm response. "Washington will inevitably pay a costly price for its muddled decision," Yang noted in another article in the official *China Daily* (*PLA Daily*, August 13; Reuters, August 13; *China Daily*, August 13).

When asked about the preeminence of military voices in the debate over how to beat back the American challenge, Major-General Xu Guangyu, another noted hawk, indicated that "it's natural for the PLA to speak out first on these issues." Xu, a researcher at the China Arms Control and Disarmament Association, added, "It's the PLA's sacred duty to defend China's territory and interests." It is also true, however, that the generals may have seized upon the downward spiral in Sino-U.S. ties—and the overall tension in the Asia-Pacific Region—to lobby for more economic and political resources to upgrade their arsenal. Particularly in view of large-scale personnel changes scheduled for the upcoming 18th CCP Congress, President Hu needs the top brass's backing for the elevation of numerous affiliates of his Communist Youth League faction, including Sixth-Generation rising stars such as Inner Mongolia Party Secretary Hu Chunhua (Reuters, August 12; *South China Morning Post*, August 4; *Apple Daily*, August 13).

That the CCP leadership has allowed moderate messages to be aired, however, seems to indicate that supremo Hu is willing to consider dovish as well as hawkish approaches to key issues such as the definition of China's core interests—and how they may be best defended in the face of what Beijing perceives to be the toughest American onslaught since President Obama took office last year. In either case, however, this essentially means that as China becomes stronger—and requires more resources to sustain its march toward superpower status—its list of core interests will grow accordingly.

Willy Wo-Lap Lam, Ph.D., is a Senior Fellow at The Jamestown Foundation. He has worked in senior editorial positions in international media including Asiaweek *newsmagazine,* South China Morning Post, *and the Asia-Pacific Headquarters of CNN. He is the author of five books on China, including the recently published* "Chinese Politics in the Hu Jintao Era: New Leaders, New Challenges." *Lam is an Adjunct Professor of China studies at Akita International University, Japan, and at the Chinese University of Hong Kong.*

PLA Amphibious Capabilities: Structured for Deterrence

By Dennis J. Blasko

A few weeks before the U.S. Department of Defense (DoD) released its 2010 report to Congress on "Military and Security Developments Involving the People's Republic of China," a Taiwanese military intelligence assessment reportedly asserted that the People's Liberation Army (PLA) "regular amphibious abilities have ... increased, with transport capacity reaching a full division" (*Taipei Times*, Jul 19). Unfortunately, the 2010 DoD report does not support the assertion that amphibious capabilities have "increased." This year's report shows no change in the number of PLA large and medium amphibious ships from 2009. In fact, based on these figures and other publicly available material, despite the expansion of PLA Army amphibious and Marine units, the modernization of the PLA Navy (PLAN) amphibious landing fleet, and increased amphibious training over the past decade, PLA amphibious lift capacity is roughly the same as it was assessed to be in 1997. Moreover, as non-traditional security missions have risen in prominence for the PLA, barring a major change in the international and cross-Strait political environment, the PLA does not appear to be readying itself for large-scale amphibious operations in the near to mid-term (probably out to at least five years), particularly against Taiwan.

Background

Prior to the 500,000-troop reduction of 1997, the PLA amphibious order-of-battle consisted of a single Navy marine brigade at Zhanjiang, Guangdong province in the South Sea Fleet and an Army amphibious tank brigade in Fujian province in the Nanjing Military Region (MR). While other Army units trained occasionally in amphibious operations, these two brigades, with less than 10,000 personnel, were the PLA's main amphibious force.

At about the same time, the DoD's first report to Congress on the "Selected Military Capabilities of the People's Republic of China" concluded, "China's fleet of about sixty amphibious ships conducts modest-size training exercises in coastal regions. Although China has never conducted a division-scale or larger amphibious exercise fully coordinated with air support and airborne operations, its amphibious force is believed capable of landing at least one infantry division on a beach, depending on the mix of equipment and stores for immediate resupply" [1]. The capacity of landing "at least one infantry division" means that it was sufficient to transport the two amphibious brigades.

During the reduction in force from 1997 to 2000, the personnel size of the PLA's amphibious force tripled as Army units were transformed and assigned new duties, but amphibious lift capacity did not increase at the same pace. The PLAN is assessed to be able to transport to Taiwan roughly the same size force as it was assessed to be capable of lifting 13 years ago. This means that the PLAN amphibious ship force has been modernized, but not significantly expanded in capability over the past decade.

The former 164th Infantry Division was downsized and transferred to the Navy to become the second marine brigade. Two motorized infantry divisions were reorganized, issued armored vehicles and transformed into amphibious mechanized infantry divisions. Currently, PLA Army amphibious units are more than twice the size of the two PLAN brigades. Yet the total designated amphibious force (two divisions and three brigades), estimated at some 30,000 to 35,000 personnel, amounts to only a fraction of the approximately 34 maneuver divisions and 40 brigades in the Army (and Marines) [2].

Amphibious training has become more prominent, larger and routine. Designated amphibious units receive priority for annual maritime training, but also conduct training for other missions. Other maneuver and support units from the Nanjing and Guangzhou MRs undertake amphibious training to a lesser extent, as do some units from the Jinan and Shenyang MRs. Over the past decade, roughly 25 infantry and armored divisions and brigades, amounting to one-quarter to one-third of the total ground force, have conducted some type of amphibious training [3]. The size and number of exercises per year varies, with a peak in 2001 when nearly 100,000 Army, Navy and Air Force personnel participated in a drill at Dongshan Island at the southern tip of Fujian province (*China Daily*, July 12, 2004).

Nonetheless, according to the Pentagon, despite modernization of the amphibious fleet, the PLA's amphibious lift capacity now remains roughly the same size as a decade ago: "capable of sealift of one infantry division." Overall capabilities are described as:

> "The PLA is capable of accomplishing various amphibious operations short of a full-scale invasion of Taiwan. With few overt military preparations beyond routine training, China could launch an invasion of small Taiwan-held islands such as the Pratas or Itu Aba …. A PLA invasion of a medium-sized, defended offshore island such as Mazu or Jinmen is within China's capabilities" [4].

The paragraphs below provide details that support these

conclusions and demonstrate how these capabilities are consistent with Beijing's declared intention to protect its sovereignty and to deter what Beijing labels "separatist forces for 'Taiwan independence'."

Marine and Army Amphibious Units

The 1st Marine Brigade was formed in 1980 (*PLA Daily*, May 6). Previously, a Marine division had been established in 1954, but was disbanded in 1959. Nearly 20 years later, the 164th Marine Brigade was established out of an Army division [5]. Each brigade consists of approximately 5,000-6,000 personnel (including some women) and is organized into three or four infantry or amphibious mechanized infantry battalions, an armored regiment, an artillery regiment (including air defense and anti-tank missile units), plus smaller engineer, reconnaissance (including some Special Operations Forces), chemical defense and communications units [6]. Amphibious vehicles include Type 63A amphibious tanks, older armored personnel carriers (including Type 86 BMP-type infantry fighting vehicles and Type 63 APCs modified with bow and stern extensions and outboard motors), new ZBD05-series amphibious vehicles (seen in October 2009 military parade), and 122mm self-propelled howitzers [7]. These amphibious vehicles can "swim" in shallow water for several kilometers. Often they are launched from amphibious ships a few kilometers offshore, but are vulnerable to high winds and waves.

Due to their location, Marine units are primarily oriented toward operations in the South China Sea but can undertake out-of-area missions. They train with South Sea Fleet landing ship units and helicopters often at training areas on the Leizhou Peninsula. Mostly they train by themselves (i.e. not in "joint" exercises among the services), though Marine units can participate in larger joint training, such as the Sino-Russian combined exercise, Peace Mission 2005, held in Shandong. There, on Day 2 of a three-day exercise, elements of a Marine armored regiment conducted a beach landing along with Russian forces (*People's Daily* Aug 25, 2005; Kommersant, September 8, 2005). Detachments of Marine Special Operations Forces have also been assigned to each of the six PLAN task forces conducting anti-piracy operations in the Gulf of Aden.

The Army's designated amphibious force is comprised of 1st Amphibious Mechanized Infantry Division and an amphibious armored brigade in the Nanjing MR and the 124th Amphibious Mechanized Infantry Division in the Guangzhou MR. The armored brigade likely has three or four armored battalions and a mechanized infantry battalion plus support units. It appears to be armed with newer Type 96A amphibious tanks as well as older light tanks and APCs (*PLA Daily*, June 16, 2009). Total personnel for the brigade probably reaches nearly 2,000 men [8].

The 1st Amphibious Mechanized Infantry Division has undergone two transformations in the past decade. The first was from its motorized predecessor into its initial amphibious mechanized form, which entailed getting new equipment (such as modified Type 63 amphibious APCs) and dedicating itself to the practice of amphibious warfare. The second conversion began in 2009 when new armored vehicles, like the ZTD05 series (seen in the October 2009 parade) and ZBD05, were delivered. Currently, the unit has a three-year plan to build an information-based operational system. Significantly, division leaders acknowledge that although they know what their goal is, the unit still has a long way to go to accomplish it (*PLA Daily*, April 26). The division undertakes extended amphibious training every year, often culminating in a full division evaluation exercise, but it also is involved in many other types of exercises, including acting as a "blue force" in opposing force exercises [9].

In the Guangzhou MR, the 124th is equipped and trains much like its brother unit to the north. Similar to several other infantry divisions in the ground force, these two divisions have been downsized to consist only of two mechanized infantry regiments and one armored regiment along with artillery and anti-aircraft regiments and other support units. As such, these reorganized divisions now count roughly 10,000 personnel on their rosters instead of 12,000 or more under previous structures [10].

Amphibious units can spend three or more months per year training in tasks associated with landing operations. These units also prepare for non-amphibious roles and can be used in non-traditional security missions. In addition to the designated amphibious units, nearly all main force combat units in the Nanjing and Guangzhou MRs have conducted some amount of amphibious training, as have units from Jinan MR and a few from Shenyang and Beijing MRs. Amphibious training areas have been established in the four MRs along the coast (Guangzhou, Nanjing, Jinan and Shenyang) to accommodate this activity, though a shortage of training areas is a problem [11]. Training usually begins with movement to coastal sites around May and can continue through September or later, as new units rotate into the areas. Training often progresses from swimming lessons, to loading and unloading vessels, to small unit exercises, and finally large unit evaluation. Usually units practice within their own MRs, but cross-regional training has become more common in recent years. For example, in September 2008, Joint 2008 (*Lianhe* 2008) involved all three services and featured the 138th Motorized Infantry Brigade of Jinan MR moving from Shandong across the

Bohai to conduct an amphibious landing on the Liaodong peninsula (*People's Daily*, September 23, 2008). In the last few years, amphibious exercises have not reached the grand scale demonstrated in 2001.

Amphibious Ship Units

The PLAN has two landing ship flotillas (*denglujian zhidui*), one in the South Sea Fleet and another in the East Sea Fleet, and a landing ship group (*dadui*) in the North Sea Fleet [12]. Each flotilla probably has two or three subordinate groups. Because it provides direct support to the Marine brigades, the South Sea Fleet landing ship flotilla appears to be larger than the East Sea Fleet's. Each landing ship group commands some 10 to 15 large and medium landing ships. Smaller landing craft used to transfer personnel and equipment from ship to shore include many small 10-man-boats with outboard motors and about a dozen small and medium air cushioned craft.

Over the past 10 years, newer ships have replaced older amphibious ships, which were retired from service. Currently, large landing ships include one Type 071 Landing Platform Dock, approximately seven Type 072 (Yukan Class), 10 Type 072-II (Yuting Class), and nine Type 072-III (Yuting-II Class). Medium landing ships include seven Type 074A, 13 Type 074 (Yuhai Class), and 11 Type 073-III (Yudeng Class) [13]. Large and medium landing ships can make the 100-plus nautical mile voyage (depending on the point of embarkation) from the mainland to Taiwan [14]. The personnel capacity of these 58 ships remains at about 12,000 personnel, or one division. Not included in this total are another 31 (or fewer) Type 079 (Yulian Class) medium landing ships which mostly operate in coastal waters and the South China Sea, but may not be able to make the transit to Taiwan safely when fully loaded except in the most ideal weather conditions.

The Army has up to another 15 ship groups (*dadui*), each with around 10 landing craft assigned to two or three squadrons (*zhongdui*). These vessels, mostly Type 271-series and Type 068 (Yuqing Class) landing craft, also are primarily used in coastal waters and would be unsuitable for a long amphibious mission over open seas. The Army coastal defense force appears to control eight ship transport groups, used mostly for supporting coastal defense units with water and fuel, but which can also be used for transport and amphibious operations close to the mainland [15]. Some Joint Logistics sub-departments also have ship transport groups (at least two have been identified in Nanjing MR) and the Nanjing MR Army Reserve Logistics Support Brigade is assigned a ship transport unit [16]. Finally, eight years ago, a ship group (*chuanting dadui*) was formed at the Dongshan Island training area. According to its commander, this unit has participated in some 40 exercises and is the only Army ship unit that undertakes amphibious operational support missions exclusively (China News, March 20). Though these units are quite dispersed, they potentially add about 150 small landing craft for amphibious operations in coastal waters (but likely not extending to Taiwan).

Sealift forces may be expanded by incorporating civilian vessels into the force. Maritime militia units have organized ship units and civilian fishing and transport vessels may also be mobilized. In many cases, civilian ships require modifications to transport military equipment. Under most conditions, civilian shipping would not be suitable for amphibious assault but would be more appropriate for landing in ports captured in the early phase of an operation. Military and civilian ships may also secure artillery and rocket launchers to their decks to provide fire support for landing operations. These weapons, however, most likely would be effective primarily for large area suppressive barrages since their accuracies would not be as precise as naval gunfire or aircraft.

Conclusions

Although the number of units equipped and trained to conduct amphibious operations has increased over the past decade, the Navy's sealift capacity for operations beyond China's immediate coastal waters has not matched this growth. Army, Navy, and civilian forces probably could mass amphibious lift for a multi-division operation against smaller offshore islands (though they probably would lose the element of surprise as they assembled and loaded troops).

The current lack of strategic sealift suggests that the increase in amphibious capabilities is directed more to deterrence than to preparation for war in the short-term. This posture is consistent with Beijing's policy of "opposing and checking [i.e., deterring] Taiwan's secession … promoting peaceful national reunification and maintaining peace and stability in the Taiwan Straits" [17].

Despite the *modernization* [emphasis added] of the PLAN amphibious landing fleet, the expansion of Army amphibious and Marine units and increased amphibious training, the PLA does not appear to be readying itself for a large-scale amphibious operation in the near to mid-term. This may not have been the case 10 years ago. Obviously, the cross-Strait political situation has changed and Beijing may have realized that overt, obvious attempts to intimidate Taiwan with amphibious exercises in Fujian are counterproductive. To be sure, the Chinese defense industry has the capacity to build more landing ships and craft in a relatively short

time and the PLA could be given the resources to surge the tempo and intensity of amphibious training.

At the same time, the PLA is practicing other actions required for local war scenarios and major amphibious operations, such as cross-region movements, air defense over land and sea, control of surface and subsurface sea areas, joint firepower campaigns, information operations and logistics support. While preparing for local war remains the PLA's core mission, as seen by the recent deployment of the *Kunlunshan* Type 071 Landing Platform Dock on the anti-piracy mission in the Gulf of Aden, non-traditional security operations are also receiving high priority (CCTV.com, June 29).

In the final analysis, the creation of a credible force is the first element of deterrence. The second element of deterrence, demonstrating the forces' ability, can be accomplished through exercises, parades and opening military units to foreign visitors, as has been seen for most of this decade [18]. With the changes in cross-Strait political environment since 2008, China's leadership apparently sees little need to repeat the large-scale landing demonstrations of years past. Were Beijing's intentions to change toward a forced reunification, we could expect to see an expansion of amphibious shipbuilding along with increased amphibious training in the forces. Large-scale amphibious operations, however, would almost certainly be low on the list of PLA force options and follow extensive air, sea, information and special operations campaigns, which would result in the loss of strategic surprise.

Dennis J. Blasko, Lieutenant Colonel, U.S. Army (Retired), is a former U.S. Army attaché to Beijing and Hong Kong and author of The Chinese Army Today (Routledge, 2006).

Notes

1. "Selected Military Capabilities of the People's Republic of China," April 1997: 9.
2. "Military Power of the People's Republic of China 2009," Figure 15: 60. "Maneuver" units include all types of infantry and armored divisions and brigades. The number of divisions does not include the three airborne divisions in the PLA Air Force. Coincidentally, the number of dedicated amphibious personnel is almost exactly the same as the number of airborne personnel.
3. Dennis J. Blasko, *The Chinese Army Today: Tradition and Transformation for the 21st Century*, (Routledge, 2006): 155.
4. "Military Power of the People's Republic of China 2009": VIII and 44 and "Military and Security Developments Involving the People's Republic of China 2010": 51.
5. Dennis J. Blasko, "PLA Ground Forces: Moving Toward a Smaller, More Rapidly Deployable, Modern Combined Arms Force," in *The People's Liberation Army as Organization*, eds. James C. Mulvenon and Andrew N. D. Yang, RAND Conference Proceedings (2002): 330.
6. International Institute for Strategic Studies, *The Military Balance 2010*: 402 and Office of Naval Intelligence, *China's Navy 2007*: 55.
7. Marine vehicles are painted in blue camouflage patterns and have turret/side numbers beginning with an "H."
8. Blasko, *The Chinese Army Today*: 42.
9. Perhaps the most famous single PLA amphibious unit is the "Hardbone [or "Dauntless"] 6th Company" (*yinggutou liulian*) subordinate to the 1st Amphibious Mechanized Infantry Division. *PLA Daily* has a webpage for the unit at http://www.chinamil.com.cn/site1/2009zt/2009ygtll/index.htm. It has also been the subject of many television reports on China Central Television. Recognizing the propaganda elements of these reports, they are nonetheless useful in getting a sense of the unit's training and equipment.
10. Blasko, *The Chinese Army Today*: 42.
11. Blasko, *The Chinese Army Today*: 151-6 and Blasko, "PLA Ground Forces: Moving Toward a Smaller, More Rapidly Deployable, Modern Combined Arms Force": 322-31.
12. *China's Navy 2007*: 41.
13. The number of PLAN amphibious ships varies among sources. The numbers used here were derived from Office of Naval Intelligence, *A Modern Navy with Chinese Characteristics*; *The Military Balance 2010*; "Military Power of the People's Republic of China 2009"; and the Sinodefence website. Nomenclature for landing ships are taken from Sinodefence.com at http://www.sinodefence.com/navy/vessel.asp. Type 071, Type 072-II and Type 072-III are capable of supporting helicopter operations. PLA Navy large and some medium amphibious ships have three-digit bow numbers beginning with 9 while other medium landing ships have four-digit bow numbers beginning with 3 or 7.
14. The distance from the mainland directly across the Taiwan Strait is roughly 100 nautical miles. Naval units from the South Sea Fleet would have to travel at least 500 nautical miles and those from the North Sea Fleet would have to travel at least 700 nautical miles to reach Taiwan.
15. These units are listed on the "Military Spirit" website that lists PLA border and coastal defense units, http://bbs.junhunw.cn/viewthread.php?action=printable&tid=626. Border Defense Ship Transport Groups (*chuanyun dadui*) are held at Waichangshan, Liaoning; Neichangshan, Shandong; Yantai, Shandong; Qingdao, Shandong; Zhoushan, Zhejiang; Haotou in Xiamen, Fujian; Zhuhai; and Qiongshan, Hainan (listed as vehicle/ship transport group). Army landing craft can be identified by bow

numbers that start with the English initial for the Military Region to which they are assigned, G, N, J, and S, followed by another letter and three numbers or four numbers.
16. For a Shanghai ship transport group, see http://www.sgs.gov.cn/sabicsgs/ShangHaiGS/sub/post_con_6_20.html; for a Nanjing ship transport group, see http://www.jslib.org.cn/njlib_hdzn/200507/t20050721_2408.htm; and for the reserve unit, see http://pic.chinamil.com.cn/news/2008-04/16/content_1201158.htm. One of the main missions of these units is transport of fuel, though they could be used for amphibious operations. The PLA Air Force also has a ship transport unit used to transport fuel along rivers.
17. Anti-Secession Law, Article 1, March 14, 2005. The term *e'zhi* translated here as "checking" is also rendered as "to deter," as in "to deter war," in official Chinese documents, such as the 2006 White Paper on National Defense. Any policy of deterrence retains the option for the use of force, as stated Article 8 of the Anti-Secession Law.
18. Peng Guangqian and Yao Youzhi (eds), *The Science of Military Strategy*, (Beijing: Military Science Publishing House, 2005): 213-229.

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The Caspian Sea: China's Silk Road Strategy Converges with Damascus

By Christina Y. Lin

The Caspian region is becoming enmeshed in a web of overlapping political, military, trade and energy interests of countries extending from Asia, to the Middle East, to Russia, to Europe. Given the rising instability of Middle East energy supplies, the Caspian basin has emerged in prominence as an alternative resource for the world's growing energy consumers. It is estimated that the Caspian Sea is home to the world's largest reservoir for oil and natural gas after the Persian Gulf and Russia [1]. Historically, Russia had a monopoly of influence in the region during the Soviet era, but after 1991 the United States began making inroads into the region to reduce Russia's influence over the newly formed independent states [2]. In recent years, both China and the European Union have stepped up their presence and have become active players in the region. Other new players albeit smaller but with increasing footprints include countries such as India, Japan and South Korea. Of the various players, China has the fastest growing presence in the region—driven by its voracious energy appetite but also enabled by the Shanghai Cooperation Organization (SCO) framework. As China embarks on its "look west" development Silk Road Strategy, Syria's "look east" policy appears to be converging with Chinese interests at the Caspian Sea. The interplay of China's growing footprint in the Caspian region via its modern Silk Road—reinforced by Syrian President Assad's nascent "Four Seas Strategy"—will have important implications for the United States, the European Union and other allies.

China's Current Footprint in the Caspian Sea Landscape

Over the past few years, China has poured investments into Central Asia and the Caspian region—especially Kazakhstan and Turkmenistan—with two main infrastructure projects: the Kazakhstan-China oil pipeline and the Turkmenistan-China gas pipeline (also known as Central Asia-China gas pipeline). Below is a brief overview of Chinese investments in the Caspian region countries.

Turkmenistan: Beijing's main economic interest is gaining access to natural gas in Turkmenistan—Central Asia's largest gas producer. It has granted loans worth $3 billion to be used to exploit South Yolotan gas reserves (estimated as the fourth largest gas reserve in world) [3]. Its largest energy infrastructure project—the Central Asia-China Gas Pipeline—linking gas fields in Turkmenistan to Xinjiang— was inaugurated in December 2009. The 1,833 km pipeline, starting near a Chinese developed gas field in eastern Turkmenistan, is expected to reach full annual capacity for $40 billion cubic meters (bcm) by 2012-13 (Reuters, March 11). Additionally, 37 enterprises with Chinese capital shares operating in Turkmenistan implemented 57 investment projects, amounting to over $4.163 billion (State News Agency of Turkmenistan, June 20). In June 2010, Turkmen President Gurbanguly Berdimuhamedov announced a $2 billion trans-Turkmen pipeline project to connect the China-Central Asia pipeline east of Turkmenistan to the country's western resources—the same reserves traditionally exploited by Russia and earmarked for the U.S./EU-backed trans-Caspian Nabucco project [4]. In August 2010, President Berdymukhamedov further sought a $4.1 billion soft loan from China State Development Bank to develop the South Yolotan gas field (Associated Press, August 13; Reuters, August 13).

Kazakhstan: Beijing has invested $16 billion into the Kazakh economy. Out of this, $8.9 billion is investment, $1 billion is low-interest loans and almost $6 billion covers the cost of acquired assets [5]. In November 2009, Chinese state-owned CNPC tied up with Kazakh state firm KazMunaiGas in a $2.6 billion deal to jointly take over Kazakh oil producer MangistauMunaiGas. Additionally, China gave Kazakhstan $10 billion in loans to finance various projects (Reuters, March 11). In October 2009, a Chinese investment company bought an 11 percent share in Kazakh oil major KazMunaiGas E&P for $939 million. KazMunaiGas E&P, the listed subsidiary of KazMunaiGas, is one of Kazakhstan's top three oil producers, and the total

volume of its proved and probable reserves, as at the end of 2008, is 241 million tones (1.8 million barrels) [6]. In June 2010, CNPC signed an agreement with KazMunaigas to build the second phase of the Kazakhstan-China Gas Pipeline in a bid to tap gas reserves in southern Kazakhstan (*People's Daily,* June 14).

Azerbaijan: In 2009, bilateral trade reached $300 million (Crescent Online, June 18). In June 2010, Prime Minister Artur Rasizade and a member of Standing Committee of the Political Bureau of the Communist Party of China, Secretary of Central Commission for Disciplinary Inspection He Guoqiang, signed an agreement on economic and technological cooperation on He's visit to Baku (State News Agency, June 16). China is to provide grant aid worth 20 million yuan under the agreement. China's CNPC has a 25 percent stake in the Salyan oilfields, while Sinopec is considering bidding for the Azeri-Chirag-Gunashli oil project (about US$3 billion) (CACI Analyst, June 9). China is eyeing ways to enhance Chinese presence in the region, such as the proposed Kars-Akhalkalaki-Baku railway linking Turkey, Georgia and Azerbaijan, and connecting the Asian and European railway systems (CACI Analyst, June 9). It has presented itself to Azerbaijan as an attractive alternative market to Europe's Nabucco project—which after a decade of debate and competing European projects such as White and South stream is testing Baku's patience (*Hurriyet,* December 23, 2009).

Iran: In 2009, bilateral trade was $21.2 billion. Over 100 Chinese state-owned companies operate in Iran, and it is estimated that between 2005 and 2010, Chinese firms signed $120 billion worth of contracts with the Iranian hydrocarbon sector (Fars News Agency, May 8; AEI Iran Tracker, July 13). In 2008, CNPC and NIOC signed a $1.76 billion deal to develop the North Azadegan oil field, and in March 2009, China signed a $3.2 billion gas deal for the South Pars Gas field. In June 2009, CNPC inked $5 billion deal with NIOC to help develop phase 11 of the field. In August 2009, China agreed to a $3 billion deal to expand Iran's Abadan and Persian Gulf refiners, and in September 2009, Sinopec and CNPC signed a $4 billion contract to increase oil production in Iranian oil fields. In November 2009, Sinopec agreed to expand this figure to $6.5 billion in financing (Fars News Agency, August 15, 2008; Fox News, March 15, 2009; Fars News Agency July 29, 2009; *Financial Times,* September 22, 2009; *Reuters,* November 25, 2009). In April 2010, as unilateral U.S. sanctions against Iranian gasoline imports appeared imminent, CNPC exported 600,000 barrels of gasoline to Iran worth $110 million while Sinopec's trading company, Unipec, agreed to ship some 250,000 barrels to the country via a third party in Singapore (Press TV, April 22). Moreover, China is keen to join the Iran-Pakistan-India (IPI) Pipeline that competes with the U.S.-backed Turkmenistan-Afghanistan-Pakistan-India (TAPI) pipeline to stabilize Afghanistan (Zawya, February 5).

China's Silk Road Strategy toward the Caspian Sea

China appears to have three broad goals in the Caspian region, which is tied to its interests in Central Asia: (1) provide security to the region and anchor its restive Xinjiang province; (2) gain access to natural resources; and (3) consolidate political influence to become a regional hegemon via SCO's political framework. This is part of China's overall Silk Road strategy to diversify energy dependence from the unstable Gulf region and build overland routes to hedge against maritime supply disruptions from the Gulf [7]. According to CNPC Research and Development Department Director Yan Xuchao, China's oil security faces several risks in the near term: increased oil pricing as oil production extends to volatile regions and difficult terrain; transportation channel risk as traffic volume at the Malacca Straits nears full capacity with perceived threat of U.S. military deployment in the region; political risk as the oil sector is politicized in inter-state competitions (*China Brief,* January 31, 2008) [8]. Beijing thus seems to be using financial means to create oil and gas dependency in the region as a platform for eventual political-military cooperation [9]. Equally, the Caspian region's "look east" policy toward China provides an alternative market to EU and Russia. Xia Yishan, an energy expert at the China Institute of International Studies, said "China can be a stable buyer of Central Asia oil and gas… China's economic takeoff and growing awareness of environmental protection needs, demand of clean energy [including natural gas] is bound to soar" [10].

Moreover, Guo Xuetang, deputy director of the Institute of International Politics at Tongji University, argues for strengthening the SCO for energy cooperation and to work with Russia to bring Turkmenistan and Afghanistan into the SCO fold [11]. Guo argues that the SCO has been successful in accelerating regional integration, and as Iran is an observer in the SCO, this will further promote integration via infrastructure projects, and "building the proposed oil pipeline from Kazakhstan via Turkmenistan to Iran may be raised if this is coordinated through the SCO" [12]. Guo further contends that China should explore bilateral and multilateral oil cooperation for an overseas oil strategy in order to allay fear of the "China oil threat," such as Sino-Indian agreements to "enhance the reputation of China's strategy internationally" [13]. Indeed, China hopes that U.S. troops will depart from the region so that it can move into the power vacuum via the SCO without any significant challenge from Russia [14]. The Chinese assess that due to U.S. focus on terrorism and nuclear

proliferation in the post 9/11 world, Washington has been propelled to consider cooperation with other countries, such as China, and grant it some leverage over U.S. policy, as well as avoid confrontation in the near to medium term. Wang Jisi, dean of School of International Studies at Peking University, suggests that "The readjustment of the center of gravity of U.S. global strategy has determined that for several years to come it will not regard China as its main security threat..." [15].

China's interests in the Caspian Sea anchor its larger Silk Road Strategy toward the Middle East, Europe and Africa that make up the Union of the Mediterranean. China is not only investing in emerging markets but also developed markets through dollar diplomacy (e.g. its massive bailout of Greece) and opening the prospect of rising Chinese influence in fiscally-fragile developed states, which could potentially be tied into not only Chinese loans, but agreements to sell infrastructure, technology or financial assets [16].

Syria's Four Seas Strategy

While China is moving west towards the Caspian Sea, Damascus is concurrently moving eastward. Since 2009, Bashar al-Assad has been promoting a "Four Seas Strategy" to turn Damascus into a trade hub among the Black Sea, Mediterranean Sea, Persian Gulf/Arabian Sea and the Caspian Sea. Aligning Syria with countries that lie on these shores—Turkey, Iran, and Azerbaijan (*The Weekly Middle East Reporter,* August 1, 2009)—Assad peddled this idea in May 2009 with Turkey, stating that "Once the economic space between Syria, Turkey, Iraq and Iran become integrated, we would link the Mediterranean, Caspian, Black Sea, and the [Persian] Gulf … we aren't just important in the Middle East…Once we link these four seas, we become the compulsory intersection of the whole world in investment, transport and more." He described Syria's nexus of "a single, larger perimeter [with Turkey, Iran and Russia]…we're talking about the center of the world" [17]. Syria can thus act as a means of access for EU countries to markets in the Arab world and western Asian countries [18]. Assad discussed this vision with Medvedev in May this year, and in August 2009 he received Iranian supreme leader Ali Khamenei's blessing when he presented this strategy [19].

To this end, Assad is taking steps to expand the Arab Gas Pipeline (AGP) to pipe gas from Egypt and Iraq via Syria, and connecting with Nabucco pipelines to Turkey onto Europe.

AGP currently links Egypt with Jordan, Syria, Lebanon, and a new 62 km link between Syria and Turkey was signed in 2009 to be completed in 2011 (*Forward Magazine,* February 2010). This would provide a much-demanded supply of gas to northern Syria, and as gas becomes available form other sources (primarily Iraq), it will ultimately serve as a supply route to Turkey and the EU. Syria's long-term aim is to be a transit state for Egypt, Iraq, Iran and Azerbaijan (*Eurasia Review*, June 29). In 2009 Assad visited Azerbaijan—the first Syrian president to visit since Azeri independence in 1991—and signed 19 cooperation agreements and MOUs on economic, political and commercial fields. This included a deal for Azerbaijan to export 1.5 bcm of gas annually to Syria via Turkey in mid 2011 (*World Bulletin*, July 2; *The Turkish weekly*, June 29). It is also eyeing a role in the Nabucco gas pipeline project, while Russia's Gazprom considers joining the Arab Gas Pipeline that will feed gas from Egypt, Iraq, and Azerbaijan into Nabucco (*Pipeline International,* May 12). Another Russian company, Stoytransgaz, has been involved in the construction of the first two stages of the AGP, building a gas processing plant in central Syria and another 75km south of Al-Rakka (World Bulletin, July 2; *The Turkish Weekly*, June 29).

Implications

China's Silk Road Strategy is linking up with Syria's look east policy at the Caspian region. The region is a key source for feeding various pipeline projects: Azeri gas to the first stage of the Nabucco pipeline to Europe, which will eventually connect with the AGP to the Middle East; Turkmen and Kazakh gas via the Central Asia-China Pipeline and the Kazakhstan-China Pipeline to China; and Turkmen gas to Afghanistan, Pakistan and India via the TAPI pipeline to South Asia. Concurrently, a new Eurasian regional security architecture based on energy security appears to be emerging, with Turkey, Syria and Iran in the Four Seas Strategy to connect with the Shanghai Cooperation Organization. In 2007 an Iranian Fars News Agency article, entitled "Inevitable Iran-Turkey-Syria-Russia Alliance," discussed how this "union of four" would challenge U.S. policies in the Middle East (Fars News Agency, November 5, 2007). Likewise, Russia and China may be taking steps to use the SCO to build a new regional security architecture that reinforces each other's territorial integrity while retrenching Western influences [20]. As Russia is steadily increasing its Black Sea Fleet (Reuters, July 12; Christian Science Monitor, May 19), gaining a foothold in the Mediterranean via the Syrian port Tartus and forming a Black Sea military alliance with Turkey and Ukraine to be signed in August 2010 (RIA Novosti, June 28; Vestinik Kavkaza, June 29; World Security Network, July 7), China is increasing its footprint in the Caspian region via the SCO and Silk Road of pipelines, rail and highways [21]. Once again, there appears to be a new

"great game" around the Caspian region and the Greater Middle East.

Christina Lin, Ph.D., is a visiting fellow at The Washington Institute for Near East Policy.

NOTES

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China's Secure Communications Quantum Leap

By Matthew Luce

In May 2010 a team of 15 Chinese researchers from Tsinghua University in Beijing and the Hefei National Laboratory for Physical Sciences, a government-directed research center, published a research paper announcing a successful demonstration of "quantum teleportation" (*liangzi yinxing chuan*) over 16 kilometers of free space. These researchers claimed to have the first successful experiment in the world. The technology on display has the potential to revolutionize secure communications for military and intelligence organizations and may become the watershed of a research race in communication and information technology.

Although much of the science behind this technology is still young, quantum technologies have wide-ranging applications for the fields of cryptography, remote sensing and secure satellite communications. In the near future, the results from this experiment will be used to send encrypted messages that cannot be cracked or intercepted, and securely connect networks, even in remote areas, with

no wired infrastructure, even incorporating satellites and submarines into the link [1].

Roots in Quantum Physics, Applications in Intelligence

Rather than transporting matter from place to place, quantum teleportation's most practical applications currently involve using photons for instantaneous, almost totally secure data communication. Using the term "teleportation" to describe this effect can be justified by what Albert Einstein called "spooky action at a distance": after two particles are linked together through quantum entanglement, any change in the state of one particle immediately alters the other, even from miles away. In effect, the state of the particle at the sender's end is destroyed and reappears as an exact replica at the receiver's end, with a negligible chance of undetected third-party interception [2].

While the teleportation of physical matter remains science fiction at this point, quantum teleportation could be immediately implemented as a means for secure communications and cryptography. Current encryption techniques are based upon mathematical functions involving very large prime numbers and secure key management and distribution, but this strategy has a number of drawbacks and is nearing the end of its shelf life. In particular, as computing power continues to double every year and computer bits speed up through the use of quantum particles, the cryptographic keys used for encoding and decoding must now be changed more often to prevent encrypted data from being cracked. As a result, it has become very difficult to "future proof" the encryption of data, and were any major breakthrough in quantum computing to be achieved in the near future, current encryption techniques could become obsolete and encrypted data could suddenly become unprotected [3].

The security of using quantum teleportation to distribute cryptographic keys, on the other hand, is upheld by the laws of physics and has a seemingly infinite time horizon. These keys cannot currently be detected and cracked even with the help of the most powerful computers. Owing to the Heisenberg Uncertainty Principle, the quantum states of photons cannot be observed without changing the state of the particle, which has the result of immediately informing the sender and receiver of any eavesdropping. Quantum communication can thus be used to send the most sensitive information, including keys to decode encrypted data sent over less secure means.

Significance of China's Achievement

As a result, the issue has found itself at the center of a rapidly developing geopolitical race to apply quantum technology to military and intelligence work. Since secure quantum key distribution (QKD) provides a much higher level of security between communication networks, employing quantum teleportation over a satellite network allows for completely secure communications, even in sensitive and remote areas, without fiber optic infrastructure, as long as all parties are able to maintain line of sight with a satellite. This could have wide applications in communications and intelligence for ground troops, aircraft, surface ships and submarines, and fits into China's current plans to grow its satellite network even further.

Using quantum teleportation to send this type of information has been technically possible for several years, but according to the Chinese research paper, it had been previously demonstrated experimentally only over an enclosed fiber optics network and then only over a distance of several hundred meters [4]. The Chinese experiment appears to shatter these records by claiming to be the first to use a high-powered blue laser to exchange quantum information over a free space channel, and to demonstrate the principle over a distance as great as 16 km. This distance is significant because it displays approximately the same degree of light distortion as is seen in communication from the earth's surface to a satellite, and so would allow for quantum communication using satellites. If this experiment were indeed the first of its kind, it would appear that China has succeeded in leapfrogging the West, and gained a significant edge in next-generation communications and cryptography.

A Quantum Space Race?

The Chinese claim to be the first may not be entirely accurate, although certain elements of their experiment were unique and innovative. In 2005, a group of universities and defense corporations under a Defense Advanced Research Projects Agency (DARPA) grant and led by BBN Technologies, the company responsible for developing the precursor to the internet, succeeded in transferring cryptographic keys over a free-space link of 23 km in Cambridge, Massachusetts. Well beyond the single link employed by the Chinese, the BBN program has developed an expanding, multi-node web of secure quantum communication that will be able to further expand and link seamlessly with existing internet technology [5]. There are a few differences in the physics of their experiment that still make it notable and may not technically disqualify the Chinese from claiming their status as first, but nonetheless American researchers seem to have had a five-year head start in demonstrating the principles of the technology.

However, one notable difference between the Chinese and

American experiments is that the Beijing experiment used a blue laser for their teleportation experiments while the BBN team had been employing infrared. Both have advantages and disadvantages in range and power, but the primary difference in their applications seems to be that blue and blue-green lasers penetrate further into water and so have wider applications for sub-surface communications. China is currently modernizing its submarine fleet as a way to project force further past its coastal waters to deter any U.S. naval response to a potential invasion of Taiwan as well as doing significant research into laser communications in submarines [6]. Quantum laser links with satellites would allow sub-surface communication without most of the traditional downsides of radio communications and allow subs to operate with even greater autonomy and silence [7]. Judging from the interest in blue lasers for underwater communication and the interesting choice of a blue laser for the teleportation experiment, it would be safe to venture a guess that applications for quantum communication are already beginning to find their way into Chinese military research and development.

Because of its security level and applications for satellite and submarine communications, quantum communication technology figures centrally in the objectives of the Chinese military to upgrade their growing command and control capabilities. A functional satellite-based quantum communication system would give the Chinese military the ability to operate further afield without fear of message interception.

However, Chinese researchers must also be aware of the potential for the United States to employ the same technology and may be seeking ways to counter this eventuality. While it is still almost impossible to intercept quantum messages without being detected, it may be feasible to jam the laser signals that send them with "optical noise" or other lasers. Understanding the ways in which quantum cryptography functions may also eventually expose further weaknesses in the network that can be exploited by a savvy adversary. China's continuing cutting-edge quantum cryptography, lasers and optics research thus seems as much a reaction to the same research in the United States and an attempt to counter it as it is to develop its own indigenous network.

Conclusions

All of these potential uses are motivations for Chinese labs to be the first to develop successful applications of quantum technology for immediate deployment and to claim milestones like being the first to successfully execute teleportation over several miles of free space. Besides the military uses and academic prestige, this accomplishment could attract a significant amount of international funding for China's developing optics industry, and if quantum teleportation becomes the new paradigm for the future of secure communications, China would like to make a name for itself as the premier research and development hub. Claims of this recent "first" for China then have that much greater significance for security and the continued health of US technological superiority.

Matthew Luce is a researcher and Chinese linguist at Defense Group Inc's Center for Intelligence Research and Analysis, where he does primary source research and analysis of China's science and technology policies and development programs. Mr. Luce's research and writing focuses on cyber security, C4ISR-related technologies, and China's ethnic relations. He has worked and traveled extensively in China and speaks and reads fluent Chinese.

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