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China's Space Capabilities

The People's Republic of China has a rapidly growing, robust space program that serves both civilian and military objectives. Operated by the Chinese military, the program's accomplishments are impressive and its plans aggressive. For example:

- China has a modern fleet of communication, reconnaissance and weather satellites, and is developing its own space-based navigation constellation, similar to the U.S. Global Positioning System. Most of these spacecraft have both military and civilian applications.
- The Chinese Long March family of boosters has posted a 100% launch-success record over a 10-year period. A Long March costs about half that of Western boosters, such as Europe's Arianespace Ariane V vehicle.
- China is developing a new line of rocket engines that will burn oxygen/kerosene and oxygen/hydrogen fuel. Scheduled to fly by 2010, new-engine Long March 5s will give China heavy-lift "rocket capabilities comparable to the U.S. Air Force Evolved Expendable Launch Vehicle (EELV)," according to Craig Covault, Senior Editor for *Aviation Week & Space Technology* magazine (May 5, 2008, p. 29).
- This month or next, China expects to launch the first of its new-generation Fengyun-3 polar-orbit weather satellites, which will benefit both People's Liberation Army (PLA) and civilian forecasters. Carrying 11 sensors, the spacecraft will be comparable to mid-1990s versions of U.S. Defense Meteorological Satellite System vehicles. It will be able to resolve Earth-surface areas as small as 250 square meters—which is of particular value for military operations. Further, an onboard microwave sensor will enable creation of three-dimensional images through clouds.
- China plans to launch its Shenzhou VII this October, marking the nation's third manned space flight. Plans call for one of the three astronauts to conduct an EVA (extravehicular activity), wearing an organically developed spacesuit.
- Chinese officials have unveiled plans to perform in-orbit docking of two orbital modules, which will facilitate building and operating a 20-ton-class, manned space station similar to the Russian Mir platform.

- China has placed a spacecraft into orbit around the Moon, and is developing a small rover vehicle to explore the lunar surface around 2015. Successful rover operation may lead to a lunar sample-return mission in the 2017-2020 timeframe.
- The nation is investing heavily in building a robust space infrastructure to enhance manned space operations. On Apr. 25, China launched the first of two Tianlian relay spacecraft, which will ensure communications with ground controllers throughout most of each Shenzhou orbit. The Tianlian system will preclude building a global network of ground stations and is analogous to the U.S. Tracking and Data Relay Satellite network.
- Knowing that "intellectual capital"—a competent, well-educated workforce—is the foundation of a vital aerospace sector, China now has about 200,000 engineers and technicians conducting research and development in various disciplines, such as space nuclear power, propulsion, materials, multi-spectral sensors, robotics and myriad other technologies.
- In January 2007, China successfully shot down its own aging FY-1C polar-orbit weather satellite at an altitude of 537 miles, demonstrating a direct-ascent antisatellite (ASAT) capability. That system has limitations, and is not particularly flexible, it appears, but a Chinese ASAT threat definitely exists now. That means many U.S. and allied spacecraft in various orbits are at risk of being targeted. Ostensibly, China developed this capability in response to a U.S. ASAT demonstration in the 1980s, when an F-15-launched missile destroyed an aging American satellite in low-Earth orbit.

China's 2007 ASAT test created approximately 2,300 pieces of *observable* orbital debris, triggering strong objections, criticism and denouncements from other spacefaring nations. The test has been described as "the worst satellite fragmentation event in the 50-year history of spaceflight" (*Aviation Week & Space Technology*, May 12, 2008, p. 36). China's leaders appear to have underestimated the intensity of international reaction, and now regret allowing its R&D sector to conduct the test. Clearly, they also grossly miscalculated the potential impacts of so much debris on all nations' satellites.

The ASAT test shocked many in Congress and the Executive Branch. But it was no surprise to many U.S. military space officials, who have repeatedly sounded warnings about potential threats to U.S. national security, civil and commercial satellites. General Kevin Chilton, commander of U.S. Strategic Command, which is responsible for the nation's milspace operations, noted China has yet to explain its reasons for conducting the test. "It's an important message to the rest of the world," he said. "We oftentimes thought of space as being a sanctuary. Frankly, the U.S. military has not thought that way. But the Chinese [ASAT test] put an exclamation point on that: that it's not a sanctuary; that you do have to worry about people or countries taking you on in this domain, in the event of conflict."

As a reporter for *Aviation Week*, I wrote numerous articles that quoted General Chilton and other leaders of then-U.S. Space Command, its successor, Strategic Command,

and the Air Force, Navy and Army space commands, who voiced similar warnings. Those milspace professionals consistently made several key observations: the U.S. is highly dependent on its space infrastructure; that infrastructure is painfully vulnerable, and losing our space assets would be disastrous to U.S. national and economic security. A series of space-related wargames over at least a decade repeatedly underscored the validity of those assessments. However, these articles and generals' testimony seemed to fall on deaf ears in Washington. Consequently, my coauthors and I decided to write a book of fiction, "*Space Wars: The First Six Hours of World War III*," to tell Americans what *could* happen, if a number of U.S. satellites were systematically disabled via covert attacks.

Attacks in Space

Over the last decade, U.S. satellites and datalinks have been subjected to electronic jamming, laser "dazzling," control-network hacking attempts and other forms of interference. China has been responsible for several of these "soft attacks," demonstrating both a willingness and capability to target U.S. spacecraft and control networks. Consequently, U.S. Strategic Command and its service-level agents are taking prudent measures to protect our satellites, ground stations and uplink/downlink signals. Many of these initiatives are classified, and I'm not cleared for the technical "how" and "what" details. But it's obvious that China's ASAT test served to accelerate these efforts *and* bring badly needed funding to support them. But much more needs to be done to protect U.S. and allied spacecraft.

Since China obviously intends to become a world-class spacefaring nation, it is imperative that U.S. leaders and citizens come to grips with that reality. Should China's growing space capabilities be cause for concern in the West? What are China's motivations for developing such technological strengths, and should we view them as threats or opportunities?

China knows the U.S. has a powerful Navy that can project power via its aircraft carrier groups. Confronting a naval force would be suicidal for China, so the PLA turned its attention to the U.S. Navy's Achilles Heel: a strong dependence on satellites. Thus, China developed a relatively low-cost, asymmetric capability to disable the Navy's space-based communications, navigation, weather and intelligence/surveillance/reconnaissance (ISR) resources by disabling or destroying our satellites. And by demonstrating that capability via an ASAT test, China may force the U.S. to spend prodigious amounts of national treasure to protect our space assets and counter any potential attacks on-orbit.

Another possible asymmetric strategy is China surreptitiously launching a fleet of micro- or nanosatellites and positioning them in close proximity to critical U.S. spacecraft in geostationary orbit. These undetected, tiny "killersats" could be lurking near some of our huge satellites, waiting for an order to attack and destroy their neighbors. Because our "space situational awareness" or SSA resources are limited, U.S. milspace

professionals worry that they may be unaware of such dangerous on-orbit weapons. In fact, "nano-killersats" might already be on-station in GEO, waiting.

Adversary or Partner?

From a national security perspective, prudence dictates that U.S. military leaders view China's growing space presence and capabilities as potential threats, then find ways to mitigate and counteract them as soon as possible. I'm confident that such measures are being taken. But U.S. political leaders and citizens also would be well-served by viewing China's space ambitions, military buildups and phenomenal economic growth from a cultural standpoint.

American and Chinese citizens see the world through vastly different cultural lenses. For example, most Chinese consider their nation's 2,400-year recorded history to be an integral part of a "core belief system." They are justifiably proud of their culture, their society and their myriad accomplishments. Historically, China has been a major world power, a fact its neighbors acknowledge, and central to that power is stability. Confucianism dictates that a nation's stability avoids many ills, such as social unrest and wars that drain resources. America, in China's eyes, is an immature latecomer, in comparison, a nation that somehow rose to greatness despite its seemingly chaotic, "unstable" two-party political system.

Many Chinese believe the period from 1860 to 1949 was an aberration in China's long history, an inward-looking phase that allowed others to become world powers. But the nation's people now believe China is reassuming its rightful place as a major world power, and they have been "going to school" on what constitutes a global power today: a large and powerful military; a growing, vibrant economy; impressive cities with huge buildings; an educated workforce and technological prowess. Finally, China believes that, to be a major world power in the 21st Century, it must be a spacefaring nation, as well.

It's important to understand that all these elements are vital *symbols*, and symbolism is at the foundation of Chinese culture. In fact, some experts on China's culture maintain that a vital, accomplished military-commercial space program is primarily a symbol aimed more at garnering the support of Chinese citizens than to threaten the U.S. and other spacefaring nations. "Space has high visibility and a lot of cache via symbolism in political terms. It 'proves' the effectiveness of [China's] government," says Dr. Noel Miner, Managing Director of International Management Consultants, which facilitates clients' business dealings in China. As Chinese citizens grow suspicious of government effectiveness and corruption, the nation's space program is being leveraged as a powerful symbol of government prowess, Miner and other China experts maintain.

Most of all, China wants to be respected, and, in general, the U.S. has failed to show respect for that nation's economic and technical accomplishments, Chinese citizens feel. Rather than being congratulated for its rapid development of successful rockets,

satellites and lunar-probes, for example, China sees U.S. leaders chastising it for human rights shortcomings. Even in this department, China has come far in a relatively brief period. "A hundred and fifty years ago, America didn't have a great human-rights record, either," notes Thomas Menza, a retired U.S. Air Force officer and former Chinese history professor at the Air Force Academy. "China is saying, 'give us credit for what we *have* done!' By harping on human rights, we're creating an enemy, where there doesn't have to be one."

In January, *Aviation Week & Space Technology* named Qian Xuesen the magazine's "Person of the Year," saluting the father of China's space program. This choice generated more than a little hate mail from outraged readers, but cooler heads saw the choice for what it was: respect for a man's—and a nation's—considerable accomplishments in space. Similar recognition and respectful moves by U.S. political leaders might pave the road to space-program cooperation, rather than creating an adversary.

While it is virtually impossible to decipher China's intentions, America must simultaneously prepare for the possibility of conflict in space, while also making an effort to engage China through cooperative space ventures. The U.S. and Russia successfully separated their military and civilian space programs, then found ways to cooperate on the latter. China should be coaxed into doing the same—although the nation's excessive secrecy regarding space matters is already making engagement a frustrating, lengthy venture. But the potential payoff in reducing mistrust and suspicions is worth the effort.

Cooperative U.S.-China space programs, such as joint deep-space exploration initiatives or having China become an International Space Station partner, would go a long way toward developing mutual respect, understanding and positive relationships among the two nations' space professionals. Such an approach can build on the economic ties our two nations already have forged, which are reducing the chances of terrestrial or in-space conflict.

Deterrence Through Information

Cooperative commercial and civil space programs, guided by a policy of mutually beneficial interaction among U.S. and Chinese space professionals, could lead to what might be termed "deterrence through information." For example, if China's leaders fully understand that shooting dozens of missiles at other nations' satellites would create so much orbital debris that *nobody* could safely launch a spacecraft for years, perhaps they would think twice about firing an ASAT. Further, if they know that America's advanced-technology weapons can disable Chinese satellites at will, *without* creating massive debris fields, and that U.S. satellites can maneuver or otherwise protect themselves, a preemptive ASAT strike might be deemed inadvisable. In short, the message we should impart is: conflict in space would be a catastrophe for both the U.S. and China, so let's not go there.

Creating a Space Race

Finally, U.S. citizens and their leaders must recognize that roughly 90% of China's approximately one billion citizens admire and greatly respect Americans. Many Chinese want U.S. products, services, music, movies and other elements of Western culture. They have no desire to see our two nations become adversaries. However, U.S. leaders are on the verge of turning a billion Chinese citizens into rabid America-haters, creating a visceral hatred that will persist for a generation or longer. How? By boycotting the 2008 Olympic games. If Congress or the Bush Administration bans U.S. athletes from competing in Beijing this summer, it will be viewed as a slap to the face of every Chinese man and woman—the ultimate humiliation of a proud people. The summer Olympic games are China's coming-out party, and refusing that Asian nation's invitation will trigger a host of unintended consequences. And Americans will suffer greatly for such shortsightedness.

To avoid triggering a very expensive "space race" and giving hardliners justification for building an even larger, more powerful Chinese military force, the Congress and Administration must curb "human rights" rhetoric and allow U.S. athletes to compete in Beijing. Only then can we find new ways to foster U.S.-China cooperation in space.