A Space Race with China

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On the morning of November 26, 2007, Chinese Premier Wen Jiabao stood before a cheering assembly of technicians in the flight command and control center of China's Space City. The Chinese leader pulled away a red silk sheet covering an unremarkable black and white photograph of the lunar surface. "Comrades," he said, "cherishing an incomparable mood of joy and pride, we unveil the first image of the lunar surface from Chang E 1."

With People's Liberation Army (PLA) General Guo Boxiong and officials from the Chinese National Space Agency (CNSA) standing by his side, Premier Wen thanked the technicians on behalf of the Central Committee of the Chinese Communist Party, the State Council and the Central Military Commission. He told them the success of the Chang E lunar orbiter "demonstrates that our comprehensive national strength, our creative capabilities and the level of our science and technology continues to increase, with extremely important practical implications, and deep historical significance, for raising our international standing and strengthening the force of our ethnic solidarity."

It was not the first time in recent memory a Chinese leader connected success in space to the fate of the nation. Four years earlier, shortly after the first Chinese astronaut returned from space, President Jiang Zemin, wearing army fatigues and standing before a collection of military officers, compared the importance of their piloted space program to China's successful effort to develop nuclear weapons and ballistic missiles.

Words and images like these make non-Chinese nervous. To some they convey a shrill nationalism reminiscent of Imperial Germany or Meiji Japan. Those who give credence to great power theories of international relations tie concerns about Chinese nationalism to dire predictions of what one American scholar called "an intense security competition with a considerable potential for war." In January of 2007, China destroyed one of their own aging weather satellites as part of a series of anti-satellite weapons tests that lent new weight to these forecasts.

The global ideological and intellectual discourse on space technology and national security that shaped the later half of the twentieth century is now fueling fears of a 21st century space race in Asia. Chinese leaders say they want to avoid it, and that their quest for a place in the heavens is peaceful, but many foreign observers are not assured by these claims.

Space, Science, and Salvation

The contradictions in Chinese rhetoric about space are easier to understand in historical context. Since the Opium Wars of the mid-nineteenth century, successive generations of Chinese intellectual and political leaders sought national salvation in science and technology. They went abroad to buy it, study it, and to bring it back home. Reformers and revolutionaries nearly destroyed traditional Chinese culture with their iconoclastic attempts to create a "new culture" that, by embracing science and technology, could liberate the Chinese people from foreign exploitation and domination.

Contemporary histories of China's space program are written as object lessons for the next generation in the relationship between mastering science and preserving Chinese sovereignty and security. While these lessons can sound shrill and aggressive to outsiders, the propaganda connecting science to national restoration also extends to environmental protection, conservation, agriculture, economics, management, and every other imaginable field of professional endeavor. In the same way the concept of "moral values" animates contemporary American politics, respect for "science" and "education" define Chinese aspirations for the future.

Project 863 is a blueprint for the realization of those aspirations. It takes its name from the March, 1986 decision by Deng Xiaoping to support recommendations contained in a letter drafted by four senior Chinese scientists in response to concerns about Ronald Reagan's "Star Wars" initiative that were raised during meetings of the Chinese Academy of Science and the Chinese Commission of Science, Technology, and Industry for National Defense (COSTIND) earlier that year. Although the initial focus was on the military aspects of national security, when the final plan emerged from the Central Committee and the State Council in December of 1986, Deng Xiaoping, settling a dispute between two camps of consulting scientists, declared civilian applications the principal focus. Military applications were to be de-

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veloped within civilian capabilities whenever possible. These priorities were reaffirmed in the Outline for the National Mid-to-Long Term Science and Technology Development Plan (2006-2020), promulgated by China's State Council in 2005.

Space technologies are inherently dual use. Military and civil satellites use the same technologies, and many satellites have both civilian and military applications. Missiles that deliver warheads and rockets that carry satellites employ the same technologies. Given a national science and technology policy that encourages military planners to pursue dual use technologies, is not surprising that space became an important focus of China's military modernization.

China's two largest space projects are essentially civilian. The PLA may have a prominent role in the Shenzhou and Chang E programs, but most military strategists concede that putting people into space and exploring the moon have little military utility. The decision to develop a piloted space program was based on political, economic, and social considerations. Jiang Zemin argued on numerous occasions that putting people in space was a hallmark of a major power, that it was necessary to raise the stature of the Chinese people and would ensure China remained an influential actor in international politics. China's leaders also expect to reap the same economic and social benefits the United States harvested from the Apollo program, in particular, a new generation of well-trained and highly motivated scientists and engineers.

Forests and Trees

As we look back on 50 years of space flight, President Eisenhower's quiet commitment to the Corona satellite reconnaissance program is still overshadowed by the historical and political theatrics surrounding Sputnik, despite the fact that Corona contributed far more to American national security than the pursuit of the "space race" initiated by Senator Lyndon Johnson, at the suggestion of a Democratic political operative, during hearings of the Senate Armed Services Committee in November of 1957. The images Corona returned from space allowed Americans to base security policies on facts rather than fear, on information rather than speculation.

In much the same way, and for many of the same reasons, the headlines and hyperbole surrounding China's high-profile space programs obscure the more significant accomplishments of China's burgeoning space industry. The most economically and militarily useful space activities are those that take advantage of the ability of space-based assets to conduct large-scale simultaneous observation of the Earth's surface and atmosphere, and to enable communication between, and simultaneously

broadcast to, large parts of the Earth. Access to those capabilities is mediated by a small community of American, European, and Russian providers. China's space industry is positioning itself to change that, beginning with a concerted effort to become the provider of choice for the developing world.

The successful Chinese launch of a Nigerian communication satellite in May of 2007 marked the first time China provided the complete package of satellite design, manufacturing, launch, and on-orbit servicing under a contract for a foreign client. The 5086 kg satellite was built on China's newest satellite bus, the DFH-4, and was placed into a geostationary orbit on the 56th consecutive successful launch of a Chinese Long March rocket. It carries 28 transponders in four bands that, according to the Chinese trade press, will save Nigerian users approximately 95 million dollars a year in broadband access fees and other African users another 6.6 billion dollars in telecommunication and data transfer costs over the satellite's fifteen-year life span. Satellite applications in e-commerce, e-government and distance education are expected to provide Nigerians with 150,000 new jobs in telecommunications and related fields.

China is constructing two expansive research and production facilities—one in Beijing and the other near Shanghai—which, in addition to establishing China as a significant player in the international satellite industry, will supply China's growing domestic demand for a wide-range of military and civilian satellite applications. The 11th Five-Year Plan for Space Development, announced by COSTIND shortly after the close of 17th Party Congress in November of 2007, confirmed China's intention to build a global positioning system that will provide a free public service in addition to a secure government service. It also includes plans for a significant expansion and upgrade of their earth observation capabilities, including a new generation of polar and geostationary weather and oceanographic satellites, high-resolution imaging satellites, interferometric synthetic aperture radar satellites, and a constellation of micro satellites to conduct environmental monitoring and manage natural disasters.

The dramatic expansion in satellite manufacturing will be complimented by increased space-launch capability. China is developing a new launch vehicle capable of carrying up to 25 tons to low earth orbit and fourteen tons to geostationary orbit—a nearly three-fold increase over the Long March 3B, the most powerful rocket currently in use. The new and wider rocket, expected to enter service around 2012, will require a new launch facility, which is being built near the town of Wenchang on the northeast corner of Hainan Island. According to provincial reports, the new facility will be surrounded by space oriented theme parks and museums designed to contribute to the island's booming tourist industry, and put a less mysterious and less military face on the country's space program.

China's space industry continues to face its share of problems. The first of its new line of large capacity communications satellites, planned to carry high definition video and other broadband traffic for the 2008 Olympics, failed because of a faulty solar panel. The Sino Satellite Communications Company, a commercial joint venture of COSIND, the Chinese Aerospace Corporation (CASC), and the People's Bank of China, was reported to be in excess of ten billion Chinese yuan. A commercial subsidiary of the Chinese Aerospace Industrial Corporation (CASIC) tried to develop a family of small, solid-fueled commercial carrier rockets designed for micro satellite payloads, and failed. The KT-1 prototype barely made it off the launch pad in September of 2002 and suffered another less than completely successful attempt a year later. Although the developers claim to have "learned valuable lessons," an independent Chinese professional assessment of the project indicates it may have been scrapped.

Problems with organization, training, management, inefficiency, quality control, and even environmental pollution were addressed in the new five-year plan for China's space industry, which called for strengthening the policies, practices, laws and regulations that govern the activities of the public and private entities involved in space-related activities. It reflects a government-wide emphasis on professionalism and the rule of law that is bringing order, predictability, and meritocracy to institutions that are still plagued by habit, patronage, favoritism, and corruption. Institutional reform may be the single most important factor in advancing the scientific and technical capabilities of the Chinese space community.

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Implications

In the wake of the January 1999 Report of the Select Committee on US National Security and Military/Commercial Concerns with the People's Republic of China – commonly referred to as the Cox Report after Committee Chair, Republican Congressman Christopher Cox – the United States has enforced an increasingly restrictive set of controls governing scientific, commercial, and diplomatic contact with China on space-related matters. These restrictions are intended to prevent the transfer of technologies with military applications deemed threatening to the United States and its allies in the region. Because many of these technologies also have non-military applications, the restrictions have a significant impact on commercial relationships and scientific collaboration.

The State Department has issued "guidance" on the

implementation of these controls that prevents NASA, which has a broad mandate to engage other countries for the purpose of scientific collaboration and space exploration, from engaging in virtually any form of bilateral dialog or cooperation with their Chinese counterparts. The penalties for violating this guidance are so intimidating that prior to departing for the 2007 annual summer session of the International Space University, hosted this year by the Beijing University of Aeronautics and Astronautics, NASA attendees were warned not to speak with Chinese students and faculty. NASA Administrator Michael Griffin traveled to China in September of 2006, purportedly to try to establish a foundation for future cooperation. But his ability to engage the Chinese was severely limited, and the visit was a dismal failure. It may have even set back efforts by other public and private US organizations to engage the Chinese on scientific and commercial space issues.

An ironic consequence of the concerted US effort to isolate the Chinese space community and inhibit Chinese access to advanced space technologies may be an acceleration of China's ability to produce these technologies on their own. China made significantly more progress in the eight years since the Cox Report then they did in the eight years prior. Chinese space technology is still less advanced than technology they could have purchased from the United States and Europe in the absence of restrictions, and Chinese scientists and engineers acknowledge there is much they could learn through commercial and scientific collaboration. At the same time, the new Chinese leadership now believes that reliance on acquisitions from abroad tends to retard the development of innovative indigenous technology, insuring China will always be one or more steps behind more advanced nations.

Innovation and creativity are the new buzzwords of Chinese President Hu Jintao's science and technology policy. It was the centerpiece of his speech to the Chinese Academies of Science and Engineering in June of 2006. One possible way of understanding the shrill political propaganda that attends every milestone in China's lunar and piloted programs is that the country's leaders want people to feel confident about the progress they are making, and in their ability to develop new technologies without having to resort to the century-old policy of relying on imported ideas from the West. Part of Hu's message, which has a significant political appeal, seems to be that science and technology do not have a national or ethnic identity, so Chinese should no longer feel they need to be Western in order to master it.

The fine line between patriotism and nationalism is easier to cross in the wrong direction in a global ethos defined by national competition. Politicians and pundits who promote the concept of a "space race" between China and the United States can, like Lyndon Johnson a half century earlier, capture headlines and the political initiative. But if history is any guide it will come at the cost of combative, hostile, and ultimately unproductive political behavior both within and between countries. Promoting cooperation, despite its risks, is more likely to encourage peace, and produce better science.

Unfortunately, space bureaucrats in most of these countries are already using the supposed "threat" of foreign accomplishments to goad political leaders into providing more funding for high profile piloted and lunar space initiatives. On the eve of a crucial vote on NASA appropriations in the fall of 2007, the NASA Administrator issued a public statement claiming that his visit to China leads him believe that China would put people on the moon before the United States could return, despite the fact that China, unlike the United States, has no plans for a piloted lunar mission. Griffin's comments were widely circulated in the press and repeated on the floor of the Senate by NASA supporters who got the budget increases Griffin requested.

China sends mixed messages. In 2003, PLA Air Force Col. Yang Liwei, China's first person in space, unfurled two flags in front of the television camera in his Shenzhou 5 spacecraft as it circled the earth: the Chinese national flag and the flag of the United Nations. At the UN, the Chinese Foreign Ministry is pushing for a new treaty to secure the peaceful use of outer space, which is consistent with its desire to use space for a range of purposes, while at the same time the PLA is testing destructive anti-satellite weapons. In 2005, during the 24-7 coverage of the Shenzhou 6 mission, an unending stream of nationalist propaganda filled the airwaves. Yet 79% of the millions of Chinese viewers who responded to an on-line poll conducted by Chinese Central Television, asked for less political commentary and more live pictures of the Earth from space.

As China appears to be teetering between an ugly techno-nationalism and a deeper appreciation of the practical uses of outer space, US decision makers would be wise to reconsider policies that are unlikely to stop China from becoming a military space power while at the same time engendering politically counterproductive resentments and anxieties in the Chinese technical community. Cooperation in commercial and scientific space activities holds the promise of building a community of common interest among scientists, and entrepreneurs, who are, by the very nature of their avocation and training, more inclined to see the world as a complex, interdependent whole than a fragmented collection of nation states. As China continues to fashion an increasingly professional government heavily populated by scientists and engineers appointed according to merit, scientific and technical cooperation, rather than competition, is more likely to produce the security both sides desire.

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