

An hourglass-shaped graphic with a globe inside. The top bulb is dark blue, and the bottom bulb is light blue. The globe is centered in the narrow neck of the hourglass. The text is overlaid on the hourglass.

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*China's Anti-Satellite Weapon Test*

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April 23, 2007

**Abstract.** On January 11, 2007, the People's Republic of China (PRC) conducted its first successful direct-ascent anti-satellite (ASAT) weapons test in destroying one of its own satellites in space. The test raised international concerns about more space debris. Longer-term, the test raised questions about China's capability and intention to attack U.S. satellites. The purpose of this CRS Report, based on open sources and interviews, is to discuss that ASAT test by China's military, the People's Liberation Army (PLA), and issues about U.S. assessments and policies.

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# China's Anti-Satellite Weapon Test

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**CRS Report for Congress**

*Prepared for Members and Committees of Congress*

## Summary

On January 11, 2007, the People's Republic of China (PRC) conducted its first successful direct-ascent anti-satellite (ASAT) weapons test in destroying one of its own satellites in space. The test raised international concerns about more space debris. Longer-term, the test raised questions about China's capability and intention to attack U.S. satellites. The purpose of this CRS Report, based on open sources and interviews, is to discuss that ASAT test by China's military, the People's Liberation Army (PLA), and issues about U.S. assessments and policies. This report will not be updated.

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## China's Destruction of its Satellite in Space

On January 11, 2007, at 5:28 pm EST, the PRC conducted its first successful direct-ascent anti-satellite (ASAT) weapons test, launching a ballistic missile armed with a kinetic kill vehicle (not an exploding conventional or nuclear warhead) to destroy the PRC's Fengyun-1C weather satellite at about 530 miles up in low earth orbit (LEO) in space. The PLA conducted the test near China's Xichang Space Center in Sichuan province. The weapon under development was fired from a mobile transporter-erector-launcher (TEL). China reportedly used a two-stage, solid-fuel medium-range ballistic missile that was launched from a TEL. A U.S. intelligence official testified to Congress that the U.S. designation of this ASAT weapon is SC-19. A National Security Council spokesman issued the White House's public response on January 18, stating that "China's development and testing of such weapons is inconsistent with the spirit of cooperation that both countries aspire to in the civil space area." He stated that the PRC used a land-based, medium-range ballistic missile. He also noted that the United States and other countries responded with formal protests to China.<sup>1</sup> Australia, Canada, United Kingdom, South Korea, Japan, Taiwan, and the European Union reportedly also issued concerns. Russia downplayed the test. China did not give advance warnings and its Foreign Ministry did not issue a public statement until January 23, saying that China calls for the peaceful use of space and that the test was not aimed at any country.

## Issues for Congress

### What Are the Security Implications of This ASAT Test?

The critical challenge in the short term is posed by the space debris resulting from the PRC's intentional destruction of a satellite. It was the first such destruction of a satellite since the ASAT tests conducted during the Cold War by the United States and the Soviet Union in the 1980s. Since then, neither the United States nor Russia has destroyed satellites in space, while many more civilian and military satellites have been used by countries and companies. In LEO (up to 2,000 km, or 1,242 miles altitude), reconnaissance and weather satellites, and manned space missions (including the International Space Station, Space Shuttle, and China's manned flights) are vulnerable to the increase in space debris resulting from China's satellite destruction. This debris cloud (estimated at 950 pieces 4 inches or bigger plus thousands of smaller pieces) threatens space assets in LEO, according to the Johnson Space Center. The Director of Space Operations at the Air Force said that his staff tracked about 14,000 particles before January 11, and that number increased to about 15,000. The Commander of the Strategic Command (STRATCOM) testified that the last U.S. kinetic ASAT test occurred in 1985 and at the lower altitude of LEO, and even so, the debris took over 20 years to come down out of space and burn up in the atmosphere. China's test was in the upper altitude of LEO and the resulting debris is

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<sup>1</sup> Craig Covault, "Chinese Test Anti-Satellite Weapon," *Aviation Week & Space Technology*, online post on Jan. 17, 2007 (first public report of China's ASAT test); Colin Clark and Jeremy Singer, "China's ASAT Test Widely Criticized, U.S. Says No New Treaties Needed," *Space News*, Jan. 22, 2007; Director of the Defense Intelligence Agency, Lieutenant General Michael Maples, testified to the Senate Armed Services Committee at a hearing on worldwide threats on Feb. 27, 2007 (record of responses to Senator Hillary Clinton as issued by her); Jim Wolf, "China Poses Risk to Key U.S. Satellites," *Reuters*, Apr. 12, 2007 (quoted Air Force Chief of Staff General Michael Moseley as saying that missile was fired from a mobile launcher).

seen as a threat to space assets for more than 20 years. According to the Air Force Space Command, the space debris increased the collision risk for about 700 spacecraft.<sup>2</sup> China has known about international concerns about space debris. Its "Space White Paper" of October 2006 stated that China has "actively participated" in the Inter-Agency Space Debris Coordination Committee, initiated a Space Debris Action Plan, and increased international exchanges on space debris research.

The longer-term implications concern some questions about China's capability and intention to attack U.S. satellites. Whereas the Secretary of Defense has reported publicly to Congress since 1998 that China's military has been developing an ASAT capability,<sup>3</sup> some observers doubted the Pentagon's assertions. China's January 2007 test confirmed China's long-suspected program to develop ASAT weapons, a program that could potentially put at risk U.S. military and intelligence satellites that are needed to provide tracking and targeting for rapid reaction or other operations. China demonstrated a limited capability to use a missile to launch a kinetic kill vehicle to destroy one of its own satellites in LEO under testing conditions that it controlled. The mobility of this ASAT weapon under development also could present challenges for U.S. tracking and warning time. Aside from developing and testing this ASAT capability, China does not have enough satellite interceptors, although it can produce enough of them by 2010 to destroy most U.S. satellites in LEO with little warning, estimates the Defense Department. Also, the ASAT test did not threaten the U.S. missile defense system. The Director of the Defense Intelligence Agency testified to Congress that the test demonstrated China's capability "to eventually deploy an ASAT system that could threaten U.S. satellites."<sup>4</sup>

Threat consists of capabilities and intentions, stressed the Chairman of the Joint Chiefs of Staff, General Peter Pace, at a news conference on March 7, 2007. He visited China on March 22-26, and reported that the intention of the ASAT test remained unclear. China has not explained how it intends to use this ASAT weapon that has been tested. Various comments by PLA officers and PRC civilian analysts have justified the ASAT test as needed to counter perceived U.S. "hegemony" in space and target the vulnerability of U.S. dependence on satellites. A PLA Air Force colonel wrote in late 2006 that U.S. military power, including long-range strikes, have relied on superiority in space and that leveraging space technology can allow a rising power to close the gap with advanced countries more rapidly than trying to catch up.<sup>5</sup> A PRC specialist at Fudan University indicated that China's ASAT program is developed partly to maintain China's nuclear deterrence, perceived as undermined by U.S. space assets.<sup>6</sup> An analyst at the PLA's Academy of Military Science argued that China does not have a clear space deterrence theory and

<sup>2</sup> Leonard David, "China's Anti-Satellite Test," *Space.com*, Feb. 2, 2007; Bill Gertz, "Beijing Space Test Scattered Debris," *Washington Times*, Apr. 10, 2007; General James Cartwright, hearing of the House Armed Services Subcommittee on Strategic Forces, Mar. 8, 2007; Jim Wolf, "China Poses Risk to Key U.S. Satellites," *Reuters*, Apr. 12, 2007.

<sup>3</sup> In response to National Defense Authorization Acts, the Secretary of Defense submitted reports on China's military in 1997, 1998, 2000, 2002, 2003, 2004, 2005, and 2006.

<sup>4</sup> Bill Gertz, "China Mum on Pace Query on Anti-Satellite System," *Washington Times*, Apr. 6, 2007; Deputy Director of the Missile Defense Agency quoted in *VOA News*, Jan. 30, 2007; Lieutenant General Michael Maples, "Current and Projected National Security Threats to the United States," statement for the record, Senate Armed Services Committee, Feb. 27, 2007.

<sup>5</sup> Dai Xu, "Space, A Rising Power's New Opportunity," *Huanqiu Shibao*, Dec. 21, 2006.

<sup>6</sup> Shen Dingli, "Outer Space Security Balance," *Shanghai Dongfang Zaobao*, Jan. 23, 2007.

that China likely seeks a limited capability to counter U.S. dominance in space and reduce the likelihood of U.S. attacks against space assets.<sup>7</sup>

## Did China's ASAT Test Surprise U.S. Assessments?

Some news reports speculated that this ASAT test surprised U.S. intelligence. Although China's test confirmed long-standing Defense Department reporting about China's counter-space program, some warnings seemed inconsistent with China's January 2007 kinetic kill ASAT test. In the three annual reports on the PLA from 2004 to 2006 (required by the FY2000 National Defense Authorization Act), the Secretary of Defense reported to Congress that China could destroy or disable satellites in space "only" by launching a ballistic missile or space launch vehicle "armed with a nuclear weapon."<sup>8</sup> However, the Pentagon's 2003 report warned that China was developing a "direct-ascent ASAT system" that could be fielded between 2005 and 2010. Also, U.S. intelligence reportedly knew about the PLA's previous tests and preparations for this latest ASAT test. A number of U.S. intelligence agencies had a "full court press underway" to monitor the ASAT test on January 11, and it was the fourth test that the United States monitored using missile-warning satellites. China conducted three previous tests in this weapon program between September 2004 and February 2006, according to a U.S. official.<sup>9</sup>

## Why the Delay in China's Official Statement About the Test?

Despite foreign protests, China did not issue an official statement until January 23, 12 days after the ASAT test. China's Foreign Ministry simply stated that its "experiment" did not target or threaten any country and that China opposes the weaponization of space or an arms race in space. Beijing's lack of a prepared explanation and delay in issuing a statement raised questions about whether the top leaders approved the PLA's ASAT tests, coordinated between the Foreign Ministry and the PLA, miscalculated foreign responses, or approved the ASAT program and anticipated criticisms but decided anyway to test. Adding to concerns about China's intentions, the ASAT test did not come at a time of bilateral tensions. After the U.S.-China summit in April 2006, NASA and the STRATCOM proposed civilian and military space contacts with China, and NASA's Administrator visited China in September 2006. In this debate, National Security Advisor Stephen Hadley questioned whether China's leaders knew about the PLA's ASAT test in advance, suggesting that U.S. protests sought to compel top ruler Hu Jintao to become directly involved or responsible. However, Deputy Under Secretary of Defense Richard Lawless called the speculation "farfetched," since Hu is the Central Military Commission Chairman (as well as Communist Party General-Secretary and PRC President).<sup>10</sup>

<sup>7</sup> Bao Shixiu, "Dominance in Space," *Beijing Review*, Mar. 15-21, 2007.

<sup>8</sup> Secretary of Defense, reports to Congress on "PRC Military Power."

<sup>9</sup> Craig Covault, "Chinese Test Anti-Satellite Weapon" *Aviation Week & Space Technology* (online), Jan. 17, 2007; Mure Dickie and Stephen Fidler, "Satellite Kill Likely to Have Equal Impact on Terra Firma," *Financial Times*, Jan. 20, 2007.

<sup>10</sup> David Sanger and Joseph Kahn, "U.S. Tries to Interpret China's Silence over Test," *New York Times*, Jan. 22, 2007; Richard Lawless speaking to the U.S.-China Economic and Security Review Commission, Feb. 1, 2007.

## Was China Signaling Potential Offensive Military Actions?

China could have signaled a perceived self-confidence in countering U.S. forces in a possible conflict over Taiwan or another area of dispute. Then-Commander of the Pacific Command (PACOM), Admiral William Fallon, said that the PLA was trying to counter U.S. military power in a possible conflict over Taiwan.<sup>11</sup> Also, the ASAT weapon demonstration was undeniably traced to the PLA. Moreover, the January 2007 test followed sudden changes made by the PLA Air Force in its control of airspace and flight routes near Shanghai, including a rare shutdown of the busy Pudong airport, in November and December 2006.<sup>12</sup> PRC officials and scholars have been warning that 2007 is a critical year with potential crises in the Taiwan Strait, citing their concerns about perceived pro-independence moves by Taiwan's president. The PLA Air Force's actions and ASAT test could have signaled to Washington to heed Beijing's words about Taipei.

## Was China Responding to U.S. National Space Policy of 2006?

Some in China argued that the new U.S. National Space Policy prompted China's test, while U.S. officials have contended that, regardless, China has developed a range of counter-space weapons to challenge U.S. space dominance. News reports stressed a hardline tone of the policy (signed by President Bush in August 2006, with a public version issued in October 2006), which stated opposition to new space arms control and denial of the use of space to adversaries "hostile" to U.S. interests. Under Secretary of State for Arms Control and International Security Robert Joseph contended that the United States does not monopolize space or deny access to space for peaceful purposes. He characterized the space policy as responding to "growing threats" from a number of countries that "are exploring and acquiring capabilities to counter, attack, and defeat U.S. space systems," when the United States is more dependent on space than other nations.<sup>13</sup> Even before issuance of the U.S. space policy, China conducted three previous tests of this direct-ascent ASAT weapon and, by September 2006, China had used a ground-based laser to illuminate a U.S. satellite in several tests of a system to "blind" satellites.<sup>14</sup> Before and after this latest ASAT test, PRC military and civilian analysts have voiced concerns about China's perceived vulnerability against U.S. dominance in military and space power. After the test, a Senior Colonel of the PLA's Academy of Military Sciences said that "outer space is going to be weaponized in our lifetime" and that "if there is a space superpower, it's not going to be alone, and China is not going to be the only one."<sup>15</sup>

## Was China Trying to Prod the United States in Arms Control?

In wake of the ASAT weapon test, the PRC's military and civilian analysts argued that the PRC's "peaceful" motive for the test was to prompt the United States to engage in space arms control. At the United Nations in October and December 2006, the United States was the only country to

<sup>11</sup> Audrey McAvoy, "Fallon Sees Expansion in U.S.-China Relations," *AP*, Feb. 18, 2007.

<sup>12</sup> "Pudong Airport's Airspace Apparently Given Over to Air Force," *Ta Kung Pao* [PRC-owned newspaper in Hong Kong], "Airport Shutdown Delays HK Flights," *Standard*, Dec. 2, 2006.

<sup>13</sup> White House, "U.S. National Space Policy," issued October 2006; State Department, Robert Joseph, "Remarks on President's National Space Policy," Dec. 13, 2006.

<sup>14</sup> Vago Muradian, "China Tried to Blind U.S. Sats with Laser," *Defense News*, Sept. 25, 2006.

<sup>15</sup> Senior Colonel Yao Yunzhu's remarks, reported by the *Associated Press*, Jan. 26, 2007, and *Ta Kung Pao* [a PRC-owned newspaper in Hong Kong], Jan. 28, 2007.

vote against a resolution on the “Prevention of an Arms Race in Outer Space” (PAROS), adopted by the General Assembly. However, PAROS seeks to prevent the weaponization of outer space, and even if there were such an agreement, it would not ban the type of land-based ASAT weapon (not space-based weapon) that China tested. A former PLA officer at China’s Arms Control and Disarmament Association noted that the Foreign Ministry’s silence about the test was “baffling” and that “if it is a negotiating chip, it’s illogical not to come out and announce something.”<sup>16</sup> China’s Foreign Ministry had not prepared any explanation for the ASAT test, and its short statement of January 23 did not mention arms control. It was at a regular news conference a week later that the ministry called for a “legal document.” Indeed, China had already subtly shifted its stance on space arms control at the United Nations, dropping an original call for not testing, deploying, or using on land, at sea, or in the atmosphere any weapons for warfighting in outer space.<sup>17</sup>

## What are Some Policy Options?

The PRC’s ASAT test raised an issue of whether there are benefits in talking with China and other countries about an arms control agreement (such as PAROS), a code of conduct, or other security-building measures.<sup>18</sup> China’s ASAT test did not violate any existing arms control treaty, although it broke a voluntary moratorium since the 1980s on such destruction of a satellite.<sup>19</sup> A middle-ground view between seeking and rejecting sweeping arms control suggested that there could be a narrowly-targeted ban on kinetic ASAT weapons that create space debris.<sup>20</sup> In contrast, the Bush Administration objected to the implication that China’s ASAT test was another reason to pursue outer space arms control, noting that PAROS would not ban China’s ground-launched ASAT activities.<sup>21</sup>

Also, the Administration decided not to send demarches to dissuade China from such testing.<sup>22</sup> An issue is whether to lodge a diplomatic protest to China for any future test. It is questionable that China’s leaders would heed U.S.-only objections to a PLA program. Still, some urge a new strategic dialogue, given concerns about China’s miscalculations and crisis-management. Regarding other policies, General Pace visited China in March, continuing to pursue military-to-military ties. However, the ASAT test likely affected debates in Congress about whether to relax legal restrictions for contacts with the PLA (a debate prodded by PACOM) and whether to resume commercial satellite deals (such as space launches). There also is an issue about whether to

<sup>16</sup> Chris Buckley, “China Experts See Space Blast as Puzzle & Warning,” *Reuters*, Jan. 22, 2007.

<sup>17</sup> Comparing “four principles” urged by Vice Foreign Minister Qiao Zonghuai on May 2, 2002 (and repeated by Pan Zhenqiang of the PLA’s NDU in an article published in Dec. 2005) and later calls for “three principles” by PRC Representative Hu Xiaodi at the United Nations.

<sup>18</sup> For example: Gary Samore of the Council on Foreign Relations (quoted in *New York Times*, Jan. 18); David Wright, Union of Concerned Scientists, statement issued on Jan. 19, 2007; Theresa Hitchens of the Center for Defense Information (quoted in *Financial Times*, Jan. 20); Michael Krepon, Stimson Center, “A Space Code of Conduct?” *Space News*, Mar. 5, 2007.

<sup>19</sup> The Outer Space Treaty of 1967 bans the deployment of weapons of mass destruction in orbit, on the moon, or otherwise in outer space; and limits the use of the moon to peaceful purposes.

<sup>20</sup> “China’s Anti-Satellite Test,” editorial, *Space News*, Jan. 22, 2007.

<sup>21</sup> State Department, Ambassador Christina Rocca, U.S. Permanent Representative, “Statement to the Conference on Disarmament,” Feb. 13, 2007.

<sup>22</sup> Michael Gordon and David Cloud, “U.S. Knew of China’s Missile Test, But Kept Silent,” *New York Times*, Apr. 23, 2007.

continue or suspend bilateral space cooperation proposed in 2006 by STRATCOM, which could include talks on collision avoidance, signals interference, and station keeping (maneuvering satellites).<sup>23</sup> For other responses, at a hearing of the Senate Armed Services Subcommittee on Strategic Forces on March 28, 2007, the STRATCOM Commander urged support for programs for space situational awareness and Prompt Global Strike. (See CRS Report RL32496, *U.S.-China Military Contacts: Issues for Congress*, by Shirley A. Kan; CRS Report RL33601, *U.S. Military Space: Status of Selected Programs*; and CRS Report RL33067, *Conventional Warheads for Long-Range Ballistic Missiles: Background and Issues for Congress*, by Amy F. Woolf.)

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<sup>23</sup> Jeremy Singer, "Cartwright Seeks Closer Ties with China, Russia," *Space News*, Oct. 16, 2006.