

## China's White Papers on Space: An Analysis

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### **Summary**

The three White Papers provide overall, basic information about the Chinese Space agenda. They highlight the fact that China has achieved important breakthroughs in a relatively short time and can be viewed as a rapidly rising Space power. The emphasis in the White Papers is on the civilian aspects of the Chinese Space programme. This could, in a sense, be regarded as the tip of the iceberg, focusing on the civilian aspects of the Space agenda while hiding deeper strategic intentions. China's international alignments and cooperation in the Space arena indicates that it views Space technology as an instrument to boost its soft power status.

It is important not to view the Chinese Space programme in a limited sense as an attempt to demonstrate technological or military superiority. It is as much about showing visionary leadership as an attempt to achieve great power status by putting a Chinese on the Moon, the first country envisaged to do so in the 21st century.

The increasing Chinese interest in Space technology, particularly since the 1990s, has its roots mainly in the 1991 Gulf War, which showcased the military dimension and utility of the United States (US) Space power, and in the “accidental” bombing of the Chinese Embassy in Belgrade, Yugoslavia by the US in 1999. The Chinese believe that it was impossible for such an accident to occur when US forces had the support of the Global Positioning System (GPS) – the most accurate Space-based navigational network. These events probably made China realise the relevance of Space technologies for modern warfare. US support for Taiwan has also played its part in China’s development of its Space programme, as the Chinese realised the asymmetric advantage the US could have against them in any likely conflict in the Taiwan Straits. Moreover, China has also realised the dependence of the US forces on Space assets and the fact that any intentional destruction caused to any of these satellite systems or any temporary or permanent jamming of any of them could significantly limit the US military capability both during peace and war. In short, there was a realisation in China about both the offensive and defensive aspects of Space technologies in warfare.

The Chinese also realised that Space technologies are all about ‘rocket science’, and that very few countries in the world are likely to possess these technologies in the near future. China sees investments in this field as having a direct correlation with its national prestige as well. Its technological and military leadership, understanding the socio-economic and strategic relevance of these technologies, and simultaneously appreciating the technological challenges involved, have prepared a roadmap for the future outlining plans for research, investment, and development in this field. The dynamic nature of technology as well as strategic considerations demand the regular updating of such plans. During the last decade, China published three White Papers on these issues, in 2000, 2006, and 2011. This issue brief is an attempt to develop a holistic picture of China’s Space policies based on a critical analysis of the three White Papers.

White Papers are usually published by a state to make its people and the international community aware of policy issues. They provide authentic information, highlight the state’s point of view, and seek to dispel misgivings, if any. Issuing a White Paper is not a novelty even for a Communist state like China. The Chinese government has been regularly releasing White Papers on defence, climate change, Tibet, population policy, human rights, and poverty, among other areas.<sup>1</sup> This probably offers the Chinese government an opportunity to exhibit a form of transparency in its functioning thus attempting to create confidence internationally about its intent as well as announcing future plans.

The three White Papers were published by the information office of the State Council in

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<sup>1</sup> The full list of China’s White Papers is available at the following URL: <http://www.gov.cn/english/links/whitepapers.htm>.

order to map Chinese activities in Space., The basic intent of these White Papers has been to highlight the progress made so far, spell out plans for the following five years, discuss developmental policies and measures undertaken till then, proposals for future, and, finally, to underline international exchanges and cooperation.

### The Three White Papers

The first official White Paper on Space Policy was released by the People's Republic of China (PRC) in the year 2000. This Paper primarily described Chinese achievements in Space since 1956, thus filling an information gap regarding the development of the Chinese Space programme during these 45 years. Detailing the various technologies and areas in which China has made progress, the paper highlighted the fact that the PRC was confident enough about its progress in Space to release a White Paper, making public its overall status.

The 2006 White Paper also analysed the success of the Chinese Space programme. The Paper showed that the Chinese government managed to achieve a number of stated goals. It also enumerated the plan for the next five years.

The most recent White Paper dated 2011 clearly highlights the Chinese desire to achieve a moon landing. In addition, China is also working towards completing its International Space Station. The work is already in process and the successful docking of Tiangong 1, the first module of the Chinese Space Station with Shenzhou VIII, an unmanned spacecraft has showcased the technological achievements of the Chinese Space industry. The November 2011 docking demonstrated the successful linking up of two unmanned spacecraft in Space. Additionally, by the end of 2011, the Chinese also successfully tested the Beidou system, which they portray as an alternative to the Global Positioning System (GPS) operated by the United States. The 2011 White Paper also sheds light on Chinese ambitions towards a manned mission to the Moon.<sup>2</sup>

Through the three White Papers China has sought to 'enlighten' the rest of the world about the fact that it appreciates the requirements of a global Space regime and feels that the United Nations has a major role to play in this regard. They also and highlight China's participation in the activities organized by the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPOUS) as well as its Scientific and Technical Committees and Legal Sub-committees.<sup>3</sup>

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<sup>2</sup> 'Moon Mission on the Horizon', *Moon Daily*, January 3, 2012, available at [http://www.moondaily.com/reports/Moon\\_mission\\_on\\_the\\_horizon\\_999.html](http://www.moondaily.com/reports/Moon_mission_on_the_horizon_999.html), accessed on January 16, 2012.

<sup>3</sup> See 'Full Text: China's Space Activities in 2011', available at [http://news.xinhuanet.com/english/china/2011-12/29/c\\_131333479.htm](http://news.xinhuanet.com/english/china/2011-12/29/c_131333479.htm), accessed on January 16, 2012.

Table 1 shows the projections made by the Chinese government in the three White Papers.<sup>4</sup>

**Table 1: Projections made in the White Papers**

<b>White Paper (2000)</b>	<b>White Paper (2006)</b>	<b>White Paper (2011)</b>
<ul style="list-style-type: none"> <li>• Achieve marketisation and industrialisation of Space applications</li> <li>• Complete manned spaceflight system and scientific research in the field</li> <li>• Exploration studies in Outer Space</li> <li>• Upgrade the level and capacity of the launch vehicles</li> <li>• Improving the performance and reliance of the 'Long March group of rocket launchers</li> <li>• Realise manned spaceflight</li> <li>• Establish coordinated and complete national remote sensing applications</li> <li>• Develop the application technology for satellite navigation and positioning</li> <li>• Space explorations centring on the moon</li> </ul>	<ul style="list-style-type: none"> <li>• Improve the carrier rockets' capabilities</li> <li>• Develop earth observation system</li> <li>• Develop satellite remote-sensing applications</li> <li>• Achieve spacecraft rendezvous and docking</li> <li>• Achieve lunar orbiting probe</li> <li>• Original and important achievements in Space</li> <li>• Continue with manned spaceflight</li> <li>• Continue with lunar explorations</li> </ul>	<ul style="list-style-type: none"> <li>• Improving ground facilities for receiving, processing, distributing and applying satellite data</li> <li>• Expand value-added business in satellite communication</li> <li>• Work on lunar surface landing</li> <li>• Explore the properties of dark matter particles</li> <li>• Continue work on Space debris monitoring and mitigation and spacecraft protection</li> <li>• Promote satellite application industry</li> <li>• Work on strengthening the national Space law and improve related laws</li> <li>• Work on Space industrial policies guiding and regulating Space activities</li> </ul>

<sup>4</sup> For complete text of the White Papers, see <http://www.spaceref.com/china/china.white.paper.nov.22.2000.html> (2000), <http://www.china.org.cn/english/2006/Oct/183588.htm> (2006), and [http://news.xinhuanet.com/english/china/2011-12/29/c\\_131333479.htm](http://news.xinhuanet.com/english/china/2011-12/29/c_131333479.htm) (2011), accessed on January 18, 2012.

The White Papers have also been used to list achievements made so far. Table 2 offers some details.

**Table 2: Achievements**

White Paper (2000)	White Paper (2006)	White Paper (2011)
<ol style="list-style-type: none"> <li>China has developed four types of satellites: recoverable, remote sensing satellites Dongfanghong (DFH), telecommunications satellites Fengyun (FY), meteorological satellites, and Shijian (SJ) scientific research and technological experiments satellites.</li> <li>First man-made satellite Dongfanghong-I was launched in April 1970.</li> <li>By the year 2000, China had launched 47 satellites of various types.</li> <li>Developed the Long March rockets independently; China conducted 63 launches and 21 consecutive successful flights between 1996 and 2000.</li> <li>Launched and recovered the first unmanned experimental spacecraft 'Shenzhou' in 1999.</li> <li>China explored the upper atmosphere with the help of rockets and balloons from the 1960s.</li> <li>By the mid-1980s, China began to utilise domestic and foreign telecommunications satellites and developed related technologies. It also began using navigation satellites of other countries.</li> </ol>	<ol style="list-style-type: none"> <li>China added Earth resource satellites, Ziyuan (ZY) and Navigation and positioning satellites, Beidou.</li> <li>Developed and launched 22 different types of satellites.</li> <li>Long March rockets made 24 consecutive successful flights.</li> <li>Research and development of the 120 tonne-thrust liquid/kerosene engine while the development of the 50 tonne-thrust hydrogen-oxygen engine is in progress.</li> <li>Construction of three launching sites at Jiquan, Xichang and Taiyuan made progress.</li> <li>Research into space environment and also observation, reduction and forecasting of Space debris; and has developed the capability to forecast the Space environment.</li> </ol>	<ol style="list-style-type: none"> <li>Long March series of rocket launchers undertook with 67 successful launches sending 79 spacecraft into planned orbit.</li> <li>Developed the Fengyun (Wind and Cloud), Haiyang (Ocean), Ziyuan (resource), Yaogan (Remote sensing) and Tianhui (Space mapping) satellites.</li> <li>Initiated the development of a high-resolution Earth Observation system.</li> <li>Launched 10 satellites for the Beidou system and provided services to the Asia-Pacific region.</li> <li>Launched and developed the Shijian (Practice) satellites and small as well as micro satellites.</li> <li>Launched the manned spaceship and also achieved Space docking between Shenzhou VIII and Tiangong 1, paving the way for the establishment of the Space laboratory and Space Station.</li> <li>Launched the first lunar probe Chang'e-2</li> <li>Building a new launch site at Hainan.</li> <li>Monitored Space debris and provided early warning against them.</li> <li>Removed aging GEO satellites out of orbit.</li> <li>Working on protecting manned spaceflight from Space debris.</li> </ol>

## What the White Papers Show

Tables 1 and 2 provide information based on 'official Chinese thinking' as encapsulated in the White Papers. A few important aspects of China's vision and commitment to this field emerge out of these three official documents. The Chinese techno-politico leadership demonstrate clarity of thought. They clearly identified areas for development (long-term development targets for the next 20 years or so) and efforts have been fully concentrated towards achieving the set objectives. Their focus has been to develop a Space industry, work towards the upgradation of launch systems, develop remote sensing satellites and navigational systems, and also work towards undertaking manned Space missions and Moon missions. In all these fields, China has made swift progress.

It is a known fact that Rocket Science is a complicated area for research and development. Failures are not uncommon in this field; however, a brief look at China's achievements indicates that it has achieved a very good success rate with varying space. Space missions so far. China is presently only the third country in the world to achieve feats such as a Space walk and the launch of a Space Station. China has two moon missions to its credit, undertaken in quick succession (Chang'e 1 in 2007 and Chang'e 2 in 2010), and has also operationalised its regional navigational system called Beidou (end of 2011).

Investments for building satellites for the purpose of reconnaissance have been a key area of focus of the Chinese establishment for the last decade. It appears that the Chinese government has intentionally avoided publicity in this regard. From April 2006 to November 2011, 15 satellites in the Remote Sensing Satellite (Yaogan) series were launched by China. Officially, these satellites are meant for scientific, land survey and disaster management purposes. However, it is generally believed that since these satellites have either optical or synthetic aperture radar (SAR) sensors, they have a definite military utility. Some of the previously launched satellites in this series have been retired, and presently operational satellites are known to have a resolution of 1.5 to 1.0 metres, almost matching the best in the world (the US Quick Bird has a resolution of 60 cm and Indian Cartosat has a sub-metric resolution).

Understanding the importance of the emerging Space market, the Chinese have made concentrated efforts to develop the Space industry base in their country. They established the Chinese Aerospace Science and Technology Cooperation<sup>5</sup> (CASC) on July 1, 1999 to serve as the main outlet for carrying forward their Space agenda. This organisation primarily manages the Chinese launch and satellite manufacturing industry. Presently,

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<sup>5</sup> For further information, see 'China Aerospace Science and Technology Corporation (CASC)', China Aerospace Corporation - CASC, available at <http://www.fas.org/nuke/guide/china/contractor/casc.htm>, accessed on January 16, 2012.

the CASC has total assets worth approximately US\$ 25 billion, and features among the top 10 of the existing 125 central enterprises in China.<sup>6</sup>

China has established an impressive infrastructure for undertaking satellite launches and has developed a special niche for itself in the satellite launch market. So far, it has carried out 33 commercial launches for international customers and has successfully placed 39 satellites in orbit.<sup>7</sup> China is also offering satellite manufacturing services on a commercial basis. In particular, for small and developing states, China is providing assistance ranging from custom-made development of satellites, launching them, and making earth tracing systems available. Their main clientele in this field appears to be states from South America and Africa.

It is important to appreciate that although China's rise as a Space-faring nation has been visible over the past two decades; its efforts in this direction had began much earlier. Since the 1950s, it has made steady investments in Space sciences and technologies. More importantly, its priorities did not undergo significant changes over these years. This probably accounts for its current successes. Yet, it is important to note that certain 'checks and balances' were also in place, and blind political support was not available.

Leaders like Deng Xiaoping had their own views with regard to making investments in the Space arena; Deng was not particularly keen to develop the so-called high profile projects. Unenthusiastic about ideas regarding manned Space capsule and the two-stage-two-orbit horizontal takeoff and landing reusable Space shuttle, he did not grant permission to develop these programmes. It is only after Deng resigned as the head of the Chinese Military Commission in 1989 that the Chinese Military was able to refocus its interest in this area.<sup>8</sup> Incidentally, the first Chinese White Paper giving details of the proposals for the manned mission and Moon mission was published in 2000, three years after Deng's demise.

China has already mapped the moon's surface with the help of data received from the Chang'e 1 and 2 satellites. In the future, it proposes to undertake an unmanned robotic mission to the Moon, with the aim of accomplishing a lunar landing. Its ultimate aim is to land an astronaut on the Moon in the coming few decades. One rationale for China's

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<sup>6</sup> See 'China Aerospace Science & Technology Corp. (CASC)', available at <http://www.china-defense-mashup.com/defense-manufacturers-data/china-aerospace-science-technology-corp-casc>, accessed on January 17, 2012.

<sup>7</sup> Xin Dingding, 'China to Launch 5 Satellites for Foreigners', *China Daily*, December 21, 2011, available at [http://www.chinadaily.com.cn/china/2011-12/21/content\\_14296838\\_3.htm](http://www.chinadaily.com.cn/china/2011-12/21/content_14296838_3.htm), accessed on January 16, 2012.

<sup>8</sup> *Encyclopedia Astronautica: China*, available at [www.astronautix.com/articles/china.htm](http://www.astronautix.com/articles/china.htm), accessed on January 10, 2012.

'Moon attraction' is the quest for energy resources. China's 'Lunar Probe Project' has suggested that there is about one million tonne of Helium-3 on the Moon's surface which could meet mankind's energy demand. Only a little more than 10 tonnes of Helium-3 is available on Earth. Meeting China's power demand requires the consumption of eight tonnes of Helium-3, equivalent to 220 million tonnes of oil or about one billion tonnes of coal.<sup>9</sup> It appears that China, and even India and Japan, have started the process of indentifying, experimenting, and analyzing the efficacy of resource mining on the Moon. However, it may take another three to four decades to actually transport this resource from the Moon to Earth.

It is important to note that human Space missions, the establishment of a Space Station, and the Moon mission are unlikely to have direct military relevance. However, various new technologies would have to be developed to successfully accomplish these missions. Such technologies could be used or modified for military purposes. Technologies in the fields of robotics, radar networks, material development etc., could have significant dual use applications.

The White Papers are silent on China's policies about Space-based and/or Earth-based weapons for targets in Space. The 2011 White Paper does not mention the 2007 anti-satellite (ASAT) test undertaken by the Chinese. There is no mention of investments in technologies like jamming technology. Another area of Chinese interest—the family of small satellites known as the Micro, Nano and Pico satellites—does not find mention; Near-Space technologies are also not discussed. Interestingly, the White Papers do mention the need for establishing systems for Space debris monitoring and mitigation, and spacecraft protection. China also emphasises the need for international collaboration with regard to the protection of the Space environment and Space resources. In this regard, the Chinese want the function of the UN Office of Outer Space Affairs (OOSA) to be consolidated.

China's keenness to develop regional cooperation is evident in these documents. In 1992, it even established the Beijing-based Asia-Pacific Space Organisation (APSCO) of which China, Pakistan and Thailand are members. But other Asian Space giants, India and Japan, are not members of this organisation. There is some commonality among the Space projects being attempted by these three states; yet, so far there have been no efforts to establish any collaborative efforts.

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<sup>9</sup> 'Change-2 Satellite's Camera Resolution Reaches One Meter', *Space Daily*, January 14, 2010, available at [http://www.spacemart.com/reports/Change\\_2\\_Satellite\\_Camera\\_Resolution\\_Reaches\\_One\\_Meter\\_999.html](http://www.spacemart.com/reports/Change_2_Satellite_Camera_Resolution_Reaches_One_Meter_999.html), accessed on January 14, 2012.



## Conclusion

The three White Papers provide overall, basic information about the Chinese Space agenda. They highlight the fact that China has achieved important breakthroughs in a relatively short time and can be viewed as a rapidly rising Space power. The emphasis in the White Papers is on the civilian aspects of the Chinese Space programme. This could, in a sense, be regarded as the tip of the iceberg, focusing on the civilian aspects of the Space agenda while hiding deeper strategic intentions. China's international alignments and cooperation in the Space arena indicates that it views Space technology as an instrument to boost its soft power status.

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