

China’s 2016 White Paper on Space: An Analysis

1. Introduction to China’s Space White Papers

On 27 December 2016, the Information Office of China’s State Council released the new version of the country’s five-year policy guidelines for national space activities. Published in the form of a government White Paper, the document highlights the major developments of the past five years (2011-2015) and provides a comprehensive description of the programmatic intentions for the sector over the period 2016-2020.

In this respect, it is important to highlight that China’s space activities are planned and executed within the Framework of China’s Five-Year Plans (*Zhongguo Wunian Jihua*). Discussed and adopted by the Central Committee of the Chinese Communist Party (CCP) and subsequently ratified by the National’s People Congress since 1953, these plans provide a grand blueprint of the overall objectives and goals related to national social and economic growth and industrial planning in key sectors and regions.

The 2016 White Paper hence represents the specific plan for the space sector during the 13th Five-Year Plan, which governs the period 2016-2020. Remarkably, the 2016 White Paper is the fourth policy document of this kind, the other three having been released in 2001, 2006 and 2011, in conjunction with the 10th, 11th and 12th Five-Year Plans, respectively.

2. What’s Inside and What’s Left Out

Like the three previous versions, “China’s Space Activities in 2016” is organised around five major sections. In the first one, the document spells out the purpose, visions and principles of development for the country’s space programme. It then hails the remarkable accomplishments and breakthroughs realised during the 12th Five-Year Plan (2011-2015) and enunciates the plans for the next five years. Finally, a set of policy measures designed to assist the realisation of the programmatic targets and the international cooperation policies are presented.

In line with the 2011 version, the new White Paper contains a quite extensive range of technical and operational information, which signal a greater level of confidence in the country’s space capabilities and technological prowess as well as the desire to “enable the world community to better understand China’s space industry”. A stated objective for this increased level of transparency is to support the principle of “*open development*” through international cooperation, which is one of the four guiding principles to which China’s space developments adhere, the others being *innovative*, *coordinated* and *peaceful* development. Consistent with these four guiding principles, the principal axes around which China’s space programme is stated to operate can be summarised as follows:

- Implementing major space science and technology projects by pursuing independent innovation as core development strategy of the space industry;

- Allocating various resources in a rational and coordinated manner to promote a comprehensive development of space science, space technology and space applications, and improve the quality and efficiency of the overall space sector;
- Adhering to the peaceful and clean utilisation of outer space by opposing the weaponisation and any arms race in space and taking effective measures to protect the space environment;
- Combining self-reliance with opening to the outside world by actively engaging in international cooperation based on equality, mutual benefit, peaceful utilization, and inclusive development.

Thanks to its open policy statements, China's White Paper marks several steps forward in enhancing the degree of transparency and in providing foreign audiences with an effective tool of communication on the purpose, visions and development principles of its space programme. Where the White Paper is, however, much less communicative – not to say silent – is in providing a comprehensive and clear picture of the uses China intends to make of its space programme, which is an equally important means for reducing ambiguities and potential tensions, while building confidence internationally.

Predictably, the document's focus is on peaceful development of space activities to support scientific and technological development and spur social and economic growth. The security and military-related goals, policies, and activities of programme are barely mentioned.¹ Admittedly, the document acknowledges that the purpose of the space programme is to meet the demands of national security and towards this "to build China into a space power in all respects". But apart from this and some other generic statements, the White Paper carefully omits to provide any account of the security-related uses of its satellite systems, the majority of which is known to serve dual use purposes.

Similarly, no indication is given about the resource allocations and the stakeholders involved in the management of the programme. This is not surprising. Chinese official documents have rarely released figures on the country's overall space spending, nor have they provided clear guidance to navigate the ocean of its complex organisational structures. In the White Paper, mention is made of the China National Space Administration (CNSA) which, however, is little more than a clearing house acting as the public interface of the Chinese space programme on the international stage. Arguably, this reticence about releasing information on its policy processes, capabilities and expenditures, while consistent with China's strategic thinking, continues to create a certain degree of ambiguity that undermines the stated goal of making China's space programme more transparent so as to promote deeper international cooperation.

3. China's Programmatic Targets for 2016-2020

Looking at the specific targets set out by the White Paper, the documents contains little that is new, though the full spectrum of activities is remarkably covered. The major targets fixed for the 2016-2020 period can be grouped under the following major headings: space transportation, space infrastructure, human spaceflight and space exploration, space applications, space science and technologies, and ground infrastructures.

In the area of access to space, the new policy document pledges some efforts to improve the reliability of the new *Chang Zheng* (Long March – LM) rocket family, namely the LM-5, the LM-6 and the LM-7, the development of which was completed during the 12th Five-Year Plan. In parallel, the document anticipates some major efforts and breakthroughs in the development of a new heavy-lift launch vehicle (unofficially referred to as LM-9) and, interestingly, "research into the technologies for low-cost launch vehicles, new upper stage and a reusable space transportation system".

In the area of satellite systems, which is identified as a key priority area during the 13th Five-Year

¹ In this 11,000 words document, the word "security" is mentioned only three times, while the word "military" or "dual-use" find no trace at all.

Plan, efforts are pledged in the full range of China's applications satellites, including Earth observation, communications and navigation. Specifically, the new policy document calls for a) the further development of three series of multi-functional, high resolution satellites for observing the land, oceans and atmosphere, and the creation of networks of satellites integrating them;² b) the expansion of a "comprehensive [satellite] system capable of providing broadband communications, fixed communications, direct-broadcast television, mobile communications and mobile multimedia broadcast services"; and c) enhancing the capacities of the Beidou-2 GNSS constellation. In this respect, China plans "to start providing basic services to countries along the Silk Road Economic Belt and 21st-century Maritime Silk Road in 2018, form a network consisting of 35 satellites for global services by 2020, and provide all clients with more accurate and more reliable services through advancing the ground-based and satellite-based augmentation systems in an integrated way".

With regard to human spaceflight and space exploration, the key focus is understandably on the activities and technologies required for building and operating the future Chinese Space Station (CSS), including the launch of the *Tianzhou* (Heavenly Vessel) cargo spacecraft to dock with *Tiangong-2*. Interestingly, the assertions contained in the 2011 White Paper about the conduct of studies "on the preliminary plan for a human lunar landing" are not reaffirmed in the new White Paper, which limits to state that China will "strive to acquire key technologies [...] to raise manned spaceflight capacity and laying the foundation for exploring and developing cislunar space. Concerning robotic exploration, the White Paper confirms the three-step strategy of "orbiting, landing and returning" for its lunar exploration project by anticipating the launch of *Chang'e-5* sample return mission in 2017 and the launch of the *Chang'e-4* lunar probe in 2018 to achieve mankind's first soft landing on the far side of the moon. Finally, indications are given on the launch of a new Mars probe by 2020, a mission that was put aside following the failure of Phobos-Grunt in 2012.

In terms of infrastructure development, the document emphasises the need to improve "the existing space launch sites by raising the reliability and IT application level and conducting adaptive improvements to ground facilities and equipment". The document also pledges to enhance China's TT&C systems – i.a. by launching and operating a second-generation data-relay satellite system and building "a space-ground integrated TT&C network featuring security, reliability, quick response, flexible access, efficient operations and diverse services – and to improve China's capability in characterising the space environment and associated risks through an advanced and more effective SSA system.

With regard to space science and technology development, key pioneering experiments are planned in the field of space astronomy and space physics, quantum mechanics, biology, life sciences, medicine and materials in space through dedicated space missions and various activities on-board the *Tiangong* space laboratory. Also, the document states that within the next five years China is to develop and launch technology experiment satellites (including three new *Shijian* missions)³ and to conduct experiments on key technologies for new electric propulsion, laser communications and common platforms of new-generation communications satellites with the goal of further supporting the maturation of its space industry.

Finally, in the area of space applications, consideration is given to the need of raising the scale, operational standards, industrialisation and commercialisation levels of China's space applications so as to serve national security objectives and foster new growth points for the national economy. The document in particular puts the spotlight on ensuring an extensive provision of integrated space-based services for meeting the needs of industries, regions and the general public.

² China already operates five dedicated series of EO satellites, namely the *Fengyun* (Wind and Cloud) series for meteorology, the *Haiyang* (Ocean) series for oceanography and maritime observation, the *Ziyuan* (Resources) series for natural resource monitoring, the *Gaofen* (High Resolution) series for near-real time geographical mapping, climate change monitoring, environmental surveying and precision agriculture, and the *Yaogan* (Remote-Sensing) series for disaster management and surveillance operations combining optical, radar and electronic intelligence signals.

³ *Shijian* (literally, "practice") is a scientific and technology demonstrator satellite series started in the 1970s.

4. Between the Lines

The 2016 White Paper not only serves as a celebration of China's past achievements and a compendium of programmatic targets for the next five years. Although the statements are, as mentioned, rather scant, in reading between the lines and in comparing the new version with the one of 2011, a whole set of underlying policy goals and priorities comes into the fore.

To begin with, it does not go unnoticed that whereas the formula deployed to enunciate goals and working principles of China's space policy is essentially the same as the 2011 White Paper,⁴ the new version adds the principle of *coordinated development*; an inclusion that, together with the ever-growing stress on international cooperation, seems to acknowledge the difficulties faced by the Chinese space community in balancing its involvement in so many different programmes and its pursuit of so many different objectives. While no new trailblazing programme was revealed in the paper, it should not be neglected that, in addition to the programmes already underway, the White Paper envisages many new efforts in the whole plethora of space activities during the 2016-2020 period. Building a space station is already an extremely costly undertaking and the *soft-landing* scenario envisaged for China's economic performance over the next years recommends – indeed requires – China's space officials to be more pragmatic and effective in managing the ever-growing resources demand and policy goals. And this is evident in the set of policy measures spelled out in the fourth section to assist the realisation of the above-mentioned programmatic targets and, more specifically, in increased interest toward private sector's participation in the space programme.⁵

A careful reading of the White Paper also shows how China intends to leverage its space programme to support objectives that are at once commercial, diplomatic and strategic. To illustrate, in the section "Key areas for future cooperation", China announces the construction of a "Belt and Road Initiative Space Information Corridor" (encompassing Earth observation, communications, navigation and positioning, satellites development; ground and application system construction; and application product development). This initiative is an integral part of the development strategy and framework known as *One Belt, One Road* to enable China to take a bigger role in global affairs by improving connectivity and strategic cooperation among the countries located along the land-based "Silk Road Economic Belt" and oceangoing "Maritime Silk Road". Similarly, the construction of the BRICS remote-sensing satellite constellation and the construction of the APSCO Joint Small Multi-Mission Satellite Constellation Programme serve to position China as a strategic hub alternative to the US on the geopolitical chessboard of 21st century international relations.

Finally, the assertion that the space programme is intended to "protect China's national rights and interests, and build up its overall strength" can be taken as a clear indication of the further development of military space capabilities to enhance the country's *Zhonghe Guoli* (Comprehensive National Power)⁶ and avert behaviours that might limit its freedom of action, be it in space or on Earth.

⁴ The operative language in the 2016 document reads as follows: "China's space industry is subject to and serves the national overall development strategy, and adheres to the principles of innovative, coordinated, peaceful and open development", while in the 2011 paper reads as follow: "China's space industry is subject to and serves the national overall development strategy, and adheres to the principles of independent, peaceful, innovative, and open development".

⁵ Interestingly, these measures call for rationally arranging national space activities; enhancing space-related innovation ecosystem; upgrading space industry capacity; accelerating satellite application industry; improving a system of diverse funding for space activities by i.a. increasing cooperation with private investors; strengthening the training of professionals for the space industry, and disseminating knowledge about space science.

⁶ *Zhonghe Guoli* refers to the total sum of strengths of a country in economy, military affairs, science and technology, education and resource and its influence

5. Concluding Remarks

After five years of highly remarkable achievements, the vision announced by the 2016 White Paper on Space Activities may appear rather modest for a fast-rising space power like China: no ground-breaking plans were announced, and the majority of them were already known to the international space community. But the quantity of projects China will embark upon in the next five years is, in fact, impressive: new satellites systems for earth observation, communications and navigation, new space science missions, robotic exploration missions to the Moon and Mars, manned space missions to pave the way for the construction of the *Tiangong* space station, consolidation of the current launcher fleet and R&D for new launch vehicles, key technologies experiments, comprehensive development of space application for a variety of uses and strengthening of the ground infrastructure. All these undertakings will certainly contribute to making China a mature spacefaring nation as well as one of the most prominent powers in the international (space) hierarchy of the 2020s.

The very importance of this government White Paper should not be dismissed either. In outlining its policy posture in the open, China makes significant efforts to avoid ambiguities and speculations about its space programme and enable the international space community to increase understanding of the country's vision and goals in space. While this increased level transparency is certainly much appreciable, it is still far from being an effective tool for confidence-building and for unlocking the full potential of China's international cooperation efforts.

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