



By: Gordon Feller

China's push into space – Challenges for the West



In 2021 a Long March 5B Y2 rocket launched from the Wenchang Launch Site in Hainan Province. It carried the Tianhe module, which became the Chinese orbiting space station's core.

Completed in 2022, Tiangong the **orbiting station** is named after China's first long-term space presence. While the International Space Station will be retired in 2030, Tiangong is expected to have a service life that ends in 2032 (if it is not extended by the Chinese). It's only one of a growing number of Chinese space projects.

Beijing's leaders have invested a vast treasure into a long-term strategy that works, simultaneously, at achieving multiple goals; placing orbiting assets into space; ensuring advanced technologies for land-based assets on Earth, such as launch facilities; inserting assets onto celestial bodies, starting with the Moon, and extending to asteroids and Mars.

Namrata Goswami, an independent analyst who formerly served at the Futures Laboratory in Alabama, says that a permanent space station is deemed to be important by Beijing's leaders because it helps to send "signals to the world that China is openly contesting the US for space leadership across the board, and that it is a capable partner for international cooperation in space".

The dual use of satellites

The Asia-Pacific Space Cooperation Organisation (APSCO) is one example that the Chinese regularly cite when they want to demonstrate their peaceful intentions in space.

APSCO oversees an ambitious space surveillance project: the Asia-Pacific Ground-Based Optical Space Object Observation System. As part of this project -- which aims to address the space debris problem at a global level -- China has provided three 15 cm telescopes to Peru, Pakistan, and Iran, each of which are capable of tracking objects in both Geosynchronous Earth Orbit (GEO) and Low

Earth Orbit (LEO).

Orbiting assets have received China's greatest sums of money and political capital

Orbiting assets have received China's greatest sums of money and political capital, in large part because the dual use of satellites are of keen interest: civilian missions (such as weather, navigation, monitoring environmental systems, voice and data communications, broadcast, etc.) and military missions.

Over the past few years China became focused on one fact: the PRC cannot assert itself as a full-fledged space-based communications power without achieving truly independent and disruptive innovations.

China's leaders assume they will not leapfrog if the country continues down the path laid out by others.

Innovative development

According to Marco Aliberti, the European Space Policy Institute's Senior Research Fellow, "this acknowledgement has ushered the country to place more emphasis on the principle of 'innovative development' in the pursuit of its space efforts, and hence to provide more substantial backing towards more innovative and potentially disruptive concepts and programmes".

Major breakthroughs with far reaching consequences are expected in several areas, including space sciences (with key scientific missions such as those related to the study of dark matter and gravitational waves); sat-communications (i.e., quantum communication and 6G); access to space.

One **orbiting satellite constellation**, BeiDou, has received the single largest investment. It is among the most expensive efforts by the Chinese, although it's little known to the

outside world. With the launch of Beidou-3 G3, in June 2020, the Chinese completed that constellation's full deployment.

Particular emphasis continues to be placed in supporting the Beidou's penetration into Belt & Road-associated countries

According to Aliberti, "China will now focus on furthering the integration of Beidou in the national infrastructure and on promoting its commercial uptake both domestically and internationally".

Particular emphasis continues to be placed in supporting the Beidou's penetration into Belt & Road-associated countries, with a view to consolidating the construction of the "B&R Spatial Information Corridor".

In addition, the Chinese government has set up 3 mechanisms by which they intend to further Beidou's penetration into the international systems: China-Central Asia BDS Cooperation Forum; China-Russia Satellite Navigation Key Strategic Cooperation Project Committee; **China-Arab States BDS Cooperation Forum**.

The most active launch service provider worldwide

According to Aliberti, more than 40 launches are scheduled for launch by CASC alone; a figure that will likely continue to maintain CASC as the most active launch service provider worldwide, well ahead of SpaceX.

The figure is even more impressive if one considers that it does not include that additional launches that shall be likely carried out by CASC's Smart Dragon (Jielong-1) rocket (which claims to have 30 orders already), as well as by private launcher companies like Galactic Energy, Expace, and LandSpace.

In the area of application satellite systems, Aliberti thinks that we "will see the

deployment of new telecommunication and Earth Observation (EO) satellites, including, most likely, the launch of additional EO satellites of the Gaofen series for environmental monitoring, of Fengyun series for meteorology as well as the fourth satellite of the Ziyuan series".

Experimental and technology demonstrator satellite series (for scientific and national defence purposes) will likely continue to occupy an important share in China's launch log

One or more satellites of the new Hainan EO constellation, which was initially scheduled for 2019, will probably be launched this year, alongside commercial satellites for foreign companies/countries.

By the same token, Aliberti says "the launch of military EO satellites will also continue to see a consolidation, although no information has been released in this respect".

Aliberti concludes that, "as in previous years, experimental and technology demonstrator satellite series (for scientific and national defence purposes) will likely continue to occupy an important share in China's launch log".

Nervousness in the US and EU

China's focus on developing a wide array of sat technologies produces nervousness in Washington and Brussels.

Cornell's Lincoln Hines points out that these capabilities include "military reconnaissance satellites, remote sensing satellites, comm-satellites, cube-satellites or micro satellites, the world's first quantum communications satellite, and the BeiDou navigation system".

These satellites are built by China's state-owned sector, the emerging commercial sector, and even Chinese universities. The aim

is for commercial firms to be complementary to state-owned entities, with a focus on what Hines calls “smaller, more cost-effective investments, such as microsats”.

In recent years China’s actively promoted BeiDou as a civilian-led program intended primarily for commercial and scientific purposes. The truth is that the BeiDou program is under overall military direction, with the PLA taking charge of all of BeiDou’s top-tier program management entities.

“No one really knows how much China spends on its space program” - Lincoln Hines

Hines questions the assumption that China has made substantial new investments in these capabilities: “Although outside organisations make estimates about China’s annual spending on space activities, no one really knows how much it spends on its space program. As of now, China has steadily developed its space capabilities in accordance with publicly stated goals. This suggests that Chinese investments have not dramatically increased (or decreased), but have rather steadily increased”.

In the view of Hines, far from resembling a “race,” China’s space program dates back to the late 1950s.

China began launching its BeiDou satellites in the early 2000s, and completed construction of its global constellation of satellites in June of 2020. BeiDou provides another alternative to the US’s GPS, Europe’s Galileo, or Russia’s GLONASS.

Is there an alternative to GPS?

Hines says that although it provides an alternative to these services, “it’s unclear what added functionality is provided by BeiDou, in comparison to these other systems. Moreover, many countries rely so heavily on GPS, it’s hard to imagine they will switch to China’s

alternative”.

There are also important geopolitical considerations. Hines thinks that relying on a Chinese system, rather than these alternatives, “means that other countries would be dependent on China”.

For some countries, such as those that have territorial disputes in the South China Sea, “it’s hard to imagine that they would want to be overly dependent on Chinese services. It is more likely that China will find willing partners as part of its ‘One Belt One Road’ initiative. Moreover, BeiDou could serve China’s large domestic market”.



Smallsat constellations could be a game changer, and a method to maintain the US lead - Dr. Samson Phan

Dr. Samson Phan, SRI’s Senior Research Engineer thinks that “Chinese launches to the Moon are quite impressive”, but they “highlight the shrinking technology gap and don’t provide a direct comparison of capabilities”.

Beidou seeks to provide an independent source of Positioning, Navigation, and Timing for the Chinese military, which Dr. Phan thinks “could drastically alter their warfighting capability”.

Dr. Phan admits that he’s “highly biased”, but he believes that smallsat constellations “could be a game changer” -- and a method to maintain the US lead.

Changing from the “all eggs in one basket” approach, which dominated the past, to a “more distributed system that smallsats allow increases capability robustness as well as

pervasiveness”.

China clearly considers space to be a strategic concern, particularly under the leadership of President Xi, and wants complete independence in weather and climate forecasting, navigation, space data and communications. If history is any guide, they will continue to invest in these capabilities.