



Giants Reaching for the Stars

By Ian Christensen and Victoria Samson

Published in German as “Riesen, die nach Sternen greifen” in

Internationale Politik, Issue #2/2022 – March/April 2022

<https://internationalepolitik.de/de/die-welt-ist-nicht-genug>

(Original English draft below)

The United States and China are two of the world’s leading space powers and have arguably the two most comprehensive and capable space industry sectors. Both countries are ambitiously seeking to position their space programs as drivers of economic growth, diplomatic leverage, and security advantage. While they are competitors, this rivalry does not necessarily mean that their programs are intended to threaten each other; it does indicate that this is just one part of an extraordinarily complicated relationship between geopolitical powers. While there are some limited space interactions right now, deeper engagement is hampered but necessary. Figuring out ways in which these two space powers can do so is important for the future stability and sustainability of space, a topic that is of relevance to all.

Every five years, China’s State Council releases a Space White Paper which describes China’s accomplishments in space activities in the last five years, and outlines major objectives for the next five years. China’s [2021 Space White Paper](#) (released in late January 2022) outlines an ambitious and comprehensive space program, with continued development of a crewed space station; a sustained robotic lunar exploration program as preparation for crewed activities; and continued integration of satellite applications in communication, navigation, and remote sensing into economic infrastructure. The white paper does not address China’s military space activities. In December 2021, the Biden Administration outlined its areas of emphasis for the U.S. space program in its [United States Space Priorities Framework](#). This document also describes an ambitious and comprehensive space program including continuing U.S. interests

in human exploration of the Moon; supporting and enabling a commercial space industry; sustaining activities in space science; and protecting and enhancing the contribution of space technology to economic and security infrastructure in the United States. Both countries' high level space program goals also include an emphasis on using space technology in support of climate change monitoring and response efforts.

SPACE INDUSTRY DEVELOPMENT

As part of these national space programs, commercial and industry space capabilities and assets are playing an increasingly significant role. Development and support of commercial space capability is a long-standing tenet of U.S. National Space Policy. In China, the space sector was only recently – as of 2014 – “opened” to private development and investment. An [analysis](#) of China’s commercial space sector published in September 2019 by the U.S. Institute for Defense Analyses (IDA) Science and Technology Policy Institute (STPI) identified 78 commercial space companies in China. China is the second-largest market for space-related investment activity, following only the United States. U.S.-based analytical firm BryceTech [reports](#) that in 2019, non-governmental investors made USD\$314.2 million in investments into Chinese space-related firms; by comparison firms based in the United States received a total of USD\$4.8 billion in investment.

However, China’s commercial space sector is generally poorly understood in the U.S. space business community. Our [research](#) indicates that unmatched perspectives and misperceptions play a powerful role in shaping the discourse around this relationship.

U.S. stakeholders view Chinese firms as inevitable future competitors, but have difficulty separating expectations of competition with Chinese industry from concerns about broader geopolitical competition with China as a state. Despite this, our research indicates that U.S. commercial space industry stakeholders largely welcome market competition with Chinese firms, but they look for it to be under fair and defined rules, and therefore many want to better understand how the Chinese commercial space sector operates. As an example, U.S. stakeholders are largely skeptical to how “commercial” China’s commercial space sector really is, believing that the Chinese government plays a dominant and active role in firms’ activities. The nature of internal competition within China’s space ecosystem is not widely recognized in the U.S space sector. For their part, Chinese private aerospace companies look to learn from U.S. companies’ technical and business experience, in an approach that might be described as second-mover advantage or copycat innovation. Chinese commercial space stakeholders also hope that U.S. progress will inspire and spur more substantial Chinese national policy.

As the space industry sectors advance in both countries, both are pursuing some similar capabilities. One such area is the development and launch of large constellations of satellites in low Earth orbit (LEO) (with planned sizes of thousands of satellites) with global coverage to provide broadband Internet services direct to end-users. In the United States, companies such as SpaceX and Amazon are fielding these systems with aims to serve consumer markets,

sometimes supported by U.S. government funds. In China, the government has established a new state-owned enterprise (SOE), China Satellite Network Group Co. Ltd, at the same administrative level as existing primary aerospace and telecommunications SOEs, to develop and operate the planned approximately 13,000 satellite GuoWang broadband constellation. Chinese private space companies, most notably Galaxy Space and CommSat, are developing initial test satellites which [might eventually compete](#) to be part of the supply chain for GuoWang. The activity of U.S. companies in this area remains more advanced than the nascent activity in China - with SpaceX already having launched more than 2,000 satellites in its Starlink constellation - however, it is clear that China has made development of satellite networks a key priority in its space and infrastructure planning.

The continued development of large constellations will increase the reliance on, and benefit of, space applications in each country. Yet, as each country pursues their own constellations, it is also likely to contribute to a competitive rivalry, in economic as well as strategic dimensions. As these satellite networks mature, a range of outcomes are possible in how their services interact with a potentially global user base. At one end, the user equipment for satellite networks operated by Chinese and American providers could be interoperable, allowing each country to operate their national constellation asset(s), while end-users have the ability to switch between service providers. This is much as the global navigation satellite service sector is evolving towards end user devices capable of interoperability on a common signal band between the American GPS system, the Chinese BeiDou system and Russian and European systems. At the other end of the spectrum, Chinese and American operators would build out proprietary user equipment and customers and users of the services would be aligned with existing diplomatic and economic initiatives of the two countries. Some [analysts](#) have described this scenario as an extension of the “splinter-net,” where one set of users is associated with a Chinese provided version of Internet-connectivity and another set of users is associated with an American or European provided version, similar to how terrestrial communications infrastructure has evolved in some regions of the world.

Given current geopolitical realities in the U.S.-China relationship, a scenario approaching the second extreme is more likely. It is unlikely, for instance, that U.S. regulators would give a Chinese satellite internet provider market access rights to serve the United States (or vice versa). Going forward it is likely that, if both countries (and their national operators) are successful in deploying global satellite broadband constellations, these networks would become another tool which both the United States and China would use in soft power diplomacy and in trade. Even as this occurs, there is need - and benefit - in finding ways to build engagement and interaction between U.S. and Chinese space industry stakeholders. As commercial space capabilities become increasingly integrated in economic strategy, engagement and interaction can help to build mutual understanding of perspectives and viewpoints, and reduce the potential for misunderstanding that increases tension. It can also help business actors build strategy in response to a better understanding of the informal rules that their competitor is operating under. More concretely, both countries have a vested self-interest in the operational

safety of the domain. The ability of these planned large constellations to operate - and provide the services and benefits that will be part of national strategy - is dependent on a stable space environment. Developing understanding of operating principles for space safety is potentially an area where mutually beneficial exchange can occur between American and Chinese space actors. Here, operator to operator dialogue and relationships can in particular act as a complement to State-level dialogues.

COUNTERSPACE COMPETITORS

The Space Age has always been steeped in geopolitical competition. The reasons why the two Cold War superpowers went to space were largely military in origin. The United States was the first country to hold an anti-satellite (ASAT) test in 1959, followed by the USSR in 1963; both have spent a significant amount of resources in the interim decades working on either counterspace programs or capabilities. So it is a bit of a mischaracterization to say that space was a sanctuary up until China's 2007 ASAT test, as some in U.S. national security circles argue.

This does not mean that each country's national security space activities do not have an effect on the other's, as both the United States and China warily watch what the other is doing and respond accordingly. While it is not accurate to term this relationship a space race - if it's a race, where to? For what end? - it is more appropriate to call it a competition amongst near-peer rivals. [Both countries have worked on and are continuing to develop counterspace capabilities.](#)

China has at least one, and possibly as many as three, programs underway to develop direct ascent anti-satellite (DA-ASAT) capabilities, either as dedicated counterspace systems or as midcourse missile defense systems that could provide counterspace capabilities. China has engaged in multiple, progressive tests of these capabilities since 2005, which shows a sustained organizational effort. China has conducted multiple tests of technologies for rendezvous and proximity operations (RPO) that could lead to a co-orbital ASAT capability. However, it would appear that they have not conducted an actual destructive co-orbital intercept of a target, and these technologies could be developed for non-offensive purposes.

In 2015, as part of a larger military re-organization, China placed its space and counterspace forces in a new major force structure that also is in charge of electronic warfare and cyber. However, it is uncertain whether the goal of developing these capabilities is to use them to deter future U.S. aggression or if they are meant to be used in a conflict. In any case, there is no public evidence of China actively using destructive counterspace capabilities in current military operations.

Meanwhile, even though the United States does not have an acknowledged DA-ASAT capability, it does have operational interceptors from its sea-based missile defense system that have been used in an ASAT role against a deorbiting U.S. satellite. The United States has in the past developed dedicated both conventional and nuclear DA-ASATs, and should it choose to do so,

most likely could do so again in the near future. The United States has conducted multiple tests of RPO technologies that could lead to a co-orbital ASAT capability (although they were conducted for non-offensive missions).

More recently, U.S. government and military officials have increasingly talked about space being a warfighting domain, while simultaneously reorganizing national security space and focusing on space systems’ resiliency. This led to the 2019 creation of the U.S. Space Force and the reestablishment of U.S. Space Command.

THE WOLF AMENDMENT: SENDING A SIGNAL

For more than a decade, U.S. law has significantly limited NASA’s ability to engage bilaterally with China. In April 2011, Congress passed legislation that would complicate efforts by the White House’s Office of Science and Technology Policy (OSTP) and NASA to engage in bilateral agreements and coordination with China. As stated in the Commerce, Justice, Science, and Related Agencies Appropriations Act, [Sec. 1340](#):

(a) None of the funds made available by this division may be used for the National Aeronautics and Space Administration or the Office of Science and Technology Policy to develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company unless such activities are specifically authorized by a law enacted after the date of enactment of this division.

This language is passed in an annual bill, which meant that subsequent appropriations bills carried largely the same language forward, with some expansion over the past decade. [Now](#), it is NASA, OSTP, and the National Space Council affected by the legislation; in addition to the language expressed above, the three entities must now consult with the FBI, certify that any proposed bilateral activities will not transfer sensitive technology or interact with human rights violators, and submit information about proposed bilateral activities to the House and Senate appropriations committees and the FBI 30 days prior to the action.

This legislation was led by US Rep. Frank Wolf (R-Virg.) and hence has been referred to as “the Wolf amendment.” While it has not banned US-China cooperation in space, as is often reported, it definitely made it more complicated.

There were several impetuses for the original legislation’s existence. Wolf was concerned about Chinese human rights violations and cyberattacks thought to come from China against U.S. government officials. Furthermore, he wanted to secure U.S. intellectual property/military technology. But the most dominant ones were keeping China out of the International Space Station (ISS) and to avoid helping China develop its own space capabilities.

A bilateral meeting between U.S. President Barack Obama and Chinese President Hu Jintao in November 2009 resulted in a [joint statement](#) that called for starting a dialogue on human spaceflight. Obama’s NASA Administrator Charles Bolden went to China in October 2010 and did not coordinate his messaging with Congress prior, leaving Wolf to believe that the Obama administration did not have a plan for its cooperation with China in space. Hence, the Wolf amendment.

In terms of consequences of the Wolf amendment, there is no evidence that it changed China’s behavior regarding its treatment of minorities (with the caveat that there is something to be said about taking a stand). On a broader level, withholding U.S. cooperation may have instead encouraged China to develop indigenous capabilities faster and given it more prestige than it would have had garnered from cooperating with the United States. China eventually developed parallel capabilities (including its own space station). These have allowed it to use space for soft power outreach, something NASA excelled in during the early parts of the space age. It also had consequences for the United States: not having direct engagement with China’s space programs has limited the United States’ ability to collect information to better understand China’s motivations and capabilities and created a knowledge gap.

There are a number of areas of cooperation that could be done in a manner that is transparent, reciprocal, and mutually beneficial. Human spaceflight probably is not one of them, however, due to trust concerns and human rights issues. It might be beneficial to start considering scientific data exchanges or sharing information about space situational awareness (SSA), and doing so in a manner where the sharing is equitable.

As both the United States and China expand their footprints in space, interaction and coordination can be beneficial to both and it will be important to have a process established to get to that point. For example, if both the United States and China are going to the South Pole of the Moon, there should be at least some methods of engagement to coordinate for safety reasons.

LOOKING AHEAD

It is increasingly appearing that the two geopolitical competitors will be taking their rivalry off-planet – to the Moon. While the United States holds the title of being the only country to have sent humans to the Moon, both the United States and China have active space science programs that have brought robotic vehicles onto the Moon for research purposes. The United States has been promoting its Artemis program as a way in which the first woman and a person of color will go back to the Moon (with the extremely ambitious deadline of 2025). Along those lines, the United States has been active in seeking signatories for its [Artemis Accords](#), which call for cooperative efforts in lunar and space exploration and pull out many of the principles already encapsulated in the 1967 Outer Space Treaty (a treaty that both the United States and China have signed). As of February 2022, there were 15 countries who had signed on to the

Artemis Accords; Russia and China were not amongst that group and have not indicated any interest in doing so.

At the same time, China and Russia have been paving the way for their lunar exploration and cooperative efforts. In March 2021, they signed a [memorandum of understanding](#) on a joint international lunar research station (ILRS) and that they have since encouraged other countries to become a part of as well. While there is no reason why the Artemis Accords and the ILRS cannot be complementary and there is no official restriction preventing other countries from participating in both, in all likelihood this has the strong possibility of creating parallel efforts on the Moon that will be competing for supporters.

In general, the United States needs to find a way to engage with China as a space power. This is important for commercial reasons, in that understanding Chinese space sectors can help the United States compete and develop more informed business strategy. This is important for national security reasons, in that an informed understanding about military space capabilities and plans of China is needed in order for the United States to have fully comprehensive policy responses. And it is important for spaceflight safety reasons, as the United States and China will need to work together on coordination issues (like space traffic management and sharing SSA data). Engaging is critical to enable sustainable space operations as U.S. and Chinese satellites co-exist on orbit. Given that these are two of the most primary actors in space, finding this balance is in the interests of all.

About the authors: Ian Christensen is Director of Private Sector Programs of the Secure World Foundation; Victoria Samson is the Washington Office Director of the Secure World Foundation.