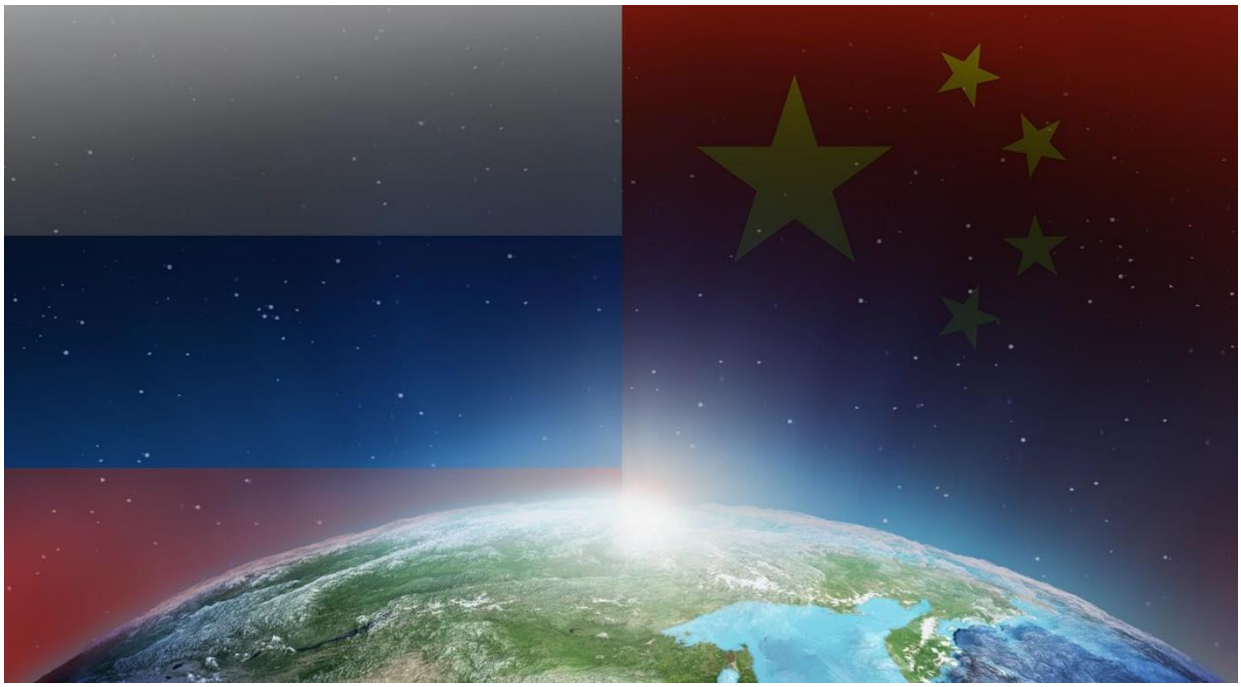
航 空 航 天

CHINA AEROSPACE STUDIES INSTITUTE



China-Russia Space Cooperation: The Strategic, Military, Diplomatic, and Economic Implications of a Growing Relationship

Kevin Pollpeter, Elizabeth Barrett,
Jeffrey Edmonds, Amanda Kerrigan,
and Andrew Taffer

CNA

Printed in the United States of America
by the China Aerospace Studies Institute

To request additional copies, please direct inquiries to:
Director, China Aerospace Studies Institute,
Air University, 55 Lemay Plaza, Montgomery, AL 36112

E-mail: Director@CASI-Research.ORG
Web: http://www.airuniversity.af.mil/CASI
https://twitter.com/CASI_Research @CASI_Research
https://www.facebook.com/CASI.Research.Org
https://www.linkedin.com/company/11049011

CASI would like to acknowledge the work and effort of Kevin Pollpeter, Elizabeth Barrett, Jeffrey Edmonds, Amanda Kerrigan, and Andrew Taffer, and the whole team at CNA for their continued excellent work.

China Aerospace Studies Institute

The mission of China Aerospace Studies Institute (CASI) is to advance the understanding of the strategy, doctrine, operating concepts, capabilities, personnel, training, and organization of China's aerospace forces and the civilian and commercial infrastructure that supports them.

CASI supports the Secretary, Chief of Staff of the Air Force, the Chief of Space Operations, and other senior Air and Space leaders. CASI provides expert research and analysis supporting decision and policy makers in the Department of Defense (DoD) and across the U.S. government. CASI can support the full range of units and organizations across the United States Air Force (USAF), U.S. Space Force (USSF), and the DoD. CASI accomplishes its mission through conducting the following activities:

- CASI primarily conducts open-source native-language research supporting its five main topic areas.
- CASI conducts conferences, workshops, roundtables, subject matter expert panels, and senior leader discussions to further its mission. CASI personnel attend such events, government, academic, and public, in support of its research and outreach efforts.
- CASI publishes research findings and papers, journal articles, monographs, and edited volumes for both public and government-only distribution as appropriate.
- CASI establishes and maintains institutional relationships with organizations and institutions in the PLA, the PRC writ large, and with partners and allies involved in the region.
- CASI maintains the ability to support senior leaders and policy decision makers across the full spectrum of topics and projects at all levels, related to Chinese aerospace.

CASI supports the U.S. Defense Department and the China research community writ-large by providing high quality, unclassified research on Chinese aerospace developments in the context of U.S. strategic imperatives in the Asia-Pacific region. Primarily focused on China's military air, space, and missile forces, CASI capitalizes on publicly available native language resources to gain insights as to how the Chinese speak to and among one another on these topics.

Executive Summary

Over the past two decades, the relationship between the People's Republic of China (PRC) and Russia has transitioned from what some described as a relationship of convenience to what both countries now call a "comprehensive strategic partnership." The growing strategic partnership between China and Russia is reflected in a burgeoning China-Russia space relationship. Once the dominant power in the space relationship, Russia now appears to be taking a secondary role. China's growing expertise in space, matched with the financial capabilities to sustain a large and growing space enterprise, signals not only China's rise as a major space power but also the geopolitical transition taking place between China, Russia, and the United States.

Key findings

China-Russia space relations are indicative of a broader effort to build mutual trust, further Chinese and Russian influence and counter Western political and economic pressure, facilitate multipolarization, and achieve common national security goals.

Any limitations of the China-Russia relationship do not appear to be significant enough to derail the broader relationship. Indeed, not only do Beijing and Moscow seem to have successfully compartmentalized such irritants, but bilateral cooperation in sensitive dual-use areas of scientific and technological research suggests that they may be gradually overcoming—or are working to overcome—their mutual mistrust.

In this context, China-Russia space cooperation is intended to enhance each country in several ways:

- *Strategically,* through joint efforts that balance against U.S. dominance
- *Militarily,* through combined military exercises, technology transfer, coordinated actions, and confidence-building measures
- *Diplomatically,* through proposed activities that demonstrate Chinese and Russian space leadership separate from U.S. cooperative space frameworks
- *Economically,* through technology transfer agreements and joint development efforts that reduce the technological and budgetary risk of space programs and promote space products and services
- *Technologically,* through agreements that provide alternatives to Western technologies

China-Russia space relations indicate deepening trust between the two countries.

While not an alliance, the burgeoning cooperation between Russia and China on issues of space and space-related technology has a breadth and depth that indicate a growing strategic partnership. The expanding and increasingly sensitive nature of China-Russia space cooperation may make it more difficult for the United States to influence the two countries' cooperative space activities.

- A 2019 agreement to transfer sensitive missile defense technology allows China access to technologies dominated by the United States and Russia.
- A 2017 agreement covering intellectual property rights (IPR) protection on the transfer of space technologies suggests that Russian concerns over Chinese technology theft, a hindrance to previous China-Russia technological cooperation, have been assuaged or at least suggests that Russia has come to accept technology theft as an inherent risk of doing business in China. It is unknown to what extent the funding shortfalls in Russia's space program provided China with leverage in these negotiations.
- Depending on the level of cooperation, a 2021 joint lunar exploration memorandum of understanding (MOU) could tie the two countries together in ways that make success contingent on both countries' participation.
- Although the improvement in China-Russia space relations is a sign of the increasing trust between the two countries, U.S. political and economic sanctions against both countries' space programs also likely play a role in bringing the two countries closer together.

China-Russia space relations indicate an effort to balance against U.S. dominance.

China-Russian space cooperation is driven by the same forces that drive the overall strategic relationship. While the two countries do not share completely overlapping security concerns, they do share a strong desire to counter U.S. leadership, including in outer space. They share concerns over interpretation of U.S. space initiatives and see U.S. space-based capabilities and dominance, especially anything related to missile defense, as threatening to their strategic nuclear arsenals.

China-Russia space relations indicate an effort to deter and counter the U.S. militarily.

China-Russia space cooperation involves activities related to national defense. These include cooperative activities on ballistic missile defense (BMD), space debris monitoring, and satellite navigation.

Ballistic missile defense

China possesses BMD systems that have capabilities similar to those of the U.S. Patriot and Theater High Altitude Area Defense (THAAD) systems. Unofficial Chinese sources have linked an interest in developing more advanced BMD capabilities to the withdrawal of the United States from the Intermediate Range Nuclear Forces agreement and the U.S. development of long-range missile capabilities. China has stated opposition to global missile defense systems, and it is unknown to what extent BMD cooperation is limited to tactical and regional capabilities.

- Russian assistance could aid China in developing ground- and space-based missile warning systems that would raise the effectiveness of China's existing missile defense systems and speed the development of new systems.
- Combined Chinese-Russian air and missile defense exercises indicate an effort to improve defenses against ballistic and cruise missile attack and demonstrate the growing closeness of the relationship. It is unknown to what extent the combined exercises reflect an intent to develop an actual combined air and missile defense capability.
- We found no evidence to support the speculation of media and subject matter experts concerning the development of a joint missile early warning system. Such an agreement would be a significant step forward in the two countries' relationship, making it similar to an alliance. Cooperation in this area could create mutually supportive relationships that not only would provide each country with enhanced capabilities but would also impose shared responsibilities that could increase the risk of escalation by drawing both countries into conflict with the United States.

  A hypothetical joint missile early warning system would complicate U.S. efforts to deny, degrade, or destroy Chinese or Russian BMD systems. Depending on the extent to which the Chinese and Russian systems were mutually supportive, attacks intended to suppress either the Chinese or Russian BMD system individually would risk escalating the conflict by involving both countries.

Space debris monitoring

China and Russia signed an agreement on space debris monitoring and data exchange in November 2018. Little is known about this cooperation, but it could involve two activities:

- Technical cooperation to develop space debris monitoring capabilities
- Mechanisms to allow for notification of conjunction events between spacecraft and debris

Due to the dual-use nature of space debris monitoring, China-Russia cooperation could have potential military applications. The similarity of space debris monitoring capabilities to military space surveillance capabilities could enhance the ability of both countries to collect intelligence on adversary space systems and aid in the tracking and targeting of U.S. satellites. The development of space surveillance capabilities could potentially leverage cooperation on missile early warning systems.

Satellite navigation

China-Russia cooperation in satellite navigation appears to be one of the most robust space-related activities between the two countries. In 2014, the two countries signed an MOU on satellite navigation cooperation concerning compatibility and interoperability, and the establishment of ground stations in each other's countries, among other issues. China-Russia cooperation on satellite navigation could provide an alternative signal in the event that either country's national satellite navigation system was denied or degraded. U.S. actions to deny either China or Russia satellite

navigation would have to take into account each country's access to both Beidou and GLONASS as well as the escalatory implications of denying both systems. Promoting interoperability between the civil signals of satellite navigation systems is common practice, however. The United States and China signed a joint statement on civil signal compatibility and interoperability in 2017, and the European Galileo system and Beidou are interoperable.

China-Russia space cooperation effort is likely intended to increase Chinese and Russian influence in international space diplomacy.

In March 2021, China and Russia signed an MOU on joint lunar exploration, covering the establishment of a lunar research base in lunar orbit and/or on the surface of the Moon. Although not acknowledged by either China or Russia, cooperation on lunar exploration and their openness to additional participants appears to be a response to the U.S.-led Artemis Accords that established a set of principles for the exploration and commercial use of space. Neither China nor Russia has introduced a similar set of principles individually or jointly, though.

China-Russia cooperation does not appear to significantly advance commercial competitiveness.

China-Russia economic space cooperation appears to be most pronounced in satellite navigation. Agreements to increase interoperability and compatibility will likely facilitate the use of the Beidou and GLONASS satellite navigation systems in both countries.

China-Russia space cooperation indicates a desire to reduce technological and budgetary risk.

For China, this means acquiring technology from Russia, especially rocket engine technology that would be too complicated or too costly to develop alone. Technology transfer flows both ways, however. Russia's interest in Chinese aerospace electronic components suggests the intent to create an alternative supply chain for its space industry, necessary because the European Union imposed sanctions on dual-use components to Russia after the 2014 Russian invasion of Ukraine.

China-Russia technological cooperation also reflects the Russian aerospace industry's need for funding. Chinese purchases of Russian technology likely provide a much-needed infusion of cash to Russian aerospace companies. China may also look to the partnership as a way to reduce the budgetary demands of space exploration, given the cost and few tangible benefits associated with lunar exploration.

China-Russia space relations indicate a shifting power dynamic between the two countries.

For much of the history of China-Russia space relations, Russia has been the leading space power in the relationship, providing much-needed technology and know-how to a small and inexperienced Chinese space program. This relationship dynamic appears to be undergoing a fundamental shift because of China's improving technological capabilities and sustained funding. China now appears to be positioning itself to be the leading space power in the relationship in which Russia plays an important, but nonetheless secondary, role as a provider of capabilities to

Chinese-led space endeavors.

A lack of transparency to outside observers adds uncertainty to determining the true nature of China-Russia space relations.

China-Russia space cooperation lacks transparency. As their cooperation in defense-related fields has deepened, it has also become more secretive. Much of the media reporting only mentions signed agreements and provides little specific information. Although the number and types of cooperation agreements indicate a growing strategic partnership, it is possible that some or many of the agreements examined here lack substance, were not fully carried out, or were cancelled. Alternatively, the lack of transparency could also hide a more substantive relationship than the one presented here. Either finding would necessarily call for a reevaluation of the China-Russia space relationship.

Contents

Chapter 1: Introduction

Over the past two decades, the relationship between the People's Republic of China (PRC) and Russia has made important progress. In 2019, China and Russia characterized the relationship as a "comprehensive strategic partnership."[1] The growth in the relationship is occurring at the same time that both countries' relations with the United States are deteriorating. China and Russia are now engaged in a growing number of activities that draw them closer together economically, diplomatically, and militarily. China is using its relationship with Russia to modernize its military capabilities and advance technological innovation, while Russia uses its relationship with China for economic gain. Both countries use the relationship to counter U.S. power and influence globally.

The China-Russia space relationship is also deepening and expanding. Cooperative agreements signed between the two countries cover a broad range of space endeavors such as lunar and Mars exploration, technology transfer of rocket engine technologies, cooperative activities in the strategically important areas of ballistic missile defense (BMD) and satellite navigation, and diplomatic efforts in space arms control. (See the appendix for a list of China-Russia space cooperation agreements.)

Space activities, however, cannot be divorced from earthly endeavors. The improvement in China-Russia space relations not only mirrors the broader relationship but also serves as an indicator of its nature. Although China-Russia space cooperation does not indicate the formation of an alliance, closer space cooperation between the two countries does signal a meaningful strategic partnership intended to advance each country's national interests.

Within this context, China-Russia space relations are indicative of a broader effort to further Chinese and Russian influence and to deter the U.S. militarily. China-Russia space cooperation is intended to enable the countries to counter Western political and economic pressure, facilitate multipolarization, and achieve common national security goals. As a result, China-Russia space cooperation is intended to enhance each country in several ways:

- *Strategically,* through joint efforts that balance against U.S. dominance
- *Militarily,* through combined military exercises, technology transfer, coordinated actions, and confidence-building measures
- *Diplomatically, through* proposed activities intended to demonstrate Chinese and Russian space leadership separate from U.S. cooperative space frameworks

- *Economically,* through technology transfer agreements that reduce technological and budgetary risk of space programs and promote space products and services
- *Technologically,* through agreements that provide alternatives to Western technologies

The improvement in China-Russia space relations also reflects the changing power dynamic between China and Russia. For much of the history of China-Russia space relations, Russia has been the leading space power in the relationship, providing much-needed technology and know-how to a small and inexperienced Chinese space program. This relationship dynamic appears to be undergoing a fundamental shift because of China's improving technological capabilities and sustained funding. China now appears to be positioning itself to be the leading space power in the relationship in which Russia plays an important, but nonetheless secondary, role as a provider of capabilities to Chinese-led space endeavors. As a result, the China-Russia space relationship reflects the overall rise of China as a great power and the diminishing capabilities of Russia.

Chapter 2: The China-Russia Relationship

China-Russia ties have grown increasingly close in recent years, and the improvement in diplomatic and strategic relations between the two countries is a trend that has been observable for decades. Indeed, according to Chinese and Russian leaders, the relationship is currently at a historically high level.[2] The relationship has consolidated in the context of both states' deteriorating ties with the U.S. and their shared and growing perception that the U.S. and its allies pose a threat to their national security. Over the last decade, China-Russia bilateral cooperation has significantly expanded across the diplomatic, military, economic, and information domains. Nevertheless, the relationship is limited by mutual mistrust and the reluctance to incur costs on the other's behalf that has led to a debate about the extent to which the two countries are truly close.

This chapter explores the bilateral relationship over time. It argues that whatever limitations the relationship has, they do not appear to be significant enough to derail the broader relationship. Indeed, not only do Beijing and Moscow seem to have successfully compartmentalized such irritants, but bilateral cooperation in sensitive dual-use areas of scientific and technological research suggests that they may be gradually overcoming—or are working to overcome—their mutual mistrust.

Post-Soviet Union China-Russia relations

Although relations between China and Russia have become significantly closer over the last several years, bilateral ties have been improving for decades and predate the collapse of the Soviet Union.[3] In the 1990s, Beijing and Moscow began the process of resolving their border disputes, and Russia resumed supplying China with weapons; by the middle of the decade, the two states had established a "strategic partnership of cooperation."[4] Also beginning in the 1990s, China and Russia issued numerous joint declarations addressing some of the most fundamental and strategically salient issues in international affairs.[5] In 1997, for example, they issued a joint declaration at the UN, calling for "a multipolar world" and a "new international order," and in the years since, Beijing and Moscow have routinely reiterated such calls.[6]

In 2001, the two states served as founding members of the Shanghai Cooperation Organization (SCO), a multilateral institution intended in part "to maintain and ensure peace, security, and stability in the [Central Asian] region."[7] In 2003, China and Russia began holding combined military exercises, both bilaterally and multilaterally under the auspices of the SCO.[8] A number

of analysts have noted that the 2008-2009 global financial crisis served to further deepen political and economic cooperation: both Beijing and Moscow viewed the global financial system, designed and led by the U.S. and the West, as unstable and potentially threatening.[9] In a May 2008 joint statement on "major international issues," China and Russia declared that they shared "the same or similar views and stances on the root causes of the crisis and the reform of the global financial system and the international financial institutions."[10]

Deteriorating ties with the United States

The increasing closeness of the China-Russia relationship has corresponded with a deterioration in both states' relationships with the United States. Beginning in the late 2000s, Chinese officials bristled as the United States increasingly expressed concerns with China's conduct in the South China Sea,[11] and the Obama administration's rebalance to the Pacific was widely portrayed by government- and party-affiliated analysts, as well as official state media, as a hostile initiative intended to contain China.[12] Following Russia's 2014 invasion and annexation of Crimea, Moscow's relationship with the United States and the West entered its worst crisis of the post-Cold War era.[13] Confronted with diplomatic isolation and economic sanctions, Moscow turned increasingly to Beijing for support.[14]

Indeed, authoritative Chinese and Russian documents released over the last decade illustrate a shared view of the United States as a national security threat.[15] China's 2019 defense white paper highlighted several U.S. security initiatives as undermining China's national security and global strategic stability.[16] Similarly, Russia's 2015 National Security Strategy states that the United States and its allies are implementing a "policy of containing Russia."[17] Chinese and Russian leaders have traditionally been careful to disavow any suggestion that their relationship is driven by, or aimed at, a third party. However, when PRC defense minister Wei Fenghe visited Moscow in 2018, he declared, "The Chinese side has come to show Americans the close ties between the armed forces of China and Russia ... we've come to support [Russia]."[18]

Deepening convergence

It has been in this context that the China-Russian relationship has burgeoned. In 2014, Russian president Vladimir V. Putin said of China, "We are natural partners and natural allies," and in 2019 Chinese leader Xi Jinping characterized Putin as "my best friend and colleague."[19] In 2019, the two countries announced their intention to form a "comprehensive strategic partnership of coordination for a new era," and in the same year, Xi and Putin issued a joint statement in which the bilateral relationship was described as reaching "the highest level in history."[20] In 2020, a PRC Foreign Ministry spokesmen stated that "there is no limit to the traditional China-

Russia friendship and no restricted areas for expanding our cooperation."[21] This characterization appears broadly consistent with the U.S. intelligence community's assessment: in 2019, Dan Coates, the director of national intelligence, stated, "China and Russia are more aligned than at any point since the mid-1950s" when the two states were formal allies.[22]

Security cooperation

Over the last decade, combined military exercises between the two countries have become more frequent and have expanded geographically. The 2001 China-Russia Friendship Treaty, which serves as the political foundation of their relationship, does not contain a mutual defense clause. However, Beijing and Moscow have established a number of military and security coordination mechanisms that one could argue are ostensibly similar to the kind that undergird a formal allied relationship.[23] In 2017, China and Russia signed a roadmap governing military cooperation from 2017 to 2020 that was described by the PRC Ministry of National Defense (MND) as "the embodiment" of the "high-level of strategic mutual trust and strategic collaboration" between the two countries and "conducive to meeting new threats and challenges."[24] With the exception of the Arctic, the Chinese and Russian militaries have now operated and exercised around the Eurasian landmass, making the current defense relationship transregional.[25] The two militaries have also exercised on land, at sea, and in the air.[26]

Economic ties

The China-Russia economic and trade relationship has similarly expanded. In 2018, bilateral trade surpassed the $100 billion mark for the first time and did so again in 2019 and 2020.[27] Chinese firms have made large investments in Russian energy projects in the Far North, and since 2014 Russia's ambivalence about facilitating a larger Chinese presence in the Arctic appears to have declined.[28] In 2014, China and Russia concluded a landmark natural gas agreement, and in 2019 the Power of Siberia gas pipeline that supplies natural gas to China was opened.[29] Also in 2019, the first road bridge connecting the two states was completed; the first rail link between the two is expected to open in 2022.[30]

Media

Chinese and Russian media companies have also begun to cooperate with each other to produce narratives that are consistent and are favorable to each other and the bilateral relationship. In June 2019, for example, the China Media Group and *Rossiyskaya Gazeta* formed a "commentary workroom" in Moscow to generate "articles related to major issues and events concerning the China-Russia relationship."[31] The two countries have also held an annual Media

Forum, which government officials have used to "tell each other's stories well."[32] According to an official with China's Central Cyberspace Affairs Commission, China and Russia should work together to "establish a healthy international public opinion environment" and to "jointly fight against attacks and provocations from Western countries."[33]

Science and technology cooperation

In recent years, China and Russia have also deepened cooperation in a number of science and technology fields. In addition to partnerships covering the basic sciences, bilateral cooperation now spans the following fields: biotechnology, neuroscience, nanotechnology, big data, robotics, artificial intelligence, telecommunications, alternative energy, and optics.[34]

The 2019 joint statement on developing a "Comprehensive Partnership of Strategic Coordination for a New Era" repeatedly underscores that technological cooperation constitutes an important vector in the China-Russia relationship and that the two countries intend to "expand the depth and breadth of scientific and technological innovation cooperation."[35] In 2016, China's vice minister of science and technology and his Russian counterpart agreed to establish a China-Russia Innovation Dialogue, organize a bilateral forum on innovation, and strengthen China-Russia science and technology parks.[36] Officially sanctioned bilateral technology and innovation exchanges have since convened regularly.[37] In 2016 and 2017, Chinese and Russian entities established two new bilateral innovation parks: one research center focusing on medical robotics, and one start-up incubator.[38] In 2019, organizations under the Chinese Academy of Sciences and the Russian Academy of Sciences established the China-Russia Research Center for Atmospheric Optics in China's Anhui Province.[39]

In August 2020, Beijing and Moscow declared "the China-Russia Year of Scientific and Technological Innovation."[40] The governments reportedly scheduled over 1,000 activities to be conducted over the course of the year.[41] In a congratulatory letter sent to President Putin to mark the beginning of the year, Xi Jinping stated that bilateral technology cooperation is intended to position China and Russia "to make greater contributions to the reform of the global governance system."[42]

Response to U.S. sanctions

A number of Western and Chinese analysts have suggested that increased China-Russia cooperation in the science and technology domain is, in part, a product of recent U.S. efforts to bar Chinese and Russian firms from accessing American technology and markets.[43] The Chinese telecommunications firm Huawei is a case in point. As the Trump administration moved to restrict its ability to do business with U.S. suppliers, Huawei accelerated its efforts to expand into the Russian market and to partner with Russian IT companies and research institutions.[44] In 2019, for example, the firm announced that it would more than double the

number of research and development centers in the country and that it would invest $7.8 billion in training Russian IT specialists over a five-year period.[45] In the same year, Huawei signed an agreement with a Russian telecommunications firm to build a test 5G network in Moscow and concluded a cooperative agreement with Russia's government-backed Center for Artificial Intelligence Research.[46]

Limitations

Despite the progress in the China-Russia relationship, it still has limitations. For one thing, it has become increasingly asymmetrical in economic terms, as the Chinese economy has experienced consistent high growth and the Russian economy has struggled.[47] Russia's 2014 invasion of Crimea exacerbated this dynamic by increasing Russia's economic and financial dependence on China in the face of Western sanctions.[48] At least some Russian elites appear to bristle at this dynamic.[49] Moreover, analysts note that while Beijing has used its position to acquire Russian natural resources on favorable terms, PRC investment in the Russian economy has been lacking.[50] According to the International Monetary Fund, between 2009 and 2019 China was never among Russia's top 10 sources of direct investment, and in only one year (2014) was it in the top 15.[51]

Furthermore, although senior Chinese and Russian officials routinely affirm that their relationship is characterized by great trust, subject matter experts from both countries note that mutual mistrust continues to present problems.[52] In their most sensitive political and military challenges, China and Russia have offered each other only limited support. For example, in their respective territorial disputes Beijing and Moscow maintain what Zhao Huasheng, a leading observer of Sino-Russian relations at Fudan University, has termed "friendly neutrality."[53] Their position of neutrality in such sensitive disputes suggests that both parties are eager to avoid incurring costs on the other's behalf. The following examples are illustrative:

- **Georgia:** Beijing neither supported Moscow's 2008 military campaign in Georgia nor followed Moscow in recognizing South Ossetia and Abkhazia as independent states.[54]
- **Crimea:** In 2014, Beijing, rather than vetoing, abstained from voting on a UN Security Council resolution urging the international community not to recognize Crimea's post-invasion referendum on seceding from Ukraine and joining Russia.[55]
- **South and East China Seas:** While Moscow has provided Beijing with a degree of diplomatic and symbolic support, Russia does not officially endorse China's controversial territorial and maritime claims.

Chapter 3: Brief Overview of the China-Russia Space Relationship

China-Russia space cooperation began robustly in the 1950s. The Soviet Union transferred R-1, R-2, and R-11F ballistic missiles to China and sent Soviet engineers to assist the Chinese in developing strategic weapons technology.[56] In 1960, however, the Soviet Union ceased these activities when its relations with China ruptured over differences in ideology, Soviet concerns over what was considered Chinese adventurism in regard to Taiwan, and Chinese concerns over perceived Soviet intentions to subordinate China to Soviet influence in Asia.[57]

Sino-Soviet split and PRC "self-reliance"

From the 1960s to 1991, cooperation between China and the Soviet Union was either nonexistent or conducted at very low levels. During this time, Chinese space research and development has been described as entering a period of "self-reliance." Despite the near-complete cutoff of foreign technology, China was able to make progress in ballistic missiles, space launch vehicles, and satellites. In 1960, China launched the first Dongfeng ("East Wind") series of ballistic missiles. In 1970, it launched the first Long March series of space launch vehicles as well as its first satellite, the Dongfanghong-1 ("East is Red") satellite.[58] Over the next two decades, China expanded both the types and numbers of its ballistic missile inventory, space launch vehicles, and satellites, although in terms of both numbers and technical sophistication it lagged well behind the Soviet Union and the United States.

Post-Cold War and human spaceflight

Relations between the two countries thawed toward the end of the Cold War. In 1992, China's decision to conduct human spaceflight opened up new opportunities for space cooperation between China and (now) Russia. Russia's extensive experience in human spaceflight was instrumental in the success of the Chinese human spaceflight program.[59] Russia transferred several technologies to China, including a docking apparatus, but what appears to have been more important was the technical know-how provided by Russian engineers. Beginning in 1991, China had begun inviting Russian engineers to discuss the technical aspects of their human spaceflight program in order to provide a venue for Chinese engineers to learn human spaceflight research and development (R&D) and to address challenges that they faced in their projects. In 1994, Moscow and Beijing signed the "Intergovernmental Agreement on the

Cooperation on the Study and Use of Outer Space for Peaceful Purposes."[60] This agreement resulted in 93 contracts, including the sale of Russian Soyuz spacecraft designs, spacesuits, and a training package for two Chinese astronaut candidates at the Cosmonaut Training Center.[61]

China-Russia space subcommittee

In 1997, China and Russia signed an agreement to establish regular meetings between the countries' premiers. This agreement also established a space subcommittee to promote cooperation between the two countries in space. The subcommittee held its first meeting in May 2000 in Beijing and appears to have continued meeting on an annual basis, overseeing two-year agreements.[62] Unfortunately, little information is available on the cooperative activities covered in these agreements. According to one Russian source, these meetings resulted in few tangible results.[63] However, speaking in 2016, China National Space Administration (CNSA) deputy director Wu Yanhua stated that since 2001, China and Russia had cooperated on more than 100 projects.[64]

2013-2017 China-Russia Space Cooperation Agreement

Beginning in 2013, China-Russia space cooperation began to be governed under five-year agreements. The "2013-2017 China-Russia Space Cooperation Agreement" was described as "expanding and deepening" cooperation in launch vehicle technologies and rocket engines, deep space exploration, human spaceflight, Earth observation, satellite navigation, space-related electronic parts and components, and other areas.[65] According to Wu Yanhua, the agreement also included the new area of space science.[66]

Both Russian and Chinese sources state that China-Russia space cooperation began to take on renewed vitality after the 2014 Russian invasion of Ukraine resulted in the United States, the European Union (EU), and other countries imposing diplomatic and economic sanctions against Russia that resulted in a ban on exports of space-related electronic components to Russia.[67] As one Russian media source stated when commenting on improved relations with China:

> In fact, the logic of this decision is simple: if there are a huge number of opponents, in the absence of like-minded people you need to be friends with someone. Moreover, in the conditions of economic downturn, when the financing of the industry is constantly subjected to sequester, it is almost impossible to implement ambitious projects (such as lunar or Martian missions) alone.[68]

Potentially signifying the importance now given to space cooperation, the two countries signed an intellectual property rights (IPR) agreement for space technologies in the summer of 2016, which appears to have been ratified in 2017.[69] An IPR agreement was reportedly the main condition under which Russia would begin substantive cooperation and reflected its long-standing concern over Chinese technology theft.[70] The agreement appears to have been especially important in advancing negotiations on the Russian transfer of rocket engine technology.[71]

CNSA and Roscosmos 2018-2022 Space Cooperation Outline

The second five-year agreement on space cooperation, the "China National Space Administration (CNSA) and Roscosmos 2018-2022 Space Cooperation Outline" is described as a significant step forward for China-Russia space cooperation. It governs space activities between the two countries in the area of launch vehicles and rocket engines, space planes, lunar and deep space exploration, Earth remote sensing, space electronics, space debris, satellite navigation, and satellite communications.[72]

According to PRC media, the agreement signaled that Russia and China had entered "an important stage of strategic cooperation."[73] According to Yin Liming, president of the Chinese space industry's China Great Wall Industry Corporation, the agreement demonstrates that "China and Russia have great opportunities for deeper cooperation."[74] According to one article, "Even though this is not the first agreement between China and Russia in the area of space cooperation, it is the most important" and "will allow both sides to achieve higher goals."[75]

Chapter 4: Lunar Exploration

On March 9, 2021, China and Russia signed the "Memorandum of Understanding between the Government of the People's Republic of China and the Government of the Russian Federation Regarding Cooperation for the Construction of the International Lunar Research Station."[76] The MOU covers joint lunar exploration missions centering on the construction of an International Lunar Research Station (ILRS) that will involve a "cis-lunar transportation facility" that will orbit around the Moon to facilitate travel between Earth and the Moon and between the facility and the lunar surface. In addition, a "long-term support facility" will be located on the lunar surface.[77] The research program focuses on the lunar South Pole, an area identified as most likely to sustain a human presence on the Moon due to the presence of water ice. According to the two countries, the ILRS will be open to international participation.[78] The MOU follows the October signing of the U.S.-led Artemis Accords, an agreement between the United States and 10 other countries governing lunar and space exploration and commercial activities.

China's missions to the Moon

China's lunar exploration program was approved on January 23, 2004. China to date has launched five lunar exploration missions under its Chang'e program and has three more missions planned. China has used a three-stage process for these missions, encompassing two missions that orbited the Moon (Chang'e-1 and -2), two missions that landed on the Moon (Chang'e-3 and -4), and one mission that landed on the Moon and returned to Earth (Chang'e-5).[79] Details of each mission are as follows:

- *Chang'e-1.* The Chang'e-1 mission was launched in 2007 and mapped the lunar surface using a 3D imager, analyzed the lunar soil, measured its depth, and explored the environment between Earth and the Moon. After completing its mission, the spacecraft was crashed into the lunar surface so that scientists could analyze the composition of the lunar dust kicked up by the impact.[80]
- *Chang'e-2.* Chang'e-2 was launched in 2010. The spacecraft, similar to the Chang'e-1, also mapped the lunar surface. After completing its lunar exploration mission, the spacecraft traveled to the Earth-Sun L2 Lagrange Point, where spacecraft can maintain their orbit with minimal adjustments. China is only the third country to visit this point. While stationed at the L2 point, China tested deep space communications and tracking capabilities. In April 2012, the spacecraft conducted a flyby of the asteroid 4179 Toutatis.[81]

- *Chang'e-3.* Chang'e-3 was launched in 2013. The mission conducted a soft lunar landing and deployed the Yutu rover to further explore the lunar surface.[82]
- *Chang'e-4.* Chang'e-4 landed on the far side of the Moon and deployed the Yutu-2 rover. Prior to the Chang'e-4 mission, the PRC launched the Queqiao data relay satellite to facilitate communication between the Chang'e-4 lander and the Yutu-2 rover. Queqiao was stationed at the Earth-Moon L2 Lagrange Point, the first spacecraft to be placed in that orbit. [83]
- *Chang'e-5.* The Chang'e-5 mission collected and returned to Earth samples of the lunar soil.[84]

China's next series of lunar missions, starting in 2024, is described as another three-stage process of "surveying, constructing, and exploiting."[85] Chang'e missions 6 through 8 will focus on the first step, surveying.

- *Chang'e-6.* Chang'e-6 will extract soil samples from the lunar South Pole and is scheduled to be launched around 2024.[86] While the final payloads have yet to be announced, one possible candidate is a joint Chinese-Russian mission to detect water on the lunar surface.[87]
- *Chang'e-7.* The Chang'e-7 mission will involve multiple craft to explore the Moon's South Pole: a lunar orbiter, a lander, a rover, a flying probe, and a communications relay satellite. It is set to launch in 2024.[88]
- *Chang'e-8.* The Chang'e-8 mission "will test key technologies to lay the groundwork for the construction of a scientific research base on the Moon."[89] It is scheduled to be launched around 2025.[90] According to Hu Hao, chief designer for the lunar exploration program's third stage, "a prototype scientific research station" is scheduled to be built on the Moon by 2030.[91]

Russia's missions to the Moon

Russia (then the Soviet Union) has not conducted a lunar exploration mission since 1976 when the Luna-24 mission landed and brought back lunar rock samples.[92] Russia has now reinvigorated its lunar exploration program with five scheduled missions:

- *Luna-25.* Luna-25 is set to launch in 2022 and will land at the Moon's South Pole. Its mission is to study the composition of the lunar regolith and the plasma and dust components of the lunar exosphere.[93]
- *Luna-26.* Luna-26 will launch in the 2023-2024 timeframe and will orbit the Moon to facilitate communications between future landers and Earth.[94] While in orbit, it will also create a 3D map of the lunar surface.[95]

- *Luna-27.* Luna-27 is scheduled for launch in the 2024-2025 timeframe and will land at the Moon's South Pole to search for water ice.[96]
- *Luna-28.* Luna-28 is scheduled for launch in 2026-2027 and will retrieve lunar soil samples.
- *Luna-29.* Luna-29 is scheduled to be launched at an unknown date. The mission will involve a rover to research the lunar surface.[97]

China-Russia cooperation on lunar exploration

As stated earlier, China and Russia signed the Memorandum of Understanding on the ILRS in March 2021.[98] A statement issued by CNSA describes the station's purpose as "a comprehensive scientific experiment base with the capability of long-term autonomous operation." According to CNSA, the ILRS "will carry out multi-disciplinary and multi-objective scientific research activities such as the lunar exploration and utilization, lunar-based observation, basic scientific experiment, and technical verification."[99]

PRC articles refer to the ILRS as involving "extensive consultation, joint contribution, and shared benefits" between China and Russia.[100] *China Daily* stated that the station will "serve as a platform to boost scientific exchanges and foster peaceful exploration and development of outer space."[101] Roscosmos director Dmitry Rogozin also emphasized the peaceful intent of the ILRS: "The idea is not about confrontation but is about cooperation in lunar exploration."[102] The cooperation also has practical benefit. According to Rogozin, "In deep space, considering that the distance to the Moon is farther than to the International Space Station, mutual support is extremely important. We never know what can happen, and how would we help our astronauts and recover lost equipment."[103]

A document released by CNSA and Roscosmos in June 2021 describes an extensive program of collaboration between the two countries that will establish a space station in lunar orbit to facilitate travel between Earth and the Moon and between the space station and the lunar surface and a lunar base on the surface of the Moon. The program will culminate in joint human exploration of the Moon. The program will be divided into four phases, supported by launches from both China and Russia.[104] These are described below.

2021-2025

China and Russia will explore the lunar surface with the coordination of Chang'e missions 6 and 7 and Luna missions 25, 26, and 27, described above. This phase will also involve the design of the ILRS and selection of ILRS site(s).

2026-2030

China and Russia will conduct Chang'e mission 8 and Luna mission 28, described above. The joint document also states that this phase will begin joint operations between China and Russia that involve "technology verification for the command center for the ILRS" and "massive cargo delivery and secure, high-precision soft landing."

2031-2035

China and Russia will jointly conduct ILRS missions 1-5 that will establish the in-orbit and lunar surface facilities for the ILRS. These include power generation, communications, and transportation facilities as well as the verification of in-situ facilities for the utilization of Moon resources. The objective is to support lunar research and technology development as well as to support human exploration of the Moon.

- *ILRS-1.* This mission will establish the command center and basic power generation and communication facilities.
- *ILRS-2*. This mission will establish lunar research and exploration facilities to study lunar physics, geography, and lava tubes, and to collect lunar samples.
- *ILRS-3.* This mission will establish in-situ resource utilization for lunar resources.
- *ILRS-4.* This mission will verify technologies for biomedical experiments and lunar sample return.
- *ILRS-5.* This mission will establish lunar astronomical and Earth observation capabilities.

2036

This phase will begin full operation of the ILRS.

Additional partners

The ILRS is also open to additional international cooperation.[105] A day before the 2021 China Space Day event, during a subcommittee meeting of the UN Committee on the Peaceful Uses of Outer Space, China and Russia reiterated the ILRS's openness to other countries.[106] CNSA's and Roscosmos' joint statement emphasized that countries could contribute as they are able and could join at "any aspect of the mission at every stage" such as "planning, design, research, development, implementation, and operations."[107] CNSA's deputy head, Wu Yanhua, stated that the ILRS is "another major contribution that China and Russia shall make to the promotion of long-term and sustainable development of UN outer space activities."[108]

PRC and Russian reaction to the Artemis Program and Artemis Accords

The China-Russia lunar exploration MOU may be a response to the U.S.-led Artemis Program to return humans to the Moon and the October 2020 signing of the Artemis Accords, but could also be a natural outcome of decades of space cooperation.[109] The Artemis Accords are a U.S.-led effort involving 10 other countries to "establish a common vision via a practical set of principles, guidelines, and best practices to enhance the governance of the civil exploration and use of outer space with the intention of advancing the Artemis Program."[110] The Accords are intended to cover activities that may take place on the Moon, Mars, comets, and asteroids, including their surfaces and subsurfaces, as well as in orbit of the Moon or Mars, in the Lagrange Points for the Earth-Moon system, and in transit between these celestial bodies and locations.[111]

Although both countries have stated that they are open to cooperation with other countries, they appear to be unwilling to sign the Accords.[112] Russia, for example, has not explicitly ruled out signing the Accords, but Dmitry Rogozin, director general of Roscosmos, has stated that the Accords are "in its current form…too U.S.-centric" and has likened the Artemis program to NATO.[113] Nikolai Sevastyanov, CEO of the Energia Rocket and Space Corporation, has also appeared to not completely rule out participation in the Artemis Program, stating that his company can provide a crewed spacecraft and a super-heavy-lift rocket for any lunar exploration program.[114]

Although China also has not explicitly ruled out participation in the Artemis Accords, its Foreign Ministry has stated that China supports discussions of space resource development that are consistent with the 1967 Outer Space Treaty and conducted within the United Nations.[115] Others have expressed skepticism or outright concern over the Accords. An *Observer* article states that the Accords' provision for a "safety zone" is controversial and may violate the 1967 Outer Space Treaty.[116]

Dr. Wang Guoyu, deputy director of the CNSA Space Law Center and legal counselor in space law at the CNSA Lunar Exploration and Space Project Center, writing in a personal capacity, has stated that the Accords are intended "to create a favorable international environment for space resources exploitation and utilization led by the United States"; that they would likely exacerbate competition between the United States and China; and that they "may become another platform to isolate China in space, and make Sino-U.S. space relations even worse."[117] According to the semi-official *Global Times*, "Chinese space analysts believe that the development fits a larger trend of both Russia and China encountering a range of difficulties in working with the U.S. for different reasons, and becoming increasingly worried over how the U.S. is pushing its space agenda…aggressively and with an obsolete cold war mentality."[118]

However, even if China and/or Russia were willing to join the Artemis Accords, it does not appear that the United States has invited either country. Moreover, it is uncertain whether the legal restrictions governing NASA's activities with China prohibit it from participating in the Accords.

Academic cooperation on space exploration

China and Russia are also involved in academic cooperation on lunar resource exploration. According to Professor Vladimir Khmelyov of Altai State Technical University, China and Russia will jointly conduct research on an ultrasonic drilling project. The Russian Fundamental Research Fund and the China National Natural Science Fund will fund the project to explore lunar water ice. Russian media outlet TASS reported that this project will look at the far side of the Moon for drilling sites. An unidentified Harbin-based university will support the project from the Chinese side. An unidentified Chinese scientist remarked that finding locations where water is present on the Moon would help identify potential locations for the lunar research station.[119]

Chapter 5: Human Spaceflight and Deep Space Exploration

China and Russia cooperate across several areas in human spaceflight and deep space exploration. This includes potential Russian participation in a PRC space station, PRC support for the Spektr-M satellite, and joint research into deep space exploration. These activities are examined in more detail below.

Human spaceflight

In addition to China-Russia collaboration on a lunar research station, both countries are building, or are planning to build, their own space stations. China is constructing a space station that is to be completed in 2022.[120] Construction will require 11 missions. The first mission, to launch the space station's core module, was in April 2021. In that same month, Roscosmos' director for Advanced Programs and Science announced plans for constructing a Russian space station between 2030 and 2035 that will be at a higher orbit than the International Space Station (ISS) and at a tilt to allow "more opportunities to study deep space."[121] The construction of the Chinese space station and the announcement of a potential Russian space station come at a time when the future of the ISS is uncertain. The ISS may be retired by 2025 if commercial operators do not take over its operation; its retirement would set the stage for China to possess the only operational space station. In April 2021, Roscosmos director general Dmitry Rogozin unofficially announced Russian intentions to withdraw from the ISS in 2025.[122] Rogozin has also stated that Russia is interested in participating in the Chinese station and in June 2021 stated that Russia was in negotiations with China over sending crewed missions to the space station.[123] In June 2021, Rogozin was reported as stating that Russian participation in the ISS would depend on the lifting of U.S. sanctions against the Russian space industry, although he later appeared to back away from his remarks. [124]

Spektr-M in-orbit observatory

The Russian Spektr-M observatory, named in the December 2020 Joint Communiqué of the 25th Regular Meeting Between Chinese and Russian Prime Ministers, is a space telescope that will scan the sky in the submillimeter and far-infrared wavelength ranges.[125] Reported launch dates for Spektr-M conflict. A May 2020 TASS article states that Spektr-M "will be launched to

the Lagranian point L2 after 2025."[126] A December 2020 *South China Morning Post* article, however, cites Russian media as saying that the mission will launch around 2030.[127]

Similar to the Russian lunar program, Spektr-M also appears to face budgetary pressure. According to the *South China Morning Post* article, the project's budget was cut in 2019.[128] According to one PRC scholar and commentator, the Russian motivation for working with China is financial: "China needs Russia's deep-space experience, while Russia desires Chinese research funding to keep [advancing its] space research program, as well as help Russian scientists to keep their jobs."[129] The chief of another Russian satellite project, Spektr-RG, corroborated this assessment, stating that "Russia is doing as much as possible with the budget available" and adding that "it means slow progress" in space.[130]

Mars exploration

In 2015, China and Russia agreed to cooperate on Mars exploration and, in 2007, had signed a joint agreement on the exploration of Mars and one of its moons, Phobos.[131] Little is known about the 2015 agreement. In 2011, Russia launched a spacecraft to Phobos that carried China's first Mars orbiter, Yinghuo-1, which was planned to examine the planet's magnetic field and ionosphere, and photograph the Martian surface.[132]

Phobos-Grunt (also called Fobos-Grunt) was tasked with collecting samples from Phobos. It launched from the Baikonur Cosmodrome on November 8, 2011, but because of failures with the spacecraft's propulsion system, was stranded in low Earth orbit (LEO).[133] Phobos-Grunt remained in LEO until it broke up in the atmosphere on January 15, 2012.[134] An investigative report, released in February 2012,[135] cited "a programming error which led to a simultaneous reboot of two working channels of an onboard computer" that put the craft into safe mode.[136]

China-Russia cooperation on deep space exploration

China and Russia also are teaming up on an upcoming mission to a near-Earth asteroid and a comet in the asteroid belt. The Russian Academy of Science's Space Research Institute will cooperate on this Chinese-led space mission, proposals for which CNSA put out a call in 2019. Expected around 2024, it will entail returning a sample collection from Kamo'oalewa, a near-Earth asteroid, and then traveling to and orbiting Elst-Pizarro, a comet in the asteroid belt.

The Russian technology aboard the Chinese spacecraft includes ULTIMAN and ULTIWOMAN, which detect ions and electrons, and an instrument to detect the impact of solar wind plasma on Kamo'oalewa and Elst-Pizarro. In addition to collecting samples from Kamo'oalewa, this

mission will examine Elst-Pizarro's atmosphere and ionosphere.[137] At the 2021 China Space Day event, an individual from the Chinese Academy of Sciences stated that this mission also will look at "detecting possible water and organics on the comet and studying the formulation and evolution of the solar system."[138]

Other deep space cooperation includes Russia's 5-100 Plan, which allows Russian universities to work with Chinese universities in the space field. Two joint research laboratories have been established: one that studies space cable systems (shared by Russia's Samara State Aerospace University and China's Northwestern Polytechnical University); and one on engine manufacturing (with Nanjing University of Aeronautics and Astronautics). In addition, the Saint Petersburg State Institute of Technology has contracts looking at the welding of nano-composite materials in space with HengE (Shanghai) Medical Technology Co., Ltd., and Shanghai Miaosheng Intelligent Technology Co., Ltd. Kazan Federal University is cooperating with Guangzhou University on a "Moon-centric navigation network." Tomsk Polytechnic University has a project on space material science and collaborates with Tsinghua University in engineering physics.[139] It is unclear whether Tsinghua works on this project.

Chapter 6: Ballistic Missile Defense

China-Russia cooperation on ballistic missile defense (BMD) could have important implications for the United States in terms of the U.S. nuclear deterrent and long-range strike capabilities. China-Russia cooperation on missile defense includes arms transfers, technology development, combined exercising, and confidence-building measures. China-Russia cooperation on ballistic missile defense became prominent on October 3, 2019, when Russian president Vladimir Putin announced that the two countries were discussing cooperative efforts. According to Putin, "I don't think I will reveal a big secret, this will become evident after all…. We are now helping our Chinese partners to create a missile warning system. This is a very serious thing that will drastically enhance the defensive capacity of the People's Republic of China."[140]

Background

China has been interested in developing ballistic missile defense systems since the 1960s. In 1963, Mao Zedong agreed to the development of a ballistic missile defense system, which began in 1964. Due to the technological complexity of missile defense, the project was cancelled in 1982.[141] Evidence suggests that Chinese research on BMD was restarted in the mid-1990s.[142]

According to the Department of Defense, "China is working to develop ballistic missile defenses consisting of exo-atmospheric and endo-atmospheric kinetic-energy interceptors" and has expressed "the intent to develop both land-based and sea-based missile defense systems."[143] In January 2010, China announced that it had conducted a land-based mid-course missile defense test, adding that the test was "defensive in nature" and "not targeted at any country."[144] Additional declared mid-course missile defense tests were conducted in 2010, 2013, 2014, 2018, and 2021.[145] According to an unnamed U.S. defense official, China likely will not have an operational mid-course missile defense system until the late 2020s.[146]

PRC position on missile defense

Since at least the late 1990s, the PRC government has been opposed to national ballistic missile defense, arguing that U.S. missile defense systems would harm international strategic stability. In 2020, the PRC government expressed opposition to *global* missile defense systems and the deployment of space-based missile defense systems that can defend against intercontinental ballistic missiles (ICBMs).[147] The withdrawal of the United States from the Antiballistic Missile Defense Treaty in 2002 reinforced the PRC's perceptions that U.S. missile defense systems

could negate China's nuclear deterrent capability. PRC government officials also argued that missile defenses would promote the proliferation of nuclear weapons by forcing countries to develop more and better missiles to overcome defenses. PRC subject matter experts have also expressed concern that U.S. missile defense efforts could further drive the U.S. and its allies, especially Japan, to develop a regional missile defense system.[148] Finally, the PRC government is concerned that the deployment of space-based missile defenses could lead to the weaponization of space.[149]

PRC opposition to missile defense is not absolute, however. As early as 1999, China stated that it did not oppose lower-tier missile defense, such as the U.S. Patriot system, which provides point defense against tactical ballistic missiles.[150]

PRC rationales for missile defense

PRC writings provide several reasons for developing missile defense capabilities. The PRC may perceive that its attempts to curtail U.S. missile defense efforts have failed and that it requires its own missile defense system. This need may have been made more important by the U.S. withdrawal from the Intermediate Range Nuclear Forces (INF) Treaty in 2019. According to a professor from the PLA's National Defense University, China needs a missile warning system that can detect ICBMs launched from the United States as well as intermediate-range missiles launched within the region. As a result, "China needs a more sensitive missile attack warning system that can cover longer ranges and detect incoming missiles faster, so as to buy time for defense and retaliation."[151]

In this regard, some PRC writings have characterized China's development of missile defenses as inherently stabilizing and U.S. missile defenses as inherently destabilizing. PRC researchers have argued that China's BMD system will not be strategically destabilizing because it will be too small to threaten the large ICBM force of the United States. At the same time, the PRC fears that the U.S. system, although limited in capabilities, will be able to negate China's smaller ICBM force and may require China to increase its nuclear arsenal.[152]

According to a 2010 commentary in the journal *Liaowang* contrasting the U.S. and Chinese missile defense programs, "To pursue the development of strategic offensive weapons and missile defense for hegemonic interests will give people tumult and painful disaster, but the pursuit of strategic defensive weapons for the pursuit of peaceful goals will increase the choices for strategic balance."[153] In this respect, one commentator sees missile defense as one way in which China is "shouldering global responsibilities to build a harmonious world" characterized by an impartial and equitable international political order.[154]

PRC commentators also portray an increasingly complicated regional threat environment that requires the development of BMD. One potentially destabilizing influence is North Korea's

missile programs. Chinese commentators also note that India, South Korea, and Pakistan have ballistic missile programs.[155]

China-Russia cooperation on missile defense

China-Russia cooperation on ballistic missile defense is conducted on four tracks: arms transfers, technology development, combined exercises, and confidence-building measures. These are discussed below.

Arms transfers

According to the Department of Defense, "The PRC has utilized Russian-developed missile defense systems while indigenously producing its own increasingly capable missile defenses and radars."[156] China purchased the Russian S-300 air defense system in 2010 and first purchased the S-400 system in 2014 with a second shipment in 2020.[157] The Department of Defense describes the S-400 as having "some capability to engage ballistic missiles, depending on the interceptors and supporting infrastructure."[158]

Technology development

China has also deployed its indigenously developed HQ-9 and HQ-19 air and missile defense systems that the Department of Defense describes as having "a limited capability against ballistic missiles."[159] The HQ-19 appears similar to the U.S. THAAD system and may have begun operations in the country's west. According to the Department of Defense, the system "has undergone tests to verify its capability against 3,000-km class ballistic missiles."[160]

Some sources speculate that the HQ-9 and HQ-19 air defense systems were both based on Russian designs. Janes, for example, notes that the HQ-9 resembles the Russian S-300, although shorter.[161] China and Russia are also reported to have cooperated on the development of the HQ-19 theater defense missile system that is considered to be based on the Russian S-400 missile defense system.[162] According to the U.S. Department of Defense, the HQ-19 "appears to be very similar to the S-400."[163] Janes notes that "the HQ-19 system appears to use the same missiles, sensors, battle management, and launch vehicles as the Russian S-400."[164]

In regard to Russian president Putin's announcement of missile defense cooperation in 2019, the U.S. Department of Defense states the following:

> Russia announced plans to assist China in developing their missile-attack early warning network, including aiding the development of ground-based radars and potentially extending to space-based sensors. China already has several ground-based large phase array radars—similar in appearance to U.S. PAVE PAWS radars—that could support a missile early warning role.[165]

Vasily Kashin of the Russian Higher School of Economics has stated that China is likely not intending to copy Russian systems but instead is likely leveraging Russian experience in developing key technologies.[166] Kashin writes that only one contract related to missile warning has been identified: a $60 million contract for the development of BMD software.[167] Kashin notes, however, that BMD cooperation "likely consists of numerous small contracts that address various problems in the Chinese system."[168] Nevertheless, Kashin also speculates that this cooperation likely represents a significant increase in trust between the two countries due to the sensitive nature of BMD. Technological cooperation would likely reveal sensitive technological details that would ordinarily not be shared because of fears of compromising the system.[169]

Combined missile early warning system

Putin's missile defense cooperation announcement in 2019 drew speculation that the two countries will cooperate on operating an integrated missile defense system that relies on sensors located in China and Russia. Sensors located in Russia would provide warning of missiles coming from the north and west of China, and sensors located in China could warn of missiles coming from the east and south of China. Together the two systems would form a more complete early warning system than what could be accomplished by either country alone.[170]

According to commentary on a Chinese news site, The Paper, "Strategic missile defense technologies are a country's core secret and all countries are cautious about cooperation. But there is some space for cooperation in regards to strategic early warning. If the United States continues to promote the global missile defense system, strengthened China-Russia cooperation on missile defense cannot be ruled out."[171] No evidence was found to support this speculation, however, and an integrated China-Russia missile early warning system would likely be a significant advancement in the relationship, verging on an alliance.

Combined exercises

In May 2016, China and Russia held their first combined training exercise involving air and missile defense, called "Air and Space Security-2016." The exercise was a computer-assisted command and staff exercise held at the Russian Defense Ministry's Aerospace Defense Force's Central Research Institute. The Russian Defense Ministry's press release added that the exercise aimed "to practice combined operations of Russian and Chinese air and missile defense task forces to provide protection from accidental and provocative attacks of ballistic and cruise missiles," and were not directed against a third country.[172] The PRC MND issued a similar statement.[173] According to PRC media citing Russian media, the exercise involved combined command posts and missile early warning systems, missile defense systems, space-based sensors, launch, and the tracking of targets.[174]

In December 2017, China and Russia held the second exercise in this series, named "Air and Space Security-2017." The PRC MND press release describing the event was identical to the press release describing the 2016 exercise.[175] The exercise consisted of combined air and missile defense planning and the coordination of air and missile defense fires against ballistic and cruise missiles. According to one article, this second exercise was expanded to include field exercises.[176] A PRC MND spokesperson said that the exercise was not directed at any third party, and added, "China and Russia both oppose developing global missile defense systems. The two militaries strengthening practical missile defense cooperation is to jointly protect Chinese and Russian security interests and regional strategic stability."[177]

The exercises do not appear to have been conducted since 2017. According to Russian and Chinese media reporting, planning for Air and Space Security-2019 took place in April 2019, but there is no evidence that the exercise occurred.[178]

Confidence-building measures

In 2009, China and Russia signed a confidence-building measure on the mutual notification of ballistic missile and space launches. This agreement was renewed in 2020.[179] Although little is known about this agreement, it is likely intended to reduce the chance of an accidental nuclear exchange by forewarning each party of imminent rocket launches. The agreement is likely similar to the agreement between the United States and the Soviet Union, signed at the 1971 Strategic Arms Limitation Talks, that required each side to notify the other of missile launches that would extend beyond the country's border. This agreement was later codified by the Strategic Arms Reduction Treaty that required each side to provide telemetry data from every ICBM and SLBM launch.[180]

Chapter 7: Space Debris Monitoring

Little information is available on China-Russia cooperation on space debris monitoring. According to a press release by the PRC government, the "The Agreement Between the PRC National Space Administration and the Russian Federation Roscosmos on Space Debris Monitoring and Data Utilization Cooperation" was signed on November 11, 2018. The two sides agreed to establish a "joint low earth orbit information exchange system" intended to "more effectively" contribute to the removal of space debris.[181] According to the press release, "China and Russia jointly carrying out research on space debris monitoring and the laws and regulations governing the long-term sustainability of space reflects the role of responsible powers."[182]

Although detailed information is unavailable, cooperation on space debris could involve a variety of activities, including the following:

- Technical cooperation to develop space debris monitoring capabilities
- Mechanisms to allow for notification of conjunction events between spacecraft and debris

Chapter 8: Satellite Navigation

China-Russia cooperation on satellite navigation appears to be one of the most robust space cooperation activities between the two countries. Since 2011, China and Russia have held numerous meetings and signed multiple agreements on satellite navigation. In 2014, a joint committee on satellite navigation cooperation was established.[183] According to the China Satellite Navigation System Management Office, cooperation in satellite navigation is "highly valued" by both the Chinese and Russian leadership.[184] At an economic forum held in Vladivostok in September 2016, Wu Yanhua, the deputy director of CNSA, stated that cooperation on satellite navigation, as part of overall space cooperation with Russia, had "achieved very good results."[185]

The Beidou and GLONASS satellite navigation systems

Beidou navigation satellite system

China's Beidou Navigation Satellite System (Beidou) was developed to reduce China's reliance on the U.S. Global Positioning System (GPS). Like GPS, Beidou began as a military program and has since been expanded to include a sizable civilian component. Beidou's architecture, however, differs from GPS in terms of technology and number of satellites.

Beidou was completed in 2020 with a constellation of 30 satellites, whereas GPS has a minimum of 24 satellites. This global system will be expanded to 35 satellites, with 30 in medium Earth orbit and 5 in geosynchronous orbit.[186] Beidou's accuracy is reportedly similar to that of GPS. The Beidou system is supported by a domestic network of ground stations that augment the signal to achieve accuracies down to the millimeter level. This ground station network is being expanded internationally. Unlike GPS, Beidou offers a short messaging service in which users can send messages up to 1,000 Chinese characters long for users in and around China and 40 characters for global users.[187]

Global satellite navigation system

Like GPS, Russia's Global Satellite Navigation System (GLONASS) is composed of at least 24 satellites. It first became operational in 1996 but fell into disrepair during Russia's economic difficulties. Since 2011, the system has been fully operational. Although a global system, GLONASS is optimized to provide better accuracies for more northern latitudes in order to

better serve Russia. The accuracy of the GLONASS civil signal is similar to that of GPS at those latitudes but may not perform as well as GPS at other latitudes.[188]

Strategic considerations

China-Russia cooperation on satellite navigation is conducted for technological, political, and economic reasons. While official agreements and communiques do not explicitly mention competition with the U.S., a *People's Daily* article referred to satellite navigation cooperation as a way to "break the 'hegemonic' position of the United States in the field of satellite navigation."[189] According to an article from Sputnik, China-Russia satellite navigation cooperation would benefit "the member states of BRICS group and the Shanghai Cooperation Organization."[190] In 2015, China and Russia planned a project "to create a global navigation system based on China's Beidou and Russia's GLONASS satellite navigation for the member states of BRICS group and the Shanghai Cooperation Organization."[191]

Beidou and GLONASS are complementary systems. Because Russia is located higher in the northern hemisphere, the GLONASS system is optimized to cover northern latitudes while Beidou is optimized to cover more southern latitudes. According to the director of Roscosmos, Dmitry Rogozin, "Their complementariness would result in the biggest and most powerful competitor to any navigation system."[192]

China-Russia satellite navigation cooperation

Russia-China Project Committee on Major Strategic Cooperation in Satellite Navigation

The Russia-China Committee on Major Strategic Cooperation Projects in Satellite Navigation was the result of an MOU on satellite navigation cooperation signed in October 2014 and was formally established in January 2015.[193] The committee held its first meeting in February 2015 and has met on an annual or biannual basis since then. The committee has four working groups that meet on a more frequent basis and focus on the following topics:[194]

- Ensuring compatibility and interoperability between the GLONASS and Beidou navigation systems
- Augmentation, including mutual allocation of measuring stations within the territories of Russia and China
- Performance monitoring
- The application of satellite navigation technologies[195]

The joint committee has produced a number of outcomes, although little information on them is in the public domain. These outcomes include the following:

- *Joint Statement on the System Compatibility of Beidou and GLONASS*. Signed in May 2015, this joint statement was described by the PRC government as "an important symbol of the international development of the Beidou system." It was also described as "marking a new stage in China-Russia satellite navigation cooperation" that strengthened cooperation between the Beidou and GLONASS systems in order to promote compatibility and interoperability. [196]
- *Agreement on Technical Protection Measures for Cooperation between the Government of the People's Republic of China and the Government of the Russian Federation on the Construction and Use of Launch Vehicles and Ground Facilities and Equipment in the Field of Peaceful Research and Utilization of Outer Space*. Signed in December 2015, the agreement was reported to promote cooperation on the application of the Beidou and GLONASS systems in order to provide higher quality satellite navigation services to users worldwide.[197]
- *Cooperation Agreement between Russia's Roscosmos State Space Corporation and the China National Space Administration in the Area of Electronic Components for Space Equipment*. The PRC State Administration for Science, Technology, and Industry for National Defense announced a deal in 2015 on the "development and production of aerospace components" between China and Russia involving satellite navigation technologies.[198]
- *Fifth meeting of the China-Russia Committee on Major Strategic Cooperation Projects in Satellite Navigation*. This meeting was held in Beijing on September 28, 2018. The meeting recognized progress on nine cooperative projects. These included construction of augmentation stations, monitoring and evaluation service platforms, and cross-border transportation applications. It also considered the adoption of the Beidou/GLONASS Precision Agricultural Cooperation Demonstration Project as the 10th cooperative project.[199]
- *Cooperation Agreement between the Government of the People's Republic of China and the Government of the Russian Federation on the Peaceful Use of the Beidou and GLONASS Global Navigation Satellite Systems.* Signed on November 7, 2018, this agreement provided the legal and organizational basis for cooperation in the field of satellite navigation.[200]
- *Sixth meeting of the China-Russia Committee on Major Strategic Cooperation Projects in Satellite Navigation*. This meeting was held on August 30, 2019, in Kazan, Russia. The committee agreed on the text of the "Cooperation Agreement on China Satellite Navigation System Commission (People's Republic of China) and the Russian National Aerospace Corporation (Russian Federation) Regarding Beidou and GLONASS Global Satellite Navigation System Synchronization"; the completion of the survey certificate at the site of the China-Russia Satellite Navigation Monitoring Station; the

consideration and adoption of the feasibility study report for the precision agricultural project;, and the release of the "Global Signal Multimode Multi-Frequency RF Chip of the Sino-Russian Satellite Navigation System."[201]

Peaceful use and monitoring station agreement

In November 2018, China and Russia signed an agreement on the "peaceful use" of Beidou and GLONASS that was described as providing "a legal and organizational guarantee for the large-scale cooperation in the satellite navigation field between the two countries."[202] The cooperation agreement's language has not been made publicly available; however, the agreement is reported to have encouraged system compatibility and interoperability, construction of monitoring stations, monitoring and evaluation, joint technology development, and IPR protection.[203] Russian monitoring stations in China were to be located in Shanghai, Urumqi, and Changchun. Chinese monitoring stations in Russia were to be located in Obninsk, Irkutsk, and Petropavlovsk-Kamchatsky.[204]

Road maps and outlines

The seventh joint satellite navigation committee meeting was held in October 2020, when the "2021-2025 China-Russia Space Navigation Cooperation Road Map" was discussed. The committee also approved a joint research report on satellite-based augmentation system testing and certification technology.[205] No additional information is available on either document, however.

Belt and Road Initiative and satellite navigation

China and Russia are also cooperating on providing satellite navigation to China's Belt and Road Initiative, which seeks to advance a "Space Silk Road."[206] According to the Russian space agency's Information and Analysis Center, China and Russia conducted a project on utilizing Beidou and GLONASS within Russia.[207] Phase one of the project, testing the two systems' performance, was completed in 2018.[208]

Chapter 9: Rocket Engines

Proposed China-Russia cooperation on rocket technology centers on the Russian RD-180 rocket engine. The RD-180 is a staged combustion liquid oxygen-kerosene engine manufactured by the Russian company NPO Energomash and capable of producing 860,000 pounds of thrust. The RD-180 is a downsized version of the RD-170 that was developed by Soviet engineers in the 1970s. The RD-170's staged closed-cycle combustion approach was known by U.S. engineers at that time but was considered impossible to engineer successfully.[209] Although the design offered significantly improved performance, it was also much more prone to explode. Due to superior engineering skills and the large amount of funding characteristic of Cold War-era programs, Soviet engineers were able to develop a reliable engine that was much more efficient and powerful than other engines of its size.[210]

The RD-180 has been used on U.S. Atlas V rockets since 2002. The incorporation of the RD-180 into the Atlas design allowed the number of first-stage rocket engines to be reduced from six to one and reduced the number of parts by 15,000, a modification that also increased the reliability of the rocket from 0.9876 to 0.9955.[211] Over 85 launches, the Atlas V has had only had one partial failure and no complete failures.[212] Despite the proven performance and reliability of the RD-180, political pressure to use American rocket engines, especially after the 2014 Russian annexation of Crimea, prompted Congress to mandate that purchases of the RD-180 cease on December 31, 2022.[213]

PRC interest in the RD-180 appears to date to 2015.[214] According to Dmitry Rogozin, the head of Roscosmos, "We and our Chinese partners see the provision of rocket engines themselves as part of broader cooperation, for example, in the field of future heavy rocket design, in space stations, and in long-range spaceflight."[215]

China's interest in the RD-180 appears to be related to the development of the engines for the Long March-9 (LM-9) super-heavy-lift launch vehicle that is planned to become operational by 2030. At 93 meters long and featuring a 10-meter-diameter core and a mass at liftoff of 4,140 metric tons, the LM-9 will be similar in size to the Saturn V used in the Apollo program. Like the Saturn V, the LM-9 is intended to be used in a potential Chinese manned lunar program as well as other deep space and Mars exploration missions.

The first stage of the LM-9 is planned to be powered by four Chinese-developed YF-130 kerosene-liquid oxygen rocket engines that can each produce a thrust of over 1.1 million pounds, which will enable the rocket to lift 140 tons into low Earth orbit or 50 tons into trans-lunar injection.[216] In March 2021, it was reported that the first test of the YF-130 was successful.[217]

Russian assistance in developing the YF-130 engines for the LM-9 could prove invaluable by helping to reduce expenses and shorten timelines. It is also possible that China could use parallel tracks for the LM-9 engine development, prioritizing the YF-130 engine while maintaining the option of moving forward with the RD-180 in case the YF-130 design fails. A presentation by Long Lehao, chief designer of the Long March series of rockets, in June 2021, made no mention of using the RD-180 engine in the LM-9, casting doubt on whether the proposed deal had gone through.[218]

IPR issues

In April 2016, it was reported that China's non-membership in the Missile Technology Control Regime required the two sides to establish a "legal and regulatory basis" for the sale, apparently in order to prevent the transfer of RD-180 technology to third countries, especially North Korea.[219] This impasse was apparently resolved. According to the Russian news agency TASS, in June 2016, China and Russia reached an agreement on IPR protection intended to facilitate the sale of the RD-180. At the same time, it was also reported that the two countries were working on an agreement for Russia to sell the RD-180 to China for aerospace microelectronics.[220] In October 2016, PRC media reporting on Russian press reports, stated that NPO Energomash general manager Igor Albtsov had said that talks with the PRC over the export of the RD-180 were only in the preliminary stages and that Russia was only interested in selling complete engines and not the knowledge and skills necessary for the manufacture of the engines.[221]

The IPR agreement appears to have been ratified in 2017. According to Energomash CEO Igor Arbuzov, "We were restrained in our negotiating process (with the Chinese) until the end of 2017 as the agreement between the governments of Russia and China…was not ratified."[222] Following ratification, discussions between the two sides were described as "substantive" and "practical."[223] According to TASS:

> The areas of cooperation in the sphere of rocket engines were defined by the protocols of sessions of the Russian-Chinese commission for cooperation in carrier rockets and rocket engines held in 2018 and were approved on September 28, 2018 in Beijing by a protocol of the 19th session of the sub-committee for interaction in outer space of the Russian-Chinese committee for preparing regular meetings of the heads of governments. After that, Energomash will draft and submit a package of documents to Russia's State Space Corporation Roscosmos for a government resolution on the possibility of cooperation in this area, the statement says.[224]

Other rocket engine cooperation

In 2018, it was reported that Energomash and the Sixth Academy of the China Aerospace Science and Technology Corporation (CASC) signed an agreement to jointly develop and manufacture liquid rocket propellants. According to an Energomash press release, the two companies would cooperate on developing liquid rocket propellants using "oxygen-kerosene, oxygen-hydrogen and oxygen-methane propellant components." It was agreed that the Sixth Academy would send technical work requirements to Energomash and would hold a meeting in January 2019 to finalize the cooperation.[225] It is unknown whether this meeting occurred.

Chapter 10: Space Arms Control

For the past two decades, China and Russia have cooperated closely in pushing for negotiations regarding Prevention of an Arms Race in Outer Space (PAROS) at the UN Conference on Disarmament (CD), the main multilateral disarmament negotiating forum of the international community.[226] After a few years of producing joint working papers and hosting meetings on issues related to PAROS in the early 2000s, in 2008 China and Russia proposed the first draft of the "Treaty on Prevention of the Placement of Weapons in Outer Space and the Threat or Use of Force against Outer Space Objects (PPWT)."[227] The draft treaty received a mixed reception, with some countries (mostly in the developing world) welcoming its introduction and others, such as the United States and the EU countries, stating that it had significant shortcomings and would need to be revised in order to be effective.[228]

2014 draft "Treaty on the Prevention of the Placement of Weapons in Outer Space and the Threat or Use of Force against Outer Space Objects"

In 2014, China and Russia proposed a revised second draft of the treaty to the CD, based on feedback on the 2008 version. The core treaty obligation of the 2014 version (Article II) states the following:

- The States Parties to this Treaty undertake:
    - Not to place any weapons in outer space;
    - Not to resort to the threat or use of force against outer space objects of States Parties to the Treaty;
    - Not to engage, as part of international cooperation, in outer space activities that are inconsistent with the object and purpose of this Treaty;
- Not to assist or induce other States, groups of States, international, intergovernmental or non-governmental organizations, including non-governmental legal entities established, registered, or located in territory under their jurisdiction and/or their control, to participate in activities inconsistent with the object and purpose of this Treaty.[229]

Despite revisions to the 2008 treaty, there were some enduring issues in the 2014 treaty that continued to cause concern.[230] The United States submitted an analysis of the treaty, stating

that, like the 2008 version, the 2014 version was still "fundamentally flawed" in the following areas:

- *Need for a verification regime*: There was no "integral verification regime" to help monitor or verify the limitation on the placement of weapons in space. Existing technology and/or cooperative measures also could not "effectively verify an agreement banning space-based weapons."[231]
- *Limited scope for space-based arms control*: There were "no prohibitions" on the "research, development, production, and terrestrial storage of space-based weapons," enabling a party to the treaty to "build and have in its inventory a readily deployable space-based antisatellite weapon (ASAT) or BMD capability."[232]
- *No limits on terrestrially based antisatellite weapons*: The treaty did not address terrestrially based antisatellite weapon systems. There was "no prohibition on the research, development, testing, production, storage, or deployment of terrestrially-based anti-satellite weapons"; such capabilities could be used to "substitute for, and perform the functions of, space-based weapons."[233]

Table 1 gives a summary of the activities prohibited and not prohibited by the 2014 draft PPWT based on US analysis.[234]

Table 1. The 2014 PRC-Russian Draft PPWT: Summary of Implications

Basing mode	Space-based counter-space	Space-based missile defense	Ground-based counter-space	Sea-based counter-space	Air-based counter-space
Research	Permitted: No constraints or limitations				
Development	Permitted: No constraints or limitations				
Testing against own country's space objects	Prohibited	Prohibited	Permitted	Permitted	Permitted
Production	Permitted: No constraints or limitations				
Storage	Permitted: No constraints or limitations				
Deployment	Prohibited	Prohibited	No constraints or limitations		
Operational use against another country's space objects	Prohibited if constitutes "use of force" or "threat of force" (except when required for "self-defense")				

The draft in its most recently updated (2014) form remains one of the few active options for a treaty regarding PAROS; however, its prospects are limited since resistance to it remains and the CD adopts its decisions based on consensus.[235] In addition to the aforementioned

shortcomings of the PPWT, skepticism towards it has also arisen based on Russian and Chinese activities to develop ASAT capabilities. In 2020, for example, Russia conducted a space-based antisatellite weapons test, casting doubt on its commitment to PAROS.[236]

Chapter 11: Conclusions

The burgeoning China-Russia space relationship is indicative of the growing overall strategic partnership between China and Russia. Russia, once the dominant power in the space relationship, now appears to be taking a secondary role. China's growing expertise in space, matched with the financial capabilities to sustain a large and growing space enterprise signals not only China's rise as a major space power, but also the geopolitical transition taking place between China, Russia, and the United States.

The findings presented in this report, however, are based on incomplete data. China-Russia space cooperation lacks transparency. As their cooperation in defense-related fields deepens, it has also become more secretive. Much of the media reporting only mentions signed agreements and provides little specific information. Although the number and types of China-Russia space cooperation agreements indicate a growing strategic partnership, it is possible that some or many of the agreements examined here lack substance, were not fully carried out, or were cancelled. Alternatively, the lack of transparency could also hide a more substantive relationship than the one presented here. Either finding would necessarily call for a reevaluation of the China-Russia space relationship.

Key findings

China-Russia space relations indicate a deepening trust between the two countries.

While not an alliance, the burgeoning cooperation between Russia and China on issues of space and space-related technology has a breadth and depth that indicate a growing strategic partnership. The expanding and increasingly sensitive nature of China-Russia space cooperation may make it more difficult to separate the two countries' cooperative space activities.

- The agreement to transfer sensitive missile defense technology allows China access to technologies dominated by the United States and Russia.
- Joint lunar exploration could tie the two countries together in ways that make success contingent on both countries' participation.
- An agreement covering IPR protection on the transfer of space technologies suggests either that Russian concerns over PRC technology theft—a hindrance to previous China-Russia technological cooperation—have been assuaged or at least that Russia has come to accept technology theft as the price of doing business in China. It is

unknown to what extent Russian funding shortfalls provided China with leverage in this negotiation.

- Although improving China-Russia space relations are a sign of the increasing trust between the two countries, U.S. political and economic sanctions against both countries' space programs have also likely played a role in bringing the two countries closer together.

China-Russia space relations indicate an effort to balance against U.S. dominance.

China-Russian space cooperation is driven by the same forces that drive the overall strategic relationship.[237] While the two countries do not have completely overlapping security concerns, they do share a strong desire to counter U.S. leadership, including in outer space. They share concerns over interpretation of U.S. space initiatives and see U.S. space-based capabilities and dominance, especially anything related to missile defense, as threatening to their strategic nuclear arsenals. According to then deputy prime minister Dmitry Rogozin (now director of Roscosmos), "Our technological partnership should be directed at the countries that are close to us in mentality and which in general constitute an emerging geopolitical force that we could rely on in opposing a unipolar world."[238]

China-Russia space relations indicate an effort to deter and counter the U.S. militarily.

China-Russia space cooperation involves activities related to national defense. These include cooperative activities on BMD, space debris, and satellite navigation.

Ballistic missile defense

Chinese sources have linked their interest in developing more advanced BMD capabilities to the withdrawal of the United States from the INF and the U.S. development of long-range missile capabilities. Both China and Russia have stated opposition to global missile defense systems. However, it is unknown to what extent BMD cooperation will be limited to tactical and regional capabilities.

- Russian assistance could aid China in developing ground- and space-based missile warning systems that would raise the effectiveness of China's existing missile defense systems and speed development of new systems.
- Combined PRC-Russian air and missile defense exercises indicate an effort to improve defenses against ballistic and cruise missile attack and demonstrate the growing closeness of the relationship. It is unknown to what extent the combined exercises reflect an intent to develop an actual combined air and missile defense capability.
- We found no evidence to support the speculation of media and subject matter experts concerning the development of a joint missile early warning system. Such an agreement would be a significant step forward in the two countries' relationship that would be similar to an alliance. Cooperation in this area could create mutually

supportive relationships that not only provide each country with enhanced capabilities, but also impose shared responsibilities that could increase the risk of escalation by drawing both countries into conflict with the United States.

A hypothetical joint missile early warning system would complicate U.S. efforts to deny, degrade, or destroy Chinese or Russian BMD systems. Depending on the extent to which the Chinese and Russian systems were mutually supportive, attacks intended to suppress either the Chinese or Russian BMD system individually would risk escalating the conflict by involving both countries.

Space debris monitoring

Due to the dual-use nature of space debris monitoring, China-Russia cooperation in this area could have potential military applications. The similarity of space debris monitoring capabilities to military space surveillance capabilities could enhance the ability of both countries to collect intelligence on adversary space systems and aid in the tracking and targeting of U.S. satellites. The development of space surveillance capabilities could potentially leverage cooperation on missile early warning systems.

Satellite navigation

China-Russia cooperation on satellite navigation could provide redundancy. Improving interoperability between Beidou and GLONASS could provide an alternative signal in the event that either country's national satellite navigation system was denied or degraded. U.S. actions to deny either China's or Russia's satellite navigation would have to take into account each country's access to both Beidou and GLONASS, as well as the escalatory implications of denying both systems.

Promoting interoperability between the civil signals of satellite navigation systems is common practice, however. The United States and China signed a joint statement on civil signal compatibility and interoperability in 2017, and the European Galileo system and Beidou are interoperable.[239]

China-Russia space cooperation effort is likely intended to increase influence in international space diplomacy.

The China-Russia lunar exploration MOU appears intended to establish a space cooperation framework independent from U.S.-led efforts. Although not acknowledged by either China or Russia, cooperation on lunar exploration appears to be a response to the U.S.-led Artemis Program that is intended to return humans to the Moon and the U.S.-led Artemis Accords that established a set of principles for the exploration and commercial use of space. Although neither China nor Russia has introduced a similar set of principles individually or jointly, the creation of a joint exploration program and its openness to additional participants suggest that the two countries are establishing an alternative framework to explore and use space. This effort is likely intended to increase Chinese and Russian influence in international space

diplomacy by establishing the two countries as alternative leaders in space exploration. The association of joint China-Russia lunar exploration with the United Nations appears to be an effort to further distinguish their plans from the Artemis Accords by promoting the plans as inclusive and peaceful.

China and Russia's efforts for a space arms control treaty show commitment to arms control efforts to restrict U.S. space-based weapons and missile defenses.

Chinese and Russian cooperation on space arms control appears intended to portray both countries as striving for the peaceful use of space while doing little to constrain Chinese and Russian acquisition and use of terrestrial-based space weapons. Such efforts may also serve to reinforce the narrative that while Russia and China are trying to achieve arms control in space, the United States is a destabilizing global influence.[240]

China-Russia cooperation does not appear to significantly advance commercial competitiveness.

China-Russia space cooperation to advance the two countries' commercial interests appears to be limited and focused mainly on satellite navigation. Agreements to increase interoperability and compatibility will likely facilitate the use of the Beidou and GLONASS satellite navigation systems in both countries.

China-Russia space cooperation indicates a desire to reduce technological and budgetary risk.

In addition to geopolitical considerations, China-Russia space cooperation also appears to be aimed at reducing the technological and budgetary risk of space. The Russian and Chinese space industries have the potential to benefit from each other: Although China is rapidly developing its own space industry, it can learn from Russian know-how and technological expertise. At the same time, Russia's space industry is struggling and Chinese funding and technology may help it regain some of its former momentum.

- Chinese interest in Russian space technology, especially rocket engine technology, is intended to acquire technologies that are too complicated and/or too costly to develop alone. Use of Russian technologies may be one way to facilitate development of the super-heavy-lift LM-9 launch vehicle.
- Russian interest in Chinese aerospace electronic components indicates the intent to create an alternative supply chain for its space industry after the EU imposed sanctions on dual-use components to Russia after the 2014 Russian invasion of Ukraine.
- China-Russia technological cooperation may also reflect the Russian space industry's need for funding. The Russian space industry is hampered by the overall weakness of

Russia's political and economic system. Russian state-owned enterprises, such as Roscosmos, tend to be inefficient and prone to corruption.[241]

The U.S. decision to develop a replacement for the RD-180 and the U.S. development of human-rated launch vehicles and crewed spacecraft—which would eliminate the need to launch U.S. astronauts on Russian rockets—will likely exacerbate the revenue shortfalls in the Russian space industry.

- Russia appears to have accepted the value of co-development over aggressively protecting technology. According to Vasily Kashin of the Russian Higher School of Economics, the Russian space industry does not consider China to be a competitor. Instead, the U.S. company SpaceX, with its partially reusable rockets, is the most concerning. According to Kashin, Chinese production costs are higher than Russian costs, with Chinese salaries at times higher than the salaries of the Russian space workforce. [242] Technology theft, on the other hand, "is a shared problem for all companies who do business in China, but there haven't been any cases of reverse engineering causing anyone turning away from the Chinese market—the most valuable market in the world."[243]
- China may also look to the partnership as a way to reduce the budgetary demands of space exploration, given the cost and few tangible benefits associated with lunar exploration.

China-Russia space relations indicate a shifting power dynamic between the two countries.

For much of the history of China-Russia space relations, Russia has been the leading space power, providing much-needed technology and know-how to a small and inexperienced Chinese space program. This relationship dynamic appears to be undergoing a fundamental shift. Due to its increasing capabilities and strong funding, China appears to be positioning itself to be the leading space power in the relationship in which Russia plays an important, but nonetheless secondary, role as a provider of capabilities to Chinese space endeavors. In this respect, Russian participation appears to be aimed at maintaining its legacy as a space power through its involvement in assisting China's space program. As a result, the China-Russia space relationship reflects the overall rise of China as a great power and the attempt by Russia to use its relationship with China to maintain its global stature despite its diminishing capabilities.

Appendix: List of China-Russia Space Cooperation Agreements

Table 2, below, lists the space cooperation agreements between China and Russia from 2009 through 2021.

Table 2. Space cooperation agreements between China and Russia

Year Signed	English	Chinese	Russian
2021	CNSA and Roscosmos Joint Statement on the Cooperative Construction of the International Lunar Research Station	中国国家航天局和俄罗斯国家航天集团公司关于合作建设国际月球科研站的联合声明 [244]	Меморандум о взаимопонимании о сотрудничестве в области создания Международной научной лунной станции (МНЛС).[245]
2021	Memorandum of Understanding between the Government of the People's Republic of China and the Government of the Russian Federation Regarding Cooperation for the Construction of the International Lunar Research Station	中华人民共和国政府和俄罗斯联邦政府关于合作建设国际月球科研站的谅解备忘录 [246]	Меморандум о взаимопонимании между Правительством Китайской Народной Республики и Правительством Российской Федерации о сотрудничестве в области создания Международной научной лунной станции (МНЛС)[247]
2020	2021-2025 China-Russia Satellite Navigation Cooperation Road Map	2021 至 2025 年中俄卫星导航领域合作线路图 [248]	Дорожная карта сотрудничества России и Китая в области спутниковой навигации на 2021 - 2025 годы с целью перспективного планирования и уточнения дальнейших направлений сотрудничества[249]

Year Signed	English	Chinese	Russian
2019	CNSA and Roscosmos Cooperation Agreement on the Coordinated Implementation of the "Chang'e-7" Lunar Polar Exploration Mission and the "Luna-Resurs 1" Orbiter Mission	中华人民共和国国家航天局与俄罗斯联邦国家航天集团公司关于协同实施“嫦娥七号”月球极地探测任务和“月球-资源-1”轨道器任务合作协定 [250]	Соглашение между Госкорпорацией «Роскосмос» и Китайской национальной космической администрацией о сотрудничестве в рамках координации российской миссии с орбитальным космическим аппаратом «Луна-Ресурс-1» и китайской миссии исследования полярной области Луны «Чанъэ-7»[251]
2019	Cooperation Agreement Between CNSA and Roscosmos on the Establishment of a Joint Lunar and Deep Space Exploration Data Center	中华人民共和国国家航天局与俄罗斯联邦国家航天集团公司关于建立联合月球与深空探测数据中心的合作协定 [252]	Соглашение между Госкорпорацией «Роскосмос» и Китайской национальной космической администрацией о сотрудничестве в области создания объединенного Центра данных по исследованию Луны и дальнего космоса[253]
2019	Cooperation Agreement on China Satellite Navigation System Commission (People's Republic of China) and the Russian National Aerospace Corporation (Russian Federation) Regarding Beidou and GLONASS Global Satellite Navigation System Synchronization	中国卫星导航系统委员会（中华人民共和国）与俄罗斯国家航天集团（俄罗斯联邦）关于北斗和格洛纳斯全球卫星导航系统时间互操作的合作协议 [254]	Соглашение о сотрудничестве в области обеспечения взаимодополняемости систем ГЛОНАСС и Бейдоу[255]

Year Signed	English	Chinese	Russian
2018 (enacted in 2019)	Cooperation Agreement between the Government of the People's Republic of China and the Government of the Russian Federation on the Peaceful Use of the Beidou and GLONASS Global Navigation Satellite Systems	中华人民共和国政府和俄罗斯联邦政府关于和平使用北斗和格洛纳斯全球卫星导航系统的合作协定 [256]	Соглашение Между Правительством Российской Федерации И Правительством Китайской Народной Республики О Сотрудничестве В Области Применения Глобальных Навигационных Спутниковых Систем Глонасс И Бэйдоу В Мирных Целях[257]
2018	CNSA and Roscosmos 2018-2022 Space Cooperation Outline	中华人民共和国国家航天局与俄罗斯联邦国家航天集团公司 2018—2022 年航天合作大纲 [258]	Программы развития сотрудничества в области космической деятельности между Роскосмосом и КНКА на 2018-2022 годы[259]
2018	Letter of Intent on Cooperation between the China National Space Administration and the Russian National Aerospace Corporation on the Moon and Deep Space Exploration	中国国家航天局与俄罗斯国家航天集团关于月球与深空探测的合作意向书 [260]	Меморандум о взаимопонимании между Правительством Китайской Народной Республики и Правительством Российской Федерации о сотрудничестве в области создания Международной научной лунной станции (МНЛС)[261]
2016 (China) 2017 (Russia)	Agreement on Technical Protection Measures for Cooperation between the Government of the People's Republic of China and the Government of the Russian Federation on the Construction and Use of Launch Vehicles and Ground Facilities and Equipment in the Field of Peaceful Research and Utilization of Outer Space	中华人民共和国政府和俄罗斯联邦政府关于在和平研究与利用外层空间领域建造和使用运载工具及其地面设施设备合作的技术保护措施协定 [262]	Соглашение между Правительством Российской Федерации и Правительством Китайской Народной Республики о мерах охраны технологий[263]

Year Signed	English	Chinese	Russian
2015	Joint Statement on the System Compatibility of Beidou and GLONASS	中国北斗和俄罗斯格洛纳斯系统兼容与互操作联合声明联合声明 [264]	Совместное заявление о совместимости и взаимодополняемости китайской системы “Бэйдоу” и российской системы “ГЛОНАСС”[265]
2014	Memorandum of Understanding on Cooperation between the China Satellite Navigation System Committee and the Russian Federal Space Agency in the Field of Global Satellite Navigation	中国卫星导航系统委员会与俄罗斯联邦航天局在全球卫星导航领域合作谅解备忘录 [266]	Меморандум о взаимопонимании между Китайской комиссией по навигационной спутниковой системе и Федеральным космическим агентством России о сотрудничестве в области глобальных навигационных систем[267]
2013	2013-2017 China-Russia Space Cooperation Outline	2013–2017 年中俄航天合作大纲 [268]	Программа российско-китайского сотрудничества на период 2013-2017 гг.[269]
2009	2010-2012 China-Russia Space Cooperation Project Outline	2010–2012 年中俄航天合作项目大纲	Программа сотрудничества между Россией и Китаем в области космоса на 2010-2012 годы[270]
1994	Intergovernmental Agreement on the Cooperation on the Study and Use of Outer Space for Peaceful Purposes	中俄两国航天局关于和平利用与研究宇航空间方面进行合作的议定 [271]	Межправительственное соглашение о сотрудничестве в области исследования и использования космического пространства в мирных целях[272]

Abbreviations

ASAT	Antisatellite weapon
BMD	Ballistic missile defense
BRICS	Brazil, Russia, India, China, and South Africa
CD	UN Conference on Disarmament
CNSA	China National Space Administration
EU	European Union
GLONASS	Global Satellite Navigation System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICBM	Intercontinental ballistic missile
ILRS	International Lunar Research Station
INF	Intermediate range nuclear forces
IPR	Intellectual property rights
ISS	International Space Station
MND	Ministry of National Defense
MOU	Memorandum of understanding
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
PAROS	Prevention of an Arms Race in Outer Space
PPWT	Prevention of the Placement of Weapons in Outer Space and the Threat or Use of Force against Outer Space Objects
PRC	People's Republic of China
R&D	Research and development
SCO	Shanghai Cooperation Organization
SDA	Space domain awareness
SLBM	Submarine-launched ballistic missile
THAAD	Theater High Altitude Area Defense
UN	United Nations
US	United States
USSR	Union of Soviet Socialist Republics

Endnotes

[1] Evan S. Medeiros and Michael S. Chase, "Chinese Perspectives on the Sino-Russia Relationship," in *Russia-China Relations: Assessing Common Ground and Strategic Fault Lines*, ed. Robert Sutter (National Bureau of Asian Research, July 2017), 3.

[2] Holly Ellyat, "China's Xi Calls Putin his 'Best Friend' Against a Backdrop of Souring US Relations," CNBC, June 5, 2019, https://www.cnbc.com/2019/06/05/putin-and-xi-meet-to-strengthen-ties-as-us-relations-sour.html; "Putin Says Sino-Russian Relations Better Than Ever," Reuters, June 5, 2019, https://www.reuters.com/article/us- russia-china-putin/putin-says-sino-russian-relations-better-than-ever-idUSKCN1T61FL.

[3] Bill Keller, "Gorbachev Visits Beijing for Start of Summit Talks," *New York Times*, May 15, 1989, https://www.nytimes.com/1989/05/15/world/gorbachev-visits-beijing-for-start-of-summit-talks.html.

[4] M. Taylor Fravel, *Strong Borders, Secure Nation: Cooperation and Conflict in China's Territorial Disputes*, (Princeton: Princeton Univesity Press, 2008), 141-144; Vasily Kashin, *The Current State of Russian-Chinese Military Cooperaration*, DOP-2018-U-018184-Final, 2018, p. 3, https://www.cna.org/CNA_files/PDF/DOP-2018-U-018184-Final.pdf; Stockholm International Peace Research Institute (SIPRI), *Arms Transfers Database*, 2018.

[5] See, for example, "Joint Statement on the Basis of Sino-Russian Relations" (*Guanyu Zhong E Xianghu Guanxi Jichu de Lianhe Shengming;* 关于中俄相互关系基础的联合声明), *CCTV*, Dec. 18, 1992, http://www.cctv.com/special /903/6/70491.html; "Joint Statement of the President of the People's Republic of China and the President of the Russian Federation" (*Zhong E Lianhe Shengming*; 中俄联合声明), CCTV, Sept. 3, 1994, http://www.cctv.com /special/903/6/70503.html; "Sino-Russian Declaration" (*Zhong E Lianhe Shengming*; 中俄联合声明), Foreign Ministry of the People's Republic of China, Apr. 25, 1996, https://www.fmprc.gov.cn/web/ziliao_674904 /1179_674909/t6798.shtml.

[6] "Joint Declaration on a Multipolar World and the Establishment of a New International Order," *International Legal Materials* 36, no. 4 (1997), https://www.jstor.org/stable/20698707?seq=1. In the years since, see for example, "Joint Statement by the Presidents of the People's Republic of China and the Russian Federation on Anti- Missile Defense," Nuclear Files, July 18, 2000; "Joint Statement by the People's Republic of China and the Russian Federation" (*Zhonghua Renmin Gongheguo yu Eluosi Lianbang Lianhe Shengming*; 中华人民共和国与俄罗斯联邦联合声明), Permanent Mission of the People's Republic of China to the United Nations Office at Geneva and Other International Organizations in Switzerland, Dec. 13, 2002, http://www.china-un.ch/chn/xwhd/t6808.htm; "Joint Statement of the People's Republic of China and the Russian Federation on the International Order of the 21st Century" (*Zhonghua Renmin Gongheguo he Eluosi Lianbang Guanyu 21 Shiji Guoji Zhixu de Lianhe Shengming*; 中华人民共和国和俄罗斯联邦关于 2 1 世纪国际秩序的联合声明), Central Government of the People's Republic of China (*Zhonghua Renmin Gongheguo Zhongyang Renmin Shengfu*; 中华人民共和国中央人民政府), July 1, 2005, http://www.gov.cn/gongbao/content/2005/content_64271.htm.

[7] "About the SCO," The Shanghai Cooperation Organisation, http://eng.sectsco.org/about_sco/.

[8] Kenneth Allen, Phillip C. Saunders, and John Chen, *Excel File with Data Used in Chinese Military Diplomacy, 2003–2016*, National Defense University, Institute for National Strategic Studies, July 2017, https://ndupress.ndu.edu /Media/News/Article/1249864/chinese-military-diplomacy-20032016-trends-and-implications; "Chinese President Hu Jintao Holds Talks with Russian Counterpart Medvedev," Consulate-General of the People's Republic of China in San Fransico, June 18, 2009, http://www.chinaconsulatesf.org/eng/xw/t568490.htm.

[9] Marcin Kaczmarski, *Russia-China Relations in the Post-Crisis International Order* (Abingdon, UK: Routledge, 2015); Alexander Gabuev, "Why Russia and China Are Strengthening Security Ties," *Foreign Affairs*, Sept. 24, 2018, https://www.foreignaffairs.com/articles/china/2018-09-24/why-russia-and-china-are-strengthening-security-

ties; Elizabeth Wishnick, "In Search of the 'Other' in Asia: Russia-China Relations Revisited," *The Pacific Review* 20, no. 1 (2017), doi: 10.1080/09512748.2016.1201129.

[10] *Joint Statement of the People's Republic of China and the Russian Federation on Major International Issues*, Ministry of Foreign Affairs of the People's Republic of China, 2008, htpps://www.fmprc.gov.cn/mfa_eng /wjdt_665385/2649_665393/t465821.shtml. They argued that as the World Bank reformed, "emerging markets and developing countries should have a bigger say and broader representation in the international financial institutions."

[11] Jeffrey A. Bader, *Obama and China's Rise: An Insider's Account of America's Asia Strategy* (Washington, DC: Brookings Institution Press, 2012); John Ruwitch and Ambika Ahuja, "China Ruffled at Security Forum Over Maritime Rows," Reuters, July 24, 2010, https://www.reuters.com/article/uk-asia-security-china/china-ruffled-at-security-forum-over-maritime-rows-idUKTRE66M29F20100724.

[12] Li Boya and Chen Shangwen, "'Rebalancing' Impacts Stability of Asia-Pacific," *People's Daily* (*Renmin Ribao;* 人民日报), Dec. 12, 2012， http://www.huaxia.com/thjq/jswz/2012/12/3137275.html; "Rebalancing 'Disrupts' Regional Balance," *PLA Daily* (*Jiefangjun Bao;* 解放军报), Dec. 31, 2012; Ling Shengji and Wang Fan, "Building a Peaceful Environment," *China Daily*, Dec. 31, 2012; Liu Linlin, "Asia-Pacific Geopolitics in Transition, Says CASS Report," *Global Times* (*Huanqiu Shibao;* 环球时报), Dec. 27, 2012, https://www.globaltimes.cn/content /752551.shtml; Wang Fan and Zhi Linfei, "China, U.S. Move Beyond Distractions Toward Fostering New Inter- Power Relations," Xinhua, Dec. 16, 2012， http://usa.chinadaily.com.cn/china/2012-12/16/content _16021792.htm.

[13] Eugene Rumer, *Russia and the Security of Europe*, Carnegie Endowment for International Peace, 2016, https://carnegieendowment.org/files/CP_276_Rumer_Russia_Final.pdf, 3-15.

[14] Liu Fenghua, a research fellow with the China Academy of Social Sciences, notes, "Since the outbreak of the Ukraine crisis, the US has once again chosen to contain China and Russia simultaneously, thus greatly enhancing China-Russia strategic partnership." Liu Fenghua, "China-Russia Comprehensive Strategic Partnership: Formation, Features, and Prospects," *China International Studies* 61 (2016).

[15] Over the last 10 years, China and Russia have both accused the US of being behind the episodes of internal unrest in their countries. See, for example, "Xi Jinping Meets with Secretary of the National Security Council Nikolai Patrushev of the Russian Federation," Foreign Ministry of the People's Republic of China, Dec. 2, 2019, https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1721345.shtml; Keith Bradsher, "Some Chinese Leaders Claim U.S. and Britain Are Behind Hong Kong Protests," *New York Times*, Oct. 11, 2014, https://www.nytimes.com /2014/10/11/world/asia/some-chinese-leaders-claim-us-and-britain-are-behind-hong-kong-protests-.html; Steven Lee Myers, "In Hong Kong Protests, China Angrily Connects Dots Back to U.S.," *New York Times*, Sept. 5, 2019, https://www.nytimes.com/2019/09/05/world/asia/china-hong-kong-protests.html; Miriam Elder, "Vladimir Putin Accuses Hillary Clinton of Encouraging Russian Protests," *The Guardian*, Dec. 8, 2011, https://www.theguardian.com/world/2011/dec/08/vladimir-putin-hillary-clinton-russia.

[16] *China's National Defense in the New Era*, The State Council Information Office of the People's Republic of China, July 2019, http://www.china-un.ch/eng/dbtyw/cjjk_1/cjjzzdh/t1683060.htm, 2-3. The US deployment of the Terminal High Altitude Area Defense (THAAD) system in South Korea and Washington's development of nuclear, outer space, cyber, and missile defense capabilities are all highlighted as undermining strategic stability.

[17] *Decree of the President of the Russian Federation of December 31, 2015, No. 683*, President of Russia (Dec. 31, 2015), http://kremlin.ru/acts/bank/40391.

[18] Jamil Anderlini, "China and Russia's Dangerous Liaison," *Financial Times*, Aug. 8, 2018, https://www.ft.com /content/1b4e6d78-9973-11e8-9702-5946bae86e6d.

[19] Ellyat, "China's Xi Calls Putin his 'Best Friend'"; "Putin Confirms Plans to Meet Chinese President during APEC Summit in Beijing," Sputnik International, Oct. 14, 2014.

[20] "Joint Statement Between the People's Republic of China and the Russian Federation on Developing Comprehensive Partnership of Strategic Coordination for a New Era" (*Zhonghua Renmin Gongheuo he Eluosi Lianbang Guanyu Fazhan Xin Shidai Quanmian Zhanlve Xiezuo Huoban Guanxi de Lianhe Shengming (Quanwen)*; 中华人民共和国和俄罗斯联邦关于发展新时代全面战略协作伙伴关系的联合声明（全文）), Xinhua, June 6, 2019, http://www.xinhuanet.com/world/2019-06/06/c_1124588552.htm; Ellyat, "China's Xi Calls Putin his 'Best Friend.'"

[21] Jun Mai, "Beijing Gives Cautious Welcome to Vladimir Putin's Hint Over Russia-China Military Alliance," *South China Morning Post*, Oct. 25, 2020, https://www.scmp.com/news/china/diplomacy/article/3107027/beijing-gives-cautious-welcome-vladimir-putins-hint-over.

[22] Daniel R. Coates, *Worldwide Threat Assessment of the US Intelligence Community*, Statement for the Record, Senate Select Committee on Intelligence, Jan. 29, 2019, https://www.dni.gov/files/ODNI/documents/2019-ATA- SFR---SSCI.pdf.

[23] Bilateral coordination mechanisms include China-Russia Northeast Asia Security Dialogue, Russia-China Consultation on Nuclear Security Issues, China-Russia Intergovernmental Commission on Military-Technical Cooperation, and Annual Strategic Consultations among Chiefs of the General Staff. See Alexander Korolev, "On the Verge of an Alliance: Contemporary China-Russia Military Cooperation," *Asian Security* (2018): 129-140, doi: 10.1080/14799855.2018.1463991, https://www.tandfonline.com/doi/full/10.1080/14799855.2018.1463991.

[24] "China and Russia Sign the 2017-2020 Military Cooperation Development 'Roadmap'" (*Zhong E Qianshu 2017- 2020 Nian Junshi Lingyu Hezuo Fazhan "Luxian tu"*; 中俄签署 2017-2020 年军事领域合作发展 "路线图"), *China News*, June 29, 2017, http://www.chinanews.com/mil/2017/06-29/8264778.shtml.

[25] Saunders, *Excel File with Data Used in Chinese Military Diplomacy, 2003–2016;* Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, 2018, https://media.defense.gov/2018/Aug/16/2001955282/-1/-1/1/2018-CHINA-MILITARY-POWER-REPORT.PDF.

[26] Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China*, 2018, 20.

[27] "China's Total Export & Import Values by Country/Region, December 2018 (in USD)," General Administration of Customs, People's Republic of China, Jan. 14, 2019, http://english.customs.gov.cn/Statics/a35889bb-1336-4a3d-a1af-55156eed4d3a.html; "China's Total Export & Import Values by Country/Region, December 2019 (in USD)," General Administration of Customs, People's Republic of China, Jan.14, 2020, http://english.customs.gov.cn /Statics/5892fd27-44c9-4f97-8dd2-192a9fe0739b.html; "China's Total Export & Import Values by Country/Region, December 2020 (in USD)," General Administration of Customs, People's Republic of China, Jan. 14,2021, http://english.customs.gov.cn/Statics/52e8f737-eaa9-4e74-ba62-b4ccbfb9bdfa.html.

[28] "NOVATEK Arctic LNG 2 Transaction," Novatek, July 22, 2019, https://www.novatek.ru/en/press/releases /index.php?id_4=3317; "NOVATEK and China's Silk Road Fund Conclude Selling 9.9% Stake in Yamal LNG," Novatek, Mar. 15, 2016, https://www.novatek.ru/en/press/releases/index.php?id_4=1165; "Yamal LNG Signed Loan Agreements with the Export-Import Bank of China and the China Development Bank," Yamal LNG, Apr. 29, 2016, https://www.novatek.ru/common/upload/doc/2016_04_29_press_release_Chinese_banks_FA_(ENG).pdf; Yun Sun, *The Northern Sea Route: The Myth of Sino-Russian Cooperation*, Stimson Center, 2018, https://www.stimson.org/sites/default/files/file-attachments/Stimson%20-%20The%20Northern%20Sea %20Route%20-%20The%20Myth%20of%20Sino-Russian%20Cooperation.pdf.

[29] Erica Downs, "China-Russia Energy Relations: Why the Power of Siberia Pipeline Matters to China," CNA In-Depth, Dec. 18, 2019, https://www.cna.org/news/InDepth/article?ID=25; Vladimir Soldatkin, "Putin and Xi Oversee Launch of Landmark Russian Gas Pipeline to China," Reuters, Dec. 2, 2019, https://www.reuters.com /article/us-china-russia-gas-start/putin-and-xi-oversee-launch-of-landmark-russian-gas-pipeline-to-china-idUSKBN1Y60X9.

[30] Downs, "China-Russia Energy Relations"; Vladimir Soldatkin, "Putin and Xi Oversee Launch of Landmark Russian Gas Pipeline to China," Reuters, Dec. 2, 2019, https://www.reuters.com/article/us-china-russia-gas- start/putin-and-xi-oversee-launch-of-landmark-russian-gas-pipeline-to-china-idUSKBN1Y60X9; Gleb Stolyarov, "Russia and China Deepen Ties with River Amur Bridge," Reuters, Nov. 29, 2019, https://www.reuters.com/article/russia-china-bridge/russia-and-china-deepen-ties-with-river-amur-bridge- idUSL8N28920Y; and "First Ever Railway Bridge Connecting Russia & China to Open in 2022," *RT*, Aug. 12, 2020, https://www.rt.com/business/497803-russia-china-first-railway-bridge/.

[31] "China Media Group, Rossiyskaya Gazeta Inaugurate Sino-Russia Commentary Workroom," China Plus, June 6, 2019, http://chinaplus.cri.cn/news/china/9/20190606/299283.html. Relatedly, in December 2019, a Russian state-owned television network aired a documentary accusing the United States of helping orchestrate the 2019 protests in Hong Kong. Thomas Grove, "Russia Gives China a Leg Up in Foreign Broadcasting," *Wall Street Journal*, Jan. 14, 2020, https://www.wsj.com/articles/russia-gives-china-a-leg-up-in-foreign-broadcasting-11579003202.

[32] Zhong Sheng, "Media Cooperation, Cooperate to Tell China and Russia's Story Well" (*Meiti Hezuo, Heli Jiang Hao Zhong E Gushi*; 媒体合作，合力讲好中俄故事), *People's Daily* (*Renmin Ribao;* 人民日报), June 23, 2015, http://world.people.com.cn/n/2015/0623/c1002-27192173.html.

[33] Ren Qi, "Chinese, Russian Media have Role in Virus Fight," *China Daily*, Dec. 19, 2020, https://www.chinadaily.com.cn/a/202012/19/WS5fdd3bb7a31024ad0ba9cc21.html.

[34] "Chinese Academy of Science Signs a Cooperation Agreement with the Russian Academy of Sciences" (*Zhongguo Kexue Yuan yu Eluosi Kexue Yuan Qianshu Hezuo Xieyi*;中国科学院与俄罗斯科学院签署合作协议), Chinese Academy of Science, June 10, 2018, http://www.cas.cn/tt/201806/t20180611_4652220.shtml; Yin Yeping, "Strengthening of China-Russia Technological Cooperation in Crucial: Envoy," *Global Times*, Sept. 8, 2020, https://www.globaltimes.cn/content/1200296.shtml; Samuel Bendett and Elsa Kania, "A New Sino-Russian High-Tech Partnership," Australian Strategic Policy Institute, Oct. 29, 2019, https://www.aspi.org.au/report/new-sino-russian-high-tech-partnership.

[35] "Joint Statement Between the People's Republic of China and the Russian Federation on Developing Comprehensive Partnership of Strategic Coordination for a New Era" (*Zhonghua Renmin Gongheuo he Eluosi Lianbang Guanyu Fazhan Xin Shidai Quanmian Zhanlve Xiezuo Huoban Guanxi de Lianhe Shengming (Quanwen)*; 中 华人民共和国和俄罗斯联邦关于发展新时代全面战略协作伙伴关系的联合声明（全文）).

[36] "Deputy Ministry of Science and Technology Yin Hejun Leads Delegation to Moscow" (*Keji Bu Fu Buzhang yin Hejun Lutuan Fangwen Mosike;* 科技部副部长阴和俊率团访问莫斯科), Embassy of the People's Republic of China in the Russian Federation (*Zhonghua Renmin Gongheguo Zhu Eluosi Lianbang Dashiguan*; 中华人民共和国驻俄罗 斯联邦大使馆), July 4, 2016, https://web.archive.org/web/20190923004735/http:/ru.chineseembassy.org/chn/kjhz/hzgk/t1377446.htm.

[37] "The Second Sino-Russian Innovation Dialogue Promotes Practical Cooperation" (*Di er jie Zhong E Chuangxin Duihua Tuidong Wushi Hezuo*; 第二届中俄创新对话推动务实合作), Xinhua, Oct. 17, 2018, http://www.gov.cn/xinwen/2018-10/17/content_5331568.htm; "The Third China-Russian Innovation Dialogue was Held in Shanghai" (*Di san jie Zhong E Chuangxin Duihua Zai Shanghai Juxing*; 第三届中俄创新对话在上海举行), Ministry of Science and Technology of the People's Republic of China, Oct. 9, 2019, http://www.most.gov.cn/kjbgz/201910/t20191009_149149.htm; "II Sino-Russian Forum 'Investments in Innovation," Government Fund of Funds Development Institute of the Russian Federation, https://www.rvc.ru/en/calendar/detail.php?id=106194.

[38] Bendett and Kania, "A New Sino-Russian High-Tech Partnership."

[39] Chen Na, "China, Russia Strengthen Cooperation in Atmospheric Optics Research," Chinese Academy of Sciences, June 11, 2019, https://english.cas.cn/newsroom/news/201906/t20190611_211244.shtml.

[40] "Xi, Putin Congratulate on Opening of China-Russia Scientific, Technological Innovation Year," Xinhua, Aug. 26, 2020, https://www.globaltimes.cn/content/1198943.shtml.

[41] Yin Yeping, "Strengthening of China-Russia Technological Cooperation in Crucial: Envoy."

[42] "Xi Jinping and Russia's President Putin Exchange Congratulations at the Opening Ceremony for the Year of Scientific and Technological Innovation" (*Xi Jinping Tong Eluosi Zongtong Pujing Fenbie Xiang Zhong E Keji Chuangxin Nian Kaimu Shi Zhi Hexin*; 习近平同俄罗斯总统普京分别向中俄科技创新年开幕式致贺信), Xinhua, Aug. 26, 2020, http://www.xinhuanet.com/politics/leaders/2020-08/26/c_1126416458.htm.

[43] Elizabeth Wishnick, "Sino-Russian Consolidation at a Time of Geopolitical Rivalry," *China Leadership Monitor* (Mar. 1, 2020), https://www.prcleader.org/elizabeth-wishnick; Bendett and Kania, "A New Sino-Russian High-Tech Partnership;" Yin Yeping, "Strengthening of China-Russia Technological Cooperation in Crucial: Envoy."

[44] Dimitri Simes, "Russia and Huawei Team Up as Tech Cold War Deepens," *Nikkei Asia*, Oct. 28, 2019, https://asia.nikkei.com/Politics/International-relations/Russia-and-Huawei-team-up-as-tech-cold-war-deepens.

[45] Matthew Walsh, "Sanctions-Hit Huawei to Open New R&D Centers in Russia: Reports," *Caixin*, Aug.19, 2019, https://www.caixinglobal.com/2019-08-19/sanctions-hit-huawei-to-open-new-rd-centers-in-russia-reports-101452468.html; Simes, "Russia and Huawei Team Up as Tech Cold War Deepens."

[46] "Russia's MTS and China's Huawei Sign Agreement on 5G," Reuters, June 5, 2019, https://www.reuters.com /article/huawei-tech-russia-mts/russias-mts-and-chinas-huawei-sign-agreement-on-5g-idUSR4N23602B; "MIPT and HUAWEI Started Cooperation in the Field of Artificial Intelligence," Moscow Institute of Physics and Technology, https://www.hpcwire.com/off-the-wire/huawei-mipt-establish-lab-to-develop-ai-tech/.

[47] Anders Åslund, "The Russian Economy in Health, Oil, and Economic Crisis," Atlantic Council, May 27, 2020, https://www.atlanticcouncil.org/commentary/long-take/the-russian-economy-in-health-oil-and-economic-crisis/; Jonathan E. Hillman, "China and Russia: Economic Unequals," Center for Strategic and International Studies, July 15, 2020, https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200715 _ChinaandRussia.pdf.

[48] Korolev, "On the Verge of an Alliance," p. 9; Medeiros and Chase, "Chinese Perspectives on the Sino-Russia Relationship," p. vi.

[49] A Russian senator speaking under the Chatham House Rule remarked, "The Chinese are arrogant. They are the stronger partner and can force us. And we are the weaker partner….Bad relations with the West are weakening our hand on China, and that motivates us to make deals with them." Michal Makocki and Nicu Popescu, *China and Russia: An Eastern Partnership in the Making?*, European Union Institute for Security Studies, 2016, https://www.iss.europa.eu/sites/default/files/EUISSFiles/CP_140_Russia_China.pdf, p. 18; and Gilbert Rozman, *The Sino-Russian Challenge to the World Order: National Identities, Bilateral Relations, and East Versus West in the 2010s* (Stanford: Woodrow Wilson Center Press, 2014), p. 251.

[50] Paul Stronski and Nicole Ng, *Cooperation and Competition: Russia and China in Central Asia, the Russian Far East, and the Arctic*, Carnegie Endowment for International Peace, 2018, https://carnegieendowment.org/2018/02/28 /cooperation-and-competition-russia-and-china-in-central-asia-russian-far-east-and-arctic-pub-75673; Jeffrey Mankoff, "Russia's Asia Pivot: Confrontation or Cooperation?," *Asia Policy* 19 (2015), doi: 10.1353/asp.2015.0009; Pavel K. Baev, "Russia's Pivot to China Goes Astray: The Impact on the Asia-Pacific Security Architecture," *Contemporary Security Policy* 37, no. 1 (2016), doi: doi.org/10.1080/13523260.2016.1149967.

[51] International Monetary Fund, *Coordinated Direct Investment Survey (CDIS)*, 2018, https://data.imf.org /regular.aspx?key=61227424.

[52] Chinese and Russia leaders rarely miss an opportunity to express their trust in each other and declare that theirs is a relationship characterized by great trust. In their 2019 statement, the first characteristic of the "current China-Russia relations" is "a high degree of political trust" and the first of the "basic principles to guide bilateral relations" is "mutual respect, equality, and trust." Joint Statement on Developing Comprehensive Partnership of Strategic Coordination for a New Era, June 5, 2019. However, in a 2016 article, Li Shuyin, director of the European Military Research Office at the Chinese Academy of Military Sciences, stated, "The mutual trust between the two is still insufficient." Similarly, in a 2018 analysis, a researcher with the Institute for

International Relations at China's Foreign Affairs University noted that China and Russia are "still lacking mutual trust." Li Shuyin, "Historical Study and Thinking on China-Russia Military Cooperation" (*Dui Zhonge Junshi Hezuo de Lishi Kaocha yu Sikao*; 对中俄军事合作的历史考察与思考), *Russia Journal* (*Eluosi Xue Kan;* 俄罗斯学刊) 3 (2016): 5.

[53] Zhao Huasheng, "Has There been a Change in the Nature of China-Russia Relations?" (*Zhong E Guanxi Zhibian le ma?;* 中俄关系质变了吗?), *Pengbo*, July 20, 2016. Cited in Mathieu Duchâtel, "China and Russia: Towards an Alliance Treaty?," *China and Russia: Gaming the West* (Oct. 2016), https://ecfr.eu/wp-content /uploads/ECFR_195_-_CHINA_AND_RUSSIA_GAMING_THE_WEST_002.pdf.

[54] Ted Galen Carpenter, "Caught in the Middle: Beijing's Reaction to US-Russian Tensions," China-US Focus, Nov. 10, 2014, https://www.chinausfocus.com/foreign-policy/caught-in-the-middle-beijings-reaction-to-us-russian-tensions.

[55] "UN Security Council Action on Crimea Referendum Blocked," *UN News*, Mar. 14, 2014, https://news.un.org /en/story/2014/03/464002-un-security-council-action-crimea-referendum-blocked. Carpenter, "Caught in the Middle."

[56]Wang Wei and Zhou Yuan, "China and Russia Deepen Human Spaceflight and Deep Space Exploration Cooperation" (*Zhongguo yu Eluosi Jiashen Zai Ren Hangtian yu Shen Kong Tance Hezuo;* 中国与俄罗斯加深载人航天与深空探测合作), *World Knowledge* (*Shijie Zhichi;* 世界知识) 2 (2021): 60.

[57] Lorenz M. Luthi, *The Sino-Soviet Split: Cold War in the Communist World* (Princeton: Princeton University Press, 2008), 92-113, 150-156.

[58] Wang Wei and Zhou Yuan, "China and Russia Deepen Human Spaceflight," 60-62.

[59] Li Mingsheng, *The Dream of a Thousand Years—The Story of How a Chinese First Left the Earth* (*Qiangu Yi Meng – Zhongguoren Di Yi Ci Likai Diqiu de Gushi;* 千古一梦 – 中国人第一次离开地球的故事), (Chengdu: Tiandi Press, 2016), 195.

[60] "The China-Russia Relationship (11)," (*Zhongguo Tong Eluosi Guanxi (11);* 中国同俄罗斯关系 (11)), Chinanews.com (*Zhongguo Xinwen Wang;* 中国新闻网), June 11, 2009, http://www.chinanews.com/gn/news/2009/06-11/1730337.shtml.

[61] Brian Harvey, *China in Space: The Great Leap* Forward (Chichester, UK: Springer-Praxis, 2013), 367.

[62] "China-Russia Commercial and Space Cooperation" (*Zhong E Shang Hangtian Hezuo*; 中俄商航天合作), *China News* (*Zhongguo Xinwen Wang;* 中国新闻网), May 27, 2000, http://www.chinanews.com/2000-5- 27/26/31400.html; "Joint Communique From the Ninth Regular Meeting of the Prime Ministers of China and Russia" *(Zhong E Zongli Di Jiu Ci Dingqi Huiwu Lianhe Gongbao (Quanwen)*, 《中俄总理第九次定期会晤联合公报》 (全文)), Sept. 26, 2004, http://www.huaxia.com/zt/tbgz/2004-87/793384.html; "Space Agency: China and Russia Exchange Views on Issues Such as the Outline of Space Cooperation Projects" (*Hangtian Ju: Zhong E Jiu Hangtian Hezuo Xiangmu Dagang Deng Wenti Jiaohuan Yijian*; 航天局：中俄就航天合作项目大纲等问题交换意见), *China News* (*Zhongguo Xinweng Wang:* 中国新闻网), July 13, 2009, https://www.chinanews.com/gn/news/2009/07- 13/1771957.shtml.

[63] Andrey Shelyutto, "Space in Chinese" (Космос по-китайски). *Kommersant (Коммерсантъ)*, Nov. 28, 2016, https://www.kommersant.ru/doc/3144562.

[64] "China-Russia Space Cooperation has Entered a New Stage of Major Strategic Cooperation" (*Zhong E Hangtian Hezuo yi Zhuan ru Zhongda Zhanlue Hezuo Xin Jieduan*; 中俄航天合作已转入重大战略合作新阶段), ChinaRu (*Zhong E Zixun Wang;* 中俄资讯网), Sept. 6, 2016, http://www.chinaru.info/News/zhongekuaixun/43698.shtml.

[65] State Council Information Office, *China's Space Activities in 2016*, Dec. 27, 2006, http://www.scio.gov.cn /zfbps/32832/Document/1537024/1537024.htm; State Council Information Office, "Joint Communique From the 21st Regular Meeting Between the Prime Ministers of China and Russia" (*Zhong E Zongji Di Ershiyi Ci Dingqi Huiwu*

Lianhe Gongbao; 中俄总理第二十一次定期会晤联合公报), *People's Daily*, Nov. 9, 2016, http://politics.people.com.cn/n1/2016/1109/c1001-28845796.html.

[66] "China-Russia Space Cooperation has Entered a New Stage."

[67] Shelyutto, "Space in Chinese"; Wang Wei and Zhou Yuan, "China and Russia Deepen Human Spaceflight," 61.

[68] Shelyutto, "Space in Chinese."

[69] "China-Russia Will Deepen Cooperation in Space and Other Fields" (*Zhongguo-Eluosi Liang Guo Jiang Zai Taikong he Qita Lingyu Jinxing Geng Shenru Hezuo*; 中国-俄罗斯两国将在太空和其他领域进行更深入合作), *Science and Technology Daily* (*Keji Ribao;* 科技日报), Dec. 19, 2017, http://stdaily.com/zhuanti01/tjyzsc/2017-12/19/content_610256.shtml.

[70] Shelyutto, "Space in Chinese."

[71] "Russian, Chinese Firms to Develop New-generation Liquid Rocket Propellants," *DefenseWorld.net*, Nov. 9, 2018, https://www.defenseworld.net/news/23640/Russian__Chinese_Firms_to_Develop_New_generation_Liquid_Rocket_Propellants#.YD6XZiBOlhE; "China-Russia Will Deepen Cooperation in Space and Other Fields" (*Zhongguo-Eluosi Liang Guo Jiang Zai Taikong he Qita Lingyu Jinxing Geng Shenru Hezuo*; 中国-俄罗斯两国将在太空和其他领域进行更深入合作)."

[72] Wu Yan, "China-Russia Space Cooperation is Broad" (*Zhong E Hangtian Lingyu Hezuo Kongjian Guangkuo*; 中俄航天领域合作空间广阔), *People's Daily*, Apr. 17, 2018, http://world.people.com.cn/n1/2018/0417/c1002-29930025.html; "Notice on Soliciting Project Proposals for the 'China-Russia Space Cooperation Program 2018-2022' " (*Guanyu Zhengji '2018-2022 Nian Zhong E Hangtian Hezuo Dagang' Xiangmu Jianyi de Tongzh*i; 关于征《2018-2022 年中俄航天合作大纲》项目建议的通知), Northwestern Polytechnical University School of Astronautics (*Xibei Gongye Daxue Hangtian Xueyuan*; 西北工业大学航天学院), Mar. 24, 2017, https://hangtian.nwpu.edu.cn/info/1371/10283.htm; Han Jitao, "China-Russia Space Cooperation Benefits Asia-Pacific Countries" (*Zhong E Hangtian Hezuo Youyi yu Yatai Guojia;* 中俄航天合作有益于亚太国家), China Radio International, Sept. 8, 2017, http://news.cri.cn/20170908/6382b28c-8f9b-aa9c-c126-965c4a8117cf.html.

[73] Han Jitao, "China-Russia Space Cooperation Benefits Asia-Pacific Countries" (*Zhong E Hangtian Hezuo Youyi yu Yatai Guojia;* 中俄航天合作有益于亚太国家).

[74] "China Eyes Closer Aerospace Cooperation With Russia," *China Daily*, Aug. 17, 2011, http://www.chinadaily.com.cn/world/2011-08/17/content_13137393.htm.

[75] Wu Yan, "China-Russia Space Cooperation is Broad" (*Zhong E Hangtian Lingyu Hezuo Kongjian Guangkuo*; 中俄航天领域合作空间广阔).

[76] "China and Russia Sign a Memorandum of Understanding Regarding Cooperation for the Construction of the International Lunar Research Station," CNSA, Mar. 9, 2021, http://www.cnsa.gov.cn/english/n6465652/n6465653/c6811380/content.html; "China Aims to Launch Chang'e-6 Lunar Probe Around 2024," *CGTN*, Apr. 25, 2021, http://eng.chinamil.com.cn/view/2021-04/25/content_10028740.htm.

[77] China National Space Administration and Roscosmos, "International Lunar Research Station (ILRS) Guide for Partnership," June 16, 2021, http://www.cnsa.gov.cn/english/n6465652/n6465653/c6812150/content.html.

[78] China National Space Administration and Roscosmos, "International Lunar Research Station (ILRS) Guide for Partnership."

[79] A sixth mission involving the Chang'e-5T was conducted to test reentry technologies and procedures and is not counted here.

[80] Stanley Reed, "Britain is Getting Ready for its Space Race," *New York Times*, Oct. 6, 2020, https://www.nytimes.com/2020/10/06/business/britain-satellites-brexit.html.

[81] Reed, "Britain is Getting Ready for its Space Race"; Adam Mann, "China's Chang'e Program: Missions to the Moon," Space.com, Feb. 1, 2019, https://www.space.com/43199-chang-e-program.html.

[82] Reed, "Britain is Getting Ready for its Space Race."

[83] Mann, "China's Chang'e Program."

[84] Andrew Jones, "Chang'e-5 Orbiter Embarks on Extended Mission to Sun-Earth Lagrange Point," *SpaceNews,* Dec. 21, 2020, https://spacenews.com/change-5-orbiter-embarks-on-extended-mission-to-sun-earth-lagrange-point/.

[85] Deng Xiaoci, "Russia Opting for Moon Base Cooperation With China Over US 'Not Surprising,'" *Global Times*, Feb. 18, 2021, https://www.globaltimes.cn/page/202102/1215828.shtml.

[86] "China Aims to Launch Chang'e-6 Lunar Probe Around 2024."

[87] Jin Feng (金凤) and Zhang Ye (张晔), "The Chang'e-6 Mission is to be Implemented in 2024, Targeting the Lunar South Pole!" (*Chang'e liu Hao Renwu ni 2024 Nian Shishi, Mubiao Yuqiu Nanji*!; 嫦娥六号任务拟 2024 年实施，目 标月球南极!), *Science and Technology Daily* (*Keji Ribao;* 科技日报), Apr. 25, 2021, https://baijiahao.baidu.com/s?id=1697993816350524319&wfr=spider&for=pc.

[88] "Chang'e-6/7/8, Lunar Research Station 'Arranged' | Decoding the '14th Five-Year Plan'" (*Chang'e LiuQi/Ba Hao, Yueqiu Keyan Zhan 'Anpai Shang le' Jiema 'Shisiwu';* 嫦娥六/七/八号、月球科研站"安排上了"丨解码"十四五"), CNSA, Mar. 22, 2021, http://www.cnsa.gov.cn/n6758823/n6758838/c6811422/content.html; Stephen Clark, "Russia Looks to China as New Space Exploration Partner," *Spaceflight Now*, Mar. 15, 2021, https://spaceflightnow.com/2021/03/15/russia-looks-to-china-as-new-space-exploration-partner/; Steven Lee Myers, "China and Russia Agree to Explore the Moon Together," *New York Times*, Mar. 10, 2021, https://www.nytimes.com/2021/03/10/world/asia/china-russia-moon.html.

[89] "China Unveils Follow-up Lunar Exploration Missions," Xinhua, Jan. 14, 2019, http://www.xinhuanet.com/english/2019-01/14/c_137743306.htm.

[90] "Chang'e-6/7/8, Lunar Research Station 'Arranged' | Decoding the '14th Five-Year Plan' (*Chang'e LiuQi/Ba Hao, Yueqiu Keyan Zhan 'Anpai Shang le' Jiema 'Shisiwu';* 嫦娥六/七/八号、月球科研站"安排上了"丨解码"十四五").

[91] "China Aims to Launch Chang'e-6 Lunar Probe Around 2024."

[92] Jamie Carter, "A Soviet-Era 'Moon Digger' Program Is Being Revived To Hunt For Water At The Moon's South Pole," Forbes, July 26, 2019, https://www.forbes.com/sites/jamiecartereurope/2019/07/26/what-is-luna-27-a-soviet-era-moon-digger-revived-to-hunt-for-water-at-the-moons-south-pole/?sh=1a59e2f22268.

[93] "Luna 25," NASA, https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=LUNA-25.

[94] Carter, "Soviet-Era 'Moon Digger' Program."

[95] "Russia to Start Production of Instruments for Luna-26 Orbiter by Year End," TASS, May 15, 2020, https://tass.com/science/1156817.

[96] Carter, "Soviet-Era 'Moon Digger' Program."

[97] "Russia's Sample Mission to Moon Scheduled for 2026-2027," TASS, Oct. 8, 2019, https://tass.com/science/1081926.

[98] "China and Russia Sign a Memorandum of Understanding Regarding Cooperation for the Construction of the International Lunar Research Station." CNSA, Mar. 9, 2021. http://www.cnsa.gov.cn/english/n6465652/n6465653/c6811380/content.html.

[99] "China and Russia Sign a Memorandum of Understanding Regarding Cooperation for the Construction of the International Lunar Research Station."

[100] "Chang'e-6/7/8, Lunar Research Station 'Arranged' | Decoding the '14th Five-Year Plan'" (*Chang'e LiuQi/Ba Hao, Yueqiu Keyan Zhan 'Anpai Shang le' Jiema 'Shisiwu';* 嫦娥六/七/八号、月球科研站"安排上了"丨解码"十四 五").

[101] "China, Russia to Jointly Build Lunar Post," *China Daily*, Mar. 10, 2021, http://eng.chinamil.com.cn/view/2021-03/10/content_10000480.htm.

[102] "Russian-Chinese Cooperation on Lunar Station is not Aimed Against the West—Space Chief," TASS, Mar. 16, 2021, https://tass.com/science/1266253.

[103] Russia Ready to Foster Cooperation with China In Space, Says Roscosmos Head," Xinhua, June 21, 2021, http://www.xinhuanet.com/english/europe/2021-06/18/c_1310015213.htm.

[104] "International Lunar Research Station (ILRS) Guide for Partnership."

[105] "International Lunar Research Station (ILRS) Guide for Partnership."

[106] Andrew Jones, "China, Russia, Open Moon Base Project to International Partners, Early Details Emerge," *SpaceNews,* Apr. 26, 2021, https://spacenews.com/china-russia-open-moon-base-project-to-international-partners-early-details-emerge/.

[107] Jones, "China, Russia, Open Moon Base Project"; "Joint Declaration of Roscosmos and CNSA on Creation of Lunar Station."

[108] "China Reveals Moon Station plan with Russia, Openness on Space Day," *Global Times*, Apr. 25, 2021, http://eng.chinamil.com.cn/view/2021-04/25/content_10028509.htm.

[109] Andrew Jones, "China, Russia Enter MoU on International Lunar Research Station," *SpaceNews*, Mar. 9, 2021, https://spacenews.com/china-russia-enter-mou-on-international-lunar-research-station/.

[110] NASA, The Artemis Accords, 2020, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf. The 11 signatory countries are Australia, Canada, Italy, Japan, Luxembourg, New Zealand, South Korea, Ukraine, the United Arab Emirates, the United Kingdom, and the United States.

[111] NASA, *Artemis Accords.*

[112] "Foreign Ministry Spokesperson Zhao Lijian's regular press conference on October 15, 2020" (*2020 Nian 10 Yue 15 Ri Waijiao Bu Fayanren Zhao Lijian Zhuchi Li Xing Jizhe Hui*; 2020 年 10 月 15 日外交部发言人赵立坚主持例行 记者会), Ministry of Foreign Affairs, Oct. 15, 2020, https://www.fmprc.gov.cn/ce/cemd/chn/fyrth/t1824239.htm.

[113] "Dmitry Rogozin's Interview 'KP'" (Интервью Дмитрия Рогозина «КП»), Roscosmos, July 13, 2020, https://www.roscosmos.ru/28810/.

[114] "Head of RSC Energia: the Lunar Station will Allow to Fly to the Moon, Mars and Asteroids," (Глава РКК "Энергия": окололунная станция позволит полететь к Луне, Марсу и астероидам)," Energia, February 3, 2020, https://www.energia.ru/ru/news/news-2020/news_03-02.html.

[115] "Foreign Ministry Spokesperson Zhao Lijian's regular press conference on Oct. 15, 2020" (*2020 Nian 10 Yue 15 Ri Waijiao Bu Fayanren Zhao Lijian Zhuchi Li Xing Jizhe Hui*; 2020 年 10 月 15 日外交部发言人赵立坚主持例行记 者会)."

[116] "The United States Intends to Win Over Allies to Promote International Agreements and Set Rules for Lunar Mining (*Chen Sijia Meiguo Ni Lalong Mengguo Tuidong Guoji Xieyi Wei Yueqiu Caikuang Li Guiju Guancha Zhe*; 陈思 佳 美国拟拉拢盟国推动国际协议，为月球采矿立规矩 观察者)," *Guancha*, May 6, 2020, https://www.guancha.cn /internation/2020_05_06_549365.shtml.

[117] Wang Guoyu, "NASA's Artemis Accords: The Path to a United Space Law of a Divided One?," *The Space Review*, Aug. 24, 2020, https://www.thespacereview.com/article/4009/1.

[118] Deng Xiaoci, "Russia Opting for Moon Base Cooperation with China Over US 'Not Surprising'."

[119] Ren Qi, "China, Russia will Explore Moon Water," *China Daily*, Jan. 17, 2019, http://www.chinadaily.com.cn /a/201901/17/WS5c3fdde7a3106c65c34e4f76.html.

[120] "China Reveals Moon Station plan with Russia, Openness on Space Day."

[121] "Russian National Station Deployed in Orbit by 2035" (Российскую национальную станцию развернут на орбите к 2035 году), Roscosmos, Apr. 25, 2021, http://www.roscosmos.ru/30869/; "Roscosmos Showed the First Module of the New Orbital Station" (Роскосмос показал первый модуль новой орбитальной станции), Roscosmos, Apr. 23, 2021, http://www.roscosmos.ru/30858/.

[122] "Russia to Quit Int'l Space Station in 2025 – Reports," *Moscow Times*, Apr. 29, 2021, https://www.themoscowtimes.com/2021/04/19/russia-to-quit-intl-space-station-in-2025-reports-a73643.

[123] Irene Klotz, "Russia Eyes Cooperation with China Space Station," *Aviation Week*, Apr. 2, 2021, https://aviationweek.com/defense-space/space/russia-eyes-cooperation-china-space-station and Andrew Jones, "Russia Wants to Send Cosmonauts to China Space Station," *SpaceNews*, June 22, 2021, https://www.space.com/russia-cosmonauts-may-visit-china-space-station.

[124] "Rogozin: Russia Will Not Build Its Own Space Station if US Sanctions are Lifted" (Рогозин: Россия не будет строить свою космическую станцию в случае снятия санкций США), *Kommersant (Коммерсантъ)*, June 7, 2021, https://www.kommersant.ru/amp/4848270 and Kristin Fisher, "'Divorce is not possible' with US over Space Station, Says Russian Space Chief Who Threatened to Pull Out," CNN, Sept. 2, 2021, https://www.cnn.com/2021/09/02/world/russian-space-chief-iss-nasa-roscosmos-scn/index.html.

[125] Andrew Chuter, "Former Fighter Pilot Picked to Lead British Military's Space Command," *Defense News*, Jan. 15, 2020, https://www.defensenews.com/global/europe/2020/01/15/former-fighter-pilot-picked-to-lead-british- militarys-space-command/; Ministry of Foreign Affairs, "Joint Communiqué of the 25th Regular Meeting Between Chinese and Russian Prime Ministers (full text)" ('*Zhong E Zongli Di Ershiwu Ci Dingqi Huiwu Lianhe Gongbao' Fabiao, Zhuli Zhong E Weixing Daohang Hezuo Zou Shen Zou Shi*; 中俄总理第二十五次定期会晤联合公报》发表，助力中俄卫星导航合作走深走实), Dec. 3, 2020, http://www.beidou.gov.cn/yw/xwzx/202012 /t20201207_21688.html.

[126] "Russia's Future Space Observatory to be able to Search for Other Civilizations – Roscosmos," TASS, May 28, 2020, https://tass.com/science/1161355.

[127] Minnie Chan, "China-Russia Space Cooperation: Another Small Step in Beijing's Pursuit of US?," *South China Morning Post*, Dec. 3, 2020, https://sg.news.yahoo.com/china-russia-space-cooperation-another-135626014.html.

[128] Chan, "China-Russia Space Cooperation."

[129] Chan, "China-Russia Space Cooperation."

[130] Daniel Clery, "Update: Telescope Designed to Study Mysterious Dark Energy Keeps Russia's Space Science Hopes Alive," *Science*, July 15, 2019, https://www.sciencemag.org/news/2019/07/update-telescope-designed-study-mysterious-dark-energy-keeps-russia-s-space-science.

[131] SASTIND, "The meeting of the Space Cooperation Subcommittee of the China-Russia Prime Ministers Regular Meeting Committee was held" (*Zhong E Zongli Dingqi Huiwu Weiyuanhui Hangtian Hezuo Fen Weihui Huiyi Juxing;* 中俄总理定期会晤委员会航天合作分委会会议举行), July 16, 2007, http://www.gov.cn/gzdt/2007-07/16 /content_686579.htm; "The 16th Meeting of the China-Russia Space Cooperation Sub-Committee was Held in Moscow" (*Zhong E Hangtian Hezuo Fen Weihui Di Shiliu Ci Huiyi Zai Mosike Zhaokai*; 中俄航天合作分委会第十六次会议在莫斯科召开), CNSA, Sept. 11, 2015, http://www.cnsa.gov.cn/n6758823/n6758838/c6770359 /content.html.

[132] "My Country's 'Yinghuo-1' Mars Rover Will be Launched in November This Year" (*Wo Guo 'Yinghuo Yi Hao' Huoxing Tance Qi Jiang Yu Jinnian 11 Yue Fashe;* 我国"萤火一号"火星探测器将于今年 11 月发射), CNSA, Oct. 21, 2011, http://www.cnsa.gov.cn/n6758823/n6758838/c6771393/content.html.

[133] "On the Situation with the Phobos-Grunt Spacecraft" (О ситуации с космическим аппаратом «Фобос-Грунт»), Roscosmos, Nov. 9, 2011, http://www.roscosmos.ru/17718/.

[134] Andrew Kramer, "Russia's Failed Mars Probe Crashes Into Pacific," *New York Times*, Jan. 15, 2012, https://www.nytimes.com/2012/01/16/science/space/russias-phobos-grunt-mars-probe-crashes-into-pacific.html; "On the Situation with the Phobos-Grunt Spacecraft" (О ситуации с космическим аппаратом «Фобос-Грунт»).

[135] "The Main Provisions of the Conclusion of the Interdepartmental Commission for the Analysis of the Causes of the Emergency Situation, Which Arose in the Course of Flight Tests of the Phobos-Grunt Spacecraft" (Основные положения Заключения Межведомственной комиссии по анализу причин нештатной ситуации, возникшей в процессе проведения летных испытаний космического аппарата «Фобос-Грунт»), Roscosmos, Feb. 3, 2012, http://www.roscosmos.ru/18126/.

[136] Stephen Clark, "Russia: Computer Crash Doomed Phobos-Grunt," *Spaceflight Now*, Feb. 6, 2012, https://spaceflightnow.com/news/n1202/06phobosgrunt/.

[137] "Russia Joins China's Mission to Sample an Asteroid and Study a Comet," *Space.com*, Apr. 18, 2021, https://www.space.com/russia-joins-china-asteroid-comet-mission.

[138] "China Aims to Launch Chang'e-6 Lunar Probe Around 2024."

[139] "China-Russia will Cooperate more Deeply in Space and Other Fields" (*Zhongguo-Eluosi Liang Guo Jiang zai Taikong he Qita Lingyu Jinxing Geng Shenru Hezuo*; 中国-俄罗斯两国将在太空和其他领域进行更深入合作), *Daily Economic News* (*Mei Ri Jingji Xinwen;* 每日经济新闻), Dec. 19, 2017, http://stdaily.com/zhuanti01/tjyzsc/2017-12/19/content_610256.shtml.

[140] "Russia Helping China to Create Early Missile Warning System, Says Putin," TASS, Oct. 3, 2019, https://tass.com/defense/1081383.

[141] Ji Wenbo (姬文波), "Project 640: China's First-generation Anti-missile System (*640 Gongcheng: Zhongguo Di Yi Dai Fan Dao Xitong de Yanzhi*; 640 工程:中国第一代反导系统的研制)," *Party History Gathering* (*Dang Shi Bo Cai;* 党史博采) (May 2019): 60.

[142] Mark Stokes, *China's Strategic Modernization: Implications for the United States* (Strategic Studies Institute, 1999), 115.

[143] US Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020*, 2020, 73.

[144] Andrew Jacobs and Jonathan Ansfield, "With Defense Test, China Shows Displeasure of U.S.," *New York Times*, Jan. 12, 2010, https://www.nytimes.com/2010/01/13/world/asia/13china.html.

[145] Zhao Lei, "China Tests its Missile Interception Equipment," *China Daily*, Feb. 6, 2021, https://www.chinadaily.com.cn/a/202102/06/WS601dd244a31024ad0baa7a6e.html.

[146] "China, Russia Developing 'Increasingly Capable' Missile Defenses: Pentagon," *DefenseWorld.net*, July 29, 2020, https://www.defenseworld.net/news/27529/China Russia_Developing Increasingly_Capable Missile_Defense s Pentagon#.X2pI3CB7lhE.

[147] "Statement of the Chinese Delegation at the Thematic Discussion on Nuclear Weapons at the First Committee of the 75th Session of the UNGA" (Permanent Mission of the People's Republic of China to the UN, Oct. 26, 2020), https://www.fmprc.gov.cn/ce/ceun/eng/chinaandun/disarmament_armscontrol/unga/t1831640.htm.

[148] Jing-dong Yuan, "Chinese Responses to U.S. Missile Defenses: Implications for Arms Control and Regional Security," *The Nonproliferation Review,* Spring (2003): 79-85.

[149] "Statement of H. E. Mr. Geng Shuang, Head of the Chinese Delegation and Deputy Permanent Representative at the General Debate of the First Committee of the 75th Session of the UNGA," Chinese Mission to the United

Nations, Oct. 12, 2020, https://www.fmprc.gov.cn/mfa_eng/wjb_663304/zwjg_665342/zwbd_665378/t1823442.shtml.

[150] Yuan, "Chinese Responses to U.S. Missile Defenses," 83.

[151] Yang Yucai, "China-Russia Missile Defense Cooperation Needed," *Global Times*, Oct. 14, 2019, https://www.globaltimes.cn/content/1166852.shtml.

[152] "China Warns of Response to U.S. Missile Defense," *Global Security Newswire*, July 19, 2012, http://www.nti.org/gsn/article/china-warns-response/.

[153] "Liaowang: Explaining China's Missile Defense Interception Test" (*Liangwang Zhoukan: Zhongguo Fan Dao Lanjie Jishu Shiyan Jiedu*; 《瞭望》周刊：中国反导拦截技术试验解读), Xinhua, Jan. 18, 2010, http://news.xinhuanet.com/mil/2010-01/18/content_12828435.htm.

[154] Song Xiaojun (宋晓军), "Song Xiaojun: Ground-based Midcourse Missile Defense Requires Ballistic Missile Warning Satellites" (*Song Xiaojun: Lu Ji Zhongduan Fan Dao Cheng Junxu Dandao Daodan Yujing Weixing*; 宋晓军： 陆基中段反导成军需弹道导弹预警卫星), Sina, Jan. 28, 2013, http://mil.news.sina.com.cn/2013-01-28/0917714065.html.

[155] "China and the U.S. Cross Swords Over Missile Defense: Attacking and Suppressing the Region's 'Missile Fever' (*Zhong Mei Fan Dao Jiaofeng Ancang Xuanji: Chu Zhao Yazhi Zhoubian*; 中美反导交锋暗藏玄机：出招压制周边'导 弹热')," Feb. 1, 2013, http://blog.huanqiu.com/dongxu/2013-02-01/2683; Cheng Min, "Why Midcourse Interception? Translating Midcourse Missile Defense Interception Systems" (*Weishenme Shi Zhongduan Lanjie? Jiedu Zhongduan Fan Dao Lanjie Xitong*; 为什么是中段拦截？解读中段反导拦截系统), *Weapons Knowledge* (*Bingqi Zhishi;* 兵器知识) (Mar. 2010): 53; "China's Missile Defense Test Shocks the World" (*Zhongguo Fan Dao Lanjie Shiyan Zhenjing Quanqiu*; 中国反导拦截试验震惊全球), *Happiness* (*Xingfu;* 幸福) (Sept. 2010); "The Dance of the Heavenly Sword: A Comprehensive Analysis of Ground-based Midcourse Missile Defense Technology" (*Zhang Jian Yitian Wu Zhenjian Dui Maimang: Lu Ji Zhongduan Fan Dao Jishu Mianmianguan*; 长剑倚天舞 针尖对麦芒:陆基中段 反导技术面面观), *China Space News* (*Zhongguo Hangtian Bao;* 中国航天报) (2013): 4; Xie Ruiqiang, "China and Russia Successfully Held Anti-missile Computer Exercises, Both Countries Have Room for Deepening Anti-missile Cooperation" (*Zhong E Chenggong Juxing Fan Dao Jisuanji Yanxi, Liang Guo Fan Dao Hezuo Hai You Shenhua Kongjian*; 中俄成功举行反导计算机演习，两国反导合作还有深化空间), *The Paper* (*Pengpai*; 澎湃), Dec. 17, 2017, https://www.thepaper.cn/newsDetail_forward_1909843.

[156] US Department of Defense, *Chinese And Russian Missile Defense: Strategies and Capabilities*, July 2020, https://media.defense.gov/2020/Jul/28/2002466237/-1/-1/1/CHINESE_RUSSIAN_MISSILE_DEFENSE_FACT_SHEET.PDF.

[157] US Department of Defense, *Chinese And Russian Missile Defense*; "Russia Completes Delivery of Second S-400 Missile System Regimental Set to China – Source," TASS, Jan. 26, 2020, https://tass.com/world/1113113.

[158] US Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020*, 73.

[159] US Department of Defense, *Military and Security Developments,* 73.

[160] US Department of Defense, *Military and Security Developments,* 73.

[161] "Land Warfare Platforms: Artillery & Air Defence - HQ-9," Janes, Apr. 27, 2020.

[162] "S-400 Triumf (SA-21 'Growler')," *Jane's Strategic Weapon Systems,* July 17, 2013.

[163] US Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020*, 10, 89.

[164] "HQ-19 (S-400)," *Jane's Strategic Weapon Systems,* Aug. 19, 2013.

[165] US Department of Defense, *Military and Security Developments Involving the People's Republic of China 2020*.

[166] Vasily Kashin, "Chinese–Russian Ballistic Missile Cooperation Signals Deepening Trust," East Asia Forum, Feb. 20,2021,https://www.eastasiaforum.org/2021/02/20/chinese-russian-ballistic-missile-cooperation-signals-deepening-trust/.

[167] Kashin, "Chinese–Russian Ballistic Missile Cooperation."

[168] Kashin, "Chinese–Russian Ballistic Missile Cooperation."

[169] Kashin, "Chinese–Russian Ballistic Missile Cooperation."

[170] Kashin, "Chinese–Russian Ballistic Missile Cooperation"; Alexander Korolev, "China–Russia Cooperation on Missile Attack Early Warning Systems," East Asia Forum, Nov. 20, 2020, https://www.eastasiaforum.org/2020/11/20/china-russia-cooperation-on-missile-attack-early-warning-systems/.

[171] Xie Ruiqiang, "China and Russia Successfully Held Anti-missile Computer Exercises, Both Countries Have Room for Deepening Anti-missile Cooperation" (*Zhong E Chenggong Juxing Fan Dao Jisuanji Yanxi, Liang Guo Fan Dao Hezuo Hai You Shenhua Kongjian*; 中俄成功举行反导计算机演习，两国反导合作还有深化空间).

[172] "Russia, China to Hold 1st Computer-Assisted Missile Defense Drills in May," TASS, Apr. 29, 2016, https://tass.com/defense/873381.

[173] "China and Russia Jointly Hold 'Aerospace Security-2016' Joint Anti-missile Computer Exercise" (*Zhong E Gongtong Juxing 'Kong Tian Anquan-2016' Lianhe Fan Dao Jisuanji Yanxi*; 中俄共同举行 '空天安全-2016' 联合反导计算机演习), Ministry of National Defense, May 3, 2016, http://www.mod.gov.cn/topnews/2016-05/03/content_4652495.htm.

[174] Liu Yang and Liu Yupeng, "China-Russia 'Aerospace Security-2017' Joint Counter-Director Xi Opens Today" (*Zhong E 'Kong Tian Anquan-2017' Lianhe Fan Dao Yanxi Jinri Kaiqi*; 中俄 '空天安全-2017' 联合反导演习今日开启), Xinhua, Dec. 11, 2017, http://www.xinhuanet.com/mil/2017-12/11/c_129762153.htm.

[175] "Ministry of National Defense: China and Russia will Strengthen Cooperation in the Field of Air Defense and Anti-missile" (*Guofang Bu: Zhong E Jiang Jiaqiang Zai Fangkong Fan Dao Lingyu de Hezuo*; 国防部：中俄将加强在防空反导领域的合作), Ministry of Defense, Nov. 30, 2017, http://www.mod.gov.cn/jzhzt/2017-11/30/content_4798721.htm.

[176] "China-Russia 'Aerospace Security-2017' Joint Counter-Director Xi Opens Today" (*Zhong E 'Kong Tian Anquan-2017' Lianhe Fan Dao Yanxi Jinri Kaiqi*; 中俄 '空天安全-2017' 联合反导演习今日开启).

[177] "The Ministry of National Defense's Press Office Answers Reporters' Questions on China-Russia Anti-missile Computer Exercises" (*Guofang Bu Xinwen Ju Jiu Zhong E Juxing Fan Dao Jisuanji Yanxi Da Jizhe Wen*; 国防部新闻局就中俄举行反导计算机演习答记者问), State Council Information Office, Dec. 11, 2017, http://www.scio.gov.cn/xwfbh/gbwxwfbh/xwfbh/gfb/Document/1613255/1613255.htm.

[178] "China-Russia missile defense command post exercises to be held in Russia in 2019" (Командно-штабные учения Китая и России по ПРО пройдут в 2019 году в РФ), TASS, Apr. 25, 2019, https://tass.ru/mezhdunarodnaya-panorama/6375197; Joshua Posaner, "Germany Wary of Macron's Space Force," *Politico,* July 24, 2019, https://www.politico.eu/article/germany-wary-emmanuel-macron-space-force/.

[179] "China, Russia Extend Notification Agreement for Ballistic Missile, Carrier Rocket Launches, " Xinhua, Dec. 15, 2020, http://www.xinhuanet.com/english/europe/2020-12/15/c_139591997.htm.

[180] Luke Champlin, "China, Russia Agree on Launch Notification," Arms Control Association, Nov., 2009, https://www.armscontrol.org/act/2009-11/china-russia-agree-launch-notification.

[181] Wu Yan, "China-Russia Space Cooperation is Broad" (*Zhong E Hangtian Lingyu Hezuo Kongjian Guangkuo*; 中俄航天领域合作空间广阔).

[182] "China and Russia Sign a Cooperation Agreement on Space Debris Monitoring and Data Applications" (*Zhong E Liang Guo Hangtian Jigou Qianshu Kongjian Suipian Jiance he Shuju Yingyong Hezuo Xieding*; 中俄两国航天机构签署 空间碎片监测和数据应用合作协定), Nov. 11, 2018, http://www.gov.cn/xinwen/2018-11/11/content_5339230.htm.

[183] "China-Russia Satellite Navigation System Achieves Major Strategic Cooperation" (*Zhong E Weixing Daohang Xitong Shixian Zhongda Zhanlue Hezuo*; 中俄卫星导航系统实现重大战略合作), CCTV, Sept. 3, 2019, https://www.sohu.com/a/338402171_362042.

[184] "Agreement on China-Russia Intergovernmental Cooperation on Satellite Navigation of Signed in Beijing," Beidou, Nov. 7, 2018, http://en.beidou.gov.cn/WHATSNEWS/201811/t20181113_16594.html.

[185] "China Space Administration: China-Russia Space Cooperation has Entered a Major Strategic Cooperation Stage" (*Zhonguo Hangtian Ju: Zhong E Hangtian Hezuo Zhuan Reu Zhongda Zhanlue Hezuo Jieduan*; 中国航天局： 中俄航天合作转入重大战略合作阶段)," *Sputnik,* Sept. 6, 2016, http://www.crs.shisu.edu.cn/4a/86/c4109a84614/page.htm.

[186] George Allison, "New RAF Space Command to Launch Rockets from Scotland," *UK Defense Journal*, Nov. 19, 2020, https://ukdefencejournal.org.uk/new-raf-space-command-to-launch-rockets-from-scotland/.

[187] China Satellite Navigation Office, *Development of the BeiDou Navigation Satellite System (Version 4.0)*, 2019, http://www.beidou.gov.cn/xt/gfxz/201912/P020191227430565455478.pdf.

[188] Richard B. Langley, "Innovation: GLONASS — Past, Present and Future," *GPS World*, Nov. 1, 2017, https://www.gpsworld.com/innovation-glonass-past-present-and-future/; "GPS vs GLONASS," GPS Server, https://www.gps-server.net/gps-vs-glonass.

[189] Wu Yan, "China-Russia Space Cooperation is Broad" (*Zhong E Hangtian Lingyu Hezuo Kongjian Guangkuo*; 中俄 航天领域合作空间广阔).

[190] "Russia, China Develop Navigation System Draft for SCO, BRICS," Sputnik, Dec. 16, 2015, https://www.gpsdaily.com/reports/Russia_China_Develop_High_Precision_Navigation_System_Draft_for_SCO_BRICS_999.html.

[191] "Russia, China Develop Navigation System Draft."

[192] "Russia May Join Forces with China to Compete with US, European Satnavs," *Russia Times*, June 6, 2014, https://www.rt.com/news/164192-russia-china-gps-competitor/.

[193] "Viewing China-Russia Cooperation from the Perspective of Satellite Navigation" (*Cong Weixing Daohang Kan Zhong E Daguo Hezuo*; 从卫星导航看中俄大国合作), Beidou, Sept. 19, 2019, http://www.beidou.gov.cn/yw/xwzx/201909/t20190923_19011.html.

[194] "China-Russia Satellite Navigation System Achieves Major Strategic Cooperation" (*Zhong E Weixing Daohang Xitong Shixian Zhongda Zhanlue Hezuo*; 中俄卫星导航系统实现重大战略合作); "Russia-China Project Committee on Important Strategic Cooperation in Satellite Navigation," GLONASS, https://www.glonass-iac.ru/en/BEIDOU/committee_en.php.

[195] "Russia-China Project Committee on Important Strategic Cooperation."

[196] "Viewing China-Russia Cooperation."

[197] "Viewing China-Russia Cooperation."

[198] "China and Russia Sign Aerospace Components Deal," *Janes*, Dec. 21, 2015, https://www.janes.com/defence-news/news-detail/chinese-defence-giants-sign-partnership-deal.

[199] "Viewing China-Russia Cooperation."

[200] "Viewing China-Russia Cooperation."

[201] "Viewing China-Russia Cooperation."

[202] The agreement is called the "Cooperation Agreement between the Government of the People's Republic of China and the Government of the Russian Federation on the Peaceful Use of BeiDou and GLONASS Global Navigation Satellite Systems." See "Viewing China-Russia Cooperation," and "Agreement on China-Russia Intergovernmental Cooperation."

[203] "The 'Cooperation Agreement between the Government of the People's Republic of China and the Government of the Russian Federation on the Peaceful Use of BeiDou and GLONASS Global Navigation Satellite Systems' will come into force soon" (*'Zhonghua Renmin Gongheguo Zhenfu he Eluosi Lianbang Zhengfu Guanyu Heping Shiyong BeiDou he Geluonasi Quanqiu Weixing Daohang Xitong de Hezuo Xieding' Jijiang Shengxiao*; 《中华人民共和国政府 和俄罗斯联邦政府关于和平使用北斗和格洛纳斯全球卫星导航系统的合作协定》即将生效), Beidou, Aug. 4, 2019, http://www.beidou.gov.cn/zt/gjhz/201908/t20190805_18658.html.

[204] "The Government of the People's Republic of China and the Government of the Russian Federation Regarding the Peaceful Use of BeiDou and GLONASS Global Navigation Satellite System" (*'Zhonghua Renmin Gongheguo Zhenfu he Eluosi Lianbang Zhengfu Guanyu Heping Shiyong BeiDou he Geluonasi Quanqiu Weixing Daohang Xitong de;* 《中华人民共和国政府和俄罗斯联邦政府关于和平使用北斗和格洛纳斯全球卫星导航系统的), China Satellite, http://www.china-satellite.org/s/3565.html.

[205] "The Seventh Meeting of the China-Russia Satellite Navigation Major Strategic Cooperation Project Committee was Successfully Held" (*Zhong E Weixing Daohang Zhongda Zhanlue Hezuo Xiangmu Weiyuan Hui di Qi Ci Huiyi Chenggong Juxing;* 中俄卫星导航重大战略合作项目委员会第七次会议成功举行), Beidou, Oct. 16, 2020, http://www.beidou.gov.cn/yw/xwzx/202010/t20201020_21356.html.

[206] "Viewing China-Russia Cooperation."

[207] "Working Group on GNSS Characteristics Monitoring and Assessment The Silk Road Experiment," GLONASS, https://www.glonass-iac.ru/en/AboutIAC/silkroad2017.php.

[208] "Agreement on China-Russia Intergovernmental Cooperation on Satellite Navigation of Signed in Beijing."

[209] "Is SpaceX's Raptor Engine the King of Rocket Engines?" *Everyday Astronaut,* May 25, 2019, https://everydayastronaut.com/raptor-engine/.

[210] Brooke Mosley, *RD-180 Engine: An Established Record of Performance and Reliability on Atlas Launch Vehicles*, IEEE, 2011; Matthew Bodner, "Can SpaceX and Blue Origin Best a Decades-old Russian Rocket Engine Design?," *MIT Technology Review* (June 26, 2019), https://www.technologyreview.com/2019/06/26/134490/spacex-blue- origin-russian-rd180-rocket-engine-design/.

[211] Mosley, *RD-180 Engine*; "Atlas III RD-180 Engine Successful Test Firing International Launch Services," July 29, 1998, https://www.ilslaunch.com/atlas-iii-rd-180-engine-successful-test-firing/.

[212] "Atlas V," United Launch Services, https://www.ulalaunch.com/rockets/atlas-v.

[213] Marcia Smith, "Senate Reaches Agreement on Russian RD-180 Engines," *Spacepolicyonline.com*, June 14, 2016, https://spacepolicyonline.com/news/senate-agreement-reaches-on-russian-rd-180-engines/; Eric Berger, "Russia Now Looking at to Sell its Prized Rocket Engines to China," *Ars Technica*, Jan. 18, 2018, https://arstechnica.com/science/2018/01/russia-now-looking-to-sell-its-prized-rocket-engines-to-china/.

[214] Mike Gruss, "Amid RD-180 Debate, Russia Aims To Sell Engines to China," *SpaceNews*, July.16, 2015, https://spacenews.com/russias-interest-in-selling-rocket-engines-to-china-could-add-fuel-to-rd-180-debate/.

[215] "Russian Media: Russia Will Sell RD180 Rocket Engine to China, Which it Urgently Needs" (*E Mei: E Jiang Shou Hua RD180 Huojian Fadongji Zhongguo Poqie Xuyao*; 俄媒：俄将售华 RD180 火箭发动机 中国迫切需要), *Global Times*, June 27, 2016, https://mil.huanqiu.com/article/9CaKrnjW7EK.

[216] Andrew Jones, "China Pushes Ahead with Super-heavy-lift Long March 9," *SpaceNews*, Nov. 30, 2020, https://spacenews.com/china-pushes-ahead-with-super-heavy-lift-long-march-9/.

[217] "China Makes Breakthrough in its Most Powerful Rocket Engine," *CGTN*, Mar. 5, 2021, https://news.cgtn.com/news/2021-03-05/China-makes-breakthrough-in-its-most-powerful-rocket-engine-YobfgYNLUY/index.

[218] "Space Scientist Team to Campus and Public Lecture by Outstanding Contemporary Chinese Scientists 24/6" (*Hangtian Kexuejia Tuandui jin Xiaoyuan ji Dangdai Jiechu Huaren Kexuejia Gongkai Jiangzuo Huodong 24/6;* 航天 科學家團隊進校園暨當代傑出華人科學家公開講座活動 24/6), June 23, 2021, https://www.youtube.com/watch?v=ELUkAfREtK4&t=6620s.

[219] "Russian Media: Temporarily Unable to Supply Rocket Engines to China, Looking for a Solution" (*E Mei: Zan Wufa Xiang Zhongguo Gongying Huojian Fadongji, Zhengzai Xunzhao Jiejue Banfa*; 俄媒：暂无法向中国供应火箭发 动机，正在寻找解决办法), *The Paper* (*Pengpai;* 澎湃), Apr. 8, 2016, https://www.thepaper.cn/newsDetail_forward_1453918; Elizabeth Shim, "Russia Postpones Missile Technology Transfer to China," UPI, Apr. 8, 2016, https://www.upi.com/Top_News/World-News/2016/04/08/Russia-postpones-missile-technology-transfer-to-China/3621460127815/.

[220] "Russia, China to Sign Deal Paving Way to Rocket Engine Contract — Deputy PM," TASS, June 20, 2016, https://tass.com/economy/883484.

[221] "Russian media: Russia will Continue to Block China's Super Rocket Engine Technology" (*E Mei: E Jiang Jixu Dui Hua Fengsuo Chaoda Huojian Fadongji Jishu*; 俄媒：俄将继续对华封锁超大火箭发动机技术), *Radio Free Asia*, Oct. 18,2016, https://www.rfa.org/mandarin/yataibaodao/junshiwaijiao/lxy1-10182016101957.html.

[222] "Russian, Chinese Firms to Develop New-generation Liquid Rocket Propellants."

[223] "Russian, Chinese Firms to Develop New-generation Liquid Rocket Propellants."

[224] "Russian Hi-tech Firm to Team up With China to Develop Liquid Rocket Propellants," TASS, Nov. 8, 2018, https://tass.com/defense/1029917.

[225] "Russian, Chinese Firms to Develop New-generation Liquid Rocket Propellants."

[226] "Proposed Prevention Of An Arms Race In Space (PAROS) Treaty," NTI (Nuclear Threat Initiative), Apr. 5, 2021, https://www.nti.org/learn/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/; "Conference on Disarmament," United Nations, https://www.un.org/disarmament/conference-on-disarmament/.

[227] Ambassador Valery Loschinin, Permanent Representative of the Russian Federation to the Conference on Disararmament, and Ambassador for Disarmament Affairs Wang Qun, Head of Delegation of the People's Republic of China to the Conference on Disarmament, *Letter Dated 12 February 2008 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disaramament Addressed to the Secretary-General of the Conference Transmitting the Russian and Chinese Texts of the Draft "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT)" Introduced by the Russian Federation and China*, Conference on Disarmament CD/1839, 2008, https://digitallibrary.un.org/record/633470?ln=en; "Proposed Prevention Of An Arms Race In Space (PAROS) Treaty."

[228] Countries who welcomed the 2008 PPWT included the G-21 countries (in 2013) as well as Kazakhstan, Belarus, and Australia (in 2010). See: "Proposed Prevention Of An Arms Race In Space (PAROS) Treaty." The US submitted its analysis to the CD in 2013, and the EU responded in 2013. See: Ambassador Christina B. Rocca, Permanent Representative of the United States of America to the Conference on Disarmament, *Letter Dated 19 August 2008 from the Permanent Representative of the United States of America Addressed to the Secretary-General of the Conference Transmitting Comments on the Draft "Treaty on the Prevention of the Placement of Weapons in Outer Space and the Threat or use of Force against Outer Space Objects (PPWT)" as Contained in Document CD/1839 of 29 February 2008* Conference on Disarmament, CD/1847, 2008, https://documents-dds-ny.un.org/doc/UNDOC/GEN/G08/628/51/pdf/G0862851.pdf?OpenElement; "Proposed Prevention Of An Arms Race In Space (PAROS) Treaty."

[229] Ambassador Permanent Representative of the Russian Federation Alexey N. Borodavkin, and Ambassador for Disarmament Affairs of China to the Conference on Disarmament Wu Haitao, *Letter Dated 10 June 2014 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament Addressed to the Acting Secretary-General of the Conference Transmitting the Updated Russian and Chinese Texts of the Draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT) Introduced by the Russian Federation and China*, Conference on Disarmament, CD/1985, 2014, https://documents-dds-ny.un.org/doc/UNDOC/GEN/G14/050/66 /pdf/G1405066.pdf?OpenElement

[230] For a more in-depth discussion on some of the changes between the 2008 and 2014 versions, see: Jinyuan Su, "Space Arms Control: Lex Lata and Currently Active Proposals," *Asian Journal of International Law* 7, no. 1 (2017): 71-74, doi: http://dx.doi.org/10.1017/S2044251315000223, https://search.proquest.com/scholarly-journals/space-arms-control-lex-lata-currently-active/docview/1858165079/se-2?accountid=10186.

[231] *Note verbale dated 2 September 2014 from the Delegation of the United States of America to the Conference on Disarmament Addressed to the Acting Secretary-General of the Conference Transmitting the United States of America Analysis of the 2014 Russian-Chinese Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects*, Conference on Disarmament, CD/1998, 2014, https://documents-dds-ny.un.org/doc/UNDOC/GEN/G15/007/57/pdf/G1500757.pdf?OpenElement.

[232] *Note verbale dated 2 September 2014.*

[233] *Note verbale dated 2 September 2014*.

[234] *Note verbale dated 2 September 2014*.

[235] The other active proposals include the Draft International Code of Conduct for Outer Space Activities (ICoC) promoted by the EU and the Russia-led initiative of unilateral commitment of no first placement of weapons in outer space. Su, "Space Arms Control: Lex Lata and Currently Active Proposals," 71; *Rules of Procedure of the Conference on Disarmament* United Nations Office for Disarmament Affairs (Dec. 19, 2003), https://undocs.org /CD/8/Rev.9.

[236] Bradley Bowman and Jared Thompson, "Russia and China Seek to Tie America's Hands in Space," *Foreign Policy*, Mar. 31, 2021, https://foreignpolicy.com/2021/03/31/russia-china-space-war-treaty-demilitarization- satellites/; U.S. Space Command Public Affairs Office, "Russia Conducts Space-based Anti-satellite Weapons Test," United States Space Command, July 23, 2020, https://www.spacecom.mil/MEDIA/NEWS-ARTICLES/Article /2285098/russia-conducts-space-based-anti-satellite-weapons-test/.

[237] Andrey Kortunov, *New moves on the old board (Новые ходы на старой доске)*, 2021, https://russiancouncil.ru /analytics-and-comments/analytics/novye-khody-na-staroy-doske/.

[238] "Russia May Join Forces with China."

[239] "Joint Statement on Civil Signal Compatibility and Interoperability Between the Global Positioning System (GPS) and the BeiDou Navigation Satellite System," GPS.gov, Dec. 4, 2017, https://www.gps.gov/policy /cooperation/china/2017-joint-statement/; "FAQ," European Union Agency for the Space Programme, https://www.euspa.europa.eu/european-space/galileo/faq.

[240] For example, a senior consultant of the China Arms Control and Disarmament Association, Xu Guangyu, in an article posted by both the *People's Daily* website and the *Global Times,* contrasted Russian and Chinese efforts on the PPWT to the lack of initial US response to the treaty. The article also casts doubt on whether the US desires to prevent an arms race in outer space. See: Xu Guangyu, "Expert: China's Huge Technological Advancement in Outer Space Has Made the United States Feel Like Its Sitting on Pins and Needles" (*Zhuanjia: Zhongguo Waikong Jishu Jinbu Juda Ling Meiguo Ru Zuo Zhenzhan*;专家：中国外空技术进步巨大令美国如坐针毡), *People's Daily Online - Global Times*, June 23, 2014, http://military.people.com.cn/n/2014/0623/c1011-25185435.html.

[241] Elena Sidorenko, "Not just space: how RSC Energia returned to Istok: ex-head of the corporation Vladimir Solntsev is prosecuted in the case of embezzlement of a billion rubles in the supply of components for the ISS module" (Не просто космос: как РКК «Энергия» вернулась к «Истоку»:Экс-глава корпорации Владимир Солнцев проходит по делу о хищении миллиарда рублей при поставках компонентов для модуля МКС), *Izvestia*, Aug. 27, 2020, https://iz.ru/1053540/elena-sidorenko/ne-prosto-kosmos-kak-rkk-energiia-vernulas-k- istoku; "Construction of Infrastructure for Manned Launches From Vostochny will Begin in 2025" (Строительство инфраструктуры для пилотируемых пусков с Восточного начнется в 2025 году), TASS, Mar. 6, 2021, https://tass.ru/kosmos/10850253.

[242] Shelyutto, "Space in Chinese."

[243] Dimitri Simes, "Russia up in Arms Over Chinese Theft of Military Technology: Beijing's Rise as a Major Armaments Exporter is a Double-edged Sword for Moscow," *Nikkei Asia*, Dec. 20, 2019, https://asia.nikkei.com/Politics/International-relations/Russia-up-in-arms-over-Chinese-theft-of-military-technology.

[244] "China National Space Administration and Russian National Aerospace Corporation issued a joint statement on cooperation in the construction of an international lunar research station" (*Zhongguo Guojia Hangtian Ju he Eluosi Hangtian Jituan Gongsi Fabu Guanyu Hezuo Jianshe Guoji Yueqiu Keyan Zhan de Lianhe Shengming*; 中国国家航天局 和俄罗斯国家航天集团公司发布关于合作建设国际月球科研站的联合声明).

[245] "Russia and China Signed a Memorandum on the Creation of a Station on the Moon" (Россия и Китай подписали меморандум о создании станции на Луне)," TASS, Mar. 9, 2021, https://www.youtube.com /watch?v=jJ6fP5MTXgU.

[246] "China National Space Administration and Russian National Aerospace Corporation issued a joint statement on cooperation."

[247] "Russia and China Signed a Memorandum on the Creation of a Lunar Station" (Россия и Китай подписали меморандум о создании лунной станции)," Roscosmos, Mar. 9, 2021, http://www.roscosmos.ru/30248/.

[248] Ministry of Foreign Affairs, "Joint Communiqué of the 25th Regular Meeting Between Chinese and Russian Prime Ministers (full text)" ('*Zhong E Zongli Di Ershiwu Ci Dingqi Huiwu Lianhe Gongbao' Fabiao, Zhuli Zhong E Weixing Daohang Hezuo Zou Shen Zou Shi*; 中俄总理第二十五次定期会晤联合公报》发表，助力中俄卫星导航合 作走深走实)."

[249] "Russia and China Expand Cooperation on Satellite Navigation" (Россия и Китай расширяют сотрудничество по спутниковой навигации), GLONASS, Dec. 8, 2020, http://vestnik-glonass.ru/news/tech/rossiya-i-kitay-rasshiryayut-sotrudnichestvo-po-sputnikovoy-navigatsii/.

[250] "China National Space Administration and Russian National Aerospace Corporation issued a joint statement on cooperation."

[251] "Russia and China Signed a Memorandum on the Creation of a Lunar Station."

[252] "China National Space Administration and Russian National Aerospace Corporation issued a joint statement on cooperation."

[253] "Russia and China Signed a Memorandum on the Creation of a Lunar Station."

[254] "Viewing China-Russia Cooperation."

[255] "Russia and China Expand Cooperation on Satellite Navigation."

[256] "Agreement Between the Government of the Russian Federation and the Government of the People's Republic of China on Cooperation in the Field of Application of Global Navigation Satellites GLONASS and Beidou Systems for Peaceful Purposes" (Соглашение Между Правительством Российской Федерации И Правительством Китайской Народной Республики О Сотрудничестве В Области Применения Глобальных Навигационных Спутниковых Систем Глонасс И Бэйдоу В Мирных Целях), Ministry of Foreign Affairs of the Russian

Federation, Jan. 26, 2018, https://www.mid.ru/foreign_policy/international_contracts/2_contract/-/storage-viewer/bilateral/page-18/53430.

[257] Agreement Between the Government of the Russian Federation and the Government of the People's Republic of China on Cooperation in the Field of Application of Global Navigation Satellites GLONASS and Beidou Systems for Peaceful Purposes."

[258] "China and Russia Sign the 2018-2022 Space Cooperation Outline" (*Zhong E Qianshu 2018-2022 Nian Hangtian Hezuo Dagang*; 中俄签署 2018-2022 年航天合作大纲), Sina, Nov. 3, 2017, http://news.sina.com.cn/o/2017-11-03/doc-ifynmnae1599050.shtml.

[259] "Roskosmos. Meeting of the Sub-Commission on Space Cooperation" (Роскосмос. Заседание Подкомиссии по сотрудничеству в области космоса)," Roscosmos, Sept. 28, 2018, http://www.roscosmos.ru/25546/.

[260] "China and Russia Sign a Letter of Intent for Cooperation in Lunar and Deep Space Exploration (*Zhong E Qianshu Yueqiu yu Shen Kong Tance Hezuo Yixiangshu*; 中俄签署月球与深空探测合作意向书)," CNSA, Mar. 7, 2018, http://www.cnsa.gov.cn/n6758823/n6758838/c6799989/content.html.

[261] "Russia and China Signed a Memorandum on the Creation of a Lunar Station."

[262] "Viewing China-Russia Cooperation."

[263] "Intergovernmental Agreements and Commissions for Economic, Scientific and Technical Cooperation" (Межправительственные соглашения и комиссии по экономическому и научно-техническому сотрудничеству), Roscosmos, http://www.roscosmos.ru/22887/; "Agreement Between the Government of the Russian Federation and the Government of the People's Republic of China on Technology Protection Measures in Connection with Cooperation in the Area Research and use of Outer Space for Peaceful Purposes and in the Operation of Exploration Means and Ground Space Infrastructure" (Соглашение Между Правительством Российской Федерации И Правительством Китайской Народной Республики О Мерах По Охране Технологий В Связи С Сотрудничеством В Области Исследования И Использования Космического Пространства В Мирных Целях И В Создании И Эксплуатации Средств Выведения И Наземной Космической Инфраструктуры), 2018, http://publication.pravo.gov.ru/Document/View/0001201801100014.

[264] "Viewing China-Russia Cooperation."

[265] "Sharing Advances in Satellite Navigation" (Совместное использование достижений спутниковой навигации), *China (КИТАЙ)*, Aug. 28, 2020, http://www.kitaichina.com/rbestxinwen/202008/t20200828_800219017.html.

[266] "Viewing China-Russia Cooperation."

[267] "Sharing Advances in Satellite Navigation."

[268] "Joint Communique From the 21st Regular Meeting Between the Prime Ministers of China and Russia" (*Zhong E Zongji Di Ershiyi Ci Dingqi Huiwu Lianhe Gongbao;* 中俄总理第二十一次定期会晤联合公报).

[269] "Russian-Chinese Cooperation in the Space Industry" (Российско-Китайское сотрудничество в космической отрасли), Rakurs, 2020, https://racurs.ru/press-center/articles/obshchie-voprosy/rossiysko-kitayskoe-sotrudnichestvo-v-kosmicheskoy-otrasli/.

[270] "Joint Statement on the Results of the 14th Regular Meeting of the Heads of Russia and China" (Совместное Коммюнике По Итогам Четырнадцатой Регулярной Встречи Глав Правительств России И Китая), PRC Embassy to the Russian Federation, June 18, 2010, http://ru.china-embassy.org/rus/zgxw/t709799.htm.

[271] "The China-Russia Relationship (11)" (*Zhongguo Tong Eluosi Guanxi (11);* 中国同俄罗斯关系 (11)), Chinanews.com (*Zhongguo Xinwen Wang;* 中国新闻网), June 11, 2009, http://www.chinanews.com/gn/news/2009/06-11/1730337.shtml.

[272] Andrey Shelyutto, “Space in Chinese” (Космос по-китайски), *Kommersant (Коммерсантъ)*, Nov. 28, 2016, https://www.kommersant.ru/doc/3144562.

References

"The 16th Meeting of the China-Russia Space Cooperation Sub-Committee was Held in Moscow" (*Zhong E Hangtian Hezuo Fen Weihui Di Shiliu Ci Huiyi Zai Mosike Zhaokai*; 中俄航天合作分委会第十六次会议在莫斯科召开). CNSA. Sept. 11, 2015. http://www.cnsa.gov.cn/n6758823/n6758838/c6770359/content.html.

"About the SCO." The Shanghai Cooperation Organisation. http://eng.sectsco.org/about_sco/.

"Agreement Between the Government of the Russian Federation and the Government of the People's Republic of China on Cooperation in the Field of Application of Global Navigation Satellites GLONASS and Beidou Systems for Peaceful Purposes" (Соглашение Между Правительством Российской Федерации И Правительством Китайской Народной Республики О Сотрудничестве В Области Применения Глобальных Навигационных Спутниковых Систем Глонасс И Бэйдоу В Мирных Целях). Ministry of Foreign Affairs of the Russian Federation. Jan. 26, 2018. https://www.mid.ru/foreign_policy/international_contracts/2_contract/-/storage-viewer/bilateral/page-18/53430.

"Agreement Between the Government of the Russian Federation and the Government of the People's Republic of China on Technology Protection Measures in Connection with Cooperation in the Area Research and use of Outer Space for Peaceful Purposes and in the Operation of Exploration Means and Ground Space Infrastructure" (Соглашение Между Правительством Российской Федерации И Правительством Китайской Народной Республики О Мерах По Охране Технологий В Связи С Сотрудничеством В Области Исследования И Использования Космического Пространства В Мирных Целях И В Создании И Эксплуатации Средств Выведения И Наземной Космической Инфраструктуры). 2018. http://publication.pravo.gov.ru/Document/View/0001201801100014.

"Agreement on China-Russia Intergovernmental Cooperation on Satellite Navigation of Signed in Beijing." Beidou. Nov. 7, 2018. http://en.beidou.gov.cn/WHATSNEWS/201811/t20181113_16594.html.

Allen, Kenneth, Phillip C. Saunders, and John Chen. *Excel File with Data Used in Chinese Military Diplomacy, 2003–2016*. National Defense University, Institute for National Strategic Studies. July 2017. https://ndupress.ndu.edu/Media/News/Article/1249864/chinese-military-diplomacy-20032016-trends-and-implications.

Allison, George. "New RAF Space Command to Launch Rockets from Scotland." *UK Defense Journal*. Nov. 19, 2020. https://ukdefencejournal.org.uk/new-raf-space-command-to-launch-rockets-from-scotland/.

Allison, Graham. “China and Russia: A Strategic Alliance in the Making.” *The National Interest*. Dec. 14, 2018. https://nationalinterest.org/feature/china-and-russia-strategic-alliance-making-38727.

Anderlini, Jamil. “China and Russia's Dangerous Liaison.” *Financial Times*. Aug. 8, 2018. https://www.ft.com/content/1b4e6d78-9973-11e8-9702-5946bae86e6d.

Åslund, Anders. “The Russian Economy in Health, Oil, and Economic Crisis.” The Atlantic Council. May 27, 2020. https://www.atlanticcouncil.org/commentary/long-take/the-russian-economy-in-health-oil-and-economic-crisis/.

“Atlas III RD-180 Engine Successful Test Firing International Launch Services.” July 29, 1998. https://www.ilslaunch.com/atlas-iii-rd-180-engine-successful-test-firing/.

“Atlas V.” United Launch Services. https://www.ulalaunch.com/rockets/atlas-v.

Bader, Jeffrey A. *Obama and China's Rise: An Insider's Account of America's Asia Strategy*. Washington, DC: Brookings Institution Press, 2012.

Baev, Pavel K. “Russia's Pivot to China Goes Astray: The Impact on the Asia-Pacific Security Architecture.” *Contemporary Security Policy* 37, no. 1 (2016): 89-110. doi: doi.org/10.1080/13523260.2016.1149967.

Bendett, Samuel, and Elsa Kania. “A New Sino-Russian High-Tech Partnership.” Australian Strategic Policy Institute. Oct. 29, 2019. https://www.aspi.org.au/report/new-sino-russian-high-tech-partnership.

Berger, Eric. “Russia Now Looking at to Sell its Prized Rocket Engines to China.” *Ars Technica*. Jan. 18, 2018. https://arstechnica.com/science/2018/01/russia-now-looking-to-sell-its-prized-rocket-engines-to-china/.

Bodner, Matthew. “Can SpaceX and Blue Origin Best a Decades-old Russian Rocket Engine Design?” *MIT Technology Review* (June 26, 2019). https://www.technologyreview.com/2019/06/26/134490/spacex-blue-origin-russian-rd180-rocket-engine-design/.

Borodavkin, Alexey N., Ambassador, Permanent Representative of the Russian Federation, and Ambassador for Disarmament Affairs of China to the Conference on Disarmament Wu Haitao. *Letter Dated 10 June 2014 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disarmament Addressed to the Acting Secretary-General of the Conference Transmitting the Updated Russian and Chinese Texts of the Draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT) Introduced by the Russian Federation and China.* Conference on Disarmament. CD/1985. 2014. https://documents-dds-ny.un.org/doc/UNDOC/GEN /G14/050/66/pdf/G1405066.pdf?OpenElement.

Bowman, Bradley, and Jared Thompson. "Russia and China Seek to Tie America's Hands in Space." *Foreign Policy*. Mar. 31, 2021. https://foreignpolicy.com/2021/03/31/russia-china-space-war-treaty-demilitarization-satellites/.

Bradsher, Keith. "Some Chinese Leaders Claim U.S. and Britain Are Behind Hong Kong Protests." *New York Times*. Oct. 11, 2014. https://www.nytimes.com/2014/10/11 /world/asia/some-chinese-leaders-claim-us-and-britain-are-behind-hong-kong-protests-.html.

Carpenter, Ted Galen. "Caught in the Middle: Beijing's Reaction to US-Russian Tensions." China-US Focus. Nov. 10, 2014. https://www.chinausfocus.com/foreign-policy/caught-in-the-middle-beijings-reaction-to-us-russian-tensions.

Champlin, Luke. "China, Russia Agree on Launch Notification." Nov. 2009. https://www.armscontrol.org/act/2009-11/china-russia-agree-launch-notification.

Chan, Minnie. "China-Russia Space Cooperation: Another Small Step in Beijing's Pursuit of US?" *South China Morning Post*. Dec. 3, 2020. https://sg.news.yahoo.com/china-russia-space-cooperation-another-135626014.html.

"Chang'e-6/7/8, Lunar Research Station 'Arranged' | Decoding the '14th Five-Year Plan'" (*Chang'e LiuQi/Ba Hao, Yueqiu Keyan Zhan 'Anpai Shang le' Jiema 'Shisiwu';* 嫦娥六/七/八号、月球科研站"安排上了"丨解码"十四五"). CNSA. Mar. 22, 2021. http://www.cnsa.gov.cn/n6758823/n6758838/c6811422/content.html.

Chen Na. "China, Russia Strengthen Cooperation in Atmospheric Optics Research." Chinese Academy of Sciences. June 11, 2019. https://english.cas.cn/newsroom/news /201906/t20190611_211244.shtml.

Cheng Min. "Why Midcourse Interception? Translating Midcourse Missile Defense Interception Systems" (*Weishenme Shi Zhongduan Lanjie? Jiedu Zhongduan Fan Dao Lanjie Xitong*; 为什么是中段拦截？解读中段反导拦截系统). *Weapons Knowledge (Bingqi Zhishi; 兵器知识)* (Mar. 2010): 53.

China National Space Administration and Roscosmos. “International Lunar Research Station (ILRS) Guide for Partnership.” June 16, 2021. http://www.cnsa.gov.cn/english/n6465652/n6465653/c6812150/content.html.

China's National Defense in the New Era. The State Council Information Office of the People's Republic of China. July 2019. http://www.china-un.ch/eng/dbtyw/cjjk_1/cjjzzdh/t1683060.htm.

“China's Total Export & Import Values by Country/Region, December 2018 (in USD).” General Administration of Customs, People’s Republic of China. Jan. 14, 2019. http://english.customs.gov.cn/Statics/a35889bb-1336-4a3d-a1af-55156eed4d3a.html.

“China's Total Export & Import Values by Country/Region, December 2019 (in USD).” General Administration of Customs, People’s Republic of China. Jan. 14, 2020. http://english.customs.gov.cn/Statics/5892fd27-44c9-4f97-8dd2-192a9fe0739b.html.

“China's Total Export & Import Values by Country/Region, December 2020 (in USD).” General Administration of Customs, People’s Republic of China. Jan. 14, 2021. http://english.customs.gov.cn/Statics/52e8f737-eaa9-4e74-ba62-b4ccbfb9bdfa.html.

“China-Russia Commercial and Space Cooperation” (*Zhong E Shang Hangtian Hezuo*; 中俄商航天合作). *China News* (*Zhongguo Xinwen Wang;* 中国新闻网). May 27, 2000. http://www.chinanews.com/2000-5-27/26/31400.html.

“China-Russia missile defense command post exercises to be held in Russia in 2019” (Командно-штабные учения Китая и России по ПРО пройдут в 2019 году в РФ). TASS. Apr. 25, 2019. https://tass.ru/mezhdunarodnaya-panorama/6375197.

“China-Russia Satellite Navigation System Achieves Major Strategic Cooperation” (*Zhong E Weixing Daohang Xitong Shixian Zhongda Zhanlue Hezuo*; 中俄卫星导航系统实现重大战略合作). CCTV. Sept. 3, 2019. https://www.sohu.com/a/338402171_362042.

“China-Russia Space Cooperation has Entered a New Stage of Major Strategic Cooperation” (*Zhong E Hangtian Hezuo yi Zhuan ru Zhongda Zhanlue Hezuo Xin Jieduan*; 中俄航天合作已转入重大战略合作新阶段). ChinaRu *(Zhong E Zixun Wang; 中俄资讯网)* Sept. 6, 2016. http://www.chinaru.info/News/zhongekuaixun/43698.shtml.

“China-Russia will Cooperate more Deeply in Space and Other Fields” (*Zhongguo-Eluosi Liang Guo Jiang zai Taikong he Qita Lingyu Jinxing Geng Shenru Hezuo*; 中国-俄罗斯两国将在太空和其他领域进行更深入合作). *Daily Economic News* (*Mei Ri Jingji Xinwen;* 每日经 济新闻). Dec. 19, 2017. http://stdaily.com/zhuanti01/tjyzsc/2017-12/19/content_610256.shtml.

"China-Russia Will Deepen Cooperation in Space and Other Fields" (*Zhongguo-Eluosi Liang Guo Jiang Zai Taikong he Qita Lingyu Jinxing Geng Shenru Hezuo*; 中国-俄罗斯两国将 在太空和其他领域进行更深入合作). *Science and Technology Daily* (*Keji Ribao;* 科技日 报). Dec. 19, 2017. http://stdaily.com/zhuanti01/tjyzsc/2017-12/19/content_610256.shtml.

"China Aims to Launch Chang'e-6 Lunar Probe Around 2024." CGTN. Apr. 25, 2021. http://eng.chinamil.com.cn/view/2021-04/25/content_10028740.htm.

"China and Russia Jointly Hold 'Aerospace Security-2016' Joint Anti-missile Computer Exercise" (*Zhong E Gongtong Juxing 'Kong Tian Anquan-2016' Lianhe Fan Dao Jisuanji Yanxi*; 中俄共同举行 '空天安全-2016' 联合反导计算机演习). May 3, 2016. http://www.mod.gov.cn/topnews/2016-05/03/content_4652495.htm.

"China and Russia Sign a Cooperation Agreement on Space Debris Monitoring and Data Applications" (*Zhong E Liang Guo Hangtian Jigou Qianshu Kongjian Suipian Jiance he Shuju Yingyong Hezuo Xieding*; 中俄两国航天机构签署 空间碎片监测和数据应用合作协定). Nov. 11, 2018. http://www.gov.cn/xinwen/2018-11/11/content_5339230.htm.

"China and Russia Sign a Letter of Intent for Cooperation in Lunar and Deep Space Exploration" (*Zhong E Qianshu Yueqiu yu Shen Kong Tance Hezuo Yixiangshu*; 中俄签署月球与深空探测合作意向书). CNSA. Mar. 7, 2018. http://www.cnsa.gov.cn/n6758823/n6758838/c6799989/content.html.

"China and Russia Sign a Memorandum of Understanding on Cooperating to Build an International Lunar Research Station" (*Zhong E Liangguo Qianshu Hezuo Jianshe Guoji Yueqiu Keyan Zhan Liangjie Beiwanglu*; 中俄两国签署合作建设国际月球科研站谅解 备忘录). CNSA. Mar. 9, 2021. http://www.cnsa.gov.cn/n6758823/n6758838/c6811372/content.html.

"China and Russia Sign a Memorandum of Understanding Regarding Cooperation for the Construction of the International Lunar Research Station." CNSA. Mar. 9, 2021. http://www.cnsa.gov.cn/english/n6465652/n6465653/c6811380/content.html.

"China and Russia Sign Aerospace Components Deal." *Janes.* Dec. 21, 2015. https://www.janes.com/defence-news/news-detail/chinese-defence-giants-sign-partnership-deal.

"China and Russia Sign the 2018-2022 Space Cooperation Outline" (*Zhong E Qianshu 2018-2022 Nian Hangtian Hezuo Dagang*; 中俄签署 2018-2022 年航天合作大纲). Sina. Nov. 3, 2017. http://news.sina.com.cn/o/2017-11-03/doc-ifynmnae1599050.shtml.

"China and the U.S. Cross Swords Over Missile Defense: Attacking and Suppressing the Region's 'Missile Fever'" (*Zhong Mei Fan Dao Jiaofeng Ancang Xuanji: Chu Zhao Yazhi Zhoubian*; 中美反导交锋暗藏玄机：出招压制周边'导弹热'). Feb. 1, 2013. http://blog.huanqiu.com/dongxu/2013-02-01/2683.

"China Eyes Closer Aerospace Cooperation with Russia." *China Daily*. Aug. 17, 2011. http://www.chinadaily.com.cn/world/2011-08/17/content_13137393.htm.

"China Makes Breakthrough in its Most Powerful Rocket Engine." CGTN. Mar. 5, 2021. https://news.cgtn.com/news/2021-03-05/China-makes-breakthrough-in-its-most-powerful-rocket-engine-YobfgYNLUY/index.

"China Media Group, Rossiyskaya Gazeta Inaugurate Sino-Russia Commentary Workroom." China Plus. June 6, 2019. http://chinaplus.cri.cn/news/china/9/20190606/299283.html.

"China National Space Administration and Russian National Aerospace Corporation issued a joint statement on cooperation in the construction of an international lunar research station" (*Zhongguo Guojia Hangtian Ju he Eluosi Hangtian Jituan Gongsi Fabu Guanyu Hezuo Jianshe Guoji Yueqiu Keyan Zhan de Lianhe Shengming*; 中国国家航天局和俄罗斯国家航天集团公司发布关于合作建设国际月球科研站的联合声明). CNSA. Apr. 24, 2021. http://www.cnsa.gov.cn/n6758823/n6758838/c6811838/content.html.

"China Reveals Moon Station plan with Russia, Openness on Space Day." *Global Times*. Apr. 25, 2021. http://eng.chinamil.com.cn/view/2021-04/25/content_10028509.htm.

"The China-Russia Relationship (11)," (*Zhongguo Tong Eluosi Guanxi (11);* 中国同俄罗斯关系(11)), Chinanews.com, (*Zhongguo Xinwen Wang;* 中国新闻网), June 11, 2009, http://www.chinanews.com/gn/news/2009/06-11/1730337.shtml.

"China, Russia Developing 'Increasingly Capable' Missile Defenses: Pentagon." *DefenseWorld.net*. July 29, 2020. https://www.defenseworld.net/news/27529/China_Russia_Developing_Increasingly_Capable_Missile_Defenses_Pentagon#.X2pI3CB7lhE.

"China, Russia Extend Notification Agreement for Ballistic Missile, Carrier Rocket Launches." Xinhua. Dec. 15, 2020. http://www.xinhuanet.com/english/europe/2020-12/15/c_139591997.htm.

"China, Russia to Jointly Build Lunar Post." *China Daily*. Mar. 10, 2021. http://eng.chinamil.com.cn/view/2021-03/10/content_10000480.htm.

China Satellite Navigation Office. *Development of the BeiDou Navigation Satellite System (Version 4.0).* 2019. http://www.beidou.gov.cn/xt/gfxz/201912/P020191227430565455478.pdf.

"China Space Administration: China-Russia Space Cooperation has Entered a Major Strategic Cooperation Stage" (*Zhonguo Hangtian Ju: Zhong E Hangtian Hezuo Zhuan Reu Zhongda Zhanlue Hezuo Jiedua*n; 中国航天局：中俄航天合作转入重大战略合作阶段). *Sputnik*. Sept. 6, 2016. http://www.crs.shisu.edu.cn/4a/86/c4109a84614/page.htm.

"China Unveils Follow-up Lunar Exploration Missions." Xinhua. Jan. 14, 2019. http://www.xinhuanet.com/english/2019-01/14/c_137743306.htm.

"China Warns of Response to U.S. Missile Defense." Global Security Newswire. July 19, 2012. http://www.nti.org/gsn/article/china-warns-response/.

"China's Missile Defense Test Shocks the World" (*Zhongguo Fan Dao Lanjie Shiyan Zhenjing Quanqiu*; 中国反导拦截试验震惊全球). *Happiness* (*Xingfu;* 幸福) (Sept. 2010).

"Chinese Academy of Science Signs a Cooperation Agreement with the Russian Academy of Sciences" (*Zhongguo Kexue Yuan yu Eluosi Kexue Yuan Qianshu Hezuo Xieyi*;中国科学 院与俄罗斯科学院签署合作协议). Chinese Academy of Science. June 10, 2018. http://www.cas.cn/tt/201806/t20180611_4652220.shtml.

"Chinese President Hu Jintao Holds Talks with Russian Counterpart Medvedev." Consulate-General of the People's Republic of China in San Fransisco. June 18, 2009. http://www.chinaconsulatesf.org/eng/xw/t568490.htm.

Chuter, Andrew. "Former Fighter Pilot Picked to Lead British Military's Space Command." *Defense News*. Jan. 15, 2020. https://www.defensenews.com/global/europe/2020/01/15/former-fighter-pilot-picked-to-lead-british-militarys-space-command/.

Clark, Stephen. "Russia Looks to China as New Space Exploration Partner." *Spaceflight Now*. Mar. 15, 2021. https://spaceflightnow.com/2021/03/15/russia-looks-to-china-as-new-space-exploration-partner/.

———. "Russia: Computer Crash Doomed Phobos-Grunt." *Spaceflight Now.* Feb. 6, 2012. https://spaceflightnow.com/news/n1202/06phobosgrunt/.

Clery, Daniel. "Update: Telescope Designed to Study Mysterious Dark Energy Keeps Russia's Space Science Hopes Alive." *Science*. July 15, 2019. https://www.sciencemag.org/news/2019/07/update-telescope-designed-study-mysterious-dark-energy-keeps-russia-s-space-science.

Coates, Daniel R. *Worldwide Threat Assessment of the US Intelligence Community*. Statement for the Record, Senate Select Committee on Intelligence. Jan. 29, 2019. https://www.dni.gov/files/ODNI/documents/2019-ATA-SFR---SSCI.pdf.

"Conference on Disarmament." United Nations. https://www.un.org/disarmament/conference-on-disarmament/.

"Congratulations from Dmitry Rogozin on Cosmonautics Day." Roscosmos. Apr. 11, 2021. http://en.roscosmos.ru/22057/.

"Congratulations to CNSA on the Successful Start of the 'Chang'e-4' Mission (Поздравление КНКА с успешным началом реализации миссии «Чанъэ-4»)." Roscosmos. Jan. 3, 2019. http://www.roscosmos.ru/25910/.

"Construction of Infrastructure for Manned Launches From Vostochny will Begin in 2025" (Строительство инфраструктуры для пилотируемых пусков с Восточного начнется в 2025 году). *TASS*. Mar. 6, 2021. https://tass.ru/kosmos/10850253.

"The 'Cooperation Agreement between the Government of the People's Republic of China and the Government of the Russian Federation on the Peaceful Use of BeiDou and GLONASS Global Navigation Satellite Systems' will come into force soon (*'Zhonghua Renmin Gongheguo Zhenfu he Eluosi Lianbang Zhengfu Guanyu Heping Shiyong BeiDou he Geluonasi Quanqiu Weixing Daohang Xitong de Hezuo Xieding' Jijiang Shengxiao*; 《 中华人民共和国政府和俄罗斯联邦政府关于和平使用北斗和格洛纳斯全球卫星导航 系统的合作协定》即将生效)." Beidou. Aug. 4, 2019. http://www.beidou.gov.cn/zt/gjhz/201908/t20190805_18658.html.

"The Dance of the Heavenly Sword: A Comprehensive Analysis of Ground-based Midcourse Missile Defense Technology" (*Zhang Jian Yitian Wu Zhenjian Dui Maimang: Lu Ji Zhongduan Fan Dao Jishu Mianmianguan*; 长剑倚天舞 针尖对麦芒:陆基中段反导技术 面面观). *China Space News* (*Zhongguo Hangtian Bao;* 中国航天报) (2013): p. 4.

Decree of the President of the Russian Federation of December 31, 2015 No. 683. President of Russia. Dec. 31, 2015. http://kremlin.ru/acts/bank/40391.

Deng Xiaoci. "Russia Opting for Moon Base Cooperation with China Over US 'Not Surprising'." *Global Times*. Feb. 18, 2021. https://www.globaltimes.cn/page/202102/1215828.shtml.

"Deputy Ministry of Science and Technology Yin Hejun Leads Delegation to Moscow" (*Keji Bu Fu Buzhang yin Hejun Lutuan Fangwen Mosike*; 科技部副部长阴和俊率团访问莫斯科). Embassy of the People's Republic of China in the Russian Federation (*Zhonghua Renmin Gongheguo Zhu Eluosi Lianbang Dashiguan*; 中华人民共和国驻俄罗斯联邦大使馆). July 4, 2016. https://web.archive.org/web/20190923004735/http:/ru.chineseembassy.org/chn/kjhz/hzgk/t1377446.htm.

"Dmitry Rogozin's Interview 'KP'" (Интервью Дмитрия Рогозина «КП»). Roscosmos. July 13, 2020. https://www.roscosmos.ru/28810/.

Downs, Erica. "China-Russia Energy Relations: Why the Power of Siberia Pipeline Matters to China." CNA In-Depth. Dec. 18, 2019. https://www.cna.org/news/InDepth/article?ID=25.

Duchâtel, Mathieu. "China and Russia: Towards an Alliance Treaty?" *China and Russia: Gaming the West* China and Russia? Gaming the West" (Oct. 2016). https://ecfr.eu/wp-content/uploads/ECFR_195_-_CHINA_AND_RUSSIA_GAMING_THE_WEST_002.pdf.

Elder, Miriam. "Vladimir Putin Accuses Hillary Clinton of Encouraging Russian Protests." *The Guardian*. Dec. 8, 2011. https://www.theguardian.com/world/2011/dec/08/vladimir-putin-hillary-clinton-russia.

Ellyat, Holly. "China's Xi Calls Putin his 'Best Friend' Against a Backdrop of Souring US Relations." CNBC. June 5, 2019. https://www.cnbc.com/2019/06/05/putin-and-xi-meet-to-strengthen-ties-as-us-relations-sour.html.

———. "China's Xi Calls Putin his 'Best Friend' Against a Backdrop of Souring US Relations." CNBC. June 5, 2019. https://www.cnbc.com/2019/06/05/putin-and-xi-meet-to-strengthen-ties-as-us-relations-sour.html.

"FAQ." European Union Agency for the Space Programme. https://www.euspa.europa.eu/european-space/galileo/faq.

"First Ever Railway Bridge Connecting Russia & China to Open in 2022." RT. Aug. 12, 2020. https://www.rt.com/business/497803-russia-china-first-railway-bridge/.

Fisher, Kristin. "'Divorce is not possible' with US over Space Station, Says Russian Space Chief Who Threatened to Pull Out," CNN, Sept. 2, 2021, https://www.cnn.com/2021/09/02/world/russian-space-chief-iss-nasa-roscosmos-scn/index.html.

"Foreign Ministry Spokesperson Zhao Lijian's regular press conference on October 15, 2020" (*2020 Nian 10 Yue 15 Ri Waijiao Bu Fayanren Zhao Lijian Zhuchi Li Xing Jizhe Hui*; 2020 年 10 月 15 日外交部发言人赵立坚主持例行记者会). Ministry of Foreign Affairs. Oct. 15, 2020. https://www.fmprc.gov.cn/ce/cemd/chn/fyrth/t1824239.htm.

Fravel, M. Taylor. *Strong Borders, Secure Nation: Cooperation and Conflict in China's Territorial Disputes*. Princeton: Princeton University Press, 2008.

Gabuev, Alexander. "Why Russia and China Are Strengthening Security Ties." *Foreign Affairs*. Sept. 24, 2018. https://www.foreignaffairs.com/articles/china/2018-09-24/why-russia-and-china-are-strengthening-security-ties.

"The Government of the People's Republic of China and the Government of the Russian Federation Regarding the Peaceful Use of BeiDou and GLONASS Global Navigation Satellite System" (*'Zhonghua Renmin Gongheguo Zhenfu he Eluosi Lianbang Zhengfu Guanyu Heping Shiyong BeiDou he Geluonasi Quanqiu Weixing Daohang Xitong de;*《中华人民共和国政府和俄罗斯联邦政府关于和平使用北斗和格洛纳斯全球卫星导航系 统的). China Satellite. http://www.china-satellite.org/s/3565.html.

"GPS vs GLONASS." GPS Server. https://www.gps-server.net/gps-vs-glonass.

Grove, Thomas. "Russia Gives China a Leg Up in Foreign Broadcasting." *Wall Street Journal*. Jan. 14, 2020. https://www.wsj.com/articles/russia-gives-china-a-leg-up-in-foreign-broadcasting-11579003202.

Gruss, Mike. "Amid RD-180 Debate, Russia Aims To Sell Engines to China." *SpaceNews.* July 16, 2015. https://spacenews.com/russias-interest-in-selling-rocket-engines-to-china-could-add-fuel-to-rd-180-debate/.

Han Jitao. "China-Russia Space Cooperation Benefits Asia-Pacific Countries" (*Zhong E Hangtian Hezuo Youyi yu Yatai Guojia;* 中俄航天合作有益于亚太国家)." China Radio International. Sept. 8, 2017. http://news.cri.cn/20170908/6382b28c-8f9b-aa9c-c126-965c4a8117cf.html.

Harvey, Brian, *China in Space: The Great Leap* Forward (Chichester: Springer, 2013).

"Head of RSC Energia: the Lunar Station will Allow to Fly to the Moon, Mars and Asteroids," (Глава РКК "Энергия": окололунная станция позволит полететь к Луне, Марсу и астероидам)," *Energia*, February 3, 2020, https://www.energia.ru/ru/news/news-2020/news_03-02.html.

"Heads of Roscosmos and CNSA Discussed International Lunar Research Station Creation." Roscosmos. Mar. 26, 2021. http://en.roscosmos.ru/22016/.

Hillman, Jonathan E. *China and Russia: Economic Unequals.* Center for Strategic and International Studies. July 15, 2020. https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/200715_ChinaandRussia.pdf.

"HQ-19 (S-400)." *Jane's Strategic Weapon Systems.* Aug. 19, 2013.

Ibold, Sebastian. "China's Space Silk Road." Belt and Road Initiative. May 14, 2018. https://www.beltroad-initiative.com/space-silk-road/.

II Sino-Russian Forum 'Investments in Innovation. Government Fund of Funds Development, Institute of the Russian Federation. https://www.rvc.ru/en/calendar/detail.php?id=106194.

"Intergovernmental Agreements and Commissions for Economic, Scientific and Technical Cooperation (Межправительственные соглашения и комиссии по экономическому и научно-техническому сотрудничеству)." Roscosmos. http://www.roscosmos.ru/22887/.

International Monetary Fund. *Coordinated Direct Investment Survey (CDIS)*. 2018. https://data.imf.org/regular.aspx?key=61227424.

"Is SpaceX's Raptor Engine the King of Rocket Engines?" *Everyday Astronaut,* May 25, 2019. https://everydayastronaut.com/raptor-engine/.

Jacobs, Andrew, and Jonathan Ansfield. "With Defense Test, China Shows Displeasure of U.S." *New York Times*. Jan. 12, 2010. https://www.nytimes.com/2010/01/13/world/asia/13china.html.

Ji Wenbo. "Project 640: China's First-generation Anti-missile System" (*640 Gongcheng: Zhongguo Di Yi Dai Fan Dao Xitong de Yanzhi*; 640 工程:中国第一代反导系统的研制). *Party History Gathering* (*Dang Shi Bo Cai;* 党史博采) (May 2019): p. 60.

Jin Feng and Zhang Ye. "The Chang'e-6 Mission is to be Implemented in 2024, Targeting the Lunar South Pole!" (*Chang'e liu Hao Renwu ni 2024 Nian Shishi, Mubiao Yuqiu Nanji*!; 嫦娥六号任务拟 2024 年实施，目标月球南极!). *Science and Technology Daily* (*Keji Ribao;* 科技日报). Apr. 25, 2021. https://baijiahao.baidu.com/s?id=1697993816350524319&wfr=spider&for=pc.

Su Jinyuan. "Space Arms Control: Lex Lata and Currently Active Proposals." *Asian Journal of International Law* 7, no. 1 (2017): 61-93. doi: http://dx.doi.org/10.1017/S2044251315000223. https://search.proquest.com/scholarly-journals/space-arms-control-lex-lata-currently-active/docview/1858165079/se-2?accountid=10186.

"Joint Communique From the Ninth Regular Meeting of the Prime Ministers of China and Russia" *(Zhong E Zongli Di Jiu Ci Dingqi Huiwu Lianhe Gongbao (Quanwen)*; 《中俄总 理第九次定期会晤联合公报》(全文)). Sept. 26, 2004. http://www.huaxia.com/zt/tbgz/2004-87/793384.html.

"Joint Declaration of Roscosmos and CNSA on Creation of Lunar Station." Roscosmos. Apr. 23, 2021. http://en.roscosmos.ru/22074/.

"Joint Declaration on a Multipolar World and the Establishment of a New International Order." *International Legal Materials* 36, no. 4 (1997): 986-989. https://www.jstor.org/stable/20698707?seq=1.

"Joint Statement Between CNSA and ROSCOSMOS Regarding Cooperation for the Construction of the International Lunar Research Station." CNSA. Apr. 29, 2021. http://www.cnsa.gov.cn/english/n6465652/n6465653/c6811967/content.html.

"Joint Statement Between the People's Republic of China and the Russian Federation on Developing Comprehensive Partnership of Strategic Coordination for a New Era" (*Zhonghua Renmin Gongheuo he Eluosi Lianbang Guanyu Fazhan Xin Shidai Quanmian Zhanlve Xiezuo Huoban Guanxi de Lianhe Shengming (Quanwen)*; 中华人民共和国和俄罗斯联邦关于发展新时代全面战略协作伙伴关系的联合声明（全文）). June 6, 2019. http://www.xinhuanet.com/world/2019-06/06/c_1124588552.htm.

"Joint Statement by the People's Republic of China and the Russian Federation" (*Zhonghua Renmin Gongheguo yu Eluosi Lianbang Lianhe Shengming;* 中华人民共和国与俄罗斯联邦联合声明). Permanent Mission of the People's Republic of China to the United Nations Office at Geneva and Other International Organizations in Switzerland. Dec. 13, 2002. http://www.china-un.ch/chn/xwhd/t6808.htm.

"Joint Statement by the Presidents of the People's Republic of China and the Russian Federation on Anti-Missile Defense." Nuclear Files. July 18, 2000.

"Joint Statement of the People's Republic of China and the Russian Federation on Major International Issues." Ministry of Foreign Affairs of the People's Republic of China. 2008. htpps://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t465821.shtml.

"Joint Statement of the People's Republic of China and the Russian Federation on the International Order of the 21st Century" (*Zhonghua Renmin Gongheguo he Eluosi Lianbang Guanyu 21 Shiji Guoji Zhixu de Lianhe Shengming*; 中华人民共和国和俄罗斯联邦关于２１世纪国际秩序的联合声明). Central Government of the People's Republic of China (*Zhonghua Renmin Gongheguo Zhongyang Renmin Shengfu*; 中华人民共和国中央人民政府). July 1, 2005. http://www.gov.cn/gongbao/content/2005/content_64271.htm.

"Joint Statement of the President of the People's Republic of China and the President of the Russian Federation" (*Zhong E Lianhe Shengming*; 中俄联合声明). CCTV. Sept. 3, 1994. http://www.cctv.com/special/903/6/70503.html.

"Joint Statement on the Basis of Sino-Russian Relations" (*Guanyu Zhong E Xianghu Guanxi Jichu de Lianhe Shengming*; 关于中俄相互关系基础的联合声明). CCTV. Dec. 18, 1992. http://www.cctv.com/special/903/6/70491.html.

"Joint Statement on Civil Signal Compatibility and Interoperability Between the Global Positioning System (GPS) and the BeiDou Navigation Satellite System," GPS.gov, Dec. 4, 2017, https://www.gps.gov/policy/cooperation/china/2017-joint-statement/.

"Joint Statement on the Results of the 14th Regular Meeting of the Heads of Russia and China" (Совместное Коммюнике По Итогам Четырнадцатой Регулярной Встречи Глав Правительств России И Китая). PRC Embassy to the Russian Federation. June 18, 2010. http://ru.china-embassy.org/rus/zgxw/t709799.htm.

Jones, Andrew. "Chang'e-5 Orbiter Embarks on Extended Mission to Sun-Earth Lagrange Point." *SpaceNews.* Dec. 21, 2020. https://spacenews.com/change-5-orbiter-embarks-on-extended-mission-to-sun-earth-lagrange-point/.

———. "China Pushes Ahead with Super-heavy-lift Long March 9." *SpaceNews.* Nov. 30, 2020. https://spacenews.com/china-pushes-ahead-with-super-heavy-lift-long-march-9/.

———. "China, Russia Enter MoU on International Lunar Research Station." *SpaceNews.* Mar. 9, 2021. https://spacenews.com/china-russia-enter-mou-on-international-lunar-research-station/.

———. "China, Russia, Open Moon Base Project to International Partners, Early Details Emerge." *SpaceNews.* Apr. 26, 2021. https://spacenews.com/china-russia-open-moon-base-project-to-international-partners-early-details-emerge/.

———. "Russia Wants to Send Cosmonauts to China Space Station," *SpaceNews*, June 22, 2021, https://www.space.com/russia-cosmonauts-may-visit-china-space-station.

Kaczmarski, Marcin. *Russia-China Relations in the Post-Crisis International Order*. Abingdon, UK: Routledge, 2015.

Kashin, Vasily. "Chinese–Russian Ballistic Missile Cooperation Signals Deepening Trust." East Asia Forum. Feb. 20, 2021. https://www.eastasiaforum.org/2021/02/20/chinese-russian-ballistic-missile-cooperation-signals-deepening-trust/.

———. *The Current State of Russian-Chinese Military Cooperation.* DOP-2018-U-018184-Final. 2018. https://www.cna.org/CNA_files/PDF/DOP-2018-U-018184-Final.pdf.

Keller, Bill. "Gorbachev Visits Beijing for Start of Summit Talks." *New York Times*. May 15, 1989. https://www.nytimes.com/1989/05/15/world/gorbachev-visits-beijing-for-start-of-summit-talks.html.

Kim, Cynthia, and Hyunjoo Jin. "With China Dream Shattered Over Missile Land Deal, Lotte Faces Costly Overhaul." Reuters. Oct. 24, 2017. https://www.reuters.com/article/us-lotte-china-analysis/with-china-dream-shattered-over-missile-land-deal-lotte-faces-costly-overhaul-idUSKBN1CT35Y.

Klotz, Irene. "Russia Eyes Cooperation with China Space Station." *Aviation Week*. Apr. 2, 2021. https://aviationweek.com/defense-space/space/russia-eyes-cooperation-china- space-station.

Korolev, Alexander. "China–Russia Cooperation on Missile Attack Early Warning Systems." East Asia Forum. Nov. 20, 2020. https://www.eastasiaforum.org/2020/11/20/china-russia-cooperation-on-missile-attack-early-warning-systems/.

———. "On the Verge of an Alliance: Contemporary China-Russia Military Cooperation." *Asian Security* (2018). doi: 10.1080/14799855.2018.1463991. https://www.tandfonline.com/doi/full/10.1080/14799855.2018.1463991.

———. "On the Verge of an Alliance: Contemporary China-Russia Military Cooperation." *Asian Security* (2018): 1. doi: 10.1080/14799855.2018.1463991. https://www.tandfonline.com/doi/full/10.1080/14799855.2018.1463991.

Kortunov, Andrey. *New moves on the old board (Новые ходы на старой доске).* 2021. https://russiancouncil.ru/analytics-and-comments/analytics/novye-khody-na-staroy-doske/.

Kramer, Andrew. "Russia's Failed Mars Probe Crashes Into Pacific." *New York Times*. Jan. 15, 2012. https://www.nytimes.com/2012/01/16/science/space/russias-phobos-grunt-mars-probe-crashes-into-pacific.html.

"Land Warfare Platforms: Artillery & Air Defence - HQ-9." *Janes.* Apr. 27, 2020.

Langley, Richard B. "Innovation: GLONASS — Past, Present and Future." *GPS World*. Nov. 1, 2017. https://www.gpsworld.com/innovation-glonass-past-present-and-future/.

Li Boya and Chen Shangwen. "'Rebalancing' Impacts Stability of Asia-Pacific." *People's Daily* (*Renmin Ribao;* 人民日报). Dec. 12, 2012. http://www.huaxia.com/thjq/jswz/2012/12/3137275.html。

Li Mingsheng. *The Dream of a Thousand Years – The Story of How a Chinese First Left the Earth (Qiangu Yi Meng – Zhongguoren Di Yi Ci Likai Diqiu de Gushi;* 千古一梦 – 中国人第一次 离开地球的故事). Chengdu: Tiandi Press, 2016.

Li Shuyin. "Historical Study and Thinking on China-Russia Military Cooperation" (*Dui Zhonge Junshi Hezuo de Lishi Kaocha yu Sikao*; 对中俄军事合作的历史考察与思考). *Russia Journal* (*Eluosi Xue Kan;* 俄罗斯学刊) 3 (2016): 5.

"Liaowang: Explaining China's Missile Defense Interception Test (*Liangwang Zhoukan: Zhongguo Fan Dao Lanjie Jishu Shiyan Jiedu*; 《瞭望》周刊：中国反导拦截技术试验 解读). Xinhua. Jan. 18, 2010. http://news.xinhuanet.com/mil/2010-01/18/content_12828435.htm.

Ling Shengji and Wang Fan. "Building a Peaceful Environment." *China Daily*. Dec. 31, 2012.

Liu Fenghua. "China-Russia Comprehensive Strategic Partnership: Formation, Features, and Prospects." *China International Studies* 61 (2016).

Liu Linlin. "Asia-Pacific Geopolitics in Transition, Says CASS Report." *Global Times* (*Huanqiu Shibao;* 环球时报). Dec. 27, 2012, https://www.globaltimes.cn/content/752551.shtml.

Liu Yang (刘扬) and Liu Yupeng (柳玉鹏). "China-Russia 'Aerospace Security-2017' Joint Counter-Director Xi Opens Today" (*Zhong E 'Kong Tian Anquan-2017' Lianhe Fan Dao Yanxi Jinri Kaiqi*; 中俄 '空天安全-2017' 联合反导演习今日开启). Xinhua. Dec. 11, 2017. http://www.xinhuanet.com/mil/2017-12/11/c_129762153.htm.

Lo, Bobo. *A Wary Embrace: What the China-Russia Relationship Means for the World*. A Lowy Institute Paper. Melbourne, Australia: Penguin Books, 2017.

Loschinin, Valery, Ambassador, Permanent representative of the Russian Federation to the Conference on Disararmament, and Ambassador for Disarmament Affairs Wang Qun, Head of Delegation of the People's Republic of China to the Conference on Disarmament. *Letter Dated 12 February 2008 from the Permanent Representative of the Russian Federation and the Permanent Representative of China to the Conference on Disaramament Addressed to the Secretary-General of the Conference Transmitting the Russian and Chinese Texts of the Draft "Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT)" Introduced by the Russian Federation and China.* Conference on Disarmament CD/1839. 2008. https://digitallibrary.un.org/record/633470?ln=en.

"Luna 25," NASA, https://nssdc.gsfc.nasa.gov/nmc/spacecraft/display.action?id=LUNA-25.

Luthi, Lorenz M. *The Sino-Soviet Split: Cold War in the Communist World*. (Princeton: Princeton University Press), 2008.

"The Main Provisions of the Conclusion of the Interdepartmental Commission for the Analysis of the Causes of the Emergency Situation, Which Arose in the Course of Flight Tests of the Phobos-Grunt Spacecraft" (Основные положения Заключения Межведомственной комиссии по анализу причин нештатной ситуации, возникшей в процессе проведения летных испытаний космического аппарата «Фобос-Грунт»). Roscosmos. Feb. 3, 2012. http://www.roscosmos.ru/18126/.

Makocki, Michal, and Nicu Popescu. *China and Russia: An Eastern Partnership in the Making?* European Union Institute for Security Studies. 2016. https://www.iss.europa.eu/sites/default/files/EUISSFiles/CP_140_Russia_China.pdf.

Mankoff, Jeffrey. "Russia's Asia Pivot: Confrontation or Cooperation?" *Asia Policy* 19 (2015): 65-87. doi: 10.1353/asp.2015.0009.

Mann, Adam. "China's Chang'e Program: Missions to the Moon." Space.com. Feb. 1, 2019. https://www.space.com/43199-chang-e-program.html.

Medeiros, Evan S., and Michael S. Chase. "Chinese Perspectives on the Sino-Russia Relationship." *Russia-China Relations: Assessing Common Ground and Strategic Fault Lines*, edited by Robert Sutter. National Bureau of Asian Research, July 2017.

Messier, Doug. "Russia's Luna-25 Moon Lander Undergoes Acoustic Tests." Parabolic Arc. Feb. 23, 2021. http://www.parabolicarc.com/2021/02/23/russias-luna-25-moon-lander-undergoes-acoustic-tests/.

Ministry of Foreign Affairs. “Joint Communiqué of the 25th Regular Meeting Between Chinese and Russian Prime Ministers (full text)” ('*Zhong E Zongli Di Ershiwu Ci Dingqi Huiwu Lianhe Gongbao' Fabiao, Zhuli Zhong E Weixing Daohang Hezuo Zou Shen Zou Shi*; 中俄总理第二十五次定期会晤联合公报》发表，助力中俄卫星导航合作走深走实). Dec. 3, 2020. http://www.beidou.gov.cn/yw/xwzx/202012/t20201207_21688.html.

“The Ministry of National Defense's Press Office Answers Reporters' Questions on China- Russia Anti-missile Computer Exercises” (*Guofang Bu Xinwen Ju Jiu Zhong E Juxing Fan Dao Jisuanji Yanxi Da Jizhe Wen*; 国防部新闻局就中俄举行反导计算机演习答记者问). Dec. 11, 2017. http://www.scio.gov.cn/xwfbh/gbwxwfbh/xwfbh/gfb/Document /1613255/1613255.htm.

“Ministry of National Defense: China and Russia will Strengthen Cooperation in the Field of Air Defense and Anti-missile (*Guofang Bu: Zhong E Jiang Jiaqiang Zai Fangkong Fan Dao Lingyu de Hezuo*; 国防部：中俄将加强在防空反导领域的合作).” Nov. 30, 2017. http://www.mod.gov.cn/jzhzt/2017-11/30/content_4798721.htm.

“MIPT and HUAWEI Started Cooperation in the Field of Artificial Intelligence.” Moscow Institute of Physics and Technology. https://www.hpcwire.com/off-the-wire/huawei-mipt-establish-lab-to-develop-ai-tech/.

Mosley, Brooke. *RD-180 Engine: An Established Record of Performance and Reliability on Atlas Launch Vehicles.* IEEE. 2011.

“My Country's 'Yinghuo-1' Mars Rover Will be Launched in November This Year” (*Wo Guo 'Yinghuo Yi Hao' Huoxing Tance Qi Jiang Yu Jinnian 11 Yue Fashe;* 我国“萤火一号”火星 探测器将于今年 11 月发射). Oct. 21, 2011. http://www.cnsa.gov.cn/n6758823 /n6758838/c6771393/content.html.

Myers, Steven Lee. “China and Russia Agree to Explore the Moon Together.” *New York Times*. Mar. 10, 2021. https://www.nytimes.com/2021/03/10/world/asia/china-russia-moon.html.

———. “In Hong Kong Protests, China Angrily Connects Dots Back to U.S.” *New York Times*. Sept. 5, 2019. https://www.nytimes.com/2019/09/05/world/asia/china-hong-kong-protests.html.

NASA. The Artemis Accords. 2020. https://www.nasa.gov/specials/artemis-accords /img/Artemis-Accords-signed-13Oct2020.pdf.

Note verbale dated 2 September 2014 from the Delegation of the United States of America to the Conference on Disarmament Addressed to the Acting Secretary-General of the Conference Transmitting the United States of America Analysis of the 2014 Russian-Chinese Draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects. Conference on Disarmament. CD/1998. 2014. https://documents-dds-ny.un.org/doc/UNDOC/GEN/G15/007/57/pdf/G1500757.pdf?OpenElement.

"Notice on Soliciting Project Proposals for the 'China-Russia Space Cooperation Program 2018-2022'" (*Guanyu Zhengji '2018-2022 Nian Zhong E Hangtian Hezuo Dagang' Xiangmu Jianyi de Tongzh*i; 关于征集《2018-2022 年中俄航天合作大纲》项目建议 的通知). Northwestern Polytechnical University School of Astronautics (*Xibei Gongye Daxue Hangtian Xueyuan*; 西北工业大学航天学院). Mar. 24, 2017. https://hangtian.nwpu.edu.cn/info/1371/10283.htm.

"NOVATEK and China's Silk Road Fund Conclude Selling 9.9% Stake in Yamal LNG." Novatek. Mar. 15, 2016. https://www.novatek.ru/en/press/releases/index.php?id_4=1165.

"NOVATEK Arctic LNG 2 Transaction." Novatek. July 22, 2019. https://www.novatek.ru/en/press/releases/index.php?id_4=3317.

Office of the Secretary of Defense. *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China.* 2018. https://media.defense.gov/2018/Aug/16/2001955282/-1/-1/1/2018-CHINA-MILITARY-POWER-REPORT.PDF.

"On the Situation with the Phobos-Grunt Spacecraft" (О ситуации с космическим аппаратом «Фобос-Грунт»). Roscosmos. Nov. 9, 2011. http://www.roscosmos.ru/17718/.

Posaner, Joshua. "Germany Wary of Macron's Space Force." Politico. July 24, 2019. https://www.politico.eu/article/germany-wary-emmanuel-macron-space-force/.

"Proposed Prevention Of An Arms Race In Space (PAROS) Treaty." NTI (Nuclear Threat Initiative). Apr. 5, 2021. https://www.nti.org/learn/treaties-and-regimes/proposed-prevention-arms-race-space-paros-treaty/.

"Putin Confirms Plans to Meet Chinese President during APEC Summit in Beijing." Sputnik International. Oct. 14, 2014.

"Putin Says Sino-Russian Relations Better Than Ever." Reuters. June 5, 2019. https://www.reuters.com/article/us-russia-china-putin/putin-says-sino-russian-relations-better-than-ever-idUSKCN1T61FL.

Rauhala, Emily. “China’s Anger Over U.S. Antimissile System Poses Challenge to Trump.” *Washington Post*. Mar. 7, 2017. https://www.washingtonpost.com/world/asia_pacific/china-warns-of-consequences-over-deployment-of-us-anti-missile-system/2017/03/07/dd5ca494-0319-11e7-a391-651727e77fc0_story.html.

“Rebalancing 'Disrupts' Regional Balance.” *PLA Daily* (*Jiefangjun Bao;* 解放军报). Dec. 31, 2012.

Reed, Stanley. “Britain is Getting Ready for its Space Race.” *New York Times*. Oct. 6, 2020. https://www.nytimes.com/2020/10/06/business/britain-satellites-brexit.html.

Ren Qi. “China, Russia will Explore Moon Water.” *China Daily*. Jan. 17, 2019. http://www.chinadaily.com.cn/a/201901/17/WS5c3fdde7a3106c65c34e4f76.html.

———. “Chinese, Russian Media have Role in Virus Fight.” *China Daily*. Dec. 19, 2020. https://www.chinadaily.com.cn/a/202012/19/WS5fdd3bb7a31024ad0ba9cc21.html.

Rocca, Christina B., Ambassador, Permanent Representative of the United States of America to the Conference on Disarmament. *Letter Dated 19 August 2008 from the Permanent Representative of the United States of America Addressed to the Secretary-General of the Conference Transmitting Comments on the Draft "Treaty on the Prevention of the Placement of Weapons in Outer Space and the Threat or use of Force against Outer Space Objects (PPWT)" as Contained in Document CD/1839 of 29 February 2008* Conference on Disarmament. CD/1847. 2008. https://documents-dds-ny.un.org/doc/UNDOC/GEN/G08/628/51/pdf/G0862851.pdf?OpenElement.

“Rogozin: Russia Will Not Build Its Own Space Station if US Sanctions are Lifted,” *Kommersant*, June 7, 2021, https://www.kommersant.ru/amp/4848270.

“Roscosmos Showed the First Module of the New Orbital Station (Роскосмос показал первый модуль новой орбитальной станции).” Roscosmos. Apr. 23, 2021. http://www.roscosmos.ru/30858/.

“Roskosmos. Meeting of the Sub-Commission on Space Cooperation (Роскосмос. Заседание Подкомиссии по сотрудничеству в области космоса).” Roscosmos. Sept. 28, 2018. http://www.roscosmos.ru/25546/.

Rozman, Gilbert. *The Sino-Russian Challenge to the World Order: National Identities, Bilateral Relations, and East Versus West in the 2010s*. Stanford: Woodrow Wilson Center Press, 2014.

Rules of Procedure of the Conference on Disarmament. United Nations Office for Disarmament Affairs. Dec. 19, 2003. https://undocs.org/CD/8/Rev.9.

Rumer, Eugene. *Russia and the Security of Europe.* Carnegie Endowment for International Peace. 2016. https://carnegieendowment.org/files/CP_276_Rumer_Russia_Final.pdf.

"Russia-China Project Committee on Important Strategic Cooperation in Satellite Navigation." GLONASS. https://www.glonass-iac.ru/en/BEIDOU/committee_en.php.

"Russia and China Expand Cooperation on Satellite Navigation" (Россия и Китай расширяют сотрудничество по спутниковой навигации). GLONASS. Dec. 8, 2020. http://vestnik-glonass.ru/news/tech/rossiya-i-kitay-rasshiryayut-sotrudnichestvo- po-sputnikovoy-navigatsii/.

"Russia and China Signed a Memorandum on the Creation of a Lunar Station" (Россия и Китай подписали меморандум о создании лунной станции). Roscosmos. Mar. 9, 2021. https://www.roscosmos.ru/30248/.

"Russia and China Signed a Memorandum on the Creation of a Station on the Moon (Россия и Китай подписали меморандум о создании станции на Луне)." TASS. Mar. 9, 2021. https://www.youtube.com/watch?v=jJ6fP5MTXgU.

"Russia Completes Delivery of Second S-400 Missile System Regimental Set to China – Source." TASS. Jan. 26, 2020. https://tass.com/world/1113113.

"Russia Helping China to Create Early Missile Warning System, Says Putin." TASS. Oct. 3, 2019. https://tass.com/defense/1081383.

"Russia Joins China's Mission to Sample an Asteroid and Study a Comet." Space.com. Apr. 18, 2021. https://www.space.com/russia-joins-china-asteroid-comet-mission.

"Russia May Join Forces with China to Compete with US, European Satnavs." *Russia Times*. June 6, 2014. https://www.rt.com/news/164192-russia-china-gps-competitor/.

"Russia to Quit Int'l Space Station in 2025 – Reports." *Moscow Times*. Apr. 29, 2021. https://www.themoscowtimes.com/2021/04/19/russia-to-quit-intl-space-station-in-2025-reports-a73643.

"Russia to Start Production of Instruments for Luna-26 Orbiter by Year End." TASS. May 15, 2020. https://tass.com/science/1156817.

"Russia Will Help China in Space." Associated Press. Dec. 28, 2006. https://www.taipeitimes.com/News/world/archives/2006/12/28/2003342331.

"Russia, China Develop Navigation System Draft for SCO, BRICS." Sputnik. Dec. 16, 2015. https://www.gpsdaily.com/reports/Russia_China_Develop_High_Precision_Navigation_System_Draft_for_SCO_BRICS_999.html.

"Russia, China to Hold 1st Computer-Assisted Missile Defense Drills in May." TASS. Apr. 29, 2016. https://tass.com/defense/873381.

"Russia, China to Sign Deal Paving Way to Rocket Engine Contract — Deputy PM." TASS. June 20, 2016. https://tass.com/economy/883484.

"Russia's Future Space Observatory to be able to Search for Other Civilizations – Roscosmos." TASS. May 28, 2020. https://tass.com/science/1161355.

"Russia's MTS and China's Huawei Sign Agreement on 5G." Reuters. June 5, 2019. https://www.reuters.com/article/huawei-tech-russia-mts/russias-mts-and-chinas-huawei-sign-agreement-on-5g-idUSR4N23602B.

"Russia's Sample Mission to Moon Scheduled for 2026-2027." TASS. Oct. 8, 2019. https://tass.com/science/1081926.

"Russian-Chinese Agreements on Lunar Exploration (Российско-китайские соглашения по исследованию Луны)." Roscosmos. Sept. 17, 2019. https://www.roscosmos.ru/26811/.

"Russian-Chinese Cooperation in the Space Industry (Российско-Китайское сотрудничество в космической отрасли)." Rakurs. 2020. https://racurs.ru/press-center/articles/obshchie-voprosy/rossiysko-kitayskoe-sotrudnichestvo-v-kosmicheskoy-otrasli/.

"Russian-Chinese Cooperation on Lunar Station is not Aimed Against the West – Space Chief." TASS. Mar. 16, 2021. https://tass.com/science/1266253.

"Russian Hi-tech Firm to Team up With China to Develop Liquid Rocket Propellants." TASS. Nov. 8, 2018. https://tass.com/defense/1029917.

"Russian media: Russia will Continue to Block China's Super Rocket Engine Technology" (*E Mei: E Jiang Jixu Dui Hua Fengsuo Chaoda Huojian Fadongji Jishu*; 俄媒：俄将继续对华 封锁超大火箭发动机技术). Radio Free Asia. Oct. 18, 2016. https://www.rfa.org/mandarin/yataibaodao/junshiwaijiao/lxy1-10182016101957.html.

"Russian Media: Russia Will Sell RD180 Rocket Engine to China, Which it Urgently Needs" (*E Mei: E Jiang Shou Hua RD180 Huojian Fadongji Zhongguo Poqie Xuyao*; 俄媒：俄将售 华 RD180 火箭发动机 中国迫切需要). *Global Times*. June 27, 2016. https://mil.huanqiu.com/article/9CaKrnjW7EK.

"Russian Media: Temporarily Unable to Supply Rocket Engines to China, Looking for a Solution" (*E Mei: Zan Wufa Xiang Zhongguo Gongying Huojian Fadongji, Zhengzai Xunzhao Jiejue Banfa*; 俄媒：暂无法向中国供应火箭发动机，正在寻找解决办法). *The Paper* (*Pangpai;* 澎湃). Apr. 8, 2016. https://www.thepaper.cn /newsDetail_forward_1453918.

"Russian National Station Deployed in Orbit by 2035 (Российскую национальную станцию развернут на орбите к 2035 году)." Roscosmos. Apr. 25, 2021. http://www.roscosmos.ru/30869/.

"Russian, Chinese Firms to Develop New-generation Liquid Rocket Propellants." *DefenseWorld.net*. Nov. 9, 2018. https://www.defenseworld.net/news/23640 /Russian__Chinese_Firms_to_Develop_New_generation_Liquid_Rocket_Propellants#.Y D6XZiBOlhE.

Ruwitch, John, and Ambika Ahuja. "China Ruffled at Security Forum Over Maritime Rows." Reuters. July 24, 2010. https://www.reuters.com/article/uk-asia-security-china/china-ruffled-at-security-forum-over-maritime-rows-idUKTRE66M29F20100724.

"S-400 Triumf (SA-21 'Growler')." Jane's Strategic Weapon Systems. July 17, 2013.

SASTIND. "The meeting of the Space Cooperation Subcommittee of the China-Russia Prime Ministers Regular Meeting Committee was held" (*Zhong E Zongli Dingqi Huiwu Weiyuanhui Hangtian Hezuo Fen Weihui Huiyi Juxing;* 中俄总理定期会晤委员会航天 合作分委会会议举行). July 16, 2007. http://www.gov.cn/gzdt/2007-07/16 /content_686579.htm.

"The Second Sino-Russian Innovation Dialogue Promotes Practical Cooperation" (*Di er jie Zhong E Chuangxin Duihua Tuidong Wushi Hezuo*; 第二届中俄创新对话推动务实合作). Xinhua. Oct. 17, 2018. http://www.gov.cn/xinwen/2018-10/17/content _5331568.htm.

"The Seventh Meeting of the China-Russia Satellite Navigation Major Strategic Cooperation Project Committee was Successfully Held" (*Zhong E Weixing Daohang Zhongda Zhanlue Hezuo Xiangmu Weiyuan Hui di Qi Ci Huiyi Chenggong Juxing;* 中俄卫星导航重 大战略合作项目委员会第七次会议成功举行). Beidou. Oct. 16, 2020. http://www.beidou.gov.cn/yw/xwzx/202010/t20201020_21356.html.

"Sharing Advances in Satellite Navigation (Совместное использование достижений спутниковой навигации)." *China (КИТАЙ)*. Aug. 28, 2020. http://www.kitaichina.com/rbestxinwen/202008/t20200828_800219017.html.

Shelyutto, Andrey. “Space in Chinese” (Космос по-китайски). *Kommersant (Коммерсантъ)*. Nov. 28, 2016. https://www.kommersant.ru/doc/3144562.

Shim, Elizabeth. “Russia Postpones Missile Technology Transfer to China.” UPI. Apr. 8, 2016. https://www.upi.com/Top_News/World-News/2016/04/08/Russia-postpones-missile-technology-transfer-to-China/3621460127815/.

Sidorenko, Elena. “Not just space: how RSC Energia returned to Istok: ex-head of the corporation Vladimir Solntsev is prosecuted in the case of embezzlement of a billion rubles in the supply of components for the ISS module” (Не просто космос: как РКК «Энергия» вернулась к «Истоку»:Экс-глава корпорации Владимир Солнцев проходит по делу о хищении миллиарда рублей при поставках компонентов для модуля МКС). *Izvestia*. Aug. 27, 2020. https://iz.ru/1053540/elena-sidorenko /ne-prosto-kosmos-kak-rkk-energiia-vernulas-k-istoku.

Simes, Dimitri. “Russia and Huawei Team Up as Tech Cold War Deepens.” *Nikkei Asia*. Oct. 28, 2019. https://asia.nikkei.com/Politics/International-relations/Russia-and-Huawei-team-up-as-tech-cold-war-deepens.

———. “Russia up in Arms Over Chinese Theft of Military Technology: Beijing's Rise as a Major Armaments Exporter is a Double-edged Sword for Moscow.” *Nikkei Asia*. Dec. 20, 2019. https://asia.nikkei.com/Politics/International-relations/Russia-up-in-arms-over-Chinese-theft-of-military-technology.

“Sino-Russian Declaration (*Zhong E Lianhe Shengming*; 中俄联合声明).” Foreign Ministry of the People’s Republic of China. Apr. 25, 1996. https://www.fmprc.gov.cn/web /ziliao_674904/1179_674909/t6798.shtml.

Smith, Marcia. “Senate Reaches Agreement on Russian RD-180 Engines.” Spacepolicyonline.com. June 14, 2016. https://spacepolicyonline.com/news/senate-agreement-reaches-on-russian-rd-180-engines/.

Soldatkin, Vladimir. “Putin and Xi Oversee Launch of Landmark Russian Gas Pipeline to China.” Reuters. Dec. 2, 2019. https://www.reuters.com/article/us-china-russia-gas-start/putin-and-xi-oversee-launch-of-landmark-russian-gas-pipeline-to-china-idUSKBN1Y60X9.

———. “Putin and Xi Oversee Launch of Landmark Russian Gas Pipeline to China.” Reuters. Dec. 2, 2019. https://www.reuters.com/article/us-china-russia-gas-start/putin-and-xi-oversee-launch-of-landmark-russian-gas-pipeline-to-china-idUSKBN1Y60X9.

Song Xiaojun (宋晓军). “Song Xiaojun: Ground-based Midcourse Missile Defense Requires Ballistic Missile Warning Satellites” (*Song Xiaojun: Lu Ji Zhongduan Fan Dao Cheng Junxu Dandao Daodan Yujing Weixing*; 宋晓军：陆基中段反导成军需弹道导弹预警卫 星). Sina. Jan. 28, 2013. http://mil.news.sina.com.cn/2013-01-28/0917714065.html.

“Space Agency: China and Russia Exchange Views on Issues Such as the Outline of Space Cooperation Projects” (*Hangtian Ju: Zhong E Jiu Hangtian Hezuo Xiangmu Dagang Deng Wenti Jiaohuan Yijian*; 航天局：中俄就航天合作项目大纲等问题交换意见). *China News (Zhongguo Xinweng Wang: 中国新闻网)*. July 13, 2009. https://www.chinanews.com/gn/news/2009/07-13/1771957.shtml.

Sprenger, Sebastian. “German Industry Pushes for Space Launch Site in the North Sea.” *Defense News*. Oct. 8, 2020. https://www.defensenews.com/global/europe /2020/10/08/german-industry-pushes-for-space-launch-site-in-the-north-sea/.

State Council Information Office. *China's Space Activities in 2016.* Dec. 27, 2006. http://www.scio.gov.cn/zfbps/32832/Document/1537024/1537024.htm.

State Council Information Office. “Joint Communique From the 21st Regular Meeting Between the Prime Ministers of China and Russia” (*Zhong E Zongji Di Ershiyi Ci Dingqi Huiwu Lianhe Gongbao;* 中俄总理第二十一次定期会晤联合公报). *People's Daily*. Nov. 9, 2016. http://politics.people.com.cn/n1/2016/1109/c1001-28845796.html.

“Statement of H. E. Mr. Geng Shuang, Head of the Chinese Delegation and Deputy Permanent Representative at the General Debate of the First Committee of the 75th Session of the UNGA.” Oct. 12, 2020. https://www.fmprc.gov.cn/mfa_eng/wjb_663304 /zwjg_665342/zwbd_665378/t1823442.shtml.

“Statement of the Chinese Delegation at the Thematic Discussion on Nuclear Weapons at the First Committee of the 75th Session of the UNGA.” Permanent Mission of the People’s Republic of China to the UN, 2020. https://www.fmprc.gov.cn/ce/ceun/eng /chinaandun/disarmament_armscontrol/unga/t1831640.htm.

Stockholm International Peace Research Institute (SIPRI). *Arms Transfers Database*. 2018.

Stokes, Mark. *China’s Strategic Modernization: Implications for the United States*. Strategic Studies Institute, 1999.

Stolyarov, Gleb. “Russia and China Deepen Ties with River Amur Bridge.” Reuters. Nov. 29, 2019. https://www.reuters.com/article/russia-china-bridge/russia-and-china-deepen-ties-with-river-amur-bridge-idUSL8N28920Y.

Stronski, Paul, and Nicole Ng. *Cooperation and Competition: Russia and China in Central Asia, the Russian Far East, and the Arctic.* Carnegie Endowment for International Peace. 2018. https://carnegieendowment.org/2018/02/28/cooperation-and-competition-russia- and-china-in-central-asia-russian-far-east-and-arctic-pub-75673.

"The Third China-Russian Innovation Dialogue was Held in Shanghai" (*Di san jie Zhong E Chuangxin Duihua Zai Shanghai Juxing*; 第三届中俄创新对话在上海举行). Ministry of Science and Technology of the People's Republic of China. Oct. 9, 2019. http://www.most.gov.cn/kjbgz/201910/t20191009_149149.htm.

"The United States Intends to Win Over Allies to Promote International Agreements and Set Rules for Lunar Mining" (*Chen Sijia Meiguo Ni Lalong Mengguo Tuidong Guoji Xieyi Wei Yueqiu Caikuang Li Guiju Guancha Zhe*; 陈思佳 美国拟拉拢盟国推动国际协议，为月球 采矿立规矩 观察者). Guancha. May 6, 2020. https://www.guancha.cn /internation/2020_05_06_549365.shtml.

"UN Security Council Action on Crimea Referendum Blocked." *UN News*. Mar. 14, 2014. https://news.un.org/en/story/2014/03/464002-un-security-council-action-crimea-referendum-blocked.

US Department of Defense. *Chinese And Russian Missile Defense: Strategies and Capabilities.* July 2020. https://media.defense.gov/2020/Jul/28/2002466237/-1/-1/1 /CHINESE_RUSSIAN_MISSILE_DEFENSE_FACT_SHEET.PDF.

———. *Military and Security Developments Involving the People's Republic of China 2020.* 2020.

US Space Command Public Affairs Office. "Russia Conducts Space-based Anti-satellite Weapons Test." United States Space Command. July 23, 2020. https://www.spacecom.mil/MEDIA/NEWS-ARTICLES/Article/2285098/russia-conducts-space-based-anti-satellite-weapons-test/.

"Viewing China-Russia Cooperation from the Perspective of Satellite Navigation" (*Cong Weixing Daohang Kan Zhong E Daguo Hezuo*; 从卫星导航看中俄大国合作). Beidou. Sept. 19, 2019. http://www.beidou.gov.cn/yw/xwzx/201909 /t20190923_19011.html.

Walsh, Matthew. "Sanctions-Hit Huawei to Open New R&D Centers in Russia: Reports." *Caixin*. Aug.19, 2019. https://www.caixinglobal.com/2019-08-19/sanctions-hit-huawei-to-open-new-rd-centers-in-russia-reports-101452468.html.

Wang Fan and Zhi Linfei. "China, U.S. Move Beyond Distractions Toward Fostering New Inter-Power Relations." Xinhua. Dec. 16, 2012. http://usa.chinadaily.com.cn/china/2012-12/16/content_16021792.htm.

Wang Guoyu. “NASA’s Artemis Accords: The Path to a United Space Law of a Divided One?” The Space Review (Aug. 24, 2020). https://www.thespacereview.com/article/4009/1.

Wang Wei and Zhou Yuan. “China and Russia Deepen Human Spaceflight and Deep Space Exploration Cooperation” (*Zhongguo yu Eluosi Jiashen Zai Ren Hangtian yu Shen Kong Tance Hezuo;* 中国与俄罗斯加深载人航天与深空探测合作), *World Knowledge* (*Shijie Zhichi;* 世界知识) 2 (2021): 60.

Wishnick, Elizabeth. “Sino-Russian Consolidation at a Time of Geopolitical Rivalry.” *China Leadership Monitor* (Mar. 1, 2020). https://www.prcleader.org/elizabeth-wishnick.

“Working Group on GNSS Characteristics Monitoring and Assessment The Silk Road Experiment.” GLONASS. https://www.glonass-iac.ru/en/AboutIAC/silkroad2017.php.

Wu Yan (吴焰). “China-Russia Space Cooperation is Broad” (*Zhong E Hangtian Lingyu Hezuo Kongjian Guangkuo*; 中俄航天领域合作空间广阔). *People's Daily*. Apr. 17, 2018. http://world.people.com.cn/n1/2018/0417/c1002-29930025.html.

“Xi Jinping and Russia’s President Putin Exchange Congratulations at the Opening Ceremony for the Year of Scientific and Technological Innovation” (*Xi Jinping Tong Eluosi Zongtong Pujing Fenbie Xiang Zhong E Keji Chuangxin Nian Kaimu Shi Zhi Hexin*; 习近平同俄罗斯总统普京分别向中俄科技创新年开幕式致贺信). Xinhua. Aug. 26, 2020. http://www.xinhuanet.com/politics/leaders/2020-08/26/c_1126416458.htm.

“Xi Jinping Meets with Secretary of the National Security Council Nikolai Patrushev of the Russian Federation.” Foreign Ministry of the People's Republic of China. Dec. 2, 2019. https://www.fmprc.gov.cn/mfa_eng/zxxx_662805/t1721345.shtml.

“Xi, Putin Congratulate on Opening of China-Russia Scientific, Technological Innovation Year.” Xinhua. Aug. 26, 2020. https://www.globaltimes.cn/content/1198943.shtml.

Xie Ruiqiang. “China and Russia Successfully Held Anti-missile Computer Exercises, Both Countries Have Room for Deepening Anti-missile Cooperation” (*Zhong E Chenggong Juxing Fan Dao Jisuanji Yanxi, Liang Guo Fan Dao Hezuo Hai You Shenhua Kongjian*; 中俄成功举行反导计算机演习，两国反导合作还有深化空间). The Paper (*Pengpai; 澎湃)*. Dec. 17, 2017. https://www.thepaper.cn/newsDetail_forward_1909843.

Xu Guangyu. “Expert: China's Huge Technological Advancement in Outer Space Has Made the United States Feel Like Its Sitting on Pins and Needles” (*Zhuanjia: Zhongguo Waikong Jishu Jinbu Juda Ling Meiguo Ru Zuo Zhenzhan*;专家：中国外空技术进步巨大令美国如坐针毡). *People's Daily Online - Global Times.* June 23, 2014. http://military.people.com.cn/n/2014/0623/c1011-25185435.html.

"Yamal LNG Signed Loan Agreements with the Export-Import Bank of China and the China Development Bank." Yamal LNG. Apr. 29, 2016. https://www.novatek.ru /common/upload/doc/2016_04_29_press_release_Chinese_banks_FA_(ENG).pdf.

Yang Yucai. "China-Russia Missile Defense Cooperation Needed." *Global Times*. Oct. 14, 2019. https://www.globaltimes.cn/content/1166852.shtml.

Yin Yeping. "Strengthening of China-Russia Technological Cooperation in Crucial: Envoy." *Global Times*. Sept. 8, 2020. https://www.globaltimes.cn/content/1200296.shtml.

Yuan Jing-dong. "Chinese Responses to U.S. Missile Defenses: Implications for Arms Control and Regional Security." *The Nonproliferation Review* Spring (2003): 79-85.

Yun Sun. *The Northern Sea Route: The Myth of Sino-Russian Cooperation.* The Stimson Center. 2018. https://www.stimson.org/sites/default/files/file-attachments/Stimson%20-%20The%20Northern%20Sea%20Route%20-%20The%20Myth%20of%20Sino-Russian%20Cooperation.pdf.

Zhao Huasheng. "Has There been a Change in the Nature of China-Russia Relations?" (*Zhong E Guanxi Zhibian le ma?;* 中俄关系质变了吗?). *Pengbo*. July 20, 2016.

Zhao Lei. "China Tests its Missile Interception Equipment." *China Daily*. Feb. 6, 2021. https://www.chinadaily.com.cn/a/202102/06/WS601dd244a31024ad0baa7a6e.ht ml.

Zhong Sheng. "Media Cooperation, Cooperate to Tell China and Russia's Story Well" (*Meiti Hezuo, Heli Jiang Hao Zhong E Gushi*; 媒体合作，合力讲好中俄故事)." *People's Daily,* (*Renmin Ribao;* 人民日报). June 23, 2015. http://world.people.com.cn/n/2015 /0623/c1002-27192173.html.

"zra 云卷云舒 zra." Weibo. Apr. 24, 2021. https://weibo.com/6618567819 /KcpftkBxA?type=comment&ssl_rnd=1619536922.4951#_rnd1619537043236.