Journal of Globe Scientific Reports (2024)

Journal of Globe Scientific Reports

journal homepage: www.journal-gsr.online

Paper Type: Original Article

Challenges in Global Space Governance and China's Response

Yuteng Xia[1*]

1.University of Macau

Abstract

As space exploration advances, space governance has emerged as a crucial means to regulate space activities and stabilize space development. However, issues such as space security, monopolization of governance leadership, environmental concerns, and space resource development are disrupting the orderly progression of space governance. China, as a rising space power, adheres to the principle of peaceful space utilization. This paper discusses how China addresses the current challenges in space governance through space governance proposals, promotion of space cooperation, and enhancement of space governance technologies.

Keywords: Space Governance, Space issues, Chinese diplomacy

I. The Concept of Space Governance

Space governance encompasses the institutions and actions that regulate space-related affairs or activities, including resource allocation, environmental protection, and cooperation in space. As a subset of global governance, space governance relies on collective efforts to address issues concerning all humanity. Space, being a global commons defined as "areas and resources beyond national jurisdiction," is accessible to all international actors. Hence, space governance differs from conventional global governance. Firstly, space governance involves significant potential benefits, with the returns from space development being calculated differently from traditional terrestrial industries. Since space is unclaimed, the profits from space development arise from technological investments in space. The more capital a space actor invests in developing

space technologies and shaping the space industry, the greater the potential returns. In 2018, the global commercial space sector's total value was approximately $385 billion, with estimates suggesting that it could reach $1-3 trillion by 2040. Space development is subject to governance norms, making the direction of space governance influential in determining industry revenues. Secondly, the commons attribute of space grants all humanity equal rights to participate in governance, develop space resources, and manage space-related matters. Therefore, space governance should aim to benefit humanity as a whole.

II. Challenges Facing Space Governance

Space governance is essential for regulating space activities, but current space competition in various domains significantly hinders its progress. This section provides a brief overview of the existing issues in space governance.

(A) Issues in Space Arms Control

Space is an emerging military domain with strategic significance for protecting assets, supporting terrestrial military activities, and enhancing deterrence. Since the Cold War, major space powers have competed for military dominance in space, undermining the principle of peaceful development and exacerbating potential military conflicts, thus complicating space arms control efforts. International space law has struggled to curb the militarization trend. During the Cold War, the U.S. and the Soviet Union sought to balance nuclear competition by establishing a space governance framework centered around the Outer Space Treaty, which outlines basic principles for peaceful space activities and prohibits deploying weapons in outer space. The Liability Convention provides mechanisms for dealing with negative issues arising from space technology. However, legal ambiguities allow for military deployments under scientific purposes, and weapons other than nuclear or mass destruction are not explicitly defined as space weapons, thereby weakening the effectiveness of space law. Following the Cold War, the breakdown of this framework led to a regression in space security. The U.S., leveraging its unipolar power, solidified its dominance in space and actively developed space military capabilities, perceiving space deterrence as a force multiplier. The U.S. restructured its space forces, established the Space Force in 2019, and created institutions like the National Space Intelligence Center. These actions prompted other nations to strengthen their military space strategies, with Russia establishing the Aerospace Forces in 2015 and France creating the Air and Space Force in 2019, leading to heightened space arms competition.

(B) Confrontation in Space Governance

The current space governance system resulted from Cold War-era compromises between the U.S. and the Soviet Union. In the post-Cold War period, the U.S., as a superpower, has maintained its monopoly on governance leadership, creating a hegemonic characteristic in space governance. On one hand, the monopolization of governance leadership undermines the rationality of space governance. Leadership in governance can control the direction of space regulations and influence the distribution of benefits. To safeguard its dominance, the U.S. has intensified confrontations with other countries over governance issues. It has formed exclusive coalitions like the "space military alliance" for space situational awareness data sharing and led the signing of the Artemis Accords, excluding influential nations from the International Space Exploration Coordination Group (ISECG) and refusing cooperation between the International Space Station and China's future space station. Additionally, the U.S. has rejected space legislation and behavior norms unfavorable to its interests, such as the China-Russia proposal for space transparency and confidence-building measures and the EU's Code of Conduct for Outer Space Activities. The divergence in governance approaches impedes the formation of a unified mechanism for addressing issues, further disconnecting the legal framework from reality and weakening governance efficacy. On the other hand, monopolization creates a democratic deficit in space governance. Governance concerns all humanity, yet many developing countries are excluded from managing space issues. As space development progresses, emerging space powers strive to reform governance systems to safeguard their interests, but their status as latecomers and relatively weak capabilities hinder their demands from being met. In space spectrum negotiations, developing countries are nominally given equal opportunities, but leading powers like the U.S. do not consider common interests to imply actual benefits sharing, thus not reserving spectrum resources for developing countries.

(C) Space Environmental Governance Issues

Human space exploration has adversely affected the space environment, mainly through space debris and biological contamination. Space debris results from human activities, with an estimated 31,870 tracked objects in 2022, alongside approximately 110 million untracked fragments. Unpredictable collisions between debris increase the debris population and threaten the functioning of space vehicles, with potential collisions leading to debris falling to Earth, posing biological safety risks. For instance, debris from the Soviet Union's "Kosmos 954" satellite fell into Canada in 1978, causing significant local damage. While space governance has established a debris management system centered around the IADC Space Debris Mitigation Guidelines, its effectiveness remains limited due to constraints related to arms control negotiations. Biological contamination refers to pollution resulting from biological experiments conducted in space under microgravity and other unique conditions. Space's unique environment can foster microorganisms harmful to human health or the Earth's environment. If not managed properly, such as in cases of microbial leakage during transfer, this could endanger human health or disrupt the terrestrial ecosystem.

(D) Space Resource Governance Issues

Space resources are the common wealth of humanity, yet significant challenges exist in their equitable distribution and utilization. First, the allocation of scarce space resources, such as satellite orbits and spectrum, remains problematic due to technological constraints on infinite supply. Once occupied, it is challenging to reallocate these resources to new entrants, creating conflicts between the interests of major space powers and emerging spacefaring nations. Second, the issue of space-related intellectual property arises, as entities invest substantial costs in acquiring space knowledge, necessitating protection that conflicts with the non-sovereign nature of space, leading to legal disputes.

III. China's Measures to Address Space Governance Challenges

As an emerging space power, China has become a significant player in space governance. China is committed to peaceful space development, protecting the fundamental rights of all nations to explore space, and actively promoting global space governance for the benefit of all humanity. China has made the following contributions to alleviate space governance issues.

(A) Providing New Approaches to Space Governance

The current space governance system is disconnected from practical governance needs. Although space law recognizes space as a global commons, it lacks mechanisms to protect the rights of all nations to participate in activities such as resource utilization and space security management. This issue arises from the influence of Western values on the space regulatory framework. In terms of security, Western nations prefer to use international soft law to guide space activities while avoiding formal disarmament treaties. Regarding resource allocation, they favor equality of opportunity over substantive equality. As a result, the current space framework fails to uphold the principles of fairness and justice.

China has introduced new perspectives on space governance. In 2021, the State Council Information Office issued the "2021 China's Space Program" white paper, which, for the first time, proposed the concept of a "Community with a Shared Future for Mankind in Space." This concept expresses China's willingness to cooperate with other nations based on mutual benefit, peaceful use, and inclusive development. It aligns well with the needs of space governance. First, space governance concerns the well-being of all humanity, meaning that humanity shares a common destiny in space activities. Space exploration not only expands human activity but also increases the nonlinear impact of individual actions on the whole of humanity, such as space debris affecting future satellite launches.

As space exploration deepens, human interdependence will further increase. Second, the "Community with a Shared Future for Mankind in Space" approach, with its "co-building, co-discussion, and co-sharing" principles, meets the requirements of space governance. In a multipolar space environment, more diverse participants and a fairer governance structure are needed. This approach respects the trend of coexistence among diverse international actors, balances individual and collective interests, and establishes a path to joint participation and prosperity through a balance of long-term and short-term plans. This peace-oriented development strategy discards the zero-sum approach of traditional space governance, which focused on securing national interests, making it more consistent with space's nature as a global commons.

(B) Promoting Space Cooperation

Firstly, China actively coordinates with major space powers and opposes the U.S. monopoly over space governance leadership. The U.S. has intensified conflicts over space militarization and resource competition for its interests. There is common ground among Europe, Russia, and China in opposing U.S. space hegemony and resolving space issues. China has actively coordinated with major space powers on governance issues, engaged in space cooperation, and pushed for governance reforms. China and Russia have collaborated on space arms control. In 1998, in response to U.S. actions to advance the Theater Missile Defense (TMD) system and deploy the National Missile Defense (NMD) system, both nations suspected that the U.S. intended to withdraw from the Anti-Ballistic Missile (ABM) Treaty, which restricts the number of missile defense systems and space-based missile systems, closely tied to space security and geopolitical stability. China and Russia subsequently issued documents like the "Sino-Russian Relations at the Turn of the Century," "Sino-Russian Joint Statement," and the "Joint Statement on Missile Defense," emphasizing the treaty's importance and urging the U.S. to comply with the relevant agreements. After the U.S. withdrew from the treaty, the two nations' leaders issued a joint statement calling for the establishment of a special committee to prevent an arms race in space, proposing international legislation to ban space weaponization and opposing the deployment of space weapons. With the escalation of space security issues, China and Russia have conducted more substantial cooperation on space disarmament. Since 2002, the two countries have submitted legal documents to the Conference on Disarmament to lay the groundwork for space disarmament legislation, and in 2008, they formally proposed 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).

China has also interacted with the European Union on space environmental issues. The EU proposed the "Code of Conduct for Outer Space Activities" in 2008, a voluntary set of guidelines covering space debris management, space cooperation mechanisms, and other issues. China has actively participated in discussions on this initiative to reduce the generation of space debris and has provided joint revision suggestions for the initiative.

Secondly, China actively safeguards the rights of developing countries to utilize space. Space governance concerns all humanity. However, Western powers' monopoly over governance leadership excludes less capable developing countries from participating in space management, preventing them from expressing their governance demands, thereby causing a democratic deficit in space governance. China has collaborated with emerging space nations on a reciprocal basis, enhancing their space capabilities and promoting reforms in governance mechanisms. Bilaterally, China has signed agreements with numerous developing countries on space technology cooperation and the peaceful use of outer space, exploring extensive cooperation in technology transfer, space personnel training, and data sharing, thereby facilitating developing nations' entry into space. The space cooperation between China and Brazil is regarded as a model of South-South cooperation. The two countries jointly launched Earth resource satellites in 1999, 2003, and 2007 and announced in 2007 that they would share satellite data with African nations. Furthermore, China has provided space project management and technology training to countries like Thailand and Laos. For example, in 2014, China invited technical personnel from relevant countries to visit the Beidou base in Wuhan and provided Beidou satellite technology training. China also engages in multilateral cooperation with developing countries. In 2008, China and Asian countries, including Thailand, jointly established the Asia-Pacific Space Cooperation Organization (APSCO). In 2018, APSCO held a high-level forum themed "Space Cooperation for Building a Community with a Shared Future for Mankind" and released the "APSCO 2030 Development Vision," calling for the enhancement of space capabilities in developing countries and the peaceful use of space. APSCO has facilitated member cooperation in areas such as satellite data sharing and space technology transfer, promoting the prosperity of regional space endeavors. Additionally, China has partnered with countries along the Mekong River to build the "Lancang-Mekong Space Information Corridor," implementing satellite network infrastructure to advance social development through information sharing.

(C) Enhancing Space Governance Technologies

Space pollution affects all humanity, and the "polluter pays" principle should apply. Major spacefaring nations must assume greater responsibility for their space activities to avoid causing problems in space. As a rising space power, China has continually strengthened its space governance technologies to mitigate the negative impact of space activities on the space environment. In 2000, China launched the "Space Debris Action Plan" and issued the "Management Measures for Space Debris Mitigation and Protection." In 2004, the Space Target and Debris Observation Research Center of the Chinese Academy of Sciences was established. By 2008, the Space Debris Observation Key Laboratory at the Purple Mountain Observatory was set up, followed by the Space Debris Monitoring and Application Center of the China National Space Administration in 2015. China has since developed a systematic space technology research framework, achieving breakthroughs in space debris mitigation and space situational awareness. The country has established a space debris observation system capable of environmental assessment, spacecraft fragmentation analysis, and collision warning for space vehicles.

China has successfully de-orbited defunct satellites multiple times, implemented rocket upper stage passivation procedures, and achieved significant progress in space debris mitigation technologies. Furthermore, China has explored methods for debris removal using robotic arms and applied this technology to active rockets to conduct experimental simulations of debris capture and incineration.

China's technological advancements offer more options for space governance. For instance, data from the Space Debris Monitoring and Application Center helped Venezuela's Remote Sensing Satellite I avoid debris impacts, significantly contributing to the reduction of space debris threats to human spaceflight projects.

Conclusion

Facing challenges in space governance, China upholds the principle of "peaceful utilization of outer space, safeguarding space security, promoting the building of a community with a shared future in outer space, and benefiting all humanity." China has actively contributed to promoting peace and development through a multi-layered, comprehensive governance structure that encompasses governance strategies, technological advancements, and cooperative interactions, thereby revitalizing space governance.

References

Chen, Qiufeng. "Global Commons Governance and the Construction of a Community with a Shared Future for Mankind." International Forum, no. 3, 2021, pp. 38-58.

Xu, Nengwu. Space Politics: The Path to Constructing a New High Ground of Political Civilization. China Social Sciences Press, 2015, p. 17.

Xu, Nengwu, Long, Kun, and Meng, Xin. "The Origin, Evolution, and Development Trends of Space Arms Control from an International Security Perspective." International Security Studies, no. 5, 2022, pp. 107-129.

He, Qisong. "The Fragile High Frontier: Strategic Dilemmas of American Space Deterrence in the Post-Cold War Era." Social Sciences in China, no. 4, 2012.

"Space Junk: How We Are Polluting Space" [EB/OL]. (2022-09-26) [2024-10-1], https://starwalk.space/zh-Hans/news/space-junk.

Xu, Xiangmin, and Wang, Yan. "Improvement of Legal Systems for the Utilization of Outer Space Resources and Environmental Protection." China Population, Resources and Environment, no. 4, 2007, pp. 111-115.

State Council Information Office of the People's Republic of China. "2021 China's Space

Program White Paper" [EB/OL]. (2022-01-28) [2024-10-5], https://www.gov.cn/zhengce/2022-01/28/content_5670920.htm.

He, Qisong, and Ye, Nisan. "Analysis of China-Russia Space Cooperation." Russian Studies, no. 4, 2021, pp. 148-175.

"Joint Statement by the Heads of China and Russia in Moscow" [EB/OL], (2001-07-16) [2024-10-3], China Government Website, 2001-07-16, https://www.gov.cn/gongbao/content/2001/content_60960.htm.

Council of the European Union. "Draft Council Conclusion on Draft Code of Conduct for Outer Space Activities" [EB/OL], (2008-21-08) [2024-10-03], https://data.consilium.europa.eu/doc/document/ST-17175-2008-INIT/en/pdf.

"10th Anniversary of APSCO: The 'APSCO 2030 Development Vision' Released in Beijing" [EB/OL]. (2018-11-14) [2024-10-5], Government of the People's Republic of China, www.gov.cn/xinwen/2018-11/14/content_5340417.htm.

Ren, Mingzhe. "The Basis, Challenges, and Prospects of the Lancang-Mekong Space Cooperation Plan." Indian Ocean Economic Studies, no. 2, 2023, pp. 131-150.