Antisatellite Testing and a Whole New Era in Spacefaring: The Implication of China's 2007 ASAT Test on Global Security and Strategic Intelligence

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Abstract

Spacefaring has emerged as a critical element of global security and strategic intelligence, playing a significant role in all aspects of national power: diplomacy, information, military, and economics (DIME). China's 2007 anti-satellite (ASAT) test ushered in a new era in spacefaring. China conducted a devastating direct ascent ASAT test that destroyed a weather satellite, resulting in over 3000 pieces of space debris. The unexpected nature of this test caught the international spacefaring community off guard, and gave rise to immediate concerns among spacefaring powers, prompting questions about China's intention. This was a stark reminder of the multifaceted dimensions of power associated with space exploration, encompassing all the DIME soft and hard power components. These were crucial in motivating China's decision to conduct the test and shaping the responses of other spacefaring nations. The United States and China have been competitors in space for decades. However, China's recent advancements in space and acts of aggression like the ASAT test have raised concerns with the spacefaring community. The ASAT test and other potentially disruptive activities also present a thorny warning intelligence problem, as many of these activities span national power elements. Using the theoretical framework of realism, this paper assesses the significance of China's ASAT test through the lens of DIME components to shed light on its implications on global security and propose a set of intelligence recommendations intended to prevent strategic surprises in the future.

Keywords: ASAT, China, DIME, spacefaring, soft power, warning intelligence, warfare, weaponization

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Pruebas antisatélite y una era completamente nueva en la navegación espacial: las implicaciones de la prueba ASAT de China en 2007 para la seguridad global y la inteligencia estratégica

Resumen

La navegación espacial se ha convertido en un elemento crítico de la seguridad global y la inteligencia estratégica, desempeñando un papel importante en todos los aspectos del poder nacional: diplomacia, información, ejército y economía (DIME). La prueba antisatélite (ASAT) de China en 2007 marcó el comienzo de una nueva era en los viajes espaciales. China llevó a cabo una devastadora prueba ASAT de ascenso directo que destruyó un satélite meteorológico, lo que provocó más de 3.000 piezas de desechos espaciales. La naturaleza inesperada de esta prueba tomó por sorpresa a la comunidad espacial internacional y generó preocupaciones inmediatas entre las potencias espaciales, lo que generó preguntas sobre la intención de China. Este fue un claro recordatorio de las dimensiones multifacéticas del poder asociadas con la exploración espacial, que abarca todos los componentes de poder duro y blando de DIME. Estos fueron cruciales para motivar la decisión de China de realizar la prueba y dar forma a las respuestas de otras naciones con capacidad espacial. Estados Unidos y China han sido competidores en el espacio durante décadas. Sin embargo, los recientes avances de China en el espacio y los actos de agresión como la prueba ASAT han generado preocupación en la comunidad espacial. La prueba ASAT y otras actividades potencialmente disruptivas también presentan un espinoso problema de inteligencia de alerta, ya que muchas de estas actividades abarcan elementos de poder nacional. Utilizando el marco teórico del realismo, este artículo evalúa la importancia de la prueba ASAT de China a través de la lente de los componentes DIME para arrojar luz sobre sus implicaciones en la seguridad global y proponer un conjunto de recomendaciones de inteligencia destinadas a evitar sorpresas estratégicas en el futuro.

Palabras clave: ASAT, China, DIME, viajes espaciales, poder blando, inteligencia de alerta, guerra, armamentismo

反卫星试验与航天领域的全新时代：中国2007年反卫星试验对全球安全和战略情报的影响

摘要

航天活动已成为全球安全和战略情报的关键要素，在国家实力的各个方面发挥着重要作用，这些方面包括：外交、信息、军事和经济(DIME)。中国2007年的反卫星(ASAT)试验开启了航天活动的新时代。中国进行了一次毁灭性的直接上升式ASAT试验，摧毁了一颗气象卫星，产生了3000多块太空垃圾。这次试验的意外性质让国际航天界措手不及，并立即引起了航天大国的担忧，引发了对中国意图的质疑。这清楚地提醒人们，与太空探索相关的权力是多方面的，涵盖了DIME软实力和硬实力的一切组成部分。这些对于“促使中国决定进行试验、以及影响其他航天国家的响应”至关重要。几十年来，美国和中国一直是太空领域的竞争对手。然而，中国近期在太空领域的进步和ASAT试验等侵略行为引起了航天界的担忧。ASAT试验和其他潜在的破坏性活动也带来了棘手的预警情报问题，因为其中许多活动涉及国家权力要素。本文利用现实主义的理论框架，通过DIME组成部分的视角来评估中国ASAT试验的意义，以阐明其对全球安全的影响，并提出一系列旨在防止未来战略意外的情报建议。

关键词：反卫星(ASAT)，中国，DIME，航天活动，软实力，预警情报，战争，武器化

Introduction

Spacefaring plays a significant role in global leadership because it demonstrates power across the ultimate high ground. When the space era began in 1957, spacefaring nations began competing for global hegemony and prestige, using space endeavors to demonstrate their influence on the international stage. The strategic motivation is that spacefaring is a form of power, either soft power or hard power. Popularized by Joseph Nye in the late 1980s, the concept of soft power lies in the ability to influence behavior through persuasion while achieving one's policy goals (Nye, 1990, 155). Soft power refers to using other means than the military to display force in a non-coercive manner (Mosila, 2023, 4). Hard power refers to using the national elements of power—diplomatic, informational, military, and economic to show strength or employ coercion to compel behavior and compliance. Spacefaring activities have been primarily used as soft power. Still, the use of space for co-

ercive purposes, despite international treaties banning the national appropriation or militarization of space, remains an attractive endeavor for spacefaring nations. As such, spacefaring countries have developed anti-satellite (ASAT) weapons to either interfere with satellite functionality or annihilate satellites to impede an adversary state from collecting intelligence, using navigation, or communication (Zissis, 2007, 1). While ASAT weapons have yet to be used in warfare, testing such weapons has generated havoc in the spacefaring community. The best-known ASAT testing with severe consequences was the 2007 Chinese ASAT test, which resulted in large space debris. Artificial space debris poses a serious threat to global security. It jeopardizes space activities in Earth's orbit, as ongoing activities could incapacitate the low Earth orbit, making the zone entirely unusable.

The United States and China have been competitors in space for decades. In recent years, however, China has accelerated the development of its space program, aiming to land the first Chinese person on the moon by 2030, in competition with NASA's Artemis program, which seeks to return astronauts to the lunar surface by 2026 (Donaldson, 2024, para. 2). The DIME - diplomatic, information, military, and economic components plays a significant role in the spacefaring dynamics between the two nations. While having both soft and hard power applications, diplomacy, information, and economics are considered the soft power components of spacefaring, while the military is the hard power component.

The soft and hard aspects of spacefaring power were predicted before the first artificial object would ever launch into space. A RAND report published in 1946 predicted the nation that first ventured into space would become the world's military, political, and economic leader (RAND, 1946). From its inception, the space program became a strategic endeavor and a tool designed primarily to win the Cold War. Therefore, it is no surprise that diplomacy, information, and economics are at play in soft power space policy. From the dawn of spacefaring, the first two nations involved in space activities, the United States, and the Soviet Union, used space capabilities to display power on the global stage and as a diplomatic tool to solidify and maintain superpower and world leader status and eventually win the Cold War. The space program was also an incredible economic accomplishment generated by the development of new technology and a source of informational exchange between allies, as space agencies developed collaboration and exchanged scientific and technological information. While the soft power component of spacefaring grew significantly, the hard power component, the military aspect, was not neglected. While on the diplomatic side, spacefaring nations advocated for international treaties that would regulate space activities and ban space weaponization, space militarization developed exponentially in the shadow of the civil space program with a national security purpose and a display of power on the global stage (Moltz, 2014, 121). There is no doubt that spacefaring had mili-

tary purposes from the beginning of the space age.

The 2007 Chinese ASAT test was conducted without severe consequences for China because the international space law contains many grey areas. While the Outer Space Treaty stipulates that conducting space activities that may jeopardize spacefaring for other nations should be announced ahead of time, there needs to be a clear description of such activities. Besides, ASAT tests have been conducted many times before by the first two spacefaring nations, the United States and the Soviet Union, so it is only fair that China assumed they could go ahead with similar tests without announcing anyone. China's 2007 ASAT test was its third, but the previous two did not stir up global interest because these tests did not affect satellites in orbit (Moltz, 2014, 147). While during the first few decades of spacefaring, only two spacefaring nations could conduct any space activity without much impact, this situation changed drastically when more countries joined space activities, and the low Earth orbit became crowded.

Theoretical Framework

The theoretical framework is grounded in the work of Sheehan 2007 on the international politics of space and the application of idealism and realism to spacefaring, as well as Pace 2023 on the application of realism to space activity and space policy.

Sheehan 2007 claims that idealism and realism clash in explaining why states engage in space activities (Sheehan, 2007, 7). On the surface, idealism appears to be the reason humanity has ventured into space. Ideas such as "space as sanctuary" or exploring space "for all mankind" have been promoted by the first spacefaring nations. However, at its dawn, spacefaring was used as a tool to win the Cold War, justifying the realist perspective that states struggle for power and national advantage. The space race was a clear example of the competition between the two superpowers (Sheehan, 2007, 3). According to realism, the anarchic quality of the world results in states' fear for their national security. Therefore, the first spacefaring nations—the United States and the Soviet Union—pursued the power of space capabilities in their attempt to act within the anarchy frame and as a response to each other's space capabilities development with the sole purpose of ensuring national security (Sheehan, 2007, 8). While Sheehan applies realism to the space race during the Cold War, this theoretical framework applies well to the current spacefaring competition with China. China claims that its development of ASAT technology is a response to the space capabilities displayed by the United States and a means to defend itself. The Chinese ASAT test of 2007 was no coincidence, as 2007 marked 50 years since the launch of Sputnik and the beginning of the space race. In this environment, it seemed appropriate that China wanted to rise as the new space superpower of the 21st century.

Pace 2023 examines the different strands of realism—classical, neo,

and structural, and their approach to spacefaring to explain the competition in space between states and the issue of space security. Classical realism emphasizes the importance of political leaders in this competition, while structural realism claims that power is the main drive, leaving little room for cooperation. However, neoclassical realism sees the state's domestic structure and the perception of others as critical in balancing the power relationship between states (Pace, 2023, 3). Since realism claims that states, as primary actors on the global stage, focused on their power and interests, are the cause of anarchy on the global stage, this competition for power is a reasonable justification for the space security dilemma, the idea that space competition between states is conducted with the state's interest in mind, while the consequences are global. China's interest in developing counter-space systems, including antisatellite technology, is an excellent example for the realist perspective, as China's main reason is the fear that the United States could use its power in space to prevent it from becoming a spacefaring power with the ultimate purpose of deterring it from developing its nuclear arsenal (Pace, 2023, 3). According to realism, China's development of ASAT technology is the expected reaction of a state in need to protect its national security and national interest.

Diplomacy

Space diplomacy within the framing of soft power is the cooperation between states to develop and strengthen the peaceful use of outer space (Alfathimy et al., 2022, 45). As a significant soft power component of spacefaring, space diplomacy was trendy during the 1960s and the 1970s when spacefaring was a new and novel endeavor. The United States led the diplomatic attempts to create a set of international laws that would offer a legal framework for space activities. These attempts resulted in several bilateral agreements as well as international treaties. Since the Nineties, the United States has resisted participating in space diplomacy (Moltz, 2014, 164). However, in the wake of China's 2007 ASAT test and because of the newly emerging issues in orbit generated by such activities, the United States reentered the space diplomacy field. The diplomatic purpose of ASAT tests is to coerce an adversary state to agree to a treaty or an international law about space activities, in this case, banning weapons in space (Zissis, 2007, 3). This can be viewed as an excellent example of exerting diplomatic hard power to compel and persuade action within the international community.

As stipulated by article nine of the Outer Space Treaty, in 2008, the United States was the first nation to approach the issue diplomatically by conducting consultations and sending experts to meet with the United Nation's Committee on the Peaceful Uses of Outer Space to openly present its plans for space activities and the potential consequences of these endeavors (Moltz, 2014, 147). The United States hoped to set an example for other spacefaring nations through diplomacy and trans-

parency. However, the existing body of international space law has become obsolete and inadequate to regulate and ban new space activities developed after the implementation of these laws, including the launch of ASAT weapons and their contribution to a new arms race in space, the regulation of the space debris generated by these tests, and future consequences for any space activity in orbit (Chatterjee, 2014, 43).

The United States National Space Policy of 2010 mentioned the intention to implement new international space-related treaties (NASA History, 2010), while the National Security Space Strategy of 2011 included references to the United States diplomatic engagements in space to improve cooperation with space allies and find common ground with spacefaring nations that are not currently allies, an apparent reference to China (Moltz, 2014, 164). As an influential leader in space, the United States again displayed interest in being a leader in space diplomacy as it was in the 1960s and the 1970s to ensure space security.

The differences between the space diplomacy intentions of spacefaring nations are relevant. India expressed reluctance to participate in a new international treaty that would ban testing ASAT weapons in space before India had the chance to conduct such testing, while the United States, Russia, and China have, leaving India in an inferior position in space activities (Moltz, 2014, 164). A critical diplomatic reason behind China's 2007 ASAT test was to force adversary states to come to the negotiation table to implement an international treaty or agreement that would limit or even prohibit space weaponization, ASAT weapons included (Kaiser, 2008, 318). With Russia and China favoring the *United Nation's General Assembly*'s annual resolutions on the Prevention of an Arms Race in Outer Space (PAROS) while the United States first abstained and then finally opposed PAROS in 2006, the 2007 ASAT test was a policy weapon aimed to force the United States to accept the resolution (Kaiser, 2008, 318). Unfortunately, the idea that diplomatic efforts in space would lead to treaties and international law regulating future space activities will not work if spacefaring moves faster than law-making (Young, 2014, 6). Instead, it is expected that as events in space unfold, these will shape law-making and result in new international space policies. China's 2007 ASAT test is an example of an event that may eventually lead to further diplomatic attempts and space laws.

China and Russia's space diplomacy efforts focus on a joint proposal known as "No First Placement of Arms in Outer Space" by any spacefaring nation to improve space security. However, this proposal has been perceived by the United States as a plan of the two countries to address technological gaps and create a new space regime that works against the weaponization of space (Khan & Khan, 2015, 194).

Information

Spacefaring is a vast source of information and intelligence. Information sharing occurs primarily

between allies. A space-related example would be the ongoing international cooperation on the International Space Station and several joint space missions between allies involving the National Aeronautics and Space Administration, the European Space Agency, the Japanese Space Agency, and other national space agencies. However, there is no denying that collecting intelligence from space is essential for all spacefaring nations.

China's ASAT test of 2007 had many reasons, from pride and reputation to diplomatic pressure. However, information-wise, a significant reason behind this ASAT test was that China is not dependent on space satellites to collect intelligence as much as the United States (Kaiser, 2008, 318). Therefore, the space debris generated by the test and its severe threat to reconnaissance and surveillance satellites was not so much a problem for China as it was for the United States (Kaiser, 2008, 318). Another aspect of information is that China failed to inform the international community about the test. The Chinese media did not advertise the endeavor at all. The information that the ASAT test took place on January 11, 2007, came from the United States intelligence community, primarily the United States Air Force Space Command radars that monitored the orbit before and after the test (Tellis, 2007, 42). While the United States did not fail in predicting the ASAT test, the event did bring to light some deficiencies in its space intelligence capabilities, primarily structural deficiencies, as far as the roles of space operators in national security and contextual deficiencies when it comes to how fast information travels between space operators (Mastalir, 2009, 58).

The United States is the most significant intelligence collector from space, using a vast constellation of surveillance and reconnaissance satellites in low earth and geosynchronous orbits, including signals intelligence satellites, infrared, radar, and optical imaging satellites (Tellis, 2007, 46). The development of the Chinese ASAT technology presents a near-term risk to the United States intelligence satellites, including direct ascent and direct energy attacks to the low earth orbit satellites, but also a long-term risk of co-orbital attacks (Tellis, 2007, 46). China's progress in ASAT technology represents a severe threat to information and intelligence collection and the ability of the United States to utilize space for this purpose. This development renders China's space activities more threatening to the United States' space endeavors than the Soviet Union ever was at its peak in spacefaring (Tellis, 2007, 60). Therefore, to counter China's new ASAT capabilities, the United States had to demonstrate information superiority by reforming space intelligence (Mastalir, 2009, 47).

Military

Even if an open space conflict has never occurred, the military aspect of spacefaring remains a significant component that cannot be neglected. The Revolution in Military Affairs, which refers to the inclusion of new technology into military strategy, has given considerable significance

to space warfare (Khan & Khan, 2015, 185). The military purpose of ASAT tests is to demonstrate capability. A nation capable of an ASAT test can disrupt essential functions in an adversary, including communication, navigation, and commercial services such as phone or banking, to mention just a few, but also threaten military capabilities, including intelligence gathering or military operations driven from space (Zissis, 2007, 2).

Space militarization does not necessarily imply weaponization. However, it is essential to note that a significant component of the military aspect of spacefaring inhabits the different orbits of Earth in the form of military satellites that conduct surveillance, reconnaissance, navigation, and communication. These satellites have a significant strategic objective. As such, anti-satellite tests are space debris and strategic military issues, making space the ultimate warfighting domain (Lauer, 2022, 2).

A critical military reason behind China's 2007 ASAT test was the increase and strengthening of strategic links between the United States, Taiwan, and India. China was worried after the United States and India signed a nuclear deal and a new strategic partnership. When the United States aimed to contain China and offered to assist Taiwan, China demonstrated its space military capabilities to counter these new developments (Khan & Khan, 2015, 194). In doing so, China became the third spacefaring nation capable of testing anti-satellite weapons in space after the United States and Russia. It showed the world that its military capabilities had reached a new level, generating international concern that deploying offensive weapons in space might be next (Khan & Khan, 2015, 193). While space has been militarized for decades, a space conflict has never occurred, and space weaponization remains an international topic of concern. Anti-satellite tests were the first space endeavors of a military nature and were not exploratory because they aimed to destroy space targets (Khan & Khan, 2015, 193). A clear indication of China's ASAT test in 2007 is that the Chinese space program is militarized and weaponized, despite China's space diplomacy strategy to position itself against space weaponization and as a competitive response to its main adversary, the United States (Khan & Khan, 2015, 199). China's ASAT test was a decisive moment in space weaponization as, at the very least, it generated a new discourse on the topic.

Economics

China is yet to depend economically on spacefaring, a significant reason why it remains a big advocate for space arms control (Tellis, 2007, 61). Economic dependence would mean that a U.S. space counteroffensive would result in sufficient damage to China that space arms control would become insignificant. At this point, the United States remains more economically dependent on space than China. Identifying the best option to counter China's ASAT test within the economic domain remains challenging (Mastalir,

2009, 61). In the wake of the 2007 ASAT test, the United States did not consider economic sanctions against China because the history of sanctions against China did not render good results. Instead, the path chosen was to continue improving space operations and innovation because it is the innovation that runs the United States' economic engine (Mastalir, 2009, 71).

Space economy includes all space activities that are of value to humans, and it has several different sectors, from manufacturing and launch to infrastructure operations, but also activities derived from space endeavors, such as technology transfer from space activities to other human endeavors, including medical or finance (OECD, 2020, 5). The United States remains the largest investor in space, while China is in eighth place in share of the GDP invested in the space budget (OECD, 2020, 4). The economic interest in space of the United States is significantly higher than that of China. Lastly, the issue of space debris generated by China's 2007 ASAT test is of significant economic consequence, given the importance of an operational space orbit to many industries, from communication and navigation to finance, healthcare, and even entertainment (Weinzierl, 2018, 187). Any activity that generates additional space debris in orbit can lead to significant economic disruptions.

Significance to Global Security

The importance of spacefaring to global security cannot be overstated. First, space capabilities are integral to various aspects of national security, including communications, surveillance, and navigation systems, all of which rely on satellites. If a country possesses the capability to disable or destroy these satellites through anti-satellite weapons, it gains a significant advantage, potentially crippling the adversary. Second, the accumulation of space debris, resulting from activities like ASAT tests, presents a universal threat. The debris can damage or destroy satellites and spacecraft, irrespective of national ownership, impairing critical systems for multiple countries. This would have dire consequences for global communication, navigation, and surveillance capabilities. Third, the competition between countries in space exploration, exemplified by the United States and China, adds another layer of geopolitical tension. This competition is about prestige and gaining a strategic foothold, whether closer to Earth or on other celestial bodies like the Moon. Lastly, the current inadequacy of international space law in dealing with these challenges leaves many issues unresolved, creating ambiguity that could lead to conflicts. The existing treaties are not sufficient to handle the complexities and potential confrontations arising from advanced space activities. Therefore, the situation demands a comprehensive, international approach to establishing norms and rules, the failure of which could imperil global security significantly.

Significance to Strategic Intelligence

The significance of the 2007 Chinese ASAT test was a critical event in that it marked China's entry onto the global stage regarding competition in space. Much like the Soviet launch of Sputnik in 1957, the test ushered in a new era of strategic implications for the space domain. Recognizing that the global landscape has significantly evolved since 2007 is important. In other words, if the test were to occur today, implications would have a different impact on the spacefaring community.

The global order is changing. The most recent National Intelligence Strategy (2023) categorizes China as "the only U.S. competitor with both the intent to reshape the international order and, increasingly, the economic, diplomatic, military, and technological power to do so" (NIS, 2023, 5). Additionally, in terms of global dynamics and security, it is assessed that the factors that drive the international community and status quo will encompass a more comprehensive set of characteristics and elements that move beyond the traditional aspects of national power—diplomatic, informational, military, and economic—to include the implications of increased global interconnectivity and the introduction and dissemination of game-changing technology (NIC, 2021). While it is assessed that the United States and China will remain the predominant global actors, it is likely that no nation-state will have the ability to exercise domination across all domains and endeavors. In summary, any future ASAT launch would have to be assessed through a dynamic and increasingly changing global lens driven by multiple factors.

Assessing the strategic intelligence implications of a future ASAT launch would have to be evaluated through these changing global dynamics. To mitigate the impact of a strategic surprise, the U.S. Intelligence Community and its Allies will have to assess a future launch event within the traditional confines of a defined warning problem set and conventional within the broader changing and dynamic global factors that define the international environment. It will also have to integrate additional and non-traditional elements into warning assessments. For example, classical warning intelligence frameworks focus their assessment efforts on state and group levels of analyses (Wohlsetter, 1962; Grabo, 1987). Evaluating the key and underlying drivers, however, in an increasingly complex, interconnected, and global dynamic environment requires assessing the role of key individuals—in this case, the role of leaders, scientists, engineers, and others associated with the various elements of the Chinese space programs; analyzing the relationships and linkages between a defined warning problem, such as an ASAT launch, amidst the broader global landscape and international events and trends, and determine these events along a relative power relationship between the United States and China. To summarize, assessing a future ASAT launch within the traditional confines

of a strategic warning problem will limit the intelligence community's ability to place the launch within a broader understanding of global issues.

In terms of the way ahead, strategic intelligence assessments and the evaluation of warning problems must integrate a broader set of factors. Integrating key individuals and human factors into strategic warning issues will assume a more significant role in assessing post-modern and complex issues. Alternative analysis will require not only the incorporation of traditional intelligence analytics but also the leveraging of non-traditional perspectives coming from U.S. and Allied academia and industry. It must also integrate more red teaming techniques to understand the role and likely adversary courses of action. Lastly, strategic warning evaluation cannot narrowly focus on the adversary or defined problem set. These events do not occur in a vacuum. Any evaluation must consider a net assessment of the relationship of the factors defining the problem set relative to U.S. standing and power within the global operating environment.

Conclusion

China's January 11, 2007, ASAT test surprised the international community and had significant diplomatic, informational, military, and economic consequences. China's demonstration of a significant space-related capability was a potent reminder of the soft and hard power components of spacefaring. Elements of soft power, diplomacy, information, and economics were significant. They explained the reasons behind China's decision to conduct the test and the reaction of other spacefaring nations to the test. The diplomatic purpose of ASAT tests is to coerce an adversary state to agree to a treaty or an international law about space activities, in this case, banning weapons in space. Information-wise, a significant reason behind this ASAT test was that China is not dependent on space satellites to collect intelligence as much as the United States. Therefore, the issue of the space debris generated by the ASAT test, a severe threat to reconnaissance and surveillance satellites, was not so much a problem for China as it was for the United States. Furthermore, China is yet to depend economically on spacefaring, a significant reason why it remains a big advocate for space arms control. The United States remains more economically dependent on space than China. Finally, the hard power component of spacefaring, the military, cannot be neglected. The military purpose of ASAT tests is to demonstrate capability. It demonstrated that China's military capabilities had reached a new level, generating international concern that deploying offensive weapons in space might be next.

The United States and China have been competitors in space for decades. However, in recent years, China has accelerated the development of its space program, aiming to land the first Chinese astronaut on the moon by 2030, in competition with NASA's Artemis program, aiming to return astronauts to the lunar surface by 2026. The diplomatic, information, military,

and economic instruments of power play a significant role in the spacefaring dynamics between the two nations. However, understanding the context of future events amidst a changing and dynamic global operating environment will require new approaches to strategic intelligence assessments. Warning analysis and estimates will have to integrate both traditional methodologies and non-traditional approaches including the role of individual human factors, the broadening of perspectives that reside largely primarily outside intelligence communities, and determine the relative relationship of the U.S. and its Allies amongst global power dynamics.

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Declaration of competing interest

The authors declare to have no known competing financial interests or personal relationships that could have influenced the content of this paper.

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